NELSON
DESIGN
FOR QCE

KRISTEN GUTHRIE
with CHRIS RALPH

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ABOUT THIS BOOK

Design is an exciting new syllabus for Queensland students. This creative and contemporary subject provides endless opportunities for the exploration and production of innovative and fresh design ideas. The content of the Design course meets a global demand for good design, clear communication and shared information. Critical skills such as design thinking, user-centered design and the analysis of needs, wants and opportunities are much sought after in educational and professional contexts throughout the world.

At the core of the Design syllabus is the design process. QCAA has made use of the double diamond model, but, interestingly, encourages the study of alternative models of process-based design. One of the characteristics of the Design syllabus is its grounding in real-world experiences. In asking students to make choices about the most appropriate tools to apply, the syllabus challenges and extends thinking and practical skills.

This book is designed to support the breadth and depth of the QCAA Design syllabus. It contains rich information to build design knowledge, visual examples of best practice and prompts written to inspire ideas.

Section 1 contains chapters arranged by subject matter; information relevant to each syllabus topic can be found here. Section 2 breaks down the syllabus topics into suggested structures; varying approaches, briefs, problems and prompts are in this section. Section 1 and Section 2 have been carefully constructed to work in harmony; however, it is important to understand that structures found in Section 2 are guides only, and *not a mandated approach*.

For teachers, this book may provide in-depth information about topic subject matter and assist in the creation of classroom activities and tasks for formal assessment. For students, this book is designed to ensure that important content is accessible and relevant.

Above all, *Nelson Design for QCE* provides a flexible approach to learning about design. Just like a designer does, users should consider the 'need' and identify the parts of the book that will help to achieve the desired outcome. For example, in the creation of a design proposal, a student may identify that the best means of communicating information about their design is to use a two-dimensional drawing – Chapter 3 has all of the information needed.

In writing this new book, I focused on the end user. I applied the same methods of design thinking that students and teachers will explore in the Design syllabus. Now, more than ever, the world needs good design; clear communication, innovative ideas and worthy products that solve problems. I am excited to see what can be done with the tools within this book. Over to you!

–Kristen Guthrie

HOW TO USE THIS BOOK

To assist you in using this book, icons are placed throughout to indicate the following:

FYI
Information to read that may expand your interest in the topic.

Tip
Helpful information to assist in developing your skills.

Tech tip
Helpful information to assist in developing your skills with digital media.

Key word
Fundamental vocabulary

Case study
Case studies of contemporary Australian designers provide real-world context.

Weblink
Websites that contain information that may assist your learning.

Video demo
Video demos of practical tutorials.

Chapter recap
Practical exercises to help develop your skills.

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AUTHOR ACKNOWLEDGEMENTS

DESIGN PRACTICES

DESIGN THINKING

'The main tenet of design thinking is empathy for the people you're trying to design for.'

David Kelley, founder, IDEO.com

In this chapter:

Learn the language

+ brainstorming   + critical thinking   + evaluation

+ collaboration   + decision-making   + iteration

+ convergence   + divergence   + reflection

+ creativity

1.1 WHAT IS DESIGN THINKING?

Design thinking is a term coined to describe the application of tools that are familiar to many professional designers and innovators. Design thinking is a methodology of creative problem-solving that is used increasingly to initiate, explore and realise effective solutions to problems of all shapes and sizes. Increasingly, the term is used in a wide range of contexts that are not related to design disciplines. It is a recognition that the creative processes applied in design can be applied to solving complex problems in diverse educational, professional and cultural contexts.

In the QCE design process, design thinking is used in both divergent and convergent modes; encouraging broad, open-minded and unfiltered consideration of information and ideas (divergent) and thoughtful, informed and reflective concept selection and decision-making (convergent). Design thinking is integral to the design process, which identifies opportunities for its application during the explore and develop phases.

EXPLORE
NEEDS, WANTS, OPPORTUNITIES
PROBLEM DEFINITION
USE DRAWING AND PROTOTYPING SKILLS
DIVERGENT
CONVERGENT

DESIGN BRIEF

DEVELOP
IDEAS
CONCEPTS
USE DRAWING AND PROTOTYPING SKILLS
DIVERGENT
CONVERGENT

DESIGN PROPOSAL

DIVERGENT: EXPANSIVE, UNFILTERED, OPEN-MINDED THINKING

CONVERGENT: FOCUSED, THOUGHTFUL, TARGETED THINKING
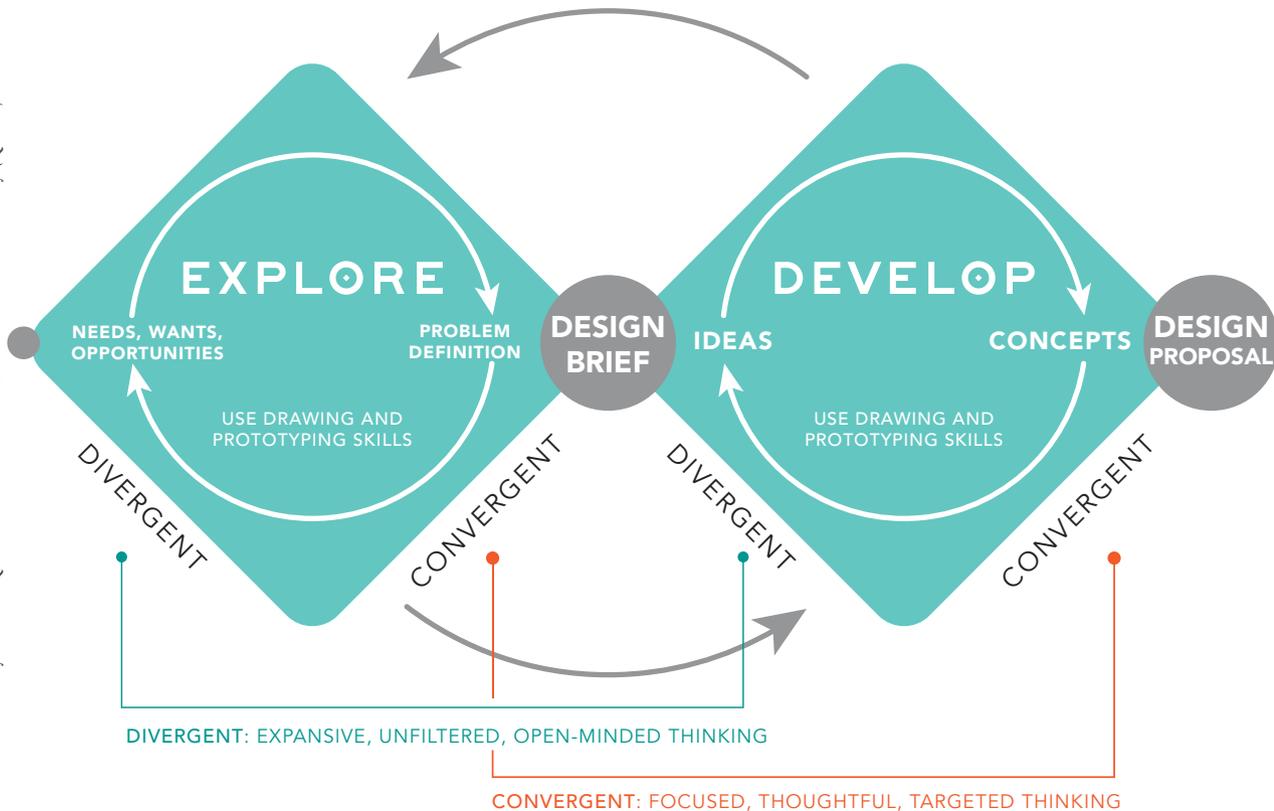
▶ Opportunities for design thinking in divergent and convergent modes are evident in the QCE design process.

Note that divergent thinking occurs during the 'widest' or 'broadest' part of the design process. The thinking that occurs here is broad and imaginative. It is when convergent strategies are applied that ideas are refined into clear concepts.

1.2 DIVERGENT THINKING STRATEGIES

Divergent thinking requires an open-minded, curious, flexible, explorative and imaginative approach. Divergence, by its very definition, suggests multiple variations, and the 'branching off' of ideas into different directions. In the case of design, the source of creative variations is the identification of a need, want or opportunity. Divergent thinking involves the identification and then generation of a wide range of different design ideas. Different directions are often prompted by research, but are not inhibited by a filter. Ideas generated using divergent techniques may vary widely and encompass abstract and unusual ideas. An architect may use sketches to explore innovative and experimental forms in the early stages of a design. The renowned architect Frank Gehry uses sketching to devise creative ideas for his clients. The sketches are often loose, fluid and experimental. Gehry's spontaneous drawings are a fine example of drawing as a highly effective, divergent thinking tool.

▶   Sketch by architect Frank Gehry

+ Divergent thinking is prompted by thoughts, ideas, inspiration and research.
+ Divergent thinking is unconstrained and unfiltered.
+ Divergent thinking is iterative; it builds on past ideas and informs new ideas.
+ Divergent thinking asks, 'What are the possibilities?'

Divergent thinking occurs throughout the design process but it is often most evident in the early explore and develop phases. It manifests in the application of stimulating tasks that tap into the imaginative resources of the mind or, during collaborative tasks, the minds of group members. Brainstorming techniques are considered essential aspects of divergent thinking. Divergent strategies focus on quantity rather than quality and the aim is to generate lots of ideas that can be sorted through to identify potentially relevant design directions. The focus is on possibilities and the creative thinking that it inspires is open, non-judgemental and imaginative.

Although many of the techniques shown here are word-based, they don't have to be. All the examples in this chapter can also be used with sketches alone or in combination with text.

CONCEPT MAPS

Concept maps are visual tools used to create thematic structures. Concept maps are quick and easy to review – just a glance will organise and identify connections and relationships between ideas. Compared to conventional notes, a concept map engages more of the brain in the process of connecting facts and ideas.

A complete concept map will have main topic lines radiating in all directions from the central subject. Subtopics, themes and ideas will branch off these, like branches and twigs from the trunk of a tree. You do not need to worry about the structure produced – this will evolve of its own accord.

VIDEO DEMO: CONCEPT MAP

Watch how to create and use a concept map.

Alamy Stock Photo/United Archives GmbH

Johanna Schreiner
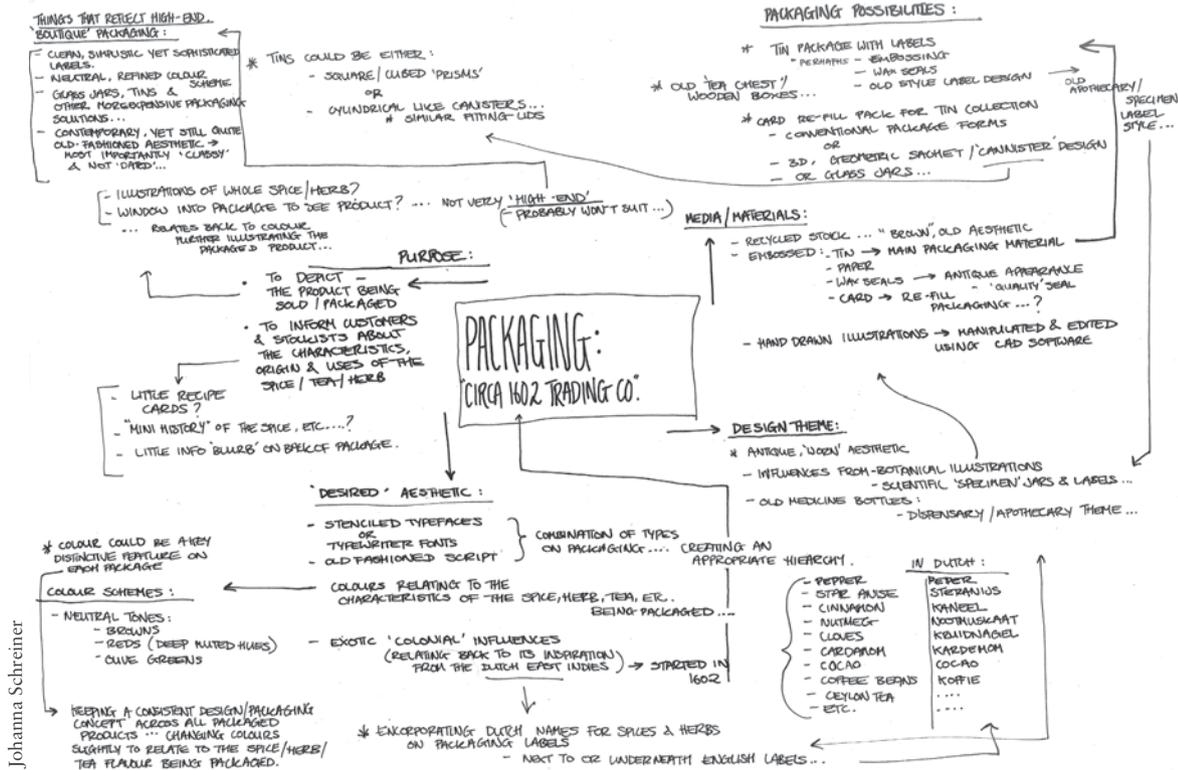
▶ Example of a concept map showing divergent thinking in practice

Nicholas Rose
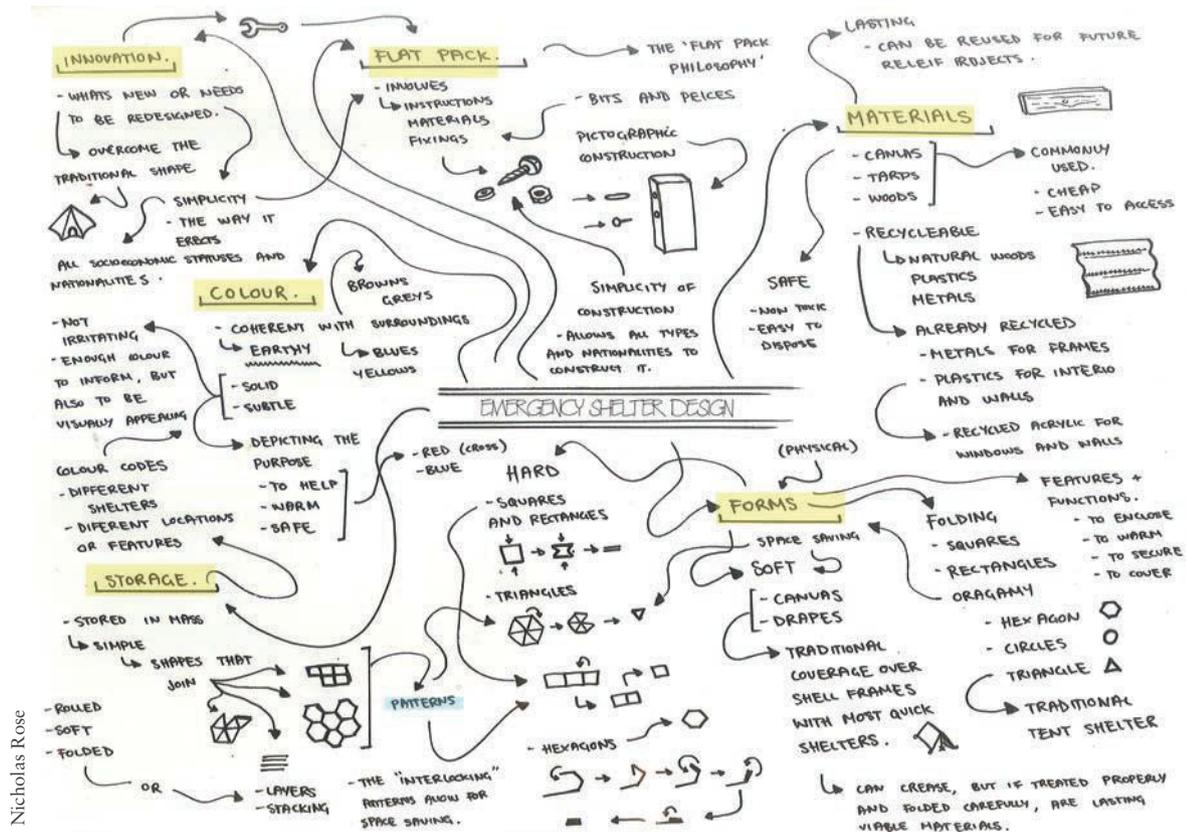
▶ Concept maps do not have to use words alone. This student used a combination of text and small images.

DESIGN PERSONALITY

A unique approach to stimulating the direction of a design, particularly if it has become stale or stuck, is to create a personality for the product or space in question. Imagine your design as a person and give it a creative name that captures its personality, for example, 'Greta' or 'Marvin' or 'Tiffany'. Think about the design as a person and describe its personality traits: is it conservative? outgoing? dynamic? It may sound silly to do so, but attaching a persona to a product design can help to make decisions about what characteristics, design elements and features might be applied.

RANDOM WORDS

A popular brainstorming tool involves selecting a random noun from a dictionary or thesaurus and finding a link with your theme or topic. In the design of a corporate logo, for instance, the random word 'bird' might be used to trigger ideas for a high-flying, progressive identity.

The subsequent brainstorming may be as follows.
+ bird – bird flight – streamlined bird flying upwards
+ bird – bird's-eye view – overview of area below
+ bird – flock of birds – images of birds in the distance showing future planning/thinking

Although an unusual method, the random-word technique can be helpful when ideas aren't flowing. The method requires an open mind, but the results will be fresh and can invigorate stale ideas.

▶ Random words can be used as prompts to stimulate and inspire ideas.

WORD LISTS

Making a list of words and phrases associated with the design problem is a good starting point. This simply requires you to write as many words as possible that are related directly or indirectly to the contents of the design brief. The idea of a word list is to forget about what might be relevant or irrelevant at this stage and just get as many words down as possible. When you think you have enough words, pick out the most promising words and develop them further. By taking one concept from the first list and expanding it into a sublist, the ideas become more specific and can lead towards initial sketches.

Olivia Rose

▶ Divergent thinking is evident in quick brainstorming, such as a list of words. This student's annotations show decisions made about possible design ideas.

Starting template for a word list

Where will the design be located/used?	Who uses or sees the design?	What does the design need to do/achieve?	What features might the design include?	How will the design be distinctive?
List all the possible locations and uses.	List every person or group that may come into contact with the design.	List all the possible functions that the design could achieve.	Be creative in listing every possible feature; practical or not. There are no wrong answers.	What could be done to the design to ensure it stands out?

THE IDEA BOX

Based on the 'morphological box' created by Dr Fritz Zwicky, this thinking tool enables new ideas to form using the existing characteristics of the design problem. Beginning with the characteristics of the design task at the top, list possible variations in each column. Then make connections between each column to stimulate new design combinations. The simpler the box, the fewer variations; the more complex the box, more possibilities arise. See the example, then create your own.

The example on the next page shows an idea box for the design of a stylish, portable storage container that accommodates cables, chargers and other connections for mobile devices and laptops.

Stylish and portable storage container			
	Form	**Materials**	**Appearance**	**Context**
1	Spherical	Plastic	Clear or see-through	Carried in a bag or backpack
2	Rounded	Metal	Natural/eco	Fits in a pocket
3	Rectangular	Netting	High-vis	Sits on a desk
4	Soft/organic	Textile	Able to be individualised	Attached to a wall
5	Cube	Wood	Quirky	Used on a worksite

▶ This idea box provides multiple options for generating different combinations and ideas.

▶ This student used an idea box to assist in devising ideas for an identity design.

Jessie Jones

RUSSIAN DOLL

Russian doll is a technique that 'splits' parts of a design problem into different attributes, which can lead to new and unexpected ideas. As in any technique that is focused on creating unfiltered ideas, there is no right or wrong dissections of the initial 'doll'. Everyone will split ideas into different attributes. The aim of this technique is to unpack possibilities!

DESIGN CRITERIA		STORAGE	CABLES	PORTABLE	DECORATED
ATTRIBUTES x 2		OPEN	TANGLED	LIGHTWEIGHT	ADJUSTABLE COLOURS
		DIVIDED	MULTI-USE	SLIM-LINE	SURFACE ALLOWS USER TO DECORATE
ATTRIBUTES x 4		MAGNETISED SNAP-ON LID	LOOPING FUNCTION IN CONTAINER	RECYCLED MATERIAL	LID AND CASE COLOUR CODED
		SECURABLE 'FABRIC' ROLL	RETRACTABLE SYSTEM	DURABLE MATERIAL	WASHABLE or ERASABLE
		COMPARTMENTS	COLOUR CODED CABLES SUPPLIED	COLLAPSIBLE FLAT PACK	SEMI-OPAQUE COLOURS
		SECTIONAL – LOCKS TOGETHER	CABLES FED THROUGH HOLES IN CONTAINER	STANDARD SIZES e.g. A5, A4, A3 to fit a backpack	STICKERS, PATTERNS & TYPE SUPPLIED FOR PERSONALISATION

▶   The Russian Doll technique may be used to devise divergent ideas or, used in reverse, as a convergent strategy.

1.3 CONVERGENT THINKING STRATEGIES

Convergent thinking requires questioning, clarifying, planning, analysing, examining, testing and evaluating ideas.

Convergent techniques are essential for the development of the ideas that arose during the divergent phase. They are often practical tools that compare, contrast, evaluate and question the effectiveness of design ideas; they involve a level of critical thought. Tools are varied and often suited to a designer's decision-making requirements. The use of matrices such as PMI (plus, minus, interesting) or the experimental SCAMPER, enables different ideas to be considered or discarded, expanded or narrowed. Designers often use critical analysis of designs to determine the suitability of a concept; they may assess factors such as legibility, aesthetics and the clarity of a visual message. The decision-making process used during the significant rebrand of the Google logo in 2015 was a good example of convergent thinking.
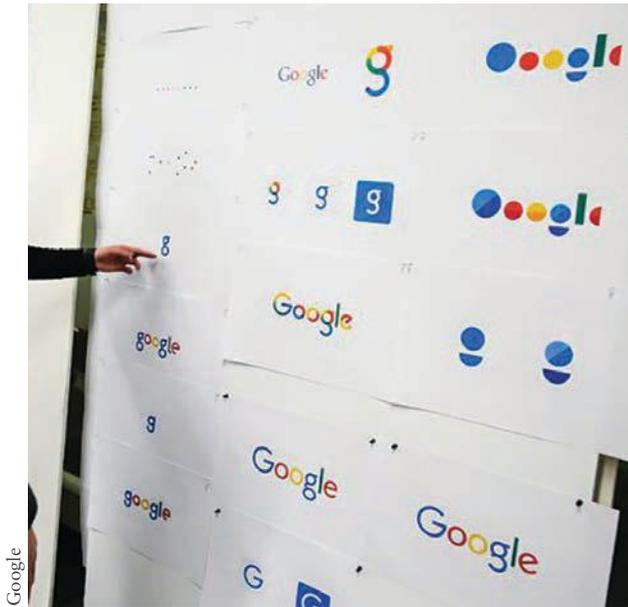
Google

▶ In designing the revised branding of Google, many ideas were proposed. Convergent thinking enabled decisions to be made about the most appropriate design concept.

During the convergent phase, judgements are made in relation to how well a concept meets the original needs of the design brief, and designers may consider feedback from stakeholders. Reflective aspects of this thinking approach may be undertaken by a designer, the client or members of the target audience.

+ Convergent thinking assists in decision making.
+ Convergent thinking recognises the strengths and weaknesses of a design idea.
+ Convergent thinking clusters and combines multiple ideas.
+ Convergent thinking asks, 'What design idea/concept solves the original problem?'

Convergent strategies occur during both the explore and develop phases of the design process, where they encourage experimentation and the testing of creative ideas. Concepts are critically evaluated and modified, enhanced or discarded as required. The following techniques assist in narrowing the multiple, broad ideas into workable and relevant design solutions.

AFFINITY DIAGRAM

▶ Affinity diagrams enable the grouping of ideas by theme.

An affinity diagram is a method of organisation often used by creative teams and project managers to sort or 'cluster' brainstormed ideas into groups of related concepts. Brainstormed ideas are written onto cards or added to chart software, then the relationships between the ideas are identified and grouped into similar areas. Ideas are sorted into groups that have an 'affinity' with, or relationship to, one another.

Affinity diagrams are highly visual and can be created manually using coloured Post-it notes or digitally using chart-creation software. Colour coding is an integral part of the process as it helps to identify similar themes and ideas. Once formed into lists or groups, each idea can be prioritised to the top or bottom of the list. Ideas and concepts can be moved, removed and reorganised until a strong design direction is identified.

POOCH

The POOCH model assists in **critical thinking** and decision-making. POOCH can be used to help choose between design options. POOCH stands for:

P – Problem

O – Options

O – Outcomes

CH – Choices

P
Problem

O
Options
What might be done?

O
Outcomes
Possible results?

CH
Choices
Best options to pursue?
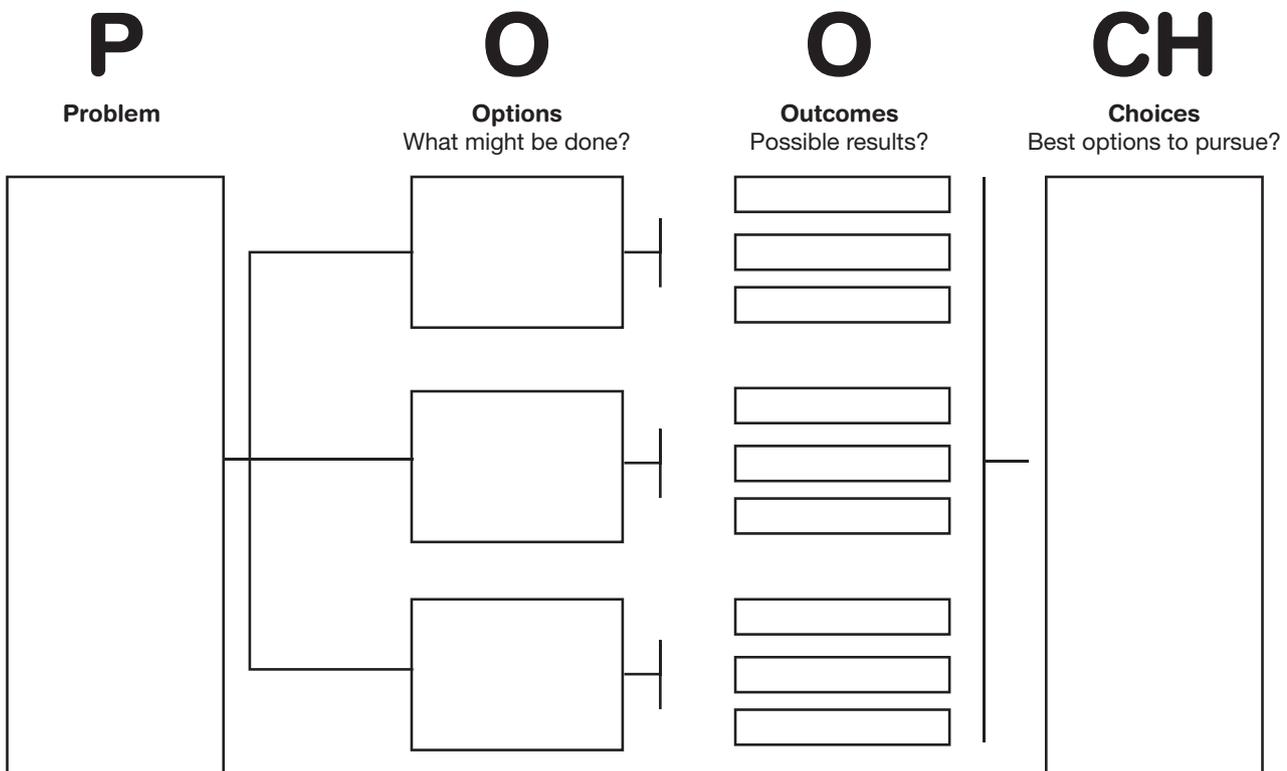
▶ The POOCH model

SCAMPER

SCAMPER is a checklist, created by Bob Eberle, that helps you to think of changes you can make to an existing idea in order to create a new one. Use these changes either as direct suggestions or as starting points for new ideas or concepts. SCAMPER is particularly useful in product design but it can be applied to any concept that requires creative development.

You may not use all aspects of SCAMPER in every design – make use of the parts that are relevant and inspiring. In using the tool, consider your application of **design factors** such as elements and principles

of design, materials and sustainable practices. Give thought to the use and incorporation of different **graphical representations**. SCAMPER stands for:

S – Substitute

C – Combine

A – Adapt

M – Modify

P – Put to another use

E – Eliminate

R – Reverse

▶ Table 1.1 Key questions using SCAMPER

SCAMPER	Actions
Substitute	Consider replacing all or part of your design with alternative options.
Combine	Create something new by combining parts of the design or introducing new combinations.
Adapt	Think about how the use or function of the design could be changed to suit a different purpose or set of circumstances.
Modify	Consider radical change to all or part of the design. Think about the distortion of some aspects.
Put to another use	Think about how the design could be used in another way. Could an aspect be sourced from another design?
Eliminate	Reflect on what could be removed from the design. Less is more, or is it?
Reverse	Consider completely 'flipping' one or more aspects of the design, either physically or conceptually.

▶ Table 1.2 Sample SCAMPER template

SCAMPER elements	Key questions to ask	What are the possible results in your design?
Substitute	What if I swap this for that and see what happens? Who else could find this appealing or useful? What other materials, design factors could I use instead? What happens if I substitute the shape, texture, form or colour?	
Combine	What elements or principles of design can be combined? What graphical representations could be combined?	
Adapt or add	What part of the concept can I change? What if I were to use parts of other design elements or principles? What if I reuse aspects of my design in other ways or other places?	
Modify, magnify or minimise	What happens if part of the concept is expanded, exaggerated, minimised or changed? What is the effect of altering proportions and relationships in the design?	
Put to another use	What other function or use can my concept be applied to? Can another design feature from another product be used in my idea?	
Eliminate or erase	What can be removed from my concept? What can be understated or streamlined? What happens to the design if parts are taken away?	
Reverse or rearrange	What is the opposite of what I am currently doing? What if I did it the other way around? What if I reverse the elements or the way it is used? What happens if I mix up the design?	

Ellen Keillar

9091 Kettle for ALESSI by designer, Richard Sapper.
Source: http://www.alessi.com/en/products/detail/9091-kettle

▶ This student was inspired by the spout of the 9091 kettle, designed for Alessi by Richard Sapper. Using SCAMPER, she applied 'Adapt' and 'Put to another use' to develop creative ideas for the decorative closure on a handbag.
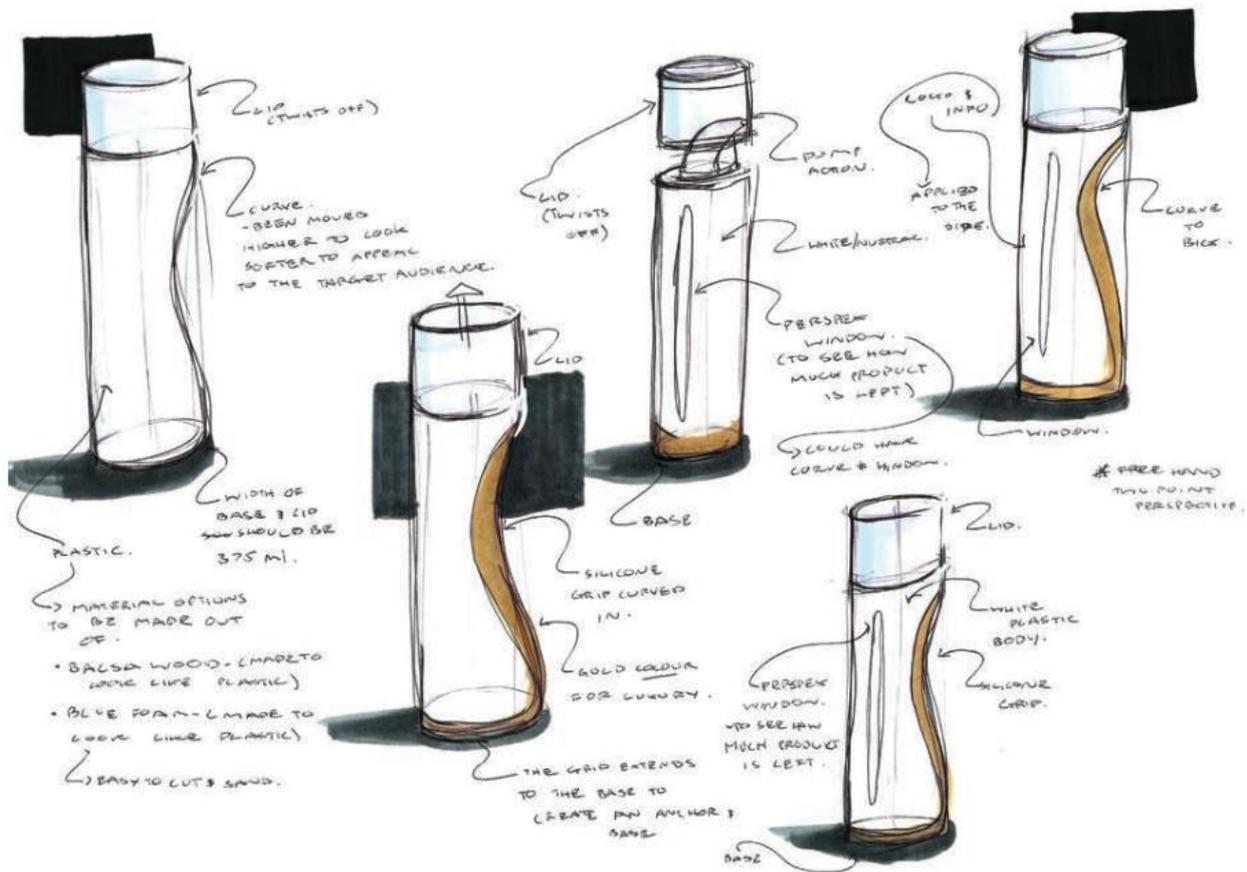
Molly Debenham

Molly Debenham

▶ Using 'Eliminate or erase', this student removed part of the surface from her packaging design to create a more comfortable grip for the user.

PLUS, MINUS, INTERESTING (PMI)

Arrange the positive and negative aspects of a design idea into categories. Use the 'interesting' section to identify what might be changed when developing this idea further.

+ PLUS

! INTERESTING

– MINUS

PLUS

The design will suit the users – they will like the contemporary colours.

I like the way the form is organic and holds the cables securely.

I like the materials – it will look good in an office or studio.

INTERESTING

Different lock ideas including an elastic strap.

Can the surface be engraved or printed on?

MINUS

Too many details make the surface look untidy.

I don't like the locking mechanism – it is too complicated and hard for the user to understand.

The size of the storage is too small.

▶ An example of PMI in practice

DEVELOP
AIRPOD EXTERIOR DESIGN

PLUS	MINUS	INTERESTING
- prevalent use of melbourne inspiration- would suit mass arrangement. - clear door reduces claustrophobia.	- In mass arrangement; it may appear to be too artificial. - Door must be easily blockable.	- would need to ensure that melbourne print is not sacrificed due to use of door.
- Segmentation creates a rough and disjointed appearance. - High degree of natural texture.	- Sharp corners may detract from the softness of the design. - Is not as effective at conveying its purpose. - Less favourability of melbourne inspiration.	- The contrast between the wood, print and door all in close proximity.
- Cohesion between faces creates a fluent effect. - Proportion favours melbourne-inspired print, whilst reducing cynicism in order to contrast airport setting through wooden 'skirting'.	- A skylight or window of some sort would need to be introduced in order to reduce claustrophobia. - Print on sides will not be seen in mass configuration.	- There is a nice fluidity between the wood skirting and the door, whilst the print is still the focal point.
- There is a nice fluidity between the roof and sides of the pod. - High degree of external light would feed through glass 'framing' of door.	- The balance does not favour the print, more so the door. - The window in that form may be difficult to block - detract from purpose.	- The cohesion between external wooden colour/ texture and the door which is somewhat isolated within the window.

Chelsea Gardner

▶ This student applied the PMI technique to evaluate the effectiveness of multiple design ideas for a sleeping pod located in an international airport.

SWOT ANALYSIS

A SWOT analysis is a framework for analysing the strengths and weaknesses of a design, and the opportunities and concerns (threats) that it raises. It helps to focus on strengths, address concerns, and take advantage of opportunities that are identified.

Strengths: This is where reflection on the positive qualities of the design are stated. Comments may focus on the appropriateness of the solution, the suitability for the user/audience and how well the concept meets the needs and constraints of the client.

Weaknesses: This is for reflection on whether the original needs have been met. It is a chance to analyse the aspects of a design that need further work to meet the expectations of the client and end user/audience.

Opportunities: This is a questioning prompt that stimulates creative and innovative changes that might be made to a concept. It offers a chance to suggest directions for development of an idea. It represents 'What if...?'

Threats: This section also prompts 'What if...?' questions, but asks the designer to predict what might happen if weaknesses are not addressed, or if concepts are not fully explored and tested. A threat may be related to competitors, safety or poor interpretation of the client/user needs.

STRENGTHS
What is effective about the design?

OPPORTUNITIES
What are the next steps to take in developing or refining this design? Where could changes or adjustments to the design lead?

WEAKNESSES
What is least effective and could be improved?

THREATS
What will happen if the weaknesses are not addressed? What issues could arise in the future with this design?
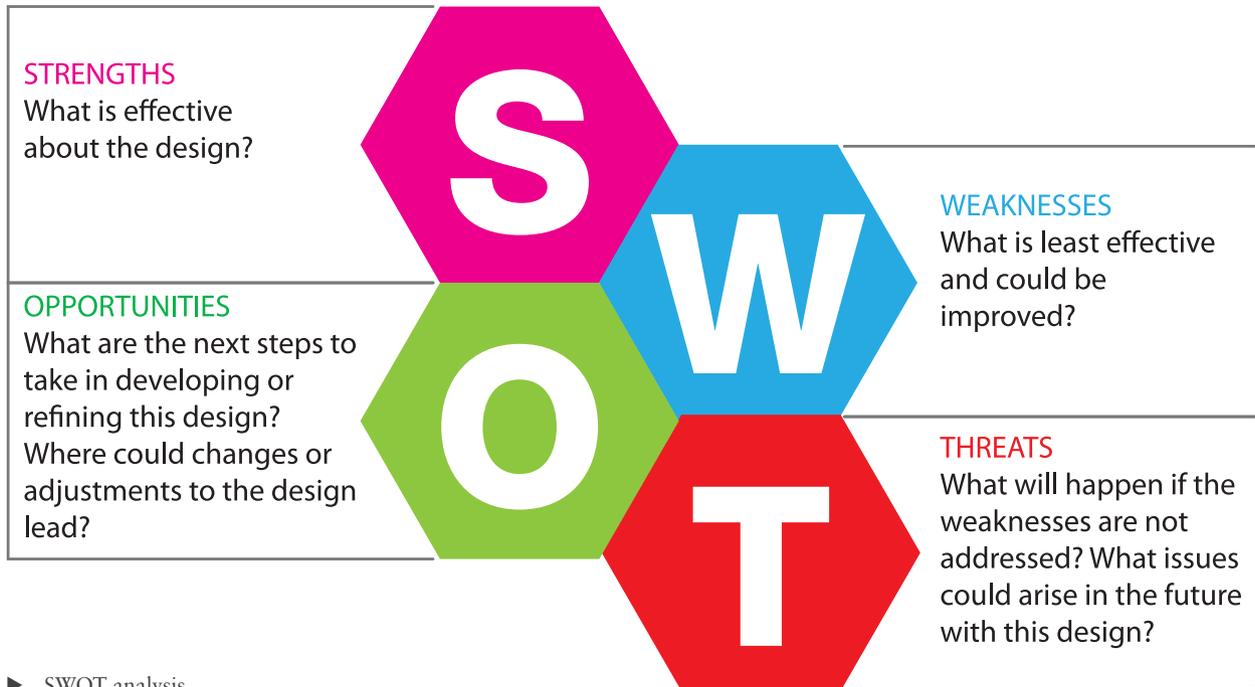
▶   SWOT analysis

SWOT ANALYSIS OF PRODUCT IDENTITY DESIGN

STRENGTHS
- VERY VIBRANT + BRIGHT → EYE CATCHING + APPEALING TO AUDIENCE
- VARYING DECORATIVE FONTS GIVE THAT FEEL OF FUN /PARTY
  - CONVEYS FLAVOUR IN HUMEROUS /SUBVERSIVE WAY, WHICH AS IDENTIFIED ATTRACT TARGET AUD

WEAKNESSES
- MAY GIVE THE IMPRESSION THIS IS A FRUITY DRINK - NOT ALCOHOL
- TYPE NEEDS TO BE CLEARER AGAINST THE YELLOW
- SHADOW ON BOTTOM OF LEMON MAKES 'SQUEEZY' HARD TO READ
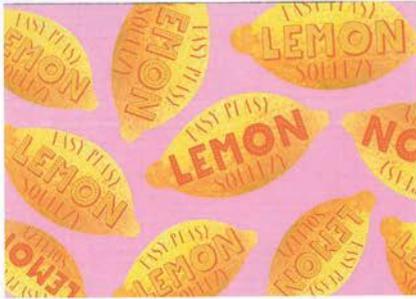
I HAVE DECIDED TO PURSUE THIS CONCEPT AS IT HAS MORE POTENTIAL IN FURTHER DEVELOP- MENT + IN ATTRACTING MY TARGET AUD.

OPPORTUNITIES
- COULD INCORPORATE THE SCRATCH + SNIFF NOTION
- CAN BE ALTERED TO FIT VARIOUS FORMS E.G. ON GLASS ETC.
- MAKE ALL HEADING TYPE ORANGE FOR MORE EMPHASIS
  - REDUCE SHADOW

THREATS
- IF I DONT MENTION ITS ALCOHOLIC NATURE SOMEWHERE COULD BREACH LEGISLATION
- HARD TO READ FROM FAR AWAY IF SHADOW ISNT REDUCED.

STRENGTHS
- CONFETTI EFFECT REALLY CREATES THAT 'PARTY VIBE'
- PINK COLOUR APPEALS TO FEMININE TARGET AUDIENCE

WEAKNESSES
- WHILST THE WHITE TYPE CONTRASTS THE PINK, IT IS STILL NOT VERY EMPHASISED /CLEAR.
  - MAY NOT NESSECERILY HAVE THE SAME 'CONFETTI' IMPACT WHEN APPLIED TO PACKAGING
  - VERY SIMPLE - NO SUBVERSIVE/ HUMEROUS ELEMENT.

OPPORTUNITIES
- EXPERIMENT WITH SIZE OF DOTS ESP IF APPLYING TO NET, AS MAY HAVE A DIFFERENT EFFECT ON NET.
- EXPERIMENT WITH MORE COLOURS TO CREATE GREATER CONTRAST + STRONGER BACKGROUND AGAINST WHITE

THREATS
- NEED TO INCLUDE SOMETHING SUGGESTING THIS IS ALCOHOL
- MAY BE TOO HARD TO READ ON PACK.

Ashley Scott

▶ This student used a SWOT analysis to decide between two options for an identity design.

CHAPTER RECAP

1   Describe how the following techniques could be used as part of divergent or convergent thinking:

Technique	Divergent thinking	Convergent thinking
Concept map		
Rendered illustration		
Low-fidelity prototype		
Visualisation drawing		
Collage using cut and torn paper		
Digital 'fly-through'		
Storyboard		

2   Below is an illustration of a proposed desk lamp. Using SCAMPER, suggest possible modifications to enhance and expand the design for production as a distinctive floor lamp.
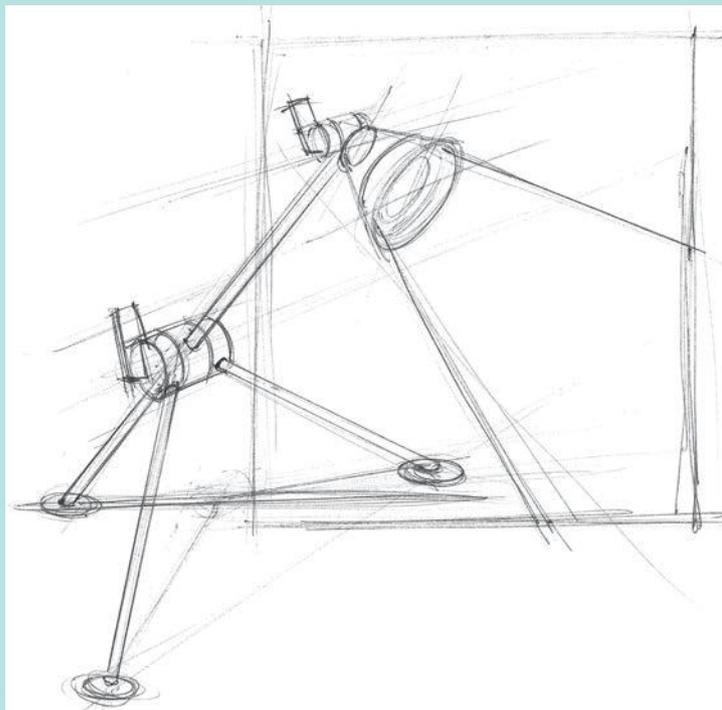
Mark Wilken

DRAWING
IDEAS

'Quit trying to make it so damn perfect; it's okay to show the wobbles. Let someone know that a human touched it.'

Carolyn Sewell, 'Quit Thinkin' and Start Inkin''
May 2015

In this chapter:

Learn the language

+ aerial views
+ charts
+ diagrams

+ functional diagrams
+ idea sketch
+ layout

+ maps (mind, empathy)
+ sketch plan
+ study sketch

2.1 IDEATION DRAWING

Ideation drawing is an important skill in all design areas. The ability to visualise ideas quickly can be extremely helpful, especially in early phases of the design process. Most professional designers roughly sketch their initial ideas on paper before moving onto digital media. The benefit of sketches is immediacy; ideas can flow quickly, be documented readily and without delay. Sketches can be the result of brainstorming, team discussions or client consultation. The ability to share ideas rapidly and immediately is beneficial to the progress of a design.

Ideation drawing is used for:
+ the rapid visualisation of creative ideas
+ the exploration of alternative visual concepts
+ the communication of creative, spontaneous or collaborative ideas between stakeholders.

Mark Wilken

▶ In the creation of illustrations for this book, designer Mark Wilken completed sketches during the briefing process. These sketches assisted Mark in generating ideas and ensured that he and the author had the same understanding of what was required for each illustration.

The qualities of **sketching** in design are as varied as the practitioners themselves. It is not essential to be a great illustrator to convey ideas and meaning through drawing. However, it is an important skill to develop, and many tertiary design courses still require students to draw their early ideas.
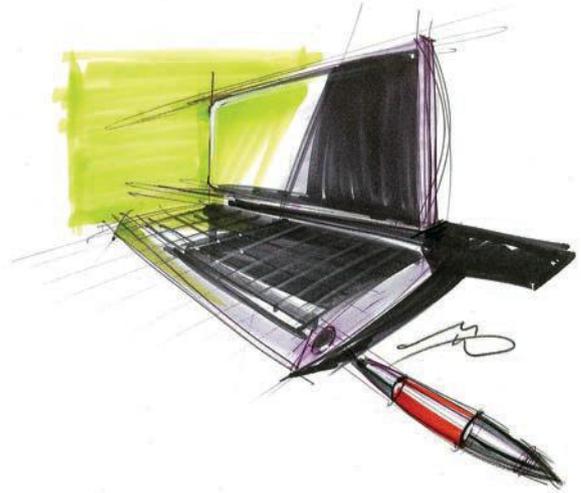
Mark Wilken

▶ Design sketch for a stylus–tablet–keyboard combo product

Sketches for design are usually freely and loosely executed and do not represent a finished drawing. Using loose but confidently applied line work and some **rendering** of tone and texture, design sketches can convey substantial visual information about **form**, **textures** and materials. Industrial design, in particular, uses the application of design sketching in the early ideation phase of the design process. Designers use sketching to explore concepts before undertaking more time-consuming and labour-intensive CAD representations.

There are techniques that can help you to build your own skills in sketching design ideas. The use of three-dimensional drawing methods is relevant in sketching (see chapter 3) as they assist in creating a high level of realism and realistic **proportions**. Selection of media is a first step in sketching. It is advisable to find the medium that is most comfortable for you; anything from a biro to a basic collection of pencils and markers on bleed-proof paper can lead to good-quality results. Popular with industrial designers, architects, interior designs and landscape architects, markers can produce instant results. They take some getting used to, but once mastered, markers often become an essential tool for designers.

Product sketching, in particular, makes use of three-dimensional drawing methods such as **perspective drawing** and **isometric drawing**. The application of '**crating**' techniques enable complex object to be created from simple shapes and forms (see chapter 3).
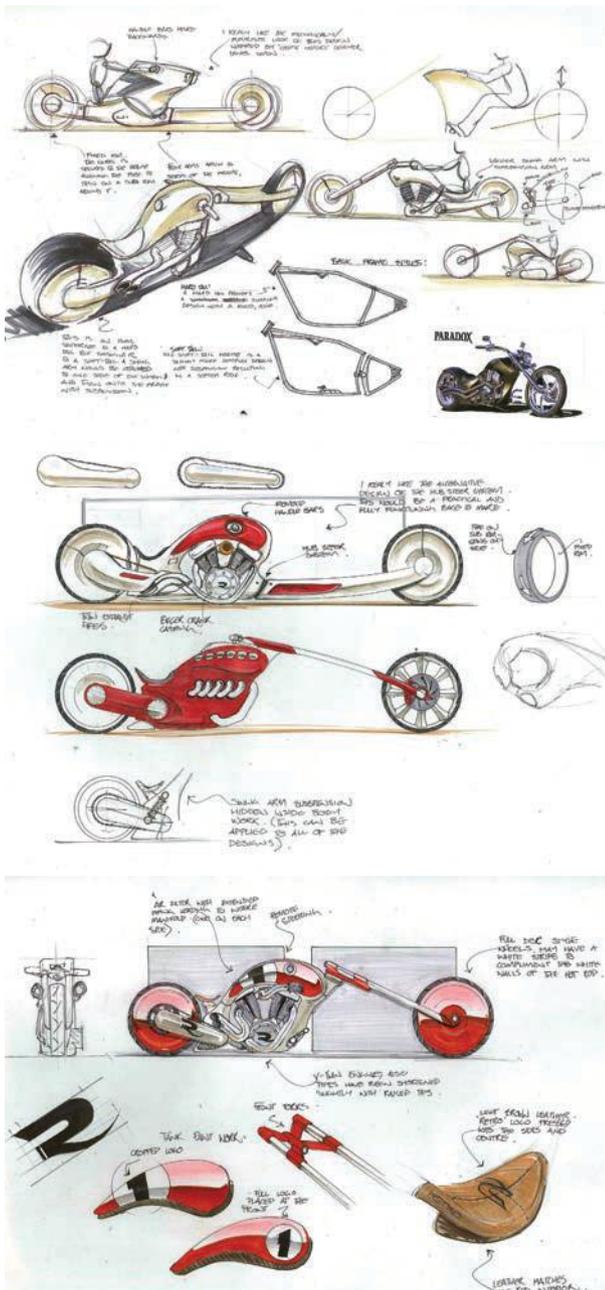
Tom Grech

▶ This student used sketches to generate early ideas about the form and function of a custom motorbike.

Rough, or 'thumbnail' ideation sketches are a most effective means of getting your ideas onto paper. These drawings are designed to communicate your initial ideas and are the first of your visual steps in response to the communication need.

DESIGN SKETCHES VS HAIRY SKETCHES
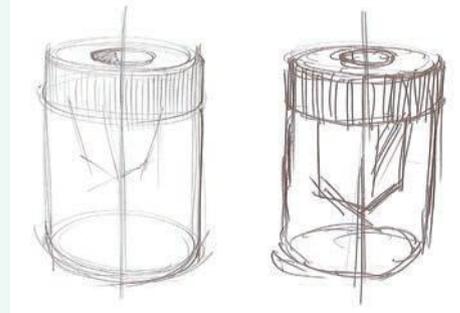
▶ Effective design sketches are drawn confidently and lightly. They have light construction lines and light line work. The line weight builds gradually as the object moves away from the light source.

▶ Sketches that are heavy-handed appear to be 'hairy'. There is no obvious construction work, lines are consistently heavy and no consideration is given to the direction of the light source.

The sketches do not need to be detailed, but they should depict your concept and provide you with sufficient visual information to build upon as your ideas develop.

Varied use of media in the early stages of design concept development is encouraged, as the properties of different media can have a direct impact on the direction of a creative idea. For instance, pencil rendering will give an object an appearance that becomes quite different when rendered with markers or pastel. Ideation drawings may be primarily linear or fully rendered with representations of tonal variations, light and shadow, as well as surface textures. Tone and the representation of light and shadows are very important in drawing. To suggest the form and textures of the image, it is advisable to consider how light is absorbed or reflected light on surfaces.
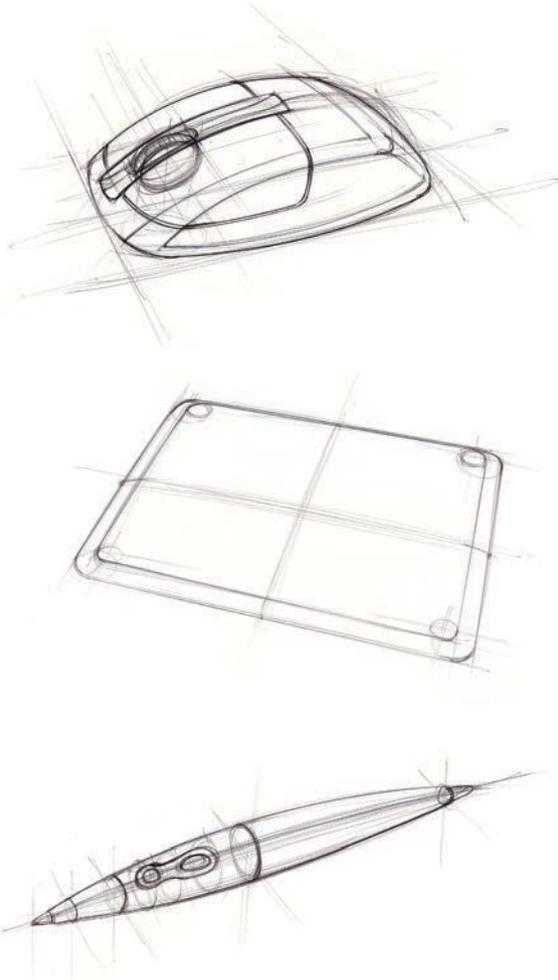
▶ Observe how simple forms have been used and combined to create these three objects. Applying perspective drawing techniques enables a simple hand sketch to appear realistic and proportional.

▶ The final images rendered and grouped together

FREEHAND SHADOWING

Freehand shadows can be an effective means of 'grounding' a sketch and placing it within a given context. This provides a sense of realism and three-dimensional form.
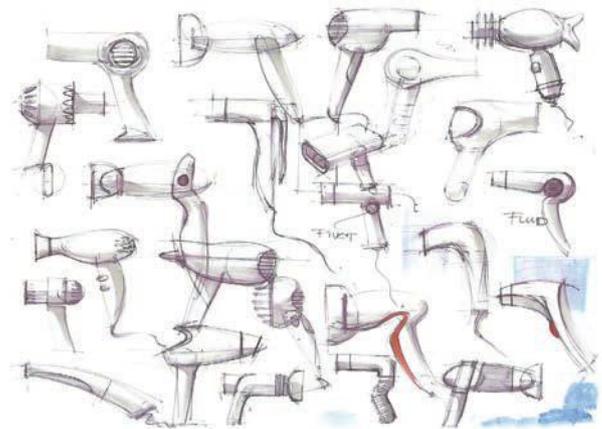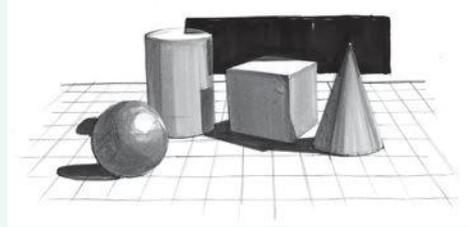
Mark Wilken

▶ Ideation drawings using tone to emphasise form

EFFECTIVE DESIGN DRAWING TECHNIQUES

Effective design drawing techniques:
+ scale and proportion
+ context
+ foreshortening
+ hierarchy
+ multiple views and overlap
+ aerial views

VISUAL BRAINSTORMING:
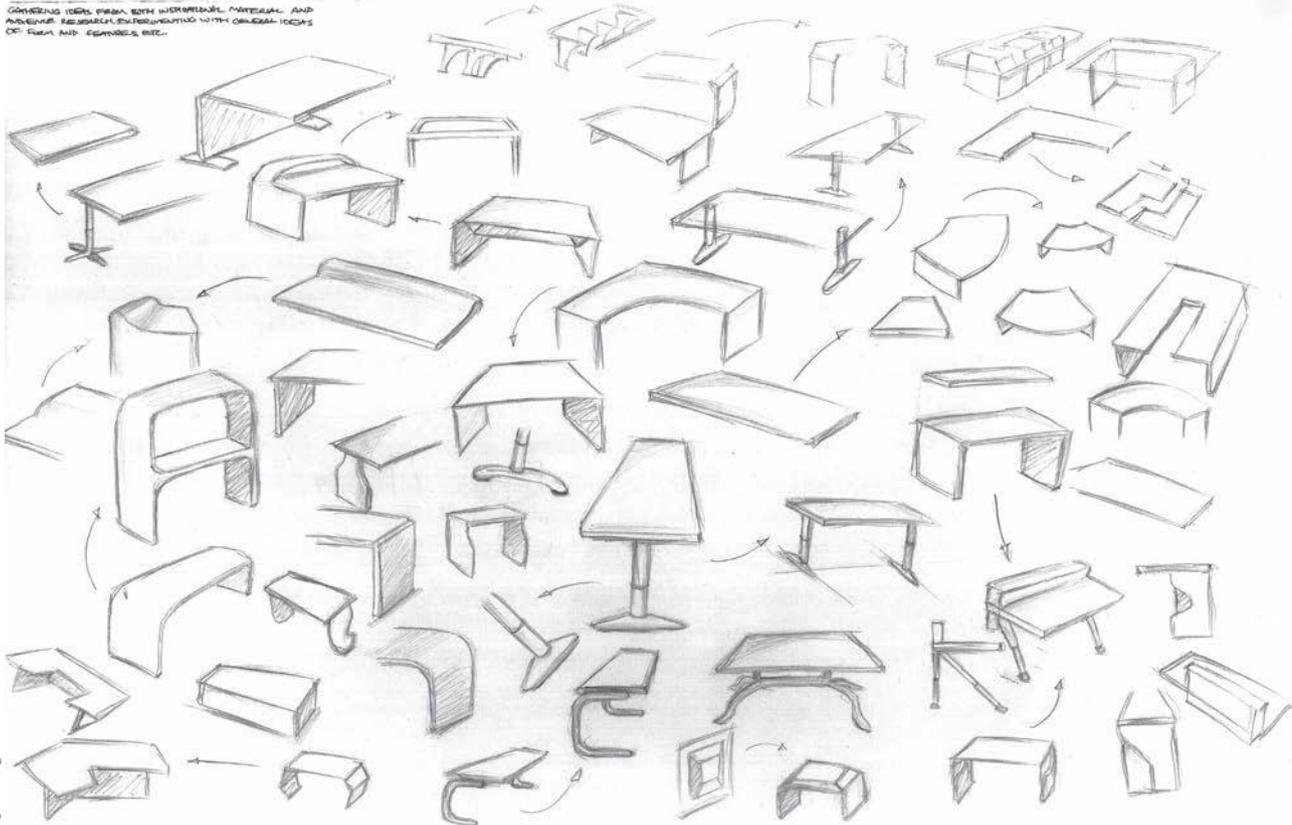
Ben Jennings

▶   Using ideation drawings to brainstorm ideas for a desk

Many great designers can represent what they see through drawing, others use drawing simply as a means of communicating ideas quickly. Drawing objects and products that already exist can help to build skills in drawing and even to inform a new design. The design of a new toaster, for example, may see a designer sketching the form of an existing toaster to understand the general proportions, shapes and **function** of the product.

The practice of drawing from the direct observation of products, constructions, spaces, buildings and environments can build drawing and illustration confidence.

Scale and proportion

Some of the most valuable skills acquired in drawing are the abilities to represent correct scale and proportion. Often when observing an object in its natural environment, you automatically refer to the objects around it and develop a concept of scale. When representing objects with a degree of realism, it is important to use correct proportions. Directly

observing an object enables you to view relationships between parts of the object and to compare them with surrounding features. A drawing of a mobile device, for instance, may become more effective by including a human hand in the drawing. Establishing a relationship between the hand and the form of the device allows you to communicate the proportions of each element clearly.
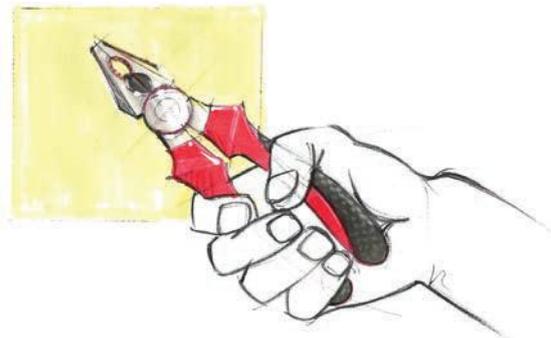
Mark Wilken

▶   Sketch of pliers showing proportion

In perspective drawing, the relative proportions of objects change according to the principles of the perspective method being used. The viewing position will also have an impact on the placement of perspective images in the foreground, midground and background. The visual relationships between aspects of a drawing will affect the realism of the representation (see chapter 3).

When we view an image of an object, we are provided with clues that help us to understand the relative proportions. Clues such as trees, cars and people are used in drawing to establish scale. We are familiar with the proportions of the human body; therefore, recognising the proportions of an object in relation to a person is easy.

Keep in mind that the depiction of adults and children needs to be clearly defined through the application of details such as clothing or facial features. Otherwise, a short figure next to a much taller figure will distort the scale of the illustration. To draw human figures effectively, establish the placement of the first figure in perspective. Ensure that you are very clear about the eye level of the drawing – floating people simply don't look realistic!
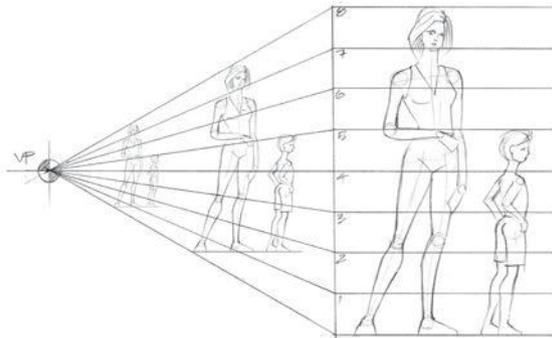
▶   Sketch of people in perspective from

To effectively manage proportions in drawing, pencil in the figure and then project lines to the **vanishing point**. These projection lines form guidelines for more figures.
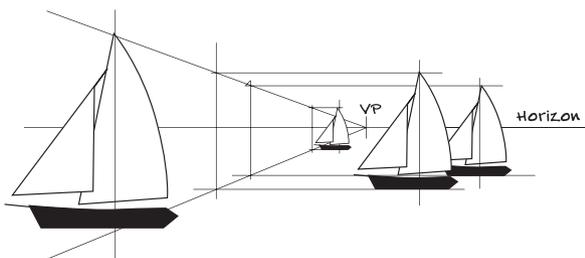
▶   Sketch of boats in perspective

The same principles apply when drawing trees, shrubs, cars, boats or any other object used to establish scale.

HUMAN PROPORTION: HEADS OR TAILS?
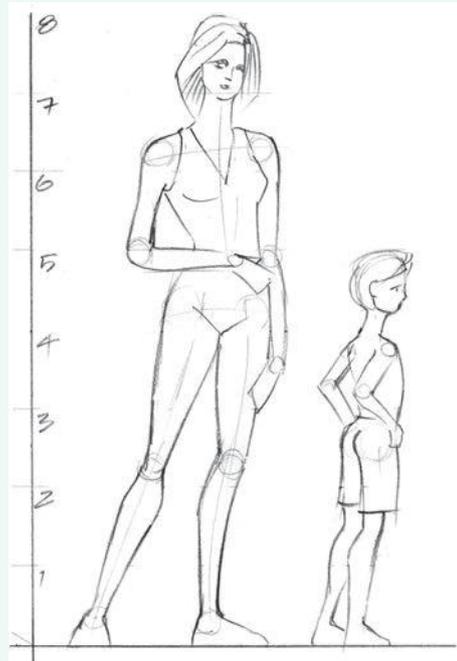
▶   Sketch of woman and child

The height of an adult human figure is approximately equal to 7½ to eight heads. When drawing an adult figure, use eight heads as a guide to gaining the correct body proportions. When drawing children, use four to five heads as a guide.

Foreshortening

Foreshortening is a term used to describe objects that appear shorter than they actually are in order to emphasise the illusion of depth.
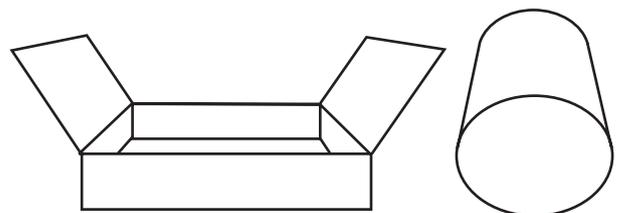
▶   Sketch of box and cylinder

Foreshortening on complex objects is easily depicted by drawing a perspective box and freehand sketching the object within the box.

Mark Wilken

▶ Foreshortening has been used in this illustration of a classic panel van. To emphasise the distinctive design of the back of the vehicle, the proportions have been compressed. Visual information that is closest to the viewer is much larger than the information further away.

Context

The effectiveness of an ideation drawing can be amplified when depicted in a clearly recognisable context. The context can indicate the function or use of the design product and can also assist in emphasising scale and proportion. Consider whether a drawing needs to be placed within an environment or used beside another object or objects to best communicate how it is used.

▶ The figure provides a clear context for the function of the handbag as well as providing a visual reference for the proportion of the bag to a human figure.

Hierarchy

One method of establishing hierarchy in perspective drawings is to overlap objects. Dominant objects appear in the foreground, partly obscuring or cropping other objects. The key to overlapping objects in perspective is to treat objects as though they are made of a transparent material.
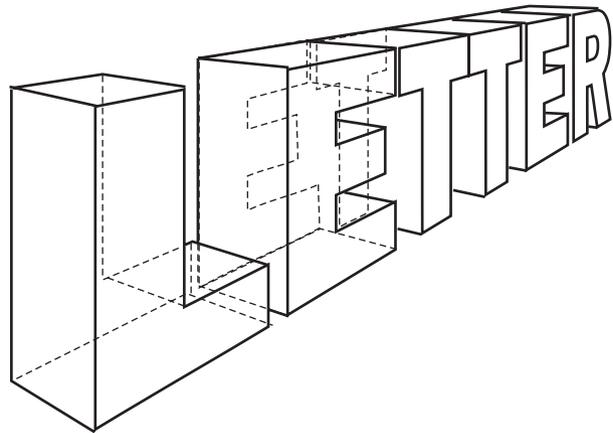
▶ Hierarchy is shown through perspective.

To create the correct proportions of objects that overlap other objects, draw them as though they are made of glass. This enables you to construct the correct perspective proportions of objects behind the dominant feature. This method is particularly useful when objects have see-through features such as glass walls and cutaway areas. Of course, design elements such as colour and tone can be added, and design principles such as contrast and cropping applied, to create a hierarchy in a three-dimensional drawing.

Multiple views and overlap

A helpful application of observational drawing is to represent multiple views of a single object. This is especially important when dealing with three-dimensional objects. Freehand sketches can assist in communicating the range of details in an object. This means that key information about the surface, appearance and any textural details can be seen from varied viewpoints. During the design process, drawing from different viewpoints can enable a designer to judge proportion and evaluate the aesthetic success of a three-dimensional design.
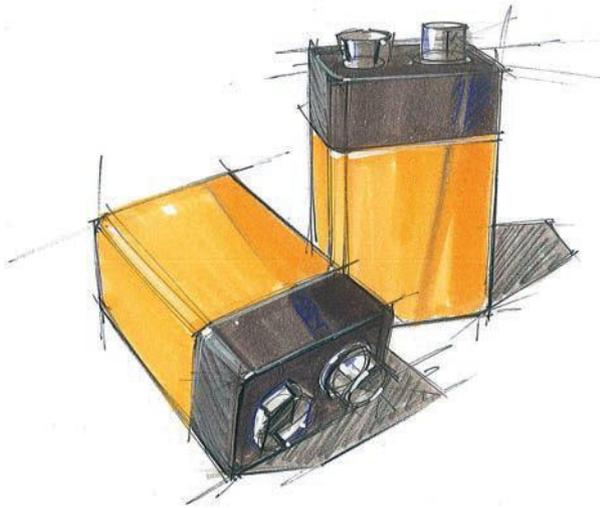
Mark Wilken

▶   Sketch of a 9-volt battery showing multiple angles of the same object. Overlapping objects assist in communicating scale and proportion.

Aerial views

A drawing that features an aerial view provides an alternative perspective on a landscape or environment. They are often used by environment designers to establish proportions, placement and location of spaces or dwellings. An aerial view may help a designer visualise the use or function of empty spaces or ideate the possibilities within an existing space or dwelling.
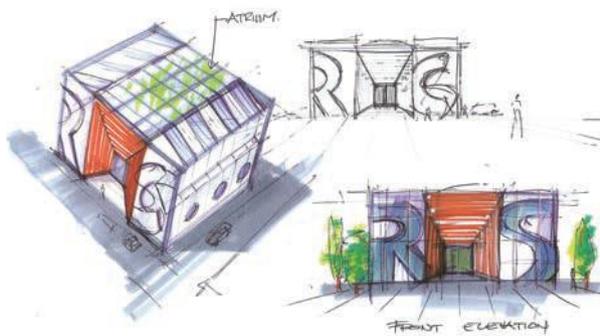
Mark Wilken

▶   An aerial view of an object enables the viewer to see design details that might otherwise be hidden.

Rendering sketches

In sketching design ideas, the application of tone and texture can help to communicate important information about features and details. Rendering is the term used to describe the application of tone and texture to create a three-dimensional appearance and/or to depict the surface details of an object.
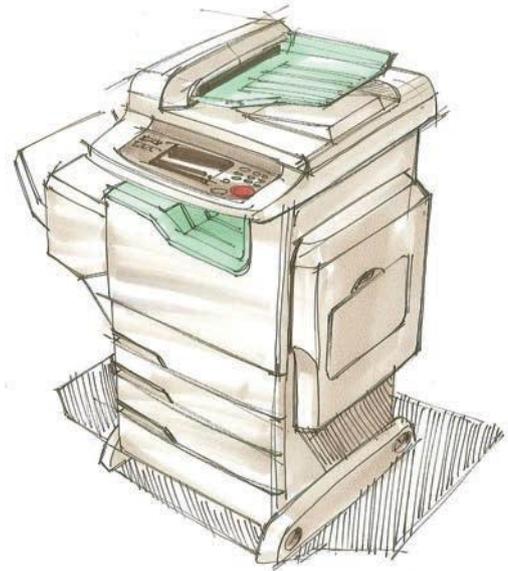
▶   Sketch of a multi-function printer rendered using fine-liner and markers

Rendering is important when the communication of the form of an object is required. If a furniture designer, for instance, needed to illustrate a new line of chairs, it would be important to depict the characteristics of the fabrics and materials used in production. The rendering of materials, using a range of media, can communicate a great deal of visual information about products and objects.
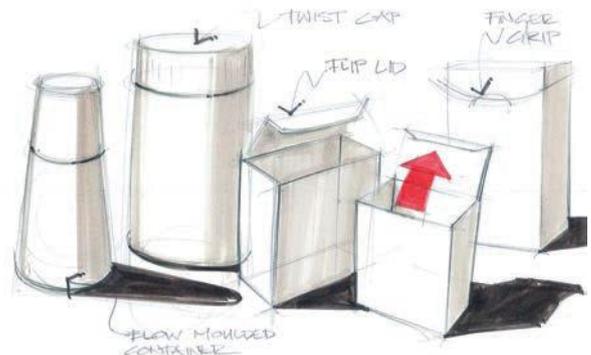
▶   Sketch of packaging ideas with arrows indicating function and annotations

You may have seen illustrations of proposed designs labelled as an 'artist's impression'. Architects and interior designers often use these 'impressions' to help clients visualise what may otherwise seem to be a complex plan. The use of colour, line and tone – to demonstrate surfaces, texture and detail – helps to communicate ideas that might otherwise exist solely as instrumental drawings.

Effective rendering can be achieved through the application of an almost limitless range of media. Markers, ink pens, computer rendering, **gouache** and pencil are probably the most popular methods, with computer-generated images becoming increasingly common. It is also possible to achieve striking results with combinations of media, as well as pastel, **collage**, watercolour, cut paper and airbrush.

Establish a light source

Incorporating a **light source** into your sketches will add realism and create three-dimensional form. Natural or artificial light influences the appearance of objects, creating highlights and shadow areas. When light from the source hits an object, it will often create a **highlight**, mid tones and dark tones, and cast shadows. Depending on the surface texture of the object, it may also reflect light.

▶   Sketch objects with a torch as a light source

It is through the representation of light and dark areas that a three-dimensional form can be depicted. It is, therefore, important to identify the light source as the first step. In daylight, it is sometimes difficult to ascertain the primary source of light, but invariably it will be a window or, if outside, the sun. In a dark space, a light globe or lamp will create a light source that will appear more clearly defined than the more diffused light of day, and will create sharp contrasts.

In rendering the form of objects, you may need to make an arbitrary decision about the primary light source, taking into account reflected light from other surfaces or secondary sources of light.

▶   The position of the light source will affect the application of tone and shadows.
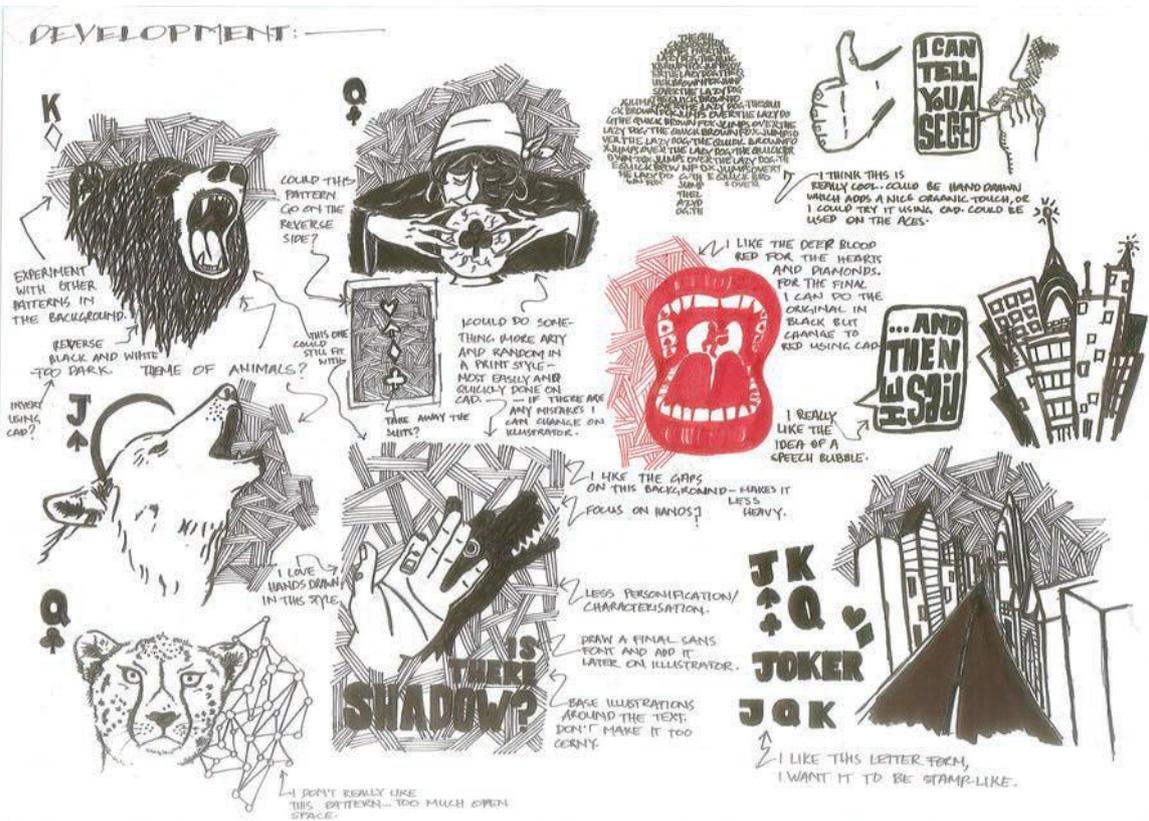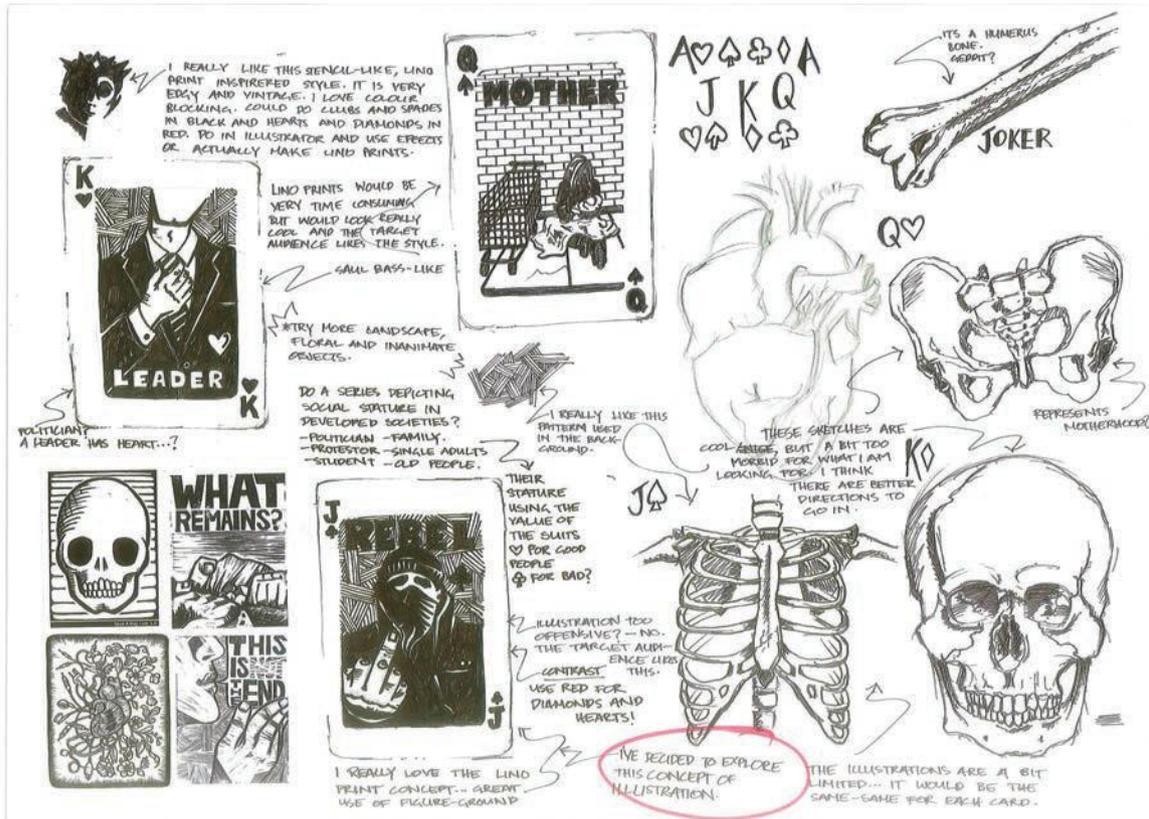
▶ Ideation drawings for a set of playing cards

In the past, formal training in illustration involved learning 'rules' about light and shadow. In fact, in many classical paintings you can see how strictly these rules were followed, with very specific applications of light and cast shadow areas.

Although it is still very important to understand the effect that light has on an object, the application of tone is much more intuitive today, relying heavily on your observational skills and sensitivity to the subject matter.

CROSSHATCHING

iStock.com/SireAnko
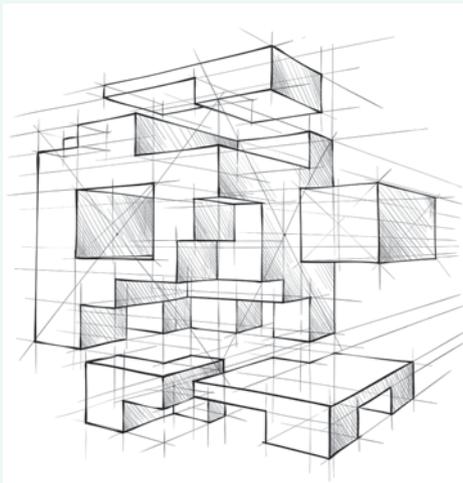
▶ Sketch of crosshatching

Need to add tone or texture quickly? **Crosshatching** is a rapid method of applying tone to freehand sketches that can be very helpful in idea development and in communicating tonal information quickly. Vertical, horizontal and diagonal lines vary in proximity to one another, creating tonal and textural variations. This technique can also be used to suggest textures such as fabric, wicker and natural fibrous materials.

2.2 SCHEMATIC DRAWING

Schematic drawings are a varied collection of drawing methods that convey information that may be conceptually or factually complex. Schematic drawings are used for a range of purposes, including representing data, conveying the steps involved in a system or process, illustrating organisational information and brainstorming ideas. Visual resources such as maps, diagrams and charts assist designers to express and evaluate ideas as well as clarify research and information gathered from multiple sources.

Schematic drawing is used for:
+ the clear communication of, sometimes, complex ideas and information
+ the exploration of alternative visual concepts
+ the communication of ideas between stakeholders.

CHARTS

Flow charts

Flow charts are designed to visually explain the steps in a system or process. They use boxes of data (nodes) to identify the steps of a process and are designed to assist the viewer's understanding of what happens next.

Often used in the design of software systems, flow charts can be useful in explaining very complex technical systems. There are many types of flow charts, and some may use more visual means than others; however, the fundamental sequence-based appearance remains the same.

```
START
  │
  ▼
PROCESS STEP
  │
  ▼
DECISION? ──NO──▶ PROCESS STEP
  │ YES            │
  ▼◀───────────────┘
PROCESS STEP
  │
  ▼
PROCESS STEP
  │
  ▼
END
```
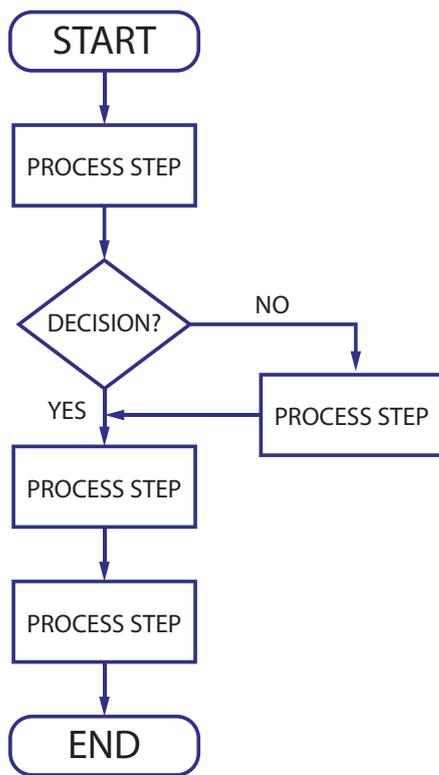
Organisational charts

Organisational charts are generally used to depict the relationships and hierarchy between roles within an organisation, institution or project team. They typically represent relationships between people but can be used more flexibly. A family tree is a good example of an organisational chart in action.

DIAGRAMS

Diagrams are often used when the visual representation of complex information is required. Diagrams present data in an accessible manner by using visual tools, such as symbols, colours and explanatory drawings.

Diagrams are visual representations of information or data. They are designed to convey complex information in a visually clear and accessible manner. Diagrams often utilise symbols and design elements, such as colour, point and line, to convey detailed information visually.

The design of information graphics is a growing field of graphic design; the sophistication of design software and the reach of the Internet mean that complex information can often be explained through interactive diagrams. We live in a world that is filled with vast amounts of data and, for many people, data presented as a diagram is more easily understood.

An increasingly common form of diagram is an infographic, which is usually found online and makes use of a range of highly illustrative design elements to convey information. From the term 'information graphics', infographics usually include more than one set of data or information and use simple but detailed illustrations. They may include graphs, maps, illustrations and symbols. Infographics can be applied to explain a process, timeline or event and are commonly used in textbooks, magazines, newspapers and online.

Many large infographics are published online and contain detailed information. The Internet is the ideal format for scrolling up and down through information and zooming into featured visual data. In fact, research has shown that infographics are some of

```
                    Managing
                    director
                    ┌──────────┬──────────┐
                    │    Administrative   Creative
                    │    director ─────── director
          ┌─────────┤         │              │
       Interior     Project   │              │
  design department manager ──┤              │
          │         │         │              │
       Project      Site      │              │
    administration  manager ──┘              │
       ┌──┬────┬────┘                        │
  Administration  Marketing  Logistics   Creative
```
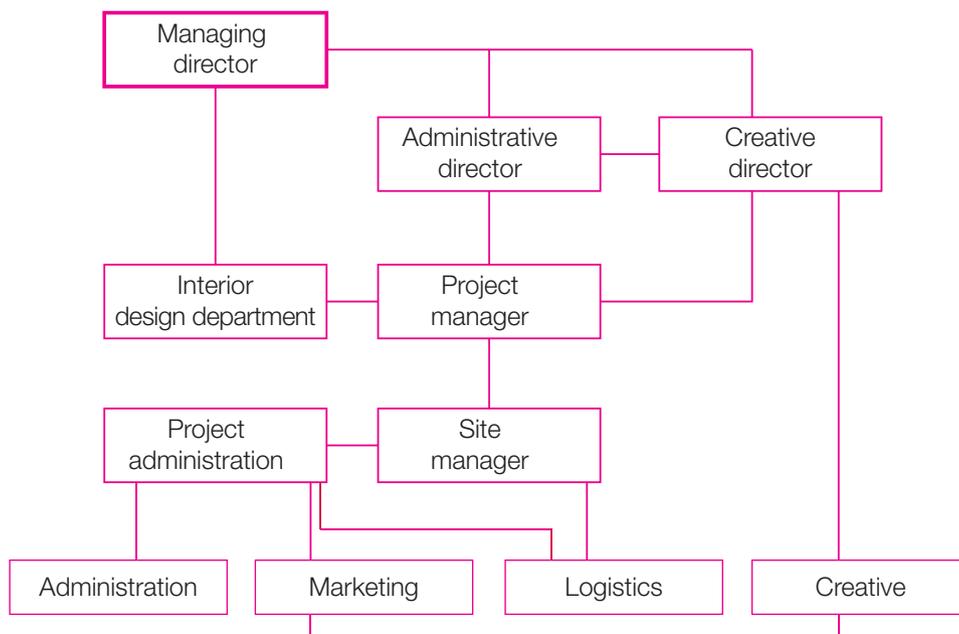
the most popular content shared on social networking sites such as Facebook, Twitter and Reddit.

Mark Wilken

▶ This simple diagram uses illustration to explain how a texture board is used. Image-based diagrams help users understand functionality.

Source: Australian Bureau of Statistics © Commonwealth of Australia

▶ This infographic conveys large amounts of data using a combination of illustrations, symbols and type. Placing the data within a blackboard frame assists with viewer engagement, while serving to visually emphasise what the data is about.

Functional relationships diagrams

Used mainly in environment design, functional relationship diagrams are integral to the early, ideation stage of buildings and environments. The purpose of functional diagrams is to create a broad and conceptual layout of a proposed design, using 'bubble' shapes and symbols to represent spaces.

Functional diagrams consider factors that deal with the function and general layout of a design. At this stage, less consideration is given to appearance or aesthetics, which is done later in the design process.

Created in the beginning of the design process, a functional diagram, often forms a basis of the design iterations that follow. Designers are able to utilise functional diagrams to communicate with other designers and clients concerning the organisation of a site. The simple visual language of these diagrams presents an accessible visual glimpse of scale, proportion and flow. Non-designers benefit from easy understanding and designers benefit from the rapid production of creative ideas. This method provides opportunities for designers to study alternative design ideas as they search for an appropriate solution.
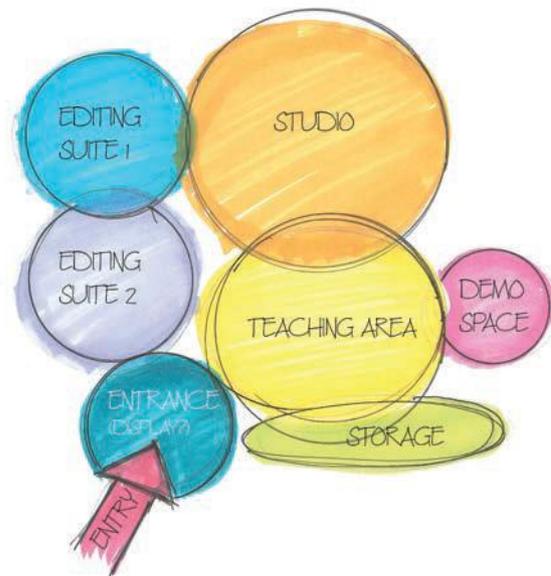
▶ This bubble diagram was used in the design of a photography studio. The designer made decisions about proportion, flow, and exit and entry points using representative shapes. Decisions were made about the space before detailed plans were undertaken.

Website or app architecture diagram

Architectural diagrams for websites and apps are similar to flow charts and organisation diagrams in that they visually depict links and hierarchical connections. For website and app developers, a map of the links contained within a product ensure that logical pathways for the user are maintained (see chapter 14 on human-centred design for more information). Given the complexity of many sites and apps, a clear visual map of the site structure assists with the planning and development of the final product. Website architecture

Chelsea Gardner
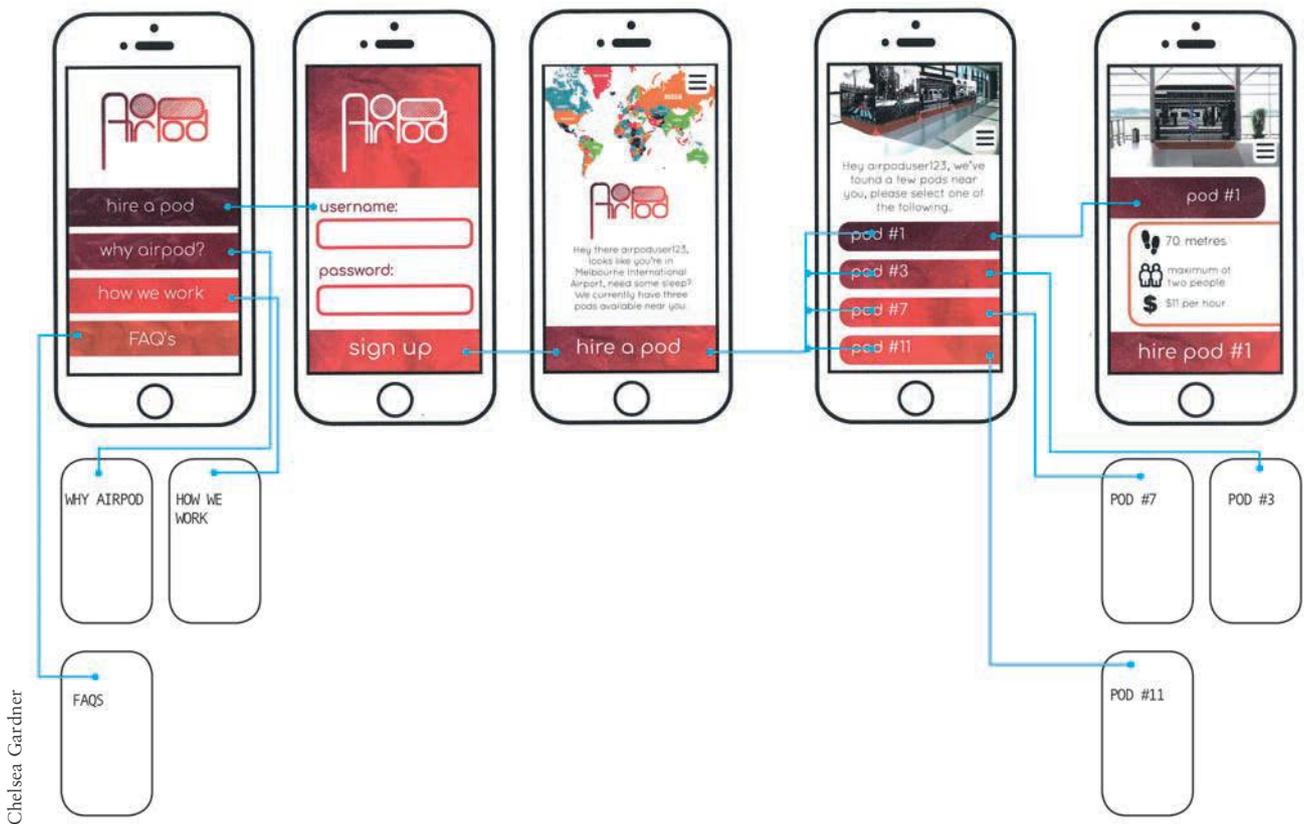
▶ An architectural diagram for a new app. The app architecture diagram structure assisted this student in the logical development of her design. Understanding how the user might interact, and step through an app or site, is integral to effective interface design.

diagrams are modified as the digital product is developed and refined. Many websites offer access to a sitemap, which also assists users in understanding the hierarchy of information contained on the site.

GRAPHS

The most common graphs serve to present detailed data in visual form and are usually divided into categories of line graphs, pie graphs and bar graphs. They use a scale and/or series of data sets that are indicated along two axes or, as in the case of pie graphs, they use divisions of a whole to communicate quantities of data. Graphs may use two-dimensional or three-dimensional means for visual impact.

Pie graphs

Pie graphs (also known as circle graphs or circle diagrams), depict 'slices' of data, hence the name 'pie'. The full circle (360°) represents 100 per cent and the angle of each segment is found by multiplying its percentage value by 360°. For example, a value of 50 per cent is indicated by a segment of 180°. Pie graphs can be seen in both two-dimensional and three-dimensional forms.

MARKET RESEARCH
ACCORDING TO THE AUDIENCE // SURVEY

THE FACT THAT A CAFE SERVED ONLY FAIR-TRADE COFFEE AND LOCALLY GROWN FOOD WOULD INFLUENCE MY DECISION TO GO THERE:

- Greatly
- Somewhat
- It wouldn't
- I don't know what fair-trade coffee is
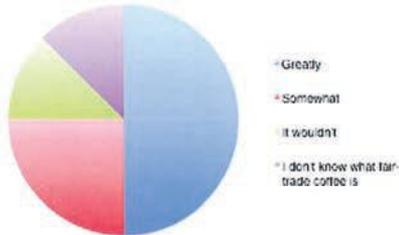
By surveying both males and females, allowed me to compare their preferences and see the similarities and differences between the personal choices of sexes. More females preferred home-style design of cafes, where males preferred industrial. Women also preferred a warm and cosy cafe, where as males preferred a trendy and popular cafe. By seeing the difference between sexes has allowed to see what I need to include in my design to attract both males and females.

WHAT TYPE OF ATMOSPHERE DO YOU PREFER IN A CAFE?

- Quiet and calm environment
- Busy and full of life
- Trendy and popular
- Warm and cosy
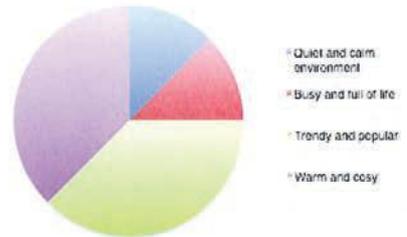
By using surveys to source information from the target audience, I have discovered peoples personal preferences and priorities in a cafe. By asking what their favourite cafe was, allowed me to do research into the style of the cafe, where it was located and the general aesthetic of the design. I was able to research into how location plays a role in enticing customers and how the main feel and mood of the cafe will affect the type of audience that you attract. By also asking what people generally order at a cafe, has taught me why people go to cafes and how much food and drinks they consume when dining out. By asking how much they rougly buy, gave me a rough estimate at the amount of time spent they may spend in a cafe.

WHAT STYLE OF INTERIOR DESIGN DO YOU PREFER?

- Industrial Style (concrete, exposed brick)
- Home-Style (couches, low tables)
- Vibrant and Bold (in design and colour)
- Contemporary (artwork and geometric shapes)
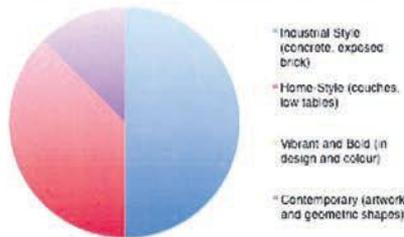
When asked how important atmosphere was when choosing a cafe, a majority of the partipants rated it very highly, which shows me the aesthetic of a cafe is the most important factor when deciding on a cafe. The design of the cafe was rated quite important to the audience as well. For the customers to enjoy their experience in a cafe, means they need to be comfortable in their environment and feel relaxed. Many participants saw the design and the atmosphere of the cafe as the most important qualities in a cafe. The least quality they found important was the quality of the coffee.

Meg Jamieson

▶ In designing a new cafe, this student used pie graphs to visually convey the preferences of her target audience.

Line graphs

Line graphs show changes over a period of time. They can be used to indicate trends and to track differences over a given period. When more than one line is featured, colour is usually used to distinguish each line.
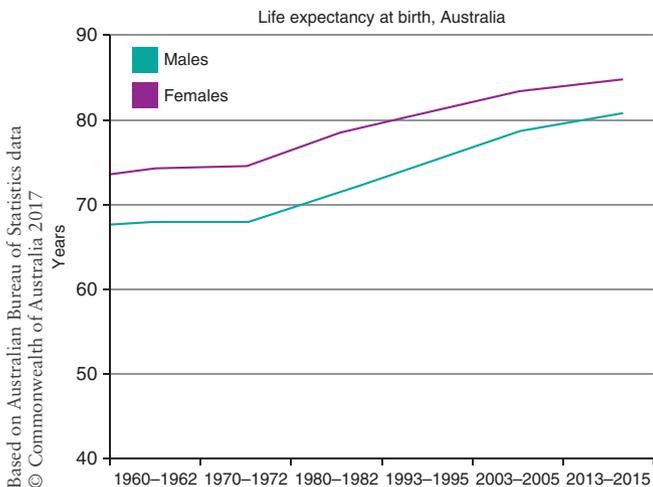
Based on Australian Bureau of Statistics data © Commonwealth of Australia 2017

Life expectancy at birth, Australia

- Males
- Females

Years

90
80
70
60
50
40

1960–1962 1970–1972 1980–1982 1993–1995 2003–2005 2013–2015

▶ Statistics plotted on a line graph that depict life expectancy at birth in Australia between 1960 and 2015.

Bar and column graphs

Bar and column graphs compare differences and similarities between data. Arranged either horizontally (bar) or vertically (column), these graphs enable visual comparisons so differences can be recognised quickly. More complex versions might use grouped bar or columns or divide each column further creating a 'stacked column graph'.

2016 2017

AMOUNT SPENT PER DINER

$60
$40
$20

ACT SA NSW WA VIC QLD AUSTRALIA

▶ Column graph illustrating the average amount restaurant diners in Australia (by state) spent on meals. The use of two coloured columns allows comparison between spending in 2016 compared with spending in 2017.

OLYMPIC GAMES 1896–2016
TOTAL MEDALS WON BY COUNTRY

Legend:
- GOLD
- SILVER
- BRONZE

y-axis: 0, 500, 1000, 1500, 2000, 2500

Countries: USA, USSR, GREAT BRITAIN, FRANCE, GERMANY, ITALY, CHINA, AUSTRALIA, SWEDEN, HUNGARY
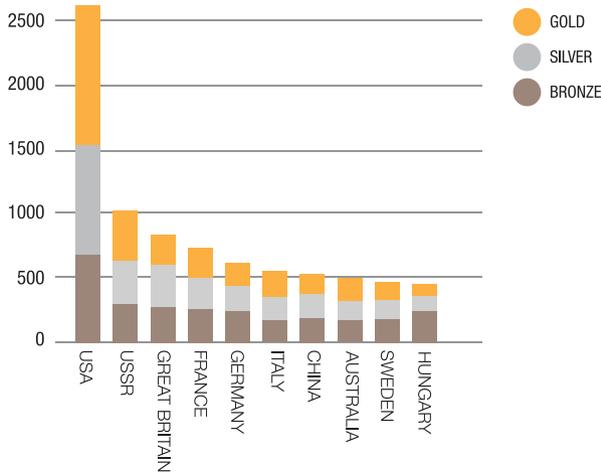
▶ Stacked column graph showing total medals won by country in the Olympic Games. The coloured division of each column allows the viewer to see the proportion of gold, silver and bronze medals within the total.

TIMELINES

Timelines are used to display events, images or data in chronological order. Often used to visually describe historical development over a period of time, they can feature illustrations and text in combination. Timelines can often be found in newspaper or magazine articles, history or science textbooks and online.

DON'T LOSE THE MESSAGE

Renowned information designer Edward Tufte warns against the overuse of visual 'decoration' in diagrams, which can distract from the key information and data that is being explained. Tufte is a world leader in information design and more information about his work and ideas can be found on his website.

Gutenberg's 42 line Bible	Jenson Garamond *Aldus Italic* Aldus Roman	Baskerville Times	Didot Bodoni Franklin Gothic	Avant Garde Helvetica Gill Sans Futura	Calibri Myriad Georgia
1450 *Blackletter*	*1500-1700* *Classical* *Old Style* *Humanist*	*1700-1800* *Transitional*	*1800-1900* *Modern*	*1900-1960* *Modernist* *(Swiss Modern)*	*1960-* *Contemporary* *Digital*
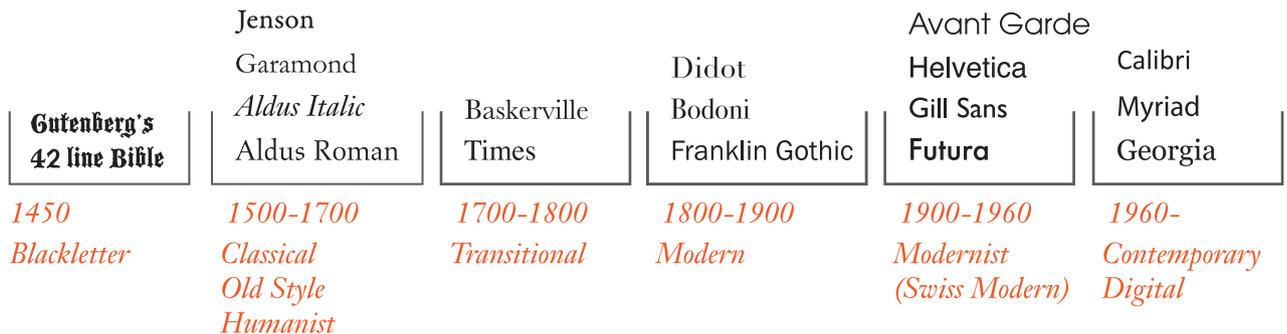
▶ A simple timeline illustrating the chronological development of modern typographic styles

APPLE TIMELINE

Apple Inc took the wraps off a faster 4G-equipped iPad starting at $629, hoping the latest version of its tablet can safeguard its dominance over rivals

SHARE PRICES AND KEY PRODUCT RELEASES

(Daily close)

Mar 7, 2012
Third-generation iPad model announced
$530.69

Aug 24, 2011 **Steve Jobs** resigns from Apple, Tim Cook becomes CEO
$376.18

Oct 4, 2011
iPhone 4S unveiled
$372.50

Oct 5, 2011
Steve Jobs dies
$378.25

Jan. 2010
First **iPad** is launched

1984
Macintosh, all-in-one PC launches

1991
First **Powerbook** released, Mac OS 7 introduced

1998
First **iMac**, an all-in-one computer, reminiscent of the Macintosh, introduced

2007
First **iPhone** launch

Dec. 1980
Apple launches IPO
$3.59

1989
Macintosh Portable released

2001
First **iPod** introduced. Mac OS X launches

2006
Macbook Pro and new **iMac** becomes first Apple computers to use Intel chips

1985
Steve Jobs leaves Apple after being forced out by board

1994
First **Power Macintosh** introduced

1997
Jobs returns to Apple as adviser and eventually takes CEO title once again

2003
iTunes Store goes live heralding online music services

Jan. 20, 2009
$78.20

2008
App Store launch

© Reuters Graphics

▶ Note the use of illustrations and the inclusion of a line graph in this diagram about Apple and the relationship between product launches and share price. The various elements of the design produce a diagram that is rich with information.

CHAPTER RECAP

1 For each of the following scenarios, identify how visualisation drawing might be applied.
   a A communication designer discusses possible ideas for an identity design during a meeting with a new client.
   b At an architectural studio, several designers discuss how a dwelling might be positioned within a given landscape to maximise sun exposure.
   c An industrial designer devises alternative design responses to the form and appearance of a new design for a screwdriver.

2 Explain how drawing might be applied at the following stages of a design process:
   a research of stakeholders
   b client interactions
   c exploration of ideas
   d ideation
   e development of concepts

3 Using an app or website that you are familiar with, observe the interface and draw a functional relationship diagram that describes how a user might navigate information.

4 Suggest appropriate drawings that might be applied to the following:
   a the design of a concept for a baby bottle
   b the design of stage sets for a musical theatre production
   c the design of landscape to be created as part of a wildlife conservation park
   d presentation of design concepts for the user interface of a car ride sharing app

TWO-DIMENSIONAL AND THREE-DIMENSIONAL DRAWING

CHAPTER 3

'I don't want to be seen as an outsider necessarily, but it means I can carry on with experimentation and innovation. Having to fight hard has made me a better architect.'

Zaha Hadid, architect

In this chapter:

Learn the language

+ angle
+ crating
+ development drawing
+ diameter
+ dimension
+ elevation
+ fold
+ horizon
+ nets
+ parallel
+ patterns
+ proportion
+ radius
+ scale
+ tab
+ third-angle projection
+ vanishing point
+ views

3.1 THREE-DIMENSIONAL DRAWING

Three-dimensional drawing represents how we see objects. We are accustomed to observing the length, width and depth of objects. Isometric drawing and perspective drawings, also known as pictorial drawing, are the most common methods applied in the QCE Design syllabus. Pictorial three-dimensional drawings can be created manually, using set squares and T-squares, or within CAD programs.

Paraline

Isometric

Planometric

Perspective

One-point perspective

Two-point perspective
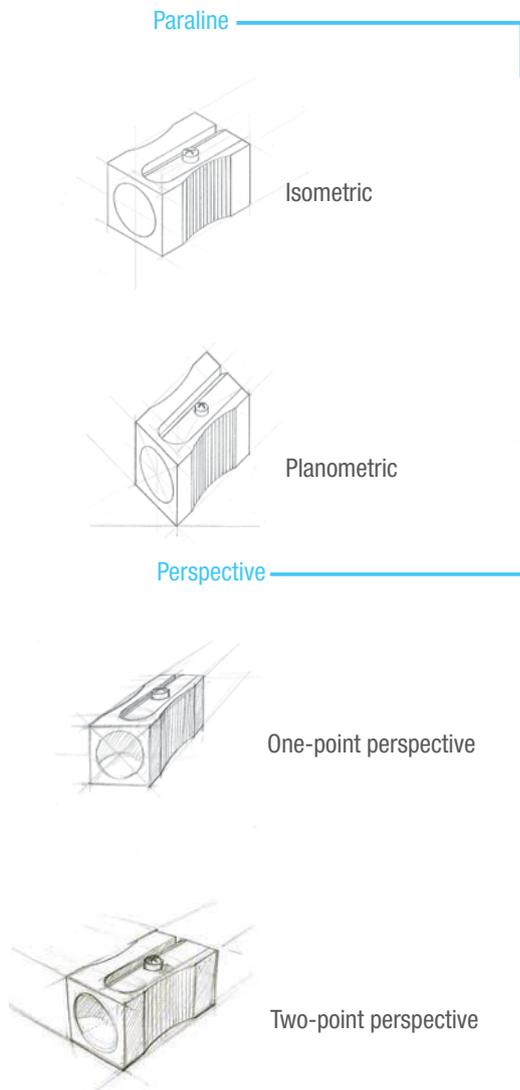
ISOMETRIC DRAWING

Isometric drawings are commonly used by industrial designers. They are used in the design of products, in engineering and mechanical drawings. Isometric drawings are constructed of lines that remain parallel and do not converge at any given point. For this reason they are sometimes referred to as 'paraline' drawings. Isometric drawing is an effective visual means of representing the form and features of a three-dimensional object.
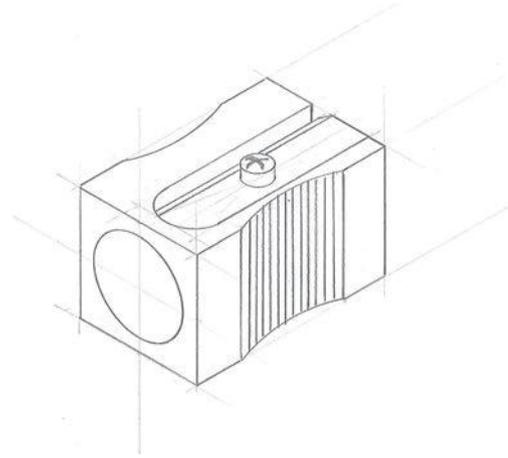
In industrial design, isometric drawings are arguably the most commonly used pictorial drawings because of their relatively simple construction. Isometric drawings are quicker to draw than two-point perspective, yet look somewhat similar and may provide similar information. In an isometric drawing, the height (or corner) of the object faces the viewer, and the width and depth of the object recede (remaining parallel) at 30°.
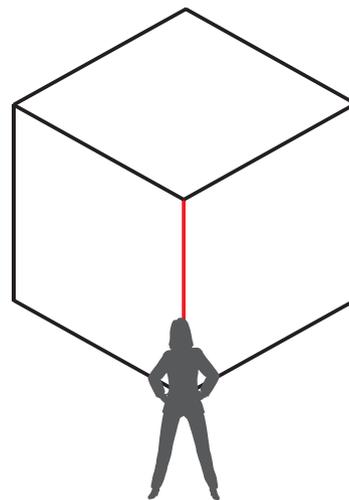
▶   Viewer position: isometric drawing

Isometric drawings are frequently used in industrial design where it is important to show as much detail as possible about the object or product using a three-dimensional representation. Isometric drawing allows a designer to depict the form and details of an object in a manner that conveys true proportions.

Isometric drawings are commonly applied in technical drawings in addition to orthogonal representations. Drawings of engineering components and the like sometimes include a three-dimensional version of the object in isometric, as well as two-dimensional technical drawings to provide details about the appearance of a completed product or part.
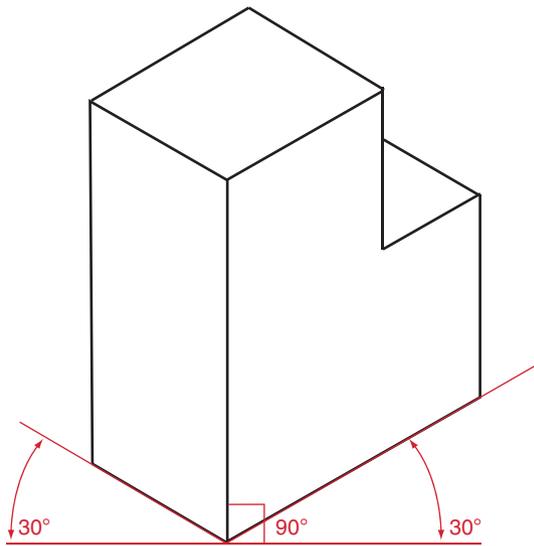
▶   Isometric drawing

ISOMETRIC GRID PAPER

If you are drawing by hand, you might find it helpful to draw your isometric drawings on isometric grid paper, which is predrawn with 30° and 90° lines in non-reproducible (i.e. will not photocopy) light blue.

A STEP-BY-STEP GUIDE TO ISOMETRIC DRAWING

Step 1: Begin by drawing the height of the object facing you. This will be at 90°.
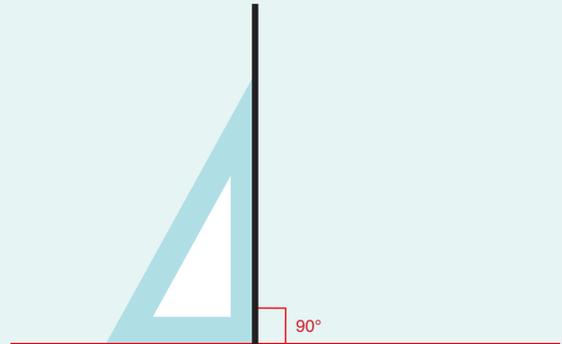
Step 2: Using a 30° set square, draw two 30° lines at the base of the vertical height line.
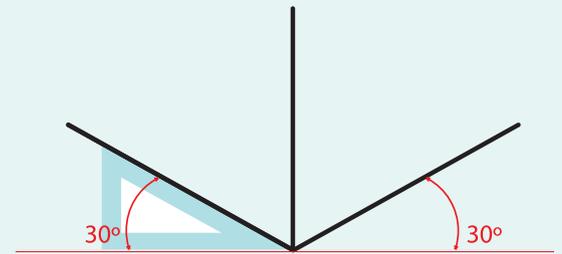
Step 3: Measure and indicate the length of the object on the 30° lines and the height of the object on the vertical line.
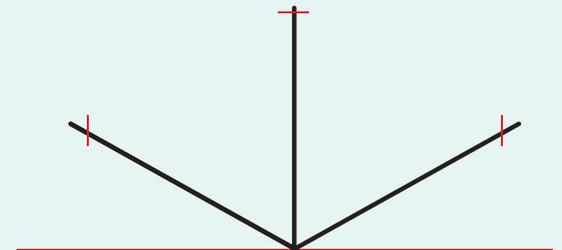
Step 4: Draw vertical lines from the 30° lines, and measure and indicate the height.
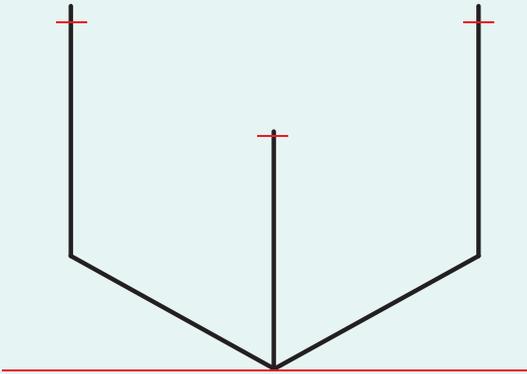
Step 5: Draw 30° lines from the top of the vertical line.
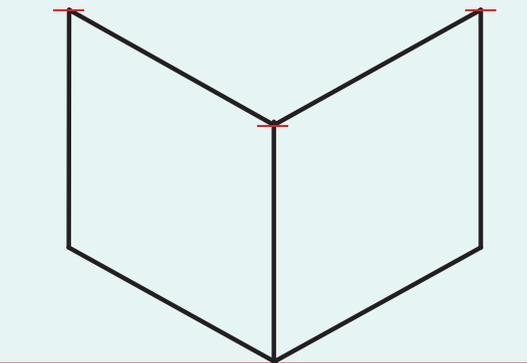
Step 6: Draw 30° lines parallel to the base of the object to complete the top. Erase any excess lines to tidy the drawing.
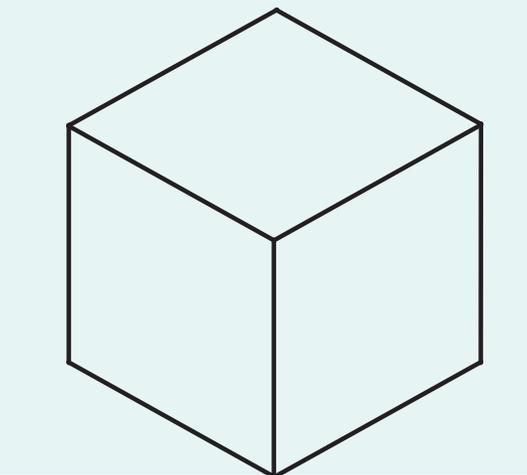
Isometric exploded view

An exploded view of an object is generally used to indicate the parts that make up a design product. An exploded view is most often drawn in isometric and shows all parts in **alignment** to one another. The value of an exploded view is that it enables the viewer to clearly visualise the placement of parts of an object; it can represent aspects of an object that may be hidden from view when shown in an alternative drawing method.
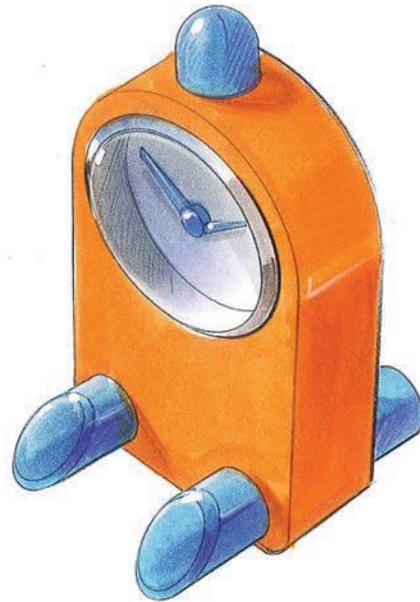
▶   Isometric view of an alarm clock
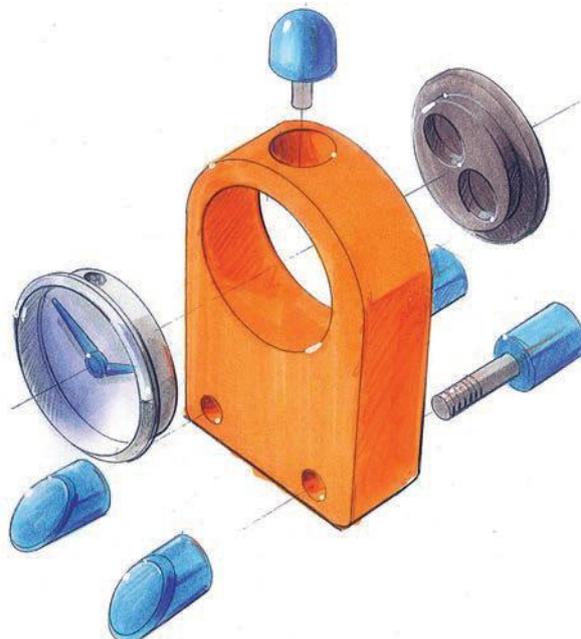
▶   Exploded isometric view of an alarm clock

Exploded views are often seen on assembly drawings in industrial design. Parts and materials are indicated on the drawing and in a table. Different representations of the object, such as orthogonal views, are usually included to assist in assembly and production.

ITEM	NAME	QUANTITY	MATERIAL
1	HAND GRIPS	2	RUBBER
2	BACKPACK	1	RUBBER
3	EYES	2	PLASTIC
4	'13'	1	VINYL
5	HEADPIECE	1	PLASTIC
6	EARS	2	PLASTIC
7	FEET	1	RUBBER
8	FRONT LEDS	6	LEDS
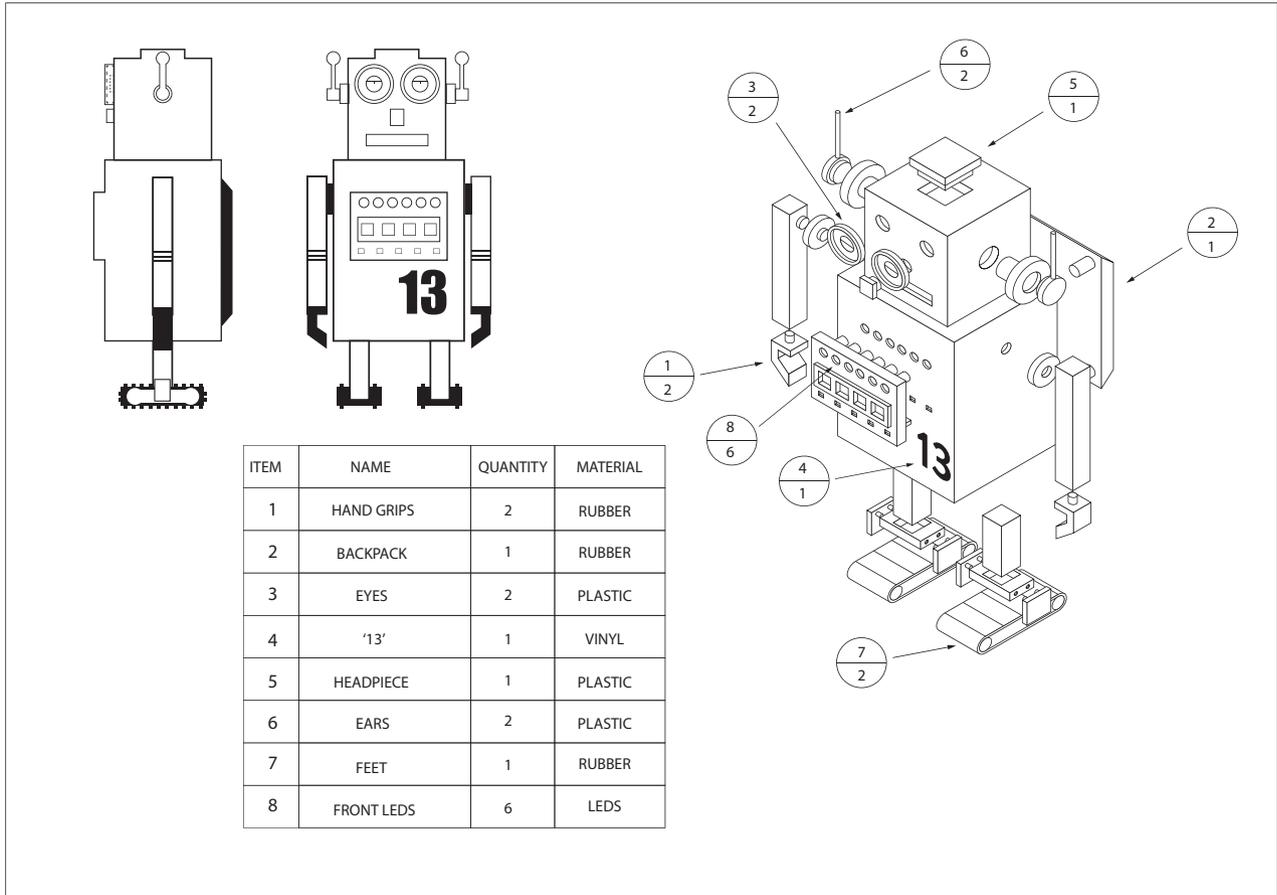
▶ An assembly drawing for a toy robot documents its parts. Along with an orthogonal drawing, the isometric exploded view helps the viewer understand the location of each part and material.
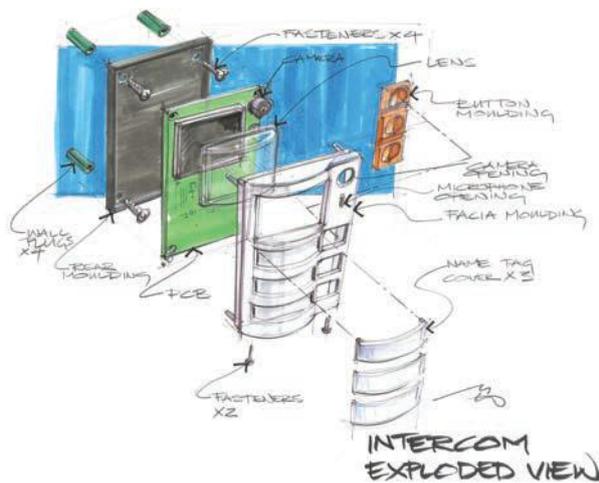
Mark Wilken

▶ Complex objects, such as this intercom, are made easier to understand in an exploded view.

PERSPECTIVE DRAWING

Perspective drawing closely reflects the way that the human eye perceives an object in space. When we see an object, our brain tells us that the object gets smaller as it recedes into space. We know for a fact that isn't true, but it is what our eye sees. We have an innate understanding of this phenomenon as representing depth and distance.

A long, straight highway is a good example of the perspective phenomenon. A road seems to narrow as it heads towards the **horizon**. However, if you were to travel along the road, it would be clear to you that the road does not diminish in size. You might also notice that any houses, trees and power poles along the sides of the road also appear to diminish in size as they recede into the distance.

Mark Wilken

Mark Wilken
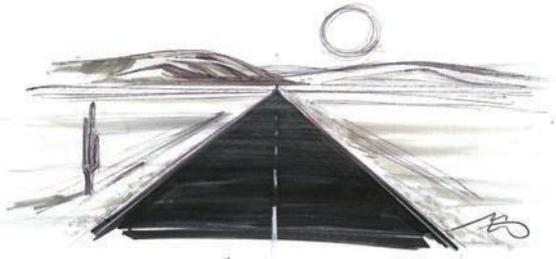
When drawing in perspective, the principles are the same. A row of objects drawn facing the viewer represents just that – a row. Redraw the same objects so that they appear to diminish in size, approaching a point on the horizon, and you have a composition that implies depth as well as representing the form and detail of the objects themselves.

Interestingly, it is not only the shape and form of objects that appear to change when drawn in perspective. Colour changes also occur when an object appears to recede into the distance. You have probably noticed that when you observe a city skyline from a distance, the buildings seem to be a uniform grey, when in fact they may be a range of colours from dark brown to metallic silver to white.

Mark Wilken

▶   In perspective drawing, colours and tones are less distinct as they move into the distance.
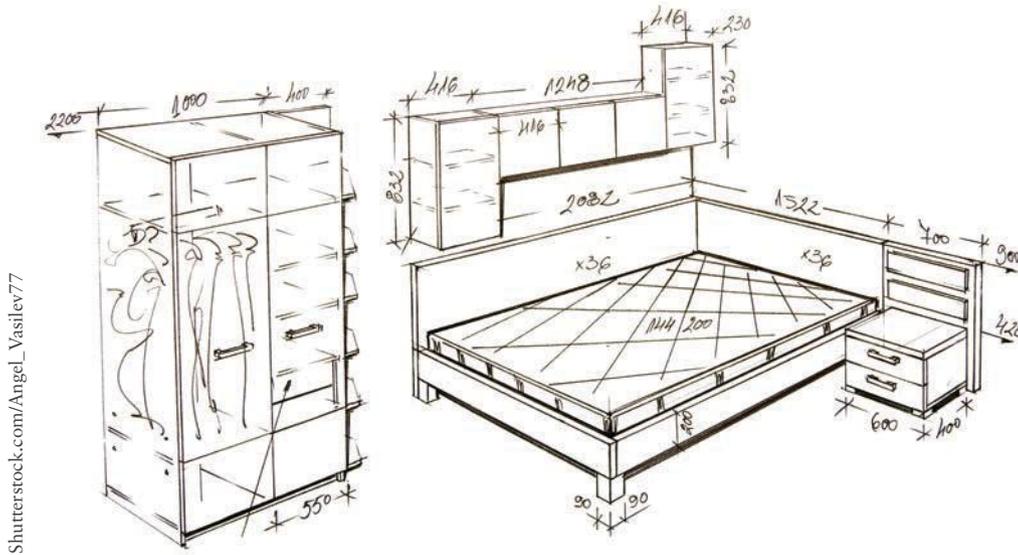
▶ Used to describe the physical arrangement of a space, this perspective sketch provides measurements and imagery that assist in the installation of furniture and fixtures.

Establishing your point of view

When drawing in perspective, your first task is to visualise what it is you want to represent. Ask yourself: What are the important features of the object I wish to illustrate? What is the key information about this object that I want to convey to the viewer? This will help you to plan the 'point of view' of the object; that is, the position from which you plan to draw it.

In any perspective drawing, the placement of the object in relation to the horizon line will affect the point of view of the depicted object.

The horizon line sits at the level of the viewer's eyes. This is called eye level. An object placed below the horizon line – below eye level – will give more information about the top of the object. Place the object above the horizon line, and then the area underneath the object becomes most obvious. If you place your object directly on the horizon line, the 'point of view' will appear to be quite realistic, as it sits at eye level. Again, it all depends on the effect you wish to create.
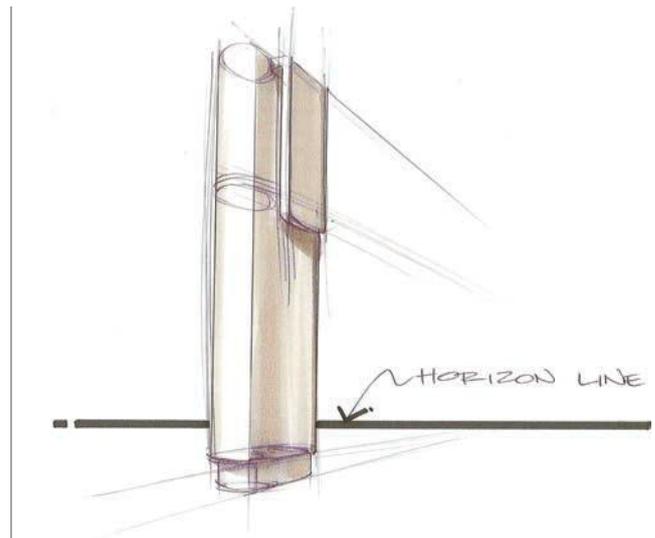
▶ An object that is drawn on the horizon line offers information about the front of the object.
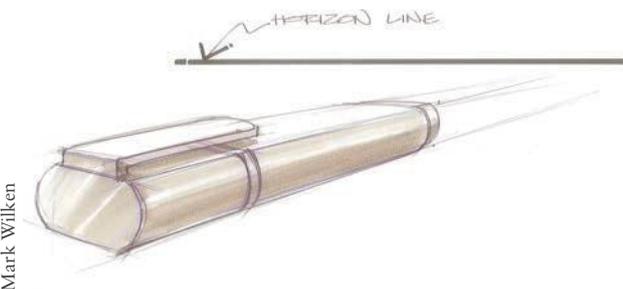
▶ An object that is drawn below the horizon line offers information about the top of the object.
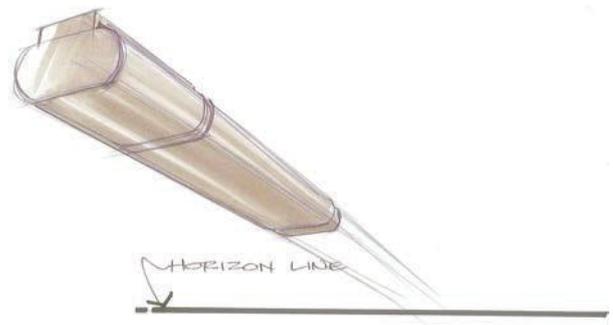
▶ An object that is drawn above the horizon line offers information about the base of the object.

DRAWING IN PERSPECTIVE

The most common methods of perspective drawing are one-point perspective and two-point perspective. Three-point perspective is sometimes used in illustrations where a dramatic and exaggerated representation is required. In the QCE Design course, you are required to develop and demonstrate skills in both one-point and two-point perspective.

One-point perspective

In one-point perspective, the height and width of the object face the viewer. Remember the following key concepts when drawing in one-point perspective:

+ The height and width of the object face the viewer.
+ All depth (or the sides of the object) recedes to one point on the horizon line.
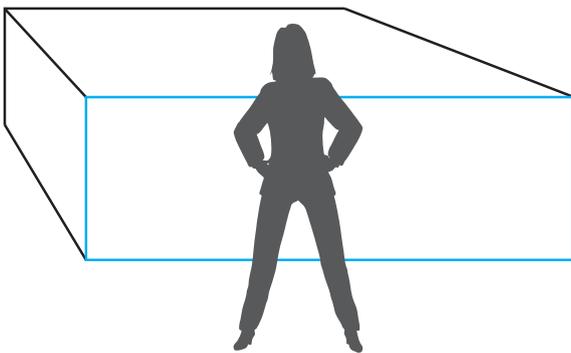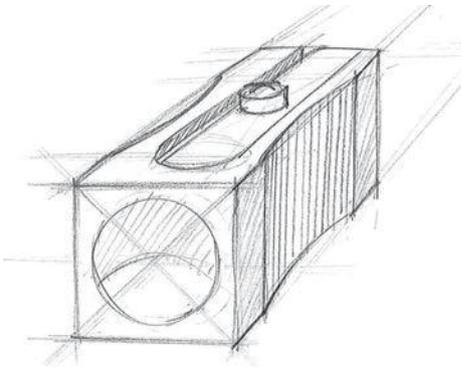
▶ Viewer position: one-point perspective drawing

One-point perspective is sometimes referred to as linear perspective. In one-point perspective, an entire plane of an object faces the viewer. The impression of a road receding to a point on the horizon is one-point perspective. One-point perspective is a method evident in many depictions of landscapes and interiors.

A perspective box is a simple way to begin working with this three-dimensional drawing method. Once you can draw a perspective box effectively, you can draw just about anything!

A STEP-BY-STEP GUIDE TO ONE-POINT PERSPECTIVE

Step 1: Decide on the position of the object in relation to eye level and draw a horizon line.

Horizon line

Step 2: Begin with the height and width of the object facing you. Your page acts as the picture plane (or surface area upon which the object is placed). The height and width of the drawn object should be parallel to the height and width of your page.

Horizon line
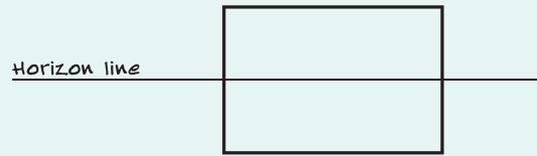
Step 3: Decide on the angle of view you wish to represent, and place the vanishing point appropriately to the left, right or in the centre. Do you want to depict more of one side? Do you want to depict the front only?

Horizon line

Vanishing point
left, right or centre

Step 4: Draw light projection lines from the corners of the object to the vanishing point.
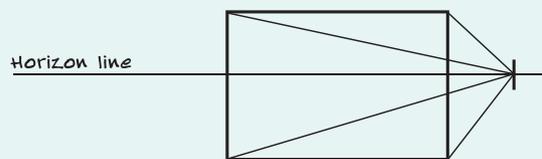
Horizon line

Step 5: Decide on the appropriate depth of the object in perspective, and draw horizontal and vertical lines within the projection lines to complete the back of the box. Making a decision about the size of the object will take some practice and require the application of your visualisation skills. Your aim is to create an image that has realistic proportions. Erase the light projection lines.

Horizon line
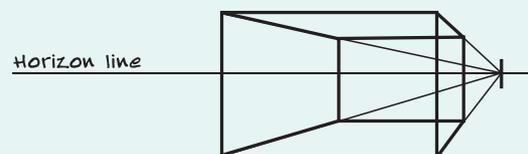
One-point perspective interior

One-point perspective represents the way the human eye sees simple interiors. Once you can draw simple geometric shapes in perspective, you can then add

details to form highly descriptive illustrations. One-point perspective is particularly useful when illustrating interiors.
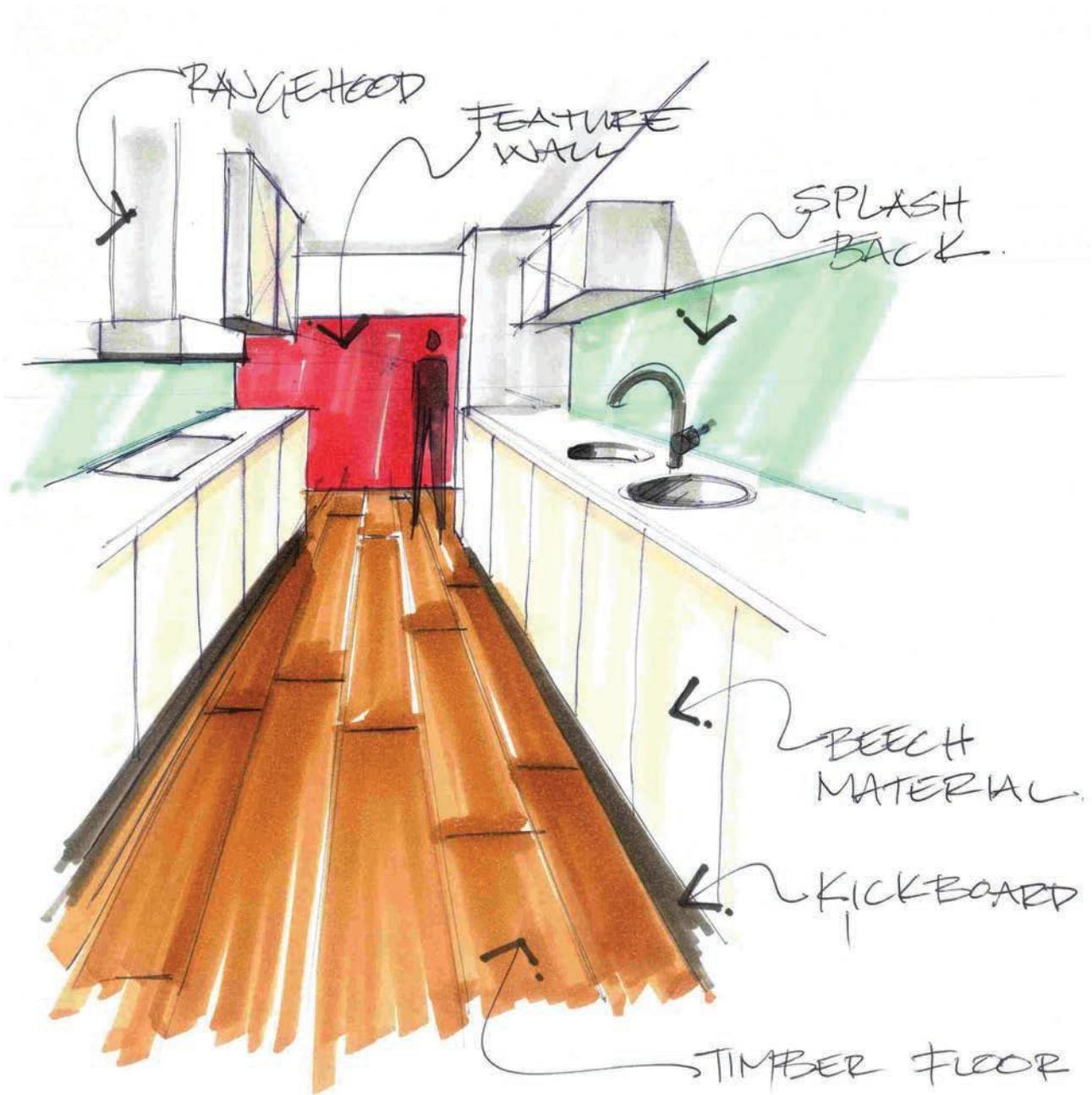
A STEP-BY-STEP GUIDE TO DRAWING AN INTERIOR

Step 1: Construct a box as illustrated previously – but this time, project lines from the left and right front corners of the box.
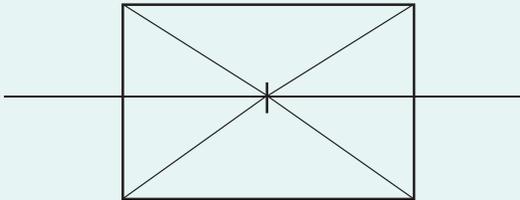
Step 2: Draw vertical lines from the back corners of the box to form the rear wall of the room or object.
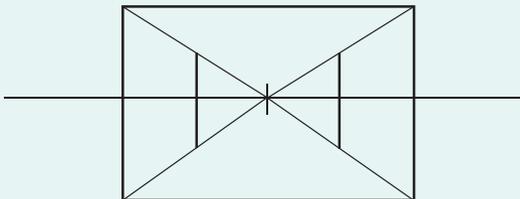
Step 3: Draw a horizontal line to form the base of the back wall.
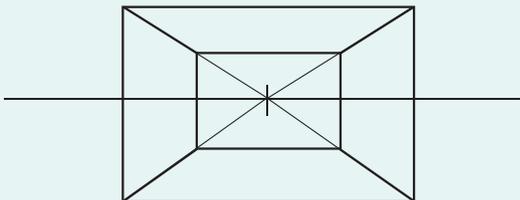
Step 4: You now have an empty box to which detail can be added to create any number of possibilities. Any object you create within the interior must recede to the vanishing point.
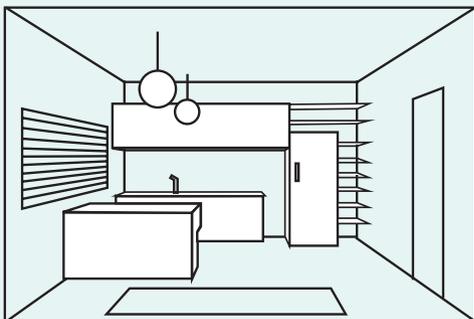
Two-point perspective
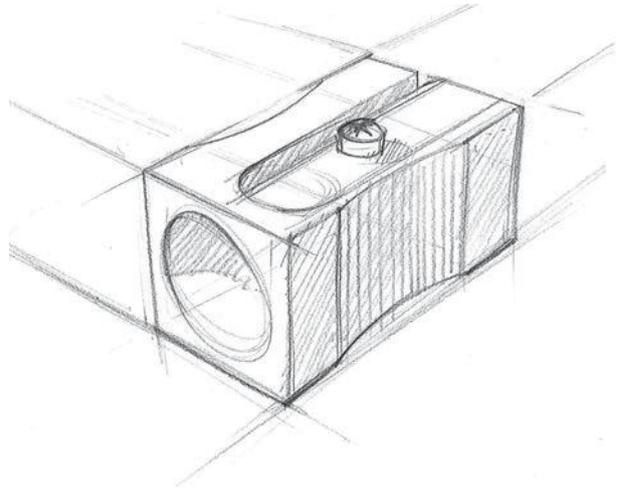
In two-point perspective, only the height faces the viewer, and the depth or sides of the object recede to two vanishing points on the horizon line. Two-point perspective is sometimes referred to as angular perspective.

Key concepts to remember when drawing in two-point perspective:

+   The height of the object faces the viewer.
+   All other dimensions recede to two points on the horizon line.

If you stand outside your house, or even outside one of your school buildings, you will become aware that the sides of the buildings recede, ever so slightly, to separate vanishing points.
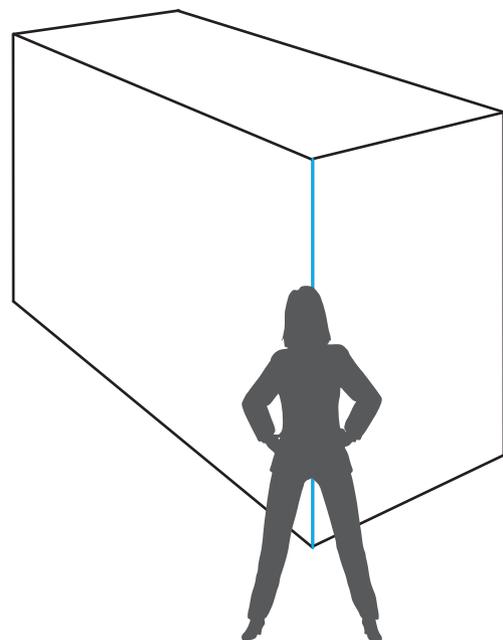
▶   Viewer position: two-point perspective drawing

A STEP-BY-STEP GUIDE TO TWO-POINT PERSPECTIVE

Step 1: Begin by making a decision about where eye level will be on your drawing. Draw the horizon line.

Horizon line

Step 2: Draw the desired height of the object.
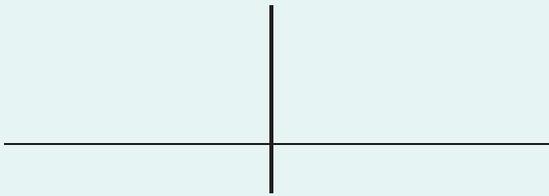
Step 3: Draw vanishing points to the left and right of the height line on the horizon line. Remember, the further apart the vanishing points, the less extreme the perspective will appear to be.

VP 1   VP 2
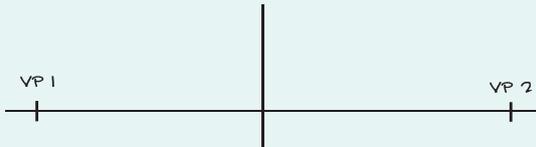
Step 4: Draw light lines from the corners of your height line to the vanishing points.
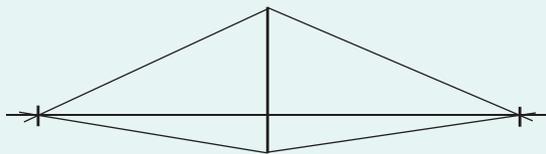
Step 5: Make a decision about the appropriate length for your object and add vertical lines to complete the sides of the object.
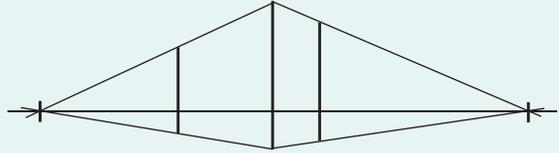
Step 6: Draw the two lines that will complete the top of the object by projecting lines from each of the lines that form the sides.
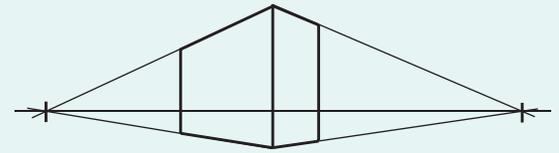
Step 7: Details can be added to a simple two-point perspective drawing to create a more detailed illustration.
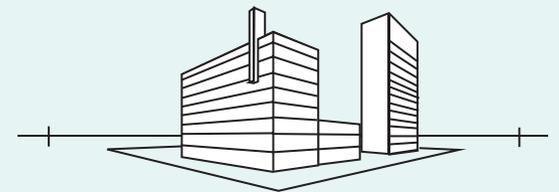
In the field of environmental design, two-point perspective is widely used for both exteriors and interiors.

▶ Two-point perspective drawing of an architectural exterior

▶ Two-point perspective drawing of an architectural interior. For more information on creating complex and rounded objects in perspective, see 'crating techniques' on pages 52–4.

In environmental design, you may need to create a three-dimensional view of a two-dimensional drawing, such as a floor plan.

A STEP-BY-STEP GUIDE TO DRAWING TWO-POINT PERSPECTIVE FROM A PLAN

Step 1: Draw a horizontal line and label it 'picture plane'. Place the plan view on the picture plane at 45°.

Plan view

Picture plane
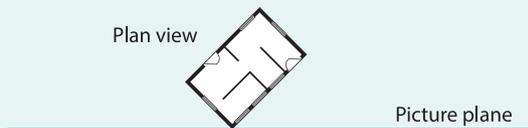
Step 2: Place the elevation view to the right of where the perspective drawing will be and draw a horizontal ground line.

Elevation
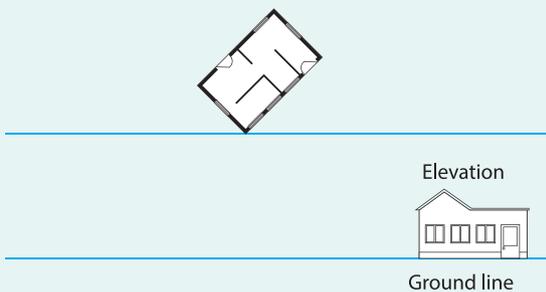
Ground line

Step 3: Place a viewing point at the most appropriate level to 'view' the drawing. Draw light project lines from each corner of the plan to the viewing point. Don't place the viewing point too close to the ground line or the drawing will become distorted.

Viewing point
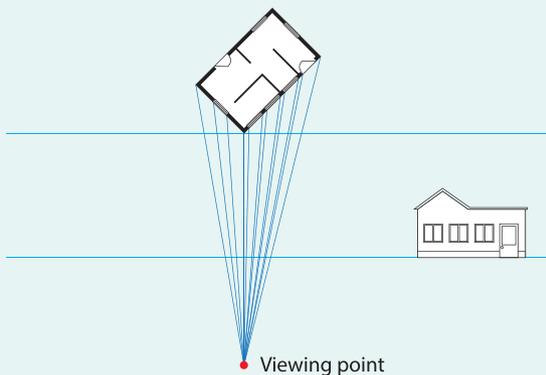
Step 4: Draw a mark where the projection lines intersect with the picture plane (projection lines can now be erased to keep things simple).
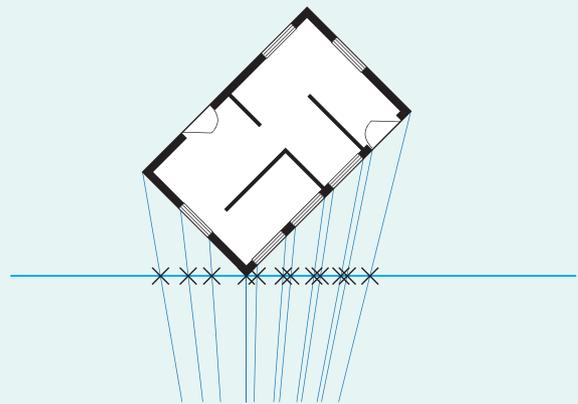
Step 5: Using the marks you just made, draw vertical lines to the ground line to establish the exterior dimensions of the structure.
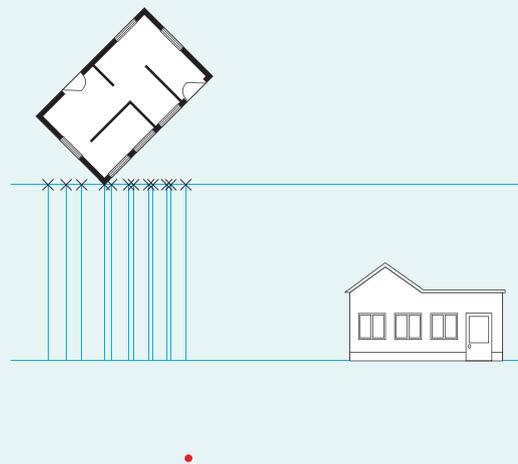
Step 6: Create a horizon line that is in line with the centre of the elevation. You can vary the position of the horizon line depending on the angle of view you wish to draw.
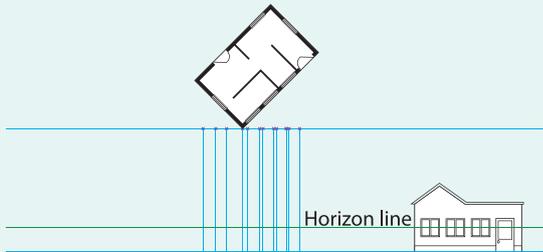
Horizon line

Step 7: From the viewing point, draw lines that remain parallel to the edges of the plan view.
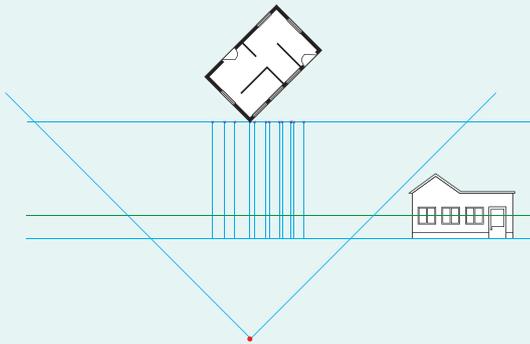
Step 8: Where these lines intersect with the picture plane, draw a vertical line down to meet the horizon line and establish each vanishing point.
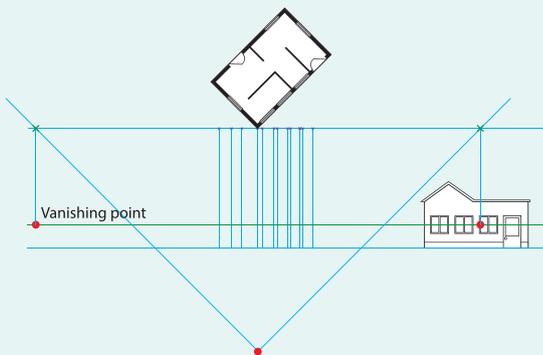
Vanishing point

Step 9: Using the elevation to determine the height of features, create vertical lines to represent the wall and roof heights.
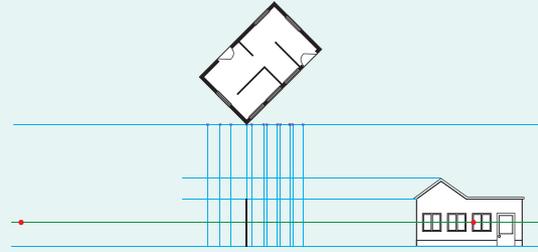
Step 10: Project lines to the vanishing points as per the two-point perspective drawing method to complete the structure.
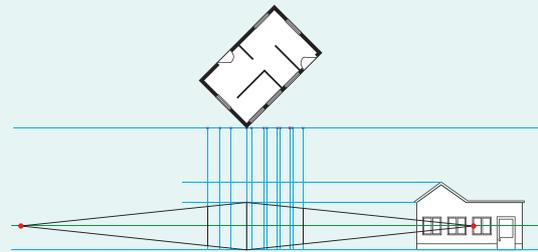
Step 11: Using the projected lines from the plan and elevation views, complete the details, such as windows, doors and roofline.
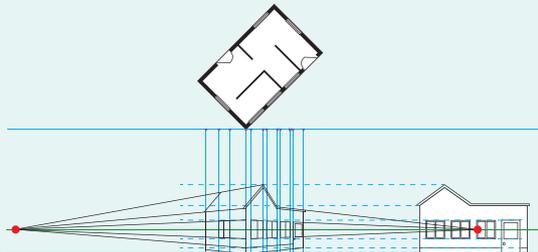
Shadows in perspective
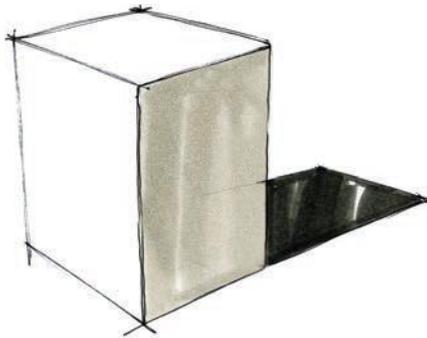
When rendering perspective drawings, it is helpful to include elements that create realism; a cast shadow is one such element. The application of a shadow can give an object context and emphasise its scale and volume.

In perspective, constructing a shadow involves projecting a shape onto a surface. The rules of each perspective method apply.

A STEP-BY-STEP GUIDE TO SHADOWS IN TWO-POINT PERSPECTIVE

Step 1: Establish a light source. This will direct the type of shadow you wish to apply.
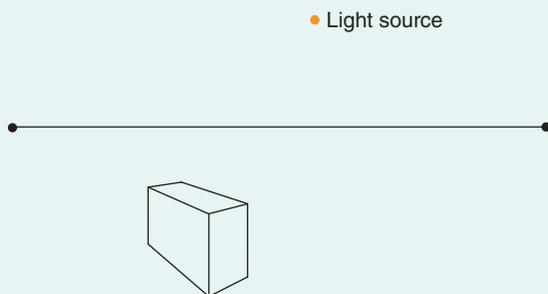
Step 2: Establish a 'shadow vanishing point'. This sits directly below the light source, behind the perspective object and in line with a relevant vanishing point.
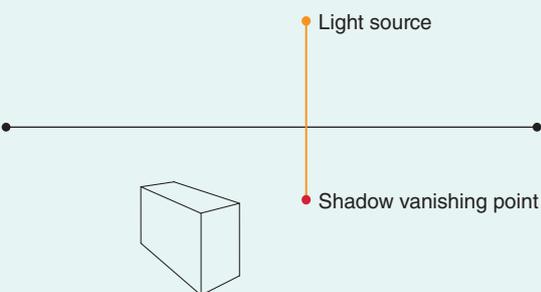
Step 3: Project lines from the shadow vanishing point via the bottom corners of the object where the shadow will be cast.
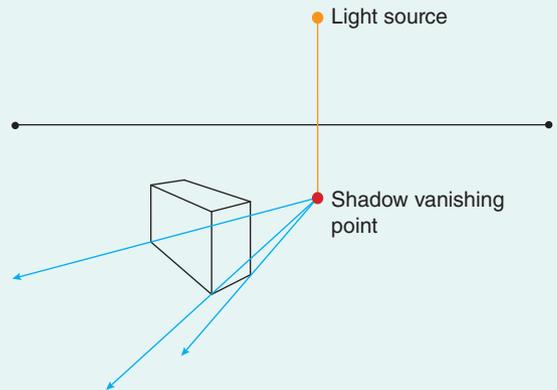
Step 4: Project lines from the light source via the top corners of the perspective object.
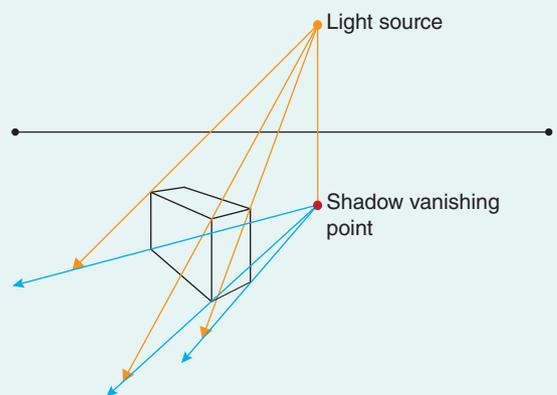
Step 5: Where the light source lines intersect with the shadow vanishing point lines, draw connecting lines.
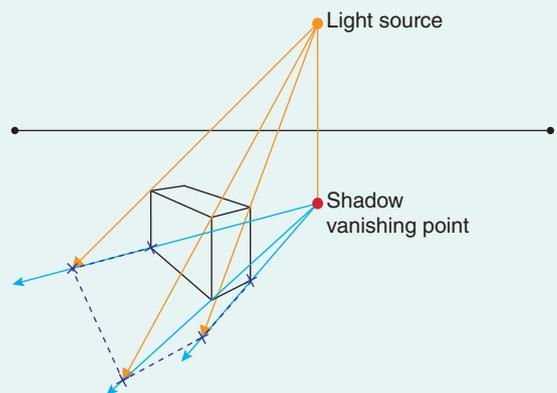
Step 6: The connected points form the shadow. Render as required.

Light source

Shadow vanishing point
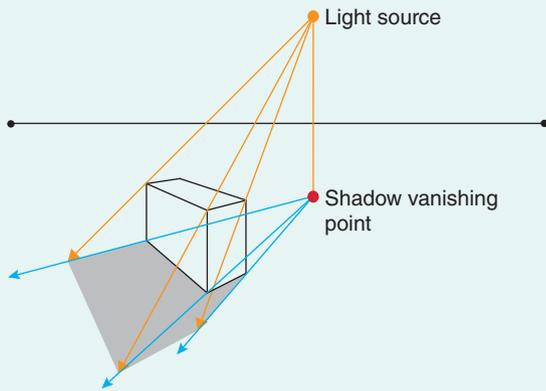
▶ When creating a shadow on a cylindrical or rounded object, use an ellipse to create the rounded edge of the shadow.

Circles and ellipses

When a circle is viewed in perspective or as part of a paraline drawing, it appears as an ellipse. Depicting circular details in three-dimensional drawing can be quite a challenge but, with practice, will become intuitive. The more you draw ellipses, the easier it becomes to create them in your visualisation and presentation drawings.

An ellipse is made up of two axes: a major **axis** and a minor axis. The major and minor axes are formed when a circle is drawn in perspective or paraline form.

Diagonals
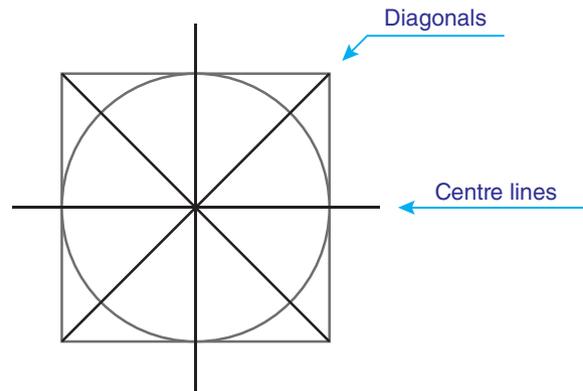
Centre lines

▶ A circle sits within a square at 90°. The circle features centre lines and diagonal lines; these lines assist in creating an ellipse.

Minor axis

Major axis
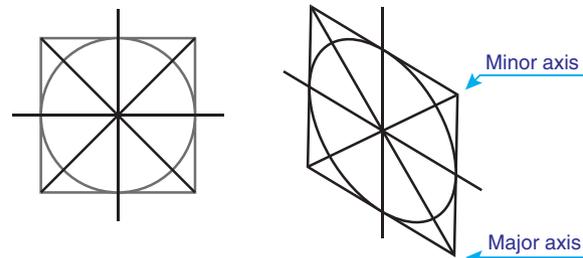
▶ The rotation of the square to 30° (isometric) means that the diagonal lines create a major (long) axis and minor (short) axis. This directs the appearance of the ellipse.

To vanishing point
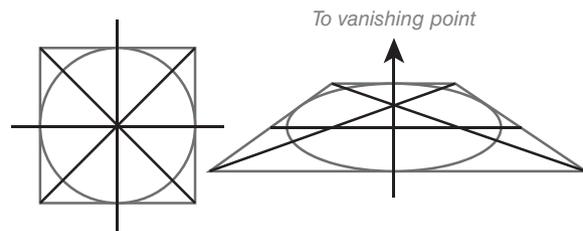
▶ A one-point perspective ellipse. Notice that the centre of the ellipse does not coincide with the intersection of centre lines. This is due to perspective foreshortening.
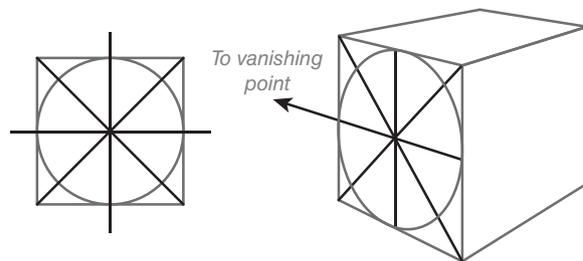
To vanishing point

▶ The same principles apply in two-point perspective. The centre lines refer to the vanishing points.

Isometric ellipses

When drawing isometric ellipses, you should become familiar with a very helpful piece of equipment: the standard isometric ellipse template. Such a template enables you to draw accurate ellipses. When larger ellipses are required, it is possible to construct them manually using segments of a circle, known as arcs.

Ellipses are used when developing images such as cylinders, spheres and tubular features. The combination of ellipses creates complex forms.
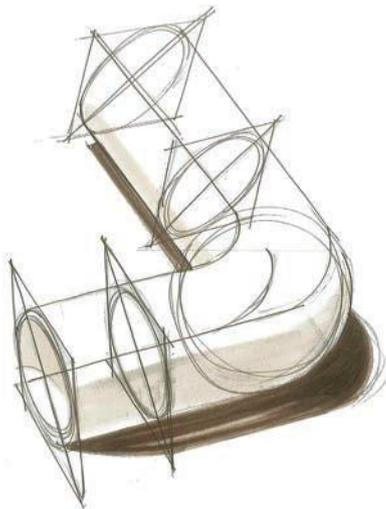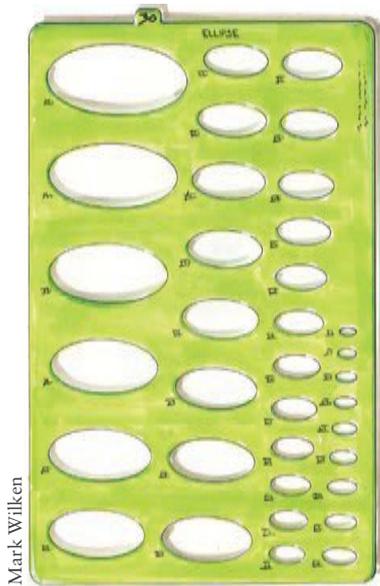
▶ Ellipses can be used in combination to form rounded and cylindrical objects.

Drawing complex objects

An effective method of drawing complex three-dimensional forms is by using the crating or boxing technique. This technique involves using basic geometric forms as the foundation for constructing complex objects. There are four basic three-dimensional forms: the sphere, the cone, the cylinder and the cube.

Many objects are made up of variations of these four basic forms. A bottle is a series of cylinders. A wine glass is formed by a partial sphere and cylinder. A compact camera is a combination of cubes and cylinders.
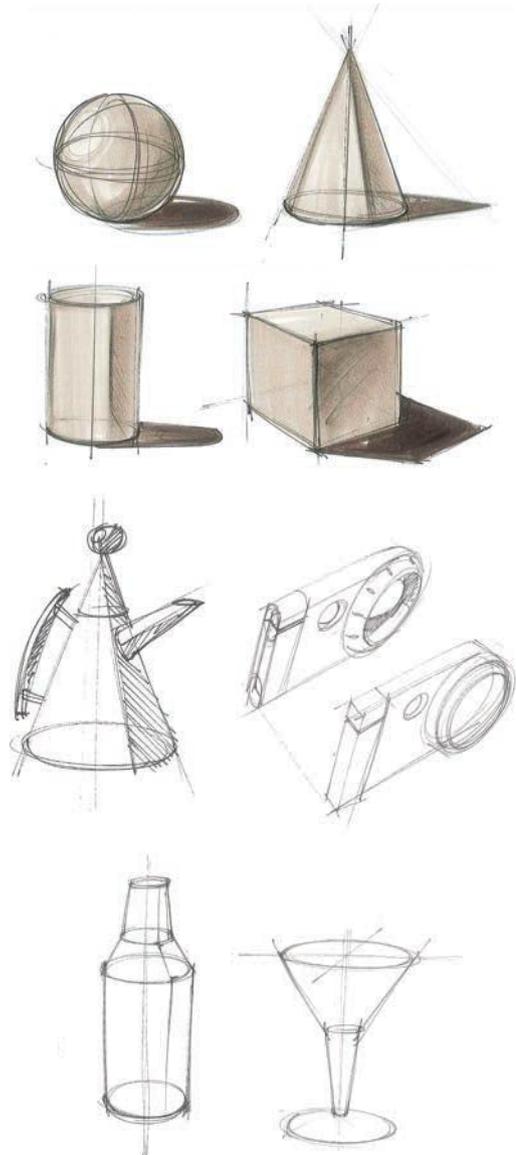
Drawing curves

Curved details on objects can be created by ellipses. The **radius**, or curved edge of the ellipse, touches the end of a straight line (or tangent). In freehand visualisation drawing, the use of ellipses to form radii or varying dimensions adds realism and emphasises complex, interesting forms.

Using the crating technique

Crating is a drawing method that utilises the basic form of an object as a skeletal structure around which the finished form can be created. When an object is broken down into its most basic shape combinations, realistic proportion and scale can be established.
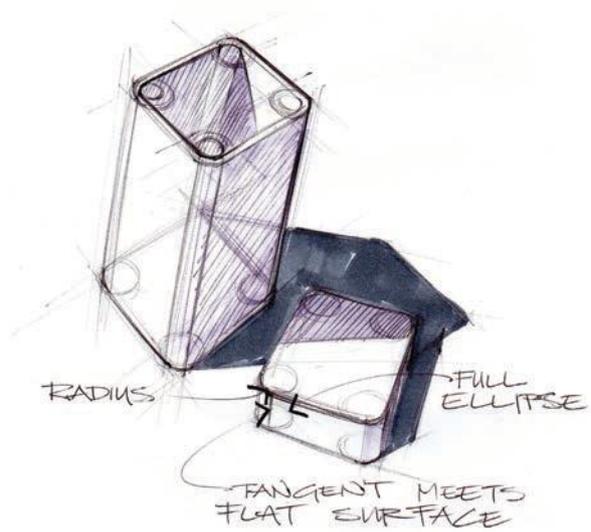
▶ Once you understand the technique of drawing curves and crating, objects take on greater realism.
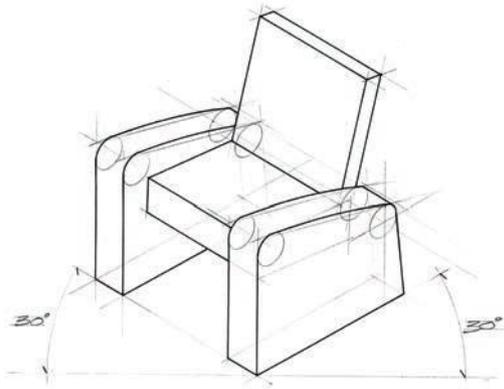
▶ Isometric drawing of a club armchair using the crating method
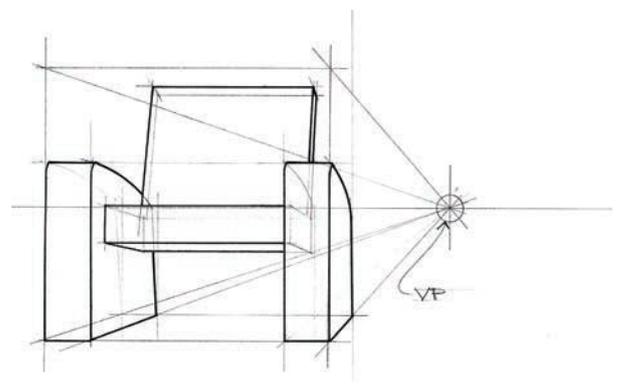
▶ One-point perspective drawing of a club armchair using the crating method
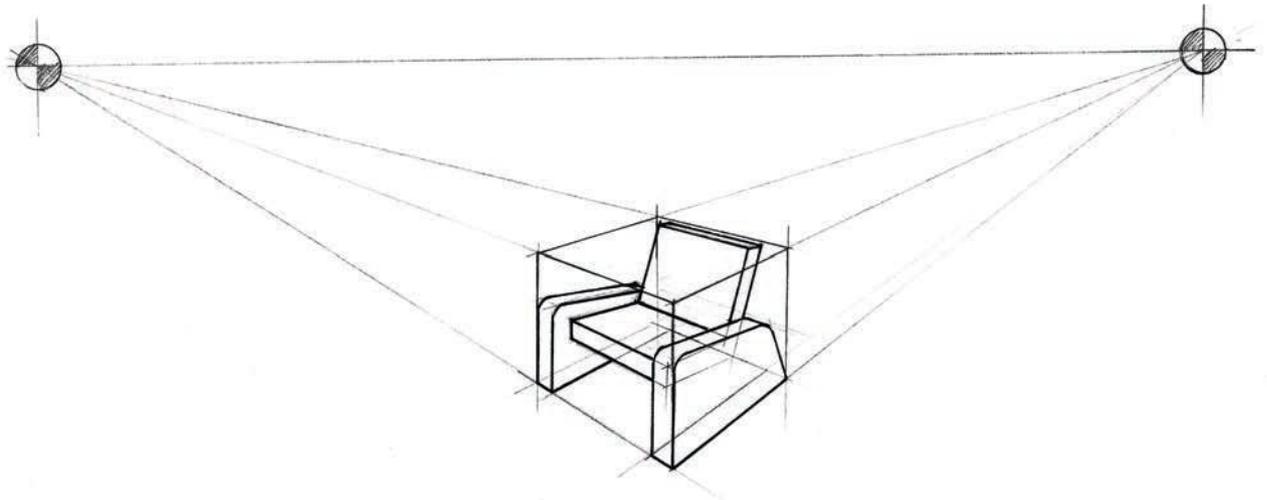
▶ Two-point perspective drawing of a club armchair using the crating method

Dividing perspective objects

To divide perspective objects, divide the plane of the object by using diagonal lines. Where those lines intersect is the centre of the plane.

Once a perspective plane has been divided, it is possible to add details that form more complex objects while maintaining appropriate proportions.

Intersection of diagonal lines is the centre of the perspective plane
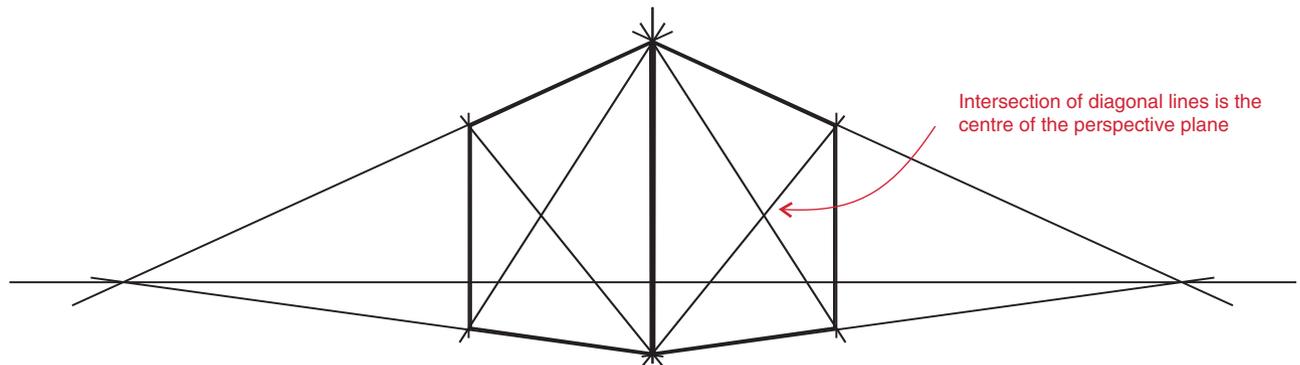
3.2 TWO-DIMENSIONAL DRAWING

Two-dimensional drawings provide a clear means of communicating information about the appearance, assembly, function or construction of an object. Two of the most commonly utilised methods of two-dimensional drawing are orthographic drawing and development drawing.

Imagine that your innovative new design for a bicycle is to be manufactured in a non-English-speaking country. You will need to ensure that the technical drawings you provide to the manufacturer are clear and contain all relevant details. Your drawings will need to convey information in a visual language that both you and the manufacturer can understand. Similarly, in the design of a building, the plans that are provided by an architect to a builder need to be clearly understood.

Two-dimensional drawing practice adheres to rules set out by a regulatory body, which creates a consistent approach to the communication of technical information. These rules are known as 'standards' and are set in Australia by Standards Australia. The use of standards means that a design can be manufactured to precise specifications without misinterpretation or misunderstanding.

For students of QCE Design, the relevant standard is Technical Drawing for Students (SAA/SNZ HB 1-1994)

and is available for purchase online. Other relevant Australian Standards include AS 1100.101-1992, AS 1100.201-1992 and AS 1100.301-2008.

TWO-DIMENSIONAL DRAWING IN INDUSTRIAL DESIGN

An industrial designer needs to produce clear technical drawings so that an engineering firm can manufacture their product. It is also necessary for the designer and the engineer to speak the same technical language, so that the product can be manufactured successfully.

Over many years, as the information conveyed in technical drawings has become more complex, a universal technical language has evolved. Using recognised standards and conventions established by a regulatory body, it is possible for the visual information and ideas, concepts and finished designs to be clearly understood throughout the world.

Two-dimensional drawings provide a clear means of communicating information about the appearance, assembly, function or construction of an object using multiple views of its form and structure. Two-dimensional drawing can be a test of your visual thinking skills, as drawing an object that you perceive as having three dimensions (height, width and depth) in only two dimensions (height and width) can be challenging.
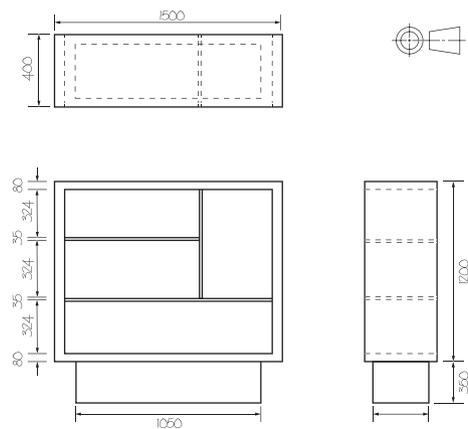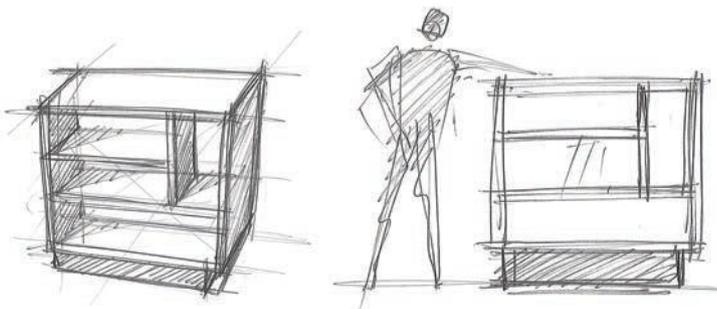
▶ Freehand sketch of shelving unit translated into an orthographic drawing. The orthographic drawing features visual and written information that assists in the manufacture of the product.

MEASUREMENTS IN MM
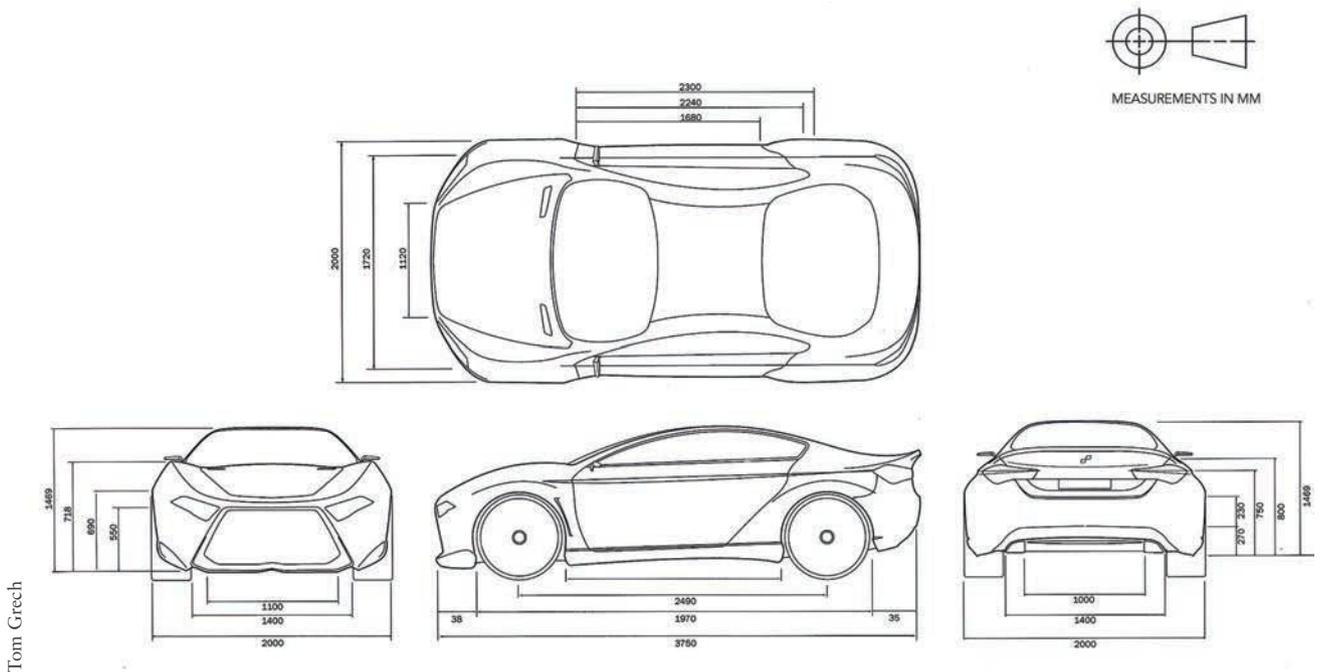
▶ Two-dimensional (orthographic drawing) of a motor vehicle

A two-dimensional drawing may be used at various stages of a design process, either as freehand sketches of views of the object in order to explain the design concept, or as a finished technical drawing with dimensions and section view included.

Orthographic drawing

Orthographic drawing is sometimes referred to as multiview drawing. A series of drawings – known as 'views' – are drawn to show every part of the object clearly. Orthographic drawings are widely used by designers, engineers, builders, architects and manufacturers to specify the precise details of objects to be constructed or manufactured.

The application of orthographic drawing is strictly regulated by a set of formal standards. These guidelines, published by Standards Australia, ensure that everyone interprets the drawing in the same way. (Note that orthographic drawing is referred to as 'orthogonal drawing' in the Australian Standards.)

Orthographic drawings usually show the number of views needed to provide the maximum amount of information. The key is to ensure that there is enough visual information evident on the depicted views to avoid any confusion. Three views – the front, top and one of the sides – will usually provide enough information for the drawing to be read clearly and understood. Of course, there may be times when more than three views are necessary.
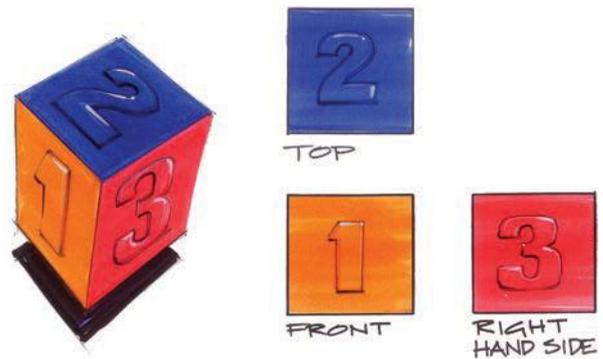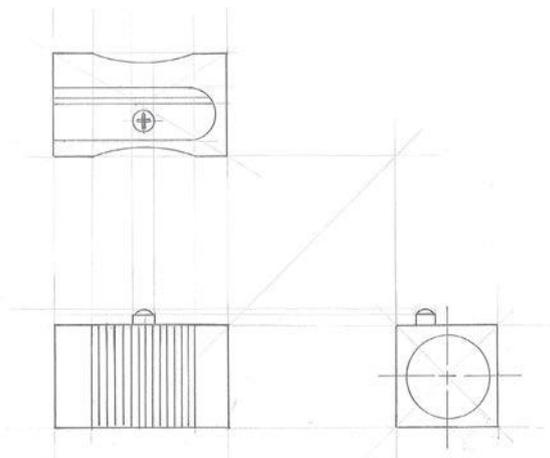
The placement or arrangement of views in an orthographic drawing is extremely important. The common arrangement used in Australia is known as **third-angle projection**, which means that each view is positioned in the drawing so that it represents the side of the object in the view beside it. For example, the right-hand side view of the object is positioned on the right-hand side of the front view.

First-angle projection is used in some countries and represents objects quite differently. In a first-angle projection drawing, the right-hand side of an object would appear on the left-hand side of the front view. In Australia, third-angle projection is the preferred method of orthographic representation, so never apply first-angle projection.

To indicate that third-angle projection has been used, a symbol appears on the drawing.
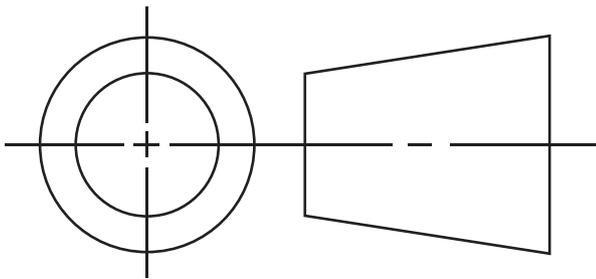
▶ The third-angle projection symbol. This should appear on all third-angle orthographic drawings.

When drawing in third-angle projection:

+ All views should be aligned.
+ The top view is always situated above the front view.
+ The right-hand side view appears on the right-hand side of the front, and the left-hand side appears on the left of the front view.
+ You may be asked to appropriately label each view of an orthographic drawing; for example, FRONT VIEW, TOP VIEW, SIDE VIEW. If so, labels should be placed centrally under each view and written in upper-case type.
+ The third-angle projection symbol must always be included on your drawing.

SEEING IN TWO DIMENSIONS

The best way to visualise an orthographic drawing is to imagine that the object is contained within a transparent box, and each part of the object can be seen on a different side of the box. This may help you to gauge how the object might look if the box were flattened out into a two-dimensional shape.
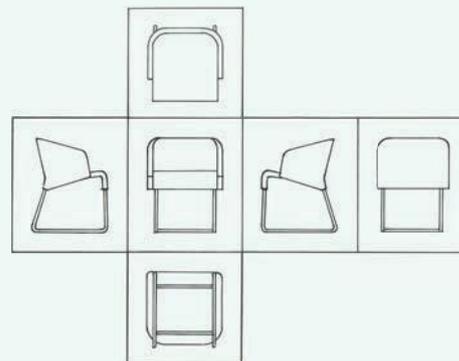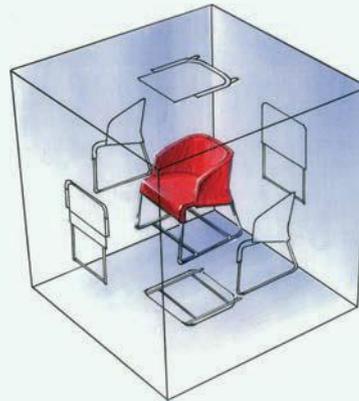
FINDING THE FRONT VIEW

In many tasks, an arrow will indicate the front view of a three-dimensional object. This should be the view that shows the greatest amount of relevant detail about the length and height of the object. In an orthographic drawing of a car, for example, the front view would show one side of the car, rather than the actual front of the car (with headlights, windscreen, etc.).
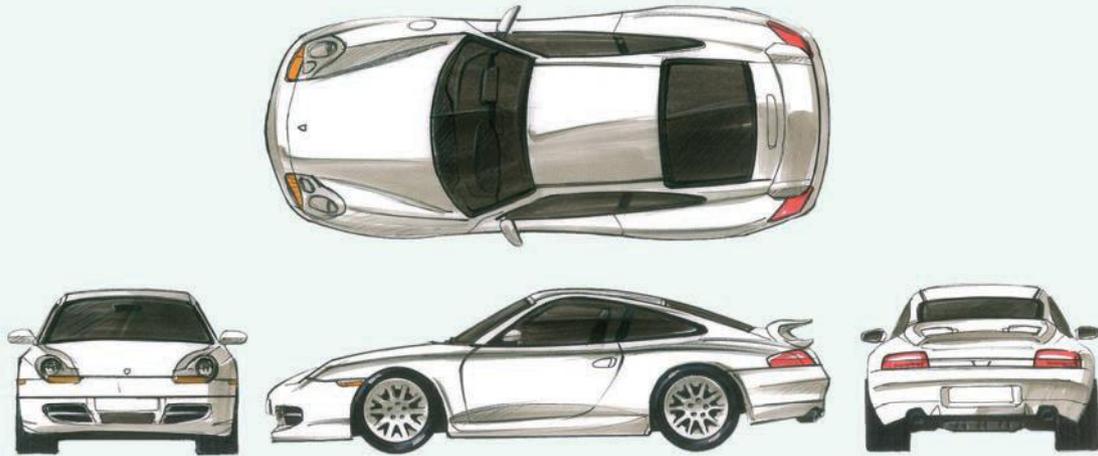
A STEP-BY-STEP GUIDE TO ORTHOGRAPHIC DRAWING

A simple method of constructing an orthographic drawing of this three-dimensional form is outlined below. Remember to align your views correctly.
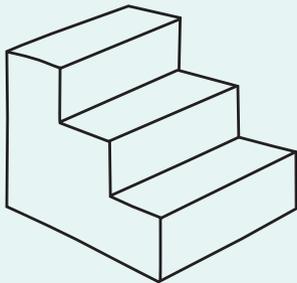
Step 1: Draw the FRONT view of the three-dimensional object.
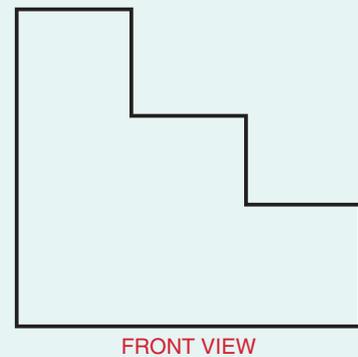
FRONT VIEW

Step 2: Draw light projection lines to project all relevant detail. The TOP view is drawn approximately 40 mm above the FRONT view.

40mm distance between views
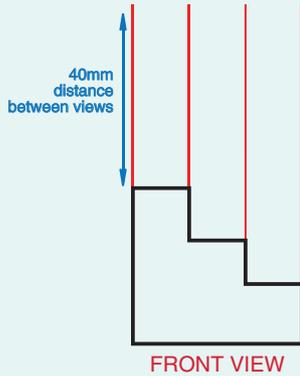
FRONT VIEW

Step 3: Complete the TOP view using the projection lines as references.
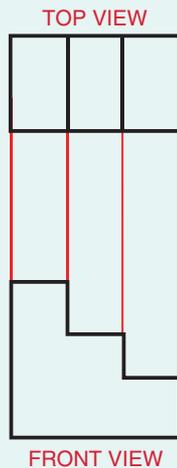
TOP VIEW

FRONT VIEW

Step 4: Draw projection lines across from the FRONT view to form the SIDE view.
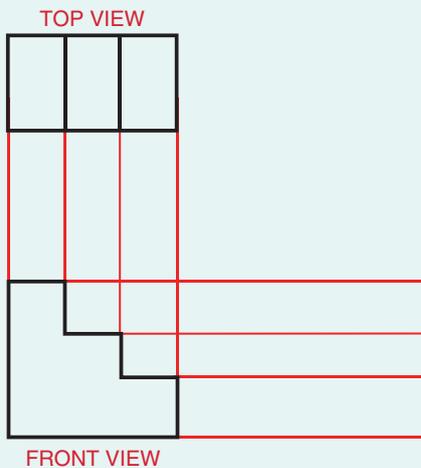
TOP VIEW

FRONT VIEW

Step 5: Draw a 45° angle at the intersection of the last projection lines on the FRONT view.

TOP VIEW

45°

FRONT VIEW
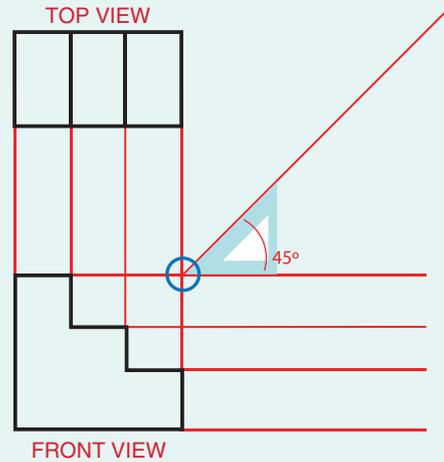
Step 6: Project lines across from the TOP view. Where they intersect with the 45° line, draw vertical lines down to form the SIDE view.

TOP VIEW

FRONT VIEW
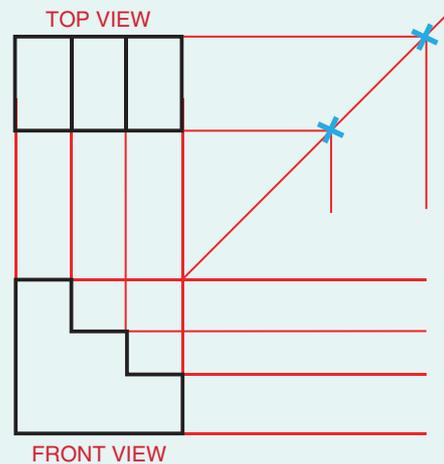
Step 7: The projection lines will make completing the SIDE view straightforward.

TOP VIEW

FRONT VIEW
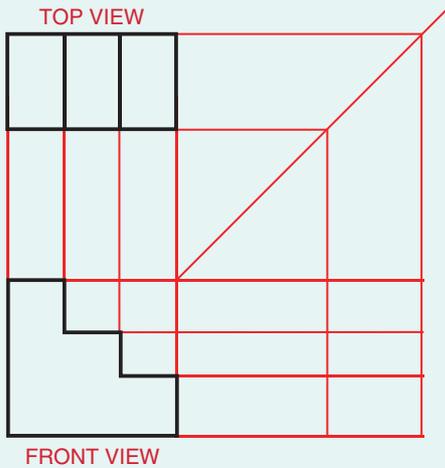
Step 8: Complete your drawing by outlining the SIDE view. Once your drawing is finished, you can remove the projection lines or trace onto a clean sheet of paper for presentation.

TOP VIEW

FRONT VIEW   SIDE VIEW
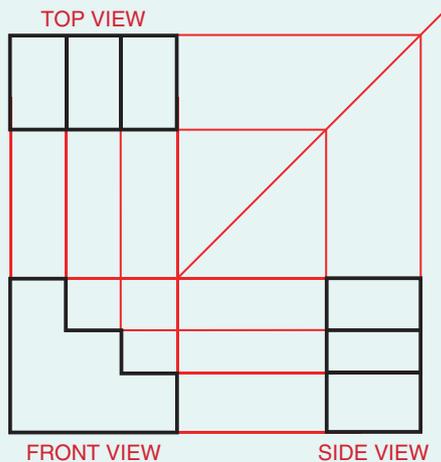
USE A GRID

If you are creating a hand-drawn draft of your orthographic drawing before moving onto a **CADD** (computer-aided design and drafting) program, try using grid paper for your initial drawings, as this can help you to align views correctly and keep your line work accurate. Once you have the drawing exactly right on the grid paper, you scan it to use on the computer.

Line conventions

The use of line in orthographic drawing is significant as each line weight and type holds a specific meaning. The width of lines indicates essential information, such as whether details are visible or hidden.

Generally, only two line thicknesses – thick and thin – are used within one drawing. When providing extremely detailed information, architects and drafting professionals sometimes use medium lines as well.

▶   Line conventions and applications in orthographic drawing

Orthographic drawing	Line type	Application
▬▬▬▬	A thick continuous line	Used to show visible outlines
─────	A thin continuous line	Used to draw: • dimension lines • projection lines • hatching • short centre lines • general symbols • fictitious outlines
- - - - -	A thin broken line	Used to show hidden details
─ · ─ · ─ · ─	A thin chain line	Used to show centre lines
— — — —	A thin broken line, thick at ends	Used to show a cutting plane
∼∼∼	A thin freehand continuous line	Used to show a break in a view, especially when drawing large objects

Scale

Every orthographic drawing must be drawn in proportion to the original three-dimensional object. The **scale** must be applied consistently throughout the drawing and indicated on the page.

Australian Standards provides recommended scale ratios for a consistent approach in two-dimensional drawing. The first numeral in the ratio indicates a measurement on the drawing, while the second numeral indicates the equivalent measurement on the actual object. For example, a scale of 1:5 indicates that 1 unit of measurement on the drawing represents 5 units on the actual object, so 1 mm on the drawing is equal to 5 mm on the object itself.

An orthographic drawing that shows actual size should indicate a scale of 1:1. Drawings that depict objects at smaller than actual size should be drawn using one of these scale ratios:

1:2	1:20	1:200	1:2000
1:5	1:50	1:500	1:5000
1:10	1:100	1:1000	1:10 000

For drawings that depict an enlargement of the original object, the following scales apply.

2:1	5:1	10:1	20:1	50:1

When creating an orthographic drawing, you will need to establish which scale is most appropriate and enables you to depict the maximum amount of detail.

Hidden detail

Sometimes an object features details that are internal and cannot be seen by viewing external surfaces. In these circumstances, orthographic drawing is vital in depicting otherwise hidden details.

Hidden details are indicated by a thin broken line. It is essential that this line convention be followed so that the detail is clearly understood and not mistaken for an outline.

Hidden details might appear on any of the featured views.

Front

Hidden detail is represented by broken lines approximately 2 mm line, 2 mm gap

- -
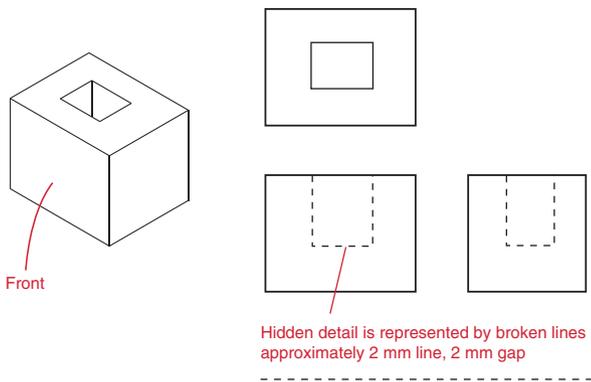
Cross-sections

The cross-sectioning of an object allows for the internal details to be clearly shown. A cross-section is literally a 'cut-through' view of an object. An imaginary cut is made at an appropriate point to display the relevant information.
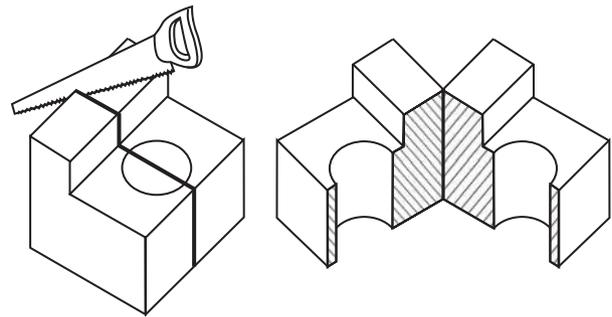
The cutting plane

The path of the imaginary cut is indicated on the orthographic drawing by a cutting plane. The cutting plane is shown as a broken line with thick lines at each end. Narrow arrowheads touch the end of the cutting plane, indicating the direction of the cut and the subsequent direction of view.
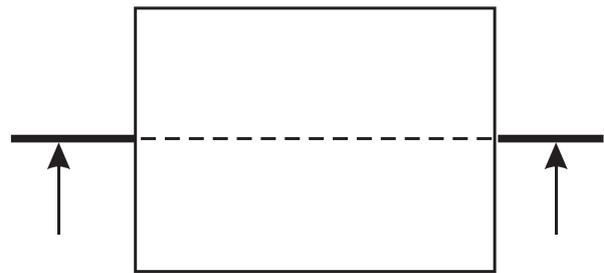
▶ A broken line indicates the cutting plane. The start and end of the cut are indicated by a short bold line.

The cutting plane is always labelled clearly. The first cross-section is labelled Section A-A, and subsequent sections are B-B, C-C and so on.

A   A
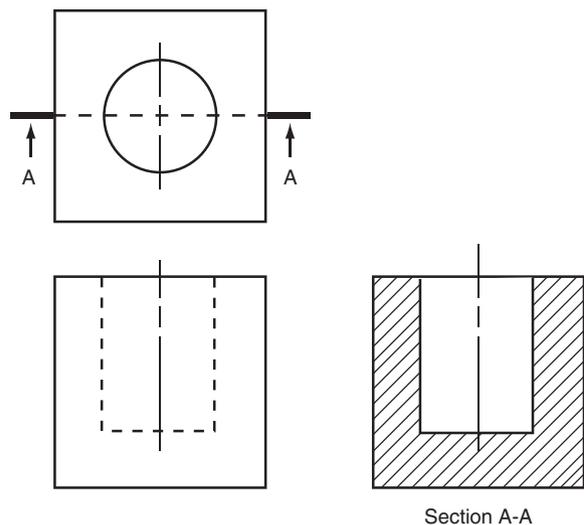
Section A-A

▶ The sections must be clearly labelled as Section A-A, Section B-B and so on, as required.

The section view is defined by the direction of the arrows on the cutting plane, and appears on an orthographic drawing at the side of the regular views.
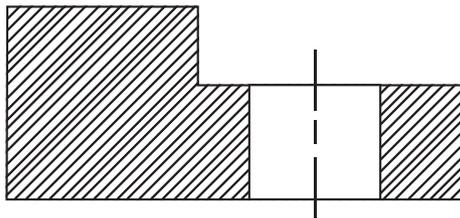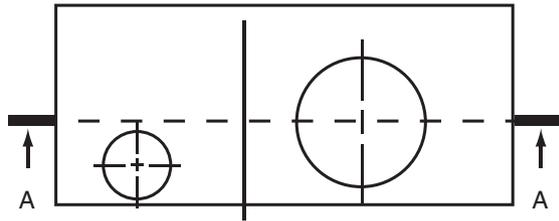
Section A-A

▶ Note that the direction of the arrows indicates the view that should be shown on the cross-section.

A

B   B

A

SECTION A-A   SECTION B-B
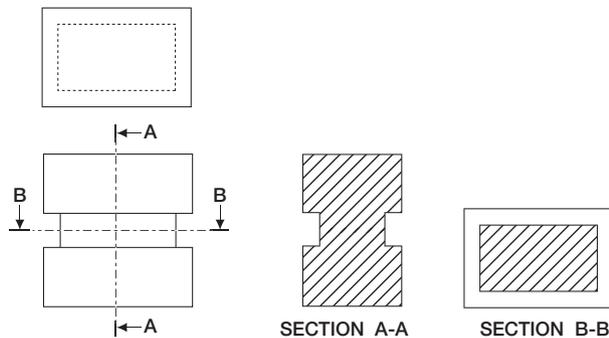
▶ Multiple section views can be shown on an orthographic drawing. Ensure that they are labelled appropriately.

Crosshatching

To show the solid areas of the object that have been 'cut', hatching is used. The hatching should be drawn at 45° and be suitably spaced relative to the area covered. It is recommended that wide spacing be used if the clarity of the technical information is not compromised. On smaller drawings, narrower spacing may be necessary. Hatching lines should be fine, to distinguish the section from the outline.
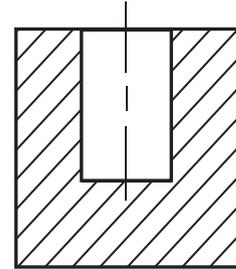
▶ The distance between hatching lines should be consistent and drawn at 45°.

Crosshatching on adjacent solid planes

Where adjacent parts of an object meet, the direction of hatching should be reversed.

Indicating large sections

Where very large sections are concerned, hatching can be limited to the areas around the outline to indicate a cut plane.
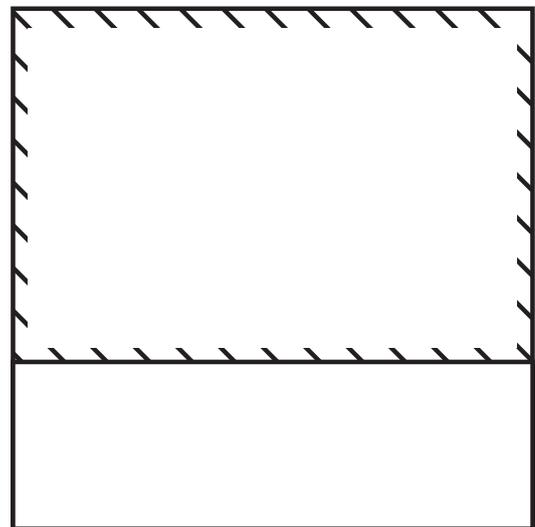
Cylindrical objects

Cylindrical objects can show internal detail by using a half section rather than a full section.
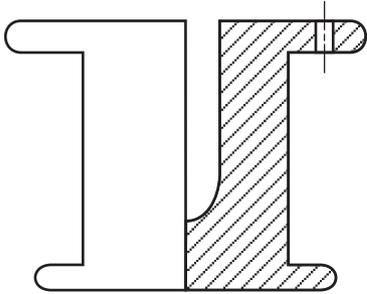
Dimensioning orthographic drawings

Dimensioning is the placement of measurements on an orthographic drawing. Like other aspects of this drawing method, there are strict conventions to be followed when dimensioning.

The key to successful dimensioning is to make sure you include every relevant measurement that is crucial to the manufacture or construction of the object.

However, it is equally important not to 'over-dimension', and each dimension should appear only once.

When you add dimensions to your drawing, make certain that you only use those dimensions necessary to clearly define the object.

Sometimes very complex objects are drawn in third-angle orthographic drawing, so it is important that the details of the drawing are very clear. Carefully plan your dimensioning so that the viewer can interpret the drawing quickly and without ambiguity.

The elements of dimensioning

+   **Projection lines:** These thin lines are placed outside the outline of the object and define the area being dimensioned. Projection lines do not touch the outline but sit approximately 2 mm from the outline edge.
+   **Dimension lines:** These are also thin lines and have thin, closed arrowheads at either end. The head of each arrow touches the projection line, defining the dimensioned area. Dimension lines are drawn 10 mm from the outline of the object.

Where there are multiple dimensions in the same area, dimension lines should remain 10 mm apart. The smaller dimensions are drawn closest to the outline.
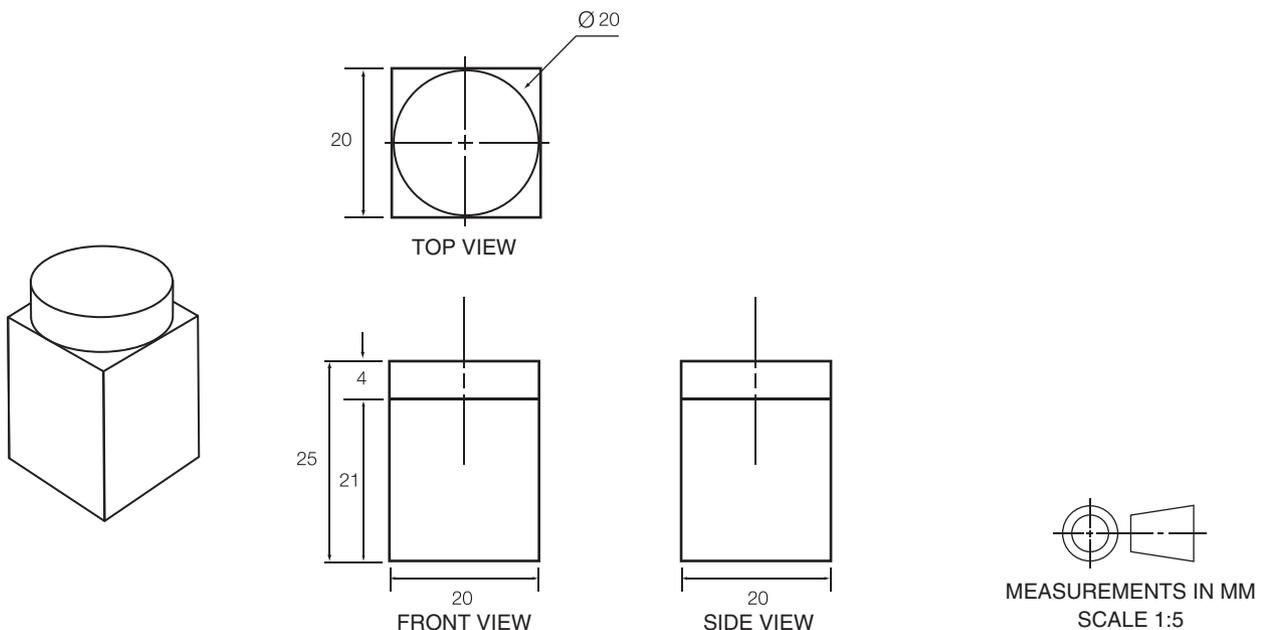
▶ Dimensioned third-angle orthographic drawing

Arrowheads
Narrow, closed and filled
arrow tip touches projection line

Dimension lines
Thin continuous line
sits approx. 10 mm from outline

Projection lines
Thin continuous line
Starts 2 mm from the outline

Outline
Thick continuous line

Position
Smaller dimensions are
placed closer to the outline
than larger dimensions

100

20   35   45

Dimensions
Face the viewer.
Only the dimension is shown,
not the unit of measurement

70

Placement
Dimensions sit outside
the dimension line, *not*
between the outline and
dimension line

20

MEASUREMENTS IN MM

▶   Elements used in dimensioning
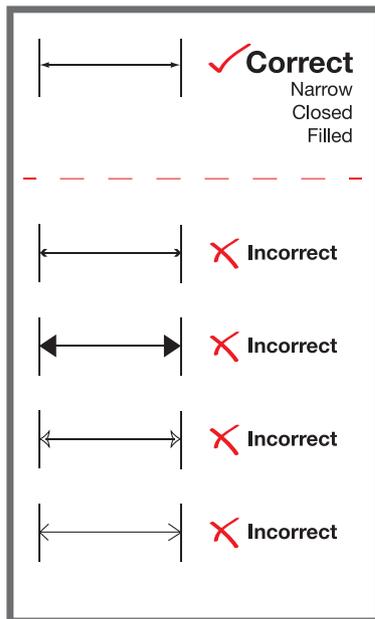
▶ Arrowheads
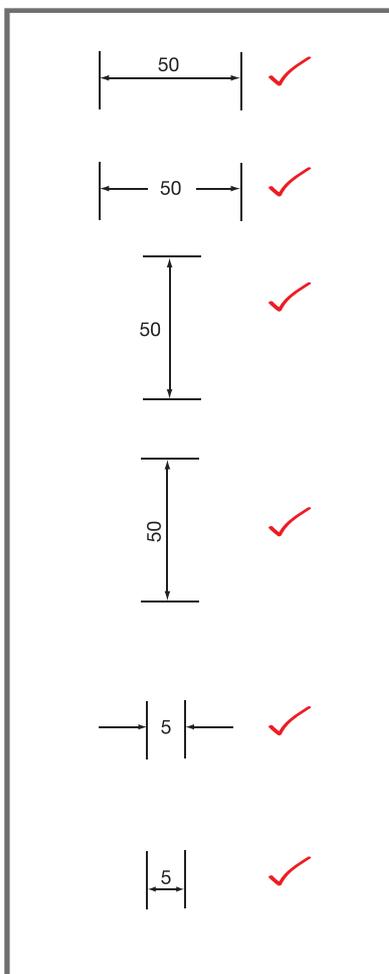
▶ Dimensions

The dimension of the object (not the drawing) is placed on or inside the dimension line. The dimension is never placed between the outline and the dimension line. The method you use when placing your dimensions is up to you (or your teacher), but clarity must be your priority. Preferred methods of representing dimensions are illustrated.

All measurements are in millimetres, and this should be indicated on your drawing by the words 'MEASUREMENTS IN MM' in UPPER-CASE letters. Don't add 'mm' to each dimension. Remember that the key is to keep the drawing as clear and uncluttered as possible.

Dimensioning circular details

Centre line

A circular or other symmetrical feature on an object is indicated by the application of a centre line. The centre line is a thin chain line that is placed through the centre of the symmetrical feature.
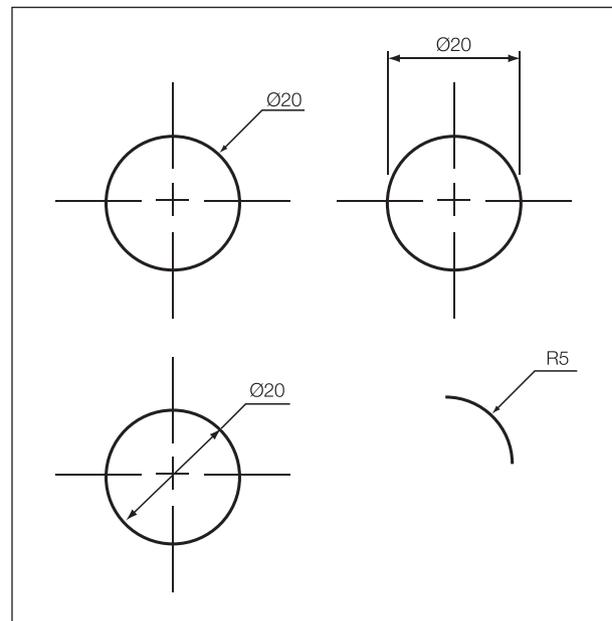
▶ Dimensioning circles

+   When dimensioning a full circle, use the symbol Ø for **diameter**.
+   When dimensioning part of a circle (an arc), use R for radius.
+   The dimension lines with a single arrowhead used in the dimensioning of circular details are known as **leaders**.

TOP VIEW

FRONT VIEW   SIDE VIEW

Ellen Keillar
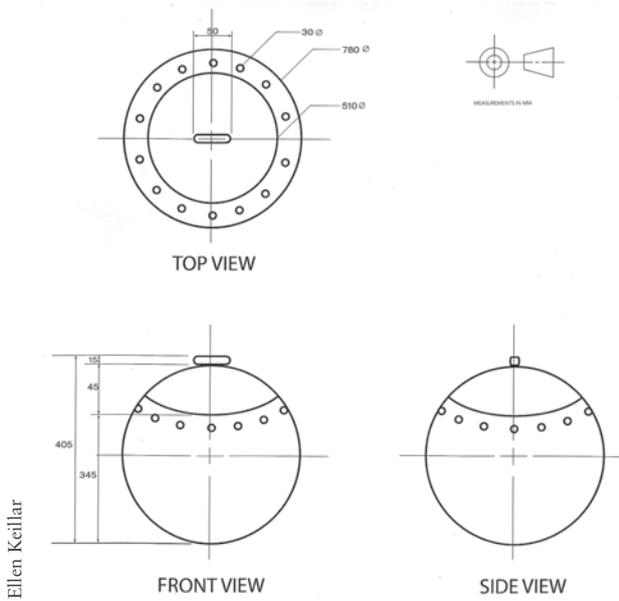
▶ Student orthographic drawing of a handbag design

Multiple dimensions

When you are working with complex objects, follow these guidelines.
+ The smallest dimensions are placed closest to the outline.
+ Larger dimensions sit at least 10 mm away from the smaller dimension.
+ At all times, remember to keep your orthographic drawing as uncluttered and clear as possible.

Dimensioning sections

Dimensions specific to the section can be shown on the section view, but the standard rule for dimensioning applies: don't over dimension. Dimensions that appear on the three regular views do not need to be shown on the section view.

Leaders – the continuous thin lines with an arrowhead – are used to indicate dimensions of any details that may otherwise be awkward to represent. Leaders are also used for notes within an orthographic drawing.

▶ Dimensioning sections

Smaller dimensions sit closer to the outline
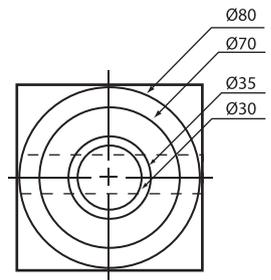
▶ Dimensioning of a complex shape
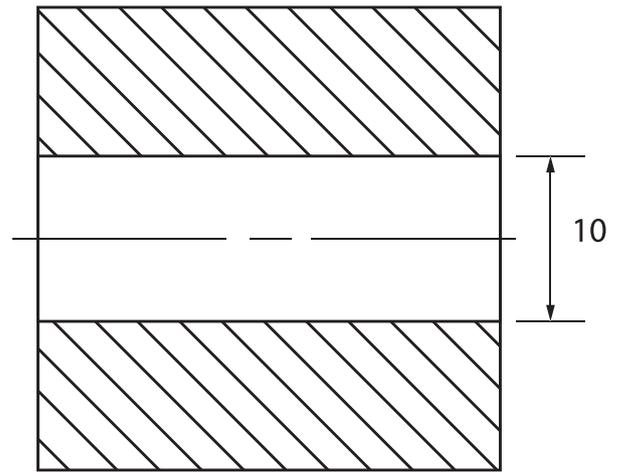
USING LEADERS
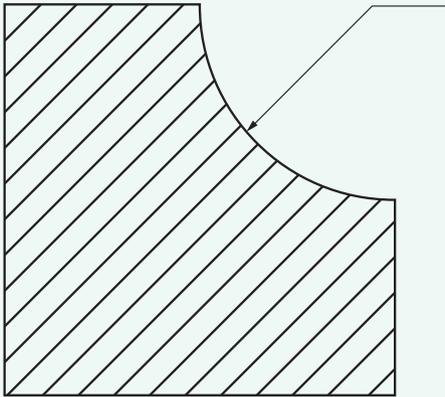
- A leader has a narrow arrowhead, similar to a dimension line.
- The tip of the arrowhead touches the outline.
- The leader is drawn at 45°.
- Leaders should be short and never overlap. (Dimensions may be repeated to avoid this.)

Dimensioning details

Angular features

When indicating the angle of a feature, dimensions should be expressed in degrees and decimal parts, such as 33° or 33.5°. If the angular measurement is less than 1°, include a zero before the decimal point (i.e. 0.3°).
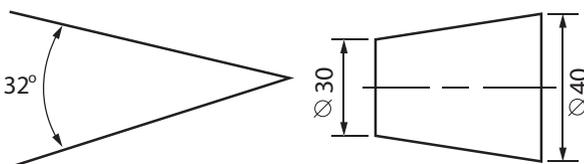
▶ Note that the dimensions are set vertically. This is often applied to save space on a drawing. Keep in mind that the placement of dimensions should be consistent across a drawing.

Tapered features

The following symbol indicates a tapered feature. The symbol indicates the direction of the **taper** and the ratio of taper to the diameter, and should be used whenever a tapered detail is shown in an orthographic drawing.

Symbol for tapered feature

Ratio of taper to diameter
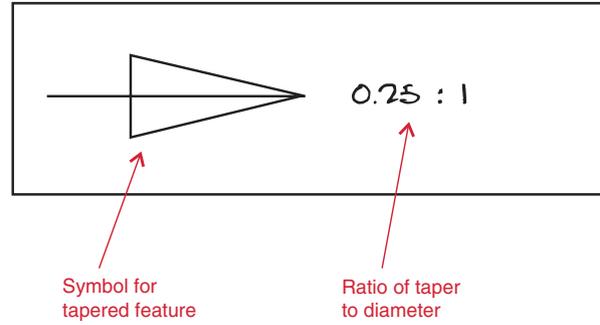
Dos and don'ts of dimensioning

Do	Don't
Ensure that your projection lines and dimension lines are thinner than the outline.	Write 'mm' next to individual dimensions. Instead, write the sentence 'MEASUREMENTS IN MM' elsewhere on your drawing.
Keep your line widths consistent.	Cross dimension lines or projection lines with other lines unless it is absolutely unavoidable.
Dimension on the view that shows a detail most clearly.	Use a centre line as a dimension line.
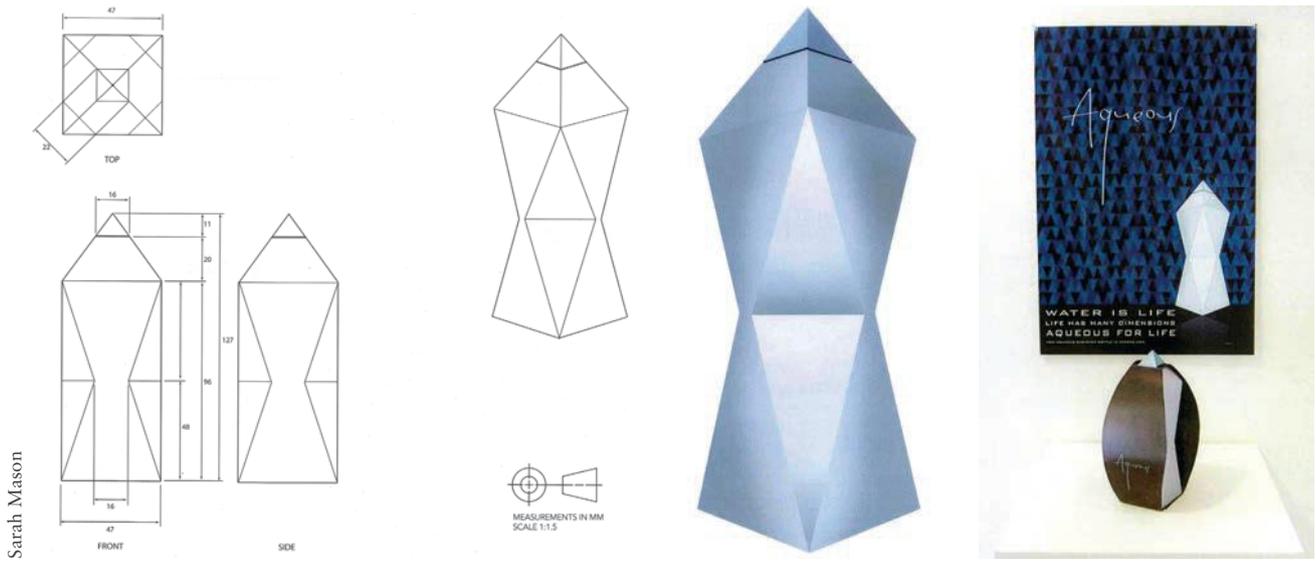
Sarah Mason

▶ In her design for a drink bottle, this student created two-dimensional and three-dimensional representations and a 1:1 scale model with packaging.

PACKAGING NETS AND DEVELOPMENT DRAWINGS

Development drawings are a method of two-dimensional drawing used when an object is to be manufactured from a single piece of material. Also known as a net or packaging net, these drawings provide information about the form of an object to be created from material such as cardboard or sheet metal. Examples include cardboard boxes used for packaging and a point-of-sale display.

Within development drawings, the representation of lines has great significance. Each line has a different meaning and it is essential that the person viewing the drawing can understand the meaning of each line. Where do I cut? Where do I fold? What is to be discarded and what is to be kept?

+   Broken lines indicate the folds of an object.
+   A solid line indicates the cutting edge.
+   If the object is to be glued, a row of black dots indicates the glue area.
+   Areas where adhesive is required, or where folded areas interlock to create the form of the object, are called tabs.
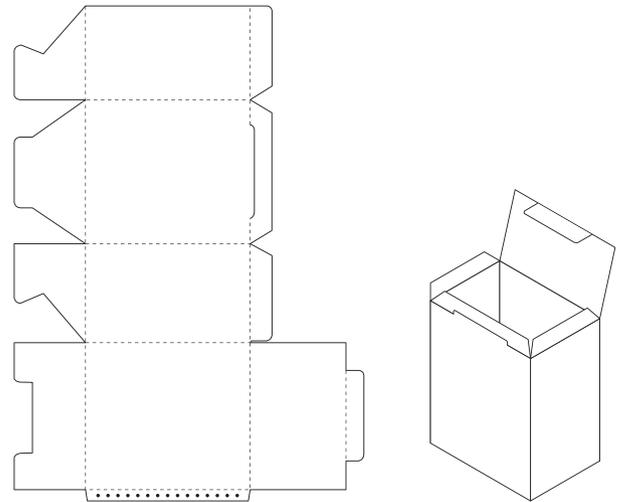
▶ Development drawing of packaging. Note the line and symbol conventions: black dots indicate glue lines, broken lines indicate folds and solid lines indicate cuts.

DIELINE

The Dieline is a site dedicated to the design of packaging. View award-winning and innovative packaging designs from around the world.

PATTERNS AND FLAT DRAWINGS

Two-dimensional drawing in fashion design

Flat drawings

Drawing in fashion design is key to explaining the appearance, textures and features of garments and accessories. We are used to seeing fashion sketches that appear to be loose, gestural images that depict the form of a garment, often displayed on an elongated human figure. Fashion designers apply multiple drawing methods, but one of the most common methods is flat drawings. These simple, two-dimensional line drawings serve as the basis for the manufacture of garments. We live in an era of mass-produced fashion, and flat drawings are an essential tool used for the clear communication of design between designer and manufacturer. With fast turnarounds and rapid changes in trends and styles, flat drawings are the most common fashion drawings in use today. Usually created using a sketch and then refined in a **vector** program such as Adobe Illustrator, flat drawings show all features of a garment in two dimensions.
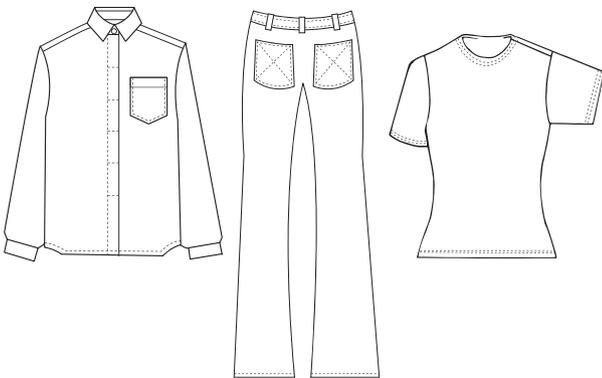
▶ Flat drawings are used in fashion design to specify the appearance and features of a garment.

Patterns

In the production of fashion, the term 'pattern' refers to the the design of a garment, created in paper. The paper pattern is placed over fabric for cutting and, once cut, is sewn together to create a garment. Patterns include information about seams and other garment features such as darts, gathers, pleats and tucks. Paper patterns use a unique visual language to how and where the pattern should be placed onto fabric; notches or small arrows are used to direct the placement and cutting of fabric. In professional design

contexts, specialist pattern makers are employed to devise and create functional patterns to help realise the vision of a fashion designer.

Getty Images/ClarkandCompany

Two-dimensional drawing in environment design

Technical drawings of floor plans and elevations are used in environmental design, which, along with computer-generated, three-dimensional images, create representations of spaces and structures that do not yet exist.

Drawing for the environment – in architectural design, interior design and landscape design – involves the application of a range of conventions. These are standard approaches that enable the viewer to understand the meaning of a drawing. The depiction of a door on an architectural plan, for example, has a standard appearance that helps us to understand what it represents.
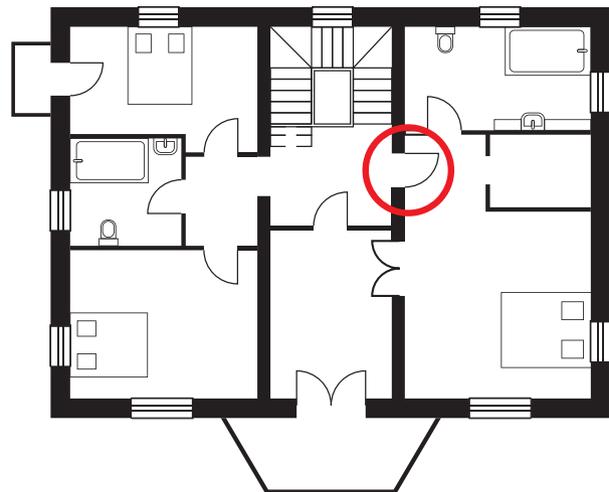
▶ Architectural floor plan indicating the symbol for a door

Two-dimensional methods are applied at various stages of the design process and may be used to visualise ideas in the early stages, as well as assist construction with refined technical drawings in the latter stages.
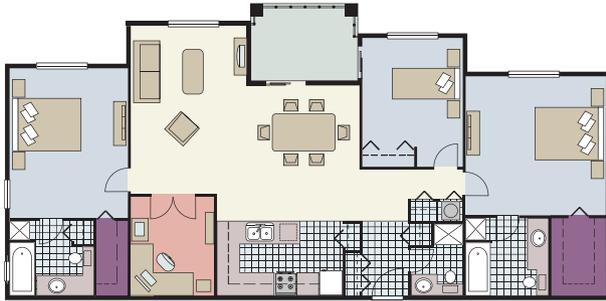
▶   Two-dimensional drawing of a floor plan

Plans and elevations

In environmental design, plans and elevations are typically used to convey visual information about a three-dimensional design. Plans are the equivalent of the top view in orthographic drawing, and elevations show the front and side views.
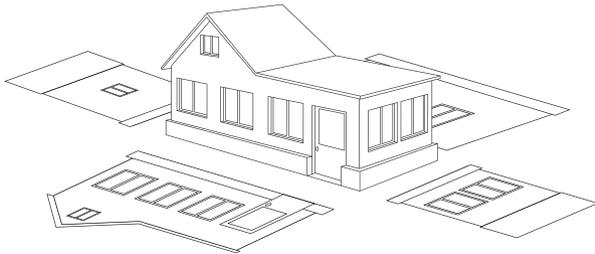
Plans and elevations designed for the purpose of construction are usually line drawings whereas plans and elevations designed for presentation can be much more detailed and may include colour, shadows, textures and backgrounds. Plans are often used in real estate advertising and online, to enable potential purchasers or tenants to see the floor plan of a property.

Drawing the plan view

There are a number of conventions used in representing architectural details in two dimensions. One of most common conventions is the use of symbols to describe features. Although their visual appearance may differ slightly if the drawing is completed by hand or via digital means, the meaning remains the same.

▶   Real estate advertising board showing floor plans

Symbol conventions

Symbols should be drawn to the same scale as the plan and, where possible, be used without a text label or abbreviation. Many details of a plan, such as domestic appliances (dishwasher, refrigerator, wall oven), are indicated by a rectangle with a diagonal line and may require an abbreviation for clarity.
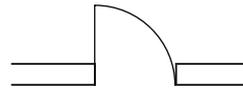
▶   Door and window symbols

Bath
Toilet
Basin
Shower
Vanity
Bed
Cooktop
Appliance e.g. dishwasher
Sink
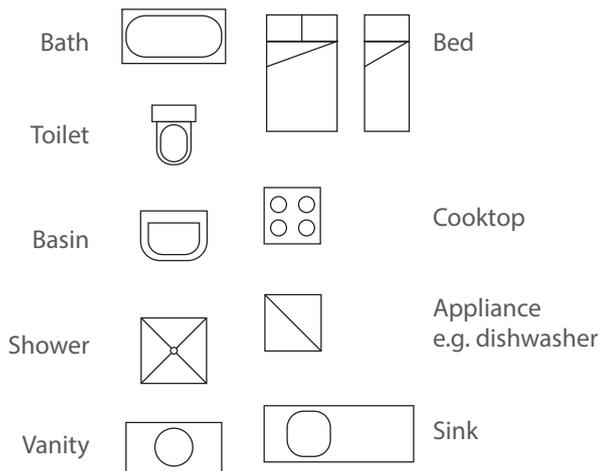
▶ General symbols. Note that the symbol used for general appliances, such as dishwashers and fridges, requires an abbreviation (see table) to identify its purpose.

CADD programs offer many examples of architectural symbols and these can assist in adding meaning and function to the drawing of a space. However enticing it may be to fill a plan view with details, always remember to err on the side of clarity.

Abbreviations

Abbreviations are used to label the features and fixtures used in a design.

▶ Examples of abbreviations used in plan and elevation drawing

Word	Abbreviation
Aluminium	AL
Bookcase	BC
Brick veneer	BV
Brickwork	BWK
Cement render	CR
Ceramic tile	CT
Clothes drier	CD
Washing machine (clothes washer)	CW
Cooker	C
Corrugated	CORR
Cupboard	CPD
Dishwasher	DW
Door	D
Down pipe	DP
Floor waste (bathroom/laundry)	FW
Heater	HTR
Hot water unit	HW
Linoleum	LINO

Word	Abbreviation
Open fireplace	OFP
Refrigerator	R
Roller shutter	RS
Shower	SHR
Stainless steel	SS
Terracotta	TC
Toilet	WC
Urinal	U
Vinyl	V
Wardrobe	WR
Weatherboard	WB
Window	W

Note that these abbreviations do not include all materials that are likely to be used in the construction of a dwelling. Details about fittings that do not affect the structure of a building, such as floor coverings, wall coverings and interior decorations, are usually listed on a separate document.

Line conventions

Line conventions are important in environmental drawing. As in orthographic drawing, the width of lines communicates different information. Although a combination of bold and fine lines are generally applied in plan and elevation drawings, medium lines are sometimes used where a detail needs to be differentiated.
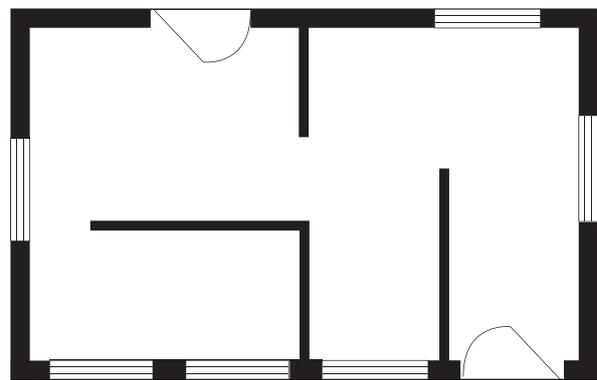
Bold lines (3 mm) indicate the outlines of structural walls and thin lines (1 mm) indicate interior walls, windows and doors. A black, filled shape, or thick outline, is used to identify wall thickness.

A STEP-BY-STEP GUIDE TO DRAWING EXTERIOR ELEVATIONS

Step 1: Establish the ground level, window height, door height and roof height of your structure and indicate these with horizontal lines.

← HEIGHT OF ROOF PITCH
← HEIGHT OF ROOF
← HEIGHT OF DOOR AND WINDOWS

← GROUND LEVEL
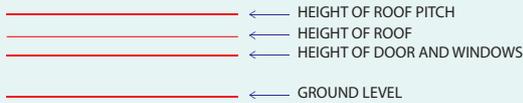
Step 2: Place your floor plan above the horizontal lines.
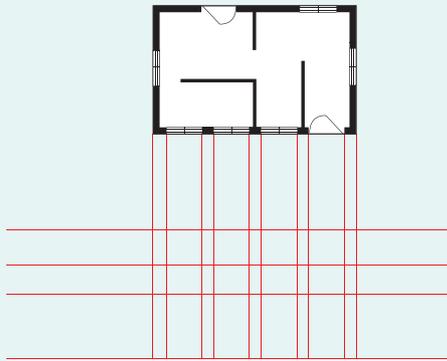
Step 3: Project vertical lines down from the plan view to indicate features such as doors, windows and external walls. Using the vertical and horizontal lines as a guide, add the details of the elevation view.
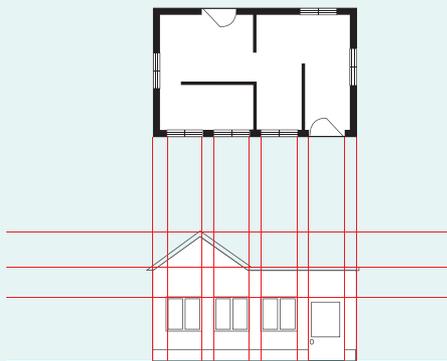
Step 4: Rotate the plan view and project lines to create the next elevation.
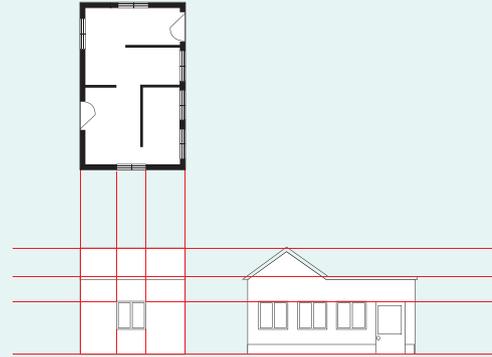
Step 5: Continue the process until all elevations are complete.
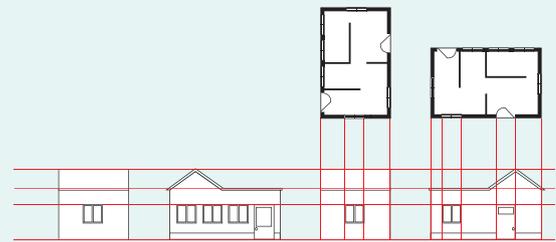
Step 6: Label each elevation in upper-case letters.
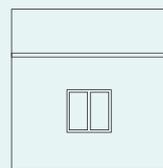
WEST ELEVATION

SOUTH ELEVATION
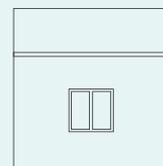
EAST ELEVATION

NORTH ELEVATION

A STEP-BY-STEP GUIDE TO DRAWING INTERIOR ELEVATIONS

Interior elevations can be constructed in a similar way to external elevations. The main difference is that the ceiling height, rather than the roof height, needs to be indicated.

Step 1: Indicate (horizontal) height and ground lines, then project (vertical) lines from the relevant section of the floor plan.
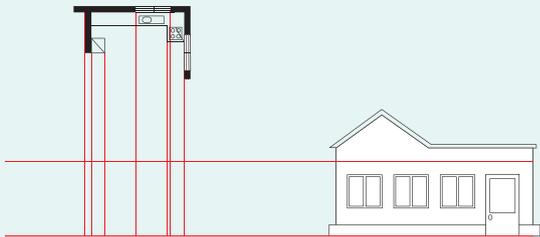
Step 2: Complete the interior elevation.
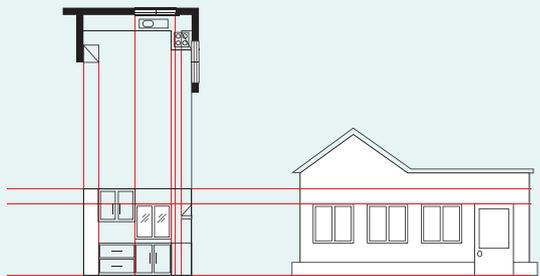
Step 3: Title the elevation in upper-case. Usually the title explains the room purpose (e.g. KITCHEN, LAUNDRY). When there are multiple elevations of the same room, the title may also indicate direction (e.g. KITCHEN WEST ELEVATION).

KITCHEN

Scale

The same scales that are used in industrial design are also applied to architectural drawing:

Reduction scales

1:2	1:20	1:200	1:2000
1:5	1:50	1:500	1:5000
1:10	1:100	1:1000	1:10 000

Enlargement scales

2:1	5:1	10:1	20:1	50:1

The most common scale applied in architectural drawing is 1:100.

Drawing elevations

Unlike orthographic drawings, which are identified as 'Front', 'Top' and 'Side' views, elevations are usually named for the direction they face: 'North', 'South', 'East' and 'West'.

To create elevations, it is necessary to have a completed floor plan drawn to scale. The floor plan is used for the projection of lines to create the elevation views. The elevations are usually drawn to the same scale as the floor plan.

You also need to establish the roof height of your structure prior to drawing the elevations.

Dimensioning plans and elevations

There are usually many more dimensions on an architectural drawing than on an orthographic drawing, so the method of dimensioning differs.
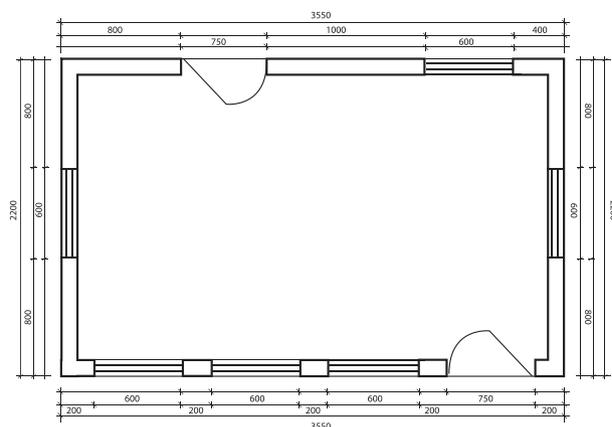
Projection lines extend from the outline by 2 mm. Dimension lines are required for all features of the structure. Smaller dimensions sit closest to the outline; for example, doors and window details.
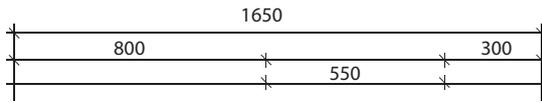
Instead of arrowheads, 45° strokes (2 mm long) are used to indicate the beginning and end of a dimensioned area.

Section views

As in orthographic drawing, section views (shown at the bottom of the page) are used to show detail that cannot be seen on a regular plan or elevation view. Section views can expose the structural features of a building and depict the internal configuration of spaces. Typically, section views use a thick outline to indicate the cut surfaces and progressively lighter line weights to show interior details.

Rendering plans and elevations
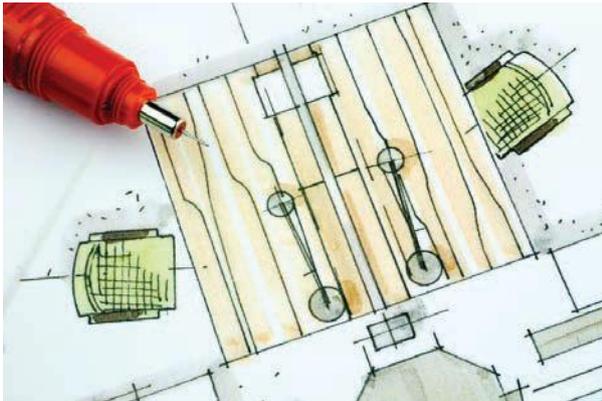
In environmental drawing, many exterior and interior elevations feature representations of materials. Architects and interior architects often render elevations to convey visual information about the materials and textures that will appear in the design.

CADD programs also offer rendering options, as well as options for depicting textures such as wood, metal, stone, glass and fabric.

From simple dot and line rendering that depicts textural detail to fully rendered representations of each material used, the use of rendering is often determined by the purpose of the final drawing.

For more information about representing materials, see Chapter 4.

Landscape design

In landscape design, plan views are an integral part of the design process. A landscape plan view provides an overview of a site and may indicate areas for landscaping, construction and planting. It may be a hand-drawn or computer-generated line drawing or fully rendered presentation.

Shutterstock.com/Scott E. Feuer

A landscape plan often includes **annotations** that indicate the nature of a planting scheme or the specifics of the materials to be used in the construction of a feature. Elevations are also used to illustrate the appearance of views within the landscape design. Like architectural drawings, landscape designs are drawn to scale.

SECTION A
WEST ELEVATION
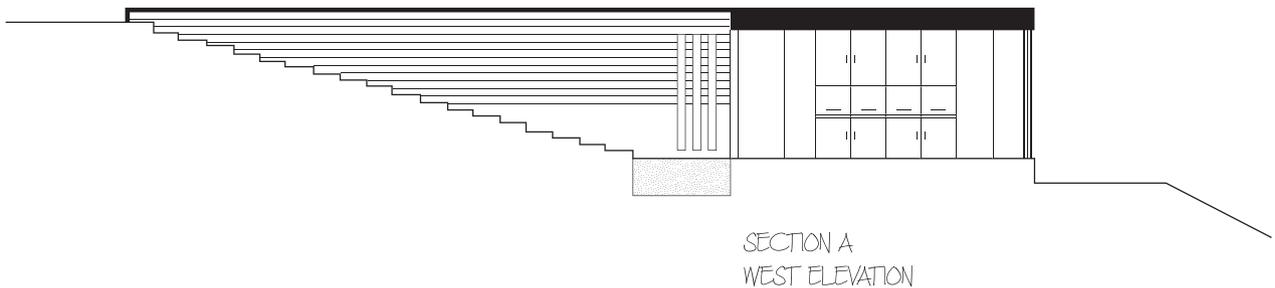
CHAPTER RECAP

1   Identify which three-dimensional object corresponds with the development drawing.
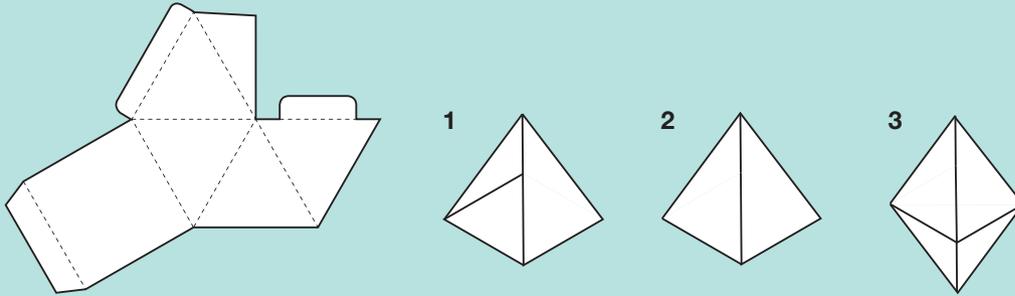
2   Identify the glue line, fold lines, cutting lines and tabs on this development drawing.
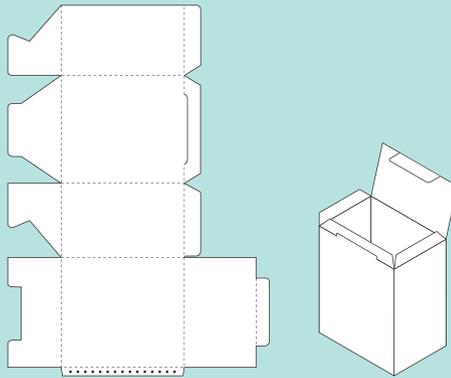
3   Select the correct views in the pictured orthographic drawings. Indicate your answer by circling the letter that sits below the correct third-angle projection.

a   Select the correct right-hand side view.
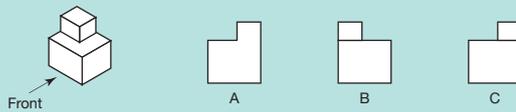
b   Select the correct front view.
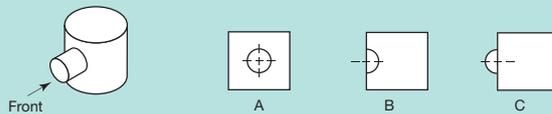
c   Select the correct top view.
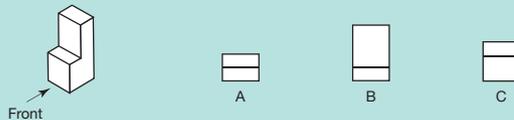
d   Select the correct front view.
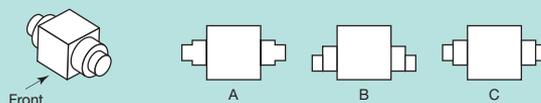
4 Select the correct set of views. Indicate your answer by circling the letter that sits below the correct third-angle projection.

a

A   B   C

Front

b

A   B   C

Front

c

A   B   C

Front

d

A   B   C
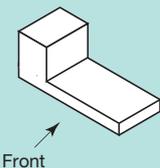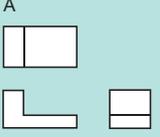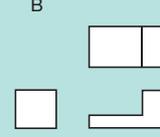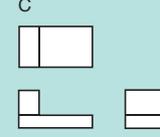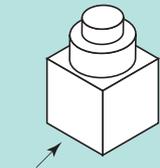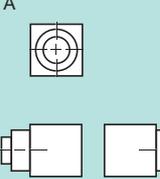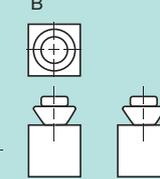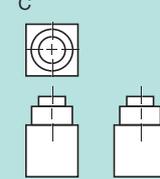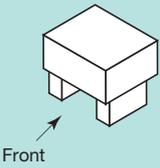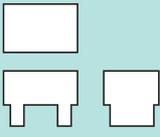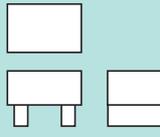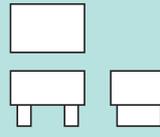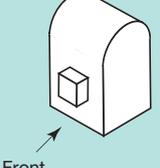
Front
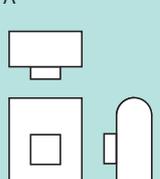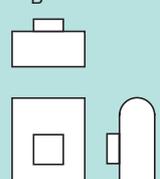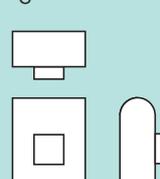
5 Draw and dimension the following object as an orthogonal drawing at a scale of 1:10. Dimensions have been provided for you. All dimensions are in mm.

200

100

550

100

100

500

350
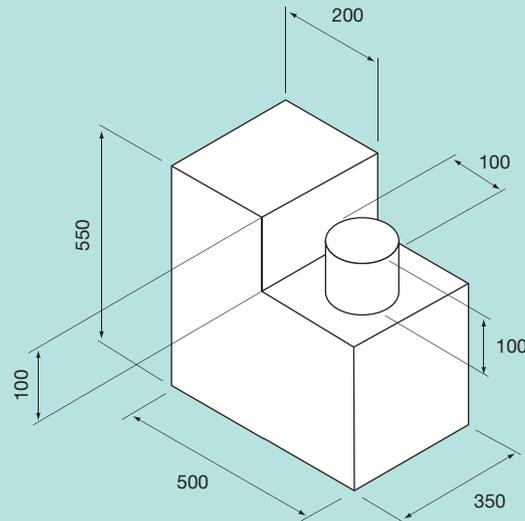
6 Draw the following objects as one-point perspective drawings.

a
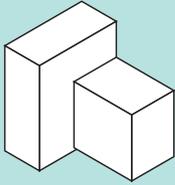
b
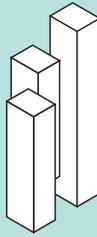
c
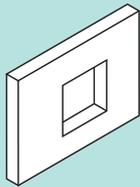
d
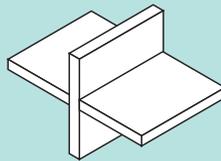
e
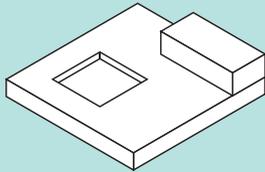
f
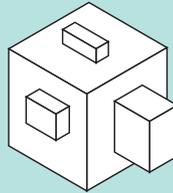
7 Draw the following objects as two-point perspective drawings.

a

b

c

d

e

f
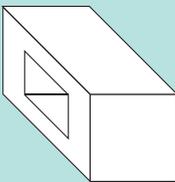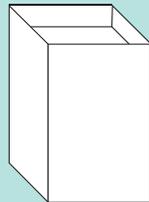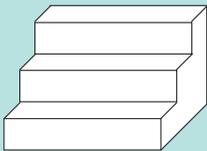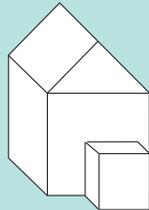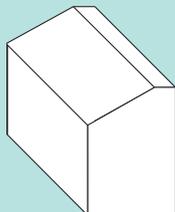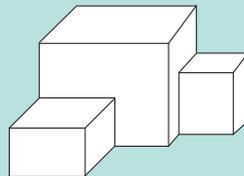
RENDERING

'Every design is an exercise in persuasion.'

Trevor van Gorp & Edie Adams in Design for Emotion, *Morgan Kaufmann 2012*

In this chapter:

Learn the language

+ form	+ light source	+ shadows	+ texture
+ highlight	+ proportion	+ sketching	+ tone

Rendering is the application of tone and texture to create a three-dimensional appearance and/or to depict the surface details of an object. Rendering is important when the form of an object needs to be communicated. If a furniture designer, for instance, needed to illustrate a new line of chairs, it would be important to depict the characteristics of the fabrics and materials used in their production. The rendering of materials, using a range of media, can communicate a great deal of visual information about products and objects.

4.1 RENDERING TECHNIQUES

Effective rendering can be achieved through the application of an almost limitless range of media. Markers, ink pens, computer rendering, gouache and pencil are probably the most popular methods, with computer-generated images becoming increasingly common. It is also possible to achieve striking results with combinations of media, as well as pastel, collage, watercolour, cut paper and airbrush.

When rendering images, establish the purpose of your image before you begin, as this will determine the most suitable medium. What is the purpose of the drawing?
+ Is it to express the realistic form of an object?
+ Is it to emphasise a feature or detail?
+ Is it to create visual interest?
+ Is it a combination of the above?
Test different options before selecting your medium, so that you can be certain that your choice is appropriate to the purpose.

PENCIL RENDERING

Pencils generally consist of a graphite core within a wooden casing. It is also possible to use graphite sticks, which are often thicker and encased in paper or plastic.

Pencils are available in a variety of grades that affect their rendering qualities. Pencils in B grades are softer and offer a smoother application over larger areas. H grades are hard and are more useful in line work and drafting.

Soft pencils enable you to render a surface with a range of tones by layering applications of tone. When using soft coloured pencils, it is possible to layer similar hues of one colour to generate an intense area of solid colour that can add visual interest. When working with pencils, applying colour thickly may

damage the paper surface. Layering is more effective and allows for flexibility.

Water-soluble pencils are very soft and can be blended easily. They offer the potential for striking rendering effects and can be used alone or with markers to create effective imagery.

Paper stumps, which look similar to pencils but are made from compressed paper, can be used to blend soft pencils. Use with care, however, as they can flatten tones if used too liberally.

In pencil rendering, working with the surface colour of the paper will provide highlight tones. When working on a white paper, keep the surface clean and clear of any tone to create effective and bright white highlights.

Jenna Hall

▶ This student used a combination of soft grey-lead pencils and paper stumps to apply an even tonal change and create a smooth transition between highlights, midtones and darker tones.
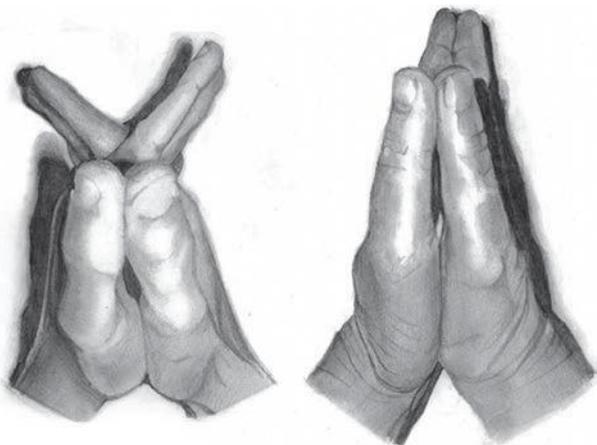
Grace Ashworth

▶ Note how this student has used the white paper. The white areas create strong highlights and give a greater level of realism to the representation of form. The use of white paper provides a much broader tonal range in a drawing.

RENDERING WITH INK OR PEN

Rendering with ink or a pen such as a fine-liner or a technical pen requires quite a different approach from working with pencil. Variations in line quality – rather than layers of tone or varying pressure – make the difference in ink-based renderings. You can use fine-liners, ink and nibs, or technical pens to create detailed renderings or quick sketches. A range of techniques can be used with permanent media such as ink.

DOT RENDERING

Izzie Klingels

Dot rendering can be used as an effective method of conveying tonal variation. Dots of a consistent size, but varying in their proximity to one another, create a range of tones that can communicate shadow and highlight areas. The key is to ensure that you don't get sloppy with your application of dots. Consistency, though time-consuming, leads to the best results with this technique. Note that you do not have to fill an entire space to suggest texture and form.

CROSSHATCHING OR LINE RENDERING
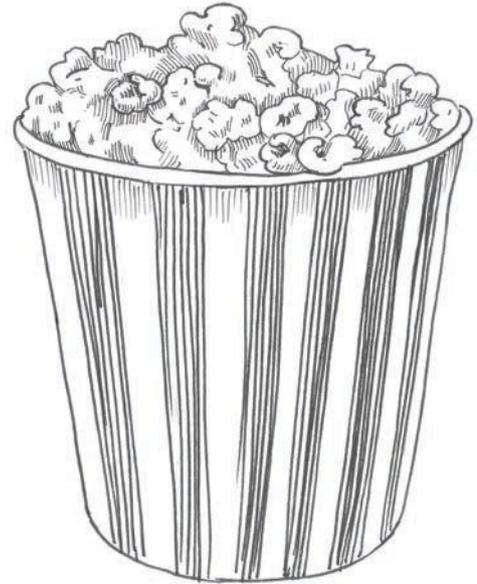
Shutterstock.com/Sentavio

Crosshatching is a rapid method of applying tone that can be very helpful when developing ideas and for communicating tonal information quickly. Vertical, horizontal and diagonal lines vary in proximity to one another, creating tonal and textural variations. This technique is often used to suggest textures such as fabric, wicker and natural fibrous materials, as well as enhancing tone on freehand sketches. To ensure the success of this technique, try to keep your line widths consistent.

MARKER RENDERING

Popular due to its rapid application, marker rendering is commonly used by industrial and product designers to present concepts. Markers contain intense pigments in an alcohol base, which provide quick-drying colour. They are best used on a smooth, non-absorbent or non-bleeding surface such as bleedproof paper. Markers often have two tips – a broad tip and a fine tip at opposite ends of the pen – allowing for both fine work and the application of larger areas of colour and tone.

Available in a range of colours, markers are also sold in sets of greys – warm, cool and neutral – which provide scope for rendering products in tonal detail. Marker refill ink can be used with the cotton pads of a multilith printer to create broad strokes of colour, useful for creating background effects.
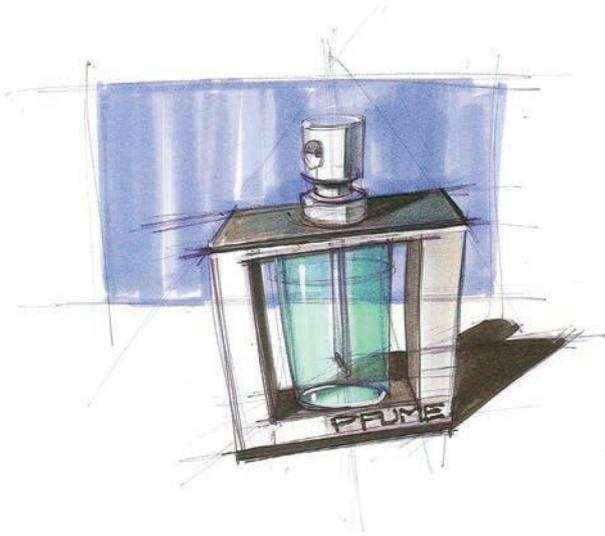
▶ Markers are applied smoothly in product rendering to create textures. Overlap marker strokes by two-thirds to avoid a striped effect. Build up tones by working with lighter hues first.

Applying markers takes practice and it is advisable to test on rough drafts before applying to a finished pencil or pen drawing.

To create block areas of colour, overlap consistent marker strokes; this will help to disguise streakiness and provide even tone. If using different markers to build tone, use the lightest marker first and build up colour with darker hues as required.

▶ Markers can be applied in a sketching motion to create a freehand effect.

COMPUTER RENDERING

Software programs are used as universal drawing and rendering tools. Methods of rendering vary between bitmap programs, and vector-based programs, but both types allow for the effective representation of tone and texture. It is possible to scan artwork and trace it in either a vector-based program such as Adobe Illustrator

or a bitmap program such as Adobe Photoshop. With a bitmap or raster program, tools and filters can be used to render the drawing, and textures and patterns can be applied. Vector-based programs enable rendering using gradient, pattern and solid fills.

Computer-generated techniques offer fast, high-quality methods of applying rendered surface details through the application of filters and special effects. Just keep in mind that everyone else has access to those filters and effects too – so use them creatively!

The best approach to drawing with computers is always to begin with a hand-drawn sketch. Whether you render it or use it as a guide, an initial sketch will invariably lead to better results on the computer. Most top digital illustrators begin their work with a traditionally executed drawing.

Tom Grech

▶ The use of brush tools, layers and gradients in raster or bitmap programs such as Adobe Photoshop can, with practice, create photo-realistic imagery. Note that in this example, it is possible to see the original drawing lines.

AIRBRUSH RENDERING

Mark Wilken

▶ An airbrush

Airbrushing is used in many areas of design, although its use has been somewhat reduced by the growth of computer rendering. Airbrushing, like marker rendering, can provide fine work or broad areas of colour. Looking like a slightly bulky pen, the airbrush draws ink from a small reservoir and propels it into the air in a fine mist using air pressure from an attached compressor.

Used in conjunction with removable masking film, masking fluid or templates, the airbrush can be used for detailed drawings of almost any scale. A combination of varying the airbrush pressure and distance from the work controls the spread and intensity of ink coverage, which in turn controls the tonal qualities of the drawing. Traditionally used in street art, aerosol paint dispensed with a range of different nozzle varieties is increasingly used by illustrators. Often it is used in conjunction with stencils and masks, creating an effect that is very similar to airbrushing work.

4.2 RENDERING TO REPRESENT FORM

In depicting the characteristics of form, the principles remain the same no matter which media you choose to work with.

LIGHT SOURCE

Natural or artificial light influences the appearance of objects, creating highlights and shadow areas. When light from the source hits an object, it will often create a highlight, midtones and dark tones, and cast shadows.

Depending on the surface texture of the object, it may also reflect light.

It is through the representation of light and dark areas that a three-dimensional form can be depicted. It is, therefore, important to identify the light source as the first step. In daylight, it is sometimes difficult to ascertain the primary source of light, but invariably it will be a window or, if outside, the sun. In a dark space, a light globe or lamp will create a light source that will appear more clearly defined than the more diffused light of day, and will create sharp contrasts.

In rendering the form of objects, you may need to make an arbitrary decision about the primary light source, taking into account reflected light from other surfaces or secondary sources of light.

In the past, formal training in illustration involved learning 'rules' about light and shadow. In fact, in many classical paintings you can see how strictly these rules were followed, with very specific applications of light and cast shadow areas.

Although it is still very important to understand the effect that light has on an object, the application of tone is much more intuitive today, relying heavily on your observational skills and sensitivity to the subject matter.

Freehand shadows can also be an effective means of 'grounding' an image and placing it within a given context. This, like the more formal construction of shadows, provides a sense of realism and three-dimensional form.
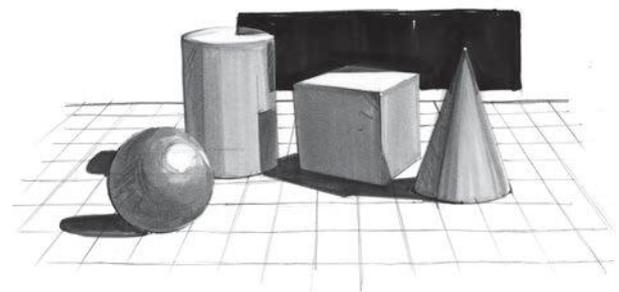
▶ This image uses both shadow and a hand-drawn grid to 'anchor' the images. This provides a believable context for the forms by 'grounding' them upon a surface.

THE POINT

When rendering, keep your pencils sharp but don't press into the paper as this will show through as an indentation on the page when you draw over the area again.

TONAL SCALE

A good method to use when rendering, regardless of the medium or rendering method, is to first create a **tonal scale**. A scale becomes a good reference point when rendering, as you can select the tone that best suits your drawing task and chosen medium.
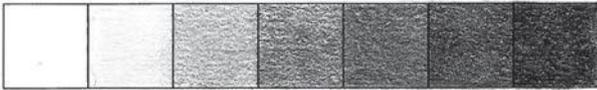
DON'T BE AFRAID OF THE DARK!

When applying tone, use the full tonal scale and don't be afraid of using truly dark tones.

When drawing from observation, it can be tempting to stick to the midtones that will produce a mediocre grey image. For effective results, resist the midtone temptation. Use a 6B pencil to generate areas of shadow. Use the contrast between highlights and dark shadows to emphasise the form of an object.

Mikaela Revell

When the darkest tone is placed next to the lightest tone, for example, the differences between the two are intensified, creating a distinctive and sometimes dramatic lighting effect.

4.3 RENDERING TO REPRESENT TEXTURES AND MATERIALS

Applying materials to objects helps a designer create a sense of realism and enables the viewer to recognise the characteristics of a design. The inclusion of textural details, tone, colour and pattern helps to define the features and forms of objects and spaces. Designers in all design areas apply the rendering of materials to some aspects of their work. Whether executed by hand using sketches or refined in CADD software, the application of materials is key to communicating the specific qualities of a design.

VIDEO DEMO: RENDERING

Learn how to render objects to represent different textures and materials.

Mark Wilken

Observe and familiarise yourself with the textures around you. Your clothing, the table, the carpet and flooring all reveal different textural qualities. Once you begin to observe and practise drawing the textures around you, you will see how it becomes easier to create the appearance of materials.

NATURAL TEXTURES

Textures that occur in nature are rarely uniform and have characteristics that are not found in human-made materials. Natural textures have imperfections. For example, wood includes the grain of the timber, knots and other irregularities due to age, damage and weather.

When drawing natural textures, it is important to include details that give an authentic appearance. However, as important as it is to incorporate texture realistically, you should judge just how much detail is required. Too much detail can detract from the purpose of the drawing.

Mark Wilken

▶ Irregular lines can create the unique character of wood grain. Avoid being too uniform in your representation.

Mark Wilken

▶ In landscape illustration, abstract shapes and gestural applications of tone and colour can be effective in suggesting foliage and natural materials.

It is not always necessary to fill an area with textural detail, as a section of texture can often convey enough information. Stone, grass and foliage are commonly depicted in illustrations, and small sections of texture can communicate the characteristics of a given area rather than filling space with detail. When drawing trees, avoid representing every leaf and branch as this can cause the image to appear contrived.

FABRIC AND TEXTILES

The diversity of available fabrics makes for equally diverse methods of illustration. In the fashion and furniture design areas, the representation of fabric texture becomes very important. In the initial stages of a design process, fashion designers might use style sketches to identify the basic form of a garment and

use rendering techniques such as crosshatching to identify the texture. More detailed drawings would then follow, showing the selected fabrics in greater detail, with annotations.

When representing fabrics such as woven cloth, you should observe the direction of the threads. Woven fabrics – whether created by hand or by a machine – have threads that travel in two different directions. Called the warp and the weft, these threads will reflect light differently. It is rarely necessary (or advisable) to show every thread, but it is important to appreciate that fabric is not flat and mono-directional, and to convey this in the rendering.

Grace Ashworth

Ellen Keillar

Fashion illustrations convey the qualities of fabric through freehand drawing and rendering. Fashion designers use drawings to show not only the form of

a garment but also the characteristics of its fabrics. Rendering in fashion drawings shows not only the appearance of the fabric but also its physical characteristics, such as reflective or transparent qualities, the richness or texture of the material, or the layering of separate fabrics in one garment. Fashion drawings, by their nature, tend to be loose and may use a range of methods such as marker, pencil, watercolour, collage and **mixed media**.

Mark Wilken

▶ The textural details of these fashion designs are indicated through marker and pencil rendering techniques. The use of a texture board and the inclusion of tone help to illustrate the characteristics of the fabrics.

Mark Wilken

▶ Leather handbag. Note the inclusion of some grain and a form that suggests stiffness.
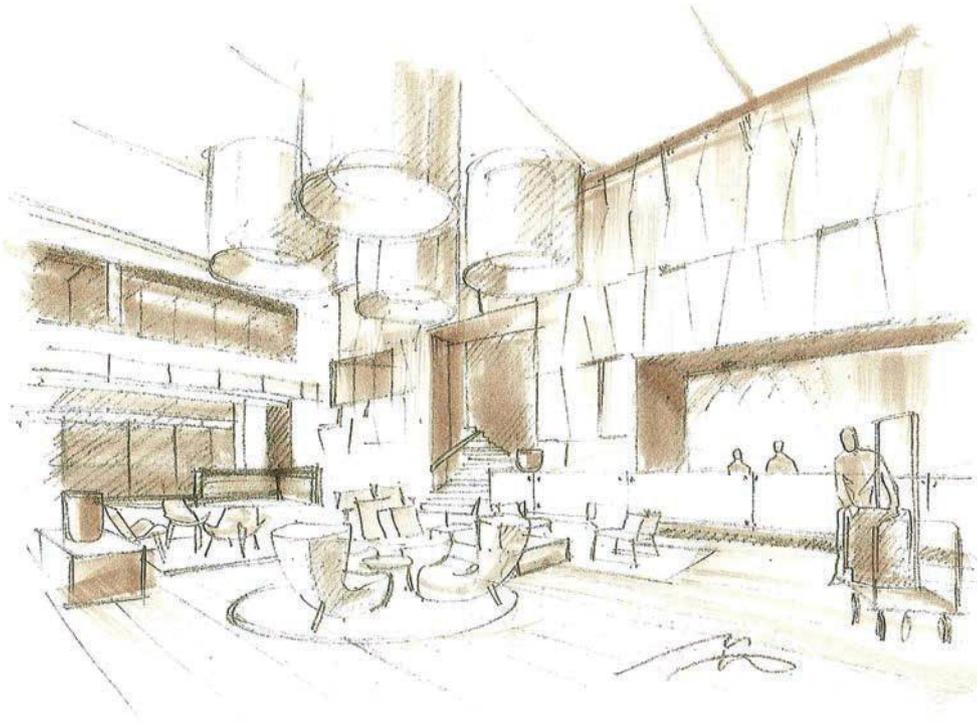
▶ Interior designers often need to represent multiple materials in a single interior. Application of tone and the use of crosshatching can indicate where textures exist in an environment.

METALLIC AND REFLECTIVE SURFACES

Materials that reflect light – such as glass and metal – can be challenging to draw. The textural characteristics of reflective surfaces are often smooth or slick.

Metallic surfaces such as chrome have no colour of their own and only reflect the surrounding colours. To capture the appearance of metallic objects, colours should be crisp, intense and bright. The application of colour often depends on the shape of the object to be drawn.

CHROME

A metal cylinder, for instance, may use a series of bands of colour, which, along with a white highlight band, serve to reinforce the cylindrical and reflective nature of the object.

When drawing glass, illustrators and designers often use a series of horizontal or vertical lines to indicate an otherwise clear or transparent surface. This technique is ideal when working with pen or pencil.

Glass absorbs colour, so – when using other media such as markers – represent glass by drawing layers of subtle colour, such as cool greys and light blues.

Mark Wilken (all on page)

▶ When drawing high-shine or reflective surfaces, be sure to leave some areas white to emphasise their reflective qualities.

Remember that glass is transparent, so you may need to render what is behind the glass, as well as any reflections. Reflections on the glass appear as white, which can seem to be floating on the surface.

▶ When illustrating glass objects such as this office desk, remember to show transparency. Add colour to the glass surface in the final stages, to cover any details that are underneath.

▶ The use of a background, in this instance a simple coloured panel, helps to reinforce the illusion of transparency.

PLASTICS

Acrylic materials and plastics often reflect light in the same way as other reflective surfaces. There are, however, many matte plastics that show little or no reflection.

The properties of acrylics and plastics allow moulding and shaping into a wide range of shapes and forms.

Mark Wilken (all on page)

▶ In this image, the subtle suggestion of semi-transparency is created with light pencil outlines of the packaging contents.

Acrylic materials can be manufactured in a vast range of colours and textures. The colours of acrylic products often appear to be saturated and vivid. When rendering work from the lightest area to the darkest, build layers of colour to achieve a saturated appearance.

Mark Wilken (all on page)
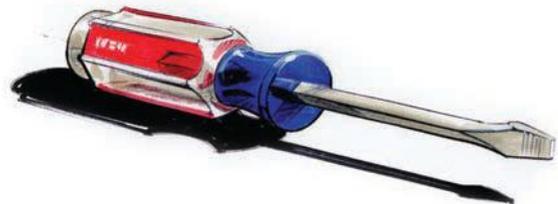
Leave some areas completely white to represent reflections and suggest form. Although plastics are not as highly reflective as metallic surfaces, there will always be highlight areas, and these should be indicated.

ECO AND RECYCLED MATERIALS

Eco materials include products that are made from recycled components or materials. They often feature colours and textures that are natural and that suggest an ecologically sustainable manufacture. Often, eco products are packaged in recycled substrates such as unbleached card or paper. Eco products tend to lack the glossy surfaces that traditional products may favour. In rendering eco products it is advisable to utilise a muted palette of browns and greens, and focus on representing matte surfaces with little reflective qualities.

The rendering of eco designs generally focuses on the recycled nature of the materials, suggesting natural or fibrous textures rather than polished, shiny surfaces.

COMPOSITES

Composites are the combination of two or more materials, which together produce a new material. Composites are often created for their strength and durability. Examples of composite materials include concrete, fibreglass, carbon fibre and plywood.

▶ Wood composites include those created with plastics. Although they look like wood, they are usually more durable and weatherproof. In rendering composite wood products, it is feasible to feature some of the more reflective qualities of plastic as well as wood grain.

Although composites may appear to have the characteristics of a natural material, there may be slight visible differences. Invariably, as composite technologies develop, it becomes harder to tell the differences between natural products such as wood and wood-looking products made with plastics.

Concrete can be polished or left in a natural state, so rendering of concrete products will vary according to the design. A polished surface will have reflective qualities.
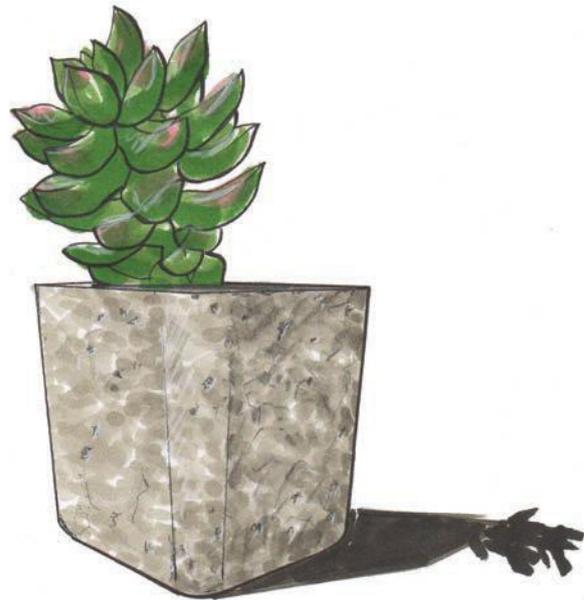
Fibre products, such as carbon fibre, can present with both matte and reflective surfaces, so their rendering needs to reflect the characteristics of the design product. The use of some highlight areas can achieve this.

Mark Wilken (all on page)

▶ Carbon fibre briefcase

▶ Items such as rubber thongs, with fabric features, offer combinations of textures but may have limited reflection. The challenge is to ensure that the forms appear three-dimensional and not flat.

CERAMICS

Ceramic products can be matte or gloss in texture. The surface qualities of ceramic designs are affected by the glaze and surface detail that is applied. Glazes include gloss, satin or matte but the object may also be left unglazed and in a natural state. Similar to plastics, gloss- and satin-glazed ceramics reflect some of their environment. Highlights assist in emphasising the areas that are reflective, while the light source is key to emphasising form. Matte and unglazed ceramic products do not reflect and require thoughtful application of light and dark tones, along with textural details to appear three-dimensional.

Mark Wilken (all on page)

▶ Terracotta teapot with matte finish
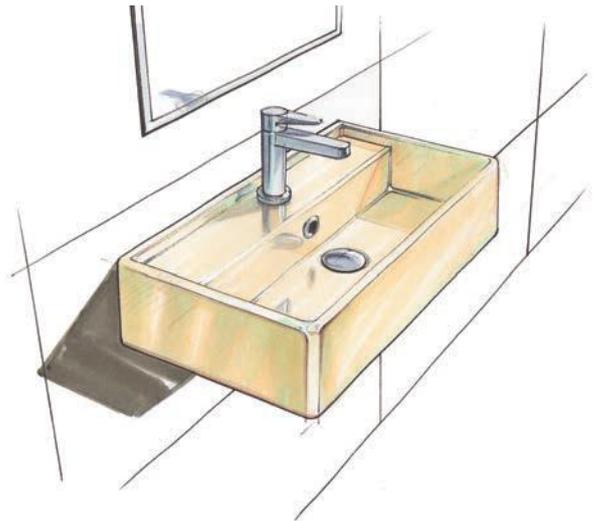
▶ Porcelain sink with high gloss texture

▶ Decorated stoneware pots with a satin or semi-gloss texture

VIDEO DEMO: RENDERING

Learn how to render objects to represent different textures and materials.

CHAPTER RECAP

1   Render the following shapes using tones in reference to the given light source.
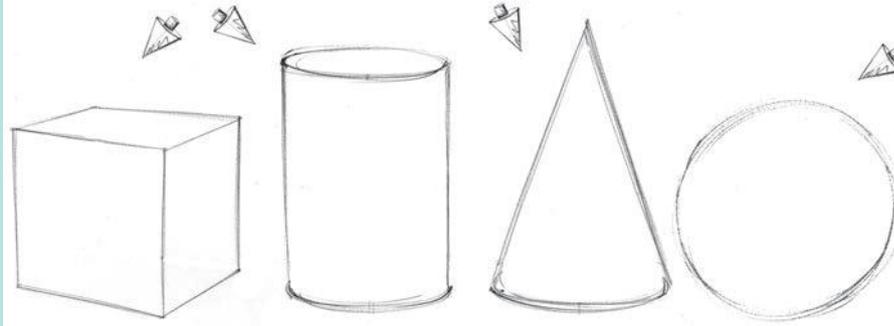
2   Render these complex shapes using tones in reference to the given light source.
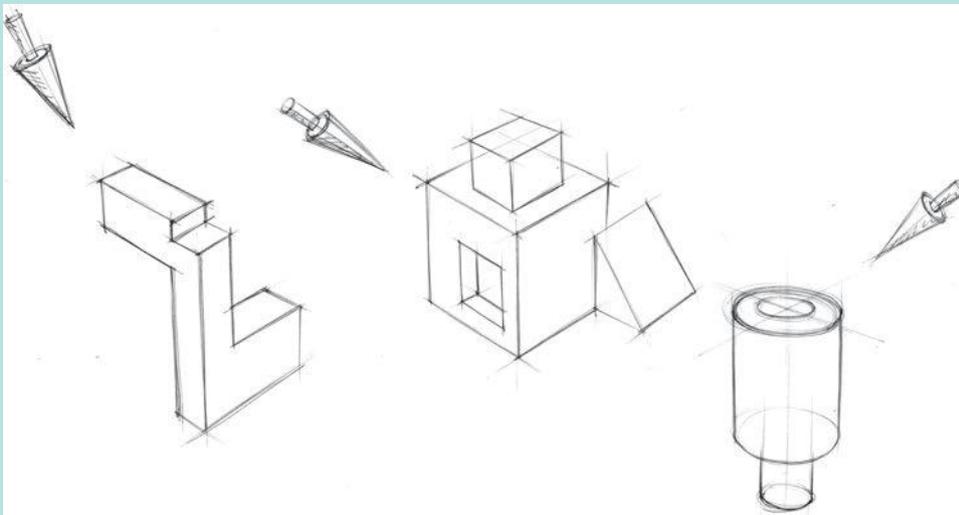
3   Apply colour, texture and tone to render the following objects. Add detail to clearly show the indicated texture and materials.

Metal   Plastic   Wood   Glass
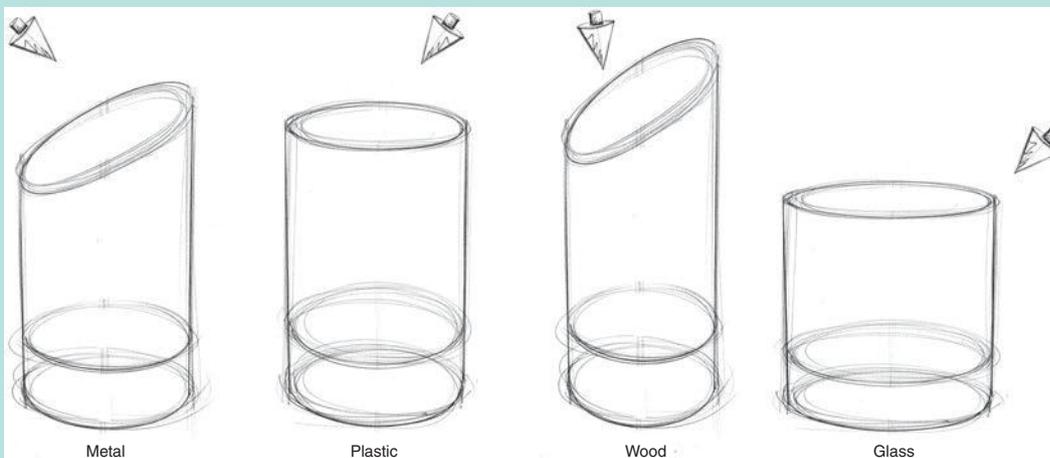
PROTOTYPING

'Prototyping at work is giving form to an idea, allowing us to learn from it, evaluate it against others, and improve upon it.'

Tim Brown in Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, *HarperBusiness, New York 2009*

In this chapter:

Learn the language

+ animation

+ augmented

+ digital

+ evaluation

+ interface

+ model

+ scale

+ simulations

+ test

+ three-dimensional processes

+ virtual

Prototyping is an integral part of the design process and involves testing and evaluating the effectiveness of design ideas. As part of a design proposal, **prototypes** may be used to closely mirror the features and functions of a final design without the expensive or complexity of full production. Designs may be presented manually or digitally by using **modelling** techniques, three-dimensional design modelling software and printers. There are two main types of prototyping used in the QCE Design syllabus: physical low-fidelity prototyping and digital low-fidelity prototyping. The term 'low-fidelity' refers to a speedy representation of ideas. Where a digital high-fidelity prototype may involve complex coding, a low-fidelity version may offer a rougher concept that still clearly conveys the meaning and detail of the design. Prototyping is a vital method of conveying information about the appearance and functionality of a design to key stakeholders such as the client or end user.

5.1 PHYSICAL LOW-FIDELITY PROTOTYPING

Physical low-fidelity prototyping involves the production of drafts, models or prints that provide a tangible insight into the appearance and functionality of a design. In industrial design, the use of three-dimensional models is commonplace and enables designers and stakeholders to see and feel the form of a product. From small domestic items to large motor vehicles, all products are evaluated before going into mass production. Made from a range of low-cost materials, including foam, card, paper, cotton textile, wood, plastic and clay, these models create opportunities for testing with users. Effective use of three-dimensional materials can lead to the production of models that communicate the form, **ergonomic** features and surface details of an object more clearly than a drawing or diagram.

EXAMPLES OF LOW-FIDELITY PROTOTYPES

Appearance model

An appearance model provides an accurate physical representation of the appearance of a product or design. Sometimes referred to as a block model, the appearance model has no moving parts and exists

for evaluation of design principles and aesthetics. An appearance model may be used in product photography for preliminary marketing of a product.

Hannah Jurisic

▶ These appearance models of skincare packaging were made of wood. The student was able to test ergonomics and user response using the models.

Functional model (aka junk model)

Made from available materials, a functional, or 'junk' model is designed to capture the functional features and fundamental operating principles of a product. The purpose of a functional model is to test ideas related to how a product works. It rarely represents the appearance of the design and may only exist to test electronic, moveable or mechanical components.

Form study

Also known as a sketch model, a form study is a relatively low-definition, three-dimensional model that suggests the key characteristics of an object's form. Usually carved from foam or clay, the form study offers an informal view of the scale and proportions of the design.

Blond, London based Industrial Design Studio

Massing model

A massing model is a spatial tool used in architecture that defines both interior and exterior space. Architects and interior architects may begin a design concept by massing through additive techniques or subtractive techniques.
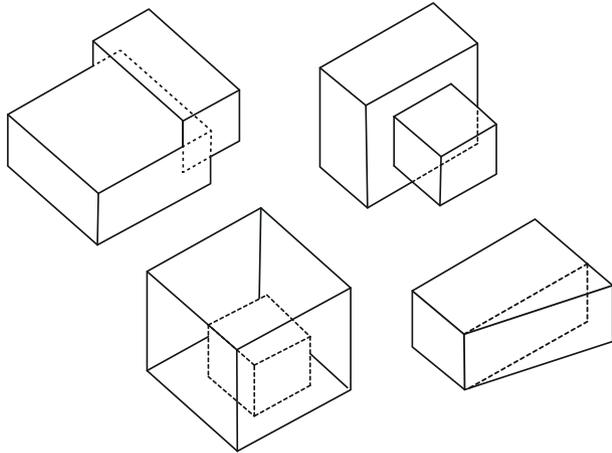
▶ Additive massing. Architects design spaces by adding, stacking, repeating, splitting and expanding masses.
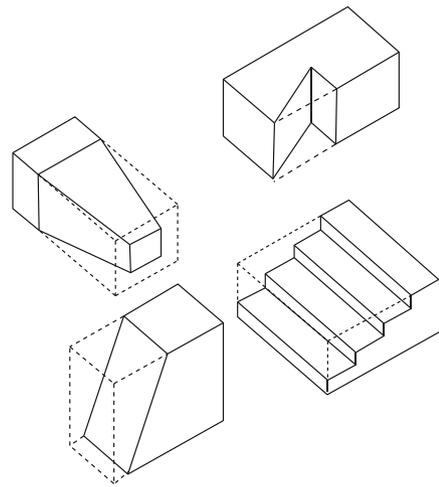
▶ Subtractive massing. Architects design spaces by extracting, removing, tapering, repeating, splitting and expanding masses.

Proof of concept

Sometimes, during the creative design process, it is necessary to present stakeholders with a suggested direction, design idea or check on progress. A proof provides all parties with a preview of the design and a clear indication of potential directions. Proof of concept may be a three-dimensional model or a printed presentation. It may feature information about the whole of a design, sketches and ideas or a detail of the proposed design direction.
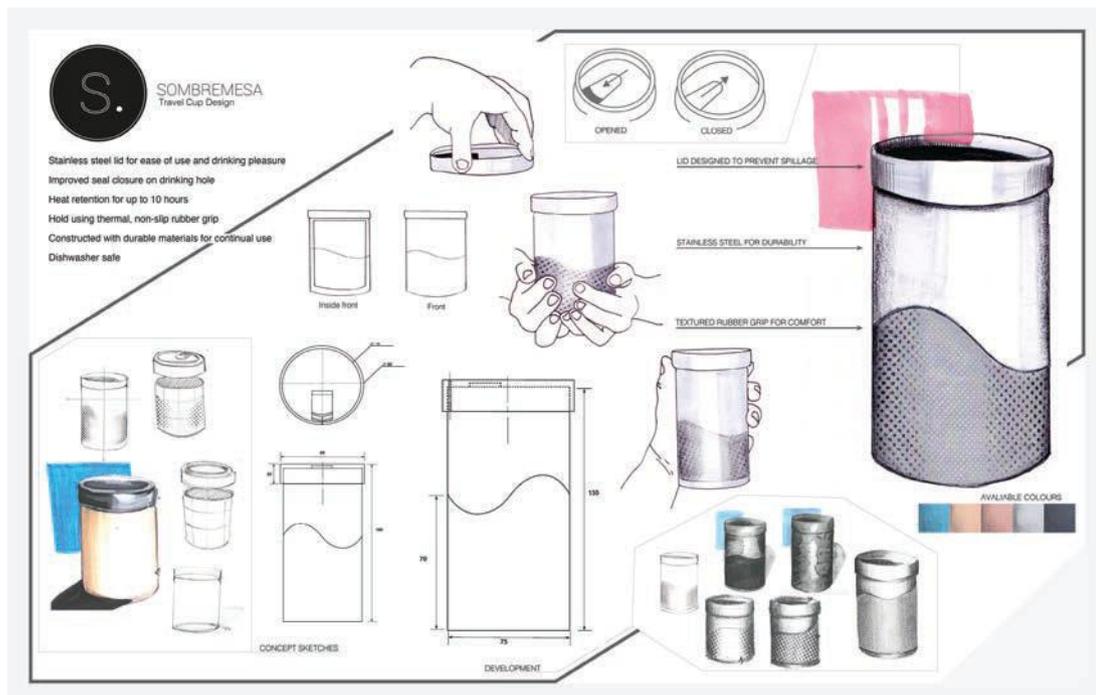
▶ Concept board showing the design of a travel cup

Samantha Chave

Scale model

A scale model represents the details and appearance of an object, product or environment in miniature. Scale models are common in architectural and product design and allow for a high level of realism and visualisation. Set and theatre designers regularly create models of sets, which enable others involved in a production to visualise the use of props, lighting and the position of actors before the actual set is constructed.
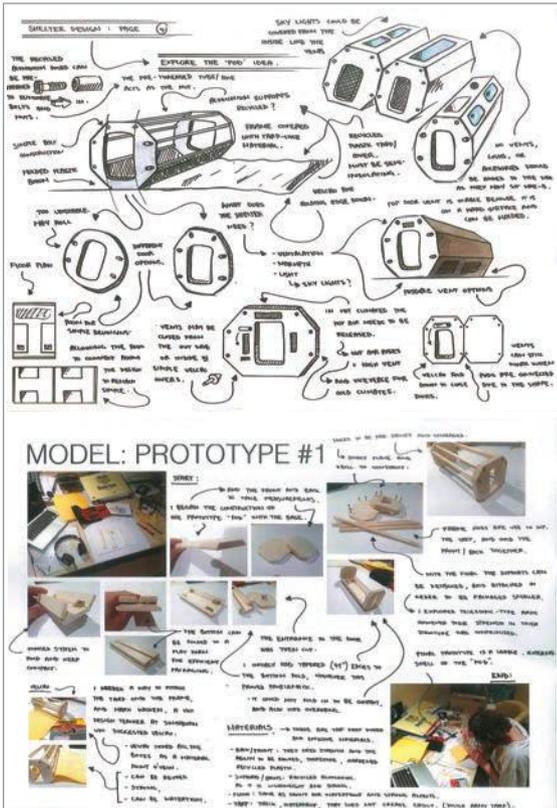
▶ This student used annotation to explain and evaluate his design thinking. At every stage of the process, he posed questions about the direction of his ideas and evaluated the most appropriate materials, functions and graphical representations for his design. The final production was a 1:15 scale model and display.

Mock-ups

'Mock-up' is a term that encompasses a range of low-fidelity prototyping methods, but it is commonly used in communication design in reference to the rough draft of a layout. Mock-ups may be created to show a packaging design with surface graphics applied, a draft-quality, printed poster or other print product. Combining text and imagery, the mock-up provides a realistic presentation of the likely final design.

Sienna Scott

▶ Mock-up of a printed, multi-fold booklet and presentation box

Sculptures and maquettes

Appropriated from a visual art context, sculptures (both representative and **abstract**) and maquettes (scale models of sculptures) are used for a range of creative purposes in design. Sculptural forms that aid aesthetics serve to elevate designs beyond function alone. Examples include signage systems, interior design elements, and decorative forms in architecture.

Architectural models in the Gemeentemuseum Den Haag by Sailko, 14 March 2017. Licensed under a CCBY3.0 Unported licence

▶ This is an architectural maquette of the Schröderhuis (1924), designed by Gerrit Reitveld.

Test rig

Used specifically in engineering and product design, a test rig is a structure designed to replicate the mechanical and electrical functions of a new product. It may take readings and data from the product to inform designers and engineers about capabilities and power. Information from the test rig is used in the development of the product.

Jim Henderson, 15 January 2013. Released to the public domain.

▶   This test rig bounces a bag of sand on baby equipment for hours to simulate the use that a baby would have on a high chair design.

Toile

Used in fashion design, a toile is a version of a final garment design created in cheap textiles, such as calico. The toile enables the designer and fabricator to examine the fit, function and overall form of a garment. It is often created to fit on a live model for assessment and evaluation.

Alamy Stock Photo/Reeldeal Images

▶   Toile is a test garment made using cheap fabric

METHODS OF LOW-FIDELITY PROTOTYPES

Acrylic

If you are fortunate enough to have access to a laser cutter, some models can be made using laser-cut acrylic. Acrylic sheet comes in a range of thicknesses and colours and can be cut to create interlocking forms or glued together; it can also be engraved. Due to its properties, it can also be heated and bent to create curved forms. Acrylic is sometimes called 'Perspex', which is the name of a commercial manufacturer.

Hand modelling

Hand modelling of objects is a quick way of creating three-dimensional forms. Clay, or commercial modelling or sculpting media, including Sculpey and Fimo, can be used to create small forms by hand or with pottery tools. Modelling media come in a range of colours and are often used for character designs for **animation** and as prototypes for products with a predominantly **organic** form.

Paper and card

Papers and lightweight card can be used to construct packaging and small-scale models. There are many packaging templates or flat plans available in books and on the Internet to assist with the construction of common and complex packaging designs. Like a fabric pattern, these templates indicate folds and outlines.

Pasteboard, which is available in a range of thicknesses, is ideal for the representation of packaging concepts.

Other cheap and readily available materials such as strawboard (which is commonly used as a base in architectural models) and lightweight corrugated cardboard can be used to construct models of

buildings. The properties of lighter weight, flexible cardboards allow for the depiction of contours, curves and details such as ground surfaces, roofs and walls. The scoring of card (by cutting grooves into the material without severing the fibres completely) also allows for effective folds and angles.

Foamcore

Foamcore is a versatile product that is used in both model making and two-dimensional presentations. It consists of a lightweight foam centre encased on two sides by a paper surface. The foam centre can be brittle if cut incorrectly and should be sliced with a very sharp blade. Use blades only under supervision.

Foamcore is available in several thicknesses and is ideal for models and structures that require solid modelling. Foamcore is also ideal for raising features on a presentation board. It can be placed as a support behind images and text panels to alter the surface of a presentation and draw attention to one or more visual features.

Polypropylene

Polypropylene is a firm plastic material that lends itself to packaging. It is available in transparent and semi-opaque colours and is often used in the construction of gift boxes and packaging where visible contents are required. Polypropylene can be scored and folded like card.

Polystyrene

Polystyrene is a coarse-grained, foam-like material that is commonly used in the packing of goods and products for transportation. It crumbles easily when cut with a knife and is best cut with a hot-wire cutter. A smooth, coloured finish can be achieved on polystyrene with the application of water-based paint.

Styrofoam

Compared to polystyrene, Styrofoam has a finer texture that lends itself to more precise cutting and modelling. It can also be painted with water-based paints for effect. Styrofoam is available in a range of densities and can be cut with a hot-wire cutter.

> ⚠️ When cutting Styrofoam or polystyrene you should wear a mask and goggles. Any cutting should be done under supervision in a well-ventilated area.

Wood

Any sanding or machining of wood and wood products should be done in a controlled, safe and supervised environment. You should always wear a mask when sanding, and if you are required to machine wood, you must wear safety glasses. You should only use power tools under supervision and work in a well-ventilated area.

Balsa wood

Commonly used in model making, balsa wood is a soft, lightweight material with a fine texture and neutral colour. Flat, square and cylindrical rods of balsa are available and can be sanded, carved or glued to form a variety of shapes. Balsa can be bent slightly and steamed to form lightly curved shapes. Balsa wood can be brittle, so it may need to be combined with a more flexible product such as card. Like many other woods, balsa can be sanded and painted repeatedly to give the appearance of another material such as metal or plastic.

Medium-density fibreboard (MDF)

Medium-density fibreboard or MDF is made from tightly compressed wood fibres that are bonded into sheets of varying thicknesses. MDF is relatively soft, flexible and does not split; it can be easily shaped with hand tools or machinery. A high-gloss finish that simulates the appearance of moulded plastic is achievable through a laborious but effective process of repeatedly sanding the MDF model and painting it with gloss or automotive enamel.

> ⚠️ MDF contains traces of toxic chemicals and should only be sanded, formed and cut in a well-ventilated area. Wear a dust mask.

Casting

Models that are required to show the form of an object alone can be created with simple casting techniques. After carefully and smoothly forming an object in clay or similar modelling material, a plaster cast can be made and used as the mould for objects to be made with resin, latex or plaster.

▶ This student documented the development of a scale model with photography. Each stage of the construction process was annotated, and illustrated the evaluation process at every step.
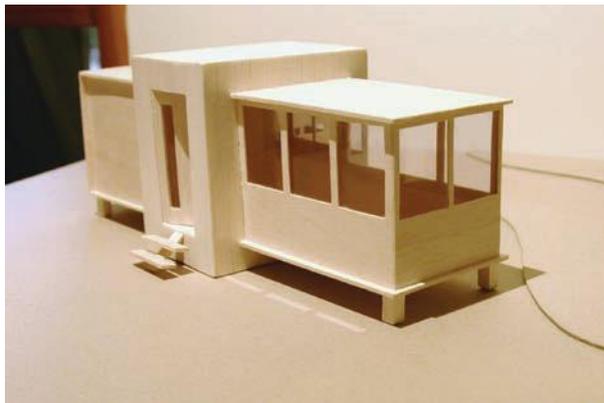
Moulding

Vacuum-moulding facilities are not common in schools, but they offer great opportunities for the development of effective scale models. In vacuum moulding, also known as vacforming, a sheet of plastic is heated to a high temperature, stretched onto a mould, and held against the mould by applying a vacuum between the mould surface and the sheet. This provides a lightweight hollow form. Vacuum moulding is a technique widely used in the manufacturing of plastic products.

Injection moulding is a technique where plastics are injected into a mould to form a product. Injection moulding is very commonly used in manufacturing but is uncommon in schools. Sometimes it is possible for student models and prototypes to be created by external providers of these systems.

Inkjet printing

Inkjet printers are the most popular means of printing colour images for school and home users. They range from small A4 printers to very large format printers. It is possible to obtain high-quality prints without the expense of professional printing processes. Inkjet printers generally use four or more colour cartridges, one for each of the **CMYK** colours (cyan, magenta, yellow and black), or hue variations of these colours (e.g. light magenta and light yellow). Different percentages of each of the four colours can produce seemingly endless variations in colour. As your computer screen operates in **RGB** mode, it is helpful to have access to a colour swatch so that you can more closely identify the printed colour. Some swatches contain the CMYK percentages for each colour to assist in generating the appropriate colour in your chosen software package.

Colours you see on the screen are often different when printed. Colour always appears brighter on the screen. Commercial products that calibrate your monitor are available to ensure greater parity between your screen and the printed page. These are placed on the monitor itself and ensure that your colours remain true. A less expensive alternative is to test print your colours as you go, or use a colour palette swatch.

When using an inkjet printer, the variables that may affect your work are print **resolution** and paper quality.

Print resolution

The number of dots per inch, or **dpi** value, of an inkjet printer will affect the clarity of the print. This value refers to the number of dots of ink placed on the paper within each inch of image space. A printer that produces 1440 × 720 dpi will print a higher quality image than a printer that prints 300 × 300 dpi.

Laser printing

Laser printers can also vary in quality and you will find that some printers produce a clearer image than others. Often, laser printers do not produce the subtle tonal variations that can be seen in inkjet prints, and colour laser prints can appear flat. However, for reproduction of single-colour letterform, logos and developmental work, the laser printer is quite suitable.

Paper quality

Paper is also known as **stock** and refers to the surface a design is applied to. Paper stock can vary widely and is measured in terms of grams per square metre or 'gsm'. The higher the value, the heavier and generally thicker the paper.

THE DIFFERENCE BETWEEN PPI AND DPI   FYI

Ppi (**pixels** per inch) refers to pixels within an image and is related to screen resolution. For example, a 300 ppi image contains 300 pixels in each inch of image size. It is the preferred term when referring to the quality of an image. Note that images created at a low resolution, such as 72 ppi, cannot have pixels 'added' later to create a higher-resolution image, as the 'extra' digital data simply doesn't exist. This is why it is vitally important to establish the purpose and, subsequently, the resolution required of your images before you start.

Dpi (dots per inch) is related to the printing of images using a printer. Generally, a printer uses four or more coloured inks to recreate images. Each pixel of the screen image is created by a series of tiny ink dots. A 1200 dpi printer, for example, will print 1200 dots of ink per inch of image. The higher the dpi, the better the print quality; however, the printer will use more ink and the print will take longer to execute.

Standard printer paper is usually around 80 gsm.

Weight	Paper	Use
80–90 gsm	Standard paper	For general printing, flyers, brochures, photocopies
120–190 gsm	Heavyweight paper	For photo prints, folded cards, posters and brochures
200–250 gsm	Extra heavyweight paper	Used for photo prints, artwork and packaging
300–400+ gsm	Card	Used for cards and covers; some specialist packaging may use heavyweight card

There are many specialty papers available for printing. Domestic and business printers have a limit to the weight of paper that can be printed. Heavier stock, such as card, is usually printed by commercial printers using the offset process.

To produce high-quality results, specialty laser and inkjet papers are treated with a vivid white coating, preventing ink from bleeding into the fibres of the paper and preserving the integrity of ink colour. When traditional 90 gsm papers such as photocopy paper are used, the ink is absorbed into the surface fibre, which reduces not only the sharpness of the print but also the intensity of the colour.

Special coated papers are available in different surface types, similar to photographic papers, including gloss, satin and matte. It is also possible to print onto iron-on transfers, transparency sheets and adhesive films. Paper coating will affect how much ink or toner is applied to a print, affecting the colour.

Laser printers use toner rather than ink, which does not bleed, although it can smudge in heavily toned areas. Specialty papers are also available for laser printers and include transparencies, varnished papers (gloss, matte and satin) and some recycled and textured varieties in a range of colours.

DON'T JUDGE A DESIGN BEFORE IT'S PRINTED

When you are designing for print, make sure you check your colours on a printed copy and not on the screen. The print will always be darker than the screen and some colours may print very differently from what you expect. For the most accurate representation of colour on the screen, use calibration tools or a colour swatch.

The choice of paper will be determined by the purpose of the print and the suitability of the surface type for the task.

Offset printing

Offset printing is a process used by professional printers. A digital file is converted to a series of 'plates', which are coated with ink. The plates travel through a complex printing press, which transfers the inked image on the plate to the chosen **substrate** or printing surface. Offset printing originates with digital files that have been prepared in line with the printer's specifications. A professional printer will indicate what is required in a printable file. Generally, the specifications include the **colour mode** (usually CMYK), the need for outlined type (to ensure type looks as intended), bleed (to extend colour, image or type to the printed edge) and trim marks (where the paper, card or other stock is cut) as well as the stock on which the product will be printed.

The professional printer can also coat the printed stock with a varnish to create a matte or gloss appearance and provide binding of books and magazines. The complexity of offset printing means that clear communication between designer and printer is essential to ensure a successful outcome.

Three-dimensional printing

Three-dimensional printing has become an affordable option for at-home printing and student work. 3D printers range in scale from small printers created from kits for home or school use to very large printers used in university settings and commercial enterprises.

Known as 'additive' printing, the method of 3D printers involves adding layers of a selected material (usually a fibre composite or plastic) over and over to form a three-dimensional representation of a CADD drawing. Often used for prototyping and the construction of models, three-dimensional printing is developing rapidly into a competitive, commercial manufacturing process. Clothing, footwear, artworks and products with working parts can be created with three-dimensional printing.

3D printers create forms using an STL file (stereolithography file) that describes the surface geometry of an object created using CADD software. To create the print, the printer builds cross-sections of the object, which correspond to cross-sections in the original STL file.
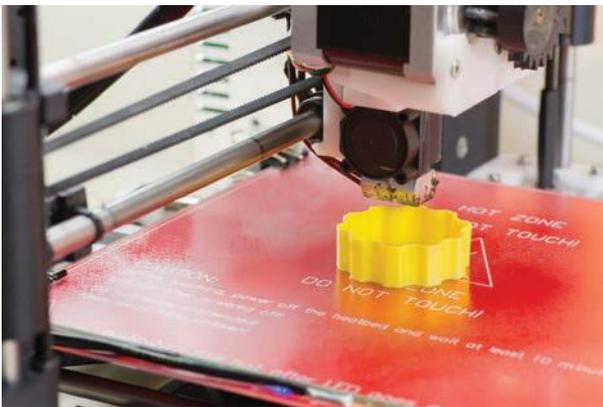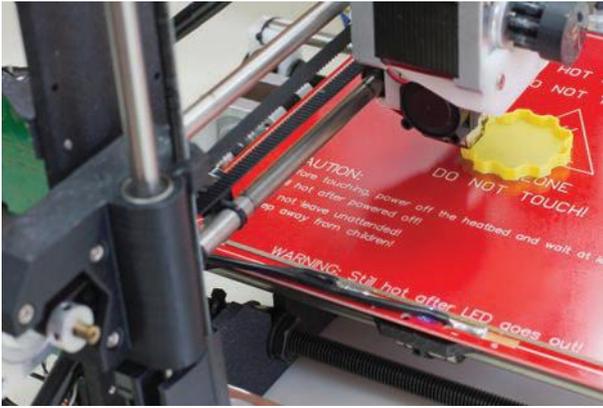
Shutterstock.com/Kaca Skokanova

▶ 3D printers create objects through the layering of plastic filament. The printer converts digital information supplied by a CADD program and layers multiple strands of materials to build up a three-dimensional form.

Like in two-dimensional printing, the thickness of layers in a three-dimensional print is described in terms of dots per inch (dpi). Typical layer thicknesses are approximately 250 dpi but vary according to the capabilities of the printer. Due to the complexity of the three-dimensional printing process, printing can take a long time, ranging from a few hours to a few days.

5.2 DIGITAL LOW-FIDELITY PROTOTYPING

Digital low-fidelity prototyping involves the creation of interactive, immersive or sequential experiences in design. The use of varied software to generate two-dimensional and three-dimensional design outcomes enables designers and stakeholders to view design concepts without physical production. Digital prototyping methods enable complex ideas to be represented without the expense of construction and production. For example, a digital 'fly through' or augmented reality experience of a residential design allows the potential end user to experience the spatial details and flow of a non-existent structure.

EXAMPLES OF DIGITAL LOW-FIDELITY PROTOTYPES

Animation and animated information graphics

Used in all design areas and sometimes referred to as 'motion graphics', an animation combines a series of images (either two- or three-dimensional) to create a sequence that displays motion. Animations may include sound and even offer some level of interactivity. Animations may show the workings of a product part, the method of utilisation of an object or instruction on the functionality of a design. Animation is also used in graphic design when print formats are not suitable for the communication of a message.
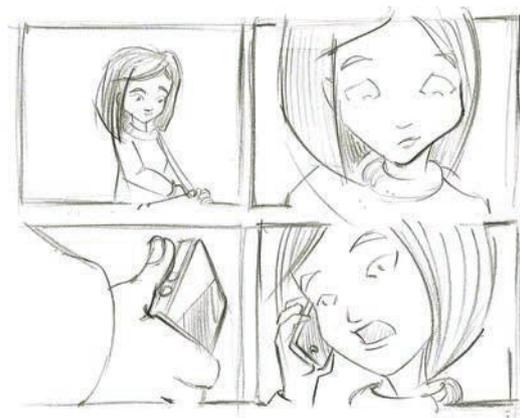
Mark Wilken

▶ Storyboard for animated graphics that may be used for an online advertisement.

Interface wireframe

A user directly interacts with a website or app via its interface. Interface wireframes are skeletal outlines that show each component of an interface design as an outlined or filled shape. Usually monochromatic and lacking content such as type, images and logos, the wireframe enables designers to resolve layouts for usability and functionality.

Shutterstock.com/REDPIXEL.PL

Website and app simulations

Simulations are designed to provide the viewer with an *experience* of a design. A simulation allows the user to engage with the design in a way that provides a 'virtual' experience of an environment. The ability to observe how users respond to a website or app that is in a 'dummy' or 'non-live' form can provide important testing information and identify concerns about compatibility with the target user.

Virtual and augmented reality

Virtual reality involves the digital creation of an environment, space or product that does not exist. Augmented reality uses an existing environment and adds enhancements and inclusions that do not currently exist. Both techniques are applied in the design of spaces and products, allowing the user or designer to engage with the design in an immersive and convincing manner. In product design, a virtual experience may offer insights into the 'actual' use of a product including potential safety issues and ergonomic concerns.

Shutterstock.com/leungchopan

Three-dimensional digital modelling

Sometimes it is most efficient to create a digital model of a product or environment. There are many 3D-modelling software packages available, including many free ones, that enable designers to create the realistic appearance of a design without the effort or expense of construction.

The use of 3D-modelling has the capability of using pixels to create the illusion of depth and can reproduce a high degree of realism with as much detail as a live action film. In 3D-graphics software, the forms of figures, structures and landscapes are created through complex combinations of shapes formed into a wireframe base. Increasing the number of shapes used to form the wireframe increases the complexity and size of the image. To enhance the realism of the surface of the three-dimensional image, lighting effects, textures and perspective are applied. As in manual rendering, colour and tone are applied to an object to enhance a sense of solidity; the creation of shadow can give objects weight and reinforce the illusion of belonging to a three-dimensional world.

Like other raster programs, 3D-graphics software often requires the application of an anti-alias function in order to smooth curved areas. Once a wireframe has been created, the program renders the object, modelling the form in a manner that is realistic. With the addition of complex commands that create subtle blurring of movements and realistic reflections and shadows, 3D-animation packages can create a sense of fluid motion that emulates rather than exaggerates the natural movements we recognise. In architectural contexts, three-dimensional models are often used to allow viewers to 'fly through' an environment that has not yet been constructed.

MAKING A COMPUTER GENERATED 3D MODEL:
(GOOGLE SKETCH UP SCREEN SHOTS)

...CONTINUED:

▶ This student depicted the steps involved in devising a computer-generated three-dimensional model of her design.
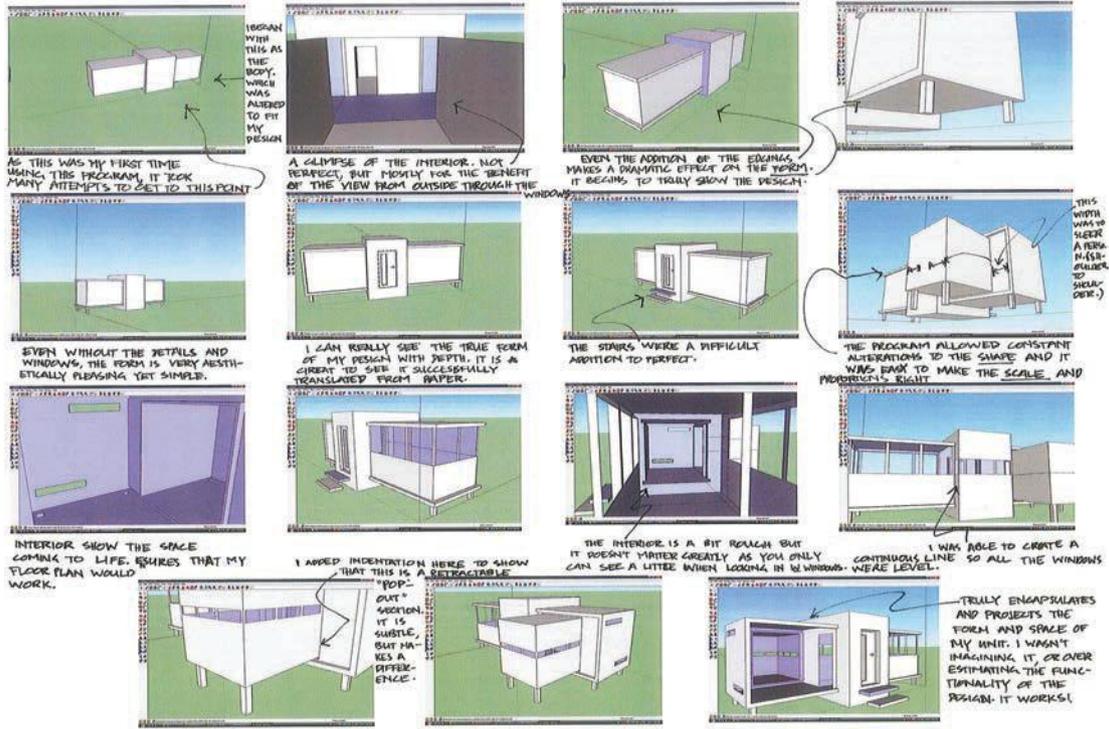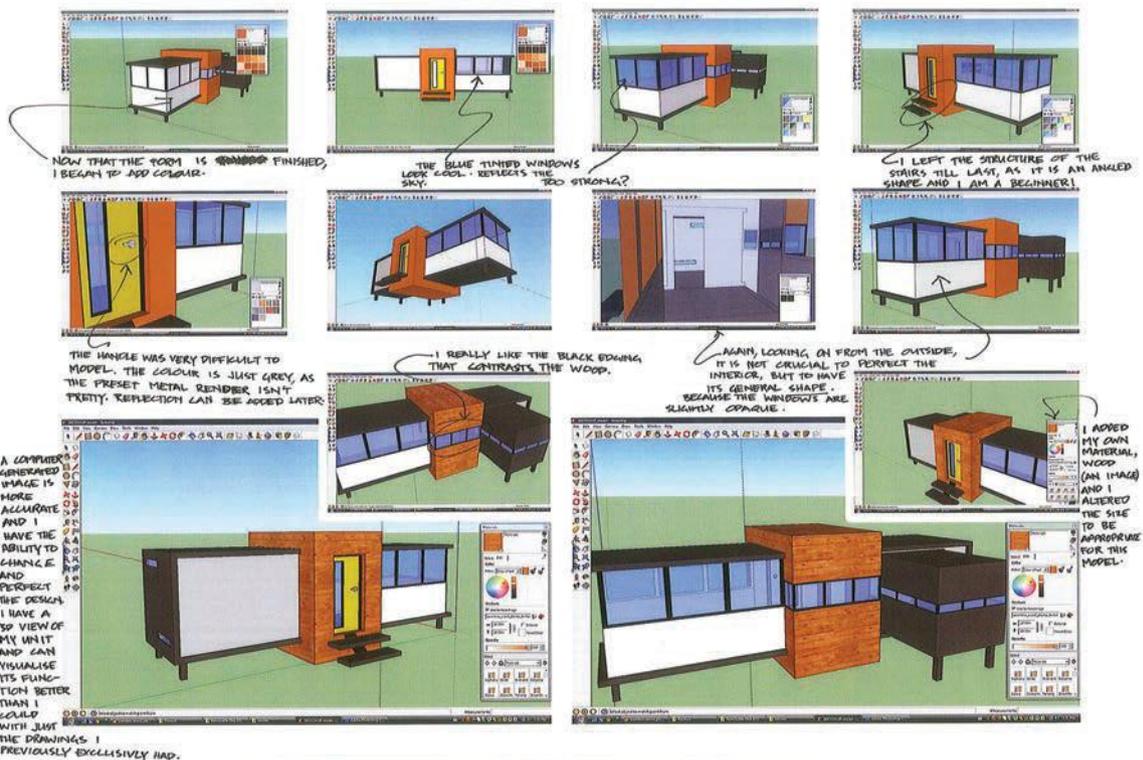
Prue Edmunds

Prue Edmunds

▶ Computer rendering and scale model presented as final design deliverables. The design brief required the design of a demountable housing option for homeless people in urban areas.

DIGITAL PRESENTATION

There are so many different varieties and versions of digital imaging software available that it isn't possible to discuss the functions of each one in this book.

The two main types of digital design software you are most likely to use are vector-based and raster-based. Many bitmap and vector-based programs can be used together to create documents and presentations using both image methods. Examples include Illustrator (vector) and Photoshop (raster).

Image types

Vector images

Vector images are mathematically defined images that consist of lines and curves. Formed in programs such as Illustrator or CorelDRAW, vector images are sometimes known as object-oriented images. This is due to the ability to move and manipulate entire lines, shapes and curves independently of other image elements. Vector images are not affected by resolution and can be resized with minimal loss of image quality. Common uses for vector images are logos, symbols, illustrations and diagrams.

▶ This vector illustration of an apple has no pixelation.

Raster images

Raster images (also known as bitmap images) use a grid (or raster) of small squares of data known as pixels to create images. The term 'pixel' is based on the words 'picture' and 'element', and refers to the smallest element of visual information on a computer monitor. Unlike the shapes, lines and curves of vector images, bitmap images can be edited pixel by pixel, or in groups of pixels. The most popular pixel-based editing program is Photoshop. Many bitmap and vector-based programs can be used together to create documents and presentations using both image methods. Software such as InDesign is used to create compositions made up of raster and vector images as well as text. InDesign also has vector capabilities.

▶ Raster image of an apple uses pixels that create the image.

MAKING THE RIGHT CHOICES

It is important to know the context in which your digital work will be used, so that you can plan ahead. There is nothing worse than spending hours on an image, only to find that the resolution is not good enough to print or that your colour mode is incorrect.

Be aware of image sizes when downloading images from the Internet to use in your design work. Make sure they are large enough to print them if you wish to. It is possible to adjust your image search to 'large' to find images of better quality. When downloading images, remember to attribute the source of your images (see Chapter 17 for information about copyright).

Planned use*	Suggested resolution	Suggested colour mode	Suggested file format
Artwork for full-colour printing	300+ ppi	CMYK or PMS/Spot colours	TIFF, EPS or PDF (or large, high-quality JPEG)
Black and white for printing	150+ ppi	Greyscale	TIFF, EPS or PDF (or large, high-quality JPEG)
Simple online graphics, such as icons and buttons	72–75 ppi	Indexed colour or RGB	GIF or PNG
Detailed, photo-realistic graphics, such as large images for use on the Internet	72–75 ppi	RGB	JPEG or PNG
Graphics for digital presentations, such as PowerPoint and Prezi	72 ppi	RGB	JPEG

*If you plan to have your design commercially printed, check with the printer or read their guidelines for artwork, to be sure of the appropriate file type.

Video

Like digital images, there are many software programs that assist with video editing, from simple editing tools found on a smartphone to complex and sophisticated tools for high-quality results.

Often, the choice of software comes down to availability and price. There are many free apps and software options that provide tools for basic and effective motion graphics, animation and short-film production.

When editing video, key considerations are space for your files, software and accessories. However, like any image production, beginning a project with good-quality footage is important as it reduces the need for 'post-production' editing and effects.

+ Take as much footage as you can. It is helpful to have extra footage to enhance your narrative or extend the timeline of your film or animation.
+ When filming, use a tripod for stability. Hand-held footage can be appropriate under some circumstances, but can be unpleasant for the viewer.
+ Close and medium shots are more effective at maintaining viewer interest than wide shots.
+ Consider an appropriate soundtrack and ensure that it enhances the imagery.

▶ Screen capture from *Nelson Visual Communication Design* instructional video. Features such as text, lighting and sound adjustments can be made in post-production, after the video is shot.

Guidelines for video

When creating video content, it is important to understand some terminology. A frame of video is composed of lines. The more lines per video frame, the higher the image resolution. In digital video, the line is processed into pixels (known as samples or sample rate). The more pixels there are, the higher the quality of video (resolution).

In planning your video footage, it helps to have an idea of what you will be using the footage for. Adjustments to the quality and resolution of the footage can be made on the recording device.

Planned use	Approx. file size of a 60-second clip	Pixel size (resolution)	Abbreviation
Large screen, high definition	128MB	1920 × 1080	Full HD
Large screen, high definition	90MB	1280 × 720	HD
Standard definition	26MB	640 × 480	SD
Hand-held device	7MB	160 × 120	QVGA

Motion graphics

Motion graphics is a term commonly used in visual/graphic communication and digital design. It refers to short animations or videos that convey basic information such as a logo, title sequence or advertisement. Eye-catching and dynamic motion graphics are often created using the effects available in video-editing software such as Adobe After Effects. Motion graphics are created from combining movement with typography, shapes and patterns. Layers of video footage, combined with text and animation, are also features of motion graphics; they may also feature sound effects or music.

Logo by Kianna Davis (Age 12)

▶ A motion graphic (gif) of the identity for this podcast was created for an email promotion. Simple motion graphics can be embedded in a range of media and enable communications to be animated and eye-catching.

CHAPTER RECAP

1 In the design of a science wing for a secondary school, suggest how low-fidelity prototyping may be used in the design process.

Example of physical low-fidelity prototyping	How might it be applied to the design process for a specialist science building design?
Example of digital low-fidelity prototyping	How might it be applied to the design process for a specialist science building design?

2 In the design of a theft-proof travel backpack, suggest how low-fidelity prototyping could be applied during the design process.

Example of physical low-fidelity prototyping	How might it be applied to the design process for a theft-proof travel backpack design?
Example of digital low-fidelity prototyping	How might it be applied to the design process for a theft-proof travel backpack design?

3 In the design of an identity and app for a fitness tracking device, suggest how low-fidelity prototyping might be applied during the design process.

Example of physical low-fidelity prototyping	How might it be applied to the design process for the design of an identity/app for a fitness tracking device?
Example of digital low-fidelity prototyping	How might it be applied to the design process for the design of an identity/app for a fitness tracking device?

DESIGN PROCESSES

THE DESIGN PROCESS

There is nothing more marvellous than thinking of a new idea.

Edward de Bono in Serious Creativity: How to be Creative Under Pressure and Turn Ideas Into Action, *Random House UK 2015*

In this chapter:

Learn the language

+ deliverables
+ design problem
+ design thinking
+ empathise
+ experiment
+ ideate
+ systems
+ test

The design process is a dynamic framework that facilitates innovative and creative solutions to identified problems. It is an iterative and cyclical process, rather than a linear or straight path. The process begins with the identification of a design need, established through research or contact with a client. The scope and direction of the design process is affected by information about the wants and needs of the client, the wants and needs of the end user, the function and purpose of the design and specified constraints. Moving through the cyclical process, research identifies and focuses the direction of potential design solutions.

There are many different design processes used in schools and professional environments, but they all share similar characteristics. There are clear commonalities between each process and all use multiple phases to generate, develop and produce effective products and solutions.

Throughout the design process there is scope for imagination and creative risk taking. The process allows for freedom and flexibility within its framework, and encourages experimentation with ideas, materials, media, prototyping, elements and principles of design. Constant evaluation is an essential part of the process. It is through this process of inspiration, experimentation, evaluation and elimination that effective designs evolve.

6.1 THE QCE DESIGN PROCESS

The QCE design process is a 'double-diamond' and is based on a process established by the UK Design Council (2015).
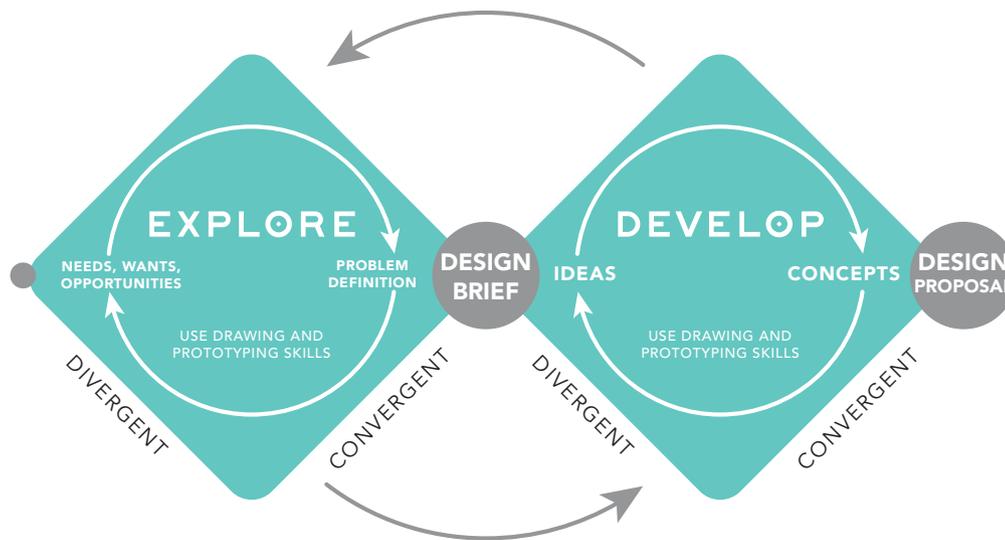
EXPLORE — NEEDS, WANTS, OPPORTUNITIES — PROBLEM DEFINITION — USE DRAWING AND PROTOTYPING SKILLS — DIVERGENT — CONVERGENT — DESIGN BRIEF — DEVELOP — IDEAS — CONCEPTS — USE DRAWING AND PROTOTYPING SKILLS — DIVERGENT — CONVERGENT — DESIGN PROPOSAL

▶ The QCE design process features two distinct phases and is based on the UK Design Council double-diamond model.

The framework is based on two linked phases: EXPLORE and DEVELOP. Within each phase, there are key priorities that propel the design forward. Thinking skills are applied throughout the process, which assist in idea generation and decision-making. The shape of the phases is important: the narrowest parts of each diamond represent the convergent application (narrow focus) of information and ideas, while the widest part of the diamond represents the divergent (broad focus) approach to expansive, unfiltered ideas and concepts. The shape of each diamond symbolises the kind of thinking and practice that should be applied.

On the QCE model, you will notice two arrows above and below the diamonds. These represent the linked nature of the two phases. As you apply the process to your design work, you will recognise the cyclical nature of the framework. The exploration and development phases may 'feed' one another and you will move between each phase throughout the process. It is important to recognise that the design process is not a straight line and requires considerable research, thoughtful decision-making and creative flexibility.
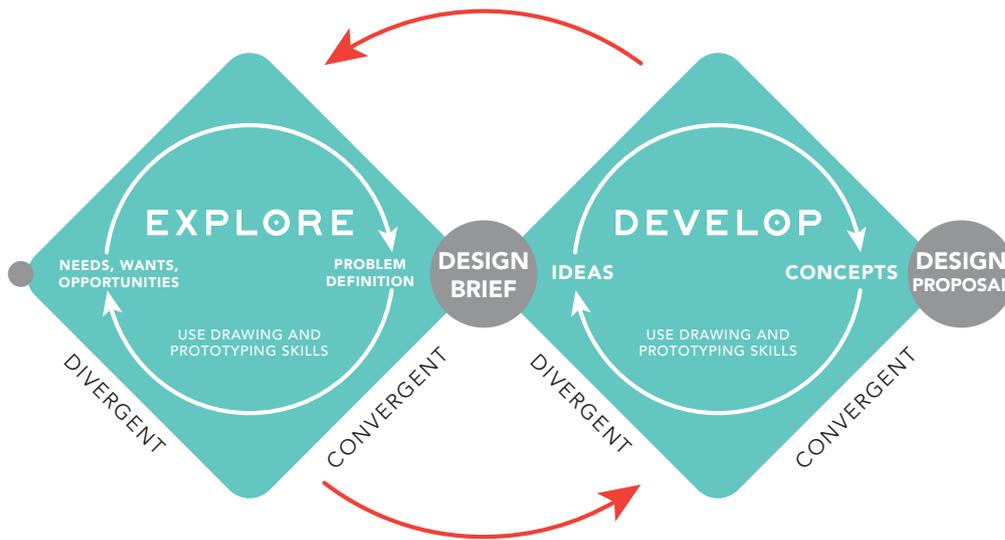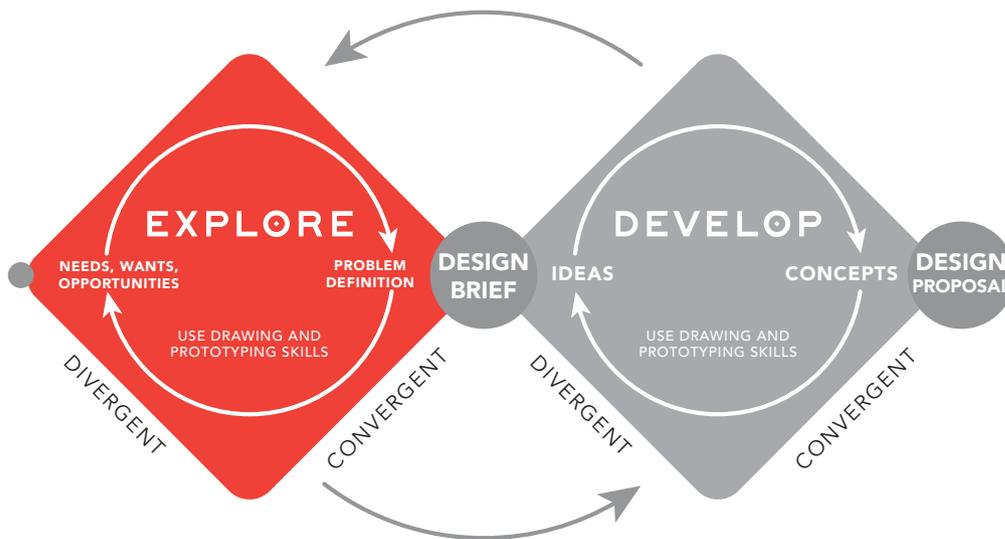
EXPLORE PHASE

The Explore phase involves:

+ the identification of a design need or design opportunity
+ the identification of stakeholders
+ the analysis of needs, wants and opportunities to identify design features and requirements
+ the use of drawing and low-fidelity prototyping skills to visualise information and ideas.

One of the key aspects of the Explore phase is the identification of a design problem. In a professional context, designers are often approached by a client who has an existing need. In this instance, the Explore phase is used to define and clarify the client requirements. Not all clients are able to articulate their needs clearly, so they rely on the designer to interpret and analyse information to understand what the client wants. Similarly, creative designers may recognise a need that has not been specified by a client and seek to innovate without client input.

In the QCE Design classroom, you will, at various stages, be provided with a clear brief and find that you do not need to access the Explore phase in its entirety. However, you will also be required to identify and articulate design problems of your own. Using the investigative, creative and analytical framework of Explore will make that achievable.

See Chapter 8 for a detailed explanation of how the Explore phase is applied in design.

DESIGN BRIEF
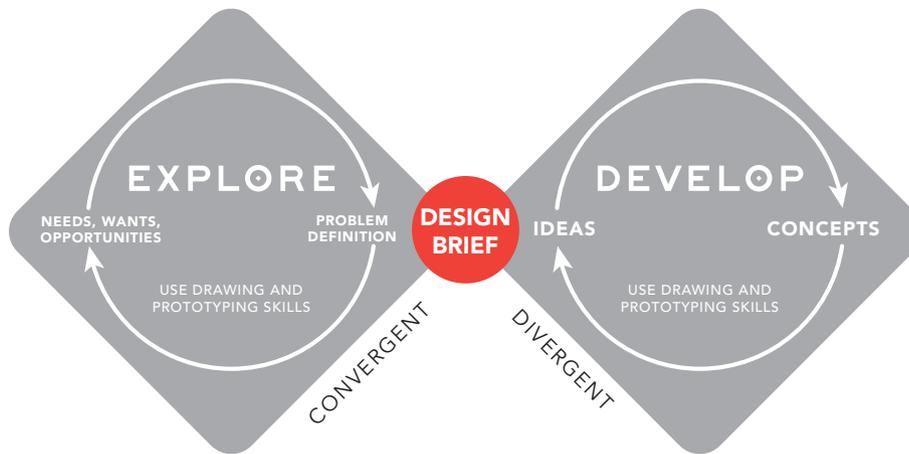
The design brief articulates the design problem that requires a solution. Design problems can range in scale from the small, such as a brochure design for a small, gourmet grocery store, to the very, very large, such as the design of an Olympic stadium. Using the data gathered in the Explore phase, the design brief should offer an insightful and clear understanding of the design need and identify the key stakeholders.

A design brief will usually include:

+ a design problem that relates to real-world needs, wants and opportunities
+ open-ended language that does not specify solutions at this early stage
+ the identification of stakeholders

+ information about aesthetic, cultural, economic, social and technical features
+ constraints
+ specific design criteria
    – related to quality of design ideas and concepts
    – relevant to meeting stakeholder requirements
    – in reference to principles of good design
+ a broad outline of intended design deliverables (the ideas and concepts) to be presented as a design proposal
+ a written format.

For detailed information about the content of a design brief and techniques for writing an effective design brief, see Chapter 9.

DEVELOP PHASE
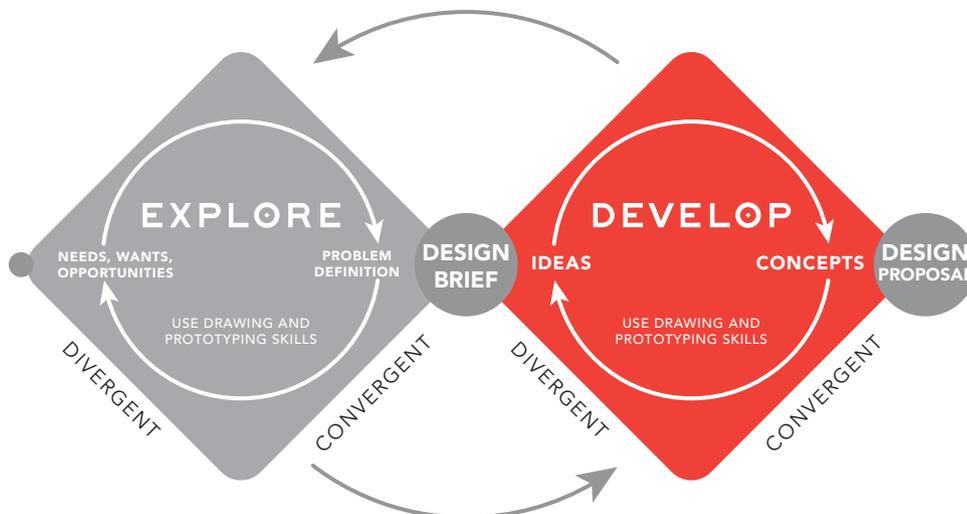
The Develop phase involves much of the creative initiation and exploration of ideas. Using the information gathered during the Explore phase, including research and stakeholder information, varied ideas are proposed under the label of development. An experimental approach followed by informed and thoughtful decision-making propels creative ideas towards suitable design solutions.

The Develop phase involves:

+ devising multiple ideas using divergent thinking techniques
+ the application of drawing to visually represent design ideas

+ the use of low-fidelity prototyping to test and experiment with ideas and concepts
+ the synthesis of design directions by applying convergent thinking techniques
+ evaluating ideas and directions against the design criteria contained in the design brief
+ making decisions about the most suitable and effective design concept.

A detailed explanation of the Develop phase can be found in Chapter 10.

DESIGN PROPOSAL
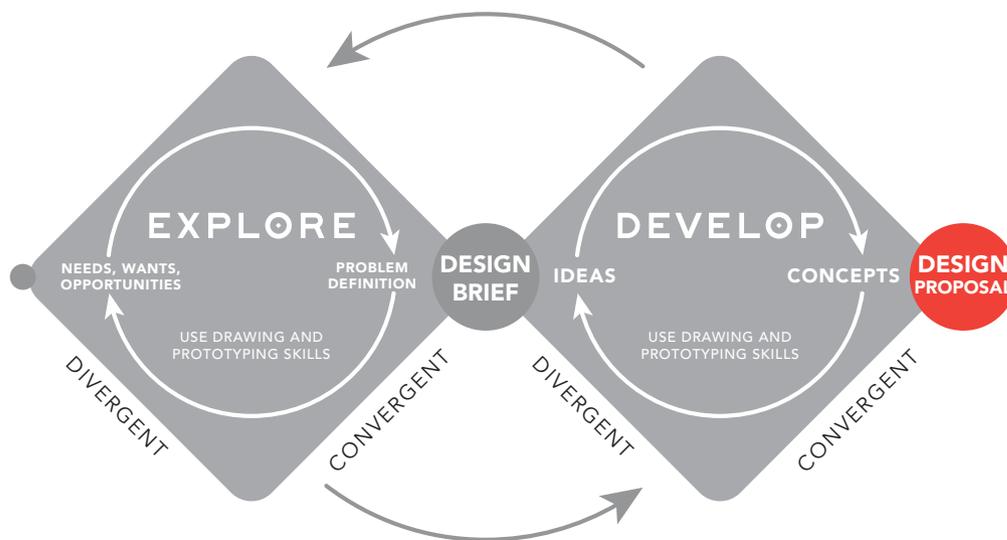
The design proposal is the culmination of the QCE design process. It is the opportunity to convey the findings and solution/s that best meet the needs identified after the Explore phase. Using visual means to convey the attributes and features of the design, the proposal is supported with written or verbal presentations that communicate how the final concept meets the original design need/s.

The design proposal:

+ shows evidence-based decision-making about the most appropriate design solution

+ is presented in the visual form that most effectively communicates the design
+ is suited to the needs of the stakeholders, including client and target audience/end user
+ may include drawing/illustration and prototypes
+ is supported with written and/or spoken information.

For a more detailed examination of the design proposal and possible formats for presentation, see Chapter 11.

6.2 DESIGN PROCESSES AND FRAMEWORKS

Variations on the design process exist in many professional and educational contexts. Increasingly, versions of the process are used by organisations and corporations to encourage innovation and creativity. The phases of the design process lend themselves to problem-solving in a wide range of circumstances, and in varying professions. Understanding how others apply the design process can assist you in seeing the power and potential of the framework. Getting to know alternative visual representations of the process and the language used to describe each phase will assist you in understanding the iterative nature of best design practices.

THE STERNDALE FUNNEL

A simple, visual representation of the creative process, the Sterndale Funnel allows for clear communication of the divergent and convergent nature of design. The funnel is divided into poetically named segments:

+ **Explorer: Search new information and resources. Look far and wide for uncharted territories.** This segment involves the identification of a design need and the application of research methods.
+ **Artist: Turn resources into ideas. Brainstorm, dream and nourish seeds of ideas to grow.** This segment involves the broadest (divergent) generation of ideas.
+ **Judge: Evaluate pros and cons of ideas. Discard or fuse ideas.** This segment of the funnel begins to converge as ideas are narrowed, adapted and discarded through analysis and evaluation.
+ **Warrior: Carry ideas into action. Defend and produce into reality.** The final segment involves decision-making and the production of a final design solution.
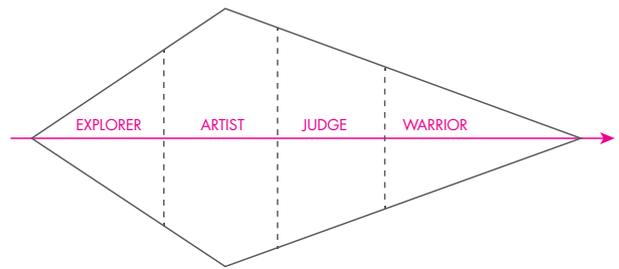
▶   The Sterndale Funnel

Although less complex than some other design-process models, the Sterndale Funnel is valuable in its visual representation of the broadening and narrowing of design thinking. The delightful titles of each segment help to inspire, rather than control, each part of the process. As a tool to help you understand where in the process your thinking should be most expansive, the funnel is effective and clear.

IDEO

One of the leaders in the application of a design process to solve diverse problems is IDEO. A prominent design firm based in the United States, IDEO was at the forefront of the expansion of design thinking into education and into non-design-related industries and organisations. Renowned for their innovative design solutions for many recognisable brands, IDEO also facilitates collaborative, global design initiative (OpenIDEO) and focuses on design thinking. One of the most successful design-thinking/design-process models supported by IDEO is contained within 'Design Thinking For Educators' created by Tim Brown; it is commonly used in schools and organisations.

The IDEO process is notable for its visual representation of the breadth of each design stage. The diagram on the next page showing each step helps guide users along divergent and convergent paths. The process encourages broad and open thinking during two of the significant phases. It also illustrates how each phase blends into the next.

PHASES

1	2	3	4	5
DISCOVERY	INTERPRETATION	IDEATION	EXPERIMENTATION	EVOLUTION

I have a challenge. How do I approach it? | I learned something. How do I interpret it? | I see an opportunity. What do I create? | I have an idea. How do I build it? | I tried something new. How do I evolve it?

STEPS

1–1 Understand the Challenge	2–1 Tell Stories	3–1 Generate Ideas	4–1 Make Prototypes	5–1 Track Learnings
1–2 Prepare Research	2–2 Search for Meaning	3–2 Refine Ideas	4–1 Get Feedback	5–2 Move Forward
1–3 Gather Inspiration	2–3 Frame Opportunities			

number of possibilities

The Design Thinking process oscillates between divergent and convergent thinking modes. It can be helpful to be aware of the mode that corresponds to the design phase you are working through.

IDEO

Visit IDEO's website to read case studies where their design-process model has been applied. Their website contains detail on the application of design thinking to a range of identified problems.

The stages of the IDEO design process

Discovery

This stage relates to the identification of a design problem or need. It involves verbalising the challenge ahead and documenting constraints that will affect the design. Research during this phase develops a deep understanding of the end user and their needs.

Interpretation

While the Discovery phase involves gathering information, the Interpretation phase is focused on organising that information. Using techniques such as affinity diagrams and questioning, possible starting points for ideation are established.

Ideation

Ideation involves brainstorming and generating diverse and unfiltered ideas.

Experimentation

This phase is directly linked to the previous Ideation phase. Experimentation challenges the designer to prototype and test ideas. Feedback gained during this phase helps to define the final direction of the design.

Evolution

This phase sees the strongest design idea introduced to stakeholders and developed into a refined concept. A pitch is used to finalise the idea and move towards production or implementation.

STANFORD D.SCHOOL

Established in 2005 at Stanford University in California, the The Hasso Plattner Institute of Design was originally part of the university's School of Engineering. It is more commonly known as the d.school. Its function is to encourage innovation and ideas outside the constraints of traditional academic structures. The d.school curriculum is based on the design-thinking process.

> It draws on methods from engineering and design, and combines them with ideas from the arts, tools from the social sciences, and insights from the business world. The process provides a glue that brings teammates together around a common goal: make the lives of the people they're designing for better. Design thinking is best learned by doing, and our classes immerse students in an experiential learning environment. Students cycle rapidly through a series of steps: observe, brainstorm, synthesize, prototype, and implement; repeating as necessary. We focus on the design process because we seek to equip our students with a methodology for producing reliably innovative results in any field. Our focus is on creating innovators rather than any particular innovation.

> Source: the d.school: The Hasso Plattner Institute of Design at Stanford – Fact sheet 2012.

The Stanford d.school model for design thinking follows similar frameworks, but offers explicit opportunities for deep thinking, collaborative practices and decision-making.

With permission from d.school at Stanford University
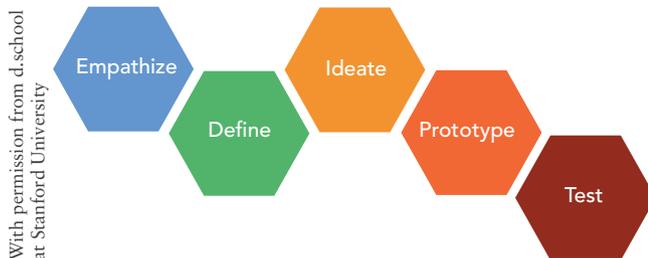
▶ The Stanford d.school design-thinking model

The notable difference between the Stanford model and other design-process visualisations is that it does not convey the breadth of each phase. However, the model is designed to work in unison with prompts and guidelines provided by the school.

D.SCHOOL

Visit the d.school website for more information and to download helpful documents for applying the design-thinking process. Download the helpful 'Bootcamp' document and 'method' cards to help build your repertoire of design-thinking tools.

The components of the d.school model are divided as follows:

+ **Empathise**: This phase relates to understanding the user of the design. One of the main areas of exploration by d.school is user-centered design. See Chapter 14 for some of the techniques applied by organisations such as the Stanford d.school.
+ **Define**: Using the information gathered from the Empathise phase, the Define mode is where the design problem is explicitly identified.
+ **Ideate**: This is the divergent phase of the d.school model, where ideas are generated and innovative, unfiltered and creative ideas are devised. This is described as 'going wide'.
+ **Prototype**: Still in the creative space, prototyping enables others to see the results of the ideation phase. Whether presented as brainstorms, models or printed concepts, prototyping brings ideas into the physical world.
+ **Test**: The test mode of the d.school model allows for evaluation. Feedback is encouraged to prompt changes and refinements that move a concept closer to a resolved solution.

DESIGN MINDS

Developed through research by the State Library of Queensland, Queensland University of Technology and Queensland Government Arts Queensland (Duell et al., 2013), Design Minds is an online platform created to support the growth of design education in Queensland schools. The Design Minds model offers a flexible set of prompts rather than a distinct framework, which differentiates it from

other process-focused and linear models of the design process. The Design Minds approach is designed to be fluid and users are encouraged to move back and forth between the three modes.
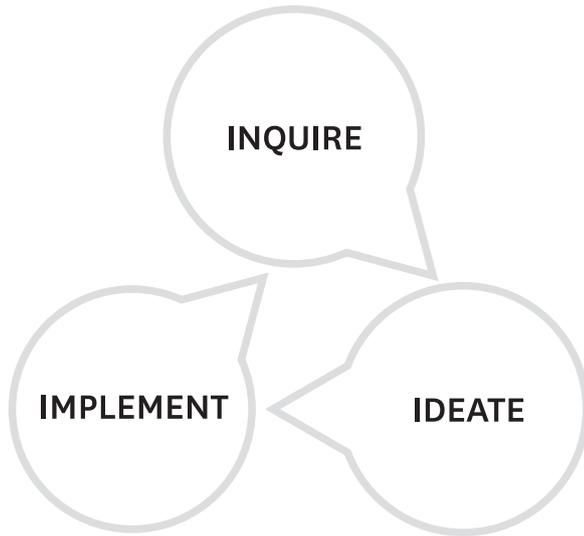
State Library of Queensland

▶ Design Minds design-thinking model

+ **Inquire:** This mode encourages research, the identification of a problem, the development of background understanding of stakeholders, and setting objectives.
+ **Ideate:** This is related to brainstorming, generating ideas and devising varied solutions to a problem. This mode encourages experimentation, risk taking and play.
+ **Implement:** This mode is related to testing ideas, prototyping and communicating a result.

Design Minds is a 2018 Good Design Award® Winner in the Digital Design category.

DESIGN MINDS

More information can be found at the Design Minds website, including applications within the classroom and collaborative links with the Smithsonian Cooper Hewitt Design Museum in New York.

CIRCULAR DESIGN

Circular design is an approach to design and production that dispenses with linearity. Where the traditional production and manufacture of products may have had a beginning, middle and an end, circular design has no end. The nature of circular design is regenerative. This approach to design is particularly attractive to entrepreneurial individuals and organisations looking to innovate.

CREATE   USE   DISPOSE

▶ Typical approaches to design (particularly in non-design environments) are linear. Products, systems, ideas and processes tend to be linear and disposed of when no longer seen as useful or relevant.
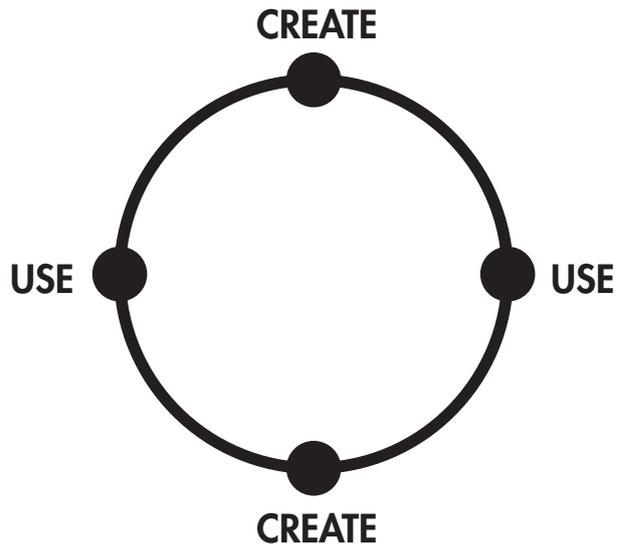
▶ A circular design approach removes the disposal stage, shifting the focus to recycling, refurbishment, re-manufacture or other sustainable methods.

Like the application of life-cycle assessment and cradle-to-cradle thinking in product design, circular design strives to minimise waste and duplication. Its simplicity makes it readily applicable to groups, businesses and organisations whose core business is not usually design- or process-focused. When creating with circular design, create may mean any of the following:

+ repaired
+ recycled
+ repurposed
+ reused
+ re-manufactured.

Methods of circular design

Most circular design methods mirror the stages of the design processes previously discussed in this chapter. Methods involve divergent and convergent thinking skills, along with many of the brainstorming and ideation techniques from Section 1, Part A. Like other creative processes, circular design suggests a series of steps to meet a design need:

1   Understand
2   Define
3   Make
4   Release

WHAT HAPPENS AFTER THE FIRST USE?

Recycled
Reused?
Repaired?
Re-manufactured?
Something else?

Then what?   Then what?   Then what?
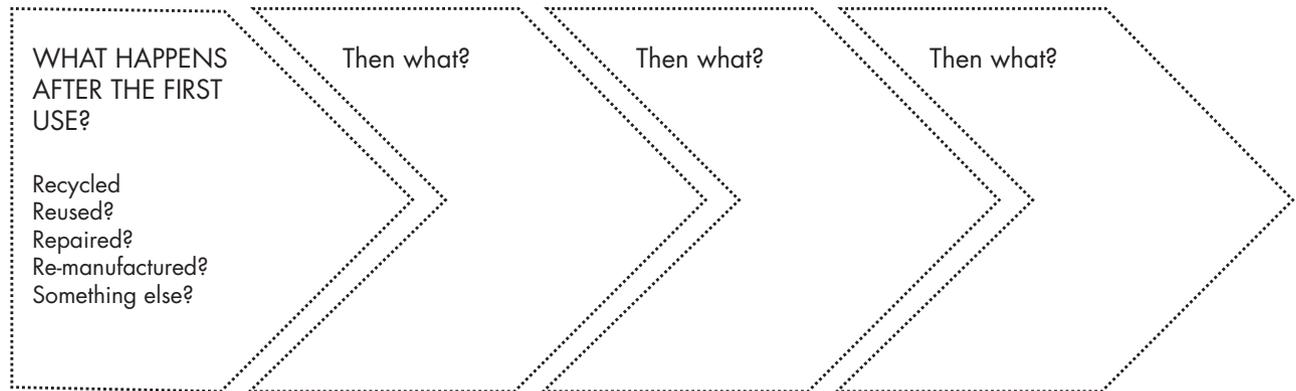
Each step is further broken down into methods:

Understand

+   Understanding circular flow
+   Regenerative thinking
+   Service flip
+   Insides out
+   Inspiration: digital systems
+   Learning from nature

Define

+   Defining your challenge
+   Finding circular opportunities
+   Building teams
+   Circular buy-in
+   Circular business model
+   Creating brand promise

Make

+   User-centred research
+   Circular brainstorming
+   Embedding feedback mechanisms
+   Soft and circular
+   Concept selection
+   Rapid prototyping

Release

+   Product journey mapping
+   Launching to learn

+   Imagining new partnerships
+   Creating your narrative
+   Aligning your organisation
+   Continuous learning loops

Techniques of circular design

The circular design model offers a great amount of detail related to each method. There are some notable techniques suggested in circular design.

Learn from nature

Biomimicry is a term used to describe products that emulate natural characteristics. Materials that decompose, products that react to heat and cold, and designs that emulate natural systems and processes are examples of biomimicry. Designers look to the natural world for guidance on sustainable and non-destructive means to innovate.

Zoom

Circular design encourages designers to 'zoom in' and, more importantly, 'zoom out' of the design process. When devising ideas and solutions, it is easy to follow a creative path and lose sight of the 'big picture' or context of the design. Integral to the circular method, is 'stepping back' from the exploration and development of a concept, to reassess its relationship to the original design problem.

Feedback mechanisms

One of the key elements in circular design is continuous learning. Feedback, in particular after a design or product is completed, can provide information leading to future improvements. Embedded feedback mechanisms may include interview or surveys, data embedded sensors and analytics.

Product journey mapping

Product journey mapping is about considering the 'use' of a design, while asking the question, 'And then what?' The use of a product defines its life, so mapping the journey provides opportunities to consider extending the length of usefulness. Critical questions about reuse and recycling options are made during this phase.
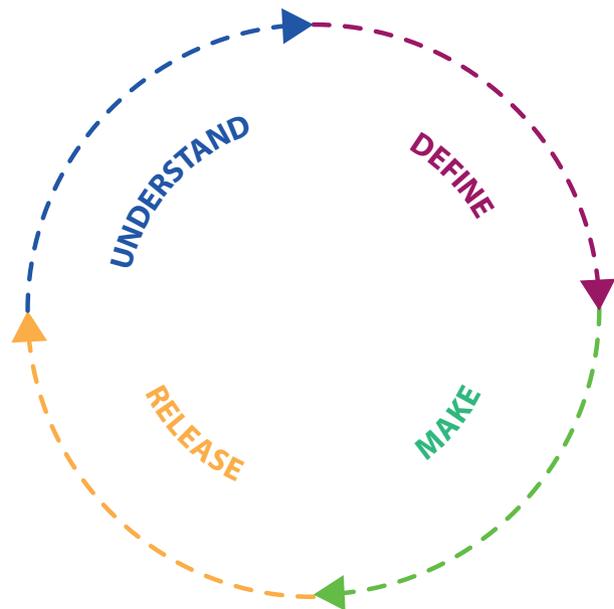
▶ Product journey mapping template to help predict possible future uses of a design

CHAPTER RECAP

1 Create a simple diagram, illustration or cartoon that explains clearly the difference between divergent and convergent thinking.

2 Using the table provided, explain in your own words the application of thinking, drawing and prototyping that occurs at stages of the listed design processes.

Process	Phase	What thinking techniques might be applied during this phase?	What drawing techniques (where applicable) might be applied during this phase?	What prototyping techniques (where applicable) might be applied during this phase?
The Sterndale Funnel	Explorer			
	Artist			
	Judge			
	Warrior			
IDEO	Discovery			
	Interpretation			
	Ideation			
	Experimentation			
	Evolution			
Stanford d.school	Empathise			
	Define			
	Ideate			
	Prototype			
	Test			
Design Minds	Inquire			
	Ideate			
	Implement			

STAKEHOLDERS

'Understanding is not synonymous with empathy. To *feel* what it is like to be another individual, you must identify with that person's culture, emotions and personal style.'

Jon Kolko in Exposing the Magic of Design, *Oxford University Press, USA 2011, p. 159*

In this chapter:

Learn the language

+ audience
+ client–designer relationship
+ demographics

+ design brief
+ design problem
+ investors

+ needs
+ target market
+ user

7.1 THE CLIENT

The needs or wants of a client are, often, the initiator of the design process. In a professional design environment, a client may approach a designer or design firm with a design problem because they were recommended to the client, or because the client was interested in work previously completed by that designer or firm. Initial meetings take place to establish what the client sees as the design problem. At this stage, both client and designer can judge whether a suitable working relationship is likely. Some designers specialise in particular areas, so it is important to determine at

an early stage whether the client's requirements and the designer's expertise match.

Clients may have a limited knowledge of the design process, so the initial communication may facilitate discussions about cost, timing and possible design outcomes. At this point, a detailed written brief is developed. The brief identifies important details such as the audience or market, the design criteria, the function of the final design, any constraints – such as cost or timing – and the 'deliverables' or outcomes required of the final design.

Client input into the design process may vary, but generally, major interactions occur between client and designer at the start of the process and at key points, when feedback is required.

A CLIENT APPROACHES THE DESIGNER WITH NEEDS, WANTS, OPPPORTUNITIES. AT THIS POINT THERE IS NO DEFINED DESIGN PROBLEM OR CLEARLY ARTICULATED DESIGN BRIEF.

A CLIENT APPROACHES THE DESIGNER WITH A DESIGN BRIEF.
OR
THE CLIENT IS PRESENTED WITH A BRIEF BASED ON NEEDS IDENTIFIED IN EARLIER INTERACTIONS.

THE CLIENT IS PRESENTED WITH APPROPRIATE DESIGN PROPOSAL/S FOR CONSIDERATION.
A DESIGNER MAY 'PITCH' CONCEPTS THAT MEET THE ORIGINAL NEEDS TO THE CLIENT.

Design 2019 v1.1 General Senior Syllabus, p. 12. Design 2019 v1.1 General Senior Syllabus © Queensland Curriculum and Assessment Authority (QCAA).

EXPLORE

NEEDS, WANTS, OPPORTUNITIES

PROBLEM DEFINITION

USE DRAWING AND PROTOTYPING SKILLS

DIVERGENT

CONVERGENT

DESIGN BRIEF

IDEAS

DEVELOP

CONCEPTS

USE DRAWING AND PROTOTYPING SKILLS

DIVERGENT

CONVERGENT

DESIGN PROPOSAL

▶   Client–designer interaction mainly occurs at key points of the design process.

CLIENT–DESIGNER RELATIONSHIP: EXPLORE PHASE

Sometimes a client may approach a designer with only a vague idea or concept. An entrepreneur may have identified a need for an app design, an inventor may

have a new product in mind and a home owner may want to expand a residential living space. In these cases, the designer's role may be to assist the client in understanding the breadth of the design task. Key information about issues including the viability of a new design product, its market appeal or affordability may be explored during the design phase. A research focus is central to this stage of the design process as

the designer 'explores' the possibilities and design opportunities inherent in the original idea.

Designers and clients may discuss the feasibility of a project and use drawings and low-fidelity prototyping, such as rough paper models, to explain possible features and functions. The designer may also question the client on their vision for the design, their preferences in previous designs and investigate their design history. In the Explore phase, a research focus assists the designer to define the design problem and set the parameters of the design brief.

Increasingly, the designer may act as their own client, identifying a need and making use of crowdfunding or crowdsourcing technologies to fund the further development of the concept.

Key questions for client research

+ Who is the client?
+ What does the client do?
+ What is the size of the company or organisation?
+ What size is it perceived to be by the public?
+ What values is it perceived to hold?
+ What is the corporate culture perceived to be?

Designers will look at the design history of a company and establish the background of previous design work.
+ What are the existing graphical products used by the client?
+ Is there a corporate style?
+ What is the existing style or aesthetic?
+ How does the client feel about previous designs?
+ What other designs does the client like, both in and outside their field of interest?

CLIENT–DESIGNER RELATIONSHIP: DESIGN BRIEF

Client's seek design professionals because they need expert design help. Very rarely does a fully formed design brief originate from a client. However, a client such as an advertising firm or construction developer may be experienced in devising clear design briefs for various design areas. For example, communication designers who work 'in house' for organisations may be provided with a brief from another department to produce a publication or visual presentation. See Chapter 9 for more detailed information about the content and construction of the design brief.

CLIENT–DESIGNER RELATIONSHIP: DEVELOP PHASE

There may be minimal contact with the client during the Develop phase of the design process as ideas and concepts are devised and tested by the designer or design team. When a clear design direction is identified, the client may be asked to provide feedback or indicate preference. Sometimes designers may present a client with several alternative ideas before advancing to the design-proposal stage. It is unusual for a client to have a 'hands-on' experience of the design process, and results are often more effective when the designer can use skill and expertise to ideate and prototype the most appropriate design concepts. Throughout the Develop phase, the client voice remains constant via the design brief. The designer may refer to the brief at various times to ensure that development is within the boundaries of the original design parameters. Towards the end of the Develop phase and during the design-proposal stage, the designer may 'pitch' the design concepts to the client. A pitch provides an overview of the decisions made during the design process and identifies the connections between the original design brief and the final design proposal. For more information on pitches, see Chapter 11.

CROWDFUNDING   FYI

Crowdfunding is a method of acquiring funds (venture capital) for the development of a product, idea or cause. Using small donations from multiple people, crowdfunding enables designers, inventors, entrepreneurs and social activists to pay for the time, labour and technology required to produce a proposed product. Kickstarter and Pozible are just two of many sites that enable designers to post concepts seeking financial support. Not all concepts are successful, while others far exceed their initial fundraising target. Supporters who donate are usually offered incentives, including discounted products, credit or acknowledgement of their donation.

CASE STUDY ~ BAGEL LABS

Kickstarter-funded products enable investors to see the design process involved in a product design. Once fully funded, designers keep members up-to-date with progress on the development and manufacture of the product. The Bagel Labs is an example of a Kickstarter success. Based on their level of investment, Kickstarter investors were offered early access to the finished product on its release.

BAGEL
THE WORLD'S
SMARTEST
TAPE MEASURE
DESIGN PROCESS

BAGEL LABS

Organize Measurements
Speech to text for your tags

38.4 in
31.4 in
40.7 in

Analyze Size Data
Keep track of body size changes.

Timeline

June, 2015
Idea Formation
Design Phase

July, 2015
Sensor Development

October, 2015
First Prototype, First App

December, 2015
Second Prototype

January, 2016
Design Upgrade

February, 2016
MWC 2016 Debut

March, 2016
Third Prototype
Sensor Upgrade

April, 2016
Prototype & App Testing
Feature Additions

June, 2016
Final Prototype

KICKSTARTER

July, 2016
Small Batch Manufacturing
Second App, Certification

August, 2016
Mass Production
Final App

November, 2016
Delivery Complete !

Remote Mode

String Mode

Wheel Mode

Built-in Laser Pointer
Guides your remote distance measurements.

Standing Supports
Helps you measure perfectly horizontal and vertical distances.

Strong, Flexible String
Made of Dyneema string that can withstand up to 112lb.

Safe for Everyone
No more cutting your fingers on metal tape edges.

Measure with One Hand
Quickest way to measure length or distance.

Rolls on Any Type of Surface
Great for measuring odd-shaped objects.

Bagel Labs, with permission

7.2 THE AUDIENCE

The audience is the market or target group to whom the design will be directed. All design has an end user or audience. The client could have a clear idea of the market, but may be seeking to expand or attract a new audience to a product or service. The designer's task is to identify the specific characteristics of the target group. Any special characteristics of this group will affect how the design is developed, constructed, manufactured and disseminated. Information and data about a user or target audience, including their location, age and gender, is referred to as demographics.

Although the audience will always vary, it is important for a designer to fully understand and respond to user needs. More information on user-centred design can be found in Chapter 14. Audience and user research is an integral part of a design process and often defines the direction of design concepts. The characteristics of an audience are often divided into specific types of data such as age, gender, socioeconomic status and interests. Other factors such as cultural background, educational level and religious affiliation can also affect the content, appearance and functionality of a design.

AUDIENCE FACTOR: AGE

Age can be identified in very specific terms or more broadly, and is often classified by arrangement into groupings. For example, 18–25 years might be more loosely defined as young adults, 40–55 years might be classified as middle-aged adults, and so on. Terms such as Baby Boomers, Generation X or Y and Millennials, used by marketers to establish generational groupings, are somewhat helpful but can be overly broad categorisations.

AUDIENCE FACTOR: GENDER

Designs can be targeted at a male or female audience or may be gender non-specific. The influence of gender is very strong in defining personality traits and consumer preferences, and will dictate the use of materials, design elements and principles in a design.

AUDIENCE FACTOR: SOCIOECONOMIC STATUS

This usually refers to the financial and social position of an audience. In Australia we perceive ourselves to be an egalitarian society and have little interest in a 'class' structure. Rather than defining social groups as working class, middle-class and so on, we tend to identify ourselves by our level of financial income. Employment status, salary level and educational background can be factors in identifying the socioeconomic status of an individual or group. The amount of money people earn determines their 'disposable' or discretionary income (that is, the income remaining after essentials are covered). Groups with a high disposable income are attractive to marketers.

AUDIENCE FACTOR: INTERESTS

This is a vast category of great importance to designers and market researchers. The interests of a specific audience may include music and fashion, for example, but there exist subcategories of those interests that can define an audience in even more detail. The specific style of music and the fashion labels that are preferred by an audience will influence their habits as consumers. Interests may also refer to specific professional, academic, cultural, political or personal interests.

AUDIENCE FACTOR: CULTURAL BACKGROUND

The content of a design may be influenced by the belief system of the audience. The appropriateness of imagery and content will be defined by cultural and religious traditions. If a brief addresses the needs of a culturally specific audience, it is essential that the designer understands what visual material is and is not appropriate to use.

AUDIENCE FACTOR: LOCATION

Where an audience lives can have an impact on the effectiveness of a design. A target audience in a remote area may have different opportunities to view designs

compared with an audience in an urban location. Designs may also be quite specific to a region or area. Location can also affect the socioeconomic status of an audience, as some areas offer different opportunities for employment or professional advancement. Location can also affect the language used in a design, the appropriateness of colour and images, and the scale or proportions of the design. An environmental design is affected by its location; the use of materials and the appearance of the structure may be impacted by geographical and planning boundaries.

USER/AUDIENCE CATEGORISATION

In an environment that is saturated with visual content, a designer must have specific knowledge of the audience to break through and make a visual and, if required, commercial connection. It is advisable to avoid formulaic groupings and develop a deeper profile of the end user. Think about your friends and family, your school colleagues or workmates; chances are they are a diverse group. Designers need to understand the diversity and breadth of an audience. Some examples of user/audience descriptors can be found below.

DEMOGRAPHICS   (FYI)

Demographics involve the analysis of statistical information about a population. Demographic data provides information about trends, ethnic diversity, average age, education levels and current interests. Companies use demographic information to make decisions about product development. This data provides the company with clues to common sets of values and attitudes of consumers. When marketing professionals use buzzwords and phrases such as 'the target demographic', they are simply talking about an audience that shares common characteristics.

Demographic descriptors	Personal descriptors	Socioeconomic descriptors	Other descriptors
Singles	Youthful	Professionals	Socially aware
Families (young family, new family, established family)	Outgoing	Young professionals	Environmentally aware
	Carefree	Older professionals	Informed
Seniors (60+)	Happy	Tradespeople/tradesmen	Hard working
Elderly (75+)	Social	Qualified/highly qualified	Self-sufficient
Retirees	Adventurous	Manager	Sedentary
Pensioners	Risk taking	Employee/employer	Engaged
Middle-aged (40+)	Conservative	Unemployed, jobseeker	Politically aware
Adults	Frail, unwell, sickly	Highly educated	Interested in social justice
Parents (mothers, fathers, grandparents)	Experienced	Poorly educated	Family-oriented
	Worldly	Corporate	Community-minded
Couples	Organised	Retired (supported by pension, family, superannuation)	Responsible
Non-traditional families/couples	Sensible	Privileged	Outspoken
	Quirky	Deprived	Critical of…
	Creative		Supportive of… ▶

Demographic descriptors	Personal descriptors	Socioeconomic descriptors	Other descriptors
Young adults	Eccentric	Budget-conscious	Passionate
Students	Independent/dependent	Average incomes	Impassioned
Teenagers/adolescents	Intellectual	Student	Multicultural
Youth	Busy	Graduate	Migrant background
School-leavers	Mischievous	Tertiary educated	Non-English-speaking background
Pre-teens (tweens)	Loving, caring	Undergraduate	Culturally diverse
Children	Empathetic, compassionate	Employed full-time/part-time/casual	Influenced by…
School-aged children	Helpful	Well paid/poorly paid	Religiously affiliated
Toddlers	Intelligent	High disposable income	
Infants and babies	Fit and healthy	Moderate disposable income	
	Colourful	Low disposable income	
	Relaxed	Independent/dependent	
	Focused	Stay-at-home (parent)	
	Positive	Working from home (small business)	
	Energetic, vibrant	Business owner	
	Concerned, worried	Worker	
	Chic/fashionable	Secure/insecure	
	Sophisticated/unsophisticated	Ambitious	
	Multicultural	Single income/dual income/limited income	
	Curious, intrigued	Wealthy	
	Optimistic/pessimistic	Established	
	Enthusiastic, keen, motivated	Reliant	
	Sporty, athletic, active		

KEY QUESTIONS FOR AUDIENCE RESEARCH

+ Who is the audience?
+ Who falls within the company's or organisation's existing market?
+ Who does the company perceive as the target market for the new design?
+ Is this a different or new market for the company? If so, why?
+ What are the company's primary and secondary target markets? (For a product aimed at teenagers, for example, the teenagers themselves are a primary market and the parents who will pay for the item are a secondary market.)
+ What research has been done to establish this market?
+ What are the details of the market? (These include age, income, background, interests, purchasing patterns, ethnicity, location, familiarity with product, technological knowledge.)
+ What other products appeal to this market?

CHAPTER RECAP

1 Read the client description and design problems outlined in the table below and suggest what further information the designer would need to ascertain before starting the design process.

Client need	Information needed by the designer
I am a plumber with a medium-sized and very successful business. I am looking to expand my business and set up a website that can be viewed on a range of devices including mobiles/tablets etc. I want a uniform for the people working for me, signage on my trucks and branding of all of my promotional materials. My business is based in central Brisbane but we service other areas. We want to be highly visible.	
I am a business owner and I specialise in developing products for the home market. We sell a range of plastic products including storage. We wholesale our products to large bricks-and-mortar retailers as well as popular online retailers. We want to develop a range of lunchboxes for families to use. We want to create storage options that can be interchangeable and offer safe and secure storage for liquids and perishables.	
I am the mayor of the local shire and I am committed to encouraging the use of outdoor recreation areas and parklands in the region. I have established a committee to address issues around this and we require the design of park/recreation area that incorporates activities and experiences for people of all ages to enjoy. There should be options for young children to play safely, but also for others to enjoy the environment. Some shelter should be included in the design.	

2 Using the audience description provided, create one or more concepts for the packaging for natural soap. Use the template to depict your concept.

THE AUDIENCE

Health-conscious singles and families residing in Queensland, who value natural ingredients and quality personal products. They may range in age from 25 to 35 and be responsible for purchasing goods for their household. They shop at the local supermarket and are careful with their household budget, but are prepared to pay a small premium for products that are kind to the environment and to the user. They may be educated about the benefits of natural, organic and healthy ingredients. Products that use natural and native Australian plants would be very appealing to the target market who may have a preference for home-grown products and Australian-made items. The audience would be house-proud and enjoy a tasteful and refined living environment. They are likely to appreciate products that fit into contemporary home decor. The target audience is both male and female, youthful and aware of healthy living.
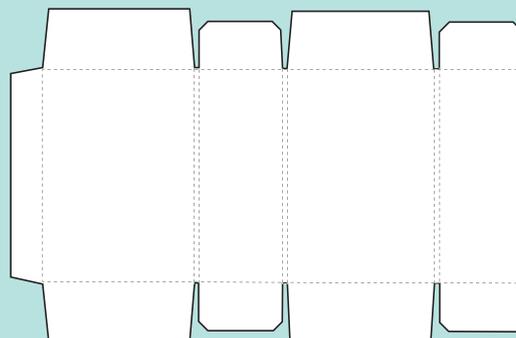
EXPLORE PHASE

'Needs aren't guesses at the future. They're existing opportunities waiting to be unlocked.'

Dev Patnaik in Needfinding: Design Research and Planning, *CreateSpace Independent Publishing Platform 2017*

In this chapter:

Learn the language

+ complexity

+ data

+ interpretation

+ mindsets

+ needfinding

+ observation

+ statistics

+ systems

8.1 IDENTIFYING NEEDS, WANTS AND OPPORTUNITIES FOR DESIGN

Needs, wants and opportunities initiate and then drive the design process. They can, as mentioned in the previous chapter, be presented to a designer by a client, or they can be identified by the designer before or even during the design process.

Needs are often identified as essentials for living. Famously identified by Abraham Maslow in the 1940s and further developed in the decades since, Maslow's

Hierarchy of Needs offers a visual representation of fundamental human requirements for living. Usually represented as a pyramid, Maslow theorised that human beings require lower level needs to be fully (or partially) fulfilled before being able to focus on higher level needs (the narrow areas of the pyramid). Used in sociology and psychology, the levels of the hierarchy are increasingly seen as interrelated. A major study in 2011 identified that universal human needs exist across all cultures, but the order of importance within the traditional hierarchy was not set.

Although the most basic needs might get the most attention when you don't have them, you don't need to fulfil them in order to get benefits [from the others]. Even when we are hungry, for instance, we can be happy with our friends. They're like vitamins; we need them all.

Tay, L., & Diener, E. (2011). *Needs and subjective well-being around the world*. Journal of Personality and Social Psychology, 101(2), 354–356.

Self-actualization
desire to become the most that one can be

Esteem
respect, self-esteem, status, recognition, strength, freedom

Love and belonging
friendship, intimacy, family, sense of connection

Safety needs
personal security, employment, resources, health, property

Physiological needs
air, water, food, shelter, sleep, clothing, reproduction

Shutterstock.com/Plateresca

Maslow's hierarchy of needs

▶   Maslow's Hierarchy of Needs

NEEDFINDING

Designer Robert McKim from Stanford University established the concept of needfinding more than 30 years ago. He recognised that for designers to have the most impact on the development of a successful product, they needed to be involved in the earliest stages of the design process (i.e. the definition of the design problem). He theorised that a designer's early involvement in identifying the need would assist in developing the most appropriate designs, because the designer would have a clear understanding of the end user's needs.

Needfinding is the act of discovering people's explicit and implicit needs so that designers can create appropriate solutions.

Source: Patnaik, Dev. *Needfinding: Design Research and Planning* (Kindle Locations 26–7). Kindle Edition

In his significant book on needfinding, author Dev Patnaik provides example of users who were unaware of poorly met needs until provided with an alternative, more effective design. In these instances, the designer initiated the need as the audience or user was unaware of a better option. Patnaik sets out some guidelines

for the effective identification of needs and suggests a range of thinking strategies that are familiar to designers and design students (see Chapter 1).

Observation of needs

They key to identifying a need is observation of the user or audience. When designers insert themselves into the environment inhabited by the user, they can gain a clear insight into how the user behaves and operates. Collecting data based on observation, which can later be added to brainstorming tools such as mind maps and affinity diagrams, means that information is relevant and authentic. Needfinding enables a designer to devise concepts and responses using factual information rather than assumption.

Patnaik suggests six observational approaches to identify needs:

+ **Watching:** Observe behaviours, interactions and responses.
+ **Asking:** Ask relevant questions and listen carefully to answers.
+ **Doing:** Participate in the actions of the user.
+ **Buying:** Use when the need is related to purchasing a product.
+ **Reading:** Access data and statistics on the user.
+ **Reflection:** Incorporate the data into design-thinking tools such as maps and diagrams.

Wants refer to the requirements or desires of a user/audience that do not qualify as essential but may still be seen as having high importance. The design of a luxury car, for instance, may fulfil the want of the target audience who have high disposable income and a preference for the latest technology. Basic transportation may be a *need* but the user who *wants* a luxury car is influenced by a range of factors, including status, emotions, personal desire, personal reward and aspirational lifestyle goals. The wants of a client, user and audience are major drivers of the design industry. Consumption of goods and technology, and construction of housing and landscape are all important aspects of contemporary life in many countries and cultures. User wants have a major impact on the diversity of design, including:

+ preference for an appealing aesthetic
+ desire for latest technological advancements
+ an emotional response to a design
+ preference for the newest or latest trends, fashions and ideas
+ requirement for upgrading or enhancing existing products, constructions or technologies

+ preference for more efficient and sustainable designs
+ reliability and affordable/manageable maintenance of products, constructions and technologies.

NEED

ACCESS TO FRESH DRINKING WATER

WANT

FILTERED WATER IN PORTABLE CONTAINERS, SUCH AS BOTTLES. PREFERENCE FOR EXPENSIVE, TALL GLASS BOTTLES, WHICH ARE HEAVY.

OPPORTUNITY

TO DESIGN A WATER CARRIER THAT IS APPEALING AND STYLISH. SHOULD OFFER A DURABLE FILTRATION SYSTEM. LIGHTWEIGHT, PORTABLE AND VISUALLY SOPHISTICATED.

In understanding the end user and recognising the difference between needs and wants, designers discover opportunities. An opportunity may be a 'gap' in an existing market, a design that doesn't currently exist or the redesign of a concept, product or construction.

OXO Good Grips

▶ An example of needs and wants in combination. OXO Good Grips are a suite of domestic products originally designed for people with limited functionality in their hands, such as those suffering with arthritis who *needed* accessible kitchen tools. Interestingly, the success of the designs has been due to users of all abilities recognising the excellent ergonomic properties, which led to *wanting* a more comfortable product.

DESIGN MINDSETS

When designers seek opportunities for innovative design, they are often said to use a beginner's mindset. Mindsets are a design-thinking tool that encourage open-mindedness and help designers avoid preconceived ideas.

Examples of mindsets are shown below:

APPLY A BEGINNER'S MINDSET	SHOW DON'T TELL	BIAS TOWARD ACTION	EMBRACE EXPERIMENTATION
APPROACH A TASK WITH NO PRIOR KNOWLEDGE. *FORGET WHAT YOU THINK YOU KNOW!*	EXPLORE IDEAS THROUGH DRAWING. *VISUALISE INSTEAD OF VERBALISE!*	DRAW, MAKE (Prototype) and DEVISE. *DON'T JUST THINK. DO!*	BE BRAVE AND UNFILTERED WITH IDEAS. *APPLY SCAMPER etc. FOR CREATIVE RISKS.*

▶   Adapted from 'Design thinking bootleg' Hasso Plattner Institute of Design at Stanford University

TAME AND WICKED PROBLEMS

Design opportunities are everywhere, but all design problems are not equal. Some problems are straightforward while other are complex. In the 1970s, the terms 'tame' and 'wicked' problems were used by academics (Rittel & Webber, 'Dilemmas in a general theory of planning', 1973) to describe issues related to urban-planning challenges. Over time, the terms have been applied to define problems in a range of areas, including design.

A tame problem is one that can be clearly defined in a design brief, understood by the key stakeholders and addressed in isolation from other issues and factors. For example, a local plumber requires an identity design for use on a website, van and stationery. The design can be created by meeting the client's (plumber's) need for a simple visual that is eye-catching and identifying.

A wicked problem is far more complex and may be influenced and connected to other factors external to the design solution. Wicked problems include climate change, homelessness and poverty and sustainability. These are problems that defy straightforward solutions. Wicked problems are influenced by myriad factors and may be based on entrenched behavioural, political and cultural systems.

Whereas tame problems can usually be analysed by addressing their component parts (e.g. audience, context, the purpose of the design, constraints), a wicked problem often needs a research focus that investigates and understands the systems that create and maintain it.

Tame problem	Wicked problem
Need for high- and medium-density housing in cities	Homelessness in global cities
Alternative to takeaway packaging for liquids, e.g. coffee	Waste build-up in landfill sites
Protection of wildlife from roads and motor vehicles	Rapid decline in native species
Promotion of ethical eating and management of food waste	Protection of food sources, including seeds and plants

8.2 RESEARCH METHODS

Research is essential and can provide important information about the client, the design problem, current trends, and the work of other designers, as well as essential information about the preferences and behaviours of the user/target audience.

As mentioned previously, observation and investigation are key methods of research. An architect will visit the site of a building to study the location of the structure and the surrounding environment. A graphic designer may meet with members of the target audience to gather firsthand information about trends, fashion and attitudes. An industrial designer may research how a consumer uses a product. Many designers will investigate

existing products and designs in the marketplace for inspiration and to gain an understanding of where a new product might be positioned.

To gain very specific information about the target audience, designers may use market research companies. Small groups of people who fit within the target audience range are observed during discussions or asked specific questions about their tastes and responses to existing products. Trend-forecasting firms also offer vast amounts of information about future developments in colour, styling, product forms and fashion.

The collected research data is analysed carefully to establish the accuracy of the information and its value to the brief. The verification of research is very important, as styles and trends can change quickly, relegating what was once thought to be innovative to the out-of-date bin. Fashion design, advertising and graphic design are particularly susceptible to changes in public attitudes and fashion trends.

Research continues throughout the design process. A design brief can demand more than one deliverable. For example, the main design brief may be for the design of a corporate logo, but the brief may also require that the logo be used in a wide range of applications. These applications may include vehicles, clothing, stationery and advertising. The designer, in this scenario, would need to undertake research into the best means of applying the logo to these diverse carriers.

Research can include:

+ investigation of the client history and existing products or services
+ investigation of direct competition to a new product or service
+ observation of the target audience in order to understand behaviours, responses, trends and preferences
+ observation of the location or context of the final design
+ analysis of data about future trends, new materials, community attitudes
+ collection of visual information to inspire new concepts.

Research is an integral part of the Explore phase of the design process. Research provides a window to essential information about important aspects of the brief, such as the audience and the relevant historical background to the task. Researching all aspects of the design brief is an important undertaking. Knowing about the client and their design history can help to ensure a new design is original and not repetitive. Research of the target audience helps to identify interests, preferences and trends. Research of similar design products is important to establish a point of difference and to view competitors' products.

▶ This student undertook market research to understand audience awareness of ethical clothing production.

EXISTING PRODUCTS

These images illustrate the convenience of the stapler.

Interesting form but looks a bit bulky

Quite a big stapler, judging from the proportion of the photo

Similar form, only the lever is at the bottom

①

Colour pink; more attractive to female students / office workers

Stand stably. Easy to use: just push down, don't have to pick the stapler up

②

Fits in a pencil case/ an office toolbox

Key cha
→ porta
prevent
loss

③ Generally rectangular in form, with curved edges

Simple and elegant design

Vertical stapling:
The slit is at the top, push these 'buttons' on the sides

Creative form; however the all-ma surface makes i look plain, cold & heavy

④

Make the 'button' a bit more cylindrical; incline the top

Cube: very streamlined & balanced

⑤

The slit could curve up like this

Vintage design: every component looks thick & solid; smooth metallic surface. Thanks to the ruler placed beside the stapler we know it is actually not as big as it looks.

Bright colours

This design appears to be modern & professional thanks to colours (black & white) and the curved shape of the base

⑥

Transparent plastic allows the user to see the components inside, making the audience want to look carefully to see how it works

FROM THIS:

⑦

The plastic looks cheap, so the stapler seems to be low quality & not very attractive

⑧

Another vintage design:

⑨

Strong, firm, solid but not very suitable for modern office environment looks like it can handle heavier duty than 6 sheets of paper

⑩

The shapes of the base and handle are very creative

Nhu Duong

60

size of the text helps highlight the company's name

ECOZONE
eco-stapler

The black & white stapler stands out against the light green packaging

This design is very eye-catching because it gives a strong sense of modernity & freshness

61

Patterns applied on different sides

Effective diagrams showing how it works, so even if the language is unfamiliar the audience can somewhat understand its function

Simple, cubic box; too ordinary and not very attractive

62
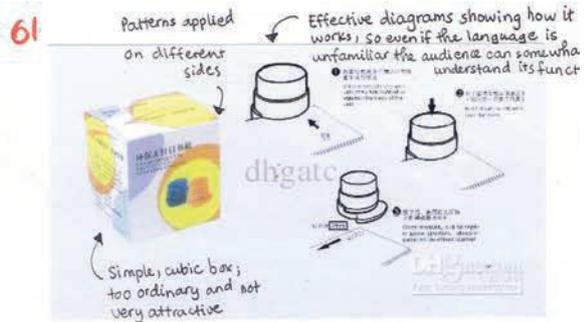
An ineffective design: everything's green, so nothing really stands out except for this line in red, which is unnecessary as it only briefly describes what the product is

EcoStapler

Key information de is n highlig

FIELD TRIP

I VISITED AN OFFICE SUPPLIES RETAIL STORE TO FIND OUT ABOUT VARIOUS PACKAGING ON DISPLAY.

THESE ARE TRADITIONAL STAPLERS BUT I THINK STUDYING THE PACKAGING WOULD HELP, SINCE BOTH TYPES HAVE SIMILAR FUNCTIONS

63

64 Colour of the graphic matches colour of the stapler

J.BURROWS

STAPLER & 1 HOLE PUNCH SET

Images add to the aesthetic of the packaging

65 Plastic is the main material used in these packagings

PRODIGY
POWER-ASSISTED · JAM FREE
PaperPro

66

Nano
EASY, POWER-ASSISTED MICRO STAPLER
PaperPro

67

Keji

Keji

The vivid yellow colour and larger logo make this packaging more eye-catching than the J. Burrows ones

68

STAPLER

Product is visible through this piece of plastic

These staplers are power-assisted so they look quite bulky, and the colour purple emphasises a sense of power.

Bigger & stronger boxes

69

Rexel
Optima 70

The white space makes the eyes focus on this image photo first

70

The staple (figure) stands out against the green ground

Rapid

Rapid

Nhu Duong

▶ In researching a new stapler design, this student looked at existing products in the marketplace, products around her and products online, and also took a field trip.

INSPIRATIONAL MATERIAL: RELEVANT PATTERN + FORM IN URBAN ENVIRONMENTS.

I figured it was important to explore the environment that my target audience work/live in, as many people draw inspiration from this. My original intention was to collect a few sample shots that could be used in my research and development, however I ended up spending a whole day continuously finding countless forms and patterns in my surroundings. I believe using this association with environment and workplace has the potential to strengthen my product and make it more appealing to my audience.

Ben Jennings

▶ This student took photographs of patterns, forms, shapes and structures that inspired him. He later used the images to initiate design ideas for product forms and surface patterns.

Gathering inspirational material is also an important function of research. Inspiration may come from anywhere and anything. Many designers find inspiration in random 'found objects', colours, words, textures, landscapes and intangible experiences, such as events, interactions and moods. Be open-minded and aware that inspirational material is all around you and may capture your interest and creativity at any time! Be prepared to collect items that might inspire the form, function or appearance of a design product.

Research is valuable for concept inspiration and it is essential to a response to a brief. How thoroughly you understand the design problem will direct the success of your final design concepts.

RESEARCH TYPES

Quantitative and qualitative research

In the discussion of research, there are two common categories into which most research will fall: quantitative and qualitative research. The key to the difference between each category is in the name.

Quantitative research

Quantitative research is concerned with statistical data and measureable, objective information. For example, quantitative information may be gathered by a web designer who is interested in establishing the success of interactive elements on a website. Gathering data related to the number of times users click on website elements may assist the designer in creating appealing and successful online content.

Qualitative research

Qualitative research is **subjective** and deals, in many cases, with images, words and behaviours. Qualitative research methods include interviews and observations. For example, in the design of a children's playground, the designer may apply qualitative research by observing and documenting the behaviour of young children at play. Using the observations noted, the designer may be able to establish patterns and commonalities to assist in designing the most appropriate and engaging playground.

It is likely that you will apply predominantly qualitative research methods to your design work, but it is also very helpful to use quantitative methods when gathering factual data to inform your design concepts.

▶ Examples of quantitative and qualitative data

Quantitative	Qualitative
The company has eight employees.	The company is small.
The house has four bedrooms.	The house is spacious.
She is 178.5 cm in height.	She is tall.
The document contains 150 words.	The document is brief.

▶ Methods of quantitative and qualitative research

Quantitative	Qualitative
Surveys	Observations
Data	Interviews
Measurements	Market research

Primary and secondary research

Primary research and secondary research refer to the source of research materials. Primary research involves collecting information specifically for a design brief. It is gathered from original sources through methods such as interviews and market research. Your observational drawing of related imagery is primary research.

Secondary research involves the use of data or other information that has been collected by another source. Census data, books and articles are secondary sources. Secondary research may not have been created for the design brief, but may still offer relevant insights and information, and usually contains analysis of primary sources. Use of design magazines is considered secondary research.

▶ Examples of primary and secondary research

Primary	Secondary
Interviews with members of the target audience	Review of articles describing the characteristics of the target audience
Photographs and collage images of objects related to the design brief	Use of stock photography images related to the design brief
A focus group of users to discuss how effectively a design functions	Use of census or similar data

MARKET RESEARCH
ACCORDING TO THE INDUSTRY

Dr Kendall Cook looks into the importance of album artwork and the impact it has on consumers, the music industry and the artist it self. Dr Kendall Cook discusses how album artwork has integrated into the 21st century and its adaptation to the new music formats.

Music Industry Market Research
The Effect of Cover Artwork on the Music Industry
By Kendall Cook
Presented to
Graphic Communication Department
California Polytechnic State University 2013
http://tinyurl.com/pl32n75

Cover art grabs the attention of the consumer and is their first impression of the album. Visual artwork is powerful, and just as a book cover grabs the attention of the reader; album artwork grabs the attention of the listener. Music sales have experienced negative and positive influences. The development of music videos, online stores such as Apple's iTunes and Spotify, cover art, and media organizers/players have grabbed the consumer's interest and have created new methods of promoting music sales.

Cover Artwork is an area of the music industry that has not yet been explored is the connection the consumer has with the aesthetics of album art. Tangible products such as records, cassettes, and CDs, all had album artwork. When a consumer picks up one of these products, cover art was the first noticeable characteristic. Holding something that is visual brings an associated connection with the album and the artwork. Album artwork is very similar to branding logos. When a music user sees album artwork they immediately know which artist produced the album. This phenomenon created by artists and record label companies, was one of the best and most effective marketing strategies of that time. Cover art is an expression that represents the artist. It has symbolism and colors that one can identify with that particular artist or album that is produced. Just as book covers grab the attention of the reader, cover art grabs the attention of the listener.

Album packaging grew in importance as time went on, record companies added gatefolds, lyric pages, sticker inserts, extra sleeves, poster inserts, etc. as a way to gain the customer's interest. Many of the additional features added to the record packaging, gave the listener a deeper insight about the artist. By creating a culture around the artist, consumer interest grew, and customers not only wanted to listen to the music, but also collect the memorabilia. Rock Stars lived glamorized lifestyles that were fabricated by record sales companies to make money by inspiring dreams of the youthful generation. By creating this culture, record companies weren't just selling records; they were also selling clothes, films, musical instruments, and other commercial products.

Art is powerful and though digital sales contain artwork they are not as noticeable as a tangible product. When holding a record, cassette, or a CD, cover art is the first thing a consumer sees. A digital track has the artwork embedded into the file that shows up on media devices that play the music, but it is no longer the outwardly noticeable characteristic it once was. Users no longer associate a connection between the album and artwork, because individual tracks are purchased.

Niche Market According to a recent statistic, vinyl record sales have resurfaced in the 21st century. Starting in 2008, vinyl records have begun to see an upward trend in sales. Nielson Sound Scan reported that sales have increased by 17.7% from 2011. According to digitalmusicnews.com, "most [records] are being sold at indie retailers with a heavy lean towards rock" (Resnikoff, 2013). The reasoning for these sales may be largely influenced by the album's artwork. Digital tracks are easier to acquire and are more cost effective. Some consumers like vinyl records because it allows the consumer to listen to the entire album. With CDs and digital tracks it is easy to skip songs on the album that may not be as popular. The choice between the two is preference. Some people who enjoy listening to the vinyl sound say "the experience is very similar to being at the live recording" (Upton, 2010). Whatever the reason may be, artwork is one of the key characteristics of a vinyl record, and people enjoy having a connection with the music to which they listen.

Constantine Virtanen

▶ This student, undertaking the design of a record sleeve, found relevant academic research. He was then able to identify key information to help generate and inform his design ideas.

COLLECTING RESEARCH

It is important to research intelligently. Research should be collated and sorted carefully, and used throughout the design process. Although the research stage is identified at the very beginning of the design process, its influence extends throughout the design task.

Where to start?

How do you know where to start? It is important to have a purpose when researching. Using the design brief, you may choose to focus on the following areas to initiate your research.

Research the client

Who are they? What is their background? Their location? What previous designs have they used/created?

Research the user

Who are they? What do they look like? What do they do? How old are they? Where do they live? What designs appeal to them? How will they use the final design?

Research existing and past design products that are similar

Which are most effective and why? Where are possible points of difference?

Research other designs that have a similar function and context

How do they achieve the function required? How are they placed/used/displayed in their given context?

Where to look?

The Internet is usually the first port of call for research and it offers a wealth of information, sometimes too much. It is advisable to look at a range of different sources for research and not rely on one source only. You also could create your own research by taking photographs, making notes and creating drawings.

RESEARCH RESOURCES

Electronic resources

The Internet is one of the most powerful information resources available. The sheer volume of available information from a wide range of sources makes this an invaluable resource.

Online databases provide access to articles and papers that might otherwise be unavailable to individuals outside specific industries and professional fields. Most of these services are subscription-based, but many libraries have access to them.

There is a wealth of free information and images online provided by individuals and organisations. However, when seeking factual material, it is important to verify the source of the information, as there are essentially no overall rules to ensure that all material published online is accurate. Email and social networks are important communication tools that can assist in the collection of information. Many manufacturers will provide company and product information in response to a request via email or offer information via their website or social media pages.

The availability of digital image technology makes the sharing of still pictures and video online quick and straightforward. Keep in mind that many online images have a resolution of 72 dpi and are small in size. This ensures that download times are minimal, but such images print poorly. Digital images that have been enlarged can appear pixelated and blurred, making them unsuitable for presentation purposes, although they may be quite suitable for research. There are some valuable online libraries of stock photos that are free to use; amateur photographers and illustrators post their images and allow their work to be used for non-commercial purposes. The quality of these images can be quite high. Most content on these sites requires appropriate **attribution** of the source, so ensure that you follow the guidelines set out by the copyright owner of the image.

When users are accessing online images and information, Google Images allows them to search by image size, which makes sourcing high-quality images easier.

Social media have made understanding the preferences and tastes of an audience even more accessible. It is possible to evaluate interest in ideas, products and fashions by gathering information about 'trending' topics online. Trending is a term used to explain the popularity of key words and terms used on blogs and on social media sites such as Facebook and Twitter. The proliferation of an idea online is known as a 'meme' and a popular meme can spread rapidly via social networking. An example of a successful meme might be a popular culture reference, a quote from a TV show or a lyric of a song.

There are many design blogs online, which are a rich resource of design ideas and can provide an insight into current trends in design. Too numerous to mention here but easy to find online, design blogs offer opportunities to see evidence of contemporary international design at both amateur and professional levels.

When researching online, begin with an idea of what it is you would like to find. The information available online can become absorbing and time-consuming, so beginning any search for images and information with a clear plan will make the most efficient use of your time online. As you search for information, record useful sites and email addresses in your notepad or sketchbook, or copy and paste the relevant links into a document or notes file. It is important to retain URLs of images that you have gathered to ensure that your sources are clearly identified in your work.

Found materials

Look around you. Don't underestimate the usefulness of junk mail, direct marketing and free promotional material. Such publications can provide an insight into different markets and interest groups and may even inspire compositional ideas.

Free postcards, street newspapers and brochures that use illustration, photography and other methods to promote and advertise events and products may be readily available. Many corporate and non-profit groups use direct marketing as a relatively cheap means of gaining access to a broad section of the community. Often found in cafes, music and fashion retail stores, and entertainment venues, free postcards provide a wealth of visual material and potential research.

Verbal resources

Valuable information about the design brief can be gathered from the source of the original need itself. Guidance from your teacher will be of great help throughout the design process; suggestions from another source can offer different directions and alternative interpretations of aspects of the design brief.

Discussion is a worthwhile research technique. Market researchers use questionnaires and surveys to gather information about the preferences and attitudes of a specific audience. Face-to-face discussion provides not only written data but also allows for the interpretation of vocal inflections and the physical body language of participants. Sometimes written material can be informative, but it lacks the extra detail of a verbal or physical response.

Discussions with experts in professional fields are an important resource when responding to a design brief. An expert can provide firsthand knowledge about techniques, the viability of production methods and information about product history. Initially, it may seem difficult to find an expert in the task, but asking parents, friends and teachers may lead you to people with expertise in similar or related fields.

Literary resources

The library is a key resource in the collection of information. Libraries offer access to books, magazines, journals and the Internet, and library staff are extremely knowledgeable about the resources they provide.

Many libraries subscribe to a range of journals and online archives. It is possible to investigate the background of a company, product or service using resources such as these. Journals and magazines such as *Choice* offer objective testing and analysis of products, which could be a valuable resource in the development of product design concepts. Magazines that focus on popular culture provide insight into trends, tastes and fashion related to their specific market.

The Australian and international magazine markets are vast and there are magazines suited to all ages and interest groups, offering information about diverse audiences.

Books are, of course, an essential resource for any research, whether for information specific to the design brief, such as a book about the history of a product, or information that is related to the task, such as a reference book about ergonomics.

Many design and industry magazines produce an annual edition, giving an overview of design developments over the previous 12 months.

Ben Jennings

▶ In researching his design brief, this student used email interviews. The design brief specified a desk design for graphic designers, so the student contacted designers in Australia and overseas. He asked pertinent questions to gain information about the most appropriate design directions.

Made Publishers

These publications often select key movements, fashions and innovations, and showcase emerging and established designers and associated professionals. Similarly, compendium volumes of design examples – such as logos and typography – provide topic-specific overviews, as do some country-specific volumes, which focus only on designers from a defined region. The concentrated nature of these publications make them valuable resources.

Historical resources

Historical resources are not necessarily dusty old books in the archives of a library, but may relate to designs from last year or last century. The history of previous designs is a good place to start researching the successes and failures of the past. From existing constructions, products or compositions it is possible to analyse the application and effectiveness over time of construction materials, content and the elements and principles of design.

'Retro' references are often made in design, so it is good to familiarise yourself with past representations of your design task.

The National Library of Australia archive old photographs, newspapers and journals for reference, and permit viewing of many primary sources. Photographic and physical records of social, environmental and geographical changes can be found at local museums and historical societies.

Such material can offer insight into not only the appearance of past designs but also their application and context.

Your local area may also provide clues to past designs. Using a camera and a notebook, you can collect images and ideas from local buildings, antique or junk stores, and landmarks.

Government agencies also collect vast quantities of data about Australian citizens. This information is then used in the development and distribution of services and the deployment of government funding. A national census is held every five years to gather information about employment, household characteristics, education and lifestyles.

AUSTRALIAN BUREAU OF STATISTICS

Census data can be viewed at the Australian Bureau of Statistics website.

Remember that research is often ongoing throughout the design process. It is important to be aware of trends and developments. So, as you design, keep an eye on your target user and the factors that influence them.

Lucy Boehme

▶ The design brief required this student to design packaging for organic skincare products. In gathering research, the student showed a selection of existing package designs to her target users and noted their responses. This informed some of her decision-making about packaging forms, textures and materials.

ORGANISING AND INTERPRETING RESEARCH

We are surrounded by a wealth of visual, verbal and written information – so, how do we determine what research will be of value to the design process?

Organisation is the key to using researched material effectively. Organise your research into clearly defined categories, for example:

+ research specific to the end user
+ research of similar products with a similar function
+ research of materials and media
+ inspirational material: layout, design elements and design principles, media, materials.

You will discover that your research has provided you with information directly related to your user, the context of the planned design and some items that have a similar function to yours. This material will assist you in understanding the design problem and will allow you to make educated decisions about the suitability of proposed graphical representations.

LOGO RESEARCH:

I would like my logo to be quite contemorary and innovative in design, but an addition recognisable universaly for its clear features which underpin its purpose.

INNOVATIVE

TRADITIONAL

CONTEMPORARY

CONSERVATIVE

Nicholas Rose
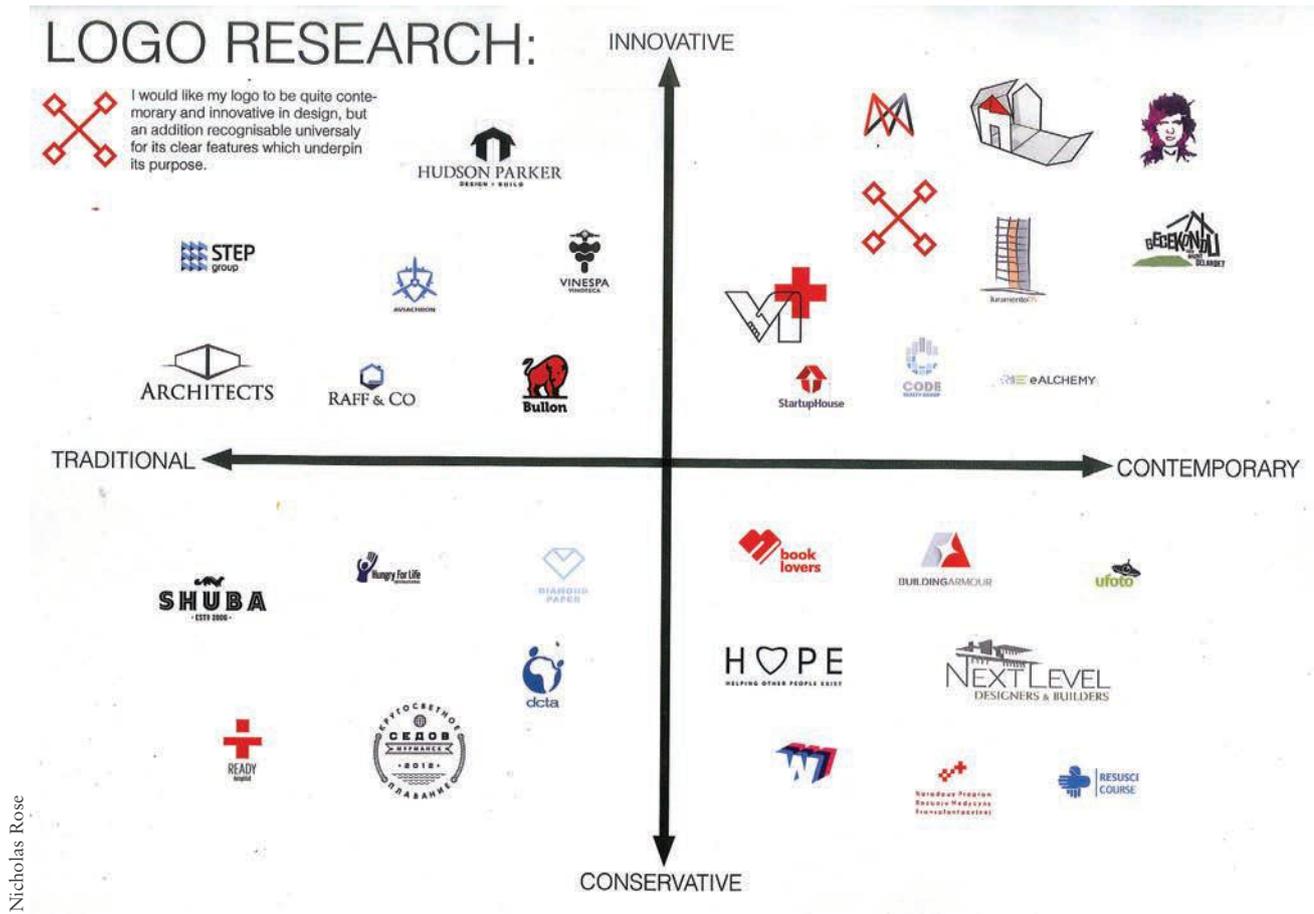
▶ This student used a scale to organise researched images of corporate identities. Organising the collected logos into four quadrants, the student could identify which were the more innovative, conservative, traditional and contemporary of the images. He was then able to identify where he would like his own design to fit. This organisational tool can be very helpful in defining the aesthetic qualities and direction of a design idea.

Annotating research

Annotation is the best means of indicating – to you and to others – the value and meaning of researched materials.

+ Insightful annotation indicates that you can analyse researched material.

+ Write about why you have chosen to use the research you have.

+ Explain how you might use your research in the design process

+ Indicate which aspects of the research might give you starting points to generate ideas.

CHAPTER RECAP

1   Categorise the following problems as 'wicked' or 'tame'.
  a   high rates of homelessness in cities
  b   a commuter vehicle that uses biofuel or solar power
  c   lifejacket with inbuilt emergency medical supplies
  d   impact of climate change on polar regions
  e   plastics recycling system
  f   rubbish build up in the Pacific Ocean
  g   refugees fleeing war zones
  h   a sustainable, inexpensive housing solution

2   Identify four collection methods for quantitative and qualitative data.

	Quantitative data collection method	Qualitative data collection method
1		
2		
3		
4		

3   Read the design brief below. Using Dev Patnaik's approach to needfinding through observation, give examples of how each observational tool could be applied and what information might be gathered.

Aoka is an ethical clothing brand who seek to address sweatshop culture and exploitative clothing production processes within several South-East Asian countries. Targeting fashion-conscious young adults aged 16–24, the brand hopes to build consumer awareness of where clothing comes from, including the financial, social and human cost of inexpensive clothing (fast fashion). Aoka's business model includes a bricks-and-mortar retail presence featuring an in-store cafe, mural artworks and information panels as well as traditional retail displays. Their clothing range includes information about the origin and true cost of each garment printed or attached to the clothing. An online presence and strong social media plan are integral to the reach of the business.

Observation technique	How could this be applied and what information might be gathered?
Watching	
Asking	
Doing	
Buying	
Reading	
Reflecting	

WRITING ABOUT DESIGN

'Few people think about it or are aware of it. But there is nothing made by human beings that does not involve a design decision somewhere.'

Bill Moggridge, co-founder, IDEO

In this chapter:

Learn the language

+ annotation
+ clarification
+ design criteria
+ reflection
+ return brief
+ terminology

9.1 ANNOTATING DESIGN IDEAS

It is helpful to explain your concepts as you research, generate, develop and refine them. Annotations are notes placed beside images that explain the concept that is being shown. Annotations are written reflections on your design ideas; actively making notes involves *thinking* about your *design thinking*. Consider annotations as forced reflection and use them to propel your ideas forward. Good annotations are reflective, succinct and relevant. They convey evaluation and suggest possible directions for further development.

These key concept questions will help you to make effective annotations.

+ **Descriptive:** What were you doing? What design factors are being applied/considered?
+ **Analytical:** Why did you do it?
+ **Predictive:** Where might the idea lead? What is the potential of the idea?
+ **Reflective:** Is it a good idea? Does it fulfil the design brief? Will it appeal to the client/end user?

As you write, imagine that you are explaining your decision-making to a complete stranger. This will assist you in keeping your statements objective. Try not to make all of your annotations personal. Avoid comments such as 'I like…' or 'I don't like…'; instead try 'This works because…' or 'This doesn't work because…'.

Annotations do not need to be full sentences; short notes in point form can convey relevant information succinctly. For example: 'Colour is vibrant. Eye-catching. Will suit the target audience'.

Writing about design, both your design ideas and the ideas of others, helps to build a design vocabulary. This becomes vital when submitting design proposals to a client (see Chapter 11) and reflecting on the pros and cons of design ideas. Articulating the possibilities of an idea is essential when collaborating with others and when discussing options with clients, users and your teachers. A shared design language, using appropriate terms in relation to elements and principles of design, drawing and rendering techniques, and prototyping methods and technologies assist in gathering feedback about a design direction.
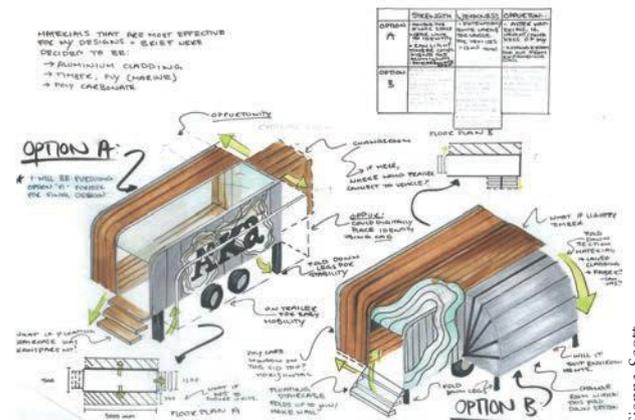
Sienna Scott
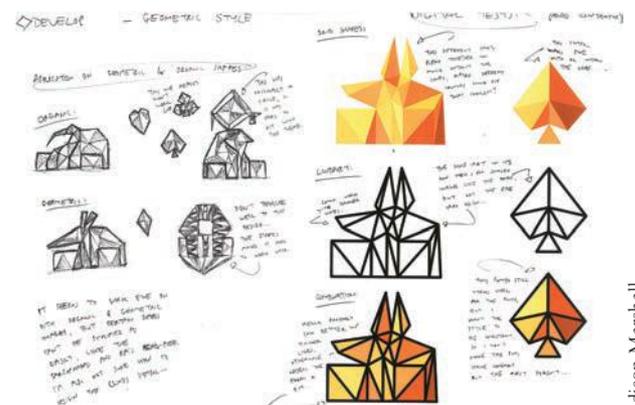
Madison Marshall

9.2 CONSTRUCTING A DESIGN BRIEF

The design brief is of prime importance. It is only possible to create a good design, when the design problem itself has been clearly articulated. Only after the identification of needs, wants and opportunities, and with comprehensive research material, can a design brief be fully formed. In most cases, the design brief is formed through discussions between client and designer to establish the following details.

+ **The core design problem**
+ **The design criteria**
  The design criteria define the requirements that must be included in a design proposal. Design criteria will vary according to the design problem. They

provide a framework for assessment and enable a design idea to be evaluated against the needs of the stakeholder (client, end user/audience) or specific needs set by the teacher within a class task or examination. Design criteria may also be based on the Principles of Good Design (see Chapter 12).

+ **The target audience/user (if known) of the design**
The audience is the market or target group to whom the design will be directed. The client may have a clear idea of the market but may be seeking to expand it or attract a new audience to a product or service. The designer's task is to identify the specific characteristics of the target group. Any special characteristics of this group will affect how the design is developed.

+ **The context of the design (i.e. where it will be used/seen/applied)**
Where a design will be used has a major impact on the content, appearance, materials and format. The physical location will determine scale, materials and the design elements and principles to be used. A billboard displayed at the edge of a freeway, for example, will be viewed by drivers and passengers passing by at 100 km per hour. The content will be read from a distance, so a design that is heavily dependent on text and small detail would not be suitable.

+ **Constraints such as cost, timeline, location, materials and technologies**
Common constraints such as time and cost have a major impact on the design outcomes. A large project requires a longer time frame and usually needs a bigger budget, so a clear understanding of the cost and time frame must be established in the early stages of the client–designer relationship. The location of a design task can also provide challenges; in a global marketplace, many designers find themselves working in overseas locations, where language and cultural differences can affect the flow of the design process. The scale of a design task and the materials required may also be factors in determining the success of a final design. If a designer is unfamiliar with new materials, technologies and processes, then training and education must be addressed.

+ **The deliverables**
The design brief will specify the final deliverables required by the client. A date will be specified and costs associated with changes will be communicated. Deliverables will vary according to the project but may include finished artwork, **branding** collateral (communication design), specifications for tooling and production (industrial/product design), plans, elevations, walk- or fly-throughs, models and building specifications (environment design).

To ensure that client and designer have the same understanding of the design process and potential outcomes, many designers produce a return brief. Taking the information gathered from the client, the designer writes the brief as they interpret it and then asks the client for comment and agreement. This technique allows the designer to craft a brief from a design perspective; returning it to the client ensures that both parties have a clear understanding of the final design deliverables. At this stage, the brief may be signed and contracts exchanged, and the project formally commences.

CLARIFYING A DESIGN BRIEF

When you receive a design brief it is important to 'unpack' the communication need, or needs, that you will be required to solve. Clarify the brief with a 'return brief' so that you, as the designer, have a clear understanding of the client's expectations. See page 151 for an example of a return brief.

+ Client name
+ Explanation of reason for design requirement(s)
+ What are the design criteria for this brief?
+ Client's background and design history. List previous or existing designs.
+ List any non-negotiable inclusions, such as logo, corporate colours, branding and so on. These may also be listed as design criteria.
+ List any general client preferences for elements, such as colour, appearance, type and so on.
+ What are the client's expectations of deliverables?

DEFINING THE DESIGN PROBLEM AND WRITING A DESIGN BRIEF

Describe the need. (What does the client require you to design?)						
Client name						
About the client						
List the design criteria (What must be included in the design? These may also be assessment requirements.)						
Principles of Good Design (Suggest the appropriate Principles of Good Design that might be included in this process – see Chapter 12)						
Audience information	Age:	Gender:	Interests:	Socioeconomic status:	Cultural or religious factors:	Location:
Constraints	Time factors	Cost factors	Location	Materials	Technologies	Other
Context (Where or when will the design be used/ seen?)						
Considerations	Elements and principles of design (Are there any *required* design elements and design principles? If so, describe.)					
	Media and materials (Have any media or materials been specified by the client? If so, describe.)					
	Legal and ethical responsibilities (Are there relevant legal responsibilities, such as copyright and IP or standards, that may affect the design process? If so, describe.)					
	Sustainability (Are there any sustainability factors that should be taken into consideration? If so, describe.)					
Deliverables (What are the deliverables?)						

▶ Design brief template

CHAPTER RECAP

1   Annotation provides written reflection on your design ideas; it involves thinking about your thinking. Good annotation is reflective, succinct and relevant. It conveys analysis and suggests possible directions for further development. These key concept questions will help you to make effective annotations:
    +   Descriptive: What were you doing?
    +   Predictive: Where might the idea lead?
    +   Reflective: Is it a good idea?

EXAMPLE

Mark Wilken
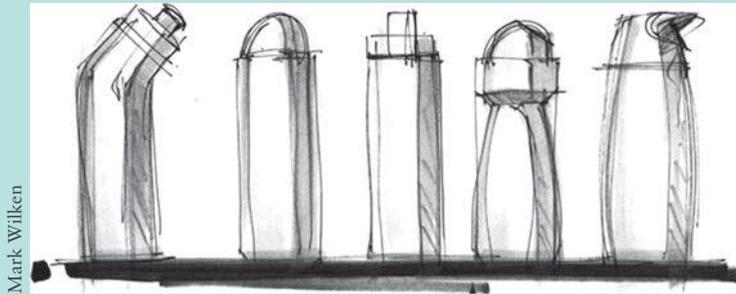
Descriptive: Generating a concept for a drink bottle.
Predictive: Will explore more ideas using the half-sphere on the top.
Reflective: Prefer rounded top – possibly more ergonomic. Might be comfortable to hold; important for the target audience.

a

Descriptive: _____

_____
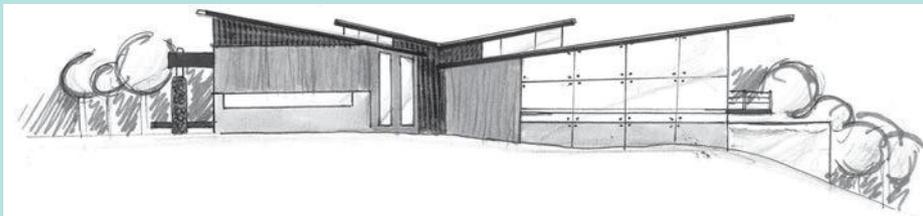
Predictive: _____

_____

Reflective: _____

_____

_____

_____

_____

b

Descriptive: _____

_____
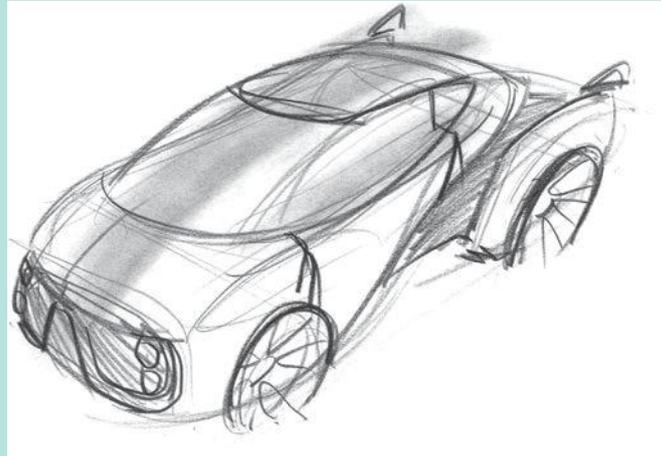
Predictive: _____

_____

Reflective: _____

_____

_____

_____

_____

2 Read the following design problems and identify possible constraints that may affect the design process. Suggest how the constraints may influence the decision-making of a designer.

Designer	Design need	Anticipated constraints	Decisions that may be made to address constraints
Fashion designer	To create a range of comfortable swimwear for toddlers and pre-schoolers that facilitates buoyancy without adding bulk. Many very young children do not like wearing a life vest so the swimwear should incorporate safety features that are comfortable for the wearer.		
Communication designer	To create a simple, illustrated first-aid booklet to be distributed to all junior primary school students in Queensland. The booklet will feature instructions about basic treatments for scratches, stings and minor injuries.		
Industrial designer	The design of an underwater camera casing for action cameras. The casing should suit a range of designs on the market and allow for maximum functionality when underwater.		
Environment designer	The design of a new gymnasium and wellness centre to service a large urban population. The users will be of mixed age and mobility.		

3 Highlight the design criteria featured in the following design brief including target audience/user, deliverables and constraints.

>   Circa 1602 Trading Co. is a boutique specialist spice, tea and herb trading company seeking a sophisticated, high-end identity design that reflects its ethos. The company is inspired by the Dutch East India Trading Company, which was founded in 1602 when the States-General of the Netherlands granted it a 21-year monopoly to carry out colonial activities in Asia; the name of the company, 'Circa 1602', stems from this significant historical date. The company is based in Brisbane and predominately markets its products to specialist stockists such as providores and delicatessens, as well as online customers. Circa 1602 prides themselves on providing high-quality spices, teas and herbs; and because of its quality ethos and artisan products the company has strived to serve a high-end market; targeting a customer base with high disposable incomes. Circa 1602 requires the design of its corporate identity, its logo and accompanying stationary: business card, letterheads, etc.
>
>   The main purpose of the identity design is to promote and advertise Circa 1602 to gourmet and boutique stockists, restaurants and chefs, as well as individual customers of local boutique providores and gourmet produce stores. The target audience for the corporate identity of Circa 1602 is potential stockists: primarily owners of boutique providores and delicatessens, restaurant owners and chefs, and specialty hospitality industry suppliers, as well as customers of these stockists and suppliers. The corporate identity design must be cost-effective, as the budget is moderate due to general business set-up costs. The identity should feature the logo for Circa 1602, and will be applied to company signage, merchandise, business cards, web pages, shipping and freight packaging, etc. Therefore, the logo must be effective in both colour and black and white, and able to be applied to a range of visual carriers, work in various sizes/proportions, and be representative of Circa 1602's quality ethos and influences.

return brief emma rickards

willoaks bed and breakfast
Lexie & Peter Rickards 31 Tetley's Lane Oxley Victoria 3678

Located at the gateway to North East Victoria's King Valley and close to the Milawa Gourmet Region, WillOaks Bed and Breakfast offers quality secluded ensuite accommodation with a beautiful vista to Mt Buffalo. Situated on the farming property of Peter and Lexie Rickards, two guest rooms are set in established gardens that surround the 1920's homestead, where gourmet breakfasts of local produce are served on the verandah during warmer months or by the open fire on cool mornings. Guests may choose to stay in either the Spa or Garden Room and are encouraged to sample the region's excellent array of food and wine establishments, including Brown Brother's Winery and Epicurian Centre, Pizzini's Winery, the Milawa Cheese Factory, Milawa Mustards, The Range Restaurant, Rinaldo's Restaurant, and the King River Café. WillOaks is located only minutes from the rural city of Wangaratta and is ideally situated for day trips to historic Beechworth, Glenrowan and Rutherglen, Paradise Falls, the picturesque town of Bright and the snowfields of Mt Buffalo, Mt Bullar and Mt Hotham.

Built around the original features of a small hut in which Peter slept as a boy, both guest rooms are tastefully decorated in warm tones and textures, with natural timber finishes and elegant colour palettes of green or blue complementing the rural landscape outside. Windows overlook the pond scattered with water lilies, the small vineyard or the surrounding paddocks where Angus cattle roam. Arrangements of fresh flowers from the garden and homemade biscuit selections provide sophisticated alternatives to the clichéd trappings of lace and doyleys often associated with bed and breakfast accommodation.

deliverables
> primary logo design
> final digital artwork for business card, 'with compliments' slip, and voucher
> final digital artwork for brochure incorporating text and imagery
> webpage design
> final digital artwork for signage displayed at property entrance

positioning
Visitors to WillOaks Bed and Breakfast seek to escape the busyness of every-day life and enjoy an accommodation experience that combines the warmth of rural hospitality with contemporary style and sophisticated flair. Peter and Lexie pride themselves on an ability to intuitively respond to the needs and desires of their guests, whether that be through the provision of plenty of privacy, or by accepting an invitation to join guests for a pre-dinner drink by the pond. Honeymooners, couples of all ages, groups of friends, small families, and those visiting the area on business regularly visit WillOaks, and often return again. Guests appreciate the secluded location, personal touches, warm greeting and fine food provided by Peter and Lexie, whose extensive knowledge of the region's food and wine offerings is valued by those with similar culinary interests.

WillOaks Bed and Breakfast requires an identity and selection of promo-tional design applications that communicate the nature of the business while expressing a warm sense of rural hospitality combined with sophisticated style.

specific responsibilities
Together with the provision of the outlined deliverables, I will also source or generate any required images in digital and/or hardcopy formats, source production quotations, communicate with suppliers, manage production and undertake a press-check if required. In order to ensure the quality of the finished designs, your responsibilities will consist of supplying any required copy or copyright images and proofreading the finished designs.

With permission from Emma Rickards

▶   An example of a return brief that specifies the agreement between designer Emma Rickards and her client.

DEVELOP PHASE

'The designer and the design problem engage in a dance of process, creativity, and often, conflict.'

Jon Kolko in Exposing the Magic of Design, *Oxford University Press, USA 2011, p. 3*

In this chapter:

Learn the language

+ develop

+ distil

+ evaluate

+ generate

+ refine

+ synthesise

There are three parts to the creative process inherent in the Develop phase. Taking prompts and data from the Explore phase, and key criteria from the design brief, ideas are devised. The most promising ideas are developed using divergent and convergent thinking techniques. Ultimately, the most appropriate design idea is synthesised into a solution suitable for presentation as a design proposal.

10.1 DEVISING IDEAS

Divergent thinking skills come into play in the Develop phase of the design process (see Chapter 1).

There are multiple applicable techniques to assist in devising design options that have arisen during the research and investigation of the Explore phase.

Freehand sketching of initial ideas created during brainstorming is a valuable method of devising ideas based on research. Visual thinking or visual brainstorming creates unfiltered thoughts and ideas. These may be linked to earlier concept maps or word lists, and can trigger innovative and fresh ideas. Ideas and concepts may be vague in the initial stages of the Develop phase, but through drawing they can be more clearly explored. (See Chapter 2 for more information about sketching.)
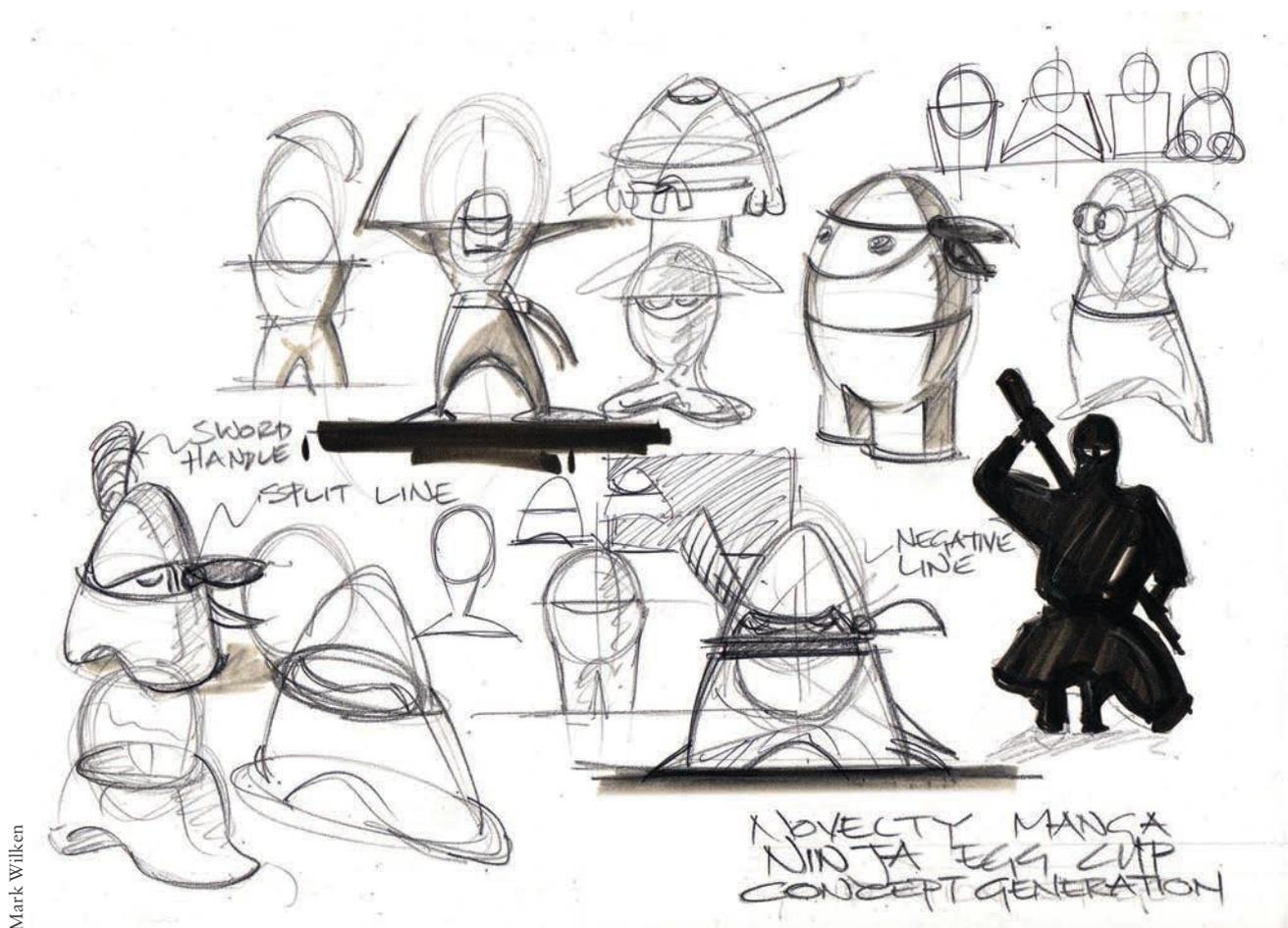
Mark Wilken

▶ Visual brainstorming

When drawing using manual or digital methods, keep these recommendations in mind.

+ **Start simple.**
  Draw the simplest representations of your design ideas first. Focus on shape to begin with – perhaps draw the front view of your design, followed by a simple three-dimensional representation of the form to follow.

+ **Ask questions; they lead to answers.**
  To push the possibilities of an idea, ask questions as you draw, or when you reflect upon a drawing: 'What could I change?' 'What would happen if…?' Rather than answering the questions in your mind, answer them with another drawing. (The SCAMPER technique can be applied here if you get stuck for questions to ask yourself; see Chapter 1.)

+ **Choose your media.**
  The temptation to erase a less successful idea can be strong. Avoid the temptation by drawing some or all of your early ideas in ink (fine-liner) or ballpoint pen. Don't waste time reflecting on an unsuccessful drawing; move quickly onto the next version and address the changes there.

+ **Practice really does make perfect.**
  The more you draw, the better your visualisation and ideation will become. Drawing is a physical activity like any other and will improve with practice. The more you draw, the more explicit the communication of your ideas will become.

+ **Generate ideas in two and three dimensions.**
  When appropriate, visualise your design in both two and three dimensions. Plan or top views can be of great help in environmental design and product design, and three-dimensional representations help to explain more detail about the form of an object. Where possible, apply drawing methods that you are familiar with, such as perspective or isometric. Freehand drawings in these methods are highly effective and add realism to your ideas.

Devising ideas involves:

+ unfiltered generation of ideas inspired and motivated by the design brief
+ multiple creative responses
+ a beginner's mindset, open to alternative ideas and opportunities.
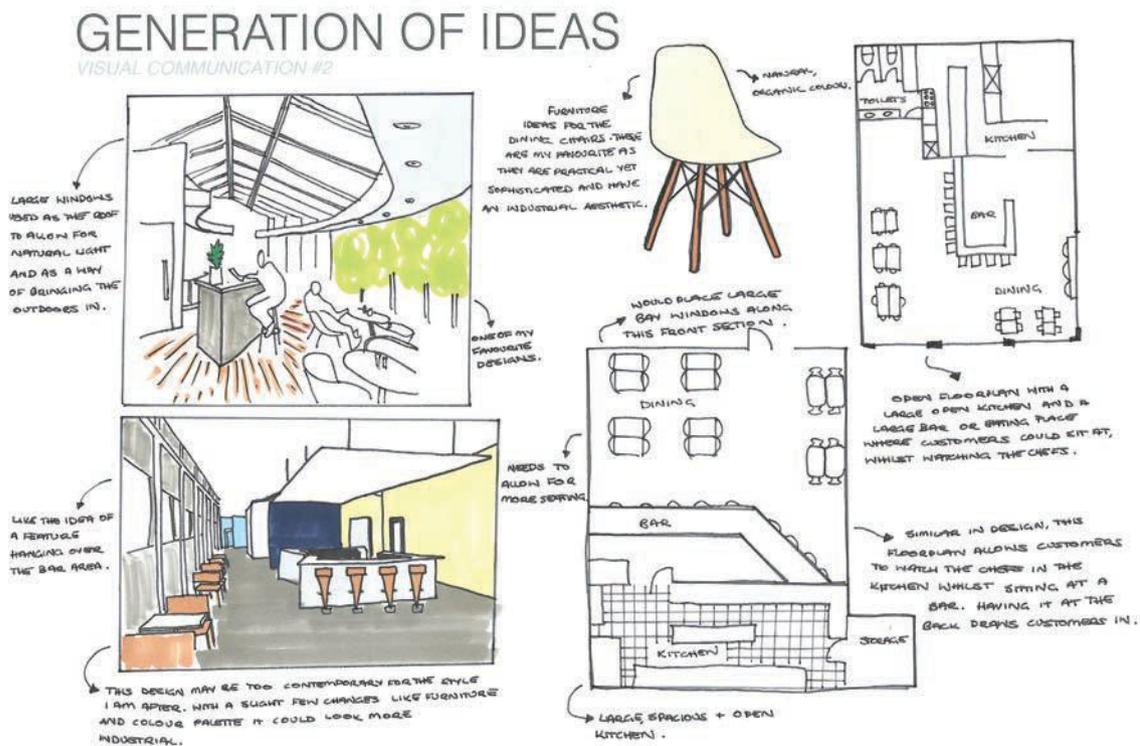
▶ Generating ideas for an environmental design saw this student create many different options for the interior fitout and features of a cafe.
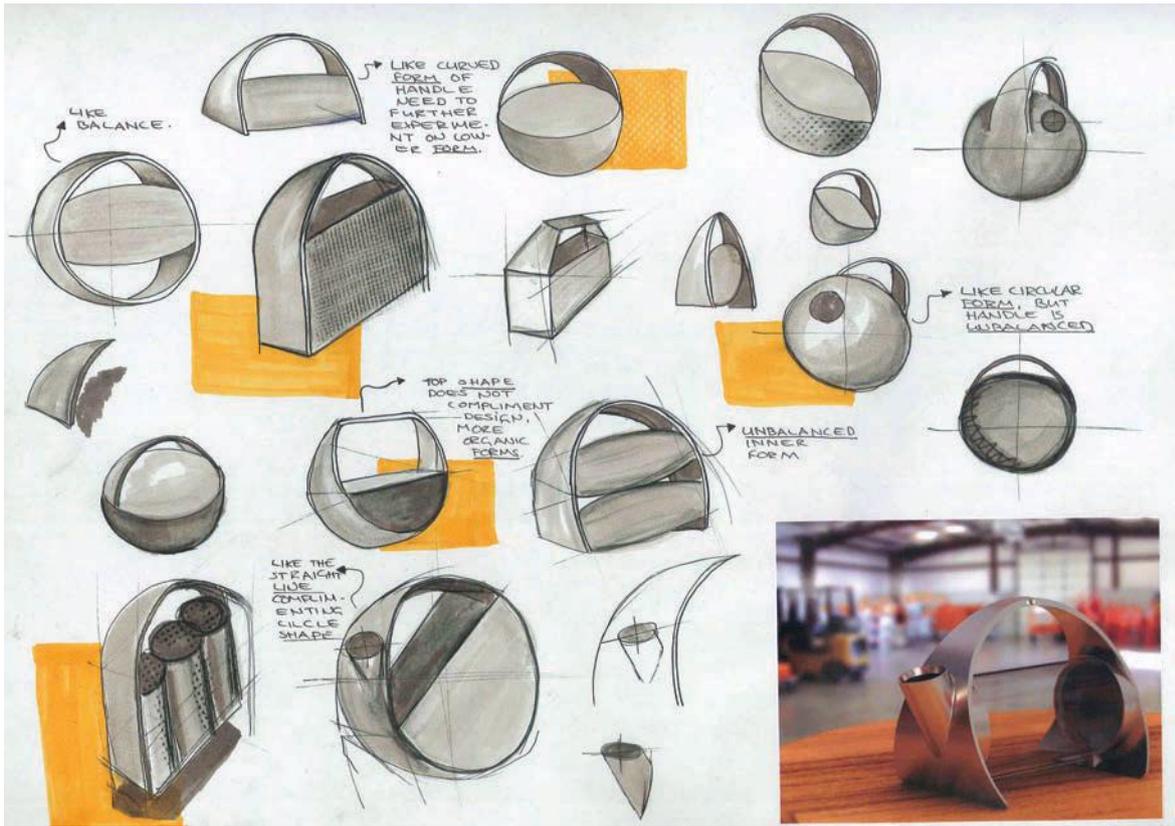
Ellen Keillar
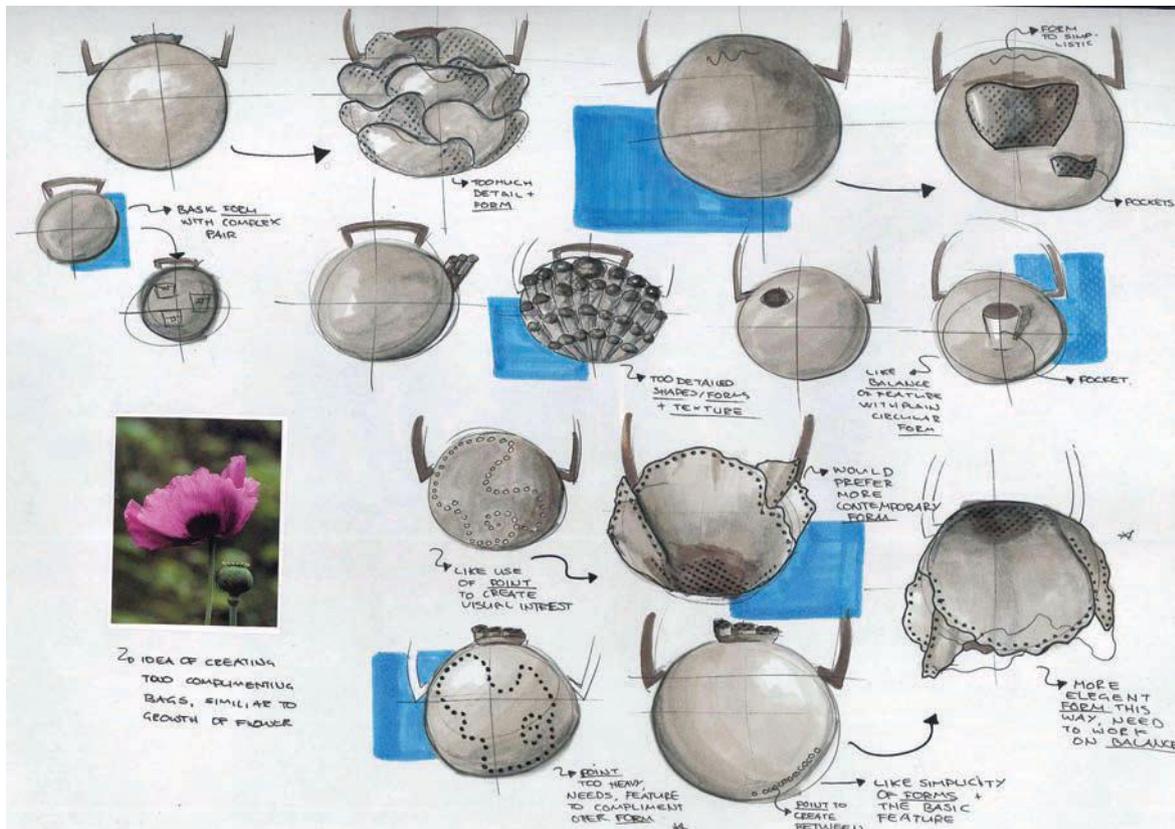
Ellen Keillar

▶ Generation of ideas for handbag design. Note the use of rendering and three-dimensional methods to emphasise form.
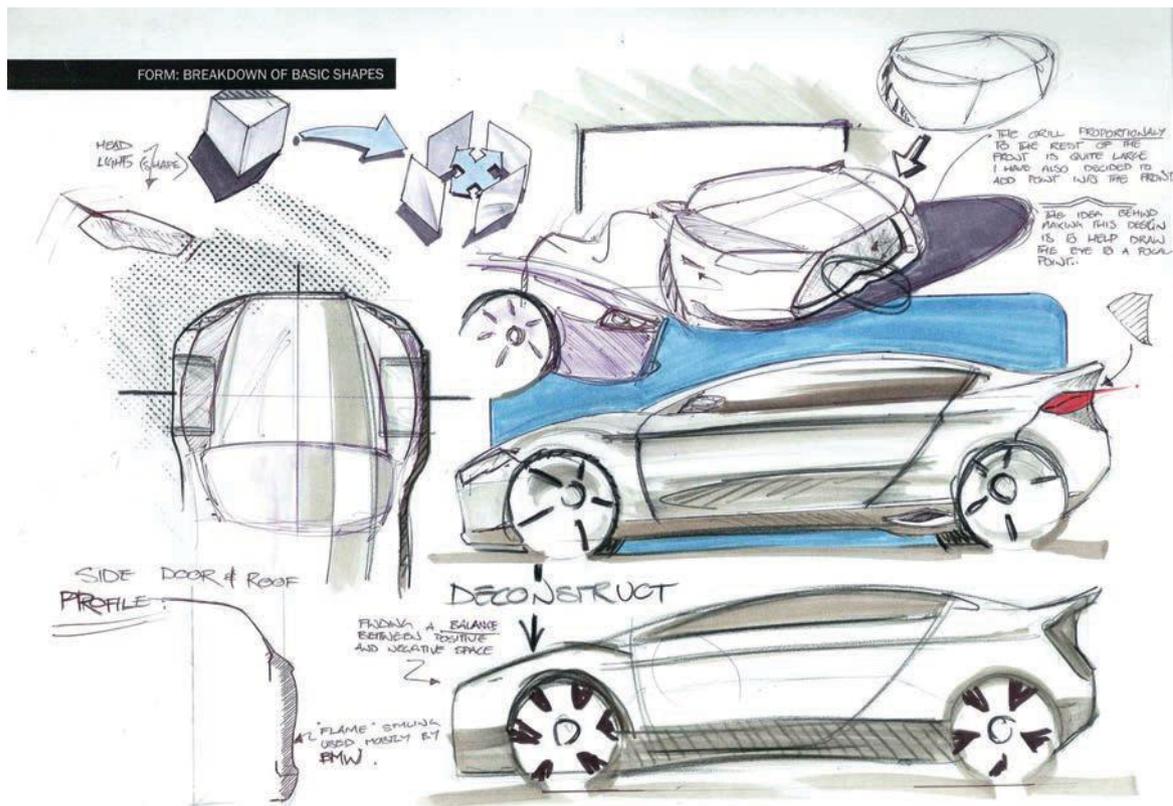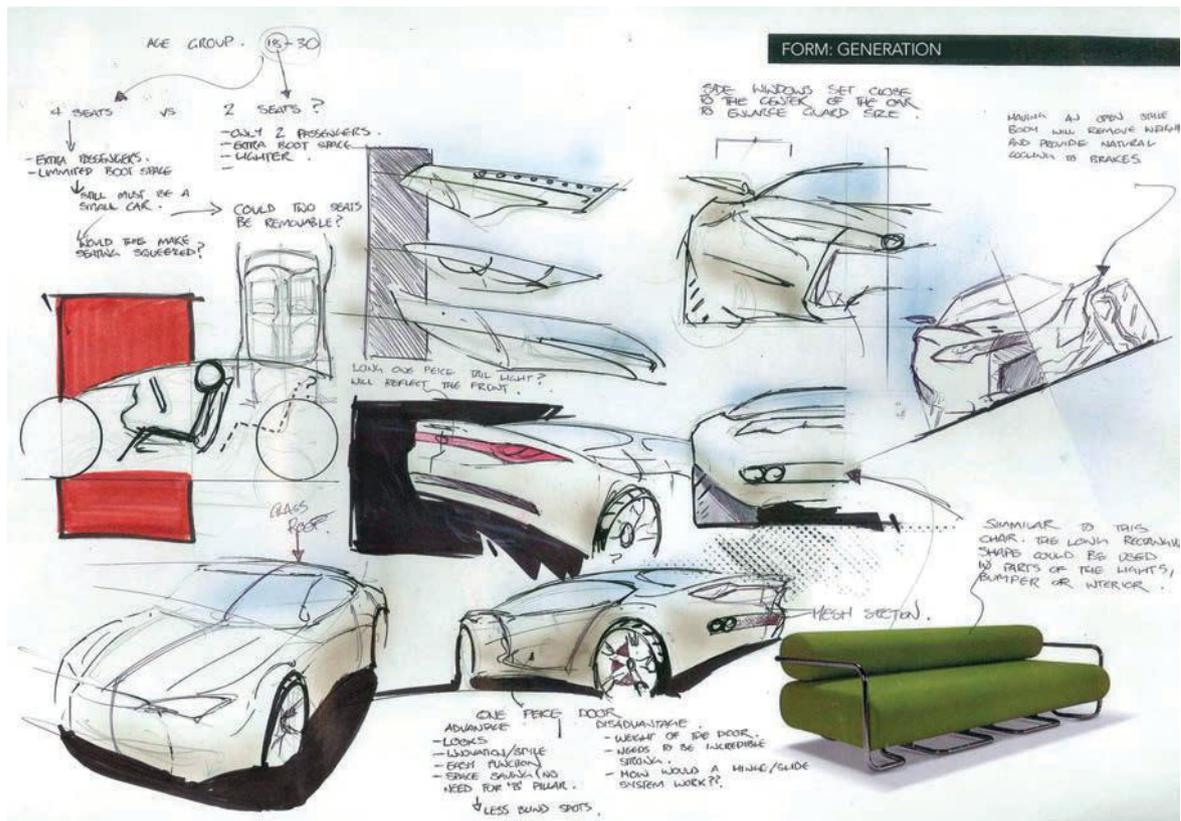
▶ Generation of ideas for a vehicle design. Note the way that this student has drawn his design ideas from multiple angles to visualise different design possibilities. Drawings in this stage do not need to be finished, polished presentations. The focus is on getting ideas onto paper.
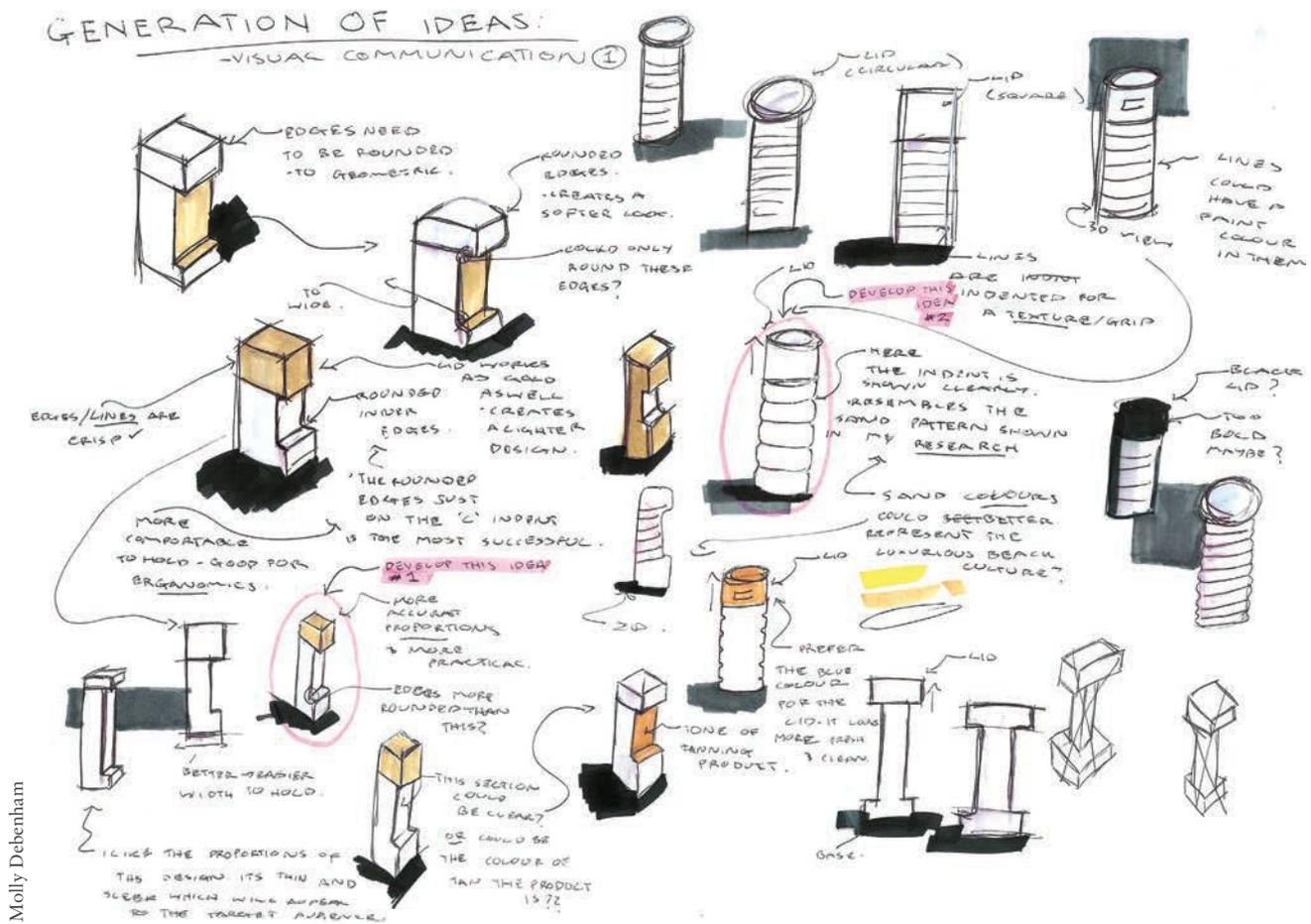
Molly Debenham

▶ After devising a range of ideas for the packaging of a tanning product, this student identified her preferred concepts to move further into the Develop phase.

10.2 DEVELOPING CONCEPTS

The development of ideas involves decision-making. From the broad base of creative concepts generated in the earlier stage of the design process, designers select the concepts that best fit the design brief. Convergent thinking skills can be applied to narrow options, to test and evaluate ideas in order to make informed decisions.

During the Develop phase, it is important to look to the brief and the initial research for inspiration. The design brief is the core that travels through the entire design process, ensuring that even the most experimental ideas relate to the design criteria. Decisions regarding the application of visual elements and principles are based on not only what is the most creative solution, but what is also the most effective solution in line with the brief.

Throughout the development of a design concept, the designer will continue to ask questions: Does it fulfil the needs of the client? Will it appeal to the target audience? What materials or features will be best suited to the final design?

Testing of elements and principles, features, media, materials and likely formats is a constant process. Designers validate or reject ideas as they progress a design. Discussions with users, stakeholders and colleagues may be used to assess and evaluate ideas.

Experimentation with concepts and the trialling of design alternatives are important and should also include thoughtful and insightful annotations (see Chapter 9). To ensure that your experimentation and decision-making are worthwhile, think carefully about what you need to test.

+ Have I explained my decision-making through annotation?
+ Have I used a wide range of methods, materials and media?
+ Have I experimented with elements and principles of design, either individually or in combination with one another?
+ Have I applied thinking techniques such as SCAMPER?
+ Have I used a range of technologies and low-fidelity prototyping in exploring my ideas and testing my design alternatives?

Development of ideas involves:
+ selecting the most suitable concepts for development
+ testing media, materials and methods
+ experimenting with design elements and principles
+ referring to the brief to ensure that the designs are on the right track
+ discussing and assessing the most effective design solutions
+ collaborating with external design professionals.

FORM: OPTION #1

Tom Grech

FORM: OPTION #2

FOR SOMEONE TO REACH DOWN AND FILL UP, IT BECOMES TO DIFFICULT. (IF THIS WAS AN ELECTRIC VERSION, THIS COULD BE THE POWER SOCKET?)

POP-OUT FUEL CAP.

REAR LIGHT

LED STRIPS

2 LED CIRCLE CLUSTERS.

NOSE MAY NEED TO COME FORWARD FOR SHAPING.

BUMPER IS TO SHORT TO TO PROPORTIONS OF THE REST OF THE CAR.

Tom Grech

FORM: OPTION #3

THERE ARE NO MAJOR CHANGES TO THE REAR FROM DESIGN OPTION 2 APPART FROM SECOND FOLD LINE HAS BEEN ADDED IN THE BUMPER.

REAR DECK AND LIP HAVE BEEN LOWERD.

LIGHT SHAPE HAS BEEN FINALISED ALONG WITH THE SHAPE OF THE BUMPER.

THE NEGATIVE SPACE ABOVE THE WHEELS (ON ARCHES) HAS BEEN INCREASED TO ADD WEIGHT AND BALANCE.

Tom Grech

▶ This student devised three options in his vehicle design. The Develop stage enabled him to experiment with different details, colours, materials, scale and proportions, until he decided on his preferred concept.

▶ This student used freehand sketches to experiment with different materials before moving on to digital design and rendering of her structure.

▶ Sketching the interior of the design assisted this student with making decisions about the feasibility of her structural design.

DEVELOPMENT

1B
CONCEPT
1

Nicole Crozier

DEVELOPMENT

Nicole Crozier

▶ Experimentation with manual and digital methods, as well as a range of media and materials, were a feature of the development phase in this student's folio.

10.3 DESIGN SYNTHESIS

Design synthesis sees the creative responses and experimentation of the Explore and Develop phases evolve into thoughtful, articulated design concepts. Synthesis draws together the most effective ideas, or components of ideas, to create a cohesive whole. Synthesis is achieved by asking the following questions:

+ Does the concept address the needs outlined in the design brief?
+ Will the concept appeal to/function for/be used by the user/target audience?
+ Is the concept appropriate for the intended context (location, social context, time) of the design?

+ Have I made the most of the design process and extended and experimented with my ideas to reach this final point?

Synthesis involves the evaluation of design ideas. It is important to assess how effectively they meet the needs of the design brief and solve the original design need. Evaluation occurs throughout the design process to ensure that the requirements of the design brief are being met, but is equally important when ideas are resolved. The costs and processes involved in the production of most design products are often expensive and complex, so it is essential that the designer identify strengths and weaknesses in a design before final production commences. The cost of destroying final products due to design flaws is prohibitive and should be avoided.

Nhu Duong

Nhu Duong

LOOKS LIKE THE CUBIC STAPLER LYING ON ITS BACK. THIS SHOULD FUNCTION FINE AS NOTHING IS DIFFERENT EXCEPT FOR THE ORIENTATION.

THE SLOT IS ON TOP FACE

PROBLEM : THE GRIP OF A 40-50 YEAR OLD USER MIGHT NOT BE STRONG ENOUGH TO STAPLE PROPERLY. ALSO, BOTH HANDS ARE NEEDED TO HANDLE THE TASK : ONE HOLDS STAPLER & ONE HOLDS PAPER. THEREFORE THIS DESIGN MIGHT CAUSE MORE INCONVENIENCE FOR THE USER

THIS DESIGN IS PRETTY BALANCED.

2 BUTTONS ARE ON THE SIDES

THE BASE SIGNALS THAT HERE'S THE BOTTOM, AND THE STAPLER SHOULD STAND THIS WAY

SIDE VIEW

TOP VIEW

COLOURS TOO SENTIMENTAL

PARALELOGRAM SHAPE

ADD THE BASE, SO THE AUDIENCE WILL NOT BE CONFUSED ABOUT ITS ORIENTATION

THE CUBIC FORM IS MORE CONFORMED BUT IT LOOKS BETTER THAN THIS

EVALUATION

I PICK 4 BEST DESIGNS FROM 2 CONCEPTS AND EVALUATE THEM AGAINST ONE ANOTHER AND THE BRIEF TO HELP ME DECIDE ON THE MOST EFFECTIVE SOLUTION.

STRENGTHS:
- SMALL & PORTABLE
- BUTTON & BASE ARE RUBBER; SOFT, COMFORTABLE TO USE
- STANDS STABLY
- MODERN & ELEGANT; SUITS PEOPLE ALL GENDERS AND AGE RANGE WITHIN THE AUDIENCE
- KID-FRIENDLY APPEARANCE & SAFE; SUITS HOUSEHOLD USE.

WEAKNESSES:
- SHAPE OF BUTTON NOT EFFICIENT, REQUIRES MORE FORCE TO STAPLE PROPERLY
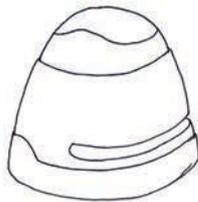
DESIGN #1
(Concept 1)

STRENGTHS:
- FORM ENABLES PROPER FUNCTION
- SIMPLE GEOMETRIC SHAPE; STREAMLINED
- BALANCED & STABLE
- NEON STRIPES EXTREMELY EYECATCHING & MODERN; APPEALS TO YOUNG PEOPLE
- DOMINANT COLOUR IS BLACK → SUITABLE FOR MORE FORMAL OFFICE ENVIRONMENT

WEAKNESSES:
- OLDER PART OF AUDIENCE ie. AGED 40-50 MIGHT NOT LIKE NEON COLOURS AS THEY'RE TOO BRIGHT & YOUTHFUL FOR THEIR AGE.

DESIGN #2
(CONCEPT 2)

STRENGTHS: - FORM ENABLES PROPER FUNCTION
- SIMPLE, STREAMLINED, CONTEMPORARY → SUITS OFFICE ENVIRONMENT
- STANDS STABLY; NOT TAKE UP MUCH SPACE
- SHAPE STANDS OUT FROM SIMILAR PRODUCTS.

WEAKNESSES:
- AUDIENCE NEEDS TO BE NOTIFIED OF THE PROPER WAY TO USE IT. THIS WEAKNESS IS ACTUALLY INSIGNIFICANT.
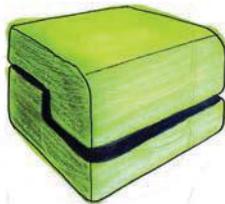
DESIGN #3
(CONCEPT 2)

STRENGTHS:
- SIMPLE FORM & COLOURS → MODEST AND ELEGANT; SUITS PROFESSIONAL ENVIRONMENT
- ROUNDED, RUBBER BASE → SOFT, COMFORTABLE TO USE

WEAKNESSES:
- DOES NOT STAND OUT MUCH
- IF DROPPED ON THE FLOOR, IT ROLLS AWAY

DESIGN #4
(CONCEPT 1)

Nhu Duong

FINAL PRESENTATIONS INCLUDE A PACKAGING NET MOUNTED ON FOAM CORE DISPLAY BOARD, AND A FOLDED PACKAGING APPLIED TO A STAPLER PROTOTYPE. THIS MOCK-UP IS PRINTED ON COPY PAPER FOR REFINEMENT PURPOSES BEFORE THE MORE EXPENSIVE MATERIAL IS USED FOR PRODUCTION.

OVERALL THIS DESIGN IS MODERN, NEAT & REFRESHING. IT SUITS WELL IN THE OFFICE, SCHOOL & HOUSEHOLD ENVIRONMENT.

SATISFIES X CONSTRAINT THAT PACKAGING MUST CONTAIN ILLUSTRATIONS SHOWING HOW TO USE

INSTEAD OF A BLACK STAPLER I USE BOLD LINE TO EMPHASISE THE IMAGE, MINIMISING SOLID COLOURED AREAS WHERE FADING IS MOST VISIBLE

LINES POINTING TO CENTRAL IMAGE, WITH BRIEF EXPLANATIONS OF THE FEATURES
→ SO CUSTOMER KNOWS MORE ABOUT PRODUCT, SO THEY'RE MORE LIKELY TO BUY, AND SATISFIES A CONSTRAINT OUTLINED IN DESIGN BRIEF

DESIGN BRIEF IS MET:

. PACKAGING USES MINIMUM MATERIAL OPEN ON 2 SIDES; MADE FROM 1 STRIP OF PAPER WITH SIMPLE FOLDS & CUTS; NO ADHESIVE; STAPLER FITS TIGHTLY WITHIN)

. PACKAGING USES RECYCLEABLE MATERIAL
  + REVIVE CREATIVE PAPER IS RECYCLED & CARBON NEUTRAL
  + BASICALLY ALL KINDS OF PAPER CAN BE RECYCLED, INCLUDING THIS ONE.

. STAPLER WON'T COME LOOSE. PACKAGING SIZE IS REASONABLE FOR A SHELVES, BAGS, DESKS

NO STAPLES REUSABLE

CHILD SAFE NO PAPER WASTE

RECYCLE SYMBOL HIGHLIGHTS THE NATURE OF PACKAGING MATERIAL

THANK YOU

MAKES USERS FEEL VALUED

CUSTOMERS CAN FIND PRODUCT'S BENEFITS ON THE TABS

LINE VERSION OF LOGO LOOKS BETTER, THAN AS IT MATCHES COLOUR PALETTE OF THE WHOLE DESIGN & SEEMS MORE DELICATE

Made in Australia by Camon Stationery 51-71 High Street, Northcote Victoria, Australia 3074 Telephone: +61 1 2345 6789 www.camonstationery.com.au

FOR A GREENER PLANET

STITCH ECO FRIENDLY STAPLER

CAMON STATIONERY

PACKAGING MOCK-UP

Nhu Duong

Nhu Duong

▶   After exploring the functionality and form of her designs for a stapler, this student evaluated each design in line with the original design brief. This assisted in synthesising the final design concept.

During synthesis, the appearance of the final design is clarified and refined; final decisions are made about elements such as colour or the most appropriate type of materials that will be used. Methods of production are finalised at this stage; decisions are made about the most appropriate form of printing, presentation, construction or manufacture. The final selection of elements, principles and media will be made following the testing of alternatives. This stage involves the final drawing together of ideas and concepts that fulfil the original need.

In your own design work, synthesis should be an opportunity to enhance and clarify the most appropriate design concept. After developing your initial ideas and testing the viability and appropriateness of the most appealing concepts, you will have selected the ideal concept to proceed with. Synthesis enables you to distil your creativity into its most suitable finished form. This may be the stage for transferring images to digital media for final refinements and finish.

CHAPTER RECAP

1   Devising ideas can be challenging. Suggest at least four different techniques that can be used to stimulate ideas and concepts.

2   Below is a concept sketch for a car key. Observe the design carefully and suggest how the product might be further developed.
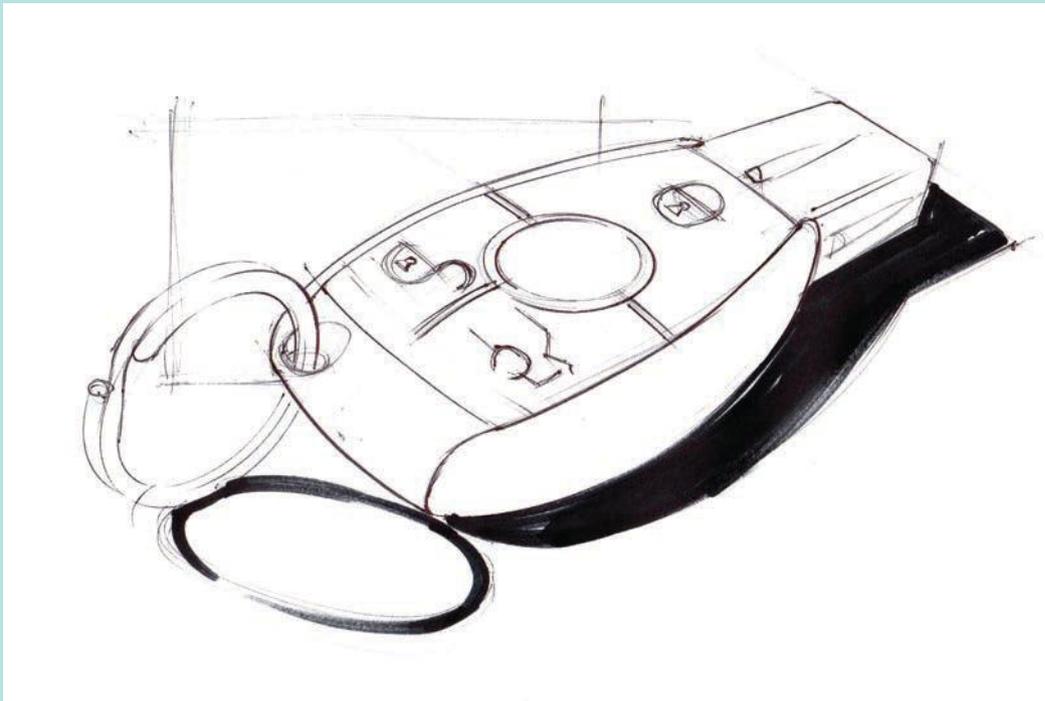
Mark Wilken

    a   What design elements could be applied to the design? What effect would these have on its appearance and function?

    b   What other drawing methods could be applied to help visualise the product (e.g. orthographic)? What would be the benefit of additional representations?

    c   What digital processes could be applied to the design? What impact would this have on the appearance of the design?

    d   What prototyping techniques might be used to best communicate the design development? Why?

    e   What materials might be used to manufacture the product? How might these be best represented during the Develop phase?

THE DESIGN PROPOSAL

'Make it simple but significant.'

Don Draper, Mad Men

In this chapter:

Learn the language

+ communication   + pitch   + succinct
+ engagement   + presentation   + visuals

11.1 COMMUNICATING DESIGN CONCEPTS

The final design is produced only after extensive evaluation of the preferred design concept. As production is expensive, a design proposal may offer an insight into the identified solution without the expense of manufacture. A design proposal may include a range of visual representations, which explain the features and appearance of the final design.

In a school context, a combination of the requirements of the original design brief and the available resources determine the breadth and visual complexity of the design proposal. It is an opportunity to respond creatively and to present thoroughly researched, developed and synthesised ideas. The design proposal may form a significant amount of assessment.

In a professional context, a designer may present a draft, prototype or model as a proposal to a client. Digital modelling, fly- or walk-throughs, virtual or augmented reality may be used to help stakeholders experience a design that does not yet exist.

DESIGN PROPOSAL

The design proposal is the format or presentation that best communicates the most appropriate design solution to stakeholders. It may take many forms and will be dependent on the nature of the design problem, the design criteria set in the design brief and, of course, the needs of the stakeholders (client and audience). Practical considerations will influence your decisions on the form of the final design. These may include choice of materials, scale and form of the final presentation, as well as the presentation space and location. For many designs, a detailed presentation may be the most appropriate means of communicating the final concept. Concept presentations communicate visual information about what the final product would look like were it to be produced. A concept presentation may include a range of visual representations, which explain the features and appearance of the final design.

The design proposal is an opportunity to respond creatively and to present your thoroughly researched and developed work. Your work may be assessed on a range of criteria, including the imaginative and creative response you bring to the task.

There are many visuals that might be included in a design proposal. The most important factor is to ensure that the message remains clear. The purpose of the design proposal is to communicate the design solution, so ensure that the presentation supports the principles of good design and presents information with clarity and relevance.

Sarah Mason

INTERIOR CONCEPT FOR EXO PORTABLE BAR

▶ This student created a concept board to explain the atmosphere and ambience of a proposed interior space. The board uses collage, drawing and the student's own photography to illustrate details about the appearance and features of a nightclub/bar design.
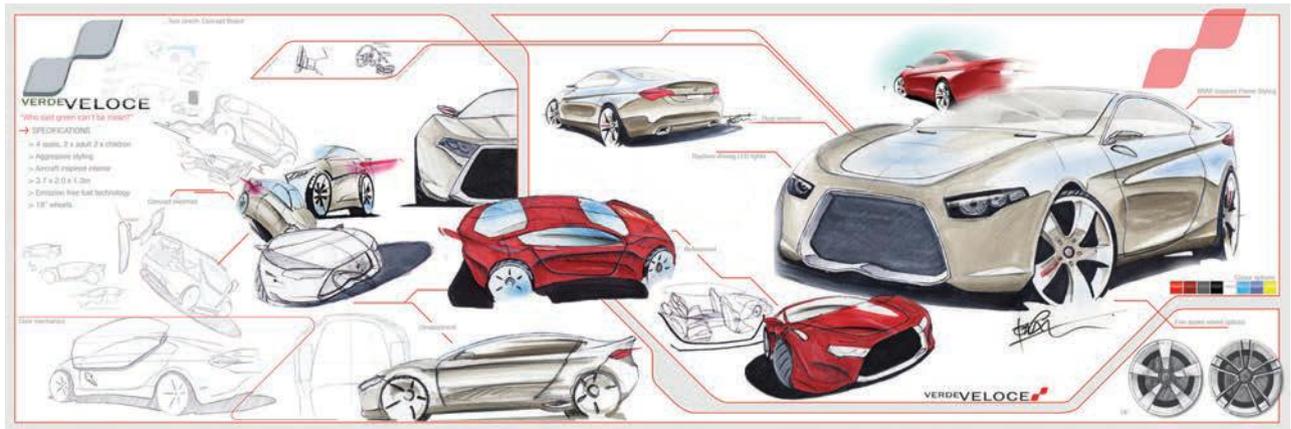
Tom Grech

▶ This student created a concept board to explain his design ideas to his client. The board uses a combination of hand-drawn and computer-generated imagery illustrating details about the appearance and features of a new car design.

▶ A selection of possible visual inclusions for effective design proposals

Communication design	
These presentations provide information for the viewer and can convey complex information and messages clearly. They can be used for the advertising, promotion and depiction of products and services. The application of the elements and principles of design are central to the effectiveness of these designs, and the application of media and materials is diverse. Presentations may represent a two-dimensional or three-dimensional form.	Maps Packaging Symbols Advertising Charts Logos Illustrations Brochures Freehand drawing Posters Diagrams Publications Graphs Infographics Clothing Signage Exhibition displays Multimedia Motion graphics

Industrial and product design	
These presentations conform to rules and conventions that define the arrangement of images and the presentation of visual data. They may convey two-dimensional and/or three-dimensional information. Final designs may be manufactured from a diverse range of materials and involve combinations of design factors, including sustainability, materials and elements and principles of design. Products can vary from small-scale domestic items to automotive design, from fashion to aircraft.	2D and 3D drawings Engineering drawings Concept presentations 3D scale models Toiles

Environment design	
These presentations present information about the construction of designs within a built environment. The presentation of information may be two-dimensional or three-dimensional. Some environmental designs are purely conceptual and are designed to inspire ideas rather than conclude with a finished product. Designs can vary from small residential projects to large apartment complexes, from courtyard landscaping to the design of a space station.	Architectural drawings 3D scale models Multimedia Maps Diagrams Concept presentations Plans Digital 'walk-through'

11.2 COMMUNICATING BY PITCH

In addition to visual information about a design, the design proposal is often verbal and may take the form of a 'pitch'. A common part of the professional design landscape, the pitch is a meeting between client and designer during which the designer presents design options that ideally fulfil the needs of the client. In a professional setting, the pitch may be a face-to-face meeting, an online interaction or a discussion and will usually involve the presentation of visual material that explains the designer's vision and proposed solution to a design brief.

The pitch is designed as a means of presenting the design ideas and solutions that have been developed and refined over the course of the design process. It is an opportunity to explain to stakeholders, such as the client or audience, the journey from brief to the final design concepts.

As an evaluation tool, a pitch provides an opportunity to gauge the success of a design. The pitch may also provide opportunities for feedback from stakeholders. This, in turn, may lead to changes and adjustments to the design. A pitch can also occur at any time throughout the design process, when stakeholder feedback is necessary. Your pitch is an opportunity to convey your ideas and to showcase your thinking and design skills. It is essential to use appropriate design **terminology**, so make use of terms that are appropriate and suited to the point you are trying to make.

KEY ELEMENTS OF A PITCH

An effective and successful pitch often includes particular qualities.

+ Make clear connections between the design brief, design criteria and final design concepts.
+ Demonstrate a strong understanding of the original design problem.
+ Empathise with the audience/end user.
+ Understand the thinking processes behind the final design decisions.
+ Be open to advice and suggestions, even when the resolution seems otherwise complete.

TOOLS FOR CREATING AN EFFECTIVE PITCH

Before starting a pitch, it can be helpful to search for successful strategies and techniques that could be used when presenting to an audience. Use the table (including some examples) to organise information and determine the most appropriate approach.

Technique	Web URL (or other resource)	Why is it an appropriate technique for a pitch?	How will this technique be used or modified for use in your pitch?
Use visual diagrams to explain the design process	Duarte blog (by Nancy Duarte, author of Slideology) http://blog.duarte.com/	Good to show a visual explanation for the audience to follow while I am speaking.	I will create a simple diagram that uses images or symbols of the progress I made through the design process.

In presenting information about your application of the design process, you may like to select the most meaningful visual examples of your progression. Make informed decisions about which images most clearly and succinctly explain your design thinking during the design process. In selecting examples to show, use the following guide.

+ Depict clear links to the design brief.
+ Images should be clear and able to be understood by the presentation audience.

+ Images should show a visual journey through the design process.
+ Images should support the verbal/written content of the presentation.

Use this table to help organise your written and visual information. This information can then be used to design the content and appearance of each slide, screen or page in your presentation.

Design process stage	Illustration of process
Develop	This page shows the most innovative ideas devised for the design need and maintains clear links to the original brief. Will scan and use.

This example shows how you might put together your pitch.

Slide, page or screen	Purpose	Verbal or written content	Supporting images
1	Title screen	Name, information about the client	Text placed over an image of my working desk
2	Explain the brief	Information about the client needs – who they are, what the design deliverables need to be	Images of other products that were researched in the Explore phase

Use this blank table to create your own pitch presentation ideas.

Slide, page or screen	Purpose	Verbal or written content	Supporting images
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Once you have prepared your pitch presentation, practise the delivery and time yourself. Ask a friend to watch the presentation and use the checklist below to evaluate the effectiveness of the presentation and suggest modifications where required.

Presentation component	Effective	Needs improvement	Suggestions/comments
Terminology use			
Pace/timing			
Clarity of verbal or written communication			
Explanation of the design process			
Use of visual resources			
Use of technology			
Overall presentation skills			

CHAPTER RECAP

1   Below is the final drawing of a steam iron. Observe the design carefully and suggest how it may be incorporated into the design proposal.

Mark Wilken

   a   In the presentation of the design proposal, what design principles should be considered?
   b   What additional information should be included on a design proposal? Suggest what could be added to this image of the iron.
   c   What digital processes could be used in the concept presentation? What impact would this have on the appeal of the design to stakeholders?
   d   What additional verbal, written or visual information may be required during a pitch presentation of the iron to key stakeholders?
   e   How may the principles of good design, thoughtful aesthetic decisions and considered addition of design elements be used to enhance and emphasise the design proposal?

2   When undertaking a pitch to stakeholders, suggest how the following may be used to communicate a design concept:
   a   scale models
   b   digital images or footage of key stages of the design process
   c   references to the original design brief
   d   market research or user analysis
   e   slides or presentation boards.

DESIGN FEATURES

GOOD DESIGN

'I have always tended to steer well clear from this discussion about beauty and argued instead for a design that is as reduced, clear and user-oriented as possible...'

Dieter Rams in '"Simplicity is the key to excellence" says Dieter Rams' by Amy Frearson, Dezeen *February 2017*

In this chapter:

Learn the language

+ aesthetics
+ beauty
+ consistency
+ Gestalt principles
+ harmony
+ innovation
+ legibility
+ simplicity
+ style
+ typeface

Good design is not just in the eye of the beholder. From your studies, it will be clear that effective use of elements and principles, skill in drawing and design technologies, an understanding of the design process and an insight into successful designs both past and present combine to subjectively recognise 'good' design from bad.

An innate understanding and appreciation of aesthetics is an important quality in a designer but can be difficult to articulate. In the past, designers have attempted to distil the key aspects of good design and this chapter presents a range of recognised and valued approaches.

12.1 DIETER RAMS' 10 PRINCIPLES FOR GOOD DESIGN

Dieter Rams is a renowned industrial designer whose career has spanned more than 40 years at iconic companies such as Braun and Vitsoe. He is well known for his 10 Principles for Good Design, which he developed in the late 1970s to express his ideas about the need for well-executed, beautiful and long-lasting products. Rams maintained that a well-designed product, that also held strong aesthetic qualities, would endure, meeting user needs for functionality and quality as well as a global need for sustainability. His mantra throughout his design career has been 'Simplicity is the key to brilliance'. At the core of his designs is the belief that a beautiful and well-made object can improve surroundings as well as a sense of well-being; equally, it is only well-made objects that *can* be beautiful.

In an interview with *Kinfolk* magazine in 2017, Rams identified beauty as a characteristic of good design that can ensure both appeal and durability. He expressed that a beautiful object is more likely to be valued and, consequently, retained, which addresses ecological issues such as waste. In Rams' definition,

beautiful objects are not judged by aesthetics, but by a 'reduced, clear and user-oriented' design. Simplicity is a key aspect of Rams' own design works, which can be clearly seen throughout his 10 Principles for Good Design. The ability to edit a design concept by minimising extraneous detail and maintaining simplicity is a challenge, yet it lies at the centre of Rams' principles.

10 Principles for Good Design

Good design...

Is innovative. The possibilities for progression are not, by any means, exhausted. Technological development is always offering new opportunities for innovative design. But innovative design always develops in tandem with innovative technology, and can never be an end in itself.

TP 1 radio/phono combination, 1959, by Dieter Rams for Braun. Courtesy of BRAUN

Makes a product useful. A product is bought to be used. It has to satisfy certain criteria, not only functional, but also psychological and aesthetic. Good design emphasises the usefulness of a product while disregarding anything that could detract from it.

MPZ 21 multipress citrus juicer, 1972, by Dieter Rams and Jürgen Greubel for Braun. Courtesy of BRAUN

Is aesthetic. The aesthetic quality of a product is integral to its usefulness because products are used every day and have an effect on people and their wellbeing. Only well-executed objects can be beautiful.

RT 20 tischsuper radio, 1961, by Dieter Rams for Braun. Courtesy of BRAUN

Makes a product understandable. It clarifies the product's structure. Better still, it can make the product talk. At best, it is self-explanatory.

T 1000 world receiver, 1963, by Dieter Rams for Braun. Courtesy of BRAUN

Is unobtrusive. Products fulfilling a purpose are like tools. They are neither decorative objects nor works of art. Their design should therefore be both neutral and restrained, to leave room for the user's self-expression.

Cylindric T 2 lighter, 1968, by Dieter Rams for Braun. Courtesy of BRAUN

Is honest. It does not make a product appear more innovative, powerful or valuable than it really is. It does not attempt to manipulate the consumer with promises that cannot be kept.

L 450 flat loudspeaker, TG 60 reel-to-reel tape recorder and TS 45 control unit, 1962–64, by Dieter Rams for Braun. Courtesy of BRAUN

Is long lasting. It avoids being fashionable and therefore never appears antiquated. Unlike fashionable design, it lasts many years – even in today's throwaway society.

620 Chair Programme by Dieter Rams for Vitsoe (ID595) ©Vitsoe. With permission.

Is thorough down to the last detail. Nothing must be arbitrary or left to chance. Care and accuracy in the design process show respect towards the user.

ET 66 calculator, 1987, by Dieter Rams and Dietrich Lubs. Courtesy of BRAUN

Is environmentally friendly. Design makes an important contribution to the preservation of the environment. It conserves resources and minimises physical and visual pollution throughout the lifecycle of the product.

606 Universal Shelving System by Dieter Rams for Vitsoe (ID210) ©Vitsoe. With permission.

Is as little design as possible. Less, but better – because it concentrates on the essential aspects, and the products are not burdened with non-essentials. Back to purity, back to simplicity.

L2 speaker, 1958, by Dieter Rams for Braun. Courtesy of BRAUN

Text source: '10 Principles for Good Design', © 2018 Vitsoe, with permission.

12.2 GOOD DESIGN AUSTRALIA AWARDS

Good Design Australia is an advocacy organisation that runs the annual International Good Design Awards as well as design awards in Queensland, Victoria and South Australia. The aim of the Good Design Awards is to establish, maintain and promote high standards of design in a wide range of design disciplines, and to foster the understanding and appreciation of design on a global stage. The awards are positioned as an important benchmark for continual improvement and international best practice for design. 'Design-led innovation' is the focus of the awards program and a series of design criteria clearly articulate the requirements for entries. The detailed criteria provide a helpful map for designers and design students striving for best practice in varied design fields.

Good Design
Australia Awards criteria
Architectural design

Form
+ Is the design appealing and desirable for the intended market?
+ Is the design visually resolved and does it evoke an emotional connection?
+ Does the form support the function and use of the project intuitively?
+ Does it respond to its environment from a visual, contextual and cultural perspective?

Function
+ Does the design perform the function it was originally designed for?
+ Is the design easy to navigate and use?
+ Will the design advance the overall user experience?

Safety
+ Does the design protect the user from harm?
+ Does the design raise any particular safety concerns?
+ Does the design comply with all applicable standards and regulations?

Sustainability
+ Has the project followed design for sustainability best practice?
+ Is the project built using materials and processes that have the least possible impact on the environment?
+ Is the project water-, material- and/or energy-efficient in its day-to-day use?

Quality
+ Has the project been well constructed and finished?
+ Does the quality of the project correspond with the desired price point and/or investment?
+ Are the chosen materials and construction techniques appropriate?

Commerciality
+ Does the project represent good value for money at the intended price point and/or investment?
+ Is the design likely to increase the brand value and/or community standing of the client organisation?
+ Is the design likely to result in a significant economic and/or social return on the investment made on design?

Innovation
+ Is the design new and original?
+ Does the design use new materials and technology in a clever way?
+ Does the design have any world first features?

Communication design and digital design

Design
+ Is the design styled to be appealing and desirable for the intended market?
+ Is the design visually resolved and does it evoke an emotional connection?
+ Does the design convey the function and use unambiguously and intuitively?

Usability
+ Does the design perform the function it was designed for?
+ Is the design easy to use and understand?
+ Does the design advance the user experience?

Creativity and innovation
+ Is the design new and original?
+ Does the design use materials and processes in a new and clever way?
+ Does the design have any world-first features?

Content and quality
+ Has the design been professionally executed and finished?
+ Is the content appropriate and professionally written for the intended market?
+ Is the information architecture arranged in an intuitive and easy-to-digest manner?

Commerciality
+ Does the quality of design correspond with the desired price point being offered?
+ Is the design likely to increase the brand value of the company?
+ Is the design likely to result in a return on the investment made on design?

Good Design Australia,
with permission.

12.3 GOOD DESIGN: VISUAL PERCEPTION

During the 1920s a group of German psychologists developed theories of visual perception based on how the human eye groups visual elements into a whole. *Gestalt* is translated as 'whole' and reflects the theory that, when images are arranged in a certain way, our brains group them together into a cohesive concept. Principles inspired by and directly attributed to Gestalt theory are often applied in design and, once identified and understood, can be seen as powerful means of conveying visual information. Some of the most commonly applied principles of visual perception include figure–ground, proximity, ambiguity, similarity/consistency, continuation, and closure. The application of Gestalt theory is important when creating designs that are coherent and visually effective. Gestalt principles are most commonly seen in communication design but are also used for impact in interior design, architecture, fashion and product design.

AMBIGUITY

One of the most famous examples of ambiguity is Edgar Rubin's vase/face image. An optical challenge, it creates two figures within its design, yet only one figure (the face or the vase) can be seen at any one time. The figure and ground in ambiguous images is alternating. Ambiguous figures can create effective patterns, illusions of depth on two-dimensional planes and impossible or puzzling forms. As a method of creating visual complexity and intrigue, ambiguity can be a highly effective device.

Alamy Stock Photo/Science History Images

CLOSURE

© 1986 Panda Symbol WWF – World Wide Fund For Nature (Formerly World Wildlife Fund) ® 'WWF' is a WWF Registered Trademark

Closure is influenced by the brain's capacity to complete simplified shapes into whole objects. Circles and squares are easily recognised shapes and are quickly perceived by viewers; when sections are missing, we are able to perceive them as complete. According to research, this generally only holds true for simple and geometric shapes, rather than complex and unfamiliar ones. There is a limit to how much can be extracted from a figure or design element before the visual meaning becomes unclear.

CONSISTENCY

Consistency is important in a range of design areas as it enables users to recognise similarities in aspects such as the branding of a business or the functionality of a product. Consistency helps users understand that a system is in place, that they are within a specific environment, or that they are purchasing from a recognised and trusted brand.

There are four commonly recognised types of design consistency: aesthetic, functional, internal and external.

Aesthetic consistency

Aesthetic consistency occurs when the same visual elements are used to create a style or appearance and can most commonly be seen in identity design. Companies often have strict control over the application of their identity to ensure that it remains consistent across many areas. An identity design often involves the creation of a 'style guide', which outlines in detail the appearance of corporate logos

and signage. For example, Facebook provides specific information about the use of their logo on online and print products, including requesting that the 'f' logo not be changed in any way.

Facebook logo reproduced with permission.

▶ Designers cannot change the font, style or colour of the Facebook logo. The logo remains consistent across all applications.

Functional consistency

Functional consistency relates to consistency in the actions of products. For example, the user easily recognises the 'power on' symbol used on most electronic devices. Functional consistency means that the user does not have to re-learn simple functions of otherwise familiar devices. Products that conform to existing and recognised functionality are easier to use and subsequently preferred by users.

▶ The 'power on' symbol is consistently applied to many electronic devices and therefore easily recognised by users, who do not require any new learning to use the device.

Internal consistency

Internal consistency refers to a consistent design approach within a system, space, organisation or location. In the example on the right, the signage used by Woodleigh School employs a consistent colour palette and typeface (Gill Sans). Ensuring that all signage is visually linked assists school visitors to navigate through the buildings, car parks and surrounds.

Adam Liddiard

▶ After years of ad hoc signs, Woodleigh School has redesigned its signage to ensure that people visiting the main campus, as well as the two junior campuses, experience a cohesive wayfinding system.

External consistency

External consistency is harder to control as it refers to the application of consistent visuals across non-related systems, organisations, spaces and locations. For example, on entering an unfamiliar building, the location of elevator controls may differ from other premises and be difficult to locate. Australian Standards control the consistency of appearance of some systems, such as fire alarms and emergency stop controls, but not all systems are required to adhere to a standard. Even when the appearance of a control differs, it is the role of the designer to ensure that users can navigate, locate and operate systems successfully.

CONTINUATION

Continuation can be achieved when parts of a design are excluded for visual effect. Cropping and removal of elements, as well as the extension of elements beyond the recognised boundaries of a design, can be powerful tools designed to draw and hold attention.

It is possible to create emphasis by placing an element 'outside' the perceived boundaries of a composition. Suddenly, the appearance of the composition becomes more interesting, more intriguing. The eye is drawn into the composition, and subconscious questions may be posed, such as 'Where does it lead?', 'Where does it come from?'. Although we may not be aware of it, cropping suggests visual possibilities that our imagination may choose to follow.
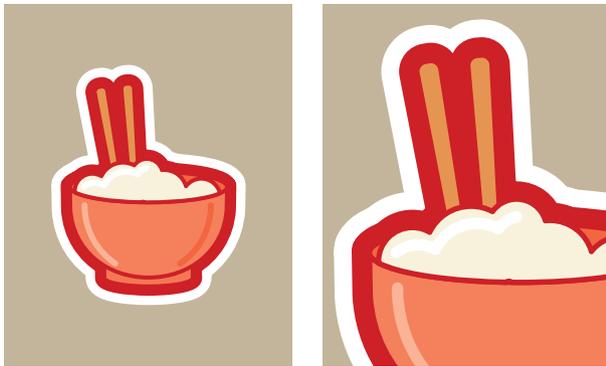
▶ The second image has been cropped. The original object is still recognisable and the image has strong visual impact.

Cropping or extension can be applied to the figure or ground of a composition. Type, shape and form can be altered in scale – or in proportion to other elements – and then cropped or extended to achieve dramatic effects. Both two-dimensional and three-dimensional presentations can benefit from the application of this technique.

Ryan Wheatley

▶ Movie posters often use cropping as a graphic device to attract the audience. The use of cropping suggests that there is more to the story, develops a sense of intrigue and, ideally, creates considerable visual interest.

FIGURE–GROUND

'Figure' refers to the visual information that is most dominant when placed against the ground. (It includes all the most dominant material rather than a single piece of visual information.) The 'ground' is usually the visual material placed in the background or, in some cases, the **white space** that surrounds the figure.
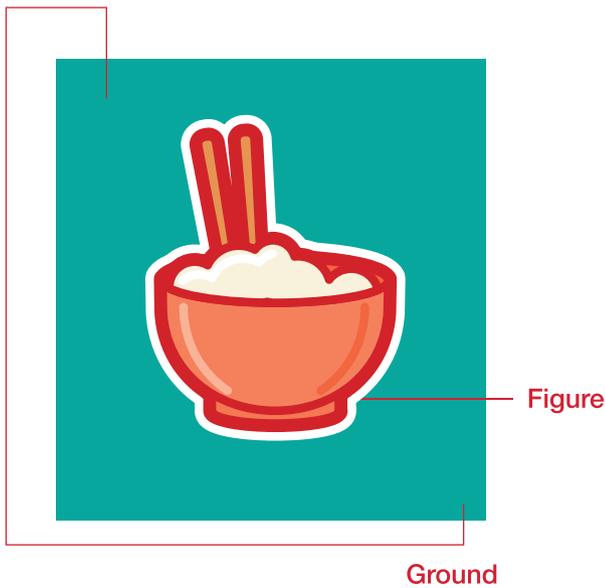
Figure

Ground

In most instances, the figure is the most important visual element, and the ground is used as support. The dominance of the figure is established by the application of elements and principles that identify it as having an important position in the compositional hierarchy. A dominant figure may be large in size, bold in colour, cropped dramatically or detailed with tonal variations – there are many methods of establishing the figure as the focus.

▶ The ground enhances the appearance or meaning of the figure.

The ground often contains images, type and other elements that reinforce the theme or message of the figure. The ground can be used as an influential visual tool, as its content may emphasise the figure itself. At times quite subtle, the ground may feature images that enhance the appeal of the figure. For instance, in automotive advertising, the ground may be used to feature a slightly blurred landscape, designed to suggest speed and handling – appealing characteristics immediately associated with the figure, which is the car itself.

rice bowl cafe

▶ The ground defines the figure.

citrus splash

▶ In this logo design for Citrus Splash Candles, the ground creates the segments of the orange and the flame of the candle, while the figure represents the source of the product.

PROXIMITY

Proximity occurs when elements of a design are placed close together. The brain perceives the elements as grouped and as having a relationship. For more information on proximity, see Chapter 13.

SIMILARITY

When objects look similar, they are often perceived as being part of a group, pattern or system. Like consistency, we react to similar visual characteristics such as shape, size, color, texture, value or orientation, and process that they are connected and belong together. Similarity and proximity often work in partnership to create patterns and meaning.

Getty Images/DigitalVision Vectors/lushik

12.4 GOOD DESIGN: TYPOGRAPHY

An understanding of effective typography is an essential skill in all areas of design. Type is used in printed and screen-based materials, advertising and branding. It is also evident in environment design as **wayfinding**, decorative elements and interior design.

Digital and interface design, industrial design, product design and fashion all make use of typography in both significant and subtle ways. It is essential that designers have a grasp of the power and impact of typography as a design tool.

Urbanite, Frost* collective

Urbanite, Frost* collective

Urbanite, Frost* collective

▶ Typography can be applied to space and surfaces in creative ways. In the Stanmore Public School library, type serves to emphasise the purpose of the space.

TYPOGRAPHIC LANGUAGE

More so than any other design element, typography requires its own language. Terms that have their origin in the history of type design are still used today. Key terminology has evolved over time to explain the many elements of typography.

Some knowledge of the language of typography is essential when discussing any aspect of this design form.

Ampersand

An ampersand is a ligature (see page 187) of the Latin *et* (meaning 'and'). The appearance of an ampersand can often identify the typeface in use.

et   **&**   **&**   **&**

Ascender

Ascender is the part of a glyph or letterform that sits above the **x-height**.

Baseline

The **baseline** is the imaginary line that a typeface sits upon. Some letters, such as the O in certain typefaces, may sit slightly below the baseline. When a designer needs to adjust the position of letterforms above or below the baseline, they create what is known as a 'baseline shift'.

Staircase   BASELINE

The 99 Steps   BASELINE SHIFT

Body text

Body text refers to the main areas of text in a document. Body text may also be called a text block. The selection of a typeface for body text is crucial and entirely defined by the context of the design. For example, newspapers and magazines often use **serif** type for body text as it is considered to be easier to read.

Bowl

The part of a type character that encloses (or partially encloses) a rounded space, for example a lower-case a or upper-case G.

Case

Upper (majuscule) and lower (minuscule) case letters are named as such because printers using metal type kept them in the upper and lower type boxes or cases. Upper-case letters are less legible when used in body text. Combinations of upper- and lower-case letters are often known as sentence case.

NATIONAL
A1

⬤ **BRUCE HIGHWAY**

Nambour	103
Maryborough	251
(Bundaberg)	356
(Gladstone)	538
Rockhampton	634
Mackay	968
Townsville	1354
Cairns	1699
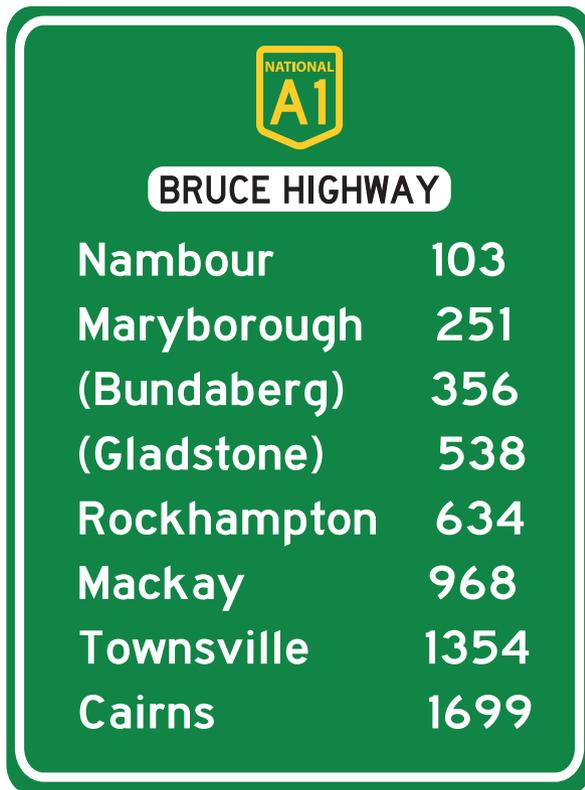
▶ Upper- and lower-case letters are used on directional Australian road signage. The combination of letterforms is easily recognisable at speed. The typeface used in Australia is called Highway Gothic.

Counter

The counter (sometimes referred to as the counterspace or counterform) is the negative space in and around the letterform. Counters are seen on lower-case a, b, d, e, g, o, p and q characters, and in most of their upper-case versions as well. The counter can be used creatively to enhance the meaning of a letterform or word.

Descender

This is the part of a glyph or letterform that falls below the baseline.

Ear

The distinctive element that rests on the upper right of the lower-case g. 'Ear' is the root of the word 'earmark', a term for the distinctive visual features that identify different type families.

Face

The term 'face' is interchangeable with the term 'typeface'.

Family

A type family is made up of all the widths, sizes and styles of a typeface. Helvetica, for example, includes Roman, Medium, Italic, Light, Condensed, Extended, Bold and Heavy in its family. Although it is possible to make many typefaces bold or italic by electronic means on the computer, using the italic or bold version from the font family reduces the risk of this 'dropping out' during the printing process.

Font

Originally, the term 'font' was used to describe a type family of one size only; for example, Times New Roman 10 pt (see 'Type size' on page 188). Since the advent of digital design, font has become interchangeable with the terms 'typeface' and 'type family'.

Grotesque/Grotesk

In the 19th century, sans serif type was commonly known as Grotesque, lineal or Gothic type. These days, sans serif is the term more widely used but many typeface names still include reference to Grotesque/Grotesk or Gothic.

Italic

An italic type is not mechanically slanted (that is, forced to be italicised by selecting 'I' in your word-processing program); rather, it is a separate version of a typeface that has been specifically designed on a slanted angle. Aldus Manutius and Francesco Griffo designed the first italic font in Venice in 1501.

Kerning

Kerning refers to the space between individual letterforms. Some letterforms need to have the space adjusted when they are used together, for example a T and L used together have larger spacing than an M and E. The type designer kerns most commercial typefaces, but design software programs allow some adjustment to kerning to improve visual appearance if required.

Leading

Leading (pronounced *ledding*) is the distance between two lines of type. The term is derived from the strips of lead that were placed between lines of type in traditional typesetting. Leading directly affects the legibility of type and is usually set so that the eye flows easily from one line to the next. Leading is often set automatically in computer software but can be manipulated.

Leading is the space between lines of type.
Leading affects the legibility of text.

Type without leading or with leading that is too close can interfere with the legibility of the text.
16 pt Myriad Pro with 12 pt leading

As can leading that is too far apart as the flow of the

text may be too difficult for the reader to follow.
16 pt Myriad Pro with 44 pt leading

Most auto leading in computer software is set 1–2 points above the point size. For example, this sentence is set in 16 point type with 18 point leading.

Letterform

Letterform refers to individual type forms including symbols, numerals and **icons**.

Ligature

ft-ligature type in 12p Garamond, Daniel Ullrich, Threedots

▶ Example of a ligature

A ligature is formed by two or more letters being joined by a stroke or bar to produce one character, such as f and I or f and t. Ligatures originate from common letter combinations in Latin. They are often seen in script typefaces and in Scandinavian languages. When used in English, they are used to increase legibility.

Lining and non-lining numerals

Numerals can be identified as upper case and lower case. Lining, or upper-case numerals, adhere to the baseline. Non-lining, or lower-case numerals, feature descenders that drop below the baseline. Not all typeface families carry both lining and non-lining numerals.

1234567890

1234567890

OpenType

OpenType fonts are suitable for use on multiple computer platforms. They are scalable fonts specifically created for use in digital design. They retain the integrity of the original typeface without becoming distorted when used across different computer platforms.

Roman

The roman form of a typeface is considered to be the standard, upright version of a font. It is sometimes referred to as the 'parent' type of the typeface family.

Serif

A serif is the small visual element at the end of a stroke. The serif is thought to aid the readability of a typeface and dates from Classical Rome. There are a number of serif styles including bracketed and non-bracketed serifs, slab serif, slur serif, wedge serif, hairline serif and rounded serif.

Bracket serif

Typeface: Garamond

Unbracketed serif

Typeface: Didot

Slab serif

Typeface: Rockwell

Sans serif

Typeface: Univers LT Bold
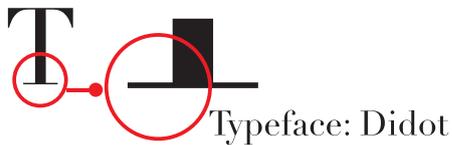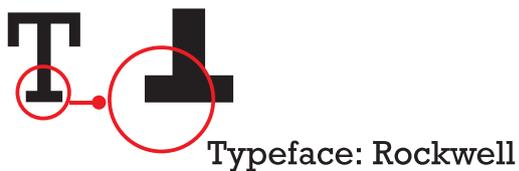
▶   Some of the most common forms of serif

Stroke

Strokes are the main construction lines of a letterform. A has three, W has four and U has one.

Spacing or tracking

Spacing and tracking refer to the distance between all letters in a sample of text. Normal tracking leaves the spacing as the type designer intended. Negative tracking moves letterforms closer together, and positive (or open) tracking moves them apart.

Tracking

Tracking

Tracking

Swash

A swash is the elongated entry point or exit point of a letterform usually seen in script typefaces.

SWASH   *Swash*

Terminal

A terminal is the end point of a stroke that does not finish with a serif. A terminal often has a slightly heavier visual weight to balance the letterform, for example, serif versions of lower-case f and r.

Type size

Points are the units of measurement used in typography. One point is 1/72 of an inch or 0.352 mm. Point refers to the height of the type block rather than the letter itself.

FACE

POINT SIZE

sxc.hu/typofi
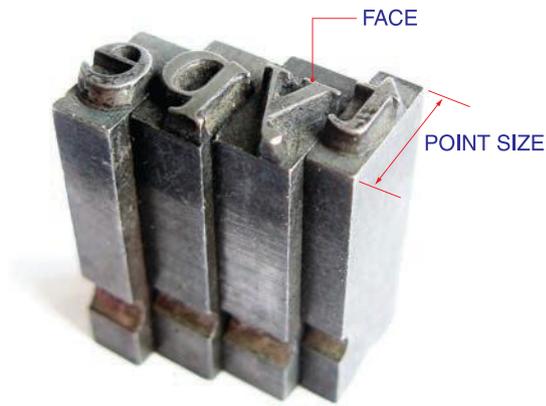
X-height

The x-height of individual typefaces varies widely. Here we show three similar serif faces that have very different x-heights.

Type Type Type

▶ Garamond, Times New Roman and Georgia, all set at the same point size. Note that all have different x-heights. This variation should be taken into account when working with multiple typefaces in a composition.

TYPE FOUNDRY   **FYI**

Although it sounds like a factory from the Industrial Revolution, a contemporary type foundry is a business that designs or distributes typefaces. Historically, typeface foundries manufactured and sold the metal type required in typesetting. Today, digital type foundries sell typefaces online and may also distribute the work of freelance type designers.

TYPE CLASSIFICATION

Categorising typefaces can be difficult. All faces have distinctive characteristics, which are known as earmarks. The distinctiveness of earmarks enables us to distinguish between typefaces. Differentiation can be found on the upper-case Q, the upper-case G and also the ampersand (&). Other features that might assist in recognising

typefaces are proportional differences; the variation between x-height and descenders/ascenders, for example. It takes a great deal of practice but in time you will find that you can distinguish differences between typefaces and this in turn will assist you in selecting the most appropriate typeface for your design task.

Blackletter

A heavy style, reminiscent of the ornate calligraphic style prevalent in the Middle ages. This style was used in early type printing and is also known as Old English, Brokenletter and Gothic.

Blackletter: Blackmoor

Humanist or Old Style

First created in the 15th and 16th centuries, the classical calligraphy of the ancient Romans was the inspiration for this typographic style. Examples include Trajan, Garamond and Caslon.

Humanist/Old Style: Garamond

Transitional

Transitional typefaces have sharper serifs and a pronounced vertical axis on the curves. Baskerville is a good example of a transitional style as it has considerable width in proportion to its x-height.

Transitional: BASKERVILLE

Modern

Designed in the 18th and 19th centuries, modern typefaces were controversial for their time. They feature strong contrasts between thick stems and thick strokes. Bodoni and Didot are notable examples.

Modern: BODONI & DIDOT

Slab serif (also known as Egyptian)

Egyptian or slab serif type was introduced in the 19th century and was used extensively in poster advertising.

Slab Serif/ Egyptian: ROCKWELL

Humanist sans serif

Sans serif typefaces became common in the 20th century. Many used humanist proportions and references to Classical style. Notable examples are Gill Sans and Optima.

Humanist Sans Serif: GILL SANS

Geometric sans serif

Based on the modernist principles of the Bauhaus, geometric sans serif type used geometric shapes as integral aspects of the typeface design. The use of circles and squares was common. Examples include Futura and Johnston.

Geometric Sans Serif: FUTURA

Transitional sans serif

The most famous of all the transitional sans serif typefaces is Helvetica. The consistently upright nature of its characters reflects earlier transitional serif typefaces. Similar fonts are Arial and Univers.

Transitional San Serif: HELVETICA

Script

Based on calligraphic handwritten type, script faces are also known as copperplate. They are not used as body text and are most commonly used for titles on invitations or menus. Examples are Edwardian Script or Berthold Script.

Script: *Edwardian Script*

Decorative/Graphic

Decorative type is used for novelty and may appear on signage, invitations or advertising materials in small doses. It is not recommended for body text. Examples include handwritten typefaces such as Comic Sans and quirky graphic styles such as Jokerman and Curlz MT.

Decorative: CURLZ MT
Graphic: Comic Sans

Digital type

Designed specifically for online legibility, digital fonts such as Verdana and Georgia have simple curves, increased x-height and more open forms than print typefaces.

Digital: VERDANA

LOREM IPSUM   FYI

When preparing a mock-up of a composition, designers often use 'dummy' text rather than actual text. Dummy text leads to fewer distractions while the effectiveness of the design as a visual communication is being assessed. The most commonly used dummy text is known as 'Lorem ipsum'. This is an excerpt in Latin from a book on ethics written in 45 BCE by Cicero. It begins: 'Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore…'

LEGIBILITY

The purpose of typography is to communicate language. Legibility is extremely important. Type is often used for visual effect but its main purpose is to be read.

There are some effective 'rules of thumb' when considering legibility. One is to avoid using more than three typeface families in a design. Too many different typefaces can distract from the meaning of a visual message and can make a design product difficult to read.

SPRING HARVEST
MENU

Entree
Lorem ipsum dolor
Consectetur adipiscing elit
Quisque rhoncus
Elementum urna quis

Main
Ornare sit amet tellus
Aenean ut elit ante
Integer auctor
Nullam sapien quam
Quisque sit amet
Purus hendrerit sapien
Fusce scelerisque
Quis diam faucibus

Dessert
Vestibulum
Primis in faucibus
Orci luctus et ultrices
Posuere cubilia
Curae
Quisque magna lectussem

SPRING HARVEST
MENU

ENTREE
Lorem ipsum dolor
Consectetur adipiscing elit
Quisque rhoncus
Elementum urna quis

MAIN
Ornare sit amet tellus
Aenean ut elit ante
Integer auctor
Nullam sapien quam
Quisque sit amet
Purus hendrerit sapien
Fusce scelerisque
Quis diam faucibus

DESSERT
Vestibulum
Primis in faucibus
Orci luctus et ultrices
Posuere cubilia
Curae
Quisque magna lectussem

▶ These are the same menu, and same text, but note the difference between the two designs. The design on the right uses two typefaces (Trajan Pro and Avenir) only; adjustments to alignment, leading and point size increase its legibility as well as its aesthetic appeal.

The selection of typeface is of primary importance; the face should suit the context of the design product. It would not be suitable, for example, to set a formal document such as a financial institution's annual report in a graphic typeface such as Comic Sans. Similarly, to set an invitation to the opening of a children's play centre in a formal script would not suit the style or context of the event.

THE COMIC SANS CONUNDRUM

FYI

To use or not to use? Comic Sans has become the whipping font of the Internet. Sites are dedicated to recording the many, varied applications of a typeface that polarises opinion. It is interesting to know that Comic Sans, created by Vincent Connare, was originally designed for use in the early Microsoft Windows help icons. A helpful cartoon dog or paperclip offered assistance to users of software such as Word or Excel. Connare believed that the heavy, serif font used in the characters' speech bubbles did not match the light-hearted cartoons. He designed Comic Sans as an alternative. Ultimately, the typeface was also added to the standard Windows installation and has found favour (and controversy) with users ever since. Connare's intention for the font provides an important insight into the much maligned Comic Sans: there is a time and a place for every font. You can very clearly differentiate between those who have a deep knowledge of design and those who don't by the typeface selection. As with all aspects of design, your choice of type requires thoughtful application.

CHAPTER RECAP

1   List Dieter Rams' 10 Principles for Good Design and find contemporary examples of designs (from the past 10–15 years) that reflect each principle. Annotate by describing your chosen examples (remember to identify sources).

2   Define the following terms:
    a   leading
    b   kerning
    c   tracking
    d   glyph
    e   ligature
    f   italic

3   Find an example of a serif typeface. Identify the bowl, ear, terminal, descender, ascender, serif and loop.

4   Locate last year's award winners from the Good Design Awards Australia. Print an image of the winner from each category. Annotate each example with the following:
    a   What were the selection criteria?
    b   How does the design meet the selection criteria?
    c   What makes the design innovative?
    d   What makes the design sustainable?

5   Create your own, original visual examples that clearly explain each of the following theories of visual perception.
    a   ambiguity
    b   consistency
    c   continuation
    d   figure–ground
    e   proximity
    f   similarity

DESIGN ELEMENTS AND DESIGN PRINCIPLES

'The process of making makes me feel whole.'

Jessica Hische, illustrator and typographer

In this chapter:

Learn the language

+ alignment
+ balance
+ colour
+ contrast
+ form
+ harmony
+ hierarchy
+ line
+ proportion
+ proximity
+ repetition
+ scale
+ shape
+ space
+ texture
+ tone

The elements and principles of design are integral to the design process and, when applied effectively, lead to harmonious and successful design products. They are the fundamental tools applied in the creation and production of all design and it is important to build a solid understanding of their application, significance and influence. There are many design elements and design principles but the QCE Design syllabus suggests the study of the examples found in this chapter. This chapter is structured to help you understand how the selected elements and principles are applied in a range of contexts and design areas.

13.1 DESIGN ELEMENTS

COLOUR

Colour is a very powerful design element. For 90 per cent of the population, colour is perhaps the most dominant and influential of all the design elements. Colour attracts us, warns us, calms and soothes us – it can influence our moods and our behaviour.

In traditional colour theory, there are three pigment colours that cannot be mixed or formed by any combination of other colours: red, blue and yellow. All other colours are derived from these three colours. Hues of all colours can be modified via the addition of black and white.
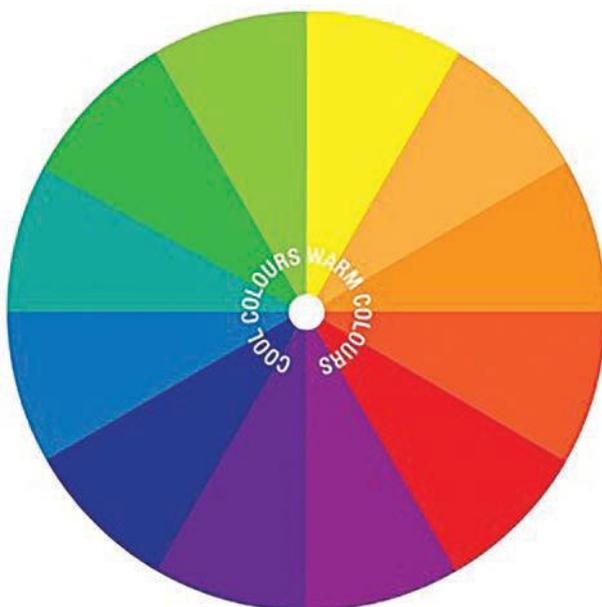
▶   The colour wheel

Primary colours

The primary colours are yellow, blue and red.
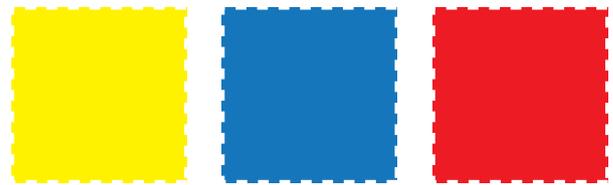
Yellow	Blue	Red

Secondary colours

The secondary colours are green, orange and purple. Secondary colours are created by mixing combinations of primary colours.

Green	Orange	Purple

Tertiary colours

Tertiary colours are created by mixing a primary colour and a secondary colour.
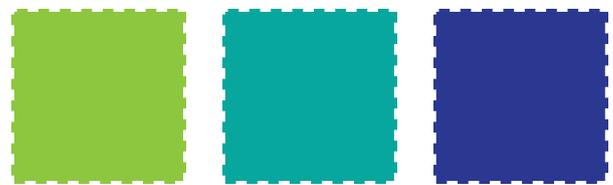
Yellow-green	Blue-green	Blue-purple
Red-purple	Red-orange	Yellow-orange

Harmonious colours

Also known as analogous colours, harmonious colours are colours that appear side by side on the colour wheel. When used together in a composition, they create subtle variations.

The colour wheel in practice

Monochromatic (black and white)

Primary colours

Secondary colours

Tertiary colours

Harmonious colours

Complementary (contrasting) colours

Complementary colours

Also known as contrasting colours, complementary colours are opposite and separated by colours on the wheel. These colours are often used together to create contrast. Colours that are direct opposites on the colour wheel can provide the strongest contrasts and draw the viewer's eye to key information within a composition. Complementary/contrasting colours can create deliberate tension in a composition, which might be required for emphasis or to create a sense of dynamic visual force. They can sometimes appear to vibrate – for example, red text on a blue background – and are deliberately used to create such an effect in some artworks.

We can look at colour from many directions, including its psychology, its symbolism and the extraordinary communicative power that colour holds. Though it is not possible to fully understand the significance and symbolism of every colour, it is essential to appreciate that colour has many facets, and to understand the influence it has in our lives.

Colour surrounds us – in language, in advertising, in fashion, and can even affect our behaviour. We quickly recognise that red means 'Stop' and green means 'Go'. When the use of colour challenges our understanding of its meaning, the message can become very confused. This can be seen in the illustration below.

To fully utilise the power of colour, designers need to understand its significance in many contexts, including that of culture. In designing for a specific audience or market, the choice of colour may be influenced by various factors. In Chinese culture, for example, red is symbolic of good luck, and at Chinese New Year, you might see streets festooned with red lanterns and red decorations. In China, white is representative of death, so whereas we are accustomed to seeing brides wearing white dresses, such clothing would not be appropriate there – in fact, the colour of traditional bridal attire is red.

Just as we need an awareness of cultural sensitivities in all areas of design, including the application of colour, we also need to understand the emotional power of design elements.

Colour can elicit strong responses from an audience, even though a reaction may be quite subconscious – we are often quite unaware of the influential and persuasive effects of colour. The colours of a country's flag or the uniform worn by its athletes at the Olympic Games might encourage a sense of patriotism, which manifests itself in emotions such as pride.

As colour stimulates our emotions and senses, it can suggest a wide range of possibilities. Colour might suggest a fashionable and appealing lifestyle, it may soothe and placate, or it could suggest energy and dynamism.

Colours can also be described as either warm or cool. Blues, greens and purples are traditionally referred to as cool colours, while reds, oranges and yellows are termed warm. Actual temperature has nothing to do with it, but warm and cool colours can describe a 'feel' in a design composition.

▶ The two posters pictured use the same graphic elements to promote a festival, yet the use of colour helps to describe the theme and season of the events.

Colour can be used in architecture and interior design to alternatively stimulate and sedate. Some

research has shown that hues of pink can have a calming effect, and in fact a colour close to bubblegum pink was used in an American prison to subdue violent and angry prisoners. Schools often choose to paint walls in vibrant colours such as yellow and green, colours that are designed to stimulate learning and creativity.

Kristen Guthrie

▶ The Pixel building in Carlton, designed by Studio 505 Architects, uses vibrant colour on the facade of the building. The coloured panels also function as insulation, shade and solar capture on this six-star energy-efficient building.

Colour production

When producing images for print or electronic publication, you will need to have an understanding of the methods of colour production. There are different colour systems that are designed for use on a computer screen and in print. It is likely that at some stage you have selected a colour on your computer screen only to have it print quite differently on an inkjet or laser printer. This is because screen colour and print colour use different systems and interchanging from one to the other will often cause colour change. Tools such as a Pantone colour-swatch and colour-management software assist in countering the differences. (See later in this chapter for more information about colour modes in digital design.)

RGB

RGB stands for red, green, blue. The RGB mode, on which your computer monitor is based, defines all possible colours as percentages of red, green or blue. RGB mode is used for on-screen editing or viewing of graphics.

| Red | Green | Blue |

RGB colours are called additive colours because the RGB system involves starting with black and adding coloured light. For example, adding green light and red light gives yellow light, while red plus green plus blue light gives white light.

CMYK

Known as process colour, CMYK divides your images into four colour channels: cyan, magenta, yellow and black, which correspond to the inks used in four-colour printing. When using design software, RGB images can be converted to CMYK, but some colour change will occur. CMYK is used by commercial printers to produce full-colour works.

| Cyan | Magenta |

| Yellow | Black |

TIP: RGB AND CMYK

When working with RGB and CMYK colours, it is helpful to use the numeric values for each. This can assist when recreating a colour or when you might need to manually key colour codes from a printed swatch. Most design software will offer a menu to toggle between each colour mode.
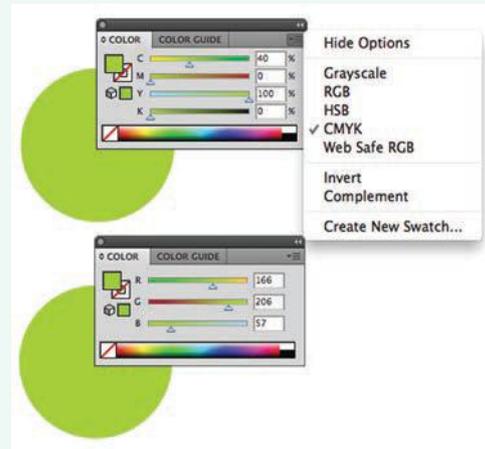
Spot colour

At times, it is more cost-effective to use a colour that already exists in ink form and does not have to be mixed via the CMYK process. Spot colours are premixed colours produced commercially and available for professional use. When using one to three colours in a document or presentation, spot colour can be the most cost-effective approach. Pantone uses the PMS (Pantone Matching System), which is perhaps the most widely recognised spot-colour-matching method. Designers select the most appropriate colour from printed swatches that show hundreds of colours. They can be confident that the final print will reflect their choice, even though PMS colours often appear differently when they are shown on a monitor as RGB percentages.

▶ A swatch book of colours

KEYWORD ~ COLOUR   **abc**

Colour can be:

+ bold
+ subdued
+ vibrant
+ bright
+ subtle
+ warm
+ cool
+ primary
+ secondary
+ tertiary
+ contrasting

+ complementary
+ eye-catching
+ dominant
+ dynamic
+ calming
+ emotive.

Colour can be used to:

+ define space
+ create contrast
+ create hierarchy
+ create a mood.

FORM

Form generally refers to objects that are three-dimensional in nature. We readily recognise the forms around us – from the pencil on the desk to the form of the human body. Form is often depicted visually through the application of other elements, such as shape and line. Form can be rendered to enhance its three-dimensional qualities. The addition of shadows and highlights can help us to 'read' the true form of an object.

Skydeck Chicago

▶ Using type and shape, the logo for the Skydeck in Chicago emphasises the form and height of the Willis Tower (the tallest tower in the western hemisphere).

As you know from the physical environment that surrounds you, forms are infinitely varied and range from the geometric and constructed to the organic forms of the natural world. The representations of these forms are similarly varied and can range from the precision of an isometric engineering drawing to a loose and flowing charcoal life-drawing.

Indicia Design, Kansas City, Missouri, USA with permission of The Buckley Group L.L.C

Designers who work with the constructed environment – such as architects, industrial designers and interior architects – constantly experiment with our perceptions of form. Many variables can affect the design of new forms, including:

+ ergonomics
+ structural constraints
+ the environment
+ fashion and trends.

Many professionals involved in environmental design – whether it is landscape, product design or the constructed environment – are heavily influenced by the versatility of form. Take a chair, which is useful for that most basic of functions – sitting down. Yet this deceptively simple, functional object has developed, changed and evolved over the past century into a product that has challenged our ideas about form.

MARC NEWSON

Marc Newson may be Australia's most successful living designer. Newson was born in Sydney, Australia, in 1963 and studied sculpture and jewellery at Sydney College of the Arts. His design expertise spans fashion for G-Star and domestic items for Magis and Alessi to aircraft interiors, automobiles and hotels. Newson's ability to create functional yet unique forms is his trademark. His innovative use of materials is also remarkable. His website provides a comprehensive archive of his extraordinary body of work.

Bunky Bed by Marc Newson, with permission

▶ A bunk-bed design by Mark Newson

Ergonomics

Ergonomics is the study of human factors in design. This scientific discipline looks at the functions, limitations and needs of the human body in relation to product design. Ergonomists often work with designers to design products that take into account the physical, organisational and psychological effects on the user.

ERGONOMICS

For more detailed information about ergonomics, visit the International Ergonomics Association website.

Form follows function

A phrase by architect Corbusier, which was embraced by the modernists of the mid-20th century, 'form follows function' suggests that aesthetic considerations should be secondary to the pure functionality of a design product. Many designers believe that beautiful design is only achieved when the successful function of the design is fully realised. Contemporary (and postmodern) interpretations of this phrase are less rigid and many current designs reflect a balance between functionality and decorative elements. A good rule of thumb is to remember that no matter how attractive a design looks, if it doesn't achieve its primary purpose, it is not a successful design.

Animi Causa, with permission

▶ Animi Causa 'Feel' seating system. The form of this innovative seating system can be changed in multiple ways by the user. Made from 120 soft foam balls covered with a smooth elastic fabric, the form was inspired by molecular structure.

KEYWORD ~ FORM

(abc)

Form can be:

+ three-dimensional
+ organic
+ geometric
+ dominant
+ subtle
+ tactile
+ solid
+ fluid
+ graceful
+ irregular
+ textured
+ natural
+ manufactured
+ modelled
+ sculpted.

Form can be used:

+ to define space
+ to create contrast
+ as a model or prototype.

iStock.com/Evgeniy Ivanov

▶ This illustration enables us to understand the structural form beneath the upholstered surface. The linear wireframe and fully upholstered views provide contrast as well as context.

LINE

Line is a versatile design element using only the dimensions of length and width. In technical drawings, line is integral to the representation of shape and form. Linear details – such as the outline of an orthogonal drawing and the appropriate dimension lines – are represented through lines of varying type.

The purpose or intent of a visual communication can vary through differences in the width or 'weight' of line. A fine or light line can suggest a specific technical detail or, in the context of an illustration, a sense of lightness or minimalism. Bold or heavy lines might be used for emphasis or to represent a structure within a given space.

Line can suggest direction and movement. It can draw the eye into a composition and direct it along a path. Used as a border or to define the areas of a composition, line can create structure and stability.
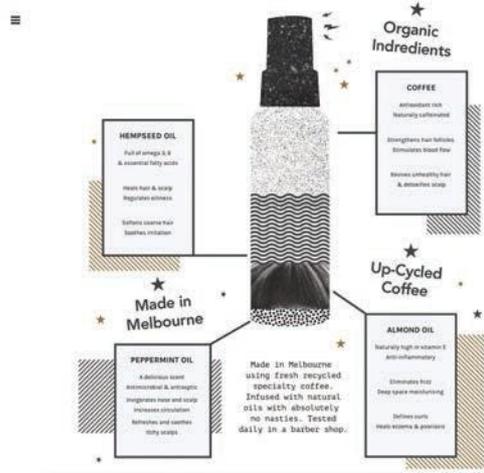
Magic Organic Hair Coffee Spray branding, with permission

▶ Line is used in multiple ways on the promotional website for Magic Organic Coffee Hairspray. Line leads the eye to key product information and creates patterns that sit behind text to define space and draw attention. Line, along with texture, illustrates the quantity of contents in the bottle.

Used as an illustration tool, line forms the basis of many popular techniques. In relief and intaglio printmaking, line is used extensively in the development of imagery. Linocuts and drypoint etching, in particular, lend themselves to the application of diverse line types. When used to render objects, line-rendering techniques such as crosshatching create variations in tone and texture, which in turn serve to emphasise form.

Alanna Sharp

▶ This student applied a highly creative use of line to create pattern and form on a minimalist film poster for *Whale Rider*.

KEYWORD ~ LINE

abc

Line can be:
+ broken
+ flowing
+ bold
+ fine
+ medium
+ repeated
+ organic
+ eye-catching
+ dynamic
+ directional
+ static
+ curved
+ straight
+ sketchy
+ freehand
+ precise.

Line can be used to:
+ establish structure
+ create a pattern
+ indicate
+ direct
+ render.

Line can create:
+ contrast
+ pattern
+ formality
+ contour
+ structure.

Gemma O'Brien

▶ The use of hand-drawn line in this work by Gemma O'Brien helps to emphasise type and creates a vibrant and eye-catching pattern.
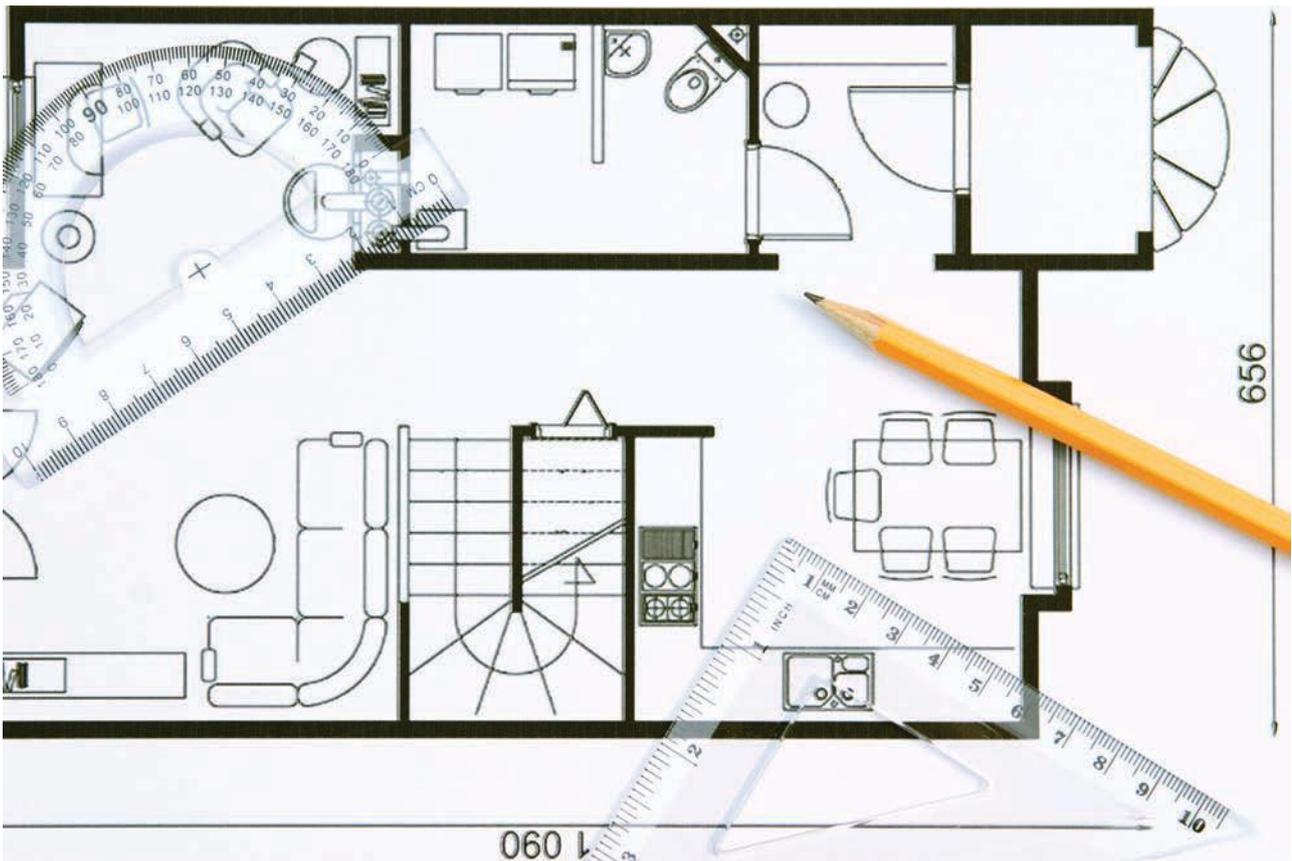
istock.com/Nathalie Beauvois

▶ Line qualities vary in architectural drawings. Varying line widths represent specific structural information.

Courtesy of Kakadu Tourism

Courtesy of Aquamums
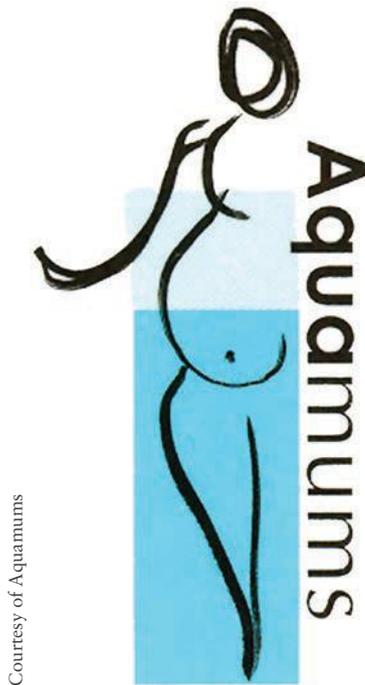
▶ Examples of line use in logo design. Both logos use line as the primary element, but note that the quality of line (freehand or instrumental) makes a significant difference to the visual outcome.

PROPORTION

Proportion is about relationships – relationships between the scale of parts of an object or a composition. Proportion, properly used, creates balance and in turn provides visual harmony – essential in the creation of pleasing designs.

How do objects relate to one another within a composition? A chair that has a small seat and an oversized back support may be uncomfortable and ugly. That doesn't mean that an overly large back support is not a feasible design option; the chair's elements simply need to be in proportion to one another to become an effective design. Likewise, in two-dimensional design, proportion is essential to creating successful designs.

▶ Note the proportional differences between the two images of the teacup and saucer.

In the left-hand image of the teacup and saucer, the proportions of shape and line are incorrect. This interferes with the believability and the attractiveness of the illustration. If the viewer becomes distracted by inconsistencies such as poor proportion it is likely that they will miss the message of the visual communication.

AESTHETIC PERFECTION   FYI

During the Renaissance, artists were concerned with the pursuit of visual harmony and beauty in drawing, painting and architecture. This pursuit of aesthetic perfection led to the development of complex geometric systems of proportion. Artists and architects used systems such as the '**golden ratio**', 'golden section' or 'divine proportion' devised by the ancient Greeks, which defined a clear visual order as a geometric equation.

Similarly, the 'harmonic ratios' of the Renaissance established a visual balance in objects by establishing that the proportions within the form matched the overall proportion of the form as a whole.

GOLDEN RATIO

This online tool allows the user to calculate the golden ratio of a series of measurements; a handy tool when creating layouts for online and print pages.

Proportion relates to the comparison of different elements within a composition. Relationships are important in any composition; they indicate which elements relate to one another and lead the eye through information in the most effective manner.

We are naturally attuned to proportion, and intuitively understand when something is 'out of proportion'. Particularly important in observational drawing, proportion helps us to depict realistic representations of objects. Renaissance artists such as Leonardo da Vinci researched the 'ideal' proportions of the human body, and da Vinci, among others, established a scale to guide artists in the depiction of the idealised classical male figure.

Courtesy Bundoora Park, City of Darebin

▶ Although the eucalyptus leaf is clearly out of proportion to the bird in this logo, we accept the proportional difference because it works as a creative linking device and a pleasing composition.

Much later, in the 1940s, French artist and architect Le Corbusier established a scale of proportion between the human body and architectural design called the 'Modulor system'.

'Playing' with proportions can lead to innovative and creative design solutions, so don't be afraid to experiment in your own work. Cartoonists commonly use exaggerated differences in scale and proportion to draw attention to a humorous concept.

When drawing from direct observation, it is essential to establish the relative proportions of physical details in order to produce the most authentic representation.
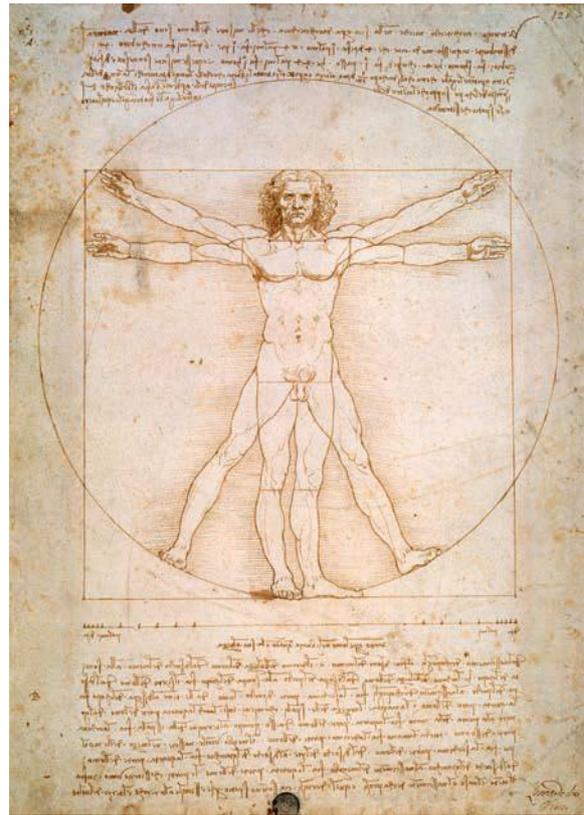
Getty Images/The Image Bank/Garry Gay

▶ Leonardo da Vinci created this drawing of average male proportions based on the writings of the ancient Roman architect Vitruvius.

iStock.com/megamix

▶ Exaggerated proportions are used in caricature and cartoons.
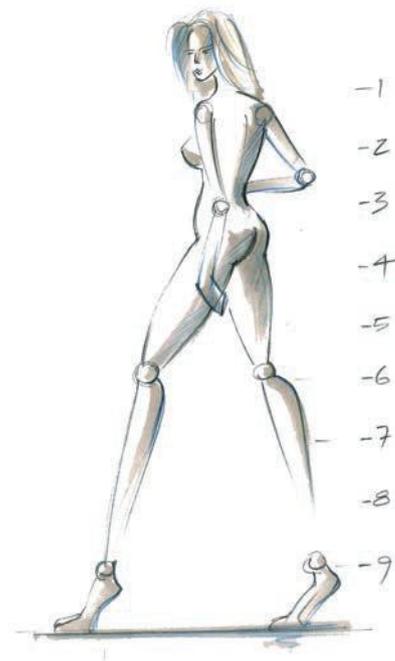
▶ Fashion illustrators distort the proportions of the human figure to emphasise features such as legs and necks. Generally speaking, the human body is equal to the height of 7.5 to 8 heads. In fashion illustration, those proportions are extended to 9 heads, which creates a lengthened legs and torso.

SCALE

Scale concerns the size of elements within a composition. Scale exists because of relationships between different elements in a hierarchy. Scale, which we can also refer to as size, assists the viewer to make sense of depth, distance and proportions in a composition. Scale enables us to make comparisons between elements or objects, and helps to add meaning. A statistical diagram, for example, uses differences in scale to depict differences in the data.
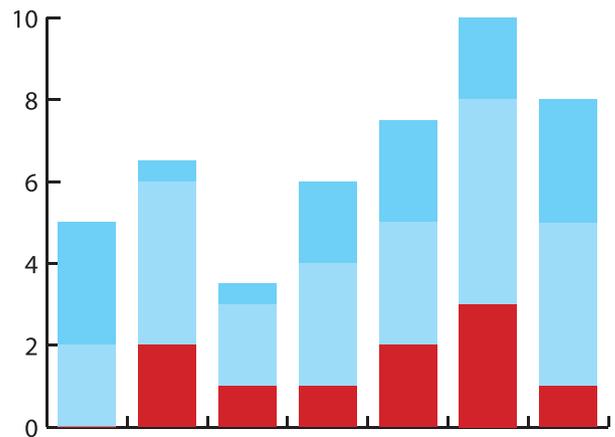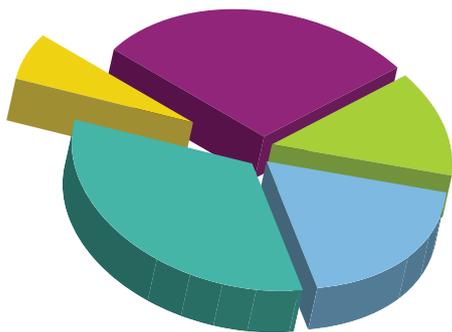
Scale is used to add realism to an illustration. The placement of familiar images, such as the human body, can provide a context in which to depict a product or construction. Architectural illustrations often use trees, foliage, cars and figures to suggest the realistic scale of a construction.

Scale can be exaggerated and used to create dynamic contrasts in visual communications. Using elements that play with our innate sense of scale can reinforce the meaning or theme of a composition. Scale and proportion often work together for visual impact. Adjustments to scale can often affect proportions in an illustration, construction or composition.

Through our understanding of instrumental drawings such as orthogonal drawing, scale is a familiar tool. Scale is used to illustrate details that cannot be represented at their actual size. Scale is applied to complex information such as maps to assist our comprehension of large amounts of information.

Scale models are used in many areas of three-dimensional design to evaluate a concept. The opportunity to observe a design concept in three-dimensional form is valuable, as the strengths and weaknesses of the concept are more clearly identifiable. A model enables a client or other

interested party to view a realistic representation of a product that may otherwise be difficult to visualise from a two-dimensional form. Scale models are used in many areas of design, such as automotive design, architecture, design of theatre sets and product design.

Prue Edmunds

▶ Scale model of a dwelling

The identification of scale can be used in illustration and layout to highlight important visual information.
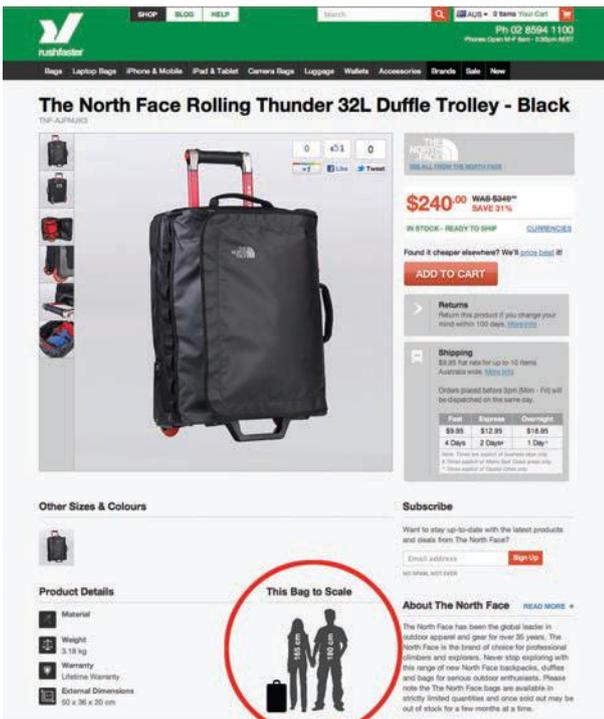
Rushfaster.com.au, with permission

▶ Rushfaster sells bags and luggage online. To assist purchasers with decision-making, a scale is used to help visualise the size of each bag.

SHAPE

Shape describes representational or abstract shapes that are two-dimensional. Simple geometric shapes with the dimensions of length and width include squares, triangles, rectangles and circles.

There are limitless irregular or abstract shapes. These might appear as natural organic shapes, or as irregular geometrically based images.

Shape may form the ground in a composition, providing a space for the placement of other elements. Shape is used for emphasis and to draw attention to the figure in a visual communication. Shape may be the figure itself in the form of a logo or symbol.

iStock.com/Nathalie Beauvois

Shape is an element that is very familiar to us, from the silhouette of the human figure to the shape of a stop or give-way sign on the road. Shape can inspire all kinds of reactions in a viewer; the shape of a heart or a cross might provoke an emotional response, whereas the hexagonal shape of a stop sign demands an immediate physical response from the car driver.

▶ Road signs use universally familiar shapes. It is the combination of shape and colour that communicate to road users. The yellow diamond is another common shape-and-colour combination that indicates caution.

Symbols are usually two-dimensional and are often based on simple geometric shapes.

Pictographs

A pictograph is a symbol that is based on a recognisable set of shapes or on a commonly recognised form. For example, the male/female signage used on public toilets is usually pictographic. The forms of the female and male figure are familiar and require no additional text for identification.
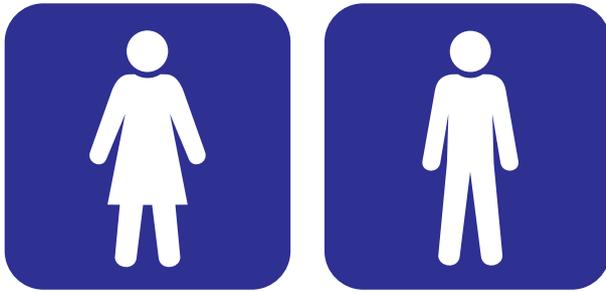
The use of shape incorporates the application of other elements such as line or colour. Shape can be created using a range of media (such as paper, fabrics or card) and methods (such as collage or monoprinting). Other design elements such as type, colour and line can be used abstractly to create shapes that increase the visual interest of a composition.

KEYWORD ~ SHAPE

Shape can create:
+ hierarchy
+ pattern
+ background
+ contrast.

+ irregular
+ organic
+ geometric
+ defined
+ cropped
+ symmetrical
+ open
+ closed
+ free form.

Shape can be:
+ two-dimensional
+ solid
+ outlined

www.animalyser.com

▶ These logos for animalyser.com cleverly combine the simplified shapes of animals to create a type-based identity design. The design, by Yiying Lu, can be adapted for a range of promotional products and merchandise relevant to the brand.

www.animalyser.com

Atelier Art Supplies Pty Ltd

▶ The Atelier Art Supplies logo references the shape of an artist's easel within a typographic identity. This addition, with its warm splash of colour, helps to emphasise the core business of the brand, which is art and design supplies.

Identity design is often shape-based. Many logos use shapes to describe concepts, ideas or events. The use of shape often means that a concept is readily transferable to different surfaces. The Born2Fish logo,

designed for a fishing-club competition team, is an example of a logo that was designed with its future applications in mind. Many designers use templates or 'blanks', such as the hats and sandwich board, to help a client visualise how the logo might be applied to different products and in different contexts.

SPACE

Space refers to the area around and between objects. It may refer to the distance between different shapes and forms within two-dimensional and three-dimensional environments. It may refer to physical spaces or to the spaces on a page or screen.

'Less is more': using white space

Attributed to Bauhaus designer Ludwig Mies van der Rohe, this statement defines much of the philosophy of the influential design movement of the 1930s. The Bauhaus rejected the decorative details and motifs seen in previous design movements. Their preference for the minimal influenced generations of designers who believed that what is left out of a composition can sometimes be as powerful as what is placed in it.

A cluttered composition can be distracting and difficult to understand. It can be important to include detailed information in a composition but it is also important to recognise that too much information can make a viewer quickly lose interest.

White space does not necessarily mean blank white space – it may contain a colour or pattern – but it will lead the viewer's eye to the crucial information. White space can be used effectively to balance a composition. For instance, a large area of white space may balance an equally large area of text, as it will be equal in visual 'weight'.

In environmental design, space may refer to the physical characteristics of a room, building or other environment. Consideration is applied to the arrangement of objects within a given space and, as with two-dimensional applications, the organisation of a space might direct and control the way a user interacts with their environment. The arrangement of a space can also control user behaviour; for example, the thoughtful design of space can control the flow and direction of passengers through a busy airport terminal. Ultimately, the function or purpose of the environment will determine the design and arrangement of space.

▶ Designed between 1923 and 1925 by Le Corbusier and Pierre Jeanneret, Maison La Roche in Paris is an early example of the modernist style embraced by many architects of the era, including the Bauhaus. Note the use of simple, uncluttered spaces and unadorned surfaces. These characteristics were typical of mid-century modernism.

Kristen Guthrie

SUSHI
a beginners guide

White space

SUSHI
a beginners guide

▶   Balance can be created with 'white' or empty space.

With practice, it is possible to create striking and memorable designs using space. In combination with design elements and principles such as hierarchy,

scale and proportion, the organisation of space can influence the response of a user and achieve a variety of different design purposes.

STOP DREAMING. START LIVING.

▶   This illustration of a home interior is used to promote a new housing development. The representation of a dwelling in this way allows the viewers to imagine themselves within the environment and can assist in marketing a space that does not yet exist. In environmental design areas, the representation of space in this way enables the end user to visualise a three-dimensional space more easily than they might from a plan.

KEYWORD ~ SPACE   **abc**

Space can be:

+ defined
+ clean
+ expansive
+ confined
+ intuitive and responsive
+ delineated
+ minimalist
+ contemporary
+ ordered
+ flowing
+ inviting
+ targeted.

Space can be used to:

+ guide the viewer/ user
+ control user/ viewer behaviour
+ create a mood
+ emphasise important visual information.

TEXTURE

Texture assists in visually describing the detail of an object, and helps us to understand what an object is made of. It can also help us to recognise and understand the features of the environment in which an object exists.
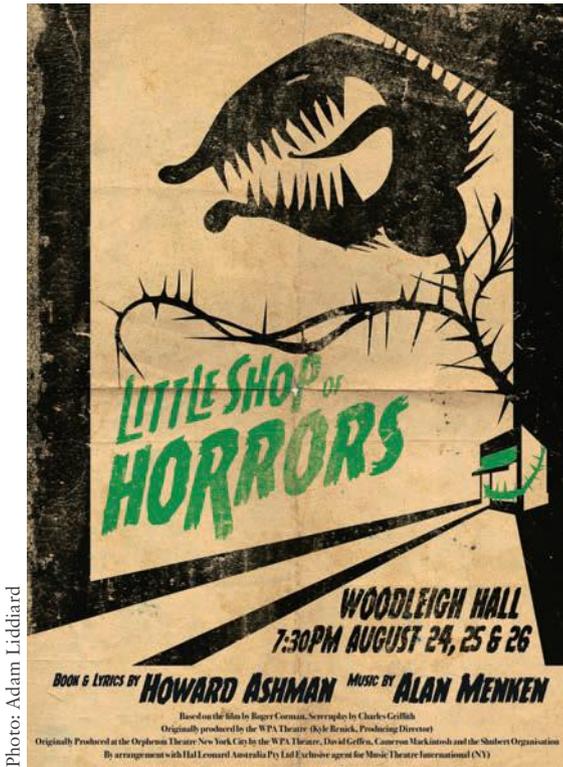
Photo: Adam Liddiard

▶ Using the texture of aged, folded paper, this promotional poster for a school production of *Little Shop of Horrors* helped to capture the B-grade movie aesthetic of the famous play. In this instance, the texture, colour and imagery were combined to evoke memories of horror movie posters from the 1950s and 1960s.

Texture offers considerable challenges in illustration; it is challenging to visually represent features that we usually recognise through our sense of touch. Representing texture on a two-dimensional surface takes some practice and acute observational skills. The key to depicting texture effectively is to take into account how tonal or colour variations can affect the appearance of texture.

Stephanie Hosler

▶ Drawing from life, this student used a range of pencil grades to achieve the softness of feathers. Tonal variations and careful mark making combine to suggest the clearly identifiable texture of feathers.
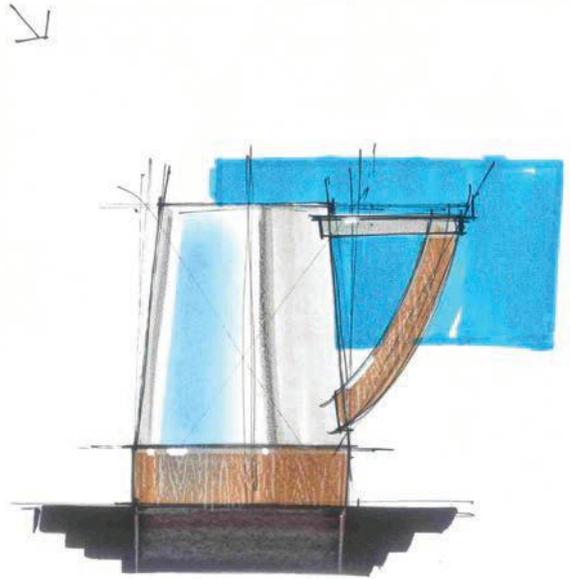
Mark Wilken

▶ A quick product sketch, designed to rapidly explain the form and materials of a kettle, makes use of pastel, marker and a texture board to represent metallic, wood and flat surfaces.

Importantly, texture communicates information about the characteristics of objects. Rendered architectural illustrations might depict stone or brickwork, reflective glass surfaces and the foliage of surrounding trees. Such detail communicates information that would not be available in two-dimensional plans or three-dimensional line drawings alone.
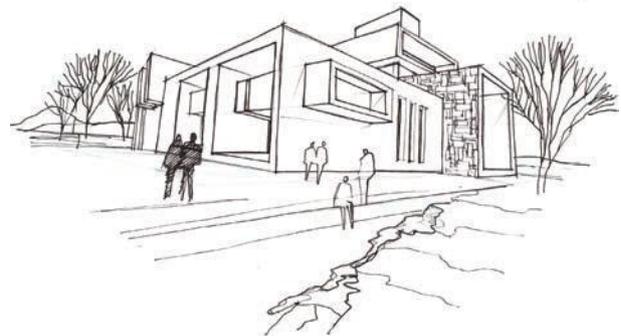
Mark Wilken

▶ An architectural sketch, using only line, can help describe the textural elements of an environment such as a stone wall or rendered surface.

Texture can be applied in logo design to reflect the nature of a company or service. Texture can be highly visually suggestive and has the power to communicate complex surface information.

The use of texture is common in logo design as companies ensure that their corporate identity is effective in digital as well as printed formats. Prior

to the Internet, very few gradients or textures were used in logo designs as they rarely reproduced well when faxed or photocopied. Now, due to innovations in technology for both screen and print, gradients, fades and a spectrum of colours or hues can be used effectively in branding.

Glitschka Studios.com

Glitschka Studios.com

▶ Illustrator and designer Von Glitchska takes photographs of textures that he finds, creates vector files and incorporates them into his illustrations.

The texture of a product or its packaging can influence our attitude towards it as consumers. Increasingly, the pursuit of 'greener' product design and packaging has led to an increase in products packaged in recycled materials. These have 'natural' textures that appeal to or encourage an environmentally aware audience.

Textures can appeal to us on a subconscious level. Humans enjoy the sense of touch; the appeal of a fluffy kitten or smooth velvet invites us to touch a surface. A soft texture may imply tenderness or luxury.

Alternatively, harsh textures such as jagged edges, barbs or thorns might repel us and may even imply danger.

Greenmark eco packaging range/greenmarkpack.com.au

▶ Greenmark eco packaging uses recycled materials.

TEXTURE MATE

Texture Mate is a visual reference library of images designed to assist designers and artists in reproducing textures and materials. The vast collection of images is arranged by detailed categories.

KEYWORD ~ TEXTURE

Texture can be:

+ smooth
+ glossy
+ matt
+ uneven
+ coarse
+ tactile
+ reflective
+ dull
+ metallic.

Texture can be used to:

+ contrast
+ emphasise
+ create pattern
+ enhance and describe form.

TONE

Tone, when applied effectively, can enhance the appearance of an object, describe three-dimensional form and provide information about the surface textures of an object.

When discussing tone, you may come across the term 'tonal scale', which refers to a series of tonal values or levels between black and white. Tone describes the play of light and shadow on an object, defining its form or shape.

Prue Edmunds

In applying tone to an image, the light source must be taken into account. Ordinarily there will be one primary source of light, which will define the highlight and shadow areas on an object and direct the application of tone.

In illustrations, the application of tone can influence the mood being conveyed. Cartoonists and illustrators often use tone to emphasise a theme in an illustration. Used for emphasis, tone can create a mood that is dark – or, alternatively, a sense of lightness. Tone can be applied by a range of media and can be created through the application of different rendering techniques such as crosshatching, pencil or marker rendering, and dot rendering.
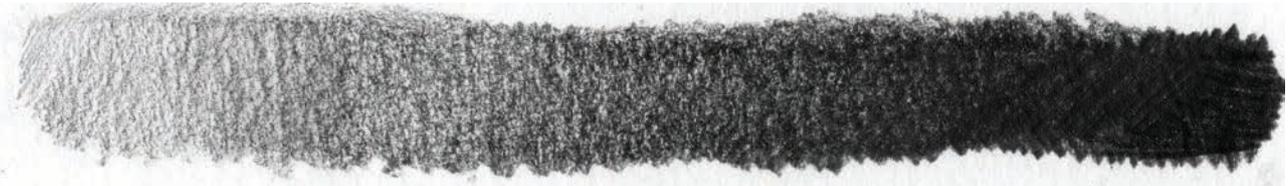
▶ Tonal scale using an 8B pencil

APPLYING TONE

To apply tone effectively and to create three-dimensional forms, such as the nuts pictured, rely on contrast. Strong contrasts between highlights and shadows create a sense of depth and distance. This, in turn, suggests form. Avoid 'flattening' tones into mid-greys; focus on sharp contrasts that can be softened as the image develops.
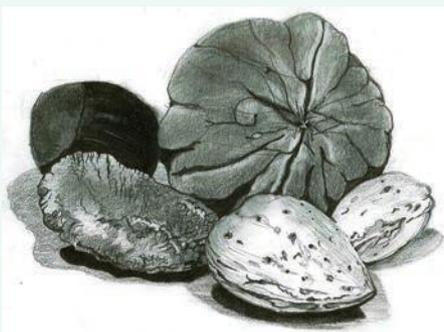
Johanna Schreiner
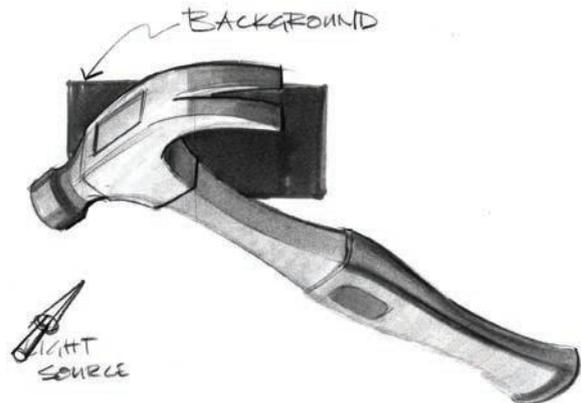
▶ The position of the light source will determine the application of light, medium and dark tones.

Thomas Rennie

Tone can be:

+ dark
+ light
+ medium
+ subtle
+ dramatic
+ muted
+ soft
+ harsh
+ defined.

Tone can be used to:

+ render
+ contrast
+ model
+ highlight
+ emphasise
+ define
+ enhance
+ create form
+ describe texture
+ define structure.

13.2 DESIGN PRINCIPLES

ALIGNMENT

Alignment is the placement of elements in relation to one another. When using word-processing software, you may have used the text alignment tools, which enable you to justify (align) your text to the left, right or centre of your page. These tools can give your text and images a sense of order and organisation that keeps the message clear. Alignment tools exist in all graphics software packages.

Effective use of alignment demonstrates that your composition is organised and implies that elements have relationships with other elements and images. Establishing a relationship between elements helps to lead a viewer's eye to – and through – your design. Elements and images placed without organisation will appear lost and unrelated to the composition.

TECH TIP: LAYOUT SOFTWARE

Layout software, such as Adobe InDesign, is ideal for creating your composition but it is possible to create equally effective grids using standard word-processing software. Use a table to form a grid and insert images and text into cells. You can hide the outlines of the table and adjust margins to form your compositional grid.

In graphic design, the considered alignment of type, imagery and other visual elements form effective compositions. The various visual components of a design are often managed within a visual '**grid**'. A grid is an invisible structure that supports the layout of print and digital content. A designer will use a grid to create hierarchy within a design composition and to delineate the placement of text and image. Grids can be seen in newspapers, magazines, web pages and even mobile devices. The grid can be a powerful tool when used well; it can draw the eye through a composition and create strong visual relationships between type and imagery.

TASTY
Noodles to go

TASTY
Noodles to go

TASTY
Noodles to go

Left alignment   Centre alignment   Right alignment
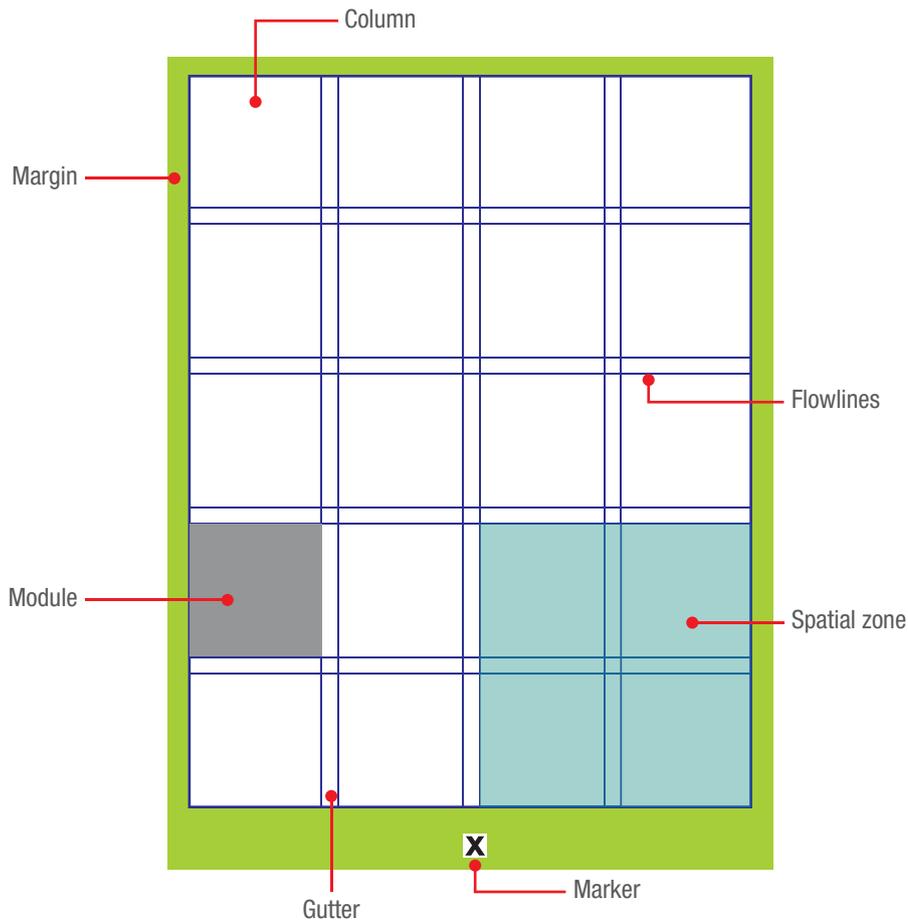
► The main components of a grid

Columns

Columns provide a sense of order in a design. They are vertical 'containers' that hold text and visual elements. The width and number of columns in a composition are established in the planning stages.

Flowlines

These are the horizontal grid lines that define areas for the placement of type and images. The combination of column and flowline creates the modules of the grid.

Gutter

The **gutter** refers to the spacing between columns. It is also used to describe the space between pages, near the binding, in a book or magazine.

Margins

Margins are the white space that surrounds a composition and separates the design/artwork from the edge of the composition. Printed compositions allow enough space in the margins for the page to be cut (trimmed).

Marker

A **marker** is a repeating element that assists navigation on a page. It may be a page number, footer or even an icon.

Modules

Modules are the grid areas defined by the columns and flowlines. These are the spaces that may contain text or images. Multiple modules create spatial zones.
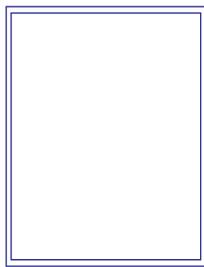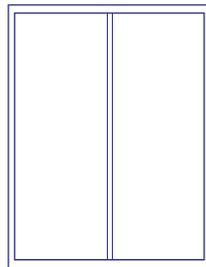
| Single-column grid | Two-column grid | Multiple-column grid | Modular grid | Hierarchical grid |
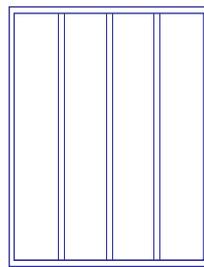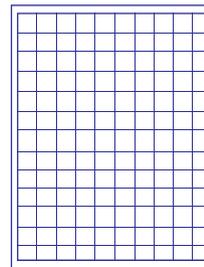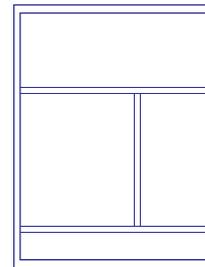
▶ Some common grid formats. The grid lines enable visual elements to be aligned effectively and assist in drawing the eye of the viewer to key information.

Interestingly, many striking designs have been created by designers 'breaking' the grid. This involves challenging the 'rules' of composition while maintaining visual balance and harmony.

▶ The left image shows the modular grid used by the designer to create the final web-page design. It is possible to see how some elements use single modules while others use larger spatial zones.

Non-grid-based alignment

Generally, alignment is defined in terms of a grid, but more complex alignment can be achieved using other visual pathways such as angles and circles. However, when visual objects are aligned along a diagonal path they should be placed on a relative angle of more than 30° as anything less is too subtle for the viewer to differentiate and may simply be seen as an unbalanced and unappealing design. The same is true for alignment along a circular path; ensure that elements are aligned clearly and do not appear randomly arranged. The use of additional design elements and principles can assist in linking visual elements together and highlighting the path a viewer needs to follow; for example, colour and proximity.

BALANCE

Balance in design establishes harmony in a composition, and harmony creates visual appeal. Whether we realise it or not, we like to see balanced compositions. It has been suggested that the appeal of balance reflects the equilibrium of the human body. Designs that are unbalanced can lack emphasis and visual appeal and may ultimately discourage us from looking, using or consuming.

In establishing harmony, balance helps to create successful designs, but don't be fooled into thinking that harmonious design means quiet, dull and boring – quite the contrary!

Balance can be symmetrical or asymmetrical, and each style has appropriate applications. The purpose, audience and context of your design will determine the style to use.

Vertical Visual Axis

SUSHI
a beginners guide

Horizontal Visual Axis
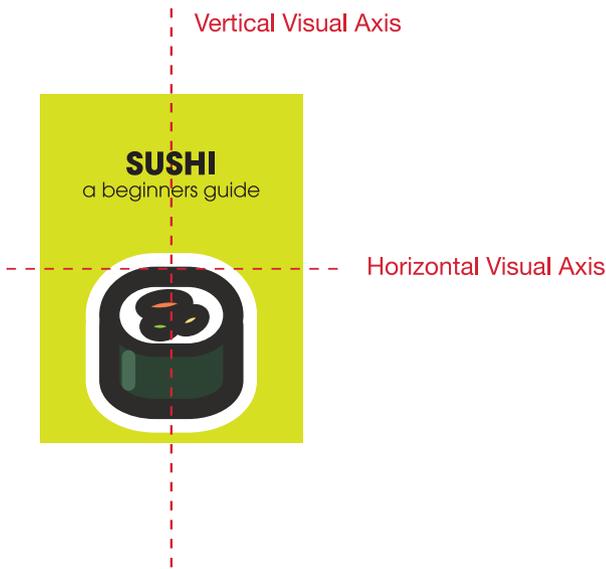
Imagine a composition that has been divided through the centre by an invisible horizontal line (axis) and an invisible vertical line. Both axes provide reference points for creating balanced and visually harmonious compositions. Although we cannot see the axes, they provide a structure that can be used to assist in planning an effective design.
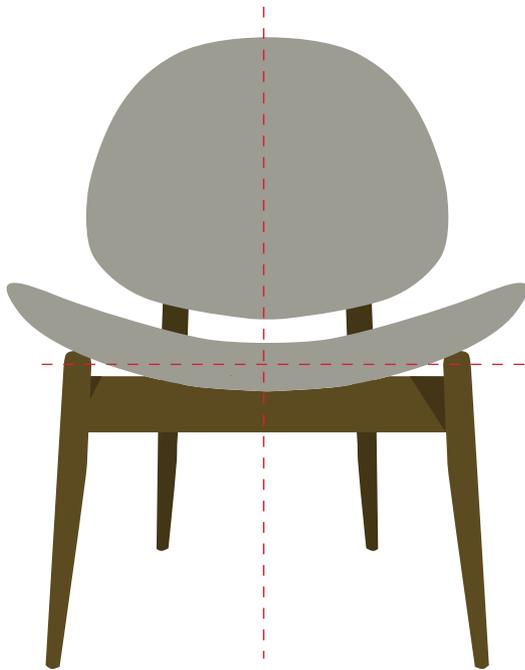
Balance in reference to vertical and horizontal axes is equally applicable to three-dimensional design.

Symmetrical balance

A composition with symmetrical balance mirrors the elements on opposite sides of the visual axis – from one side to the other.

SUSHI
a beginners guide

SUSHI
a beginners guide
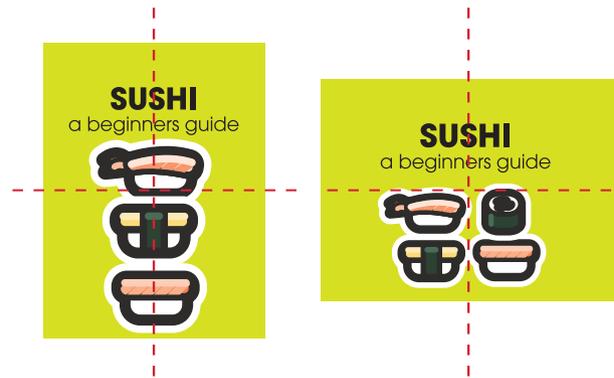
▶ Symmetrical balance

Symmetrical composition is seen as stable, static and passive. Such composition has a sense of regularity or conformity, which makes it suitable for a purpose that requires such characteristics. Symmetrical balance can be perceived as formal and organised in style, but it can also achieve a sense of unity between design elements, creating order and even a sense of beauty.

When approaching a symmetrical composition, it is possible to over-emphasise the centre and align elements in a restricted manner. It is important to be aware of the entire space you are working with.

The placement of elements in relation to an axis leads the viewer's eye into the composition. Creating a harmonious balance means that left-to-right balance and top-to-bottom balance are equally important in order to keep the viewer focused on the composition.

SUSHI
a beginners guide

SUSHI
a beginners guide

▶ Many images appear more stable if the bottom seems slightly heavier. If the top appears too heavy, the composition may look unstable.

Sometimes our own sense of balance is refined enough to sense when the balance in a composition is wrong. With practice, you will recognise when a composition is balanced and when it is not.

Asymmetrical balance

Based around a central visual axis, asymmetrical balance is characterised by an arrangement of elements that is not mirrored or equal in appearance. Asymmetrically balanced compositions appear to be more dynamic than symmetrical compositions because the placement of elements creates a sense of dynamic energy.
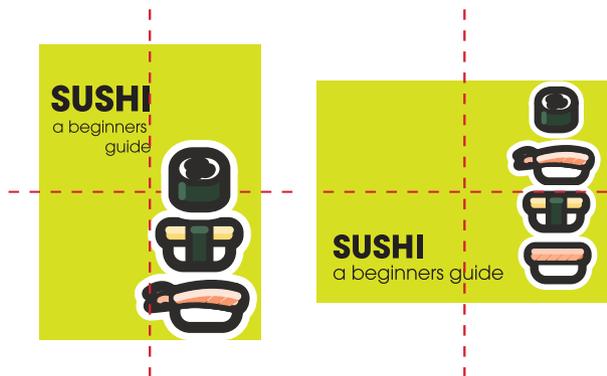
▶ Asymmetrical balance

The important thing to remember with asymmetrical balance is that the composition is still balanced! Balance is created by manipulating elements and does not have to fit the traditional 'left, right and centre' alignment approach (see Alignment on page 212). Asymmetrically balanced compositions can be created by repetition of elements and images, and creative use of scale, cropping and type.

It is even possible to use what appears to be nothing at all! The use of white space or areas that do not contain important visual details can lead to eye-catching results (see Space on page 207).

Asymmetry is often found in two-dimensional and three-dimensional designs that challenge, provoke and inspire us. Experimental designs challenge our perceptions of balance and harmony, stimulate debate and discussion, and force us to reassess our values and comfort zone.

CONTRAST

Contrast is created when two very different elements are used together for visual effect. Contrast can create conflict between elements – light versus dark,

bold versus fine – which leads to a visually dramatic composition.

Contrast creates a tension between elements. In fiction and film, tension heightens the interest for the reader or viewer – an increased level of tension encourages a sense of anticipation by raising the heart rate and stirring further interest in the storyline. Although visual contrast may not always make the heart race faster, it attracts attention and encourages interest in the content of the composition. Contrast, used bravely, stimulates interest in a composition that might otherwise go unnoticed.

iStock.com/jpa1999

▶ Bold contrasts between light and dark in this illustration convey a sense of drama and menace.

Contrast is created in many different ways and with many different elements. The key to effective use of contrast is to use it boldly. Don't be afraid to take risks with contrasting elements.

Juxtaposition

Juxtaposition refers to the placement of two different elements together within a composition in a proximity that suggests a comparison. Otherwise unrelated elements are contrasted to create a strong visual relationship that communicates a message.
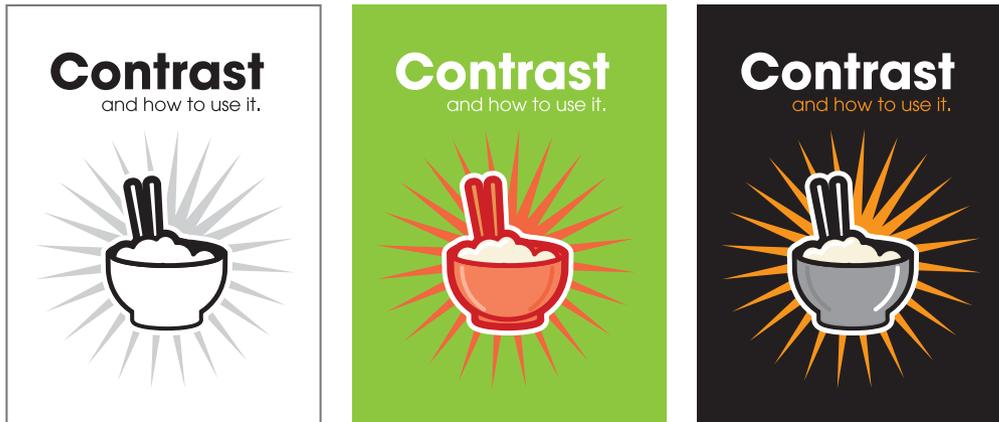
▶ Notice how the appearance of this composition becomes immediately more striking when contrasting elements are added.

Print advertisement created by Domínio Público Comunicação, Brazil for Iveco, May 2010, with permission.

▶ An elephant and a truck are, ordinarily, unrelated elements, but in this vehicle advertisement, the juxtaposition of the two objects serves to emphasise the strength and load capacity of the vehicle.

Contrast in type

Bold, sans serif type and script are vastly different in style but are sometimes seen together to contrast two words. A less dramatic version is the use of a bold typeface and a regular typeface from the same typographic family. Contrast is sometimes used at the beginning of a chapter in a book. You may see the title letter in a bolder and larger scale font than is used in the body of the text; this is called a drop cap and establishes the beginning of a chapter or section.

L orem ipsum dolor sit amet, consectetur adipiscing elit. Maecenas imperdiet orci vel dolor consectetur vitae aliquet ipsum sodales. Nam venenatis libero at metus tristique in lacinia est rutrum. Phasellus feugiat auctor felis quis bibendum. Cras congue lacus ac ligula accumsan imperdiet. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. In blandit, est vel viverra pretium, eros lacus ornare leo, at blandit ligula felis laoreet ligula.

▶ The use of a drop cap in a contrasting script typeface clearly defines the beginning of this section of body text.

Create contrast
within the same type family
(Helvetica Neue LT Bold and Light)

CREATE CONTRAST
using upper and lower case
(Futura Medium)

CREATE CONTRAST
using different type styles
(Univers and Bookman Old Style)

► Using only one or two typefaces, a designer can easily create contrast using type. Typeface families are designed to work together, but also offer opportunities for contrast.

Contrast in colour

Contrast can cause colours to virtually move around on a page, creating dazzling and dramatic effects. Some combinations of colour can create a discordant result, which may be uncomfortable to view. (Deep blue and deep red combined can have this unpleasant effect on the viewer.) However, as the human eye responds quickly to colourful stimuli, contrast using colour can be a powerful tool. Colours that sit opposite one another on the colour wheel generate the greatest amount of contrast. Contrast can be generated through the application of cool and warm colours, or by one colour used at significantly different levels of intensity.

► The use of contrasting colour emphasises the seasonal nature of these greetings. The clever use of contrast creates the metaphorical Christmas tree in both images.

The use of contrasting colours can create optical effects. As mentioned, blue and red used at equal intensity can seem to 'fight' for the most dominant role in a composition, creating the illusion of movement.

Contrast in tone and texture

Contrasting tones can assist in defining the form of objects in rendering. The difference between a dark tone and a very light or white highlight creates a sense of an object in space. Tone provides information about the surface of a form that, without contrast, would appear flat. When applying tone to an object, it is important to use a wide range of tones and to be comfortable about applying black and using white. Use the paper itself as the lightest highlight and use a 6B or even softer pencil to create very dark shadows.

Contrast can be used for dramatic effect when combining textures. In fashion and textile design, it is possible to see clear plastics and soft fabrics incorporated together in some contemporary clothing and accessories. Clashing colours and contrasting fabrics are often used to draw attention to part of a garment.

Photographer: Scott Burrows

► Contrasting textures including wood and concrete draw attention to the angles and forms of this Southport Park project by Rothelowman Architects.

Contrast in line

Bold line, fine line, broken line, solid line…

Variations in line thickness provide subtle but effective contrasts. Segments of a text-heavy document can be separated with line, or a heading can be underlined by a bold line. In rendering form, line is often used as a single element or as part of a crosshatched pattern. Lines placed close together can create a dark tone – and when spaced further apart, can appear lighter. A rendered line can contrast with areas that contain no rendering at all to create a greater sense of form.

Contrast in space, shape and form

Contrasting shapes such as a square and a circle can be used as part of an alternating pattern to create visual interest. A pattern that contains variation and particularly strong contrasts is immediately more dominant and noticeable than a pattern that does not. Point can also be used in this way to create noticeable visual variations.

Shape is used to contrast with other elements. Organic shapes can soften strong colours, and geometric shapes can provide a contrasting ground for text and the placement of images.

Geometric forms can be used with organic abstract forms to create contrast in interior and exterior architecture. In the design of residential and commercial buildings, architects often work with landscape designers to create contrast between the natural and constructed environment; for example, the contrast between a gently sloping garden and the geometric lines of a contemporary home can create a dramatic effect.
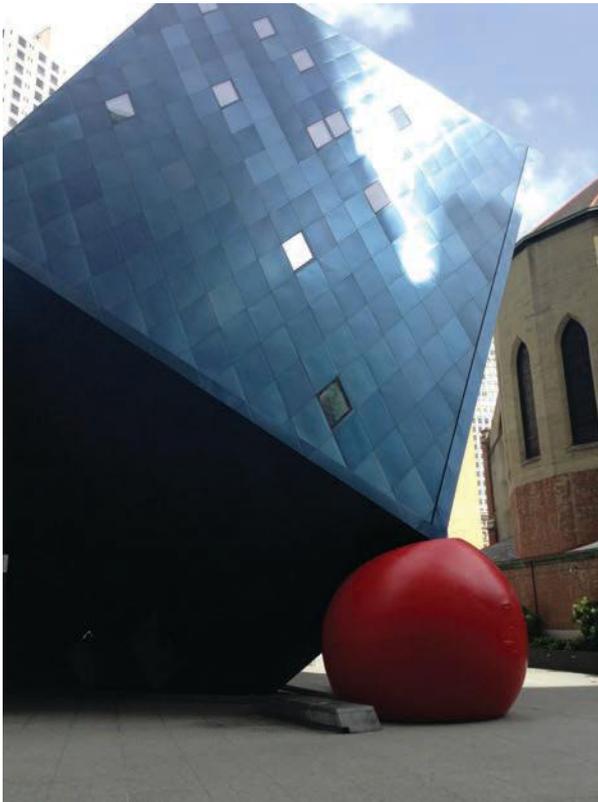
Kristen Guthrie

▶ Defying logic, the large building appears to rest on a soft, red ball. In architectural design, the contrast between forms and materials, textures and colours can create striking and provocative structures.

HARMONY

Imagine that you are listening to a friend sing during a session of karaoke. Although some people have a natural gift for singing their favourite songs, many people sing out of tune, off-key and with no 'harmony'. That lack of harmony can be painful to listen to and the same goes for visual harmony; a lack of it can be painful to view. The human eye is instinctively attracted to harmonious design and this has an impact on our preferences for products, environments and communication designs.

A design that lacks harmony, like music, becomes 'discordant' and less attractive to the viewer/user. The use of other elements and principles of design create harmonious compositions; for example, the application of balance, whether symmetrical or asymmetrical creates visual harmony.

▶ Two business cards for a traditional Hawaiian massage business. Note that the card on the left lacks harmony. The addition of harmonious colours, the use of effective proximity and scale and an appropriate typeface create a harmonious composition.

'Colour harmony' is a term often used in design and refers to the application of colours that work effectively together. Although we might consider harmonious colours to be easy on the eye, the term 'harmony' in this case refers to how successfully colour combinations work together. Harmonious colour combinations are more attractive to the eye and can be a means of influencing the interactions and responses of users and consumers.

BE QUICK!

FYI

Supermarket shoppers spend no more than 0.03 seconds looking at a grocery item. Therefore, packaging needs to grab attention in a time frame that is literally the blink of an eye. Use of harmonious and appealing design is a vital marketing tool!

► This digital pattern for a web page is created using analogous colours. The use of cool, harmonious hues of blue and green provide a pleasing visual background to more important information.

HIERARCHY

As we grow up, we become familiar with the concept of hierarchy. If you are a youngest child and were forced to sit in the middle seat in the car, or were the last person to have your opinion heard, you may have been painfully aware of family hierarchy. Hierarchy is the establishment of an order of importance. Just like a 'pecking order' within a family, there is a hierarchy within a composition.

In producing a composition, it is essential to understand the purpose for which it will be used. This will influence the arrangement of the most important elements. In learning about hierarchy, the front page of a newspaper is a great place to start. Every day, the newspaper will feature a masthead, main headline, subheadings, photographs and text. We quickly recognise that the headline is the most dominant element – the type is usually bold and much larger than the subheadings or body of text. Hierarchy,

in this case, is established through scale. The second element in the hierarchy may be the photograph, followed by (or equal to) the masthead, the text and other material.

THE EYE HAS IT!

When attempting to understand the hierarchy of a composition, close your eyes for a few seconds. When you open them, what is your eye first drawn to? The dominant element will establish the hierarchy.

Hierarchy can be established in many ways. The use of scale, as shown above, is only one method. Dominant colours, shapes and textures can also draw the eye to the most important aspects of a composition. However, poor use of hierarchy can distract from the message and meaning of a design, so it is essential to control the dominance of elements in a composition.

PROXIMITY

The principle of proximity is a Gestalt principle of perception (see Chapter 12 for Gestalt theory) that states that objects placed close to one another are perceived to be related. Objects that sit close to one another establish a clear visual relationship, while objects that are separated or that sit far apart within a space or composition are perceived as having little or no visual relationship.
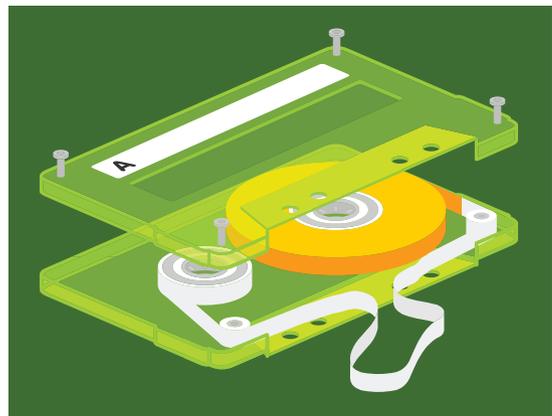
Getty Images Plus/iStock.com/anilyanik

► In this exploded view of a cassette tape, the proximity of the parts enables the human eye to visualise the object as a whole. Too far apart and it becomes more difficult to visualise the object in its original state.

DOMESTIC PET COMPARISON: Dogs vs Cats

DOGS

Canine

Usually easy to train

Social

42 teeth

Non-retractable claws

Earthbound

Long distance runners

Highly developed sense of smell

Can be housetrained

Carnivorous

Respond positively to love and a° ection

CATS

Feline

Can be diÿcult t o train

Solitary

30 teeth

Retractable claws

Can jump and climb

Sprinters
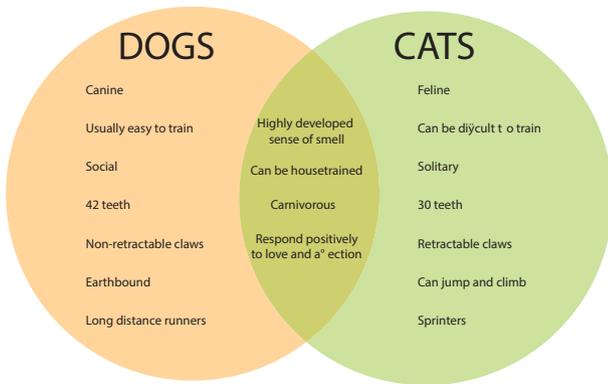
▶ Venn diagrams are a good example of the use of proximity to illustrate sets of overlapping facts, concepts and ideas. Where the circles intersect, concepts are shared.

When creating an effective space, product or composition, it is important to consider the connectedness of elements. For instance, in the design of a car, the proximity of essential functions to the driver, such as the indicator controls, means that the driving experience is logical and efficient.

Shutterstock.com/Yuri Samsonov

▶ Note the proximity of similar functions. All audio controls sit in the one area of the steering wheel while all cruise-control functions are located together on the opposite side. Once familiar with the functionality and location of controls, the proximity of related buttons helps the driver to utilise the functions without taking their attention from the road. The buttons also sit in close proximity to the driver's hands.

The grouping of elements can assist in simplifying a design; the viewer may require less time to understand the visual relationships within the design. Conversely, separate elements may encourage a viewer to spend more time within a space or composition. The application of proximity depends entirely on the original purpose of the design itself. Take care to understand the needs of the audience and the purpose of the design when applying the design principle of proximity.

REPETITION

Repetition refers to the use of the same or similar visual elements repeatedly within a composition. Repetition is most commonly seen in the creation of visual pattern. Created from shapes or combinations of shapes, the repetition of visual elements can be seen in many design areas including environmental design, product design and graphic design.

Patterns that use elements over and over are repetitive. They may be simple arrangements of lines, shapes or images, but their common characteristic is that they repeat the same sequence of imagery.

Repetitive patterns create a sense of unity and establish clear relationships within a composition. The power of repetitive patterns lies in consistency. The repetition of elements may be as basic as a bulleted list in a document, or as complex as the structure of enlarged snowflakes or a Byzantine tile mosaic.
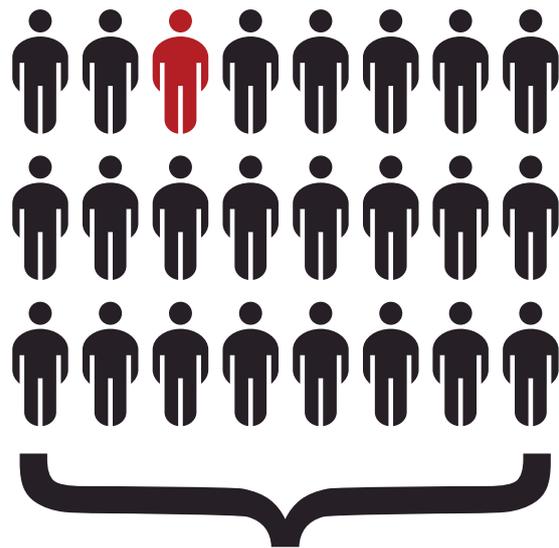
RATE OF INFECTION BY POPULATION

= 1000

▶ In this extract from an infographic, or statistical diagram, pattern has been used to convey a numeric value. The repetition of elements can assist the viewer to visualise a complex concept such as quantity.

Repetitive patterns can create a sense of rhythm in a composition, adding movement to the elements. Repeating an arrangement of shapes in a manner that is dynamic adds energy and visual interest. Creative use of figure–ground can allow for the construction of patterns that are visually ambiguous and optically intriguing.

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■ Lorem ipsum

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis luctus euismod enim. Nam quam mi, mattis a, pulvinar eget, vulputate pellentesque, metus.

Nunc egestas lacus non pede tempor aliquam. Nullam eu augue quis lorem porttitor porttitor. Praesent ut magna vitae nulla consectetuer mollis. Praesent tellus arcu, auctor sit amet, ornare sit amet, cursus ac, felis.

Praesent sagittis ligula vel pede. Quisque eu ante. Integer tincidunt ante nec mi. Aenean mi velit, ultricies vestibulum, ullamcorper eu, mattis ac, odio. Vivamus quis mauris eget nisl accumsan gravida.

▶ Repetition of elements can be used in many different ways: in borders, to distinguish lists of information and as a visual device.

Repeated elements are also seen in patterns that alternate. Such patterns may consist of several different elements used in a changing sequence. Alternating patterns can be created using any visual element and can add visual variety and dynamism to a composition.

Textile designers commonly use alternating patterns that display variations in colour, line and shape. Although designers who work with fabric and textiles may focus on the purpose of the material – such as its application to an individual item of clothing or a handbag – they also have a keen sense of how pattern will appear on a larger scale.

Like repetitive pattern, alternating pattern creates a sense of order, but in a very different way. The variation of a pattern that alternates a range of elements conveys innate energy and life.

Many patterns occur in nature and in the constructed environment. These can be a great source of inspiration in design and may trigger ideas for two-dimensional and three-dimensional design concepts.

Pattern is used in many areas of design. Digital designers use repeating patterns to create wallpapers and backgrounds for computer operating systems and web pages.

Getty Images Plus/iStock.com/AlterYourReality

Getty Images Plus/iStock.com/millsrymer

Getty Images Plus/iStock.com/Brainsil

▶ Patterns occur in nature and the constructed environment.

Textile and interior designers use patterns in fabrics and surface decoration. Patterns may alter as fashions and trends change, but they are integral to many areas of design. Pattern designers may use traditional techniques and materials in the creation of pattern such as screen printing, drawing and dyeing. However, in fashion, many commercial fabrics have their patterns developed and refined entirely by computer.
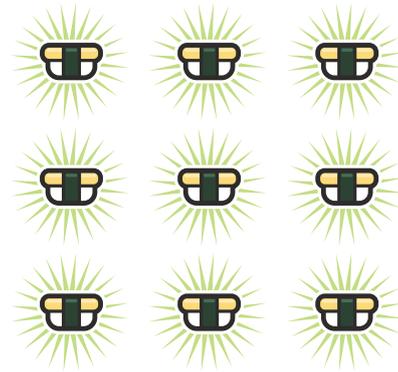
▶ When designing repeating patterns, ensure there is a link between elements on opposite sides of the original image to create a seamless pattern. The image can then be repeated like a set of tiles.

CHAPTER RECAP

1 Explain the meaning of the following terms and phrases:
   a analogous colour
   b symmetrical balance
   c repetitive pattern
   d spatial
   e dominant hierarchy
   f unproportioned
   g dramatic contrast
   h white space
   i geometric form

2 a Develop a glossary of descriptive words for each of the design elements. Use the suggestions in this chapter to start your list and add as many additional words as you can.
   b In your own words, create a minimum of eight sentences that describe the effect of each design principle. For example: 'Repetitive pattern can help to reinforce a visual motif or theme'. Try to build up as many sentences as you can for each principle. Share with your class to create a helpful collection to assist with analysis and annotation.

3 Suggest how at least one design element and one design principle might be applied within the following design scenarios.
   a a poster to promote the opening of a new early learning centre for 3 to 4 year olds
   b the design for the interior of a bookshop and café in a regional hospital
   c a scale model of a sustainable 'tiny house'
   d a wayfinding system at a water park
   e the cover design for the program of an acrobat-based circus

HUMAN-CENTRED DESIGN

'The design of the door should indicate how to work it without any need for signs, certainly without any need for trial and error.'

Don Norman in The Design of Everyday Things, *Basic Books 2013*

In this chapter:

Learn the language

+ empathy   + observation   + persona

14.1 WHAT IS HUMAN-CENTRED DESIGN?

Next time you use your smartphone or access an app on a tablet or computer, consider that the interface you see was designed with you, the end user, in mind. 'Human-centred design' is a term used to describe the consideration of the needs of the end user as a central focus in the design process.

If you type 'user-centred design' or 'human-centred design' into a search engine, you will find that it is a term most commonly used for describing the design of software, operating systems, apps and websites. Terms such as 'graphical user interface' (GUI) or 'user experience' (UX) pop up and indicate the importance of efficient interaction with digital products. However, user-centred design is an approach that can (and should) be applied to any design product where the priority of the final design product is ease of use.

Designing with the user in mind appears to be common sense, but it takes considerable research and thought to ensure that a design meets the needs and accounts for the abilities of its audience. Good user-centred design is about asking questions in the early stages of the design process to build a solid understanding of who the end user is. Understanding the characteristics of the audience is essential to designing products that are effective and meaningful. Questions might include:

+   Who are the end users of the design?
+   What are their key needs in using, interacting with or viewing the design product?
+   What are the limitations of the user?
+   How can the design be made accessible to a range of abilities, ages and body types?
+   What are the key functions that the user requires the design to provide?

The end user is the target group to whom the design will be directed. The characteristics of users are often divided into specific types of data such as age, gender, socioeconomic status and interests. Other factors such as cultural background, educational level and religious affiliation can also affect the content, appearance and functionality of a design.

USER CATEGORISATION AND CHARACTERISTICS

It has become popular over the past 20 years for marketers and social commentators to categorise consumers into birth-related groupings such as:

+   Mature consumers: born between 1900 and 1945
+   Baby Boomers: born between 1946 and 1964, in the era after the Second World War
+   Generation X: born between 1965 and 1980
+   Generation Y: born between 1981 and 2001
+   Millennials: born 2000 onwards.

Characteristic	Profile
Age	Age groups may be identified in very specific terms (e.g. 18–25 years) or more broadly (young adult, Baby Boomer, etc.).
Gender	The user may be male, female or gender non-specific. Gender can be a very strong influence on consumer preferences.
Socioeconomic status	This refers to the financial and social position of the user, usually identified by employment status, salary level or educational background.
Interests	This covers a vast range of categories and subcategories, including music, sport and fashion. Target users might be an association of professionals or an organisation for people who share a common interest.
Cultural and religious background	Content may be influenced by the belief system of the user. The appropriateness of imagery and content will be defined by cultural and religious traditions.
Location	Where a user lives can have an impact on their opportunities to view visual communications and on their employment or socioeconomic status. Location can determine visual and oral language and be linked to cultural or religious factors.

For more detailed information about users and audience characteristics, see Chapter 7.

USER RESEARCH

Research is important because it can not only provide important information about whom you are designing for, but also help to identify fashion and trends in design. Contemporary designers understand that it is important to stay up-to-date with changes in tastes, preferences, technologies and materials. Very often, these changes can be identified through the behaviour and feedback of the target market.

There are many different research techniques that can be utilised when investigating the user of a design. Sometimes the client provides designers with detailed analysis of the end user while other briefs see the designer generating their own research. Some use a range of techniques while some may use only one or two to familiarise themselves with the characteristics of the end user. In your own work it is important to first establish what it is that you need to know about your target users and then select research methods that are best suited to gathering the relevant information that will help to propel your design to a successful resolution.

Observe the user

One of the simplest methods of research available to a designer is direct observation of the target user. Watching the end user enables the designer to see behaviour and interactions in environments that may be familiar to the user. Casual observation – of how an environment or space is used, how a product is handled or responded to and the way a user reacts to a graphic design – provides data that may be helpful in identifying the needs of the user. Observing how people react to visual stimuli can also occur in a more controlled environment; for example, focus groups provide a sample of users brought together to discuss and respond to design concepts. Observations of the dynamics and reactions of the focus group may be made discreetly via video or a two-way mirror.

Built environment designers make regular use of observation. Known as site analysis, architects, interior architects and landscape designers will visit a proposed site, not only to observe important physical details about a structure but also to gather information about how the space might be utilised by the end user. Factors such as accessibility, pedestrian flow and traffic movement within the site are all important considerations in environmental design.

Interview the user

Interviews are a personal and direct method of accessing information about the likes, dislikes, needs and preferences of the end user. Asking broad questions enables the designer to gain insight into factors such as lifestyle, socioeconomic status, location and user history. Deeper, more probing questions can drill into specific details about user opinions, experiences and behaviours. Questions can be tailored to suit the audience and the use of visual prompts, props and design examples can assist in gathering important personal data.

Personas

A persona or persona profile is a representation, both written and visual, of a 'typical' user. Ordinarily, they are fictional and personify the characteristics of the most recognisable audience members. A persona can capture the 'essence' of the end user and assist in guiding the design process by targeting the appearance, functionality and design ideas towards the preferences of this fictional character. When working in a team, designers may use multiple personas to ensure that all team members are designing for the same set of audience interests and needs.

A persona will often include data about the character, a visual reference and detailed summative information about their key characteristics such as age, gender, employment, location and so on.

It can be helpful to build one or more personas in your design work to identify whom your target user is throughout the design process. Keeping the end user in mind throughout a long design process can be challenging, so creating a character to reference at different stages can be very helpful in staying focused.

AUDIENCE RESEARCH: PERSONA

RYAN

Age: 26
Occupation: Retail manager & Part time musician
Income: $37,000
Personal status: single

Interests: Music & playing in a band regularly. Collecting vinyl records, travel, writing blog, gaming.

Technical profile: Regular internet user, extremely comfortable with technology. Uses web and mobile devices regularly to update blog, contribute to social media and some gaming. Has fast broadband connection running Mac OS and spends 10 – 12 hours per week online. Technical use: 20% at work, 80% at home.

USABILITY TESTING

Later in the design process, when you have progressed towards a design solution, it can be helpful to research the responses of your target users. Designers apply usability testing to assess the progress of a design concept. Most commonly used in industrial/product design, they test for suitability, functionality and aesthetic appeal. Participants may be given the opportunity to handle prototypes and scale models to develop an understanding of form and function. Data collected from trials and tests with members of the target user group can help resolve design issues, address ergonomics and apply changes to meet an appropriate design solution. Graphic designers may also apply usability testing to focus groups, asking participants to comment on a range of design ideas for advertising, packaging, websites or other forms of visual communication.

DESIGNING WITH EMPATHY

A key aspect of designing with the end user as the focus, is to ensure that the design is truly responsive to their needs and circumstances. Research is important, but it can be detached from the subject. Designing with empathy means designing with an understanding of how the user lives their everyday life. It means looking at a design problem from the perspective of the user.

Empathising with the people you're designing for is the best route to truly grasping the context and complexities of their lives. But most importantly, it keeps the people you're designing for squarely grounded in the centre of your work.

Emi Kolawole, Stanford University d.school

To assist in empathetic design, tools such as an empathy map are useful. The map helps to break the responses of users into four key fields: thinking, feeling, doing and seeing. The fields can be populated by observing and listening to the user.
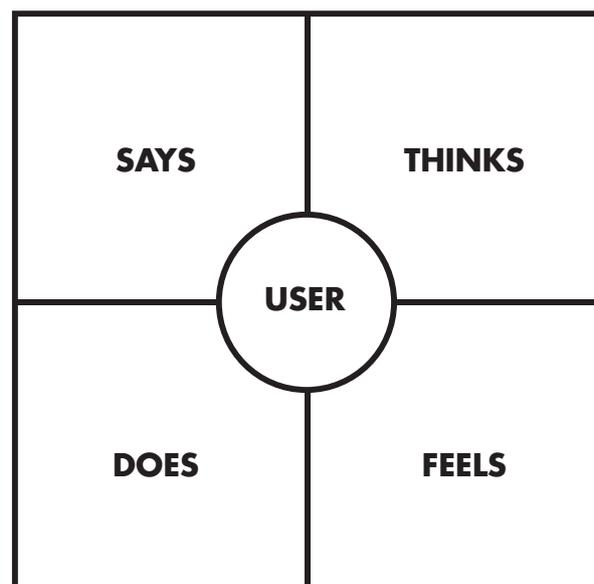
THE FOUR-PLEASURE FRAMEWORK

The four-pleasure framework was first proposed by anthropologist Dr Lionel Tiger in the early 1990s. He based his research on the interactions between users and products. It is a theory that divides the feelings of pleasure that are derived from design into four categories. The framework was designed to organise thoughts about users, rather than creating inflexible categorisations, and aimed to help designers tap into sociological theory.

Physio-pleasure

Physio-pleasure recognises that users appreciate tactile and responsive design. It may be the high-quality sounds of a Bluetooth speaker that is pleasant to hear or the feel of heated, soft leather seats in a luxury car. A user's physical response to a design will determine whether they use, appreciate or purchase a design product. Weight, texture, smell, sound and physical feel can affect the interaction of the user and the design.

Psycho-pleasure

Psycho-pleasures in design are stimulating to the intellect. They may increase engagement levels in a user, spark a cognitive response or increase imagination. Designs that trigger psychological pleasure may feature appealing aesthetics as well as a sense of discovery. Prime examples of such designs include technology such as smartphones and gaming where pleasurable learning is required to navigate and understand the product.

Socio-pleasure

Increasingly evident in social media, socio-pleasure triggers feelings of community and belonging. Apps that link users and their data with like-minded individuals are popular (think fitness trackers). The choices users make when purchasing products may be heavily influenced by socio-pleasure. 'What is fashionable?' and 'What will help me stand out as an individual?' may be the questions that guide decision-making. Socio-pleasure prompts users to identify themselves as part of a community or as individuals.

Ideo-pleasure

Ideo-pleasure relates to the values and ideals of the user. Preferences for certain designs will be influenced by ideological beliefs. For example, a strong sense of environmental responsibility may see a user choose products that are sustainable and ecofriendly. Ethics,

morality, political beliefs and aesthetic preferences may all impact decision-making for a user. From relatively small decisions about grocery items to large-scale considerations in housing construction, ideological concerns will affect a user's enjoyment of a design.

It is important to note that the four-pleasure framework was designed as a structure to help designers organise thoughts and ideas. It is impossible to generalise about what gives individuals pleasure, as one user may find a design pleasing where another may be repulsed. The framework is a helpful tool to inform the impact of designs on users and should be used as part of a 'holistic' or 'big picture' view in your research of human-centered design.

ATTRACT/CONVERSE/TRANSACT (ACT) MODEL

The Attract/Converse/Transact (ACT) model, created by Trevor Van Gorp and Edie Adams (2012) is a framework for creating designs that improve the relations of users with a product and intentionally trigger emotional responses. The ACT model applies human emotional and social characteristics to interactions with objects.

The Attract part of the model is aesthetics oriented. Users are attracted to objects and products that reflect personality and aesthetics. How a design looks, sounds and feels determines its attractiveness to the user.

The Converse part of the model is interaction oriented. The ease (or difficulty) with which the user interacts will determine the appeal of a design. Usability is key as the functions of the design need to be learned and utilised. Converse refers to the 'conversation' had between user and product.

The Transact part of the model is function oriented. The transact stage is where a relationship between user and design is formed. Following attraction and conversation, transaction implies a commitment to the design. This may take the form of a purchase or commitment to a brand.

In developing the ACT model, Van Gorp and Adams focused on the understanding that human beings are strongly influenced by their emotions. They suggest that emotions play a significant part in decision-making, and designs that display a 'personality' are more appealing to end users. The targeting of emotions is common in advertising where the impact of negative and positive emotions can be manipulated to elicit a user response. The language used in the ACT model along with the human traits assigned to each of the three phases means that it is easy to relate to. However,

it is primarily a commercial tool used by designers and advertisers, so should be used objectively and as part of a wider human-centred design approach.

14.2 ERGONOMICS

Not only do the preferences and tastes of the target users need to be taken into account, the physical characteristics of the human body have an impact on industrial design and built environment design in particular. The way humans 'fit' with a design, how they interact both physically and with their senses are important considerations in design.

Ergonomics is the study of human factors in design and how human beings interact with products and environments. This scientific discipline looks at the functions, limitations and needs of the human body in relation to product design. Ergonomists often work with designers to design products that take into account the physical, organisational and psychological effects on the user. You may be familiar with the term 'ergonomic furniture', which is often a selling point of chairs and desks for a home study or office environment. Standard ergonomic height requirements exist so that the user is most comfortable when seated at a desk for a prolonged period.

Ergonomics is concerned with the interactions between a user and a product. It relates not only to physical and biomechanical interactions with design, but also to cognitive processes such as memory and decision-making. Good design takes such factors into account and ensures that a product is not so difficult to use that a user cannot operate it or remember simple functions.

Ergonomic principles are embedded in the publications of organisations such as Australian Standards whose guidelines cover the design and manufacture of products and built environments throughout Australia. All products sold and used in Australia must meet the relevant industry standards, which range from the paper pulp used in packaging to water quality, domestic appliances and road vehicles, mining technologies, smartphones and food. The purpose of standards is to ensure safe design and manufacturing practices lead to the safety of the end user.

Mark Wilken
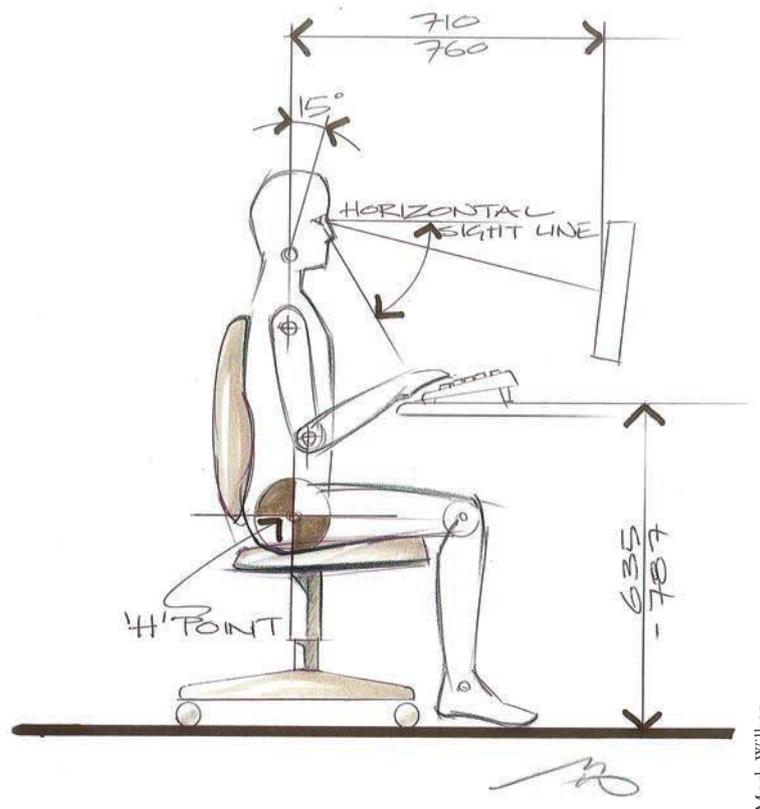
▶ This diagram indicates the ideal height of the desk and chair as well as the preferred position of the user. Anthropometric data about human body size is taken into account in the design of ergonomic products (anthropometry is the study of human body size, posture, movement, surface area, volume and mass). Due to the vast variety of human shapes and sizes, many designs need to take into account the physical characteristics of the average user and apply proportions that suit a wide range of people.

14.3 USER INTERFACE DESIGN

In digital design, users interact with a screen so the design of intuitive and functional interaction is very important to the success of computer operating systems, apps and software products. With the growth in popularity of smartphones and tablets, user experience (or UX) design is a field that has developed to meet the needs of increasingly educated technology users. UX designers focus on developing digital products that are easy to use and make the most of users' existing familiarity with technological functions. An important aspect of user-centred design in digital media is to enable users to access and use new applications without significant levels of learning. Users prefer to pick up a device being confident that fundamental functions operate in the same or similar way to previous devices. This is a challenge for digital designers and reinforces the need to have a good understanding of user needs before commencing the design process. Users will learn new functions but it is the designers' challenge to present innovations in an accessible manner, and it is here that the application of design elements and principles is of paramount importance.
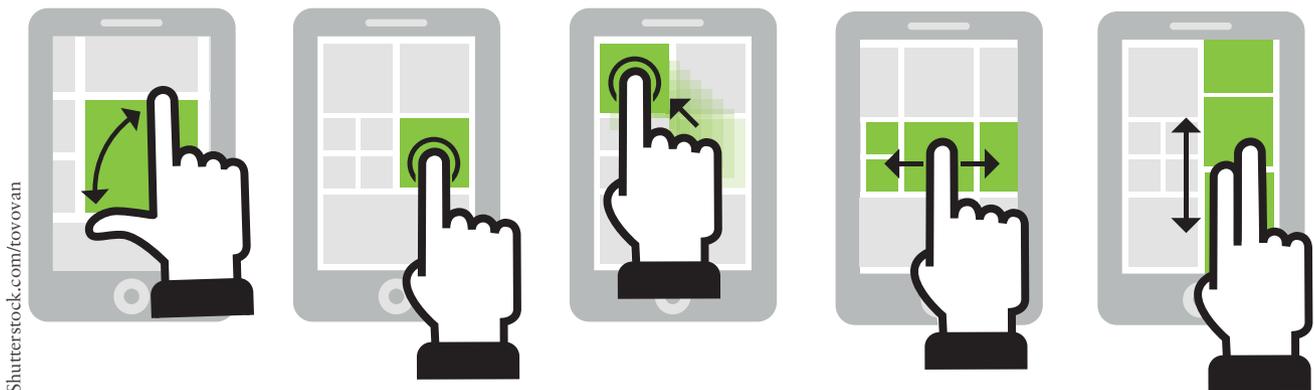
Shutterstock.com/tovovan

▶ This diagram illustrates some of the finger gestures required to navigate a tablet by touch. Interestingly, the first tablets established these gestures as standard and subsequent tablet designs have applied them in the same way. Ensuring consistency in interactivity means that users do not have to re-learn complex processes when using a new product or software system.
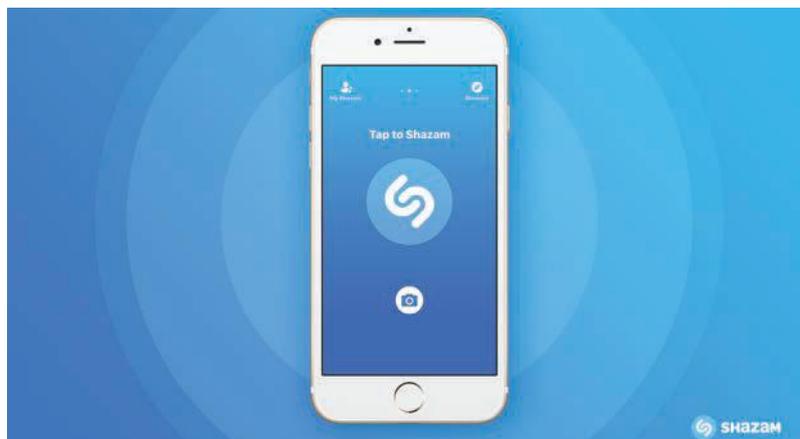
© Shazam, with permission.

▶ The popular Shazam app that identifies music via smartphone or tablet uses design elements, such as shape, type and colour, to instruct the user. It is the use of clear and effective design elements and simple instructions that make Shazam an easy app for users to learn.

14.4 ACCESSIBILITY IN DESIGN

From the humble potato peeler to low-floor buses, the design of products, the environment and graphics is constantly evolving to meet the needs of people with a range of abilities and disabilities. In particular, the designs of many public environments and some product designs are required to accommodate the needs of users with disabilities. Designers research the capabilities and limitations of users and strive to design products that are inclusive and accessible to users.

Designers use research and observation to understand the requirements of users with special needs and respond with solutions that use form, space, texture and colour among many other elements and principles of design. Consider that braille on lift controls, reflective textures on road signs and lighting controls that can be distinguished by texture were all designed in response to users with limited or poor vision. Assistance for users with sensory limitations, such as hearing loss or vision impairment, and physical disabilities are often incorporated into design fields such as transport, the built environment, wayfinding (signage), digital design and many others. Although Australian Standards usually require accessibility considerations to be factored into designs, it is important that designers consider all potential users of their final design product and explore innovative means of meeting their needs.

HUMAN-CENTRED DESIGNERS

Smart Design and IDEO are two large design and innovation firms that focus on the user as the priority in their design processes. The websites of both organisations document their successes in focusing on the user as part of their 'human-centred' approach to designing products, brands and experiences.

▶ A low-floor tram at an accessible tram stop.

Shutterstock.com/Nils Versemann

CHAPTER RECAP

1   Explain the following terms and phrases:
   a   UX design
   b   ergonomic considerations
   c   accessibility
   d   emotive imagery
   e   gestural navigation
   f   usability testing
   g   trend forecasting
   h   visual device
   i   end user

2   a   Collect examples of designs that fit within the categorisations of the four-pleasure framework.
      i   physio-pleasure
      ii   psycho-pleasure
      iii   socio-pleasure
      iv   IDEO-pleasure
   b   Annotate each design with your responses to the following:
      i   How will a user interact with the design?
      ii   What aspects of the design place it into the category?
      iii   How will the design make the user feel?
      iv   What need does the design fulfil in the user?

3   In your classroom or other immediate environment, identify where ergonomics has been correctly addressed. Draw and describe how ergonomics has been applied. Identify where ergonomics has not been addressed. Suggest the implications of poor ergonomic design in relation to your environment and its users.

4   Select a popular app or software that uses touch interaction. Using visual information only and no text, create a diagram that helps users to navigate the essential aspects of the app/software using only gestures.

INFLUENCES ON DESIGN

'When we look at what is truly sustainable, the only real model that has worked over long periods of time is the natural world.'

Janine Benyus, co-founder, The Biomimicry Institute

In this chapter:

Learn the language

+ appropriation
+ aesthetic–usability effect
+ cultural awareness
+ energy-efficiency
+ life-cycle design
+ planned obsolescence

15.1
SUSTAINABILITY

The environmental impact of design is an issue that has been actively addressed in the past 30 to 40 years. Ecological degradation due to manufacturing is a consequence of high demand for products, housing and electronic goods. Since the Industrial Revolution of the 18th and 19th centuries, factory-based manufacturing has been associated with pollution and waste. By-products of manufacture have not always been recycled, creating vast landfill around the world. Post-consumer waste, when not readily repurposed or recycled, has led to land and waterway pollution. Designers in all design fields face government regulation, consumer demand and ethical expectations in regard to the environmental impact of their work. However, designers cannot carry all the responsibility for ecological costs, as they rely on government provisions for affordable, accessible and reasonable alternatives to wasteful practices. In environment design, professionals strive to meet energy-efficiency targets that, in turn, influence the choice of materials, construction methods and design. Shifting perceptions of the functions of domestic and commercial building has seen the integration of solar energy, water storage and passive energy use.

PLANNED OBSOLESCENCE   FYI

Planned obsolescence is the practice of designing and manufacturing products with the intention of giving them an artificially limited life span. This may be achieved through low-quality materials, lack of technical support or poor production methods. In some cases, products are designed in such a way that they cannot be repaired. Particularly evident in electronic goods, fast fashion and mass-produced, single-use items, planned obsolescence is an ongoing issue in the journey to sustainability.

In 2012, the Australian Government outlined its vision for a sustainable Australia and settled on three distinct indicators of sustainability: social, environmental and economic.

+   **Social sustainability:** Targets for social sustainability aim to ensure the long-term availability and access to education, health and employment, which provide both personal and community security and wellbeing.
+   **Environmental sustainability:** Environmental sustainability aims to ensure that the natural environment is monitored, protected and managed and refers to climate, land and ecosystems, water, waste and natural resources.
+   **Economic sustainability:** Economic sustainability applies to the maintenance, development and management of factors including wealth and income, transport and infrastructure, productivity and business innovation.

The notion that sustainability reaches into most aspects of contemporary life is shared among academics, governments and organisations globally. It is a complex and evolving issue.

Along with governmental recognition of the need for action on sustainability, individuals and communities have developed a high level of awareness of sustainable practices. Greater knowledge of the human impact on the environment has led to significant and identifiable shifts in expectations from consumers and users of designed products.

Design, by its creative and innovative nature, is primed to respond to change and, in many areas, has adapted to the demands of sustainable practices. Design professionals have played a major role in bringing the design of energy-efficient homes, the application of renewable resources in product design and the use of sustainable materials into the mainstream. Design has been used to build public awareness of issues relevant to the achievement of sustainable targets, and graphic design has played a major part in the communication of these ideas.

The minimisation of waste and the application of 'life-cycle principles' in design are issues that face professionals in the industrial, built environment and graphic design fields. One of the implications of designing products for mass consumption is the increased waste due to high production volumes. The choices made by designers about materials, packaging, energy use, waste and recyclability may reflect their personal and professional values, but may also be influenced by the expectations of both client and end user.

Increasingly, the use of ethical, sustainable and appropriate materials is an expectation of informed consumers. In all fields of design, professionals consider the long-term impacts of their decisions in the earliest stages of the design process. Cost considerations may constrain the selection of materials used in a design; however, advances in the development of 'green' and 'ecofriendly' materials may now offer wider choices.

In some areas of design, the use of sustainable products and the application of energy-efficient and

environmentally friendly practices are mandated by law. Standards set by government bodies including Standards Australia may specify that the design of products, particularly of buildings, must have strict environmental codes applied. Designers of the built environment are often required to respond to constraints related to sustainability issues.

LIFE-CYCLE ASSESSMENT   FYI

Life-cycle assessment (LCA) is a technique used in industrial design for assessing the environmental impacts of a product across its entire life cycle. The life cycle refers to the period of time from extraction of base materials, through the design and manufacturing process, to the use and final disposal of the product. The life cycle of a product is also referred to as cradle-to-grave design; designs that are fully recyclable at their end of life are referred to as cradle-to-cradle designs. Observations of a product's life cycle can tell a researcher or designer about the burdens a product or service places on the environment.

MATERIAL EXTRACTION

PRODUCT MANUFACTURE

PACKAGING & TRANSPORT

PRODUCT USE

END OF LIFE

▶ tranSglass® recycled glass by Emma Woffenden and Tord Boontje, 2006

STRATEGIES FOR SUSTAINABILITY

See Chapter 6 for information about circular design.

Recyclability

Consideration of the recyclable nature of materials is important in product design. The more parts of the product that can be recycled or can be manufactured from recycled materials, the less the impact of the product on the environment.

The reuse of products for their original purpose is known as recycling (e.g. excess building bricks used for paving or on a new construction); the conversion of recycled products into a new product for a new purpose (e.g. plastic drink bottles into non-slip mats) is called downcycling.

▶ The Bottle Light is a fully rechargeable LED light that can repurpose empty bottles into long-lasting lights.

Multifunctional design

Products with more than one function can increase the value for the owner. A product designed for one purpose could be reused for a different function. For example, packaging might be able to be reused as a different product such as storage. If a product has multiple functions, fewer products are needed. Consumers may view products that have multiple functions as having higher value and retain them for longer periods of time.

Image courtesy of Marjan van Aubel, photo by Mathijs Labadie

▶ The Current Table by Dutch designer Marjan van Aubel incorporates solar cells. It functions as both a working space and a charger for electronic gadgets.

Materials selection

An effective sustainable approach is to select non-toxic, recyclable and low-impact materials in the first place. All materials have a Materials Safety Data Sheet (MSDS) that can be used to assess suitability and impacts. Hazardous and toxic substances are best avoided, but if they are to be used, identifying appropriate means of disposal at end of life is essential.

Durability

Designing quality products that are built to last means less waste in the long term. Quality products are more likely to be reused, repaired, resold or recycled. The longer a product lasts, the less likely it is to be replaced. Designing for longevity requires careful selection of materials and the use of processes that ensure solid and enduring construction. The appearance of a design can communicate its longevity; design that appears durable and long-lasting helps to reinforce its durability. Extending the life of a design may reduce consumption and waste.

Memobottle, Designer: Jesse Leeworthy, Co-founder Jonathan Byrt

Memobottle, Designer: Jesse Leeworthy, Co-founder Jonathan Byrt

▶ Locally designed product Memobottle uses non-toxic materials including BPS-free plastic. The materials selection is free of hazardous substances, it comes packaged in recycled cardboard, and $1 from each purchase is donated to a clean-water charity.

Fairfax Syndication/The Age/Gary Medlicott

▶ Shipping containers are durable and long-lasting. They have been adapted for a range of uses, including housing. This is the 'Small is Smart' house, Portarlington Road, Leopold, Victoria, fabricated from disused shipping containers. Brainchild of Geoff Fulton and Carla Salomon of Fulton and Salomon Architects, 3 June 2009.

Dematerialisation

Reducing the amount of material used in a design is a straightforward way of minimising environmental impact. Similarly, reductions in the weight, volume and size of products can lead to less waste at end of life. An example is housing design that uses a minimal range of materials.

HAY, Denmark

▶ The Nobody chair by HAY design is moulded from one piece of material. Using a technique borrowed from the car industry, the chair is manufactured from two layers of thermos-pressed PET felt – a 100% recyclable material made from used water and soda bottles. The chair is stabilised without using an internal frame, plastic, screws, glue or other reinforcements.

Efficiency

Products, particularly those that use electricity, need to be efficient in their use of energy. Creating 'standby' or 'sleep' functions reduces power use. Designs might encourage users to turn off or unplug by using automatic switches or timers. Cost-aware consumers are often attracted to energy-efficient products.

Disassembly

Products that are designed to be easily taken apart at their end of life can make the recycling process more efficient. Consideration in the early stages of a design about the structure and functionality of a product can predict the speed and ease of taking it apart for recycling.

Getty Images/iStock Unreleased/kokkai

▶ The Commons is a medium-density, residential building located in Brunswick. Completed in 2014, its use of sustainable materials, shared facilities and innovative design led to worldwide recognition, as well as many architecture and environment awards. At the core of its design, which has no car parking and shared laundry facilities, is a focus on environmentally sustainable, financially viable and socially responsible practices.

Studio David Graas

▶ This cardboard lounge, designed by David Graas, comes flat-packed for assembly. If disposal or storage is required, the design can be completely disassembled.

Degradability

Materials that can be broken down organically through composting are known as degradable materials and can be used in some products. These include paper, cardboards and starch-based plastics. Glass, metals and petrochemical-based plastics take many years to degrade and are best recycled or reused.

Greenmark eco packaging range/ greenmarkpack.com.au

▶ Traditionally, food packaging is a high contributor to landfill waste. These packages, using a combination of sugar-cane bioplastics, are fully compostable. Polylactic acid (PLA), a renewable bioplastic derived from corn starch or sugar cane, enables packaging to be waterproof and heatproof and also degradable.

Product responsibility

Increasingly, companies are encouraged to take full responsibility for their products. In recent years and, in some cases, due to consumer or government pressure, companies have introduced policies designed to address issues with the end of life of products. Recycling schemes and returns procedures enable products to be re-manufactured or recycled.

Shutterstock.com/SandyS

▶ What to do with used coffee pods is a dilemma posed by the popularity of coffee-pod machines. Nespresso offers a recycling program and accepts returns of their used pods in prepaid post satchels and at designated collection points. The pods, which are made from aluminium, can be fully recycled. In Europe, the Nespresso 'second-life' recycling program has seen the pods recycled into car parts, cookware and cans. The coffee grounds have also been repurposed as rich garden compost.

SUSTAINABLE DESIGN

There are many web resources available that outline strategies that designers can undertake for more sustainable and efficient design products. Visit these websites:
- Design Can Change
- United Nations D4S: Design for Sustainability
- Treehugger (the latest contemporary and sustainable designs in many design areas).

15.2 ECONOMIC, TECHNOLOGICAL AND POLITICAL INFLUENCES

ECONOMIC INFLUENCES

From the end of the 19th and into the 20th century, the impact of the previous 200 years of industrial development in the Western world was clearly visible. Cities had expanded to accommodate workers in the manufacturing sectors. Fewer people lived on the land in rural areas and the domestic lives of most people had undergone significant change. Access to electricity, clean water and secure housing meant a higher demand for home comforts. Decoration of the domestic space became the province of many rather than of the privileged few. This, in hand with access to a greater choice of products, built a consumer culture on a scale that had not been seen before.

The period between the world wars in Europe was a time of great social turmoil and change. In Germany, defeat in the First World War led to considerable social disarray, as industries were damaged and the economy was ruined. From these circumstances rose the Bauhaus, arguably the most influential design movement of the 20th century. In accepting the need for industrial growth, designers developed the functionalist approach to design, a manifesto that eschewed the decorative embellishment of prewar crafts in favour of simple unadorned designs.

Design does not evolve in a vacuum; it is affected by the circumstances of the society in which it exists and serves. Periods of economic decline affect the industrial and manufacturing sectors, which in turn can have an impact on the employment and social conditions of workers. During the Great Depression of the 1930s, many businesses closed and consumers had little money to spend. At a time when money was scarce and competition between companies was fierce, some appliance manufacturers adopted the streamlined designs of the period in order to attract an audience to new products.

During wartime, governments often restrict the manufacture of non-essential items and take over existing factories for military production. During the Second World War, many materials were in short supply and designers were employed on government projects to develop designs that used alternative materials. After the war ended, many of the processes established during wartime were applied to domestic products.

New materials such as bakelite, a precursor of plastic, gave rise to product design that could be freely styled and formed repeatedly. The cost of appliances tumbled during the postwar boom, which fed the further development of new processes and materials.

National Library of Australia, 'For freedom, have you bought a war loan bond?', John Sands, Sydney, 1915 (?)

▶ During wartime, posters were used for propaganda to encourage enlistment and to garner financial support through the purchase of war bonds. In this Australian poster c. 1915, it is possible to see the influence of art nouveau in the imagery used.

The rapid development of materials continued in the second half of the 20th century with lower costs of production and increasing demand for goods. Plastics and synthetic materials and the automation of manufacturing production made many objects less expensive and more accessible to the consumer. In recent times, the rise of manufacturing powerhouses such as China have meant that designed products, including both three-dimensional and print products, are manufactured in large quantities at a smaller

financial cost than ever before. Booming economies, increased disposable incomes and consumer desire for new products drive the demand for accelerated design and manufacturing. The accessibility of such quantities of cheaper products in the 21st century has had its own impact on consumer waste and the environment. In the retail sector, the sheer variety of available products for consumers to choose from is far greater than designers of the early 20th century could have imagined.

TECHNOLOGICAL INFLUENCES

Advances in manufacturing processes, materials and design technology have a direct impact on the nature of design. The development of technology affects every aspect of a design, from the initial design stages to final production.

In the 1880s, typesetting was mechanised for the first time and the production of print-based products such as posters, books and magazines became more efficient. Hand-set lettering vanished quickly and the relative ease of new type technologies added impetus to the rise of graphic design and advertising.

In the late 1940s and the 1950s, considerable advances were made in materials technology, as the technologies developed during wartime were applied to a domestic context. Lightweight, flexible and durable materials such as plastics could be manufactured readily and cheaply, providing scope for the refinement of many products. Domestic appliances made of lightweight materials became more portable, cheaper to purchase and easier to use.

Many industries use innovation and advances in technology to increase output and productivity. Production systems such as vacuum moulding and injection moulding have revolutionised the design of products, from small appliances to automotive parts. Advances in electronics have replaced cumbersome methods of production. Fibre optics, integrated circuits and silicon chips have allowed products to be scaled to the smallest workable size.

As a result of the application of digital technology, design development that once may have taken weeks by hand, may now take only hours or less. The use of computer-aided design means that concepts can be devised, designed and produced on the one source.

Getty Images Plus/iStockEditorial/alexey_boldin

▶ Wearable technology is an example of the rapid miniaturisation of powerful computers.

Constant developments in technology – from 'smart' fabrics and papers that 'read' and convey information to smaller processors and enhanced interactivity – affect all aspects of design. Developments in technology ultimately affect how designs are created, as consumers demand the new and the innovative.

Advances in technology can define design disciplines; for example, motion graphics, animation and website design are all design specialities that have grown from developments in available technologies. Increasing awareness of how we use technology has led to the establishment of professionals who specialise in 'user-centred design' and focus on designing effective user interfaces and digital experiences. Design disciplines that were unknown or non-existent only a few years ago may rise to high importance as technologies advance.

Challenges for designers in this rapidly evolving technical environment are vast. Designers whose work is in the public domain sometimes struggle to maintain control over their work across the global context of the Internet. The rise of 'citizen designer' (a term used to describe people who are untrained users of design software) means that anyone with access to a computer or mobile device and the Internet can design and post graphic products quickly and independently. Social media means that the spread of good (and bad) design is rapid and powerful.

POLITICAL INFLUENCES

Political upheaval has an impact on many aspects of a culture, including design. Some governments actively support design innovation through financial assistance and the establishment of schools. Conversely, governments that perceive subversion through creative expression and innovation in design often oppress and persecute those involved in the field, leading to an exodus of talented designers. This can have a positive impact on other countries, which may benefit from the influx of creative professionals. The Bauhaus was disbanded during the rise of Nazism in Germany, leading to Bauhaus ideas spreading throughout the United States and internationally.

Political change is often a trigger for design. Governments often commission political posters, visual propaganda and architectural displays of power or prestige. In Italy and the Soviet Union, design movements such as Futurism and Constructivism evolved with the support of the respective governments, and although these relationships may not have endured, the visual communications produced had a significant impact on the progress of design. During times of war, posters that promote the cause and those that protest the war use powerful visual communications to send a political message.

May Day 1942. Labor Council of New South Wales Sydney: Issued by N.S.W. Trades and Labor Council, 1942

▶ In this political poster from 1942, it is possible to see the influence of Constructivist design.

Getty Images/Corbis Historical/Robert Daemmrich Photography Inc

▶ Political promotion and advertising can be powerful. Iconic images, such as this famous image of Barack Obama from the 2008 US presidential election, have influence far beyond their original audience and purpose. The image, designed by Shepard Fairey, has been appropriated and reused in other cultures and contexts for a range of reasons.

15.3 SOCIAL ISSUES IN DESIGN

Societies operate in a constant state of change. Social structures, values and relationships are affected by many variable factors that have an impact both at a personal level and at a wider community or global level. Design is often a reflection and extension of the society they were created within. Design can push the boundaries of the social fabric – and often does so. Design can reflect and represent commonly held social values on the one hand, while challenging and questioning those values on the other hand. Advertising, architecture, packaging and fashion constantly challenge the norm. Imagery and content that is perceived to be unacceptable in one context is embraced in another.

Design can also direct social change. The effect of design at the social level is often determined by culture. What is acceptable advertising in one country may be offensive and even illegal in another. Religious values and cultural taboos can determine the appearance and content of visual communications. Appropriateness in content changes over time, and in contemporary Western society the use of controversial images, in particular those that display nudity or confronting behaviours, has become prevalent.

Design is sometimes used as a form of social protest. Street art is commonly used to express

opinions about social and political events or injustices. Graffiti, particularly stencil art, is also seen as a form of creative expression for young artists who wish to make a strong political or social statement. Likewise, the policing and removal of street art, posters and paste-ups is often controversial and raises issues of access, ownership and the freedom of creative expression.

Shelter or the Streets: 2nd National Youth Housing Conference – poster by Julie Shiels for Another Planet Posters 1985. Source: State Library of Victoria, Accession no. H90.95/21
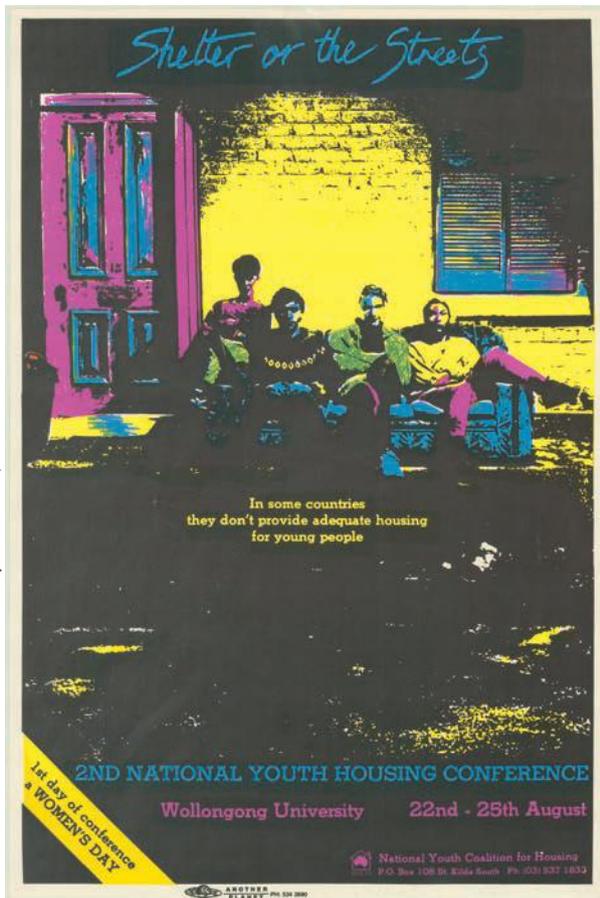
▶ Poster design and social issues have a long history. Used for promotion or protest, the most enduring poster designs that communicate social issues, dissent and opinion have traditionally been handmade. This poster for a youth housing conference in 1985 used photographic screen printing.

Social media has had an impact on the prevalence of design in contemporary life. Trends and changes in design are accessed far more readily than ever before. With design blogs, and image and link sharing, there is an immediate awareness of new designs. Technology not only enables us to see design products quickly; the expansion of online retail means that we can purchase these products without even holding them first. Partially in response to this, the early years of the 21st century have seen an increased interest in the 'handmade' and the development of a craft-influenced design aesthetic. Traditional techniques such as letterpress, screen printing, hand-drawn typography and craft arts appear in galleries and feature in online design blogs. A combination of old and new techniques, of contemporary design principles and artisanal craft, has led to the growth of what is known as 'new craft' or the 'maker's movement'.

In environment design, issues such as affordable housing, homelessness and sustainability are often tackled by architects. Emergency shelters, relocatable housing, and dwellings that respond to changes in climate and environment are design problems that have been undertaken by professional designers.
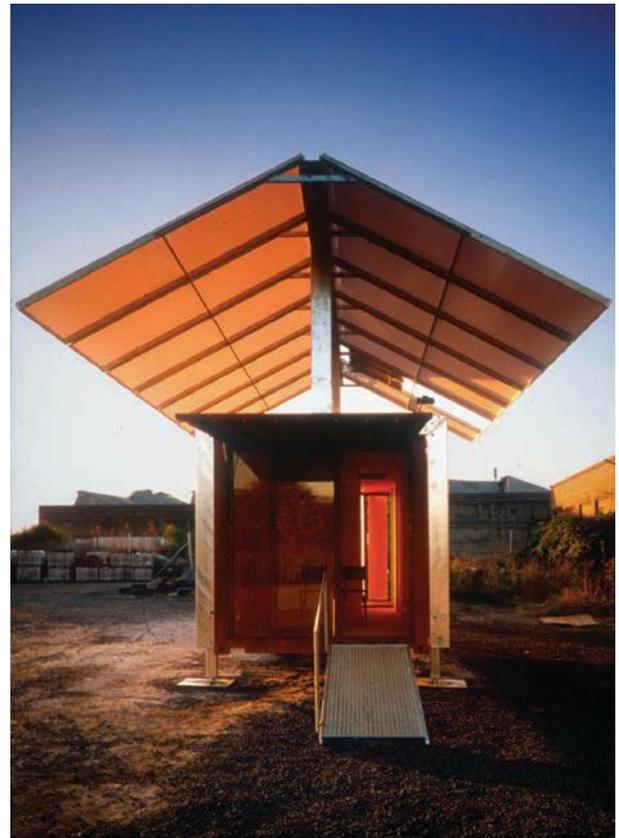
Photo: Earl Carter
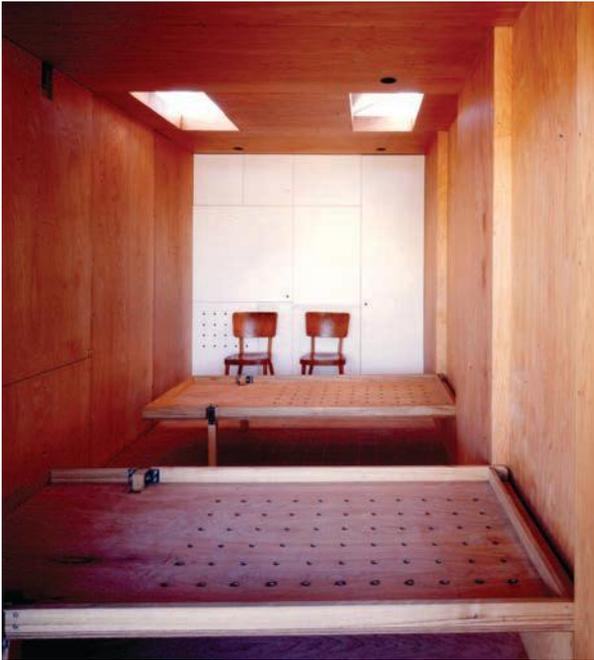
Photo: Earl Carter

▶ 'Future Shack' by architect Sean Godsell utilised a shipping container to create an adaptable emergency shelter that can be easily deployed to areas of need. Telescopic legs allow for rough terrain while the standard shipping container form enables rapid use and ease of storage.

Professionals working in environmental design are faced with complex social issues including the pressure of expanding cities, population growth and ageing housing stocks. Tensions between preserving historic and significant dwellings or public spaces and urban development often lead to protracted legal and ethical issues, protest and dissent. Designs may be adjusted to accommodate planning requirements, such as maintaining a heritage facade or incorporating a new design seamlessly into a historic location.

15.4 CULTURAL INFLUENCES

In a global marketplace, many designs are sold and used in countries around the world. But, what is appropriate in one market may not work in another due to cultural or religious sensitivities. For example, the 'thumbs up' symbol has positive connotations in Western countries, but has less clear meanings in some Middle Eastern societies. A designer may not be aware of the distribution of a design; however, if a design is likely to be used in varied markets it is the designer's responsibility to ensure that the product is not culturally offensive or

misleading. Such considerations reinforce the importance of building a solid understanding of the end user. The location and audience of a design will often determine the appropriateness of culturally sensitive imagery. Controversies over illustrations showing religious icons and deities demonstrate that in the age of global media, what is merely provocative in one culture may be seen as highly offensive in another. For designers, sensitivity to cultural factors is an important trait to develop. It may be as simple as the selection of colour – understanding the symbolism of colours in different cultures – or the use of religious and cultural symbols and icons.

APPROPRIATION OF IMAGERY

The appropriation of imagery and cultural iconography in design is an issue that increasingly affects professionals working in creative fields. Appropriation, or 'borrowing', of visual elements from another culture or subculture, is commonly seen in art but less so in design. Appropriation becomes especially problematic when used for commercial gain. Social media news feeds often feature examples of print and video advertising that have made use of either cultural imagery or stereotypes, only to have the content backfire. Notable examples of commercial appropriation resulting in community backlash include a magazine that used Native American headdresses as accessories for an editorial, and a soft drink campaign that recreated imagery of street protestors suggestive of the 'Women's March' and 'Black Lives Matter' protests. Such missteps suggest that the ideas were out of touch with community sentiment. Imagery that is stereotypical is also problematic, particularly in communication design. When visual messages are designed to be absorbed quickly, the use of stereotypes may be an easy method of conveying meaning. However, the most effective designs are those that recognise cultural shifts. Diverse societies evolve in their sociological and demographic makeup, so a stereotype soon becomes outdated, meaningless and sometimes counterproductive. When dealing with educated, active and aware consumers, respectful representations of cultural, gendered and social imagery is a significant ethical consideration.

An example of the appropriation of Native American culture is when artist Pharrell Williams wearing Native American headdress appeared on the front cover of *Elle* magazine. The magazine cover sparked controversy and resulted in public apologies from the magazine and from Pharrell Williams. Search online for an image of the cover.

In Australia, the appropriation of cultural imagery owned by Aboriginal and Torres Strait Islander people has not always been respected. The use of unattributed textiles, patterns and artworks are still evident in some retail environments, despite artistic works being protected under Australian Intellectual Property law (see Chapter 17). Specific cultural protocols exist when using images of Indigenous individuals and when seeking to use creative works. Designers need to recognise that some Aboriginal and Torres Strait Islander material is unsuitable for public use and protected as sacred, ritual knowledge under customary law. Likewise, the representation of deceased members of an Indigenous community may not be permitted or may require special acknowledgement. Gender must also be considered as some Indigenous imagery and knowledge is gender-specific and only to be seen by initiated men or women. Consultation is key for designers, and research of cultural constraints when seeking to use Indigenous imagery is an essential part of the research process.

15.5 AESTHETIC INFLUENCES

The appearance of products, objects, visual messages and environments is highly influential, and aesthetic preference plays a major role in user decisions when faced with a choice of designs. Aesthetics relate to the physical appearance of a design, and a well-designed product that makes effective use of principles of design such as harmony and balance is naturally more appealing. In fact, the 'aesthetic–usability effect' has been noted as a significant influence on design success. It seems that the more visually appealing we find a design, the more functional and usable we perceive it to be. Author and researcher Don Norman (*The Design of Everyday Things*) recognises that truly good design requires a balance between beauty and functionality: 'To be truly beautiful, wondrous, and pleasurable, the product has to fulfill a useful function, work well, and be usable and understandable'.

The role of emotion in design is significant, as designs trigger an 'affect' or response. An affect can be negative (intellectual, linear, focused on function and practicality) or positive (steeped in emotion and instinctive, visceral response).

Now consider the implications of these findings upon design. A short summary is that good human-centered design practices are most

essential for tasks or situations that are stressful: distractions, bottlenecks, and irritations need to be minimized. In pleasant, positive situations, people are much more likely to be tolerant of minor difficulties and irrelevancies. In other words, although poor design is never excusable, when people are in a relaxed situation, the pleasant, pleasurable aspects of the design will make them more tolerant of difficulties and problems in the interface.

Aesthetics are important in design. Adhering to the Principles of Good Design as articulated by Dieter Rams, is a good place to start (refer to Chapter 12). Although users may not be aware of aesthetic adjustments made by designers, it is important to make smart aesthetic decisions to ensure the effectiveness of a design product.

Shutterstock.com/Leszek Kobusinski

▶ The aesthetic–usability effect. Products that users find visually attractive are often perceived to be more functional. Positive feelings about a product can lead to patience, affection and loyalty towards a brand.

Trends are highly influential in many social groups. Fashions and trends-established by designers via social media, magazines and popular culture – affect what we buy and when we buy it. The lifestyle associations of the products themselves can dictate what we purchase, wear, drive or use. Presenting images that

are alluring and desirable can direct consumer choice and preference. Recognising and responding to fashion and trends in design is big business. Very often, users demand the newest and most up-to-date designs and the marketplace moves quickly to meet that demand. Many areas of design such as fashion design, textile design and interior design undergo seasonal shifts in colour, styling and theme. These cycles can occur very quickly and what was fashionable last month may no longer be seen as desirable next month. Blogging and the visual feast that is social media can influence what is and what is not fashionable over relatively short periods of time. Designers stay up-to-date with trends and developments by reading widely, attending expos and conferences and observing cultural shifts. In many cases, innovation and trends are set in motion by talented and innovative designers themselves. Although trends appear more slowly in built environment design, the design of spaces and structures is also affected by changing preferences in the application of materials, colours and textures. Product design

may also be influenced by colour trends, changes in the desired appearance, form and shape of consumer products and a demand for innovative materials and technologies.

FASHIONABLE COLOUR! FYI

Colour forecasting is big business. Professionals working in fashion, interior design, product design and manufacturing often begin the design of a concept many months – and even years – in advance. Predicting colour trends is therefore very important to ensure that a design is relevant and marketable in the future. Companies such as Pantone, Edelkoort and Fashion Forecast Services provide clients with reports that analyse trends in fashion, accessories, textiles, paint colours and furniture.

PANTONE® 15-0343 Greenery	PANTONE® 18-3838 Ultra Violet				
PANTONE® 13-1520 Rose Quartz	PANTONE® 15-3919 Serenity	PANTONE® 18-1438 Marsala	PANTONE® 18-3224 Radiant Orchid	PANTONE® 17-5641 Emerald	PANTONE® 17-1463 Tangerine Tango
PANTONE® 18-2120 Honeysuckle	PANTONE® 15-5519 Turquoise	PANTONE® 14-0848 Mimosa	PANTONE® 18-3943 Blue Iris	PANTONE® 19-1557 Chili Pepper	PANTONE® 13-1106 Sand Dollar
PANTONE® 15-5217 Blue Turquoise	PANTONE® 17-1456 Tigerlily	PANTONE® 14-4811 Aqua Sky	PANTONE® 19-1664 True Red	PANTONE® 17-2031 Fuchsia Rose	PANTONE® 15-4020 Cerulean Blue

PANTONE® and other Pantone trademarks are the property of Pantone LLC. PANTONE Colors may not match PANTONE-identified standards. Consult current PANTONE Fashion, Home + Interiors Publications for the accurate color.

▶ Pantone releases a 'Colour of the Year' that reflects current trends in design, fashion and interior architecture. This illustration shows all Pantone colours of the year from Cerulean in 2000 (bottom right) to Ultra Violet in 2018 (top left).

CHAPTER RECAP

1   Effects of technology on design: Select two examples of similar products designed in different time periods, such as a television set from 1960 and a contemporary television set, or a 1920s telephone and a contemporary telephone. Compare and contrast the use of materials, and discuss how developments in technology have changed the designs for each product. Present your information in written format or as a digital presentation. To enhance your presentation, use iconography and illustrations in keeping with the periods studied.

2   Effects on social change: Investigate the effects of social change on visual communications. Select a key event in history and explore the use of visual communications during that time. Explain how social events had an impact on the content and appearance of visual communications of the time. Prepare a poster that illustrates and describes your research. Use images or freehand illustrations to display your findings.

3   Political design: Investigate the use of design in the political spheres. Research the use of design by governments and political organisations in Australia and overseas. Investigate the use of visual communications in a contemporary climate, comparing and contrasting the uses to identify similarities and differences. Observe the use of design to promote ideas, or focus on electoral or wartime events. To present your findings, design a poster in a style that is typically used for political propaganda.

4   Cultural connections: Focus on one aspect of design (e.g. fashion, product design, graphic design or interior architecture) and investigate the influence of cultural and attitudinal change over time. Study the influences of popular culture (such as music, cinema and television) on design. Establish links between key cultural changes (e.g. punk in England during the 1970s) and your focus area of design (e.g. Vivienne Westwood and innovations in fashion). Present your findings in diagrammatical format or as a digital presentation.

5   Protest and dissent: Investigate the application of graphic design in times of protest and dissent. Select key historical events and analyse the use of design to convey issues and opinions. Collect visual materials from the past (e.g. anti-nuclear protest images from the 1980s and mid 1990s, women's marches, student rallies). Also seek out contemporary protest graphics and compare the content and style with earlier examples. Present your findings in digital format with visual examples or in the form of a protest graphic.

6   Appropriation and culture: Find examples of the appropriation of cultures in design including Aboriginal and Torres Strait Islander traditions. Analyse how imagery and symbolism, design aesthetics and iconography have been 'borrowed' for application in other contexts. Investigate the impact cultural appropriation has on communities and how it can be addressed. Research guidelines for appropriate use of cultural imagery and create a visual reference to assist designers in understanding their ethical (and legal) obligations.

DESIGN CONTEXTS

DESIGN STYLES

'We must come to understand the carrying and driving forces of our time. We must analyse their structure from the points of view of the material, the functional and the spiritual. We must make clear in what respects our epoch is similar to earlier ones and in what respects it differs.'

Ludwig Mies van der Rohe

In this chapter:

Learn the language

+ collaboration
+ culture
+ influences

+ modernism
+ movements
+ postmodernism

+ reaction
+ society
+ styles

Designs are a reflection of their time, and often depict the fashion, taste and trends of a period. The impact of social change can be clearly seen in many areas of design, including fashion, architecture, graphic design and product design. As public sensibilities change, so too do the boundaries of visual language. What was confronting imagery 30 years ago may be quite acceptable today.

Design trends often reflect historical references and past artistic traditions, so it is possible to see references and influences in many contemporary examples. We can revisit examples of design and recognise that advances in technology, media and materials have had an enormous impact on contemporary design.

Materials and techniques used in the production of designs change due to the influences of new technologies and concerns about ongoing environmental impact. Design innovation is often seen hand-in-hand with the development of new materials.

The application of principles and elements of design is particularly susceptible to changes in fashion and taste. Illustrations or symbols and their colours and shapes, for instance, may change over time as they acquire political or cultural significance beyond their original purpose.

16.1 THE HISTORICAL CONTEXT

There are recognisable links and influences that flow through the history of design styles. The development of designs does not occur in a vacuum, and many designers take the historical successes or failures of earlier designs into account when developing new concepts. Designers understand that to create something new, they must look to a range of sources, including designs of the past.

Historical influences on design can be subtle, perhaps even imperceptible. A designer may look at past designs and analyse examples as part of research. What aspect of the design succeeded? What failed? What appealed to the audience of the time? Answers to these questions can help designers to avoid repeating mistakes and lead them to focus on expanding the successful elements of a previous design.

Some designers incorporate their historical references more obviously than others. Fashion trends often refer to past styles and movements for inspiration, creating garments and textiles with obvious links to past styles, and the same thing happens in communication design. Retro – a colloquial term used to describe a style of design, fashion or music that blends aspects of previous styles – actually means 'backward looking', and it is possible to trace the origins of many contemporary designs that look back into the past.

Designers look to historical sources for:

+ inspiration and ideas for new design concepts
+ information about techniques and methods of production
+ analysis of successes and failures as reference for design concepts
+ classic use of design elements and design principles that have endured and remain effective
+ visual motifs and concepts that emulate an era, style or historical climate.

16.2 KEY MOVEMENTS IN DESIGN

To understand some of the historical influences that affect contemporary design, it is valuable to have a general grasp of key design developments over the past 150 years. Many excellent reference books present detailed information about design **movements**, from the **Arts and Crafts** Movement of the 19th century to **postmodernism** and design in the digital era. The Internet also offers many websites that feature design timelines and profiles of significant designers in every field.

This chapter is a comparatively brief overview of historical styles and it is recommended that you expand your knowledge by reading some of the many books and websites that offer rich information about design history.

Major developments in design occurred after the Industrial Revolution of the 18th and 19th centuries, a period of immense change in agriculture, manufacturing, mining, transportation and technology that had a massive impact on the social and cultural makeup of Western society. The 19th and 20th centuries saw significant change in the way visual communications were produced. The mechanisation of manufacturing processes, the rise of factories and the growth of global markets

ushered in major changes in how products were manufactured. Products once produced locally by artisans were produced en masse and distributed widely. Interestingly, many design styles evolved in direct reaction to the social and cultural changes imposed by the Industrial Revolution; some designers reacted negatively while others embraced the new processes.

DESIGN HISTORY TIMELINE, 1850–CURRENT DAY

| 1850 | 1860 | 1870 | 1880 | 1890 | 1900 | 1910 | 1920 | 1930 | 1940 | 1950 | 1960 | 1970 | 1980 | 1990 | 2000 | 2010 | 2020 |

1850-1914	Arts & Crafts Movement
1870-1900	Aesthetic Movement
1880-1910	Art Nouveau
1897-1905	Vienna Secession

Modernism

1907-1935	Deutscher Werkbund
1909-1930	Futurism
1916-1923	Dada
1917-1935	Constructivism
1917-1931	De Stijl
1919-1933	Bauhaus
1920-1980	International Style
1920-1939	Art Deco
1930-1960	Organic Design & Biomorphism
1930-1950	Streamline

Postmodernism

Pop	1958-1975
Radical Design & Anti Design	1968-1978
Eco Design	1970-present
Postmodern Design	1965-present
Memphis	1981-1988
Digital Design	1984-present
Maker Movement	2000-present

Arts and Crafts Movement 1850–1914

The Arts and Crafts Movement was influential in British decorative arts, architecture and landscape design. The movement was inspired by the writings of John Ruskin, and was a reaction to both the mechanisation of the Industrial Revolution and the over-intricate styling of the Victorian era. The movement called for simplicity and clear function, and believed that beautiful decorative products played a role in the improvement of people's lives. The movement eschewed mass-production techniques in favour of a hand-crafted and artisan-based approach. Designers of the Arts and Crafts Movement looked to the natural environment for inspiration and their work often used visual motifs directly sourced from flora. Handmade and carefully crafted, the work was often manufactured using slow, traditional techniques, which meant pieces were generally rare and expensive.

Bridgeman Images/'Anemone' design (textile), Morris, William (1834–96)/Private Collection

▶ Morris wallpaper from the Victoria and Albert Museum collection

In Australia, some furniture makers embraced the Arts and Crafts style; Christobel Francis Rojo in Melbourne and Beard Watson Ltd in Sydney were highly regarded for their Arts and Crafts styling using distinctively Australian timbers. Some houses were built in this style and a few can still be seen in Canberra, Sydney and Melbourne.

Key designers

William Morris, Charles Rennie Mackintosh, Margaret MacDonald Mackintosh, Frank Lloyd Wright, Alexander Knox

Bridgeman Images/High backed chair, c.1897 (dark stained oak with rush seat & pierced oval back rails) (b/w photo), Mackintosh, Charles Rennie (1868–1928)/Private Collection

▶ 'Argyle' chair by Charles Rennie Mackintosh, c. 1897

Aesthetic Movement 1870–1900

Inspired by Japanese woodcuts and Eastern goods and furnishings, the Aesthetic Movement was concerned with the representation of the natural and the beautiful in an Anglo-Oriental style. The movement's emphasis was on interiors and objects that could improve quality of life through their sheer beauty. As in Art Nouveau, a focus on the stylised abstraction of natural imagery was embraced. Writers, artists and designers took up the Aesthetic Movement's doctrine of 'art for art's sake' as defined by playwright Oscar Wilde.

Key designers

Liberty (Arthur Liberty), Aubrey Beardsley, Arthur Silver
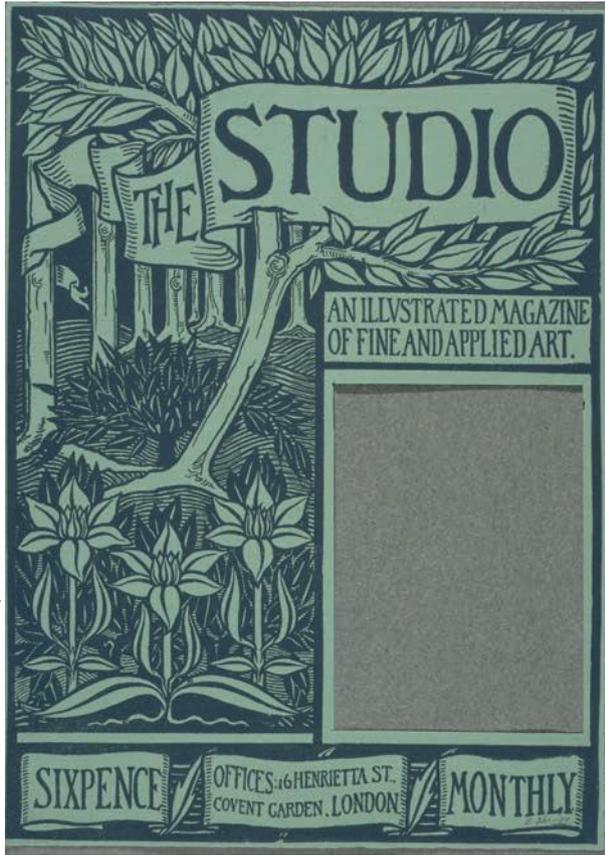
© Victoria and Albert Museum, London.

▶ Publication illustrated by Aubrey Beardsley, 1893

Art Nouveau 1880–1910

Art Nouveau was a global movement, but was most commonly known by its French identity. It displayed an emphasis on decoration and artistic unity based on natural, organic, flowing shapes and forms. Like movements in Britain, this was a reaction to the urban environment fostered by the Industrial Revolution. Art Nouveau is distinguished by its organic curvilinear forms and sensual and rhythmic styling. The influence of Art Nouveau can be seen in the product design, architecture, jewellery, signage, interior design and graphic design of the period.

In Germany, Jugendstil was an Art Nouveau movement focused on Germanic themes and mythology. The driving force of the Jugendstil movement was the magazine *Munchner Jugend*, which made extensive use of the illustrations and designs of German Art Nouveau artists. In Australia, the influence of Art Nouveau was seen mostly in architecture. In Melbourne, buildings such as the Melbourne Sports Depot in Elizabeth Street, and the City Baths exemplify the style.

Alamy Stock Photo/Didier ZYLBERYNG

▶ Art Nouveau entrance to the Paris Metro designed by Hector Guimard in 1900

Kristen Guthrie

▶ Detail of Art Nouveau glass wall, Museum of Modern Art, Brussels
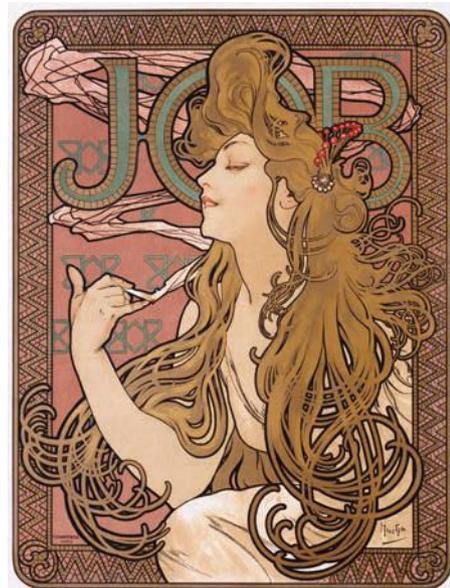
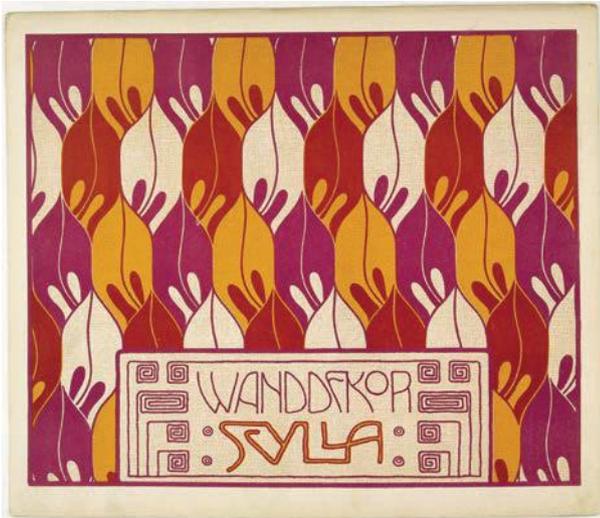Getty Images/Corbis Historical/swim ink 2 llc

▶ 'Job' poster by Alphonse Mucha

Key designers

Jules Cheret, Henri Toulouse-Lautrec, Leonetto Capiello, Victor Horta, Hector Guimard
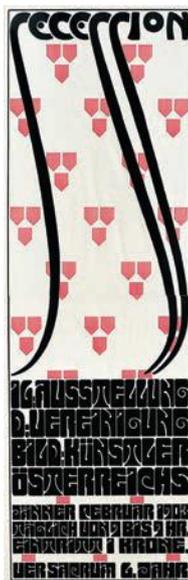
Vienna Secession 1897–1905

Getty Images/Hulton Archive/Imagno

▶   Print by Koloman Moser

Formed by artist Gustav Klimt in 1897, the Vienna Secession (meaning withdrawal) was a reaction to the conservatism of the established artistic community in Austria at that time. With the assistance of the City of Vienna and a number of wealthy patrons, the secessionists constructed an

Getty Images/Hulton Archive/Imagno

▶   Vienna Secession poster

exhibition hall in which to display their work, including metalwork, furniture, lithographs and paintings. The hall, designed by Josef Olbrich, with its distinctive geometric features including a gold dome and elaborate decorative elements, is a good example of Viennese Art Nouveau architecture.

The exhibition hall became the focus of the movement and many large-scale exhibitions were held featuring avant-garde artists and designers from across Europe. The secessionists, though together for only a brief time, were highly influential and innovators in the area of graphic design. Their journal *Ver Sacrum* fused typography, ornamental decoration and images with influences from the Far East including Japan.

Key designers

Gustav Klimt, Josef Olbrich, Josef Hoffmann, Koloman Moser

Deutscher Werkbund 1907–35

Established in Germany in 1907, the Deutscher Werkbund is considered by many historians as the foundation of modernism. Members of the Deutscher
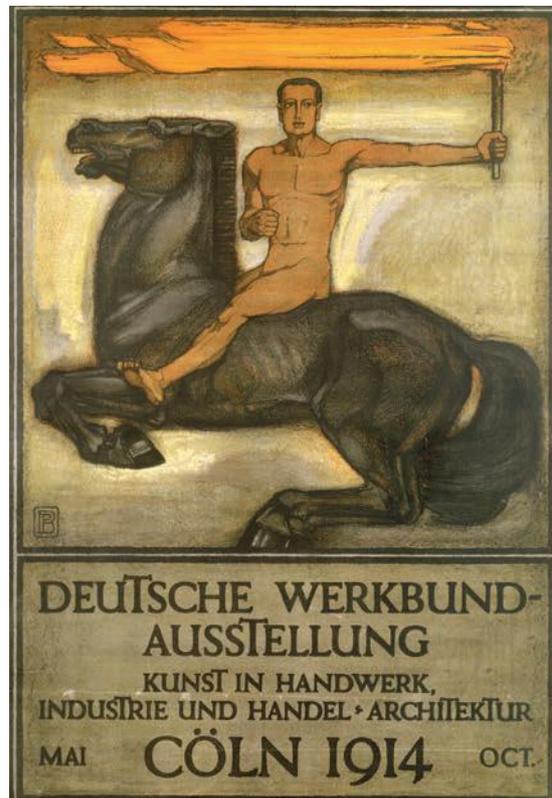
Bridgeman Images/Deutsche Werkbund Austellung, Coln, 1914 (colour litho), Behrens, Peter (1868–1940)/Victoria & Albert Museum, London, UK

▶   Poster for Deutsche Werkbund-Ausstellung by Peter Behrens, 1914

Werkbund recognised that a formal visual language of function was overtaking the decorative and expressive design of the Jugendstil. In the chaos that followed the First World War, the group recognised the need for standardisation in the production of objects, and produced simple forms that featured plain rather than decorative surfaces.

Key designers

Peter Behrens, Julius Klinger, Walter Gropius, Ludwig Mies van der Rohe

MODERNISM   FYI

Modernism is a design aesthetic that developed in the early part of the 20th century and continued into its later stages. Modernism reflected the zeitgeist, or 'spirit of its age'. Rising from the bleakness of wars, modernism was optimistically underpinned by utopian social ideals. Modernists rejected the decorative motifs of the 19th and early 20th centuries in favour of clean, functional forms. Surface decoration was minimally used and, when it was applied, appeared restrained. Visually, modernism was characterised by the use of modern materials (such as steel and glass), the application of abstract forms, the manipulation of space and a conservative colour palette, dominated by whites, greys and black. Modernism is often summarised by the expression 'Less is more', coined by Bauhaus member Ludwig Mies van der Rohe.

Futurism 1909–30

Established by Italian writer Filippo Tommaso Marinetti, and inspired by Cubism, Futurism was one of the first truly radical design movements. Concerned with embracing technological progress, the Futurists were highly influential to subsequent movements. The written word and the printed word were central to the philosophy of Futurism, and designs often involved bold, complex combinations of fragmented typography, repeated icons and Roman numerals. In London, the visual characteristics of Futurism were adopted by the Vorticists. During the 1920s, many of

the stylistic elements of Futurism, such as strong grid structures, were incorporated into print advertising, book design and magazine layouts.

Key designers

Giacomo Balla, Umberto and Carlo Carra, Edward McKnight Kauffer

Front cover from *Parole in Libertà Futuriste*, *Tattili-Termiche Olfattive* by Tullio D'Albisola. Rome, Edizioni Futuriste di Poesia, 1934 Lithograph, printed in color, composition: 9 3/16 × 8 11/16' (23.3 × 22 cm). Digital image, The Museum of Modern Art, New York/Scala, Florence

Dada 1916–23

Established in reaction to the atrocities of the First World War, this artistic and literary movement used experimental techniques, collage and randomly generated words and images to create theatre, poetry and artworks. Although Dada is not usually
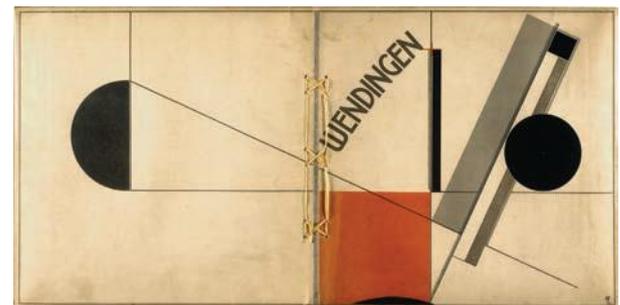
▶   *Wendingen* journal cover by El Lissitzky

seen as a design movement, the Dadaists exerted a major influence on modern graphic design. Their unconventional compositional strategies and anarchic approach to visual 'order' continued to inspire many designers in the later part of the 20th century.

Key members of Dada

Tristan Tzara, Man Ray, Francis Picabia, Kurt Schwitters, Hannah Hoch, Richard Huelsenbeck

*Da-Dandy*, 1919 (collage) by Hannah Hoch

Constructivism 1917–35

Constructivism refers to a primarily Russian movement that occurred after the revolution of 1917. Constructivist designers developed an approach to design that was strongly linked to the industrial production of well-designed utilitarian objects accessible to the masses. The Constructivists strove to reflect the principles of Communism in their work and eschewed the purely decorative for the primarily functional. They rejected the value of fine art, as they believed that utilitarianism was superior. In their print work, the Constructivists used geometric shapes and bold colours to represent industrial products.

Colour symbolism was important, with the revolutionary colours of red and black forming the main colour palette. Typography was used extensively, as was photography. Constructivist posters by El Lissitzky often showed highly experimental techniques including photograms and photomontage, reflecting the Constructivist theme of 'artist as engineer'.

Key designers

Vladimir Tatlin, El Lissitzky, Valentina Kulagina, Kazimir Malevich
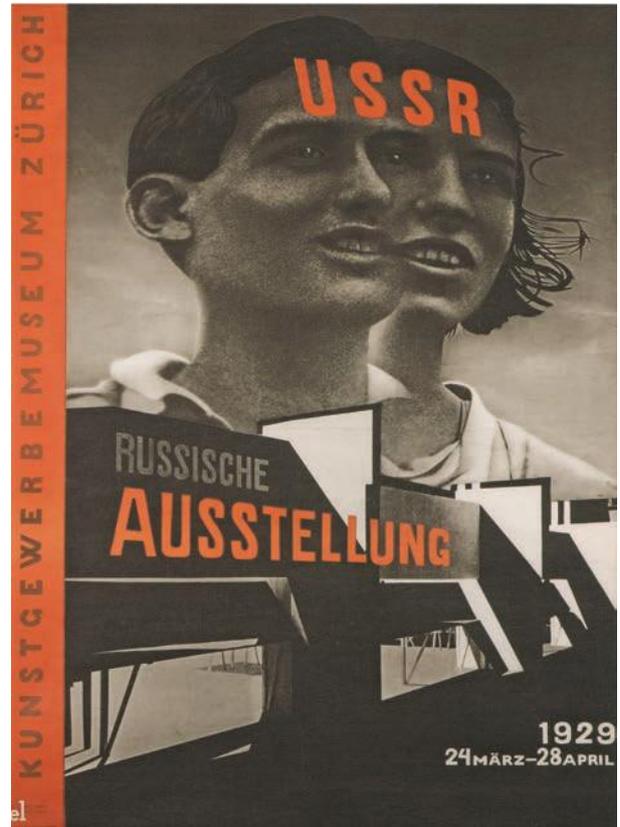
Poster by Eleazar (El) Lissitzky for the Russian Exhibition in Zurich, 1929

De Stijl 1917–31

De Stijl or 'The Style' was a movement established by a small group of Dutch artists, architects and designers in 1917. De Stijl designs were characterised by the use of strong, simple geometric forms and blocks of solid colour that defined space. Decorative excess was rejected in favour of dramatic simplification. De Stijl designs had an immediate impact on graphic design in the period after the First World War, and their designs for typefaces, posters and journals were embraced by the European avant-garde.

De Stijl design principles continued to be influential in the later part of the 20th century. Theo van Doesburg's letterforms and Gerrit Rietveld's famous Red-blue chair symbolise the style of the movement.

Gerrit RIETVELD (Dutch 1888–1964), G. A. VAN DE GROENEKAN, DE BILT (manufactured). *Red-blue chair* (1917) (designed), (c. 1970) (manufactured). Painted beech and plywood, steel 86.5 × 66.0 × 83.0 cm, National Gallery of Victoria, Melbourne. Purchased, 1970 (D33–1970) © Gerrit Thomas Rietveld/Pictoright. Copyright Agency, 2018

Key designers

Theo van Doesburg, Gerrit Rietveld, Bart van der Leck, Piet Mondrian

Bauhaus 1919–33

Formed in 1919, the Bauhaus, meaning 'building house', was a significant German design school established first in Weimar and then Dessau. The Bauhaus director, Walter Gropius, believed that the making of objects and constructions was an important social and intellectual pursuit, and he encouraged students to follow a functional aesthetic. Initially, members of other design movements became part of the Bauhaus, including Theo van Doesburg, Laszlo Moholy-Nagy and El Lissitzky. Artists such as Paul Klee and Wassily Kandinsky also found positions within the school's varied faculties.

All brought influences from across Europe and many aspects of the early Bauhaus were directly linked

to the principles of Constructivism. Core studies at the Bauhaus focused on the logical analysis of form and function. The use of materials such as steel, Plexiglass, rayon and even cellophane in design were radical departures from traditional visual arts training. Students were taught to use instruments in their drawings; items such as the compass and the straight-edge ruler, which had previously been the tools of engineers and draftsmen, became part of the creative process within the Bauhaus.

▶   'Barcelona Chair' by Ludwig Mies van der Rohe, 1929

Bauhaus designs did not like decorative motifs, instead creating designs that featured an industrial 'machine aesthetic'. Studies at the Bauhaus included

Brandt Marianne (1893–1983): Kandem Bedside Table Lamp, 1931. New York, Museum of Modern Art (MoMA). Lacquered steel h. 9 1/4' (23.5 cm), base w. 7 1/4' (18.4 cm) Phyllis B. Lambert Fund. Acc.n.: 191.1958 © 2012. Digital image, The Museum of Modern Art, New York/Scala, Florence

graphic design, typography, furniture design, architecture, textiles and metal. A significant focus of designers within the Bauhaus was the combination of photography and typography. The design of geometric letterforms and the use of lower-case type in publication design were progressive and influential. Eventually, the radical designs of the Bauhaus were seen as subversive by the Nazis and the school closed, with key teachers or 'masters' moving to the United States, where they inspired the rise of the International Style.

Key designers

Walter Gropius, Ludwig Mies van der Rohe, Marcel Breuer, Marianne Brandt, Gunta Stölzl, Laszlo Moholy-Nagy

The International Style 1920–80

The term International Style was established following an exhibition called 'International Style: Architecture Since 1922' held at New York's Museum of Modern Art in 1931. The exhibition featured modernists such as Le Corbusier, Walter Gropius and Mies van der Rohe. The term refers to a global movement of architects and designers whose application of function and pared-down geometric forms reflected aspects of the Bauhaus aesthetic. This period is most identified with modernism and reflected the shift of design influence from Europe to the United States.

During this time there was a significant shift in visual culture; the work of Saul Bass and Paul Rand saw graphic design come into its own as a recognised and esteemed design discipline. From the 1950s onwards, advertising agencies appeared in great numbers, driving the need for print-based design. The importance of logos and branding was recognised during this period; in Europe the rise of the 'Swiss' style was exemplified by developments in typography. In fashion, this period was personified by Christian Dior's 'New Look'.

▶ 'This elegant photograph, taken in 1949, shows the clean lines of a Christian Dior dress to wonderful effect. A reference to internationalism is neatly suggested by Shmith who shows the model holding an illustration of another model in a baroque French interior. However, unlike the lushness of the illustration, Shmith's photograph has a pared-down quality that draws the viewer's attention to the distinctively lean shape of the dress.' National Gallery of Victoria

Athol Shmith, No title (fashion illustration. Model Patricia Tuckwell) 1949, gelatin silver photograph, 39.8 × 28.8 cm. National Gallery of Victoria, Melbourne (PH48-1989). Purchased through The Art Foundation of Victoria with the assistance of The Ian Potter Foundation, Governor, 1989. © The Estate of Athol Shmith, Licensed by Kalli Rolfe Contemporary Art.

In Australia, the International Style was reflected in architecture and product design. Roy de Maistre's furniture and the works of Harry Seidler and Robyn Boyd indicate the style aesthetics. The former ICI building in East Melbourne (now Orica House) is a heritage-listed example.

Le Corbusier (Swiss 1887–1965), Charlotte Perriand (French 1903–1999), Cassina, Milan (Italian est. 1927). LC/4, chaise lounge France (1928) (designed), (c.1970) (Manufactured). Horse skin, leather, chromium plated steel, painted steel, rubber, cotton, metal, dacron, (a-b) 70.9 × 160.5 × 57.3 cm (overall). National Gallery of Victoria. Purchased, 1971 (D194.a-b-1971). © Foundation Le Corbusier/ADAGP. © Charlotte Perriand/ADAGP. © Pierre Zenobel/ADAGP. Copyright Agency, 2018

Key designers

Ludwig Mies van der Rohe, Le Corbusier and Charlotte Perriand, Philip Johnson, Saul Bass, Hera Roberts, Fred Ward, Florence Knoll

Art Deco 1920–39

Art Deco refers to a mix of styles that arose between the world wars, from 1920 to 1939. The title of the movement came from the 'Paris Exposition Internationale des Arts Décoratifs et Industriels Modernes' expo of luxury goods and decorative arts in 1925. The visual characteristics of the Art Deco style – **symmetry**, simplicity and geometry – formed a visual language that was applied across a wide range of products and artworks.

► Paris exposition poster, 1925

The style was seen as a celebration of glamorous modern lifestyles, and it distilled many visual features of modern art styles such as Cubism and Futurism. Art Deco influenced architecture, interior design, industrial design, jewellery, furniture, ceramics, textile and graphic design. It was an enduring style that spanned almost two decades and took inspiration from an increasingly global society. As an impressively eclectic design movement, Art Deco drew influences from many sources; however, it was the exoticism of Egypt, the Orient and Africa that gave the style many of its distinctive characteristics. The works of architect Walter Burley Griffin and graphic artist Percy Trompf typify the Australian Art Deco style.

► Art Deco tea set by Clarice Cliff

► Typical Australian Art Deco architecture featured rounded corners and linear details. Colours were muted and surfaces rendered or painted.

Key designers

Cassandre, William van Alen, Jean Carlu, Pierre Legrain, Mariano Fortuny, Thea Proctor, Clarice Cliff, Marion Mahony Griffin, Walter Burley Griffin, Walter Jardine

Streamline 1930–60

Streamline refers to the sleek, rounded and smoothly finished forms that were used during the 1920s and 1930s in the design of ships, trains, cars and aircraft. These streamlined forms – designed to enhance the aerodynamics of transportation – were appropriated in product design and used to make household objects appear sleek, modern and more appealing to the consumer. Particularly common in American product design, streamlining became popular after the stock-market crash of 1929, as consumer spending decreased and markets became more competitive. This period is sometimes referred to as American Moderne.

▶ Emerson Patriot Radio, designed by Norman Bel Geddes, mid-20th century

Organic Design and Biomorphism 1930–60

While the International Style was dominated by powerful geometric forms, Organic Design – and later, Biomorphism – approached design from a holistic perspective, taking into account human factors such as comfort. Frank Lloyd Wright was a pioneer of Organic Design; his architectural and furniture designs were conceived as a whole theme rather than in single parts. It was hoped that designs brought together in a holistic

▶ 'A New Blue Train to the Cote D'Azur', by Pierre Zenobel, 1928

Key designers

Norman Bel Geddes, Raymond Loewy, Eliel Saarinen, Walter von Nessen, Kem Weber, Gilbert Roohde

Charles Eames (designer)
Ray Eames (designer)
Herman Miller, Michigan (licensee)
Herman Miller (Aust.) Pty Ltd, Melbourne (manufacturer)
Lounge chair 670 and Ottoman 671 (1956) {designed}; (1972) {manufactured}
leather, plywood, aluminium, nylon, zip, (other materials)
(1) 85.2 × 86.2 × 83.3 cm (lounge chair)
(2) 42.7 × 65.6 × 54.6 cm (ottoman)
National Gallery of Victoria, Melbourne
Purchased, 1972 (D80.1-2-1972)

way would reflect nature. In the late 1920s, designers such as Alvar Aalto crafted wood into furniture that moulded to the human form. In the 1940s, husband and wife designers Charles and Ray Eames developed single-form moulded chairs that have had an immense and lasting impact on furniture design. Designers Grant and Mary Featherston pioneered the use of formed wood in Australian furniture design.

Key designers

Charles and Ray Eames, Eero Saarinen, Frances Burke, Verner Panton, Frank Lloyd Wright, Alvar Aalto

POSTMODERNISM   **FYI**

Postmodernism is a term used to describe the progressive architecture, design, literature, visual communications, music, sociology and film that have evolved since the 1960s. Like modernism, postmodernism is a reflection of the spirit of the age. Early postmodernists reacted against the perceived structural constraints of modernism, which they saw as conservative and restrained. Postmodernism is firmly embedded in contemporary creative and popular culture. Visually, it is characterised by the decoration and ornamentation that was rejected by the modernists, and by experimental approaches. The term is a complex one and therefore quite difficult to define, but architect, designer and writer Robert Venturi wrote 'Less is a bore', turning the modernist credo on its head.

Pop 1958–72

Pop design set many of the foundations for postmodernism. Just as Pop artists like Andy Warhol looked to popular culture for inspirational material, Pop designers appropriated materials and design elements found in the everyday. Readily discarded objects constructed from disposable materials – such as inflatable furniture – reflected the prosperity of the time. Pop design was aimed at a youth market and was inspired by social change such as the rise of the psychedelic phase, the space race and the growth of consumerism in the 1960s.

Pop design was strong in Britain during the 1960s, and its non-conformism later splintered into the rise of punk in the early 1970s. Direct links to earlier movements such as Art Nouveau and Dada can be

seen in many works from this period. The design of magazines such as *Rolling Stone* and *Oz* challenged the formal traditions of the International Style.

Ball Chair, designed 1963 by Eero Aarnio. Photo: Harri Kosonen, Studio Sempre

▶   Ball chair, designed by Eero Aarnio

Getty Images/Michael Ochs Archives

▶   Dylan poster by Milton Glaser

Key designers

Victor Moscoso, Seymour Chwast, Milton Glaser, Eero Aarnio, Joe Colombo

Radical Design and Anti-Design 1968–78

Established in Italy in the late 1960s, Radical Design was epitomised by two main studios: Archizoom Associati and Superstudio. The groups wrote manifestos and designed products inspired by the sculptures of Claes Oldenburg. Radical Design is often seen as the direct precursor to postmodern design, as it sought to blur the traditional visual language of modernism and push the bounds of socially defined 'good taste'. The distortion of proportions, clashing colours and the juxtaposition of materials were common in Anti-Design. Anti-Design was ideologically similar to Radical Design.

Key designers

Ettore Sottsass, Alberto Colombi, Ezio Didone, Jonathan de Pas, Donato D'Urbino, Paolo Lomazzi

Alamy Stock Photo/INTERFOTO

▶ Calculating machine Olivetti Summa 19, with integrated printer, design Ettore Sottsass and Hans von Klier, Italy, 1969

Eco Design 1970–present

After the energy crisis of the early 1970s, Victor Papanek published a book called *Design for the Real World*, which outlined the responsibility of the design community in developing and using sustainable materials and reducing environmental impacts through design. In the 1980s, environmental concerns gained public momentum and companies began to use 'green awareness' to distinguish their products within the marketplace. During the 1990s, raised awareness of greenhouse gas emissions and deforestation meant that consumers began to demand alternative and recyclable materials. This movement is also known as Green Design or DfE (Design for the Environment). Sustainable design is an ongoing challenge for designers in all disciplines.

Postmodern Design 1965–present

As we have seen, postmodernism refers to the stylistic developments that depart from the norms of modernism. Postmodern designers questioned the modernists' emphasis on logic, simplicity and order, suggesting that ambiguity and contradiction may also have a valid place. Postmodernists introduced colour, ornament, references to historical styles, and elements that sometimes appeared eccentric or disturbing. They sought to make reference to past design movements in order to re-establish an emotional connection between the designer and the user – a connection that they believed had been lost in the abstraction of the modernists. Magazines such as *The Face* and *Emigre* pushed the boundaries of typographic and structural style. Postmodernism is stylistically diverse and ever-changing. The product designs of the Alessi Company in Italy are recognised as postmodern design, as is the work of Australian designer Marc Newson.

Key designers

Frank Gehry, Philippe Starck, April Greiman, Michael Graves, Richard Eckersley, Tibor Kalman


Juicy Salif lemon squeezer by Philippe Starck for Alessi. Collection: Museum of Applied Arts and Sciences. Photo: Ryan Hernandez.

▶ An icon of postmodern design, the 'Juicy Salif' was designed by Philippe Starck for Alessi in 1990.

Memphis 1981–88

Memphis was a reaction to the formal lines and forms of the International Style. Formed by Ettore Sottsass in 1981 and based in Milan, the Memphis group drew inspiration from Art Deco, Pop art and kitsch. Memphis challenged the aesthetic concerns of the modernist styles, blurring the boundaries of design through the incorporation of highly decorative forms, bold colours and pattern. Memphis looked to popular culture, mass-produced objects and the rise of computer games and science fiction, and worked across a wide range of media and products.
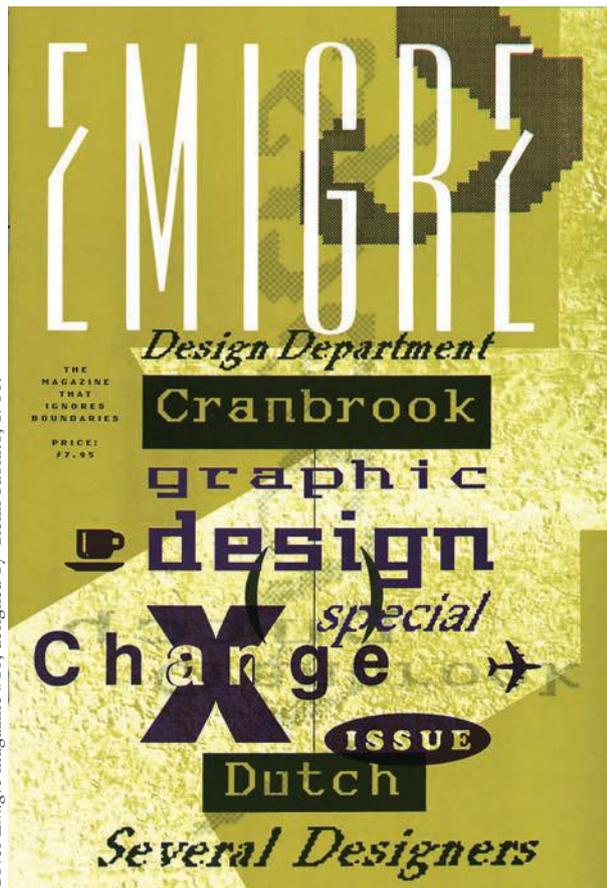
Cover *Emigre* magazine #10, designed by Glenn Suokko, 1988.

▶ *Emigre* magazine was published from 1984–2005 and was a leading graphic design magazine. It was one of the first publications to use computers for layout and used many different typefaces and layout styles in each issue.

Members of the Memphis Group

Ettore Sottsass, Martine Bedin, Aldo Cibic, Michele De Lucchi, Matteo Thun, Marco Zanini
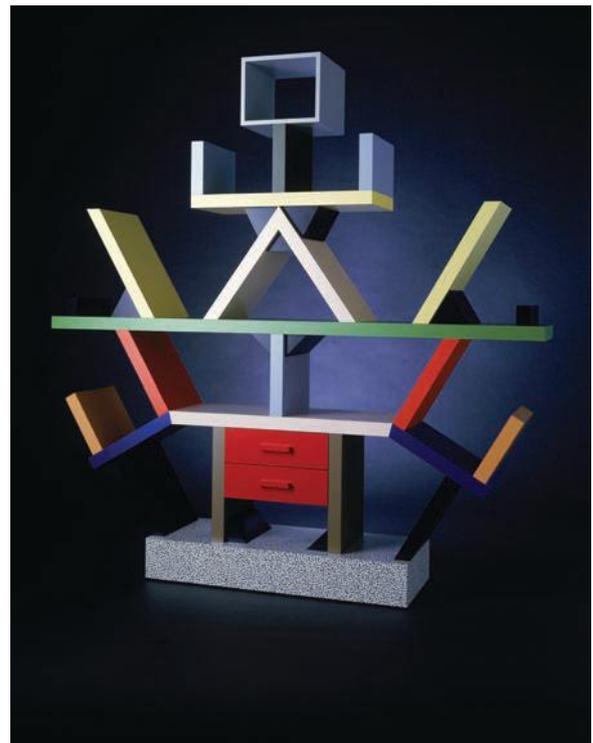
Collection: Museum of Applied Arts and Sciences. Photo: Andrew Frolows.

▶ Memphis 'Carlton' room divider by Ettore Sottsass

Digital Design 1984–present

The rise of digital technology has had an enormous impact on the nature of design and visual communication. Computer-based technologies have transformed the traditional design space, and designers are required to respond. The versatility of the computer to research, model, test, form and enhance design has had an effect on the nature of the designer. Easy access to digital tools means that individuals with little or no training can 'design' content for print or electronic format. Some postmodernists see the computer as an equaliser, moving the realm of design from specialists to anyone with interest and access. The diversity of digital media has blurred the definitions of artist, designer, filmmaker, musician and animator.

Significant contemporary designers

Michael Place, Vince Frost, Marc Newson, Deanne Cheuk, Rinzen, Joshua Davis, Zaha Hadid, Tord Boontje, Karim Rashid
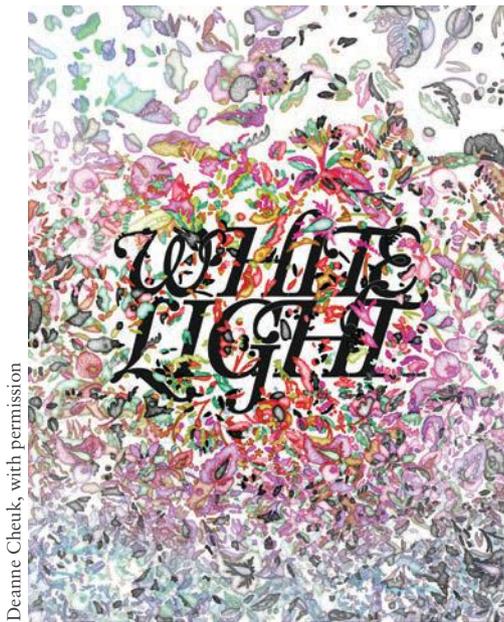
Deanne Cheuk, with permission

▶ Hand-drawn and digital image by Deanne Cheuk

Image courtesy of Karim Rashid

▶ Kettle by Karim Rashid

The Maker Movement 2000–present

Seen as a response to the dominance of digital products, the Maker Movement evolved from growing interest in traditional methods of making and production, combined with new technologies. The movement embraces social media and fosters a sharing culture using Instagram and Pinterest to observe, collect and encourage artisanal production. As technologies have developed, so have the collaborative possibilities of Maker culture. Some Maker spaces provide digital fabrication technologies while others focus on traditional hand skills. Maker spaces, which became more prominent in the mid-2010s, appeared as shared workshops and 'labs' at schools, universities and in the public and private sectors. Creativity was recognised as an essential tool in learning, professional development and in a wider community context.

Over a relatively short period of time, Maker culture expanded into areas not previously considered part of the design movement, such as food and personal care. Artisanal products such as coffee roasting, beer brewing and traditions such as barbershops appeared using a dynamic social media presence and tools such as app-based bookings and order systems.

At its core, Maker culture strives for a balance between recognising the origins of products while embracing ever-new technologies to build, promote and create products, services and designs. In many areas, it is possible to see the 'hand' of the artist evident in Maker products from hand-drawn lettering to handmade clothing. Promoting many aspects of the movement was a parallel expansion of market culture, including many art markets, farmers' markets and makers' events in urban and regional areas.

MakerSpace Company

▶ Spaces such as MakerSpace in Sydney provide industrial-grade machinery for woodwork, metalwork, ceramics, textiles and electronics, partly in response to the need for equipment that requires hands-on interaction, rather than making through the interface of a screen.

Sarah Dingwall

▶ Commonfolk in Mornington is an example of a creative, multi-use maker space. Small, artist-run studios operate in the same space as an artisanal coffee roaster and café. The coffee is ethically sourced and the space allows for creative processes to be viewed from many angles.

▶ Glass artist Sarah Dingwall, one of the founders of Commonfolk, in her glass studio adjacent to the café and roaster. Visitors can watch Sarah at work and purchase her designs directly from her studio space.

IDENTIFYING HISTORICAL CONNECTIONS

The history of design is not linear – it interweaves and overlaps, infiltrates and inspires. As time and movements pass, new designers take the legacy of their predecessors and either develop it further or react against it. Each stage of design history is connected to the next and to those beyond.

In the 1990s, an increased interest in minimalism and the aesthetic of the modernists arose amid existing postmodern designs. Product designers, architects, textile designers and fashion designers made reference to the Bauhaus and International Style in their new work. Such influence is not always direct or obvious, and the stark minimalism of the mid-1990s was not a direct copy of its modernist forbears, but a nod to their original aesthetic. It is interesting to note that postmodern characteristics can live in relative harmony with modernist considerations in the 21st century.

Identifying the links and influences between design styles and movements is not always straightforward and can involve having to sort through the popular combinations of historical and contemporary styles. However, there are some steps that can be taken to make the task of seeking and recognising links easier.

Familiarise yourself with key design movements

Using the timeline at the beginning of this chapter as a guide, investigate some significant examples of each design style. Each style is identified by characteristics such as the application of design elements and principles and the use of materials. In architectural design, for example, the application of steel, glass and rendered white surfaces in the construction of simple geometric structures could be linked to the designs of Richard Neutra and the International Style.

Don't assume that contemporary design is 'new' design

Many designers make reference to other designers deliberately. Such references might be designed to appeal to a specific audience that is aware of the other designer's work, or to give the design historical significance through a linked relationship. There are few truly original ideas, and many creative and striking designs are a hybrid of the designer's creativity and the influence of a mentor, inspirational figure or movement.

Design by Jamie Reid, courtesy John Marchant Gallery. Copyright Sex Pistols Residuals

▶ The cut-and-paste collages by Jamie Reid (a friend of the Sex Pistols' manager, Malcolm McLaren) became an intrinsic part of the Sex Pistols' visual identity. It is possible to see influences from Kurt Schwitters and the Dada artists in his work.

Read design blogs

Design blogs provide a wealth of information about professionals working in contemporary design. Writers and designers who have specialist experience in design are often aware of the influences and similarities between designers, design studios and even the design produced by different countries.

Look at the wider context

When looking at the work of designers at any stage in history, it is valuable to investigate other professionals, such as artists, musicians, writers and academics, who were active at the same time. Many designers form networks and groups with those who share the same values and interests, and develop their ideas and design philosophies together. Understanding a design group or movement is important when understanding the wider context of design.

THE SOCIAL CONTEXT

The social, economic and political environment has a significant impact on the establishment and evolution of design movements. Economic and financial factors can also influence the growth and development of design. Given the fundamentally commercial nature of design, the economic climate may dictate the success and longevity of design products.

CHAPTER RECAP

1 Comparison of two design movements: Investigate the application of design elements and principles to graphic design (of items such as movie posters, brochures, packaging) during two periods of history. Using the information gathered, create a written or multimedia presentation that explains the similarities, differences and influences observed.

2 Influences on contemporary design: Investigate the influence that a past design movement continues to have on contemporary design. For example, investigate Futurism and its effect on the contemporary application of letterform in publication design, or the Bauhaus and its influence on contemporary residential architecture. Communicate your findings as a written report or digital presentation with illustrations and diagrams that clearly indicate the influences.

3 Characteristics of a design movement: Design a diagram that depicts the characteristics of a past design movement. Use imagery and examples from key designers of the period. Incorporate visual means to describe the influence that movement has had through history.

4 Investigation of influences: Select a significant contemporary designer and investigate the influences that have impacted on their design work. Collect examples of the designer's work and make visual comparisons with work created previously. Annotate your findings and indicate the links between the current and past design movements. Present your findings in a digital or written format that reflects the stylistic influences you have investigated.

5 Making and hacking: Find examples of Maker culture where the collaboration between makers and technology has led to significant design developments. Look at crowdfunding tools such as Kickstarter to find new designs that fit within Maker culture and suggest how it might be used in a wider social context. Create your own design idea using a combination of traditional or artisanal techniques and digital technologies. Conversely, find an existing design (e.g. a piece of furniture) and suggest how it could be 'hacked' and made into new products using technologies.

LEGAL AND ETHICAL ISSUES IN DESIGN

'Copyright can be a creator's shield as well as their sword if someone else copies their creative work. Having some knowledge and legal advice can get you a long way.'

Sharon Givoni, author and lawyer

In this chapter:

Learn the language

+ appropriation
+ artistic craftsmanship
+ attribution
+ copyright

+ design registration
+ fair dealing
+ intellectual property
+ moral rights

+ patents
+ standards
+ trademarks

As in any professional area, designers need to consider the legal and ethical issues that affect their field. As professionals, they have responsibilities towards their clients, users and the wider community.

These issues include:

+ copyright
+ intellectual property
+ standards and safety
+ image manipulation
+ cultural sensitivities.

Legal issues are set; they are issues that are defined by law and cannot be breached without serious consequences. Legal regulations apply to designs created and sold in Australia and might include safety regulations and standards that designers are required to adhere to. Ethical concerns are less concrete. They may range from 'Can I work for this client?' or 'Is this a conflict of interest?' to 'Does this design negatively impact those who will see it or use it?'

Designers in all design fields need to take legal issues into account in their work. An architect may be required by council by-laws to consider the effects of a design on the community and make aesthetic judgments with those in mind. The same architect has an obligation to create a safe construction for the client, and there are legal implications if safety is compromised. All designers are faced with issues of copyright and attribution, both in their own work and when using the work of others. Decisions about the use of materials from other sources may be constrained by copyright, costs and licensing restrictions. Likewise, a designer may seek to protect their work under copyright laws.

17.1 INTELLECTUAL PROPERTY

Intellectual property is literally, 'the property of your mind' and refers to the creative production of a new invention, brand, design or artistic creation. In designing a new product, for example, intellectual property rights enable the designer to legally protect their design idea from copies and imitations. Copyright and moral rights are automatically applied to artistic works in Australia. Other areas of intellectual property (IP) are not automatically recognised and a product, design idea or concept must be registered for a given period of time, for a monetary cost. Using the Australian Government's intellectual property

organisation, IP Australia, designers can apply for patents, trademarks and registered designs to protect the originality of their work and ideas. IP Australia takes care of four distinct types of intellectual property: patents, trademarks, designs and plant breeder's rights. The table below outlines the relevant types of intellectual property that are usually registered.

What is protected	Type of IP right	What the IP provides
Art, illustration, literature, music, film, broadcasts and computer programs	Copyright (automatically applied)	The owner's original expression of ideas is protected, though not the ideas themselves. The owner has the exclusive right to use, sell or license the copyrighted work.
Letters, numbers, words, colours, a phrase, sound, smell, logo, shape, picture, aspect of packaging or any combination of these	Trademarks	A trademark identifies the particular goods or services of a trader as distinct from those of other traders. The owner has the exclusive right to use, sell or license the trademark.
The way a product looks or a design on a manufactured product	Designs	The visual appearance of a manufactured product is protected, but not the way it works. The owner has the exclusive right to use, sell or license the registered design.
Inventions	Patents	The owner has the exclusive right to use, sell or license the invention. Patents also allow the owner to stop others from manufacturing, using, copying and/or selling the device or process.

Adapted from www.ipaustralia.gov.au/understanding-intellectual-property/how-to-use-ip/what-can-you-protect/

IP rights are legally enforceable in Australia and protect many designers from copying and misuse of their designs. Areas of design that benefit from IP protections include:

+ architecture
+ digital media
+ exhibition design and display
+ fashion design
+ furniture design
+ graphic design
+ industrial design
+ interior design
+ jewellery design
+ landscape design
+ television, film and set design
+ textile design.

WHO OWNS INTELLECTUAL PROPERTY?

When creating work for a client, the ultimate owner of the design (the intellectual property) is usually established in the contract at the beginning of the design process. In the majority of cases, the contract between client and designer will state that all intellectual property generated becomes the property of the client in return for design fees.

Although a 'normal' contract would assign all IP rights to the client, a designer might negotiate at the beginning with the client over what will be assigned – and under what payment terms – and then write this agreement into the contract. For example, one option is to agree to assign the IP rights to only the final, selected idea, retaining rights to any other design ideas.

INTELLECTUAL PROPERTY RIGHTS

The website of IP Australia provides comprehensive information about all areas of intellectual property. The site explains the key differences between copyright and IP rights and offers visual examples of each IP category: patents, trademarks, designs and plant breeder's rights.

COPYRIGHT

Copyright is designed to protect the products created by writers, designers, artists, composers, filmmakers and other creative professionals. In Australia, copyright is automatically granted to a product once it is put into 'material form' such as being drawn or written down. The owner of the copyright has the right to show, publish or perform the work in the public realm and can prevent others from reproducing the work without explicit permission. The copyright owner may sell the rights to that work or 'assign copyright' to another party.
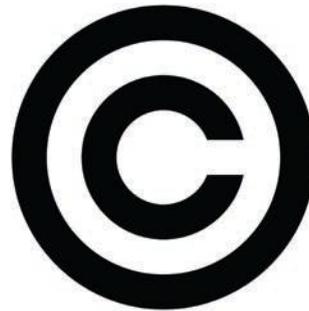
▶ Copyright logo. Even when the logo is not present, copyright still exists under Australian law.
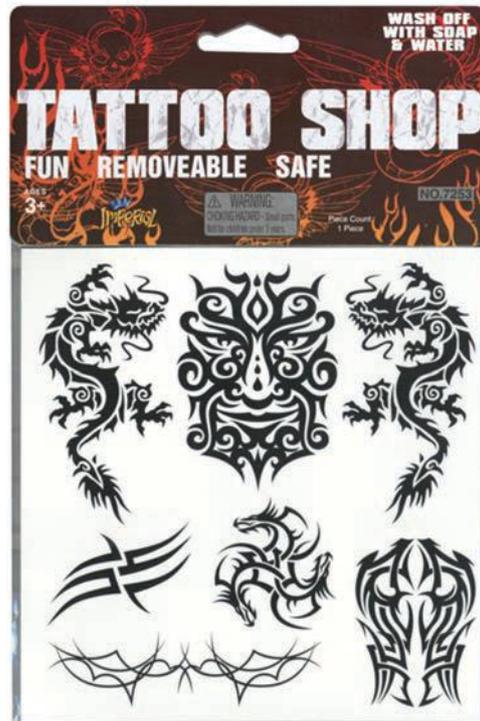
CASE STUDY ~ COPYRIGHT INFRINGEMENT: VON GLITSCHKA

US illustrator and designer Von Glitschka maintains a highly visible profile online, at conferences and as an educator. However, his distinctive work has been used at various times without permission.
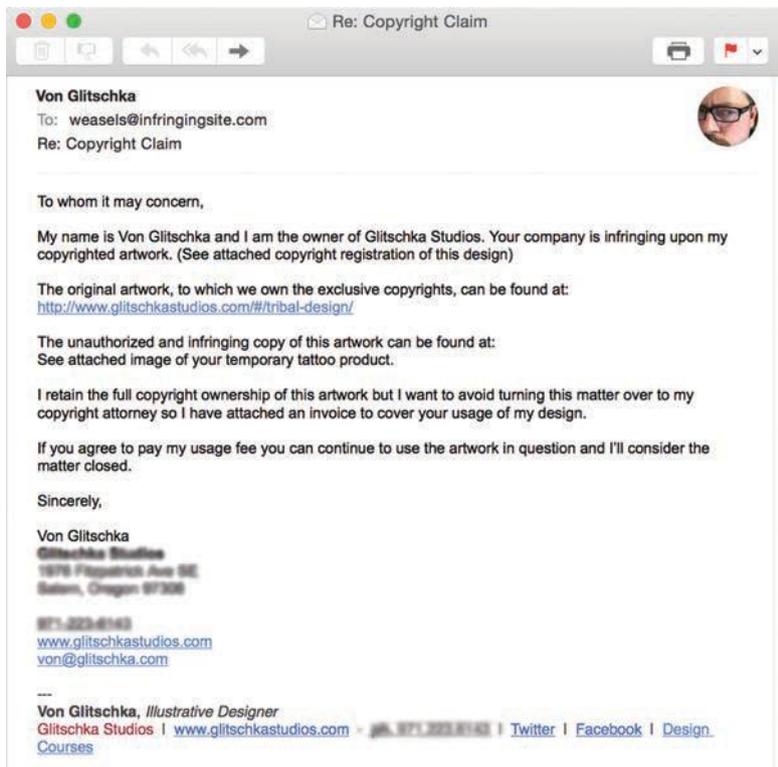
▶ Original artwork by Von Glitschka, as displayed at www.glitschkastudios.com

▶ Product that infringed Von Glitshka's copyright

Re: Copyright Claim

Von Glitschka
To: weasels@infringingsite.com
Re: Copyright Claim

To whom it may concern,

My name is Von Glitschka and I am the owner of Glitschka Studios. Your company is infringing upon my copyrighted artwork. (See attached copyright registration of this design)

The original artwork, to which we own the exclusive copyrights, can be found at:
http://www.glitschkastudios.com/#/tribal-design/

The unauthorized and infringing copy of this artwork can be found at:
See attached image of your temporary tattoo product.

I retain the full copyright ownership of this artwork but I want to avoid turning this matter over to my copyright attorney so I have attached an invoice to cover your usage of my design.

If you agree to pay my usage fee you can continue to use the artwork in question and I'll consider the matter closed.

Sincerely,

Von Glitschka
Glitschka Studios
1976 Fitzpatrick Ave SE
Salem, Oregon 97306

971-223-6143
www.glitschkastudios.com
von@glitschka.com

Von Glitschka, *Illustrative Designer*
Glitschka Studios | www.glitschkastudios.com · ph. 971.223.6143 | Twitter | Facebook | Design Courses

▶ Von Glitschka's initial response is directly to the owner of the infringing materials.

Copyright protects:
+ **artistic works:** paintings, photographs, maps, graphics, cartoons, charts, diagrams and illustrations
+ **literary works:** novels, textbooks, poems, song lyrics, newspaper articles, computer software, computer games
+ **musical works:** melodies, song music, advertising jingles, film scores
+ **dramatic works:** plays, screenplays and choreography
+ **films and moving images:** feature films, short films, documentaries, television programs, interactive games, television advertisements, music videos and video podcasts
+ **sound recordings:** MP3 files, CDs, DVDs, vinyl and tape recordings, podcasts
+ **broadcasts:** pay and free-to-air television and radio.

Copyright does not protect techniques, concepts or ideas, but it does protect their tangible physical representation. An *idea* for a textile design featuring original patterns and illustrations, for example, is not copyrighted; however, copyright law covers the sketches, drawings, prototypes and final design product.

The owner of copyright may be separate from the owner of the designed item. An individual may own the design, yet the copyright to the design remains in the hands of the original copyright owner, who may be the designer or manufacturer.

Many designers use sourced imagery in their work. Copyright images and photographs may be used in publications, websites and other public domains only with the permission of the copyright owner.

CASE STUDY ~ COPYRIGHT AND DESIGN REGISTRATION: LUMIERE ART & CO.

Artist and designer Emma Cleine juggles multiple intellectual property issues in her business, Lumiere Art & Co. Her unique artworks are automatically protected under copyright law. Her cushions, homewares and other products are protected with a combination of copyright and design registrations.

Lumiere Art & Co.

THE COPYRIGHT TIMELINE   FYI

Just because a work appears online does not mean that it is out of copyright. For artistic, literary, musical and dramatic works, the period of copyright protection runs from the time of creation until 70 years after the death of the creator. Films, sound recordings and broadcasts are protected for 70 years from the end of the year in which the work was released. Sometimes it takes some searching and research to identify whether creative products are in or out of copyright. Once out of copyright, a work is considered to be 'in the public domain' and can be used freely.

COPYRIGHT COUNCIL

The Copyright Council supports the copyright needs of creative professionals in Australia. The website offers information organised by profession and features detailed information about all aspects of Australian copyright law. Council members include representatives from the peak professional associations for Australian writers, musicians, photographers, visual artists, journalists, filmmakers and architects.

Copyright for students

The rules for using copyright-protected materials in education are slightly different. Under Australian law, schools have expanded rights to use copyright materials without seeking permission from the copyright owner as long as content remains within the classroom. This doesn't mean open slather for schools. There are still parameters set as to the amount of copyright works that may be copied, displayed and reproduced, but the rules make the use of copyright materials for educational purposes much more flexible.

Sources used by students should always be acknowledged. When using images, the original source of the image should be acknowledged in an annotation that records the original author or copyright owner. If the owner cannot be identified and the image has been sourced from an online location, note the web address or use a screen capture to identify the source. This is called attribution.

If student work is to be displayed publicly, there must be clear acknowledgement and attribution of any content used that has not been created by the student.

DON'T COPY!   FYI

Despite popular belief, it is not OK to change an existing creative work by 10% or 20% and claim that it is no longer protected by copyright. Misuse of copyright material is measured by the term 'substantial'; usually decided on a case-by-case basis. The safest approach is to be inspired but *don't* copy!

Tips for students using the work of others

Most importantly, always identify the source when using the work of others.

You are entitled to use a 'fair' amount of work from other sources for 'research and study' without gaining permission from the copyright owner; this is known as **fair dealing**. Fair dealing requires that the work is used only for research, criticism, satire and parody, or reporting of news. It is likely that most work used in QCE Design will fall under the 'research and study' area.

You are entitled to use the work of others when you have express permission from the copyright owner to do so. You should have evidence of the permission.

You are entitled to use work with a Creative Commons licence that allows use by others (See the Creative Commons guide on page 277 of this chapter).

SMARTCOPYING

This official website is designed for teachers and students at Australian schools and TAFEs. Educational use of resources entails different copyright requirements and these are clearly outlined here.

CASE STUDY ~ COPYRIGHT

As part of her Units 3 & 4 SAT folio, student Stephanie Hosler created a series of original book covers for a re-issue of classic literary works by Oscar Wilde. Wanting to have her work appear as authentic as possible, Stephanie contacted publisher Harper Collins and requested permission to include its logo on her designs. Via email, she received permission from the company to use the logo and was able to document the permission in her development work.
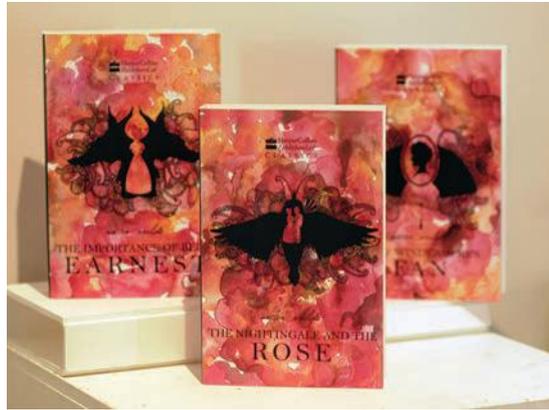
Stephanie Hosler

MORAL RIGHTS

Established under the *Copyright Amendment (Moral Rights) Act* 2000, **moral rights** protect the personal connection between creator and work. Moral rights are designed to address issues of misuse, misrepresentation and distortion of original works. They cannot be sold or transferred, and remain with the original creator (except filmmakers) for the period of their life plus 70 years. These rights protect a work's original 'author', a legal term used to describe communication designers, illustrators, craft makers, architects, musicians, writers and other creatives. Moral rights remain with the original creator even when a work is sold. Copyright to a work can be assigned to another person or entity but the moral rights to that work always remain with the original author/creator.

Moral rights law covers three areas, listed in the table.

Moral right	What is covered
Right of attribution of authorship	The original author of the work has the right to be identified. The creator has a right to correct attribution.
Right against false attribution	The original author has the right to pursue legal action against anyone who falsely attributes their work to someone else.
Right of integrity of authorship	The original author is protected against 'derogatory' treatment of their work. Any distortion, destruction, defacement or alteration that may negatively impact the reputation of the author is not allowed.

FEDERAL REGISTER OF LEGISLATION

For further details on moral rights, read Copyright Amendment (Moral Rights) Act 2000 No. 159, 2000 at the Federal Register of Legislation website.

AUSTRALIAN ATTORNEY-GENERAL

The official website of the Australian Attorney-General offers information about current copyright law.

CASE STUDY ~ MORAL RIGHTS

Designer Nicholas Found and illustrator Emma Morgan collaborated to produce a unique illustrated spoon as a gift. Nick hand-carved the spoon from blackwood using traditional tools and techniques. Emma applied her original drawing by hand to the finished spoon form in permanent black ink. Although the item was then presented as a gift, both Nicholas and Emma jointly retain the moral rights to the final design. Any change or modification to the spoon by the recipient would infringe upon the moral rights of the creators.

Nicholas Found and Emma Morgan

TRADEMARKS

Trademarks distinguish the brand or identity of a business, individual or organisation. A trademark may be a symbol, logo, phrase, name, sound, colour or even smell. Registered trademarks are designed to protect an identity from close copying by a competitor within the same market place or goods and services classification. Trademarks are registered by IP Australia within a defined category of goods and services. For example, trademarked Christmas decorations fall under Class 28 and a bank or insurance company trademark is covered by Class 36. Trademarks can also be registered for distinctive characteristics of a product or service. Famously, Cadbury Chocolate holds registered trademarks for the distinctive purple colour of their packaging and advertising. A patterned design, in the case of David Jones department store's houndstooth design, and a product form such as Coca-Cola's distinctive classic bottle are also protected by registered trademarks.

Trademark registration is a complex process and has high associated costs. It is possible to assert a trademark without registration by placing the figure™ beside a logo; whereas, a registered trademark is represented by the ® symbol. A trademark is not compulsory for a brand or product and you may find that some businesses use similar marks, names and phrases within different goods and services classifications. An application for a trademark will be rejected if it is too similar to an existing trademark within the same classification. It is also important for designers to note that Australian trademark registration only applies within Australia.

PANTONE® and other Pantone trademarks are the property of Pantone LLC. PANTONE Colors may not match PANTONE-identified standards. Consult current PANTONE Fashion, Home + Interiors Publications for the accurate color

► The identity of the Pantone brand is a registered trademark, indicated by the use of the ® symbol.

DESIGN REGISTRATION

Design registration is required when a design has a commercial focus. Three-dimensional designs that would otherwise be protected by copyright, lose that protection when they go into mass production. Subsequently, to protect a design, it may need to be registered with IP Australia. A registered design is protected under law for five years; it covers protection of the visual appearance of a product and allows for exclusive rights to commercially use, license or sell the design. What a design registration does not cover, however, is the function and materials of a design. In registering a design there are three conditions that the product must meet:

+   The design must not have been released or revealed to the public.
+   It must have been kept secret and can only be revealed when IP Australia approves the registration claim.
+   The design must be new and distinctive compared to other products, online, internationally and within Australia.

New – it must not be identical to any design previously disclosed anywhere in the world. This includes anything published anywhere in the world or publicly used in Australia.
Distinctive – it must not be substantially similar in overall impression to any design previously disclosed anywhere in the world. This also includes anything published anywhere in the world or publicly used in Australia.

Source: IP Australia.

Legal rights to the design are only approved once the registration has been 'certified' by IP Australia. This is the final stage of the registration process.

Works of artistic craftsmanship

For many small-scale product designers and makers, design registration is an expensive and cumbersome process. So, according to the Copyright Act, if their work falls under the category of 'works of artistic craftsmanship', they are entitled to copyright protection even when their products may be mass-produced. This classification was designed to protect artisan makers such as potters, furniture makers, jewellers, glass artists and other craftspeople. To qualify for protection under this classification is difficult as there are no clearly articulated rules that define 'artistic craftsmanship' in the Act itself. However, legal sources have established general guidelines.

+   The work should have an element of real artistic/aesthetic quality (as opposed to being overridingly functional or utilitarian).
+   There must be a sufficient degree of skill and craftsmanship involved in the making of the work.
+   'Craftsmanship' does not necessarily require the article to be solely made by hand (it can be made with the assistance of a machine).
+   Evidence of a conscious intention by the artist to produce a work of art is not essential, but can help.

Source: Sharon Givoni, 2015, *Owning It: A Creative's Guide to Copyright, Contracts and the Law*, Creative Minds Publishing, Melbourne, page 259

Sarah Dingwall

▶   Glass artist Sarah Dingwall produces glass jewellery, homewares and decorative items from her studio in Mornington, Victoria. Her designs are protected by copyright as she fulfils the guidelines for 'works of artistic craftsmanship'.

PATENTS

A **patent** is a legal protection for inventions. Patents can be applied to traditional inventions such as appliances and mechanical devices as well as computer-related inventions, business methods, biological inventions, micro-organisms and other biological materials. Artistic products and ideas are not covered by patents. Patents are usually applied to highly innovative products that are otherwise unique.

There are two types of patents: standard and innovation.

Standard patent

A standard patent must be new, involve an inventive step and be able to be made or used in an industry. An inventive step means that the invention is not an obvious thing to do for someone with knowledge and experience in the technological field of the invention. (The) invention must differ in some way from existing technology. This difference must be something more than the simple application of published information or standard background knowledge.

Source: IP Australia.

Innovation patent

An innovation patent provides protection for an invention with a short market life that might be superseded by newer innovations, such as computer-based inventions.

Source: IP Australia.

Like design registration, patents require an approval and certification process administered by IP Australia and are only valid within Australia. Patents for innovation last for up to eight years, while standard patents last for up to 20 years. A patent prevents competitors from producing identical products or systems. Patents and patents pending are identified by a reference number, which can be publicised to deter copycats.

17.2 CREATIVE COMMONS

Creative Commons is an international non-profit organisation that provides free licences to copyright owners to allow others to legally share, reuse and 'remix' their material. Creative Commons was created in direct response to the increasing accessibility of materials online and a perceived lack of control that creators have in the digital domain. A Creative Commons licence is identified by a series of symbols, which indicate the context in which the author of the work is prepared to allow others to use the work. When a creator releases their work under a Creative Commons licence, it is made clear what the user can and cannot do with the work. All Creative Commons licences allow works to be used for educational purposes. Teachers and students can copy, share and often modify a Creative Commons work without seeking permission from the work's creator.

▶ Creative Commons logo

HOW TO ATTRIBUTE A CREATIVE COMMONS WORK

Attribution of a Creative Commons work requires the following:

+ author name
+ title of the work
+ URL where the work was located
+ type of Creative Commons licence attached to the work
+ any copyright notice attached to the work.

CREATIVE COMMONS LICENCE TYPES

Symbol				
Meaning and letter code	Attribution BY	Non-commercial NC	Non-derivative works ND	Share alike SA
Description	This applies to every Creative Commons work. Whenever a work is copied or redistributed under a Creative Commons licence, the original creator (and any other nominated parties) must be credited and a link to the source included.	Allows others to copy, distribute and perform the work for non-commercial purposes only.	Allows others to distribute, display and perform verbatim copies of the work. The work may not be adapted or changed in any way.	Allows others to remix, adapt and build on the work, but only if they distribute the derivative works under the same licence terms that govern the original work.

CREATIVE COMMONS

The organisation supports Creative Commons in Australia and administers the Australian Creative Commons licences. The website features detailed information about licences, including fact sheets and case studies.

HARVARD REFERENCING GENERATOR

The Harvard Referencing Generator is an online tool that can help you to acknowledge your sources easily and quickly. Type in the URL, book title or magazine and the generator will produce a correct citation for you to copy and paste.

17.3 ATTRIBUTION OF RESEARCH

Source attribution is an important skill to learn and there are guides to assist you in correctly documenting your sources. The Harvard system of referencing materials is probably the most widely used.

Generally, the following should be included when attributing non-original content:

+ name of the work (if available)
+ author and/or copyright owner's name (Usually this should be the surname followed by initial but some online content may give you only first name so use what is available or attribute to Anon. if no author can be identified.)
+ URL of the work if found online
+ the origin of the work, if found in a secondary publication (The name of the publication should be identified along with its date of publication.)
+ date of the work
+ date of access or download.

Research	Source	Attribution	Example
Images	Online, e.g. Google Images	Avoid annotations that simply state 'Google Images' or another search engine. Navigate to the source site of the image and copy the URL. The attribution should state: + owner (if known) + \<URL of the image> + [date it was accessed/downloaded].	Image by Jones, J. available from \<www.greatbuildings.com/image_033> [13 May 2018]
Images	Print sources	Include the publication title and date if it originates from a print source. The attribution should state: + owner + title image and/or the article from which it was sourced + name of the print publication + date of publication.	Image by Mavis Davis, 'Australia's ten best photographers', *Design Journal*, Issue 12, 2018 (When annotating an attribution in handwriting, you can emphasise the source by an underline rather than italics, e.g. *Design Journal*.)
Stock images	Online stock photo site	Free stock photo sites will vary in the level of attribution required but most will require the name of the owner of the work. The attribution should state: + owner (if known) + ID (#) number of the image + \<URL of the image or stock site> + [date it was accessed/downloaded].	Image copyright Dani007 #0436721 \<http://sxc.hu> [4 June 2018]
Text	Digital sources, e.g. blogs, Wikipedia articles	Quotes or references directly taken from online sources such as blogs must identify the author and origin. The attribution should state: + author + title of the blog post or article + [date of the blog post or article] + \<URL of the blog> + [the access or download date].	Feagins, L., Interview with Illustrator Dawn Tan [12 September 2011] \<thedesignfiles.net> [30 June 2018]
Text	Books	When using research from a secondary source such as a book, you must also add the publisher name and location of publication. The attribution should state: + author + date of publication + title of the book + publisher, location.	Martin, B., & Hanington, B., 2012, *Universal Methods of Design,* Rockport Publishers, USA (The title should be italicised if using a computer but can be underlined when handwritten.)
Text	Magazines and journals	The article name must be mentioned and depicted in single quotation marks. The attribution should state: + author + date of publication + title of the article name of the publication issue or volume number and date.	Banham, Stephen, 2012, 'The Typeface: Newman', *Desktop Magazine,* No. 279 (Italicise the name of the magazine if using a computer, but underline if handwritten.)
Creative Commons materials	Refer to Creative Commons on pages 276–77 to read about online content that is covered by the Creative Commons' licence structure.		

17.4 STANDARDS

Standards are documented requirements that designers and manufacturers must follow. Standards set out specifications and procedures that ensure that products, services and systems are safe, reliable and consistent. The documents use consistent terminology that defines levels of safety and the quality that products are required to meet. Although standards documents are not legal documents, they are a requirement in Australian design and manufacture and they can be mandated by parliament as compulsory.

There are three kinds of standards: international, regional and national.

INTERNATIONAL STANDARDS

International standards are developed by ISO (International Organization for Standardization), IEC (International Electrotechnical Commission) and ITU (International Telecommunication Union). Australia usually adopts international standards.

REGIONAL STANDARDS

Regional standards are prepared by a specific region, such as the regional standards between Australia and New Zealand.

NATIONAL STANDARDS

National standards are developed by a national standards body. Standards developed under the brand of Australian Standard® are developed within Australia or are adoptions of international standards.

Standards can be published in a range of formats and may include:

+ Australian Standards®
+ international standards and joint standards
+ codes
+ specifications
+ handbooks
+ guidelines.

The Australian Standards® cover many industries including:

+ agriculture, forestry, fishing and food
+ mining
+ manufacturing and processing
+ building and construction
+ electrotechnology and energy
+ water and waste services
+ transport and logistics
+ health and community services
+ consumer products, services and safety
+ education and training services
+ communications, information technology and e-commerce services
+ public safety, public administration and business and management.

▶ Australian standards compliance is important in product design and environment design. Many products feature visual identification that they meet Australian standards, along with the code that represents the relevant standard.

17.5 REGULATIONS

Regulations pertinent to environment design, such as building codes and construction regulations, are considered at every stage of the design process. Affecting architects in particular, government-sanctioned regulations inform decisions about how a building is to be constructed. Regulations may affect issues such as building height, choice of materials, fire safety, energy-efficiency and more. Regulations vary according to state legislation, and local governments can also impose requirements on development and construction. Architects, interior architects and landscape architects are required to address regulatory requirements in their responses to design briefs. Documentation and evidence that all regulations have been addressed and met are an integral part of the design process.

Getty Images Plus/iStock/jandrielombard

▶ All building projects in Australia are bound to regulations from federal, state and local government bodies. Regulations are created to ensure that issues of safety, sustainability and heritage protection are addressed in the earliest stages of the design process.

17.6 USE OF IMAGES

Print media often uses images that have been altered, and the use of software such as Photoshop is often used to retouch and alter the appearance of individuals.

Shutterstock.com/Elena Rudyk

▶ Image of a female face before and after Photoshop retouching

There have been many well-documented cases of celebrities seeking compensation from publishers for overt and exaggerated manipulation of their images. Although there is no specific legislation in Australia that protects people from having their likeness altered without their consent, there are areas of law that offer some protection. Defamation law offers recourse if an individual believes that the alterations to their image cause ridicule, contempt or a loss of reputation, while consumer law protects against deceptive or misleading interpretations of an image. It is important that designers are aware of relevant legislation about image use.

ETHICS IN GRAPHIC DESIGN

Ethics in Graphic Design is an American forum for the discussion of ethical issues in graphic design. Issues range from social responsibilities in design to privacy and copyright.

CHAPTER RECAP

1 You have created illustrations and typography to be used on the album cover for a friend's band. You did not accept financial payment for the design but accepted a number of complimentary albums in return for your work. Who has copyright protection for the album cover?

2 Creative concepts and ideas are protected by copyright law in Australia. True or false?

3 You find that an image of your face has been used in an online advertising campaign without your permission. What are your rights under Australian copyright law?

4 In working for a large graphic design studio, you create the cover of a new textbook. The cover design is your own work and features illustrations in your distinctive personal style. Who owns copyright under Australian law?

5 In designing a website for a client, you wish to use a photographic image from a 1926 book about Art Deco architecture. What are your copyright obligations?

6 Walking through a market, you see a stall selling T-shirts that feature a clear image of an illustration you created and posted on social media. What steps can you take to address this issue?

7 An image you wish to use in a design is labelled 'royalty-free'. Do you still have to acknowledge copyright?

8 In your schoolwork you wish to use images of the Nike 'swoosh' logo. What are you required to document in your folio under Australian copyright law?

9 You allow a close friend to use one of your illustrations as the identity of their new blog, and you shake hands in agreement. Do you still own copyright of your image?

10 You have provided permission for your imagery to be used in a new school textbook. On publication you notice significant changes to the image and it appears distorted. Explain your moral rights in this situation.

11 As an industrial designer you have created a visually unusual and innovative vegetable peeler. The appearance and shape of the peeler is unlike any other product on the market. How can you protect the uniqueness of your new design under Australian law?

12 Architectural plans are not protected under Australian copyright law. True or false?

13 If you pay someone to use an image that they have created, who owns copyright under Australian law?

14 If you change 20 per cent of an image by using Photoshop, it is no longer covered by copyright law. True or false?

15 If you are prepared to pay enough money, it is possible to purchase the moral rights to an artwork. True or false?

DESIGN IN A PROFESSIONAL CONTEXT

'Be fascinated by the world and all its wonders, absurdities, failings and mishaps.'

John Hegarty in Hegarty on Creativity: There are No Rules, *Thames and Hudson 2014*

In this chapter:

Learn the language

+ dynamics   + ethics   + professionalism   + responsibilities

18.1 DESIGN INDUSTRY PRACTICE

Each area of design, including architecture, digital media design, fashion design, graphic (communication) design, industrial design, interior design and landscape architecture has its own language, traditions, origins and influences that distinguish it from other professional fields. Designers in all areas follow best-practice processes to make the most efficient use of time, skills and resources. This chapter goes some way towards explaining the skills, responsibilities and design processes applied by design professionals.

Design is a fluid professional field and designers may find themselves working independently or within a team at different times in their careers. Much design is collaborative and involves cross-disciplinary teams made up of professionals with specific skill sets. Other designers work across disciplines, combining product and interior design, architectural design and landscape design, graphic design and multimedia design. Design is a profession that is dynamic and ever-changing.

DESIGN PROFESSIONALS

Freelance designers

Freelance designers are individuals who work independently rather than as an employee of a design business or other organisation. Often, freelancers operate as a one-person firm, the smallest of small businesses. They may work from a home-based office or in a shared studio with other professionals. Freelance designers, illustrators, photographers, animators and other creative professionals acquire work from direct contact with clients or as an external contractor, employed by an advertising agency or design firm on a short-term basis as part of a larger team.

A freelance designer is usually responsible not only for their creative output but also for the administrative aspects of their business, such as finance, tax and all communications. For many, the appeal of freelance work lies in its autonomy and independence but, as with many small and single-person businesses, the working conditions are dependent on the amount of work available.

Design studios

Many designers work for studios, which can vary in size from small partnerships to large organisations. Within a design studio, the designer rarely works alone on a project, and is often part of a large team. The team may include a creative director or project manager whose role is to manage the project itself and the professionals involved in the project's development and production. A design team may consist of designers, administrative staff and support staff, as well as external contractors and consultants. Contact with the client may be restricted to the creative director, project manager or partner of the studio, who will then pass on the client needs and details of the brief to the larger team, usually at team meetings. A team structure provides a creative network for the flow of ideas and possible concepts, and facilitates feedback and evaluation. Unlike freelancers, designers who work for design studios are often provided with administrative support, thereby enabling them to focus entirely on the creative aspects of the design process. Dynamics within a professional team vary according to the personalities and perspectives within a group. Management of highly creative teams can be challenging, and the most effective teams work when ideas and opinions are respected and valued. Processes for decision-making vary with design contexts, but a team leader, art director or principal designer often has the task of synthesising team ideas into one or more design proposals.

In-house designers

Large organisations often employ designers to manage design tasks in-house. Many government organisations and private companies have full-time design teams working as an integral part of the company. Companies such as automotive manufacturers or film production companies, for example, require the services of designers as an essential part of their product design and development.

Although the focus of a company or organisation, such as a hospital or airport, may be fundamentally unrelated to design, there is often a requirement for the design and production of materials for promotion, employee training, shareholder information and the like. Some organisations may need designers to produce annual reports, signage, newsletters and training materials.

Although many companies and organisations outsource work to independent design firms, for large projects, such as corporate identity design, they often employ in-house designers to manage the ongoing application of that identity and to produce company- or organisation-specific materials.

Regardless of the variety of approaches and professional circumstances, there are many similarities in the way professional designers approach key aspects of the design process.

DESIGN INSTITUTE OF AUSTRALIA

Visit the DIA website for a detailed outline of its code of conduct.

PROFESSIONALISM AND ETHICS

Professional associations for designers exist in Australia and internationally as entities that promote and advocate for design, create codes of ethics, facilitate networking and support designers in their professional careers. Organisations such as the Australian Institute of Architects (AIA), the Design Institute of Australia (DIA) and the Australian Graphic Design Association (AGDA) provide designers with information, advocacy and guidance. Members of a professional association abide by an agreed code of ethics that usually covers levels of professional behaviour, good business practice and relationships with stakeholders. For example, the Design Institute of Australia provides clear ethical guidance for members on its website, which includes guidelines for dealing with the community ('A designer accepts a professional obligation to further the social and aesthetic standards of the community…'), clients ('A designer shall act in the client's interests within the limits of the designer's professional duties') and other designers ('A designer must not attempt, directly or indirectly, to supplant another designer who has a firm commitment with a client in relation to a particular project.').

Source: Design Institute of Australia Code of Ethics, Sections 3.1, 4.1 and 5.1, https://www.design.org.au/code-of-ethics

Research methods undertaken by designers	Skills utilised by designers	Collaborative practices applied by designers	Specialist practitioners who may work in collaboration with designers	Evaluation techniques used by designers	Legal and ethical considerations faced by designers
Communication design (graphic designer, communication designer, digital media designer)					
Observation of environment Books Internet Site visits Photographs Past experiences Market research Seasonal trends Client history Market history Conferences and networking	Communication Drawing Computer (esp. Photoshop, Illustrator and InDesign) Visualisation Selection of appropriate materials and media Organisational	Team meetings in person or using video applications Digital communications including collaborative online spaces to share ideas Briefings with art directors and clients	Photographer Printer Web Designer Copywriter Illustrator Animator Photoshop retouch artist Typographer	Mock-ups or rough drafts The success of the design based on sales or statistics Post-design analysis to determine client satisfaction and usability of the product/design/ environment Referral by the client User questionnaires and market research Client satisfaction	Attribution Copyright Cultural sensitivities Image manipulation Plagiarism Sustainability Issues of appropriation

Environment design (architect, interior designer, landscape architect)					
Books Magazines Internet Site visits and evaluation (Site Analysis) Observation of location Environmental and historical area research Analysis of client's needs Existing and historical buildings	Drawing 3D model construction Project management (e.g. planning, budgeting) Understanding of materials Ability to read and understand plans and technical drawings Skill in the use of appropriate terminology Understanding of building standards	Team meetings with multi-disciplinary teams, including interior and landscape professionals Site meetings in the physical space or location including surveyors, engineers, trades and client	Model maker Builder and construction professionals Computer 3D artist Interior designer Engineers (e.g. structural) Draftsperson Planning professionals	Mock-ups or rough drafts The success of the design based on sales or statistics Post-design analysis to determine client satisfaction and usability of the product/design/ environment Referral by the client User questionnaires and market research Client satisfaction	Safety Building regulations Sustainability Plagiarism Contractual legalities Attribution Cultural sensitivities
Observation Books Magazines Internet The space/ environment Existing style of the building/ space Trends	Visualisation skills Good taste Ability to create themes and integrate varied design elements Interpretation of trends Drawing skills Management of varied materials and elements together		Architect Tradespeople (e.g. painters, upholsterers) Lighting designer Textile designer		
Climate Land forms Soil quality History/ background of the site	Horticultural knowledge Environmental knowledge Drawing skills Skill in interpretation of plans		Architect Interior designer Horticulturalist Nursery		
Industrial & product design (industrial designer, product designer)					
Sample materials Similar products Observation and analysis of competitor products Environmental factors Safety and manufacturing standards Ergonomics	Practical modelling skills Computer skills (esp. 3D) Use of appropriate technical language/ terminology Organisational and planning	Team meetings within product-specific groups that may include designers, engineers, software specialists Digital communications including collaborative online spaces to share ideas	Model maker 3D computer-modelling artist Engineers (e.g. electrical, systems) Manufacturer Toolmaker	Mock-ups or rough drafts The success of the design based on sales or statistics Post-design analysis to determine client satisfaction and usability of the product/ design/ environment Referral by the client User questionnaires and market research Client satisfaction	Safety Building regulations Sustainability Plagiarism Contractual legalities

Research methods undertaken by designers	Skills utilised by designers	Collaborative practices applied by designers	Specialist practitioners who may work in collaboration with designers	Evaluation techniques used by designers	Legal and ethical considerations faced by designers
Fashion & textile design (fashion designer, textile designer)					
Observation of current trends Magazines Fashion shows Themes and ideas/ stories Trend forecasting Analysis of target audience Research of materials, fabrics, patterns for wearability and suitability	Sewing Knowledge of the qualities and characteristics of materials and fabrics Drawing Visualisation Ability to forecast or interpret trends Organisational and planning	Team meetings that may be directed by the lead designer or design partnership	Stylists Photographers Sewing staff/ machinists Pattern maker Model Graphic designer Makeup artist	Toile to evaluate the design success of a garment before expensive construction is undertaken Sales, promotion and visibility within the marketplace are indicators of success Social media response	Attribution Copyright Cultural sensitivities Sustainability Issues of appropriation

18.2 PROFESSIONAL DESIGN AREAS

GRAPHIC DESIGN/ COMMUNICATION DESIGN

The origins of communication design (also called graphic design) lie in the developments of typography in Europe from the 15th century onwards. The creation of the printing press and 'movable type' enabled mass production of printed materials and radicalised the way the written word was distributed. However, the design of graphic materials was not established as a separate and recognised practice until the early 20th century when attention began to be paid to the composition and layout of books, posters and other printed matter.

Kleine Dada Soiree (Small Dada Evening), poster by Theo van Doesburg and Kurt Schwitters, 1923

The position of communication design as a respected profession occurred later still, in the 1950s, when the design principles of the International Style were reflected in the corporate logos, film posters and publication designs of the era. Highly influential designers such as Saul Bass, Paul Rand and Milton Glaser were regarded as pioneers of modern communication design and established many of the fundamental elements and principles of design that are in use today, such as the use of Swiss typefaces including Helvetica, the use of white space and grid systems.

▶ Before the evolution of communication design as a design field in the late 1950s, printed materials often featured imagery created by artists and illustrators.

▶ This movie poster was designed in 1966 by Saul Bass, who is recognised as one of the pioneers of modernism in communication design.

The rise of communication design as a profession increased dramatically in the late 20th and early 21st centuries. It was during this time that the significance of logos and corporate branding grew. Communication designers were in demand to create corporate identities for businesses, governments and the not-for-profit sector. A recognisable visual identity and brand become essential for organisations in an increasingly competitive and developing marketplace. The role of the communication designer in brand identity, brand development and brand management remains a key aspect of the design area today.

CASE STUDY ~ VON GLITSCHKA

Von Glitschka is a US-based communication designer who is renowned for his distinctive illustrations and logo designs. Von generously shares his design process in online videos. He is a noted speaker, teacher and designer as well as the founder of the '5ive minute logo'!

Von describes his process for identity design:

My general systematic approach is the same on all projects but for a logo design project:
+ quote a project
+ send brief
+ review brief and follow up with more questions
+ sit on project and do my own research and let everything slow boil to formulate ideas
+ draw out any ideas and isolate my strongest directions
+ design close-to-final comps
+ make any revisions necessary
+ set up final art files and style guide
+ design any identity pieces like business card, letterhead, etc.
+ prepare all files for print vendor if needed
+ invoice.

From album covers and rock posters to political slogans and online campaigns, communication design has expressed dissent, new ideas, political affiliations and protests. It has been used to create amusements of minimal importance, such as memes of disgruntled cats that proliferate on the Internet, to tools of mass change, such as Shepard Fairey's 'HOPE' poster for the 2008 Obama presidential campaign.

The design of visual messages and meanings in our highly visual culture has become integrated into our lives; consider street signage, warning labels and advertising, which serve to inform, instruct and entice viewers respectively. In its short life, the profession of graphic design has become a respected and influential one.

▶ One of the most popular public awareness campaigns in history, 'Dumb Ways to Die', included a catchy song, animations and characters to promote safety around trains. The campaign was shared online, won multiple awards and has spawned collectible merchandise.

What do communication designers do?

Communication designers work with type and images to create a wide range of graphical products in print and digital media. Common projects for graphic designers include logos and corporate branding, packaging, posters, signage/wayfinding systems, publication design, website design and interactive multimedia.

Communication designers work for a range of clients across all business, government and not-for-profit sectors. Their work is diverse and often offers opportunity for creative design solutions. Advertising and corporate branding are two key areas for communication designers. Some communication design studios specialise in branding, offering businesses and organisations a comprehensive design focus to suit their needs.

The rise of the Internet from the mid-1990s has seen online visuals evolve from clumsy HTML to sophisticated interactive sites where graphics are designed for user interaction as a priority. The most successful online brands that apply effective user interface design demonstrate the skills of talented communication designers. The expanding area of user experience design is established in the realm of communication design. However, access to design software, stock images and social media has meant that the creation of a logo, illustration or graphic is accessible to many, including non-designers, with mixed results.

Communication design is an area where innovation and experimentation have reflected social change.

Designed by Yiying Lu for Wasabi Warrior

► Communication designer Yiying Lu has a diverse set of skills, from packaging and identity design to illustration and animation.

What skill sets do communication designers have?

Tertiary institutions offer qualifications in communication design (also called graphic design or visual communication) and each course offers a variety of subjects in areas such as traditional print and digital media, typography, branding and identity design, two- and three-dimensional design, motion graphics, illustration and photography. Designers have opportunities to build knowledge of design theory and analysis as well as practical skills. In their professional lives, communication designers are often multi-skilled with abilities in drawing, illustration, digital media and design software, such as Adobe Illustrator, InDesign and Photoshop, and motion-graphics programs. As in other design areas, the ability to communicate well with clients and work with other design professionals is advantageous.

Whom do communication designers work with?

Although many communication designers specialise in design areas such as print or digital media, they can be required to collaborate or seek assistance from specialist practitioners. They may work as part of a cross-disciplinary team or require the service of a specialist to complete a final design product. Specialists include printers, exhibition and display designers, multimedia specialists and website designers, game and animation designers, illustrators, photographers, sign writers, industrial designers and advertising art directors.

What resources do communication designers use?

Contemporary communication designers generally use computers for the bulk of their design work. Drawing may still be an important part of the design process, particularly in the early stages when visualisation and ideation are required. However, the main tools used in graphic design are design software packages, including Adobe Illustrator, Photoshop and InDesign. Motion graphics may be created in Final Cut Pro or Premiere Pro.

Designers often use tablets to input and edit design ideas digitally, and two-dimensional printing technologies are often used for the proofing of final artwork. Additional resources that might be found in a graphic designer's toolkit are Pantone colour swatches for colour selection, a camera for collecting research and a library of books and magazines that document contemporary trends in global design.

Significant communication designers

Milton Glaser, Deborah Sussman, Saul Bass, Paula Scher, Stefan Sagmeister, Vince Frost, April Greiman, Michael C Place (Build), Katherine McCoy, Von Glitschka, Stephen Banham

INDUSTRIAL DESIGN

Industrial design (also known as product design) is an area of design established in the mid-19th century during the latter part of the Industrial Revolution. As a design discipline, industrial design can be traced back to the influential design movements of the early 20th century in Europe including the Deutscher Werkbund and the Bauhaus (discussed in Chapter 16). Members of both movements recognised that a formal visual language of function was overtaking the decorative designs of previous art and design movements (such as Art Nouveau). In the chaos of the First World War and its aftermath, designers identified a need for accessible, standardised, simple forms and eschewed the highly decorative and hand-built in favour of a streamlined 'machine aesthetic'.

Getty Images/iStock Unreleased/senorcampesino

▶ Bauhaus, Dessau main building designed by Walter Gropius, 1925–26, 'Bauhaus' logotype by Herbert Bayer

The alumni of the Bauhaus influenced design around the world and led to the development of the highly influential International Style, seen as most typical of the clean lines of modernist design. The characteristics of modernism still influence many contemporary industrial designs: the focus on function, the application of clean, unambiguous forms and the innovative use of materials.

Architect and designer Dieter Rams, as chief of design at German company Braun, was highly influential in the design of consumer products. His modernist designs for shavers, audiovisual equipment and small domestic appliances were highly influential and many are still in production today. Most famously, Rams defined 10 Principles of Good Design, which are celebrated as defining effective modern industrial design (See Chapter 12).

CASE STUDY ~ KARTELL

Anna Castelli Ferrieri and Giulio Castelli established Kartell in 1949 in Milan, Italy. Using plastics technology, the company was quickly recognised for its innovative designs and pops of bright colour to create homewares and furniture. Ferrieri's design of the Componibili modular storage units in the 1960s was acknowledged as highly progressive and the storage units are still in demand. The Componibili units, along with other Kartell products, are valued for their adaptability, simplicity and functionality. The company is seen as an innovator in plastics technology, and collaborations with leading designers such as Philippe Starck have resulted in innovations including his iconic transparent polycarbonate furniture.

Componibili designed by Anna Castelli Ferrieri for Kartell

Louis Ghost Kartell, designed by Philippe Starck

What do industrial designers do?

Industrial designers consider form and function to create consumer or industrial products both large and small, including but not limited to motor vehicles, consumer electronics, lighting, furniture, medical equipment, toys, recreational products, industrial machinery and water craft. Most industrial designers strive to create products that are sustainable, efficient and effective by using innovative technologies and materials, principles of design and appealing aesthetics. Industrial designers are usually conceptual thinkers who are trained to respond to design problems in practical yet creative ways. They are required to work confidently to a design brief in the development of effective, attractive and marketable products, from initial research through to final prototype.

What skill sets do industrial designers have?

In training at university level, industrial designers develop skills in specialist materials and manufacturing, ergonomics and engineering. They undertake three-dimensional design and drawing studies to assist them in experimenting with ideas and documenting their design process. Industrial designers often use design sketching to visualise their early design ideas and this is a key part of their design process. Using pictorial drawing methods, such as isometric or perspective drawing, designers sketch and render their ideas before venturing into digital media. Graduate industrial designers may specialise in an area of interest or offer general skills. Specialist designers may include automotive designers, furniture designers and lighting designers. Generalist industrial designers may be required to design a wider variety of products from hair dryers and kettles to gymnasium equipment and water bottles. Manufacturers often approach industrial designers with an idea for a product for which the designer will be engaged to visualise and make real. The ability to communicate with clients and the ability to interact with other specialists are additional skills that an industrial designer needs to acquire.
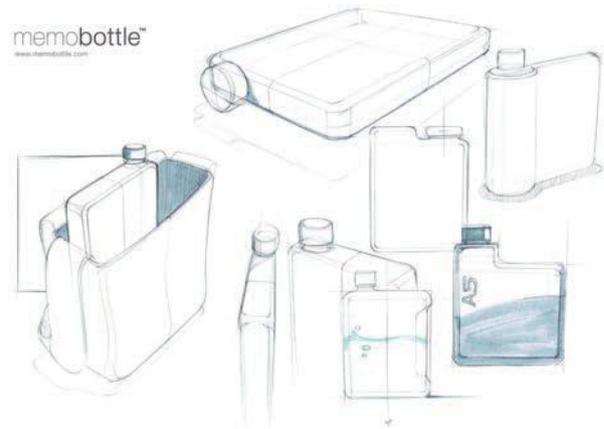
Memobottle, Designer: Jesse Leeworthy, Co-founder Jonathan Byrt

▶ Development sketches of the innovative Memobottle; a significant redesign of traditional water bottles. Industrial designers are highly skilled in visualising product concepts through drawing. Drawing ideas mean that communication of the functions, appearance and forms of products can be visualised before the expensive stages of prototyping and manufacture.

Memobottle, Designer: Jesse Leeworthy, Co-founder Jonathan Byrt

▶ The final Memobottle products

Whom do industrial designers work with?

Industrial designers work with a range of specialists. Although industrial designers often have a comprehensive understanding of how a product works, they also rely on the expertise of others to ensure that needs such as safety, functionality, durability and reliability are met. Working on a small domestic appliance, such as a blender, an industrial designer may need to consult with an electrical or systems engineer whose role it is to create an interactive interface for the product. Engineers often work with industrial designers, bringing their specific technical expertise to projects; in the automotive industry, engineers and industrial designers work in close partnership.

Although most industrial designers are required to produce models during their studies, for some professional projects, a model maker may be called upon to create a prototype of a design. Often, prototypes are used for testing and evaluation before the expensive manufacturing process begins; for example, all new motor vehicle designs are created in clay as part of the design process. Similarly, a specialist three-dimensional digital modeller may be involved in creating digital representations of the final design.

What resources do industrial designers use?

Industrial designers are required to maintain a wide knowledge of innovations in materials and technologies. Advancements in materials and manufacturing processes can increase the durability, sustainability and functionality of products, so it is essential that designers remain up-to-date. Designers might access sample materials, attend conferences and seminars, and use online resources and magazines to enhance their knowledge of changes and trends in design.

Product designs are invariably bound by manufacturing standards and regulations. Familiarity with Australian and international standards is essential to ensure that new designs are compliant. Industrial designers need to access information about user-related factors in their designs including ergonomics, interface design and aesthetic preferences. Research is a key component in building knowledge about these factors.

The rise of crowdfunding through sites such as Kickstarter and Pozible means that designers can propose and fund products using investment from a wide range of sources. Production requires significant investment and capital; crowdfunding enables small design studios and individual designers to create products outside the traditional model of industrial manufacture.

Similarly, advancements in 3D-printing technologies have meant that product designs can be produced on a smaller scale, without investment in machine set-up or 'tooling' for manufacture.

What technologies do industrial designers use?

Industrial designers use a wide range of design technologies, from pencils, pens and markers for design sketching to sophisticated CADD software such as Revit, SolidWorks and AutoCAD. They use 2D- and 3D-printing technologies to create plans and prototypes of product designs and a range of modelling techniques, including moulding, forming and constructing to create scale models.

Significant industrial designers

Dieter Rams, Raymond Loewy, Marc Newson, Philippe Starck, Karim Rashid, IDEO, Smart Design, Hilary Cottam

FASHION AND TEXTILE DESIGN

Fashion and textile design is an expansive area of design that is heavily influenced by cultural and aesthetic factors. Clothing is a basic human need, yet fashion is a complex social tool that has the power to define identity, socioeconomic standing, cultural background, age and gender. The design of clothing and textiles is more than a response to the need for coverage and comfort; instead, fashion often sets trends and guides our preferences for colour, texture, styling and appearance. Fashion and textiles change rapidly and can influence the aesthetic desires of wearers. The history of fashion and textiles is vast and there are many books, articles and websites that delve deeply into the changes that have occurred in clothing designed for men and women over time. Fashion has been a reflection of social mores, religious and cultural preoccupations and the practical needs of the wearer. Fashion and textile design is both a material practice and an agent of

social change. Historically, the garments and fabrics, colours and patterns worn by individuals denoted social standing, gender and influence. Richly coloured fabrics may have indicated wealth and status, while less refined materials were worn by individuals of lower social standing. Women's fashion especially has mirrored social expectations over time. The garments, embellishments and accessories women wore were often evidence of their status, from heavily corseted, cinched-waisted garments that idealised, restricted and exaggerated the female figure to the relative freedom of trousers and unstructured garments during the rise of the suffragette movement in the early 20th century. Social and cultural expectations still influence what women, and some men, can wear within communities such as religious groups. At the other end of the spectrum, individualism and personal identity are also symbolised through fashion and textile choices that might define the wearer as, for example, a punk, goth or hippie.

As with other areas of design, fashion in a postmodern context challenges the norm; the avant-garde and experimental fashion by Japanese designers such as Yohji Yamamoto and Comme des Garcons are good examples of fashion that tests traditional forms.

What do fashion and textile designers do?

Fashion and textile designers create garments, fabrics and accessories. They consider fabrics, structure, form and trends to create garments and products that appeal to consumers. High-profile fashion designers and fashion brands often 'show' their work at seasonal fashion shows where garments are modelled for the fashion press, bloggers and influencers. The vast majority of fashion and textile designers work for brands that have a retail focus. They may design silhouettes and forms, patterns and prints that appeal to a wide consumer base and are sold to a broad audience. Demand for new designs in fashion and fabric has led to the rise of 'fast fashion' in recent years, where brands turn over large quantities of cheaply manufactured clothing in short time periods. This has raised issues of sustainability and wasteful consumerism. Some designers work as freelance designers in both textiles and fashion. The rise of the Maker Movement and appreciation for artisanal, handmade products has led to individuals and studios designing, marketing and selling their designs at markets and online. Designers working in fashion may also create jewellery, headwear, footwear and accessories such as wraps, scarves and undergarments.

Akira, Sydney (fashion house), Akira Isogawa (designer), Dress 2008 [Resort 2009], silk (satin) 71.0 cm (centre back) 34.0 cm (waist, flat), National Gallery of Victoria, Melbourne, Purchased, Victorian Foundation for Living Australian Artists, 2008 (2008.558)
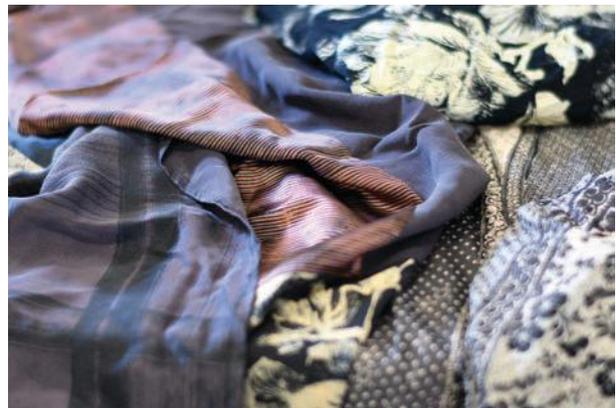
Kristen Guthrie

What skill sets do fashion and textile designers have?

Designers in fashion and textiles have a varied set of skills and come from diverse backgrounds. Both areas tend to intersect, with many fashion designers creating their own textiles and materials. Similarly, many textile designers create garments and 'wearable art'. Textile designers use a range of physical and digital skills to create fabrics. Methods may include felting, weaving, dyeing, knitting, tapestry, embroidery and printing (screen printing, wood- or linocut printing and digital printing). Vector software such as Adobe Illustrator is often used to create patterns, and designers may use the tools in the program itself or scan images, artworks or textures.
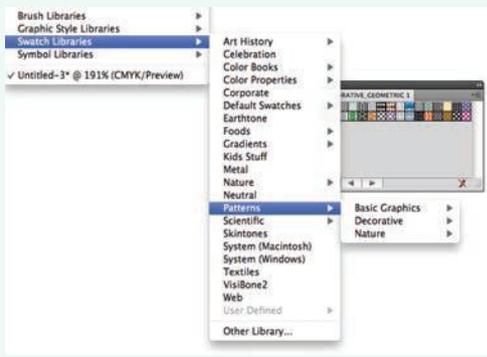
PATTERN

In vector programs such as Adobe Illustrator, it is possible to use existing patterns or to create 'swatches' of your own design that can then be tiled into seamless patterns. Just remember to make sure that there is a link between elements so that joins cannot be seen.

depict the movement and structure with loosely executed lines, shapes and textures.

Getty Images/Conde Nast Collection/Rene Bouet-Willaumez

Fashion designers also use a range of techniques to construct and embellish their designs; techniques range from traditional machine sewing to embroidery, patchwork and 3D printing. Designers use drawings to devise ideas and themes and many fashion drawings

Where fashion illustrations convey the 'feel' of a garment, fashion flat drawings are used for pattern making and manufacturing. They are simple drawings that convey the detailing and structure of a garment using two-dimensional drawing. Designers may create such images using Illustrator, or employ a specialist.
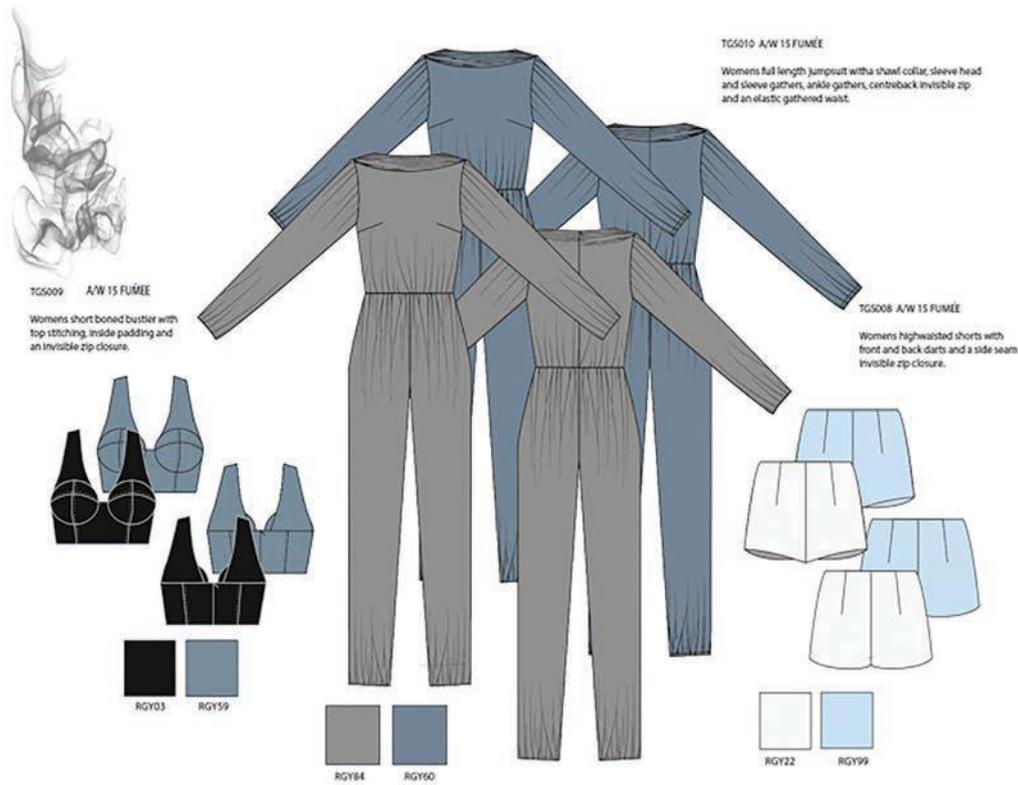
Georgina Cowin

CASE STUDY ~ ROMANCE WAS BORN

Established in 2005 by designers Anna Plunkett and Luke Sales, Romance Was Born is a highly innovative Australian fashion label that combines fashion and textile design. Using unique patterns and prints, embellishments such as embroidery, and techniques that include crochet, the brand is recognised for its singular and individual style. The brand has collaborated with iconic Australian fashion and textile designers such as Linda Jackson and Jenny Kee, with its runway shows attracting a high level of interest for theatricality and colour. The designers see their fashion as having emotional qualities and translate such ideas into an expressive application of colour, texture and construction. '[Fashion means]…ultimate freedom. Fashion is such a powerful thing. Everyone should be able to wear what they want and be who they want to be.'

Source: Anna Plunkett and Luke Sales, Romance Was Born, quoted in *Australian Style: The Who's Who of Fashion* by Lisa The and Thom Wilton, Thames and Hudson, Australia 2017.

Whom do fashion and textile designers work with?

In the construction of garments and textiles, designers work with a range of specialists. In the design of garments, designers work with pattern makers to translate a sketched design into a pattern that can be cut and sewn. Sample garments are sewn or a toile created to evaluate a design and this is usually completed by a sewing professional. Haute couture (high fashion) garments are usually hand sewn and subsequently come with a very high price tag. Mostly, garments are manufactured in specialist factories and designers develop relationships with manufacturers who fabricate finished garments.

Designers may utilise photographers and stylists to document their work for marketing and social media. A lookbook is a presentation, in digital or printed form, that showcases the current designs of a design or label. These are often professionally styled, photographed and printed. Retailers and designers may have a direct relationship, but usually, designers are represented by a fashion agency that may sell a range of different designers to retailers within Australia and overseas. Increasingly, some designers work with social media influencers who, for a small fee or free products, showcase designs to their followers.

What resources do fashion and textile designers use?

Fashion and textile designs are like artworks in that their influences can be broad, determined by the individual designer and affected by the techniques involved in production. Designers rely on inspiration and imagination to spark creative ideas and textiles. Often, fashion designs mine past trends and styles, acquiring and changing features that may have been evident in garments from decades before. Seasons can influence designers and impact fabric choice and clothing styles. Trends, social change, street culture and issues are often incorporated into fashion design. Some designers seek ideas from urban youth culture, identifying shifts in the cultural landscape and interpreting creative ideas initiated by music and social media. Resources for inspiration are extensive and may include observation, trend forecasting and an analysis of popular culture.

Significant fashion and textile designers

Yohji Yamamoto, Comme des Garcons, Martin Grant, Vivienne Westwood, Georgia Chapman, Spacecraft, Missoni, Jean-Paul Gaultier, Romance Was Born, Akira Isogawa

ENVIRONMENT DESIGN

The design of environments for human shelter and comfort is evident in much of history. Environment design, including architecture, interior design and landscape architecture, has a long tradition that links back to ancient civilisations. It is possible to identify cultural and historical change through the appearance

and function of architectural structures, interiors, parks and gardens.

Structural and aesthetic developments in architecture, interior design and landscape design are often a reflection of the times in which they were built. The most magnificent churches and temples were constructed when religious institutions were at their most influential. Castles and palaces were designed to reflect the status and power of those who commissioned them. In more recent times, corporate wealth has often been celebrated by the building of bigger, taller and more imposing office towers. However, not all environment design is about imposing structures; domestic architecture has evolved to embrace secure and comfortable dwellings that reflect the aesthetic of their time and location.

Today, we still use many classical architectural conventions that can be traced back to ancient Greece and Rome. Domes, vaults and arches are structural innovations that first appeared more than 2000 years ago, designed by Romans such as Pollio, then rediscovered and refined during the Renaissance by great architects such as Brunelleschi and Alberti.

Designers who have responded to the needs identified by client, location and climate have formed our modern environment over many years. Changing technologies and materials have defined the form, height and appearance of structures. For example, skyscrapers are a 19th- and 20th-century development that evolved from advancements in engineering. In Australia, our built environment has often been defined by climate and lifestyle; examples include the iconic Australian designs of domestic homes, government buildings and parks reflected in colonial, federation and tropical architecture.

Design of the environment is an area where innovation and experimentation are publicly debated, challenged and celebrated. Developments in materials and construction, shifts in aesthetics and taste as well as changes in urban-planning priorities combine to stimulate innovative and confronting spatial designs. Given its highly visible and public nature, this area of design can, at times, be the most controversial, with many designers required to address the response of the public in addition to clients and stakeholders.

Glass House by Philip Johnson (exterior) in New Canaan, CT, USA by Staib 14 June 2009. Released under a Creative Commons Attribution-Share Alike 3.0 Unported licence.

▶ Glass House, 1949 by Philip Johnson. The design of the landscape was by David Whitney. The design of Johnson's Glass House was inspired by the Farnsworth House by architect and former Bauhaus member Ludwig Mies van der Rohe.

CASE STUDY ~ AUSTIN MAYNARD ARCHITECTS

Innovative design studio Austin Maynard Architects facilitates a highly collaborative relationship between the studio and client. The resulting designs are often playful, creative, functional and memorable.

At Austin Maynard Architects we ask users to be the authors of their spaces and their city. We work directly with occupants to ensure we understand their wants and needs. It is through this collaborative approach that the richness in our work emerges. We ask for open participation from clients and encourage them to draw, research, question and engage.

Source: Austin Maynard Architects

designstrategy
planning
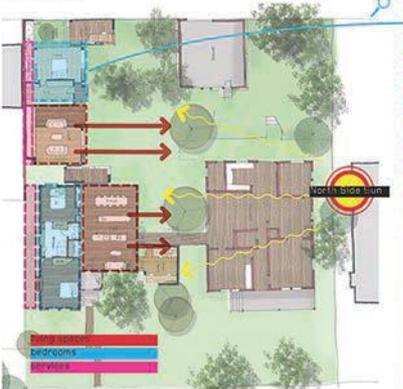
programme strategy
setting 3 clear programme zones allows a simple and effective floor layout, running the services along the south which acts as a buffer between the neighbours and the bedrooms. Moving the living spaces to the north encourages passive solar gain and activates the outdoor spaces.

the 'houses' are separated with a glazed section between them, allowing a slither of light to stream into the house and to accentuate the definition between forms, while also giving you a glimpse of the sky.
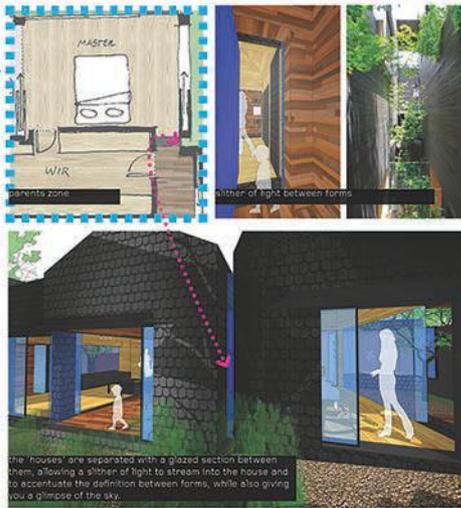
designstrategy
study tower

instead of a floor, we can install a netting above the study space, great space to relax and read a book, the netting will also allow light to pass through and filter down to the bottom

Austin Maynard Architects (all on page)

Generational change usually sees cutting-edge environment design practices absorbed and adapted over time. For example, Philip Johnson's 1949 steel-framed Glass House eschewed solid walls for sheets of glass that embraced the surrounding landscape. At the time, such a design challenged the architectural norms, while the use of glass walls and open-plan spaces are common aspects of contemporary house design.

What do architects do?

Architects are concerned with creating, enhancing and defining the built environment. Working with space and form, architects work closely with their clients to create environments that meet needs and solve design problems. They work on domestic, public, cultural and private commercial buildings on small and large scales. Architects generally work as part of a team, with assistance from junior designers and project managers. They work with builders, engineers, site managers and construction industries to see the original design take shape. Their work demonstrates a balance between creative ideas and construction technology. Architects design plans and elevations, using a range of design technologies to create two- and three-dimensional representations of their concepts.

What do interior designers do?

Interior designers work with interior space. They explore how people engage with their environment and using this knowledge, as well as an understanding of building technologies, they create spaces that address functional needs and communicate themes and ideas. Interior designers work on the spaces inside domestic, commercial and cultural buildings using many of the design technologies and drawing methods applied by architects. As well as structural changes within an environment, interior designers devise solutions for highly varied needs that might include the design of customised furniture or the identification of the most efficient movement through spatial zones. Interior designers also work on exhibition and display design and theatrical productions.

What do landscape architects do?

Landscape architects work within the natural environment to create outdoor spaces including parks, recreational spaces, gardens and landscapes associated with major infrastructure systems such as roads. Often working in partnership with architects, landscape architects have deep knowledge of environmental factors such as climate, horticulture and geography. The work of landscape architects is often collaborative and focused on creating designs that are sympathetic and appropriate for the environment, surrounding structures, urban landscape and climate. Like other environment design professionals, landscape architects use a range of design technologies to express and develop their design ideas.

Mark Wilken
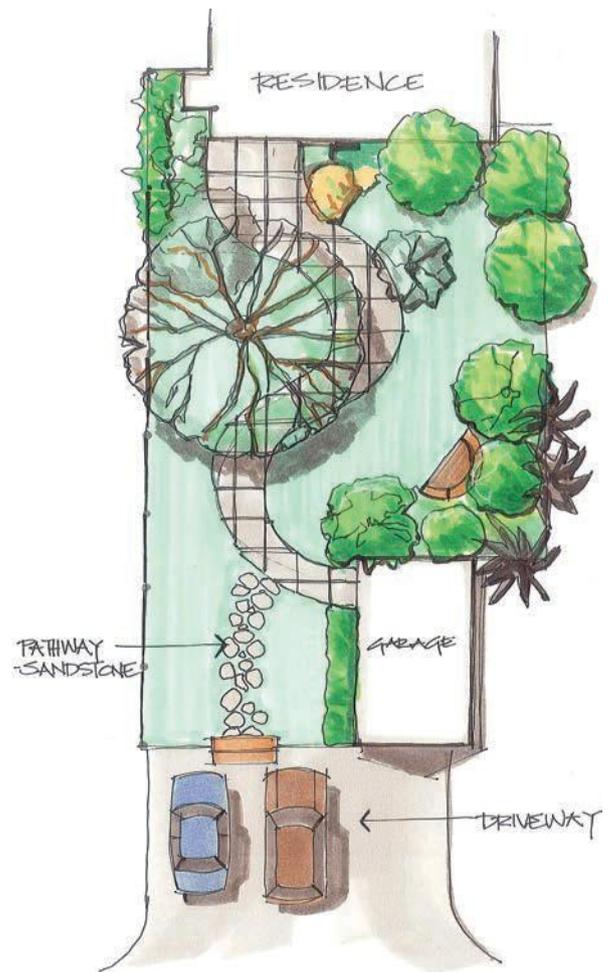
▶   Two-dimensional visualisation sketch of a site plan

What skill sets do environment designers have?

As in all design areas, environment designers are highly creative problem-solvers who have significant knowledge about the technical aspects of their specialised area. They have deep understanding of standards and safety

practices and apply these to their projects. Given that they often work in multidisciplinary teams, designers often must be skilled managers and communicators to ensure that projects stay on track and on budget.

Designers in these areas have skills in visualising three-dimensional forms and creating these using both traditional and digital technologies. They are skilled in the presentation of concepts, allowing non-professionals to comprehend the appearance, scale and proportion of a proposed design.

Whom do environment designers work with?

Environment designers work with a wide range of professionals that varies according to the context and nature of the design projects. Specialists might include model makers, engineers, surveyors, building professionals, tradespeople, drafting professionals, horticulturalists, and lighting and building automation specialists among others. A shared language and use of appropriate terminology is important in built-environment design because it facilitates the communication of ideas between key parties involved in the design and construction of a project.

What resources do environment designers use?

Environment designers use a range of technologies including the traditional drawing techniques. Although fewer designers use drawing boards and hand-draw plans, it is not unheard of. Drawing, as in other design areas, is the best method to quickly 'ideate' or visualise design ideas. Sketches may be done by hand or on screen using a tablet.

Digital technologies are commonly applied in all areas of built-environment design. CADD software enables designs to be explored and analysed in detail before undertaking an expensive construction process. Technical specifications, lists of materials and fittings, finishes and fixtures are outlined in the planning stages of the design process and contained within plans and specification documentation.
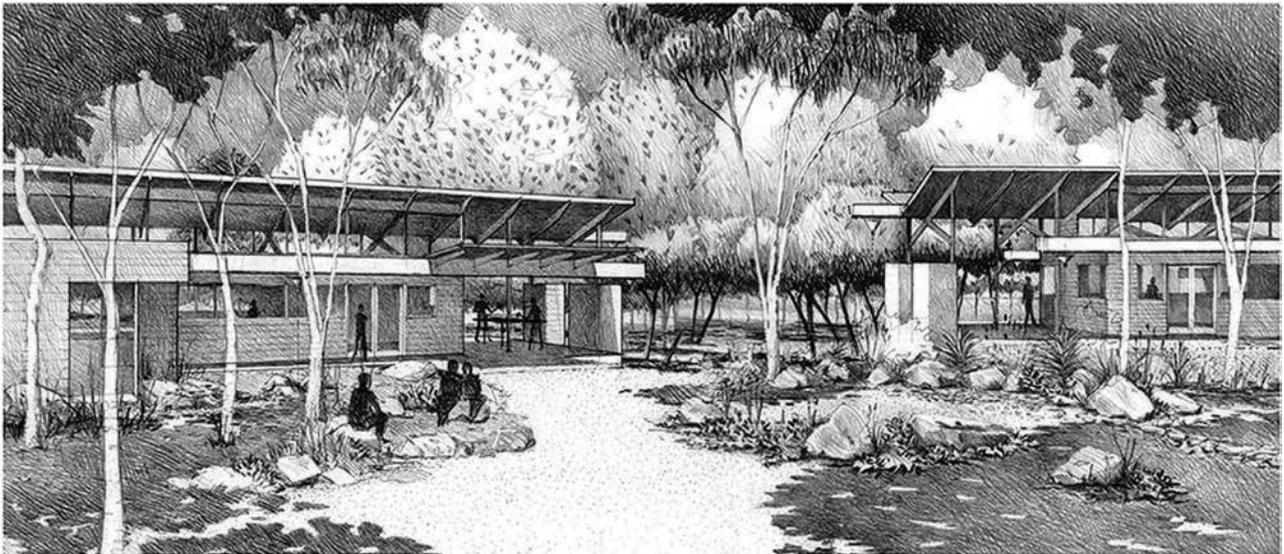
Law Architects/Barde Gregory

▶   Using both digital and traditional drawing methods, environment designers translate concepts and plans to three-dimensional drawings to help clients visualise the finished structure.

Lyndal Williams – My Architect

Lyndal Williams – My Architect

Drawing Notes:
This is a developed design drawing showing a general layout for discussion purposes only. Not for Construction. No warranty is given as to the provision of the dimensions indicated or illustrated. The customer is licensed to use this sketch design upon payment of architectural fees. This licence is non-transferable. The design and drawings shall not be reproduced, uploaded to the internet or traced without the permission of My Architect (Melbourne).
© My Architect

Project Customer + Location:	Drawing Description:	Drawing #:	Services Provided By:
	Schematic Floor Plan Options	SK02	My Architect (Melbourne)
		Date: 19 Mar '16	
		Scale: 1:100	

Architects at My Architect, an Australian firm, make drawings during the early stages of client meetings to help communicate design ideas and ensure that architect and client are visualising similar concepts. Annotated two-dimensional and three-dimensional drawing methods are used to assist in clarifying design directions before time-consuming plans and digital designs are created. Drawing is the speediest method of consultation.

Research is an important aspect of environment design. All designers will undertake a site survey to ascertain the qualities and characteristics of the location of the construction, landscape or interior. Site analysis can identify issues such as privacy, challenging landforms and planning restrictions. Aerial photography may also be ordered to allow for a comprehensive visual understanding of the site. An investigation of regulatory requirements (ResCode, the Building Code, planning regulations, building regulations, etc.) is undertaken to determine restrictions and requirements set by local authorities.

Significant environment designers

Frank Lloyd Wright, Harry Seidler, Walter Burley-Griffin, Zaha Hadid, Frank Gehry, Sir Norman Foster, Patricia Urquiola, Sean Godsell, Thomas Heatherwick, Cassandra Fahey

CHAPTER RECAP

Find an example of a significant designer for each design area listed in the table below. Collect an image that depicts the style and characteristics of their work. Describe the skills, specialists, materials, legal considerations etc. that each designer may have been required to address during their design process.

Design area	Designer	Design example (include source)	What professional skills has the designer applied in the design process?	What specialist practitioners or colleagues might the designer have worked with?	What are some of the convergent and divergent thinking skills that might have been applied by the designer?	What legal or ethical considerations might have affected the designer?
Communication design						
Industrial design (product design)						
Fashion design						
Architecture						
Interior architecture						
Landscape architecture						

LEARNING DESIGN

UNIT 1: DESIGN IN PRACTICE

In this chapter:

Unit objectives		Reference chapters
WRITE	Describe the features that define design problems and design criteria.	Chapter 8
DRAW	Represent ideas and design concepts using schematic sketching and ideation sketching in the Develop phase.	Chapter 2
PROTOTYPE	Represent ideas and design concepts using digital low-fidelity prototyping and physical low-fidelity prototyping in the Develop phase.	Chapter 4
ANALYSE	Analyse needs and wants using secondary data about stakeholders and design information.	Chapter 7
DEVISE	Devise ideas using divergent thinking strategies in response to design problems in the Develop phase.	Chapter 1 Chapter 10
SYNTHESISE	Synthesise ideas and design information to propose design concepts in the Develop phase.	Chapter 10
EVALUATE	Evaluate ideas and design concepts against design criteria to make refinements.	Chapter 1
DECIDE	Make decisions about, and use visual and written communication for specified stakeholders.	Chapter 7

Design 2019 v1.1 General Senior Syllabus, p. 19. Design 2019 v1.1 General Senior Syllabus © Queensland Curriculum and Assessment Authority (QCAA).

TOPIC 1: EXPERIENCING DESIGN

HOW DO DESIGNERS USE DRAWING AND LOW-FIDELITY PROTOTYPING SKILLS TO DEVISE IDEAS?

THE DESIGN BRIEF IS PROVIDED FOR YOU
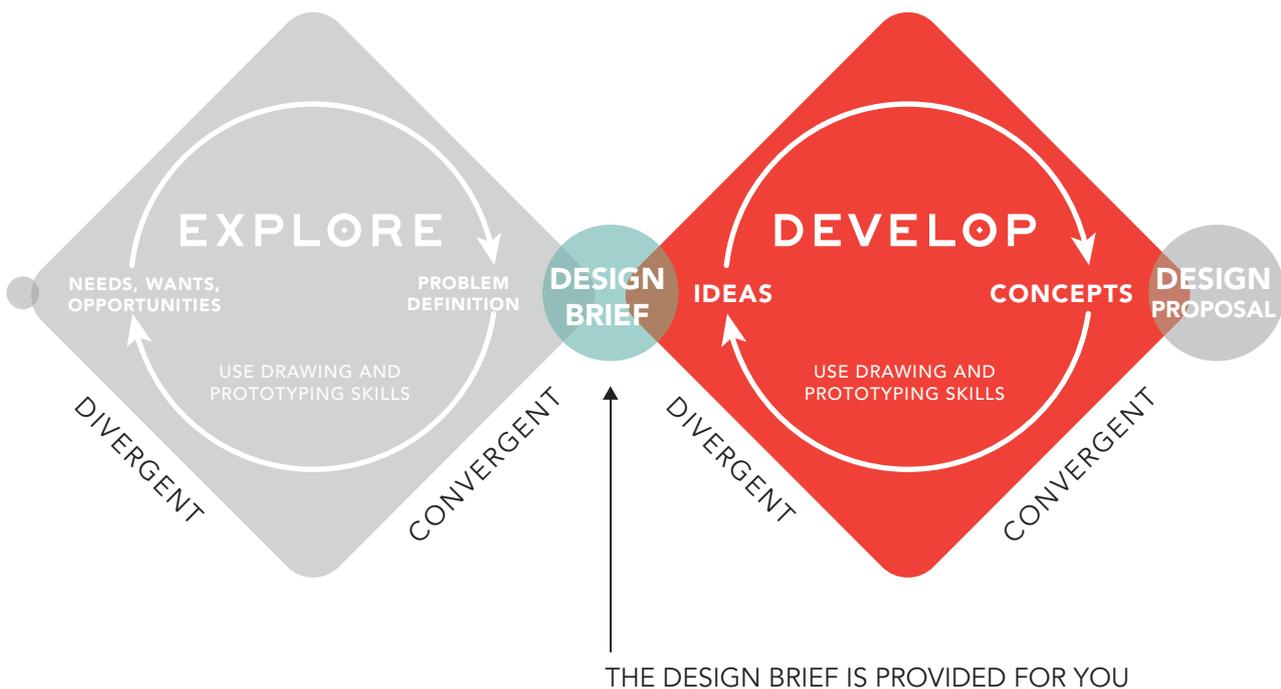
Design 2019 v1.1 General Senior Syllabus, p.20. Design 2019 v1.1 General Senior Syllabus © Queensland Curriculum and Assessment Authority (QCAA).

SUGGESTED DESIGN BRIEFS FOR UNIT 1 TOPIC 1

DESIGN BRIEF 1

Redesign an action/sports camera (e.g. GoPro) for a younger user aged six to nine years. Consider changes to the functionality and appearance of the camera. Use analysis of age-related dexterity to identify ergonomic and functional design considerations. Design an external casing and packaging to appeal to the new target market. The new camera should be safe, affordable and suited for both male and female users.

Design criteria

+ **innovative:** What is new, creative and thoughtful in the design that distinguishes it from alternatives?
+ **useful:** How does the design meet the interests and active lifestyle of the end user?
+ **aesthetic:** In what way is the design pleasing to the user? Are the aesthetics likely to attract the user?
+ **accessible:** How can the user quickly access and understand the functions of the product?
+ **sustainable:** How has the sustainability life cycle been addressed in the design?

DESIGN BRIEF 2

Design a flexible and multi-purpose desk that can be used for manual drawing tasks and digital tasks. The design should be accessible to users of varying heights and offer flexibility for those with a disability. The design should feature storage and work areas and address issues of comfort and ergonomics.

Design criteria

+ **innovative:** What aspects of the design show innovative and creative problem-solving?
+ **useful:** How effectively does the design meet the functional requirements of the end user?
+ **aesthetic:** In what way is the design appealing to the user? Do aesthetics encourage use?
+ **accessible:** How can the user quickly access and understand the functions of the design?
+ **sustainable:** How has the sustainability life cycle been addressed in the design?

DESIGN BRIEF 3

Design an emergency shelter using a common household furniture item as its base. Create a design that quickly converts from a functional item of furniture into a safe haven for individuals or groups for immediate use during a fire, cyclone, tsunami or flood. The design should be dual-function and suited to a domestic environment, with its alternative purpose as an emergency shelter well disguised. When required during an emergency, the shelter should be simple to deploy, yet offer significant safety and survival features. The design may be suited to one person or multiple individuals, but should be a recognisable and appealing household feature when not in emergency mode.

Design criteria

+ **innovative:** What is the level of creativity and innovation shown in the design concept?
+ **useful:** How does the design meet the dual needs of the end user?
+ **aesthetic:** In what way is the design pleasing to the user in both its functions?
+ **accessible:** How can the user quickly understand the function of the design and ensure successful use?
+ **sustainable:** How has the sustainability life cycle been addressed in the design?

DESIGN BRIEF 4

Identify a local area and design a children's adventure playground. The design may be outdoors or indoors but should be focused on immersive, sensory experiences. Consider the inclusion of activities that stimulate learning and require interactivity. Senses may include touch, smell, sight or sound. The age of the main users range from infants to 12 years, with accompanying parents, carers and families. Structures should meet safety standards and the area should be fully accessible to mixed abilities. Supervision by parents should be considered, while allowing children to explore and play independently.

Design criteria

+ **innovative:** What is the level of creativity and innovation shown in the design concept?
+ **useful:** How does the design meet the need of an immersive and interactive experience for the user?
+ **aesthetic:** In what way is the design pleasing and attractive to the user?
+ **accessible:** How can the user quickly understand the function of the design features?
+ **sustainable:** How has the sustainability life cycle been addressed in the design?

DESIGN BRIEF 5

Design a point-of-purchase display for the promotion of a natural, vegetable-based soft drink alternative pitched at teenagers. The display can be mobile or fixed but should offer a dynamic and interactive display to attract the target audience. The display should offer educational information about healthy food choices and provide opportunities for sampling the product. The display should be vibrant and eye-catching, and the three-dimensional form should be inspired by a vegetable shape.

Design criteria

+ **innovative:** What is the level of creativity and innovation shown in the design concept?
+ **useful:** How does the design meet the needs of the end user?
+ **aesthetic:** In what way is the design pleasing to the user?
+ **accessible:** How can the user quickly understand the function of the design and ensure successful use?
+ **sustainable:** how has the sustainability life cycle been addressed in the design?

SUGGESTED PROCESS FOR UNIT 1 TOPIC 1

Process			Reference chapters
ANALYSE	Look at the work of other designers to find examples of redesign to suit a given user or audience. Examine how new ideas may have developed from revisiting existing designs.	Look at SMART design, IDEO and CORE77 for information on adapted and redesigned products.	Chapter 6
DRAW	Create ideation sketches to generate imaginative responses to the design brief. Annotate ideas with explanations and notes to describe each concept.	Use pencil and markers to freehand sketch ideas. Use arrows, labels and notes to describe the functions and details of your design ideas. Annotate.	Chapter 2
ANALYSE	Investigate how aesthetic, cultural, economic, social and technical issues affect design decisions. Identify which of these issues may impact your design.	Create a matrix or table and assess your design ideas against each issue. Ask how aesthetic considerations might affect your design. Economic, social etc. Suggest how these might be addressed through thoughtful decision-making.	Chapter 15 Chapter 12
PROTOTYPE	Create physical low-fidelity prototypes to explain your concepts and depict form, proportion and scale. Photograph and annotate to explain the ideas, functionality, features.	Use cardboard or modelling clay to create three-dimensional versions of the most likely ideation sketches. Document your ideas and models with clear annotations, arrows and notes.	Chapter 4
INVESTIGATE	Research ergonomics and how they may affect your design.	Research comfortable materials and forms. Find information about human factors in designs that are like your own. Use your models/prototypes to test and evaluate ideas with your end user. Make notes on modifications, levels of comfort, user responses and feedback etc.	Chapter 14
THINKING	Use divergent thinking strategies to experiment and develop your ideas and prototypes.	Apply SCAMPER to take risks and innovate your design.	Chapter 1
DEVISE	Draw and prototype a range (three or more) of ideas that capture your concepts and research/analysis.	Render to show form and textures and/or create refined models to convey physical information. Include annotations that explain how your concept meets the needs of the user and responds to the design criteria.	Chapter 2 Chapter 3 Chapter 4
SELECT	Make a decision about the ideas that best meet the original design brief and design criteria.	Identify the most suitable design concept and produce a clear drawing or prototype that communicates features and functionality for presentation.	Chapter 11

TOPIC 2: DESIGN PROCESS

WHAT DESIGN PROCESSES ARE USED BY DESIGNERS?

INFORMATION ABOUT STAKEHOLDER NEEDS AND WANTS IS PROVIDED FOR YOU

Design 2019 v1.1 General Senior Syllabus, p. 22. Design 2019 v1.1 General Senior Syllabus © Queensland Curriculum and Assessment Authority (QCAA).
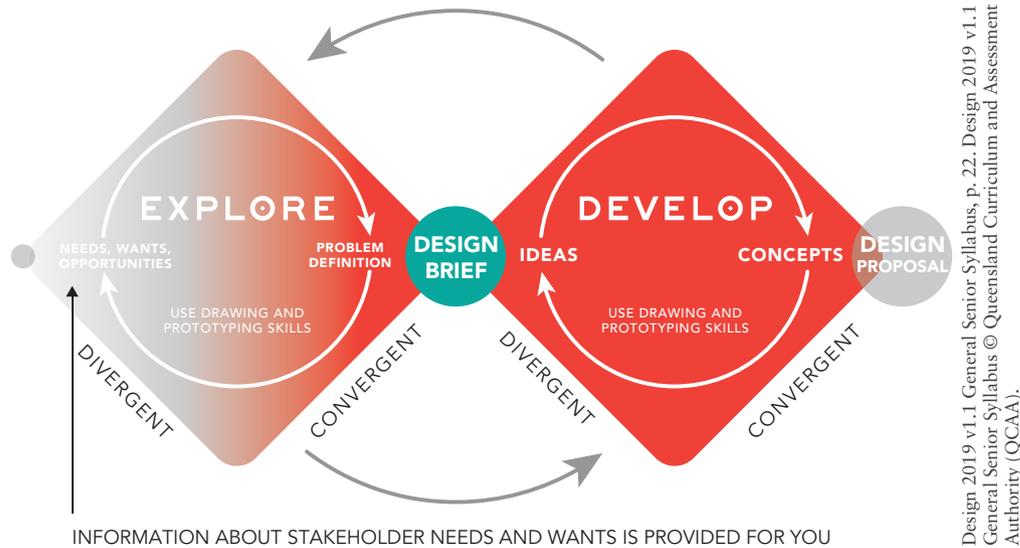
SUGGESTED STARTING POINTS FOR UNIT 1 TOPIC 2

Design prompts

The stakeholder needs listed below could be met by a variety of design concepts: phone or tablet app design, animation for website, design for interactive kiosk, instructional design, expo display.

Needs and wants 1

Stakeholders: School and university students who use computers and screens for long periods of time. To prevent injuries from poor posture, they require advice, support and information about ergonomics, postural techniques and exercises to maintain physical health.

Needs and wants 2

Stakeholders: Environmental groups concerned about the rise of plastic waste in the world's oceans. To raise awareness of the impact of plastics on sea life and to reduce waste, they require designs and information that convey the impact and urgency of this complex problem.

Needs and wants 3

Stakeholders: IP Australia, the Australian Government organisation responsible for IP, requires the production of informative and easy-to-understand visual communications that assist in building understanding

of Australian IP laws. Intellectual property laws apply to the production of designs within Australia. Awareness of the application of laws covering copyright, design registration, attributions and creative commons is important in all creative areas.

Needs and wants 4

Stakeholders: End-of-school celebrations can expose teenagers to high-risk circumstances. Public health providers are concerned about student awareness of dangers inherent in the events and activities that take place during this period. Parents may also be stakeholders and require clear and helpful information.

Needs and wants 5

Stakeholders: Access to clean water is an urgent global issue. The provision of wells and water-purification systems are high priorities for many communities in various parts of the world. Solutions exist but funding, volunteer labour and general public awareness of the issues that affect water quality are limited. This issue requires a multi-faceted approach to informing philanthropists, donors and volunteers, water-reliant communities and affected water-users as well as polluters and industry about possible solutions to a growing crisis.

SUGGESTED PROCESS FOR UNIT 1 TOPIC 2

Process			Reference chapters
ANALYSE	Identify and document the needs and wants of the provided stakeholders.	Write a list, outlining as much detail as possible including age, gender, location and socioeconomic level. Beside the above information, suggest how the stakeholder needs might translate into a design.	Chapter 7
ANALYSE	Find examples of design problems that fit within the 'tame' and 'wicked' definitions.	Document the problems, identify their level of complexity and investigate how/if they were solved by design. Remember to identify all sources.	Chapter 8
RESEARCH	Investigate the preferences, needs, wants and desires of the end user. Focus on aesthetic, social and technical needs. Find examples of designs that meet similar needs for similar stakeholders.	Use user/audience research techniques to identify key interests, preferences and concerns. Document with notes and identify sources.	Chapter 7 Chapter 14
WRITE	Write a design brief that identifies the design problem, constraints, teacher-set expectations, timeline and other variants.	Include the following design criteria: + **innovative:** What aspect of the design is new or unique? + **useful:** How well does the design fulfil the identified needs of the provided stakeholder? + **aesthetic:** In what way is the design pleasing to the senses? + **accessible:** How well does the design communicate its intended function without unnecessary elements, embellishment or decoration? + **sustainable:** How has the design been developed to sustain its useful life?	
INVESTIGATE	Research the meaning of Dieter Rams' Principles of Good Design and how designers apply them. Find examples of commercial design that reflect the application the principles and the Good Design Awards criteria.	Research the Principles of Good Design and the Good Design Awards criteria. Annotate examples of designs that represent the Principles of Good Design (individually or in their entirety) and designs that meet the criteria of the Good Design Awards in each category. Reflect on how the designer has embraced and executed good design. Suggest what decision-making and thinking would have taken place to ensure good design was prioritised.	Chapter 12
INVESTIGATE	The different design processes applied by designers	Consider the similarities and differences between the design processes. Decide on the appropriate model to follow for your Topic 2 process.	Chapter 6
DRAW	Use schematic sketching to generate ideas that address the needs/wants of the user.	Draw using your preferred media. Create sketches that convey imagery, typography and graphics that help to meet the needs of the stakeholder.	Chapter 2
ANNOTATE	Annotate your design sketches.	Use annotations to explain what the design is and assess how it meets (or doesn't meet) the design criteria. What should be changed to develop the design concept before prototyping?	Chapter x
THINKING	Use divergent thinking strategies to experiment and develop your ideas and prototypes.	Apply SCAMPER to take risks and innovate your design.	Chapter 1

Process			Reference chapters
DEVISE	Draw and prototype a range (three or more) of ideas that capture your concepts and research/analysis.	Render your drawings to show a higher level of detail and/or create digital prototypes. Include annotations that explain how the design concepts fit the brief and meet stakeholder needs.	Chapter 2 Chapter 3 Chapter 4
PROTOTYPE	Create digital low-fidelity prototypes to explore and test creative ideas.	Use animation or interactive elements to engage the end user. Consider instructional motion graphics, animation to promote the design concept or stop motion using drawings to illustrate function or purpose.	Chapter 4
PROPOSE	Make a decision about the ideas that best meet the original design brief and design criteria. Present a design proposal.	Present a refined concept that addresses the design criteria and meets the needs/wants of the stakeholders identified at the beginning of the process.	Chapter 11

TOPIC 3: DESIGN STYLES

HOW HAVE DESIGN STYLES INFORMED CONTEMPORARY DESIGN PRACTICE?

INFORMATION ABOUT STAKEHOLDERS AND DESIGN STYLES IS PROVIDED FOR YOU

Design 2019 v1.1 General Senior Syllabus, p. 24. Design 2019 v1.1 General Senior Syllabus © Queensland Curriculum and Assessment Authority (QCAA).
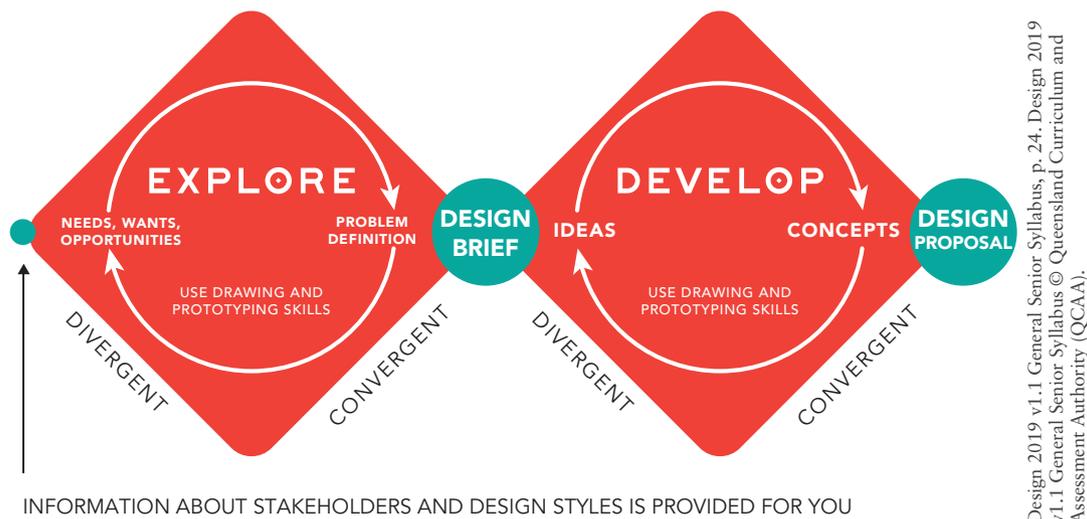
SUGGESTED STARTING POINTS FOR UNIT 1 TOPIC 3

Design style: Art Deco

Stakeholders: Music festival promoters who are renowned for visually striking artwork on posters, printed and digital promotional materials. Their previous event branding has been inspired by design styles such as Streamline and Constructivism. Festival goers find the designs appealing and enjoy that it captures the design-literate, contemporary nature of the music festival.

Design style: International Style

Stakeholders: Online supplier of classic movie posters aims to create a series of contemporary film posters in a modernist style. The collection will be available online to cinema lovers and keen collectors.

Design style: Pop

Stakeholders: Design educators plan to expand awareness of classic design styles in early childhood education. They seek innovative applications of the pop style to create educational 'A–Z' posters, puzzles or games for pre-schoolers.

Design style: Postmodernism

Stakeholders: Audiobook publisher plans to re-issue Shakespearian plays as audio books and seeks creative, contemporary promotional materials including an app design or icons that convey the thematic content of the plays in a postmodern style. They plan to target a youth audience who may find the designs eye-catching.

Design style: Anti-design

Stakeholders: A public library plans to redesign its interior to attract users to the available technologies and features. Floors, ceilings, walls, furniture and storage are to reflect a postmodern aesthetic, inspired by Anti-design.

Design style: Bauhaus

Stakeholders: Fashion designer seeks a brand and selected designs for the launch of a new label. The products include clothing and accessories, labels and logo. Inspired by the designs of the Bauhaus, the designs will feel contemporary and have appeal to a stylish, youthful market.

SUGGESTED PROCESS FOR UNIT 1 TOPIC 3

Process			Reference chapters
ANALYSE	Identify and document the needs and wants of the provided stakeholders.	Describe the stakeholders and identify whether they are designers, clients, users, other professionals or combinations. Suggest the expectations of each stakeholder.	Chapter 7
ANALYSE	Select a similar design.		Chapter 8
RESEARCH	Investigate the design style provided for you.	What are the key characteristics of the style? What are the visual motifs/themes that define the style?	Chapter 16
WRITE	Create a comparison (compare and contrast) between a contemporary design and the historical design that is a clear influence.		
INVESTIGATE	Significant design styles from varied design professionals and identify iconic design examples that capture the characteristics of the style.	Create a matrix or table and identify significant designers and examples of design in the design professions of communication design, industrial design, environmental design, fashion/textile design. Suggest why they are iconic and enduring designs.	Chapter 16 Chapter 12
WRITE	A design brief that describes a design problem based on the needs/wants of the stakeholders.	Include design criteria that specifies the Principles of Good Design that should be applied and characteristics of the design style that should be included in the final design.	Chapter 9 Chapter 16
DRAW	A pictorial drawing of an iconic design from your design-style era. An orthogonal drawing of the same iconic design using Australian Standards.	Create a rendered perspective or isometric image of a selected design from your chosen style. Ensure that you represent proportion, forms, textures and features that distinguish its style. Create a manual, dimensioned, two-dimensional drawing or CAD drawing of the same object using orthogonal drawing standards.	Chapter 3

Process			Reference chapters
ANNOTATE	Reflect on the design process as you brainstorm and devise design ideas to fulfil the design brief.	Annotate drawings and thinking tools to explain the potential directions of your design ideas. Note how they meet the needs of the stakeholders and the design brief, and reflect the design style.	Chapter 1
THINKING	Apply divergent techniques to generate multiple ideas and alternatives.	Annotate your thinking to suggest how the application of divergent thinking skills can provide varied and creative solutions.	Chapter 1
DEVISE	Design concepts using the application of elements and principles within sketches that visualise the ideas established by your design thinking.	Be creative in your application of design elements and principles. Reflect on their effectiveness using annotations. Use a range of media to represent elements such as texture, tone and colour.	Chapter 8
EVALUATE	Review your design concepts to identify the most effective and appropriate solutions.	If possible, interview a stakeholder to provide feedback on the design concepts. Record your evaluation and progress by benchmarking your design ideas against the design criteria and principles of good design outlined in your design brief.	Chapter 7
SYNTHESISE	Using feedback and evaluation, decide on the design direction and refine your concept or concepts.	Use drawing or CAD to refine your design idea. Annotate to reflect on how the design meets the needs of the stakeholder and responds to the criteria in the brief.	Chapter 10
PROPOSE	Show your final design idea to a select audience.	Use imagery/illustrations, along with written or verbal information to pitch your design idea.	Chapter 11

UNIT 2: COMMERCIAL DESIGN

In this chapter:

Unit objectives		Reference chapter
WRITE	Describe the features that define commercial design problems and design criteria.	Chapter 8 Chapter 18
DRAW	Represent ideas, design concepts and economic, social and cultural influences using schematic sketching and ideation sketching.	Chapter 2
PROTOTYPE	Represent ideas and design concepts using digital low-fidelity prototyping and physical low-fidelity prototyping in the Explore and Develop phases.	Chapter 4
ANALYSE	Analyse needs and wants using secondary data about specified clients, existing designs and economic, social and cultural influences in the Explore phase.	Chapter 7
DEVISE	Devise ideas using divergent thinking strategies in response to design problems in the Develop phase.	Chapter 1 Chapter 10
SYNTHESISE	Synthesise ideas and design information about influences to propose design concepts in the Develop phase.	Chapter 10
EVALUATE	Evaluate ideas and design concepts against design criteria to make refinements.	Chapter 1
DECIDE	Make decisions about, and use visual, written and spoken communication for clients.	Chapter 7

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TOPIC 1: EXPLORE – CLIENT NEEDS AND WANTS

HOW DO ECONOMICS, SOCIETY AND CULTURE INFLUENCE DESIGNERS AND HOW DO DESIGNERS INFLUENCE ECONOMICS, CULTURE AND SOCIETY?
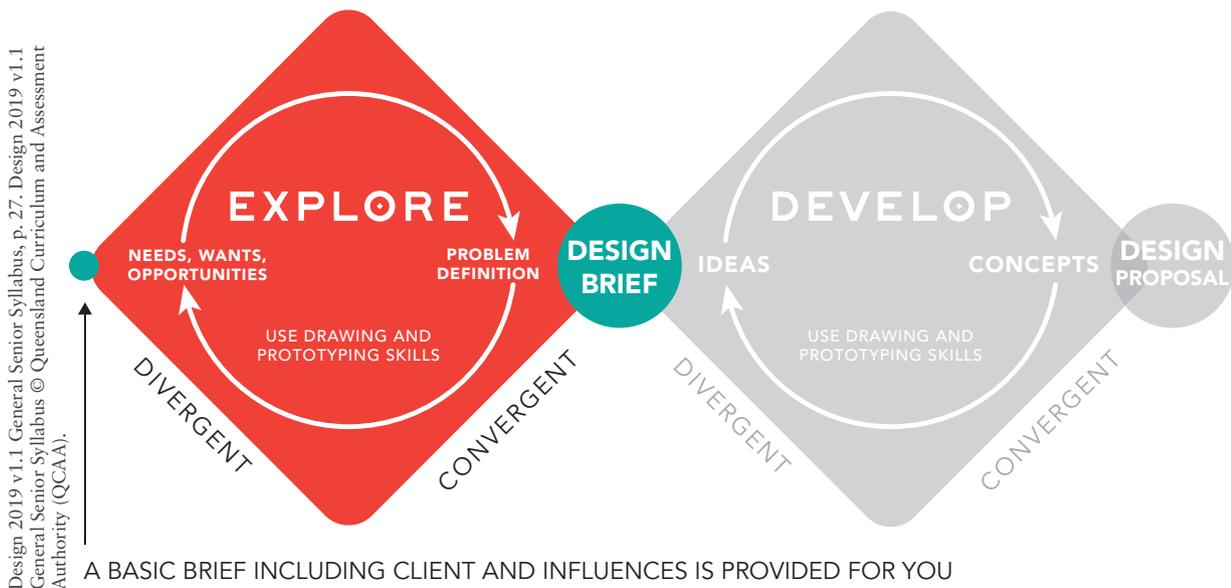
Design 2019 v1.1 General Senior Syllabus, p. 27. Design 2019 v1.1 General Senior Syllabus © Queensland Curriculum and Assessment Authority (QCAA).

EXPLORE
NEEDS, WANTS, OPPORTUNITIES
PROBLEM DEFINITION
USE DRAWING AND PROTOTYPING SKILLS
DIVERGENT
CONVERGENT

DESIGN BRIEF

DEVELOP
IDEAS
CONCEPTS
USE DRAWING AND PROTOTYPING SKILLS
DIVERGENT
CONVERGENT

DESIGN PROPOSAL

A BASIC BRIEF INCLUDING CLIENT AND INFLUENCES IS PROVIDED FOR YOU

SUGGESTED DESIGN BRIEFS FOR UNIT 2 TOPIC 1

DESIGN BRIEF 1
Client need

Airpod Pty Ltd is a travel company focused on the needs of budget travellers, backpackers and student travellers. It wants to create sleeping facilities in the form of 'pods' or 'capsules' within international airport terminals. Airpod aims to improve the travelling experience by providing a safe, comfortable and affordable space in which to rest between flights.

Economic, cultural and social factors that should be considered

The client plans to 'disrupt' the travel industry by providing alternative accommodation that is affordable, accessible and convenient. The pods should be safe, secure and comfortable and offer a range of technologies for the 'connected' traveller. Aimed at a budget market, the pods should provide conveniences rather than luxuries. The booking of pods may be facilitated by an app, enabling instant feedback, payment and access. Any digital design, signage and identification applied to the pods should be formatted to enable communication to different nationalities.

DESIGN BRIEF 2
Client need

The client is an innovative and entrepreneurial group of friends who want to develop a food truck and pop-up café concept featuring Australian bush tucker. Inspired by its Indigenous heritage, the group plans to showcase iconic and delicious tastes that capture the culinary traditions of its community. The truck will be seen at local fairs, markets and festivals.

Economic, cultural and social factors that should be considered

The target market will be food-loving people who enjoy socialising and experiencing new culinary options. The truck design, café fittings, decoration and promotional materials should reflect and respect the cultural origins of the client and the distinctive aspects of the food. Aimed at visitors of all ages, the product offerings and presentation of the business should convey a contemporary and appropriate visual tone while respecting historical perspectives.

DESIGN BRIEF 3
Client need

An Australian automotive manufacturer plans to create a fully self-sufficient, off-grid vehicle that can be used in remote areas of the country. Using innovative and sustainable design ideas, the vehicle should offer practical storage as well as high levels of comfort for the driver and passengers. The vehicle should be suited to a wide variety of terrain and weather conditions.

Economic, cultural and social factors that should be considered

The design of the sustainable SUV may make use of emerging technologies for efficiency, navigation and communication. Users are likely to seek a transport solution that does not cause additional damage to the environment in its use or maintenance. The design may be highly experimental and may offer a range of body types to suit different users. Digital technologies may be featured and promotional or instructional materials might be required.

DESIGN BRIEF 4

Client need

Seeking to capitalise on the enormous popularity of artisan markets and festivals, MakerMover Pty Ltd is a small business that has designed a collapsible, flexible and portable market-stall concept. Able to be manipulated into different shapes and sizes, the stall can be set up and dismantled in a short period of time. Used by market holders to sell food or handmade products, the design will enable spaces for display, demonstration and promotion.

Economic, cultural and social factors that should be considered

Artisan markets offer a commercial outlet for small-scale businesses so the portable commercial space should be affordable. There may be a range of size options that vary in complexity and features. All should be portable and enable speedy set up. Sustainable factors may be incorporated into the design that reduce any environmental footprint. The design should cater for the vagaries of the Australian climate. Accessibility is important, including access for market visitors with mobility issues. Instructional visual communications should provide helpful advice on erection of the product.

DESIGN BRIEF 5

Client need

Leap Circus and Trapeze School is moving and requires new premises that are suitable for training, teaching and performance. A purpose-designed space that allows for learning a wide variety of circus-related skills and enables a diverse audience to experience contemporary circus skills is required.

Economic, cultural and social factors that should be considered

Leap Circus focuses on contemporary circus skills and does not use animals in its performances. Students and performers learn and display techniques that are physically challenging, such as working at heights, contortions and acrobatics. The performance space should be accessible for varied abilities and participation of low-income and disadvantaged youth is a priority in workshops and classes. The space should offer practical facilities including rest rooms and a café.

SUGGESTED PROCESS FOR UNIT 2 TOPIC 1

Process			Reference chapters
ANALYSE	Investigate the input that a client may have in the initiation of the design process. Analyse the content of briefs to identify the factors that influence design content.	Read and annotate sample professional design briefs (supplied or sourced) and identify the information that informs costs, timelines and client expectations. Identify influences on the brief such as cultural, social and economic factors.	Chapter 9
ANALYSE	Collect and analyse a range of designs that show the influence of a range of factors on the designer's decision-making.	Create a matrix or table that enables note taking about key factors that influence designer decision-making.	Chapter 7 Chapter 15 Chapter 17
INVESTIGATE	How designers and design styles have influenced changes in the economy, society and culture. Write about how the design has successfully approached and addressed the factors listed at right.	Collect examples of designs that have exhibited social, cultural and economic influence. Organise examples under the following categories: + Designs that have recognised a market opportunity (gap) (e.g. food packaging innovations) + Accessible/affordable designs that have made use of advances in technology (e.g. car safety features) + Designs that have made a socioeconomic impact (e.g. affordable housing projects) + Designs that impact how people socialise and engage (e.g. design of public spaces) + Branding and advertising (e.g. highly recognisable brands) + Designs that use digital tools to 'disrupt' the status quo (e.g. social media apps)	Chapter 15
THINK & DRAW	Use thinking skills and schematic drawings to identify the client needs and note initial ideas and directions.	Apply tools such as concept maps, affinity diagrams and visualisation sketches to illustrate and clarify the needs identified in the brief provided for you. Include annotations that explain your ideas and thinking.	Chapter 8 Chapter 9
WRITE	Establish the design criteria that your final design will meet. Note that this will form a key part of your assessment.	List the essential requirements of the client. Include the deliverables and any constraints to be applied. List the Principles for Good Design and annotate to describe how these might be met in your design process. Criteria may include: + **innovative:** what is new, creative and thoughtful in the design that distinguishes it from alternatives? + **useful:** how does the design meet the interests and active lifestyle of the end user? + **aesthetic:** in what way is the design pleasing to the user? Are the aesthetics likely to attract the user? + **accessible:** how can the user quickly access and understand the functions of the product? + **sustainable:** how has the sustainability life cycle been addressed in the design?	Chapter 12
WRITE	Using the design brief provided by your teacher as a skeleton, flesh out the detail and include information established during your research and note the design criteria.	Ensure that your brief is broad enough for divergent ideas to flow. Do not be overly specific in the appearance of outcomes but specify the general nature of deliverables and the required design criteria they should meet.	Chapter 9

Design factors

Factors	Design example 1 (describe or include image/ sketch) _____	Design example 2 (describe or include image/ sketch) _____	Design example 3 (describe or include image/ sketch) _____	Design example 4 (describe or include image/ sketch) _____	Design example 5 (describe or include image/ sketch) _____
Suggest known or assumed constraints that may have been applied to this design. Include cost, time and client expectations.					
Suggest how the design may have been influenced by a desire to improve quality of life.					
Describe the trends and fashions that may have influenced the design.					
Suggest how the beliefs, values and traditions of users or other stakeholders have been addressed in the design.					
Suggest possible ethical considerations and obligations that were undertaken by the designers.					
Where applicable, describe how appropriate protocols were applied to address cultural interactions including communities and the cultural material of Aboriginal and Torres Strait Islander peoples.					

TOPIC 2: DEVELOP – COLLABORATIVE DESIGN

HOW DO DESIGNERS WORK COLLABORATIVELY TO DEVELOP DESIGNS FOR THEIR CLIENTS?

THE DESIGN BRIEF WAS WRITTEN BY YOU IN TOPIC 1
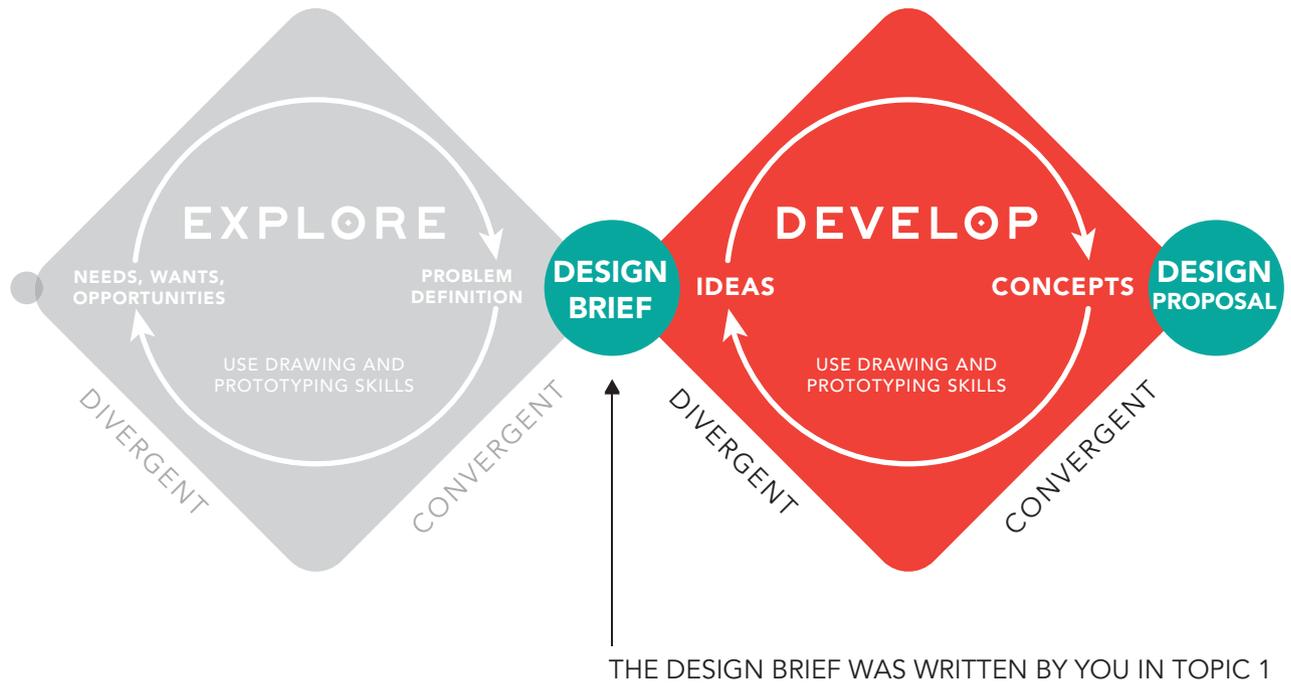
Design 2019 v1.1 General Senior Syllabus, p. 29. Design 2019 v1.1 General Senior Syllabus © Queensland Curriculum and Assessment Authority (QCAA).

SUGGESTED PROCESS FOR UNIT 2 TOPIC 2

Topic 2 uses the design brief written in Topic 1.

Process			Reference chapters
ACT	Establish a small team to work on developing your design brief.	Discuss goals, behaviours and guidelines that make for effective team work. Consider and visualise: + identification of clear goals + mutual trust and support for the opinions and work of others + open communication + democratic processes that might be used in the team + recognition of diverse skill sets and personality type.	Chapter 18
ORGANISE	Arrange your team into specified roles. Ensure that all roles, production and participation are recorded and documented.	Consider what roles are required to progress the design: + director/coordinator + documenter/scribe (for meetings) + creatives	Chapter 18

Process			Reference chapters
RESEARCH	Define the ethical obligations of designers in Australia.	Investigate the ethical guidelines from the Design Institute of Australia and explain (with examples) how designers may meet their obligations.	Chapter 17
RESEARCH	Australian intellectual property law including copyright, patents, trademarks and designs and how they apply to the process of design.	Demonstrate correct attribution of source materials, images and design examples by following copyright guidelines.	Chapter 17
THINKING	Devise multiple ideas using collaborative divergent thinking strategies.	Brainstorm ideas and solutions that address the brief and consider the influence of economic, social and cultural issues influencing the design, client and/or users.	Chapter 1
DRAW & PROTOTYPE	Use drawing and low-fidelity prototyping skills to represent the ideas established by the group.	Draw, prototype and document alternative design solutions. Progress and improve ideas through critical analysis in annotations.	Chapter 2 Chapter 3 Chapter 4 Chapter 5 Chapter 10
SYNTHESISE	Consider multiple ideas and apply convergent thinking strategies to develop focused concepts.	Use tools such as SCAMPER to combine concepts and create possible solutions that closely address the economic, social and cultural influences identified earlier.	Chapter 1 Chapter 10
EVALUATE	Evaluate the strengths, limitations and implications of concepts against design criteria and make improvements to refine ideas.	Use annotations, matrices and feedback to decide on the next steps for your design. Consider the original requirements of the client in your reflections.	Chapter 1
DEVISE	Create the most effective design concept.	Make informed choices about the most appropriate presentation methods using drawing and prototyping to present the final concept.	Chapter 2 Chapter 3 Chapter 4
PITCH	Prepare a spoken presentation that outlines the design concept.	Consider visual and verbal requirements. What do you need to show? What details should be included in your pitch? Consider: + client demographics + how the design proposal addresses identified economic, social and cultural influences + reflections on the consequence of the final design being introduced/manufactured + how the new design might be promoted + the benefits of building a positive user experience + appropriate visual, written and spoken elements.	Chapter 4
EVALUATE	Reflect on your team experience.	Document the experience of working as a collaborative team in the creation of your design.	Chapter 18

UNIT 3: HUMAN-CENTRED DESIGN

CHAPTER 21

Unit objectives		Reference chapters
WRITE	Describe the features that define HCD (human-centred design) problems and design criteria.	Chapter 8 Chapter 18
DRAW	Represent ideas, design concepts and HCD information using schematic sketching, and ideation sketching in the Explore and Develop phases.	Chapter 2
PROTOTYPE	Represent ideas, design concepts and HCD information using low-fidelity prototyping in the Explore and Develop phases.	Chapter 4
ANALYSE	Analyse needs and wants using data about stakeholders, existing designs and HCD information.	Chapter 7
DEVISE	Devise ideas using divergent thinking strategies in response to HCD problems in the Develop phase.	Chapter 1 Chapter 10
SYNTHESISE	Synthesise ideas and HCD information to propose HCD concepts in the Develop phase.	Chapter 10
EVALUATE	Evaluate ideas and HCD concepts against design criteria to make refinements.	Chapter 14
DECIDE	Make decisions about, and use visual, written and spoken communication for stakeholders.	Chapter 7

Design 2019 v1.1 General Senior Syllabus, Unit objective p. 31. Design 2019 v1.1 General Senior Syllabus © Queensland Curriculum and Assessment Authority (QCAA).

TOPIC 1: DESIGNING WITH EMPATHY

HOW DO DESIGNERS ENSURE THEIR DESIGNS MEET THE NEEDS AND WANTS OF PEOPLE?
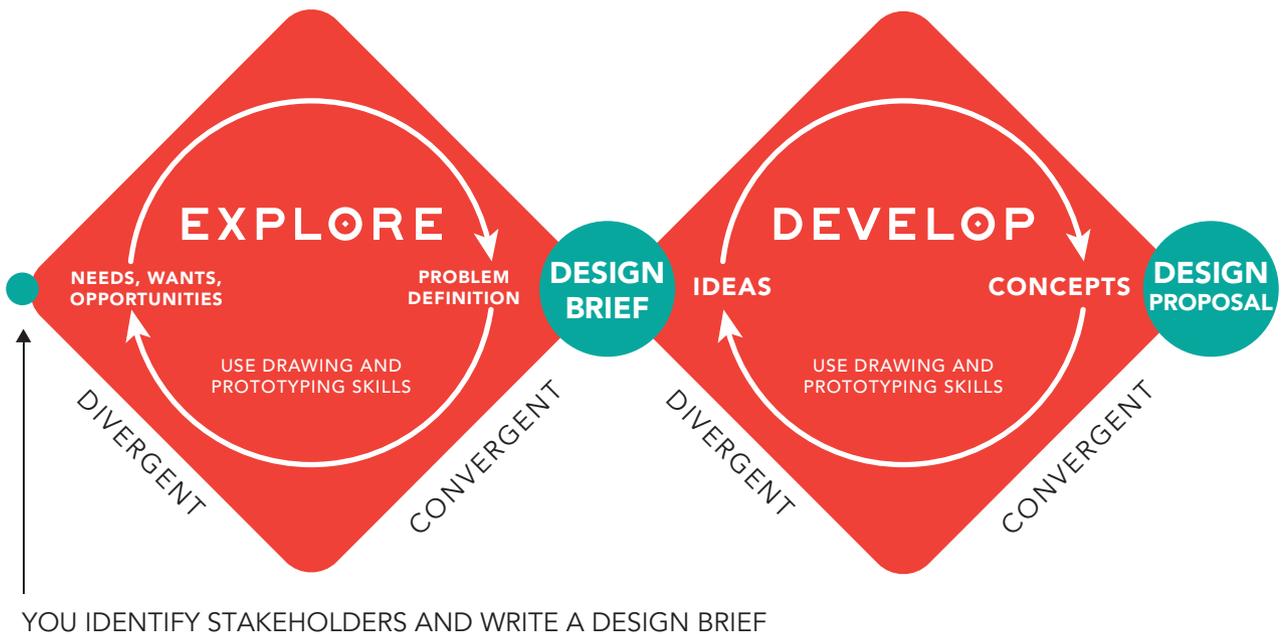
Design 2019 v1.1 General Senior Syllabus, p. 32. Design 2019 v1.1 General Senior Syllabus © Queensland Curriculum and Assessment Authority (QCAA).

ASSESSMENT IN UNIT 3

You will complete four assessments in Units 3 and 4.

In Unit 3, you will be asked to apply the design process to address a human-centred design need. You will be assessed on your design process, your design brief and your presentation of the final design including a pitch. You may be asked to select parts of your major HCD exploration and design to present as your project. Your teacher will specify requirements.

You are also required to complete a design challenge under exam conditions. The challenge will ask you to create a design in response to a human-centred design need. Your experience in exploring HCD throughout Unit 3 should prepare you for the challenge.

SUGGESTED DIRECTIONS FOR HUMAN-CENTRED DESIGNS FOR UNIT 3 TOPIC 1

At the heart of HCD is the user. These prompts are created as a starting point for you to identify a set of stakeholders and, ultimately, write a detailed design brief. Use the paragraphs below as concepts to explore further or to trigger your own ideas for an HCD challenge that meets the requirements of the QCAA content and prepares you for the exam response. All these prompts relate to areas with significant bodies of research.

HCD prompt 1

The 'maker movement' (see Chapter 16) is a return to traditional, manual craft techniques using contemporary tools, such as 3D printers, CAD-operated milling machines and laser-cutters, which have revolutionised the process for creating hand-built products. Design an accessible creative space and related services for artists, hobbyists, makers and creators with disabilities. Consider access, instruction and support for users with visual, aural and physical impairments. How can the learning of techniques and process-based production be made accessible to these users?

Possible outcomes might include interior design, app and interface design, product designs and information/communication design.

HCD prompt 2

Travel-related illnesses are an affliction for many. As transport methods evolve in efficiency, users traverse long distances by air, rail and sea with fewer stops in the journey. Cross-infection of common viruses, the experience of motion-related sickness and risk of bacterial contact are possible. Consider and create methods of minimising one or more travel-related illnesses. How can the risks of illness be addressed through design? Which users are most affected and how can solutions be integrated into travel for leisure or work?

Possible outcomes might include product design, app and multimedia design, and wearable tech.

HCD prompt 3

An ongoing debate over the impact of excessive 'screen time' and use of social media continues to dominate educational thinking. There is a tension between the usefulness of digital tools for collaboration and the risks of overuse. Consider the main users of social media platforms and their preoccupations. How can design assist in minimising harm, while ensuring access to the wealth of data and experience available online? What products, environments, information and assistance can address these issues?

HCD prompt 4

Seasonal affective disorder (SAD) is a mood disorder that often affects people during the winter months. Symptoms may also appear in summer when sufferers may experience high levels of anxiety. One of the characteristics of SAD is isolation due to the debilitating effects of the disorder. Consider design concepts that alleviate symptoms or address the impacts of SAD. Who are the likely targets? What techniques, services, environments or products might help?

HCD prompt 5

The appropriation of cultural motifs, imagery and traditions is a controversial contemporary topic. Through the use of image-sharing platforms such as Instagram and Pinterest, which enable the distribution of 'liked' images, they often move further and further away from their original source. Issues of copyright and cultural sensitivity can get lost. How can users be made aware of the importance of cultural imagery? How can traditions remain linked to their

origins? What methods might be applied to manage appropriation and issues of IP ownership? (See Chapter 17.)

HCD prompt 6

Competitive sports that involve high-impact physical interactions can be intimidating to young players and their parents. The fear of injury can be a deterrent to involvement. What methods, products, information and environments might alleviate concerns and encourage appropriate training, preparation and protection? Physical injury can be life-changing at any level, so consider the evolution of products and techniques as users age.

HCD prompt 7

Communal living is a viable option for young people looking to buy into the housing market. Living in communal housing provides solutions to affordability while raising challenges related to shared facilities. Consider the design of dwellings that might accommodate the needs of multiple users within a residential setting. What environments or resources might be shared? What needs might be individualised? How might shared products or environments be managed?

HCD prompt 8

Wearable technology is an area of design that is rapidly evolving. Clothing and devices that respond to biophysical changes are the focus of current developments. Identify how wearable technology might be designed to assist in pursuits such as water sports, snow sports and adventure travel. What data might be available via wearable tech and how might it inform the user?

HCD prompt 9

Many school students choose to pursue a gap year after their final year of study. Some travel, while others work to save money before starting university. For those who travel and also choose to work, the digital economy may be their employer. Suggest possible designs for products and/or environments that would be relevant to such young users. What functions and features would be required to meet their needs while away from home?

HCD prompt 10

Companion animals, specifically dogs, are recognised as important elements in positive mental health. Lobbying of landlords to enable more renters to own pets is an ongoing issue. Create methods, products, environments and/or information to assist users to make contact with animals for better mental health outcomes. Investigate how users might gain from the benefits of pet ownership without risking lease agreements. How might animal interactions be facilitated for positive impact?

SUGGESTED PROCESS FOR UNIT 3 TOPIC 1

			Reference chapters
REVIEW	Review design ethics, specifically a designer's responsibility to the client.	Investigate the ethical guidelines from the Design Institute of Australia and suggest how they might affect your design process.	Chapter 17
INVESTIGATE	Research theories of human-centred design.	Read and find examples of the application of: The Four-Pleasure Framework (socio-pleasure, physio-pleasure, psycho-pleasure, ideo-pleasure) and the Attract/Converse/Transact (ACT) Framework	Chapter 14
RESEARCH	Investigate ergonomic impacts on design.	Develop an understanding of the importance of ergonomics and apply data gathering techniques to your end user. Gather information and relevant data to inform your design.	Chapter 14

			Reference chapters
RESEARCH	Apply empathetic design techniques to elicit authentic information about users.	Consider use of observation, interviews and experiences or simulations to understand the user point of view. Use empathy maps and organise findings in a helpful, visual manner.	Chapter 14
WRITE	Establish the design criteria that your final design will meet.	List the essential requirements of the end user as discovered through your research. List the Principles for Good Design and annotate to describe how these will be met in your design process. Criteria may include: + **innovative:** what is new, creative and thoughtful in the design that distinguishes it from alternatives? + **useful:** how does the design meet the interests and active lifestyle of the end user? + **aesthetic:** in what way is the design pleasing to the user? Are the aesthetics likely to attract the user? + **accessible:** how can the user quickly access and understand the functions of the product? + **sustainable:** how has the sustainability life cycle been addressed in the design?	Chapter 12
WRITE	Write a design brief that identifies the design problem, constraints, stakeholder expectations, timeline and other variants.	Ensure that your brief is broad enough for divergent ideas to flow. Do not be overly specific in the appearance of outcomes but specify the general nature of deliverables.	Chapter 9
THINKING	Devise multiple ideas using relevant collaborative divergent thinking strategies and HCD information.	Brainstorm ideas and solutions that address the brief and consider the influence of HCD issues as well as economic, social and cultural issues that may be relevant.	Chapter 1
DRAW & PROTOTYPE	Use drawing and low-fidelity prototyping skills to represent the ideas identified.	Draw, prototype and document alternative design solutions. Progress and improve ideas through critical analysis in annotations.	Chapter 2 Chapter 3 Chapter 4 Chapter 5 Chapter 10
COLLABORATE	Interact with stakeholders to clarify design directions.	Consider using ideations to communicate ideas to stakeholders. Modify or adjust the brief as required to meet user needs.	
SYNTHESISE	Consider multiple ideas and apply convergent thinking strategies to develop focused concepts.	Use tools such as SCAMPER to combine concepts and create possible solutions that closely address the HCD needs. Annotate your drawings and prototypes to explain thinking, decision-making and direction.	Chapter 1 Chapter 10
DEVISE	Create the most effective design concept.	Make informed choices about the most appropriate presentations methods using drawing and prototyping to present the final concept.	Chapter 2 Chapter 3 Chapter 4

			Reference chapters
EVALUATE	Evaluate the strengths, limitations and implications of concepts against design criteria, stakeholder feedback and testing. Make improvements to refine ideas.	Use annotations, matrices and feedback to decide on the next steps for your design. Identify key questions for stakeholders that distil feedback to the most vital elements.	Chapter 1
PITCH	Prepare a spoken presentation that outlines the design concept.	Consider visual and verbal requirements. What do you need to show? What details should be included in your pitch? Consider: + client demographics + how the design proposal addresses identified economic, social and cultural influences + reflections on the consequence of the final design being introduced/manufactured + how the new design might be promoted + the benefits of building a positive user experience + appropriate visual, written and spoken elements.	Chapter 4

UNIT 4: SUSTAINABLE DESIGN

In this chapter:

Unit objectives		Reference chapter
WRITE	Describe the features and sustainable requirements that define sustainable redesign problems and design criteria.	Chapter 9 Chapter 15
DRAW and/or PROTOTYPE	Represent ideas, design concepts and sustainability information using schematic sketching, and ideation sketching and/or low-fidelity prototyping in the Explore and Develop phases.	Chapter 2 Chapter 4
ANALYSE	Analyse redesign opportunities using data about existing designed solutions and sustainability information.	Chapter 7
DEVISE	Devise ideas using divergent-thinking strategies and circular-design methods in response to sustainable redesign problems in the Develop phase.	Chapter 1 Chapter 15
SYNTHESISE	Synthesise ideas and sustainability information to propose sustainable design concepts in the Develop phase.	Chapter 10
EVALUATE	Evaluate the strengths, limitations and implications of ideas and design concepts against design criteria to make refinements.	Chapter 1
DECIDE	Make decisions about, and use visual, written and spoken communication for stakeholders.	Chapter 7

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TOPIC 1: EXPLORE – SUSTAINABLE DESIGN OPPORTUNITIES

HOW ARE SUSTAINABLE DESIGN OPPORTUNITIES IDENTIFIED?
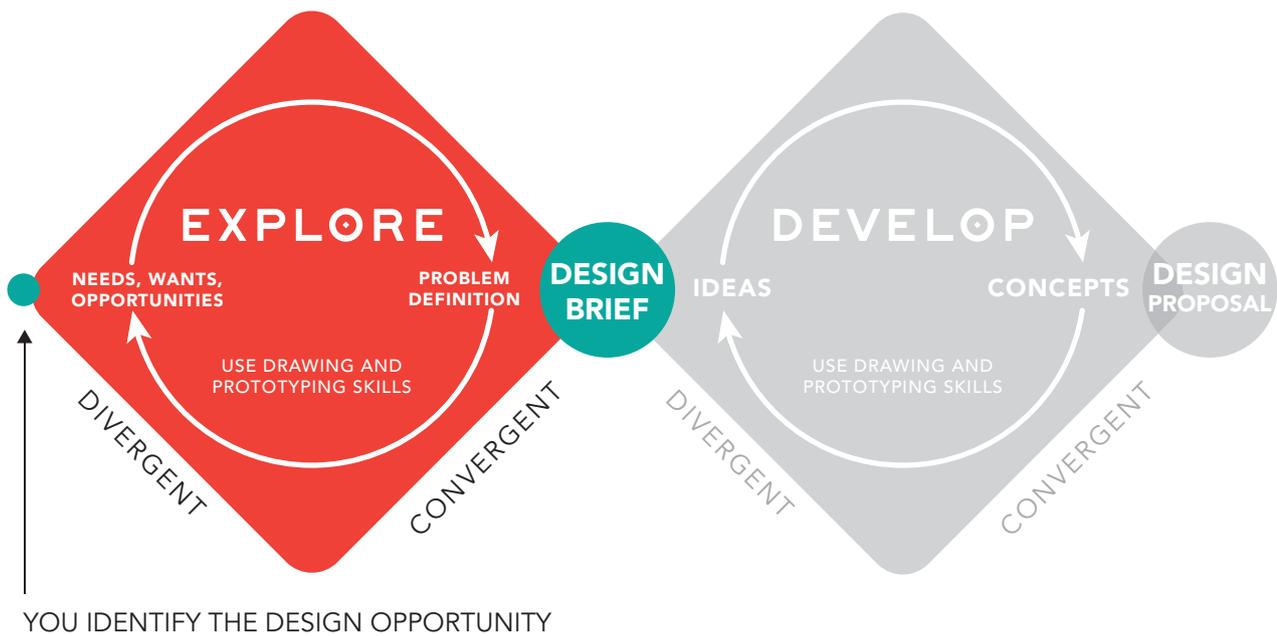
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ASSESSMENT IN UNIT 4

You will complete four assessments in Units 3 and 4.

In Unit 4, you will be asked to apply the design process to address a sustainable redesign need. You will be assessed on your design process, your design brief and your presentation of the final design including a pitch. You may be asked to select parts of your major exploration and design to present as your project. Your teacher will specify requirements.

You are also required to complete a design challenge under exam conditions. This is an externally assessed exam. The challenge will ask you to create a design in response to a sustainable redesign need. Your experience in exploring sustainability and redesign throughout Unit 4 should prepare you for the challenge.

SUGGESTED SUSTAINABLE REDESIGN PROMPTS FOR UNIT 4 TOPIC 1

Redesign prompts

Products	Services	Environments
Single-use coffee pods Plastic water bottles Christmas decorations Waste fashion items (including fast fashion) Products that make use of natural and non-intrusive power sources (e.g. solar) Paper waste Battery use (storage, disposal and innovation)	Energy-efficient power solutions Water conservation and/or treatment Public transport innovations Opportunities for low-impact food production and distribution Awareness-building of key health issues for vulnerable audiences Education and/or promotion of value in sustainable practices, directed at specific communities, e.g. locations at risk of deforestation	Ocean waste, e.g. plastic waste or commercial fishing waste Revitalised industrial areas Fallow farming environments Residential options for medium- and high-density living in urban areas Design for areas affected by water inundation, e.g. low-lying coastal areas Co-working and/or co-living environments

SUGGESTED PROCESS FOR UNIT 4 TOPIC 1

Process			Reference chapters
IDENTIFY	Establish a design opportunity for sustainable redesign.	Ensure that your design opportunity offers enough scope to apply the design process throughout Unit 4.	Chapter 8
REVIEW	Review design ethics, specifically a designer's responsibility to the client.	Investigate the ethical guidelines from the Design Institute of Australia and suggest how they might affect your design process.	Chapter 17
INVESTIGATE	Research influences on sustainable design.	Read and understand Australian priorities for sustainable futures including: economic sustainability social sustainability ecological sustainability.	Chapter 15
RESEARCH	Investigate ergonomic impacts on design.	Develop an understanding of the importance of ergonomics and apply data gathering techniques to your end user. Gather information and relevant data to inform your design.	Chapter 14

Process			Reference chapters
ANALYSE	Research and respond to examples of successful sustainable design as well as designs that have not addressed sustainability.	Collect and annotate examples of sustainable and unsustainable designs. Indicate how the design addressed issues of sustainability, market pressures and commercial concerns (as relevant).	Chapter 15
COMPARE	Research sustainable practices in a range of design areas.	Collect and annotate examples of sustainable practices in fashion, architecture, communication design, green design, products, packaging. What are the common themes? What are the main similarities and differences evident? What ideas can be taken from your research?	Chapter 15 Chapter 18
RESEARCH	Investigate selected products, services or environments that offer opportunities for sustainable designs.	List, brainstorm, annotate and collect information about possible design opportunities. Arrange and make notes on the potential of each option.	Chapter 8
WRITE	Establish the design criteria that your final design will meet.	List the essential requirements of the sustainable redesign as discovered through your research. Comment on economic, social and ecological sustainability. List the Principles for Good Design and annotate to describe how these will be met in your design process.	Chapter 12

TOPIC 2: DEVELOP – REDESIGN

HOW DO DESIGNERS REDESIGN FOR SUSTAINABILITY?

THE DESIGN BRIEF WAS WRITTEN BY YOU IN TOPIC 1
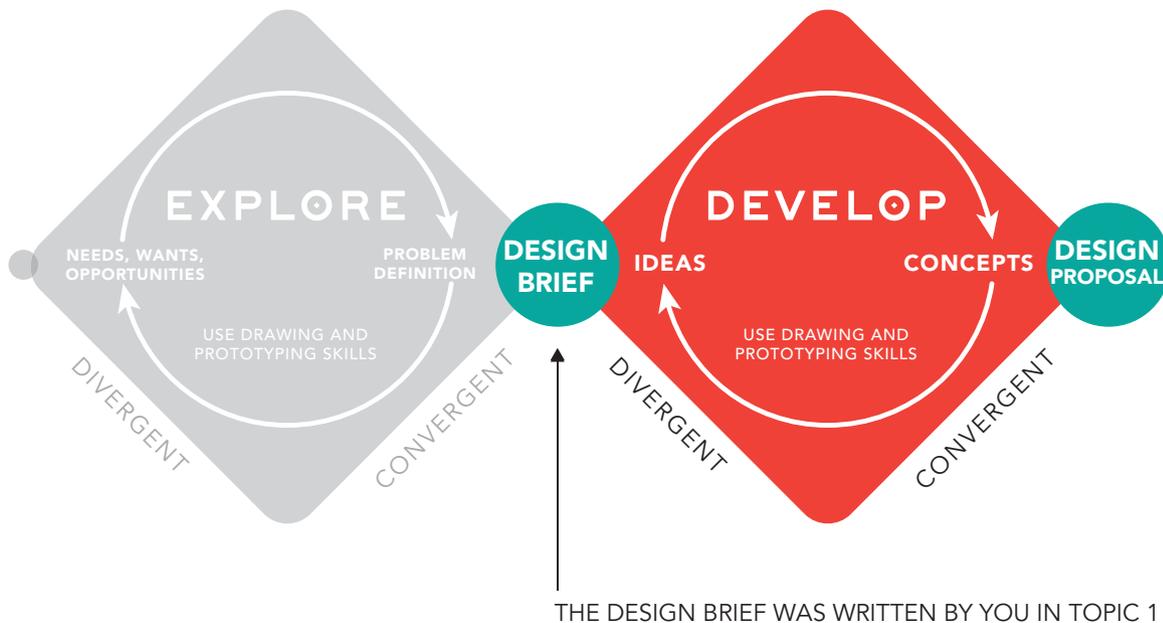
Design 2019 v1.1 General Senior Syllabus, p.44. Design 2019 v1.1 General Senior Syllabus © Queensland Curriculum and Assessment Authority (QCAA).

SUGGESTED PROCESS FOR UNIT 4 TOPIC 2

Process			Reference chapters
RESEARCH	Investigate the concepts of life-cycle design and planned obsolescence.	Find examples and describe how designs ignore or address issues of life cycle design including obsolescence (planned or other). Note how design decisions either encourage or discourage obsolescence including function, quality, endurance.	Chapter 15
INVESTIGATE	Research the application of circular design in sustainable design practices.	Find examples of the application of circular design in professional contexts.	Chapter 9
THINKING	Devise multiple ideas using relevant collaborative divergent thinking strategies and researched information.	Brainstorm ideas and solutions that address the brief and consider the opportunities available in a redesign.	Chapter 1
DRAW & PROTOTYPE	Use drawing and low-fidelity prototyping skills to represent the ideas identified.	Draw, prototype and document alternative design solutions. Progress and improve ideas through critical analysis in annotations.	Chapter 2 Chapter 3 Chapter 4 Chapter 5 Chapter 10
EVALUATE	Evaluate the strengths, limitations and implications of concepts against design criteria, stakeholder feedback and testing. Make improvements to refine ideas.	Use annotations, matrices and feedback to decide on the next steps for your design. Identify key questions for stakeholders that distil feedback to the most vital elements.	Chapter 1
SYNTHESISE	Consider multiple ideas and apply convergent thinking strategies to develop focused concepts.	Use tools such as SCAMPER to combine concepts and create possible solutions that closely address the HCD needs. Annotate your drawings and prototypes to explain thinking, decision-making and direction.	Chapter 1 Chapter 10
DEVISE	Create the most effective design concept using visual communication to convey information.	Make informed choices about the most appropriate presentation methods using drawing and prototyping to present the final concept.	Chapter 2 Chapter 3 Chapter 4
PITCH	Prepare a spoken presentation that outlines the design concept.	Consider visual and verbal requirements. What do you need to show? What details should be included in your pitch? Consider: + client demographics + how the design proposal addresses identified economic, social and cultural influences + reflections on the consequence of the final design being introduced/manufactured + how the new design might be promoted + the benefits of building a positive user experience + appropriate visual, written and spoken elements.	Chapter 4 Chapter 2

GLOSSARY

abstract Imagery that does not realistically represent life

accessibility Consideration of a range of abilities and disabilities in design and adjustments made to maximise the use of a space, product or graphic

aesthetic Considerations of appearances that are attractive or in good taste

alignment The position of text or images in a composition in relation to a grid or axis

analysis The detailed examination of the composition, elements, principles and components of a design

animation A series of images arranged in a timed sequence suggesting continuous movement

annotation Explanatory notes that accompany visual concepts

anti-alias To reduce the jagged and pixelated appearance of low-resolution images

Art Deco Design style characterised by the use of geometric shapes and forms

art director An individual with responsibility for managing the creative and production process usually within a design studio or advertising agency

Art Nouveau Design movement characterised by decorative, organic forms and inspired by Asian art

Arts and Crafts Decorative arts movement that rejected industrial forms in favour of nature-inspired design

ascender In typography, the parts of lowercase letters that rise above the x-height, e.g. b, d, f, h, k, i, and t

attribution To identify the source, author or copyright owner of original material

axis An imaginary straight line around which compositional elements are grouped

balance In design, a harmony between elements of a composition

baseline In typography, the horizontal line upon which the main body of the type sits. Rounded letters actually dip slightly below the baseline to give optical balance

bitmap Another term for raster. Images that use a grid of small squares of data (pixels) to create an image

body text Term used to describe type used for long passages of text, such as articles in a newspaper or magazine or chapters in a book

brainstorming Visual, verbal and written techniques designed to rapidly generate creative ideas and solutions

branding A unique name or image that represents a product

CADD Computer-aided design and drafting. Computer software that allows designs to be explored and analysed in detail before construction

client The initiator of a design process. The client usually identifies the design problem or need

CMYK The four process colour inks: cyan, magenta, yellow and black

collage Method of pasting shapes cut from materials including paper and newsprint onto a surface

colour The most dominant and influential of all the design elements

colour mode The type of colour required for digital images, usually CMYK or RGB

column In graphic design, a vertical 'container' for text and visual elements

composition The arrangement of design elements and visual information on a surface

constraints Creative restrictions placed upon a designer, usually outlined in the design brief

construction The building of a model or structural design

contemporary Belonging to the current era

context The circumstances surrounding a design, that is, its physical location

contour A line that traces the outer surfaces and form of an object

contrast Application of opposing elements for visual effect

copyright Legal protection against copying or misuse provided to films, images, music, broadcasts, artistic works and theatrical products. In Australia, copyright is automatically applied to original artistic works. Copyright protects tangible artistic products, not ideas. In most instances, copyright lasts for the life of the creator plus 70 years

crating The use of construction lines and shapes to build form. Often used in paraline and perspective drawings of complex objects

creative thinking The generation of a wide range of different design ideas

critical thinking The development of concepts and ideas

cropping The removal of visual material to enhance visual impact

crosshatching Rendering technique that uses overlapping diagonal lines to suggest tone

culture The ideas, customs and behaviour of a group of people or a whole society

Dada A group of reactionary artists, poets and writers that originated in Zurich, Switzerland

design brief Written or verbal instruction to a designer outlining a design task. It features information including the client need, design constraints, audience, purpose and context

design elements The building blocks that we use to construct a composition; the fundamental components of a composition. There are eight design elements: colour, form, line, point, shape, texture, tone and type

design factors Design considerations used to inspire, inform and assess successful design outcomes, including user-centred design, elements and principles of design, design technologies, legal responsibilities, project management, sustainability and materials

design field A specific area of design, with its own language, traditions, origins and influences; for example, industrial design, environmental design and communication design

design principles (Or principles of design.) Principles that direct how we use design elements to develop a composition. They include alignment, balance, hierarchy, contrast, unity, proximity, repetition, proportion, scale, consistency and cropping

design process The cyclical process involved in generating, exploring, developing and producing design solutions

design registration Provides protection for mass-produced products that are new and distinctive. Functional and utilitarian products, produced in significant quantities (guidelines suggest over 50) are not protected under copyright and require registration. Some mass-produced designs qualify as 'works of artistic craftsmanship' and are protected by copyright

design technologies The range of tools, processes and skills needed to realise design solutions

diameter A straight line that passes through the centre of a circle from one side to the other

dimensions Written measurements placed on a technical drawing

dot rendering Rendering technique that uses uniform dots of colour to create tone

dpi Dots per inch. Used in inkjet printing. Refers to the number of dots per square inch of image

elevation A drawing that shows the front, rear or side of something

empathy The ability to design with an understanding of how the user lives their everyday life. It means looking at a design problem from the perspective of the user

ergonomics The study of human factors, such as comfort and usability, in product and interface design

ethical Issues relating to the moral principles of a person or society

evaluate To assess effectiveness

fair dealing Under copyright law, the use of copyright material for research, criticism, satire and parody or news purposes

figure–ground One of eight design principles, which describes the relationship between dominant and non-dominant elements of a composition

foreshortening Drawing technique that visually indicates objects that are closer to the viewer

form The shape of three-dimensional objects

freelance To work independently rather than as an employee of a design business or other organisation

function The intended purpose of something; the way it will operate or work

golden ratio Mathematical calculation also known as golden section, golden mean and divine proportion. Refers to the height to width ratio between elements of a composition

gouache Opaque, water-based paint

graphical representations (Sometimes called design products.) The range of graphical products that demonstrate both the development of ideas and design solutions

grid An invisible structure or scaffold that supports the layout of print and digital content

gutter The spacing between columns of type

hierarchy The establishment of an order of importance

highlight To identify areas that reflect light and therefore feature little or no tonal information

horizon The defined meeting point of earth and sky, or equivalent planes in perspective drawing

human-centred design A design approach that prioritises the needs of the end user

icon Symbolic or sacred imagery that represents a concept

ideation The process of generating new concepts

intellectual property IP is the term that covers legal protections for creative works. IP owners have rights regarding attribution, use and misuse of their original works. Intellectual property rights are not automatically applied under Australian law

isometric drawing Paraline drawing method where the length and width are drawn at 30°

kerning The manipulation of space between individual letters of a typeface

layout The arrangement of visual elements, usually in a two-dimensional context

leaders Dimension lines with a single arrowhead

leading The distance between two lines of type

legibility The visual clarity of text

light source Where light is coming from, for example, the sun, a lamp or light globe

margin The white space that surrounds a composition (top, bottom and sides) and separates the design/ artwork from the edge of the composition

marker A repeating element that assists navigation on a page. It may be a page number, footer or an icon

minimalism Style of design where decoration and detail are minimal. Shapes, spaces and forms are 'clean' and uncluttered

mixed media The application of different materials and methods in the production of an illustration

modelling To create a smaller three-dimensional version of an object, either manually or digitally using 3D modelling software

modernism A design aesthetic characterised by the use of modern materials (such as steel and glass), the application of abstract forms, the manipulation of space and a conservative colour palette

module Grid areas defined by columns and flowlines

moral rights Moral rights are protected under Australian law to ensure that the works are correctly attributed to their creator and used in a manner that maintains their integrity. Almost all moral rights, like copyright, last for 70 years after the death of the author/creator

movement In design, a key influential development with its own characteristics and key designers

multimedia The use of varied software packages to create digital products using sound and vision

opaque Not transparent

organic Irregular shapes based on and inspired by natural shapes and form

orthographic drawing Sometimes referred to as multiview drawing. A series of drawings – known as 'views' – are drawn to show every part of the object clearly

paraline drawing Drawing methods where all lines remain parallel

patents Patents provide protection for inventions that are innovative and very different to existing products. They are not suitable for artistic works or ideas

perspective drawing Drawing method in which objects appear to recede to given points in the distance

pixel A very small unit of visual information in digital form

point A unit of measurement used in typography. One point is 1/72 of an inch or 0.352 millimetres

postmodernism A complex term used to describe the progressive architecture, design, literature, visual communications, music, sociology and film that has evolved since the 1960s. The postmodernism movement was a reaction against the perceived structural constraints of modernism, and is characterised by decoration, ornamentation and experimental approaches to design

ppi Pixels per inch. Used in software. Refers to the number of pixels per square inch of image

proportion The relative scale of objects in relation to each other

prototype Experimental model designed to test and evaluate a design

proximity Placement of elements close together, creating a visual relationship

radius A straight line from the centre of a circle to the circumference

raster Images made of pixels, e.g. scanned images and digital photographs. Raster software includes Adobe Photoshop

rendering The use of tone and colour in drawing to create texture, surface detail and form

resolution The quality of a digital image, determined by the number of pixels per square inch (ppi)

RGB Colour system for capturing images on a digital screen: Red, Green, Blue

sans serif Typefaces that do not have serif 'feet', for example, Helvetica

scale The ratio between the size of something real and that of a model or representation

serif A counterstroke on letterforms, projecting from the ends of the main strokes, like feet, for example, Times New Roman

shadows Areas of comparative darkness, indicated by dark tones

sketching Making a rough drawing of the main features of something in the early stages of design

spacing The distance between typeset words or lines

stock Another name for the surface a design is applied to; different thicknesses of stock are measured by weight in grams per square metre (gsm)

subjective Not objective. Displaying personal judgements and feelings

substrate The printing surface, such as paper, card, etc.

sustainability Involves the connection and interaction between social, economic and environmental systems to ensure sustainable outcomes

symmetry Visual elements mirrored on either side of an invisible axis

taper An object that gradually becomes smaller towards one end

target audience A group of people for which a design is specifically intended. The end user.

terminology A set of words related to a specific subject

texture The appearance or feel of a surface or substance

third-angle projection A method of orthographic representation in which each view is positioned in the drawing so that it represents the side of the object in the view beside it

thumbnails Small sketches used to generate ideas quickly

tonal scale The range of grey variations from white to black

tone The play of light or shadow on an object

tracking The distance between letters in typeset words

trademark A trademark is the representation of a brand. Trademarks are registered by IP Australia according to their relevant goods and/or services category, for example, jewellery, furniture. A trademark can lapse if not used and must be renewed every 10 years.

typeface the 'family' of a particular type design, e.g. Helvetica or Calibri

user The recipient/participant/audience of a design

user-centred design Designs in which the needs of the user are prioritised

vanishing point Point on the horizon where lines appear to converge

vector Images made from paths: lines and shapes. Created in programs such as Adobe Illustrator

viewpoint The position from which an object or drawing is viewed

views Representations of surfaces in orthographic drawing. Common views in third-angle projection are front, top, right- and left-hand sides

visual weight 'Heaviness' or 'lightness' of elements (including white space) within a composition

wayfinding The design and use of maps and signage

white space Areas of a composition without visual material. Can create balance and visual weight

x-height The distance between the baseline of a line of type and the tops of the main body of lowercase letters, excluding ascenders or descenders (for example, the height of a lower-case 'x' or 'e')

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