CAMBRIDGE

Food for Life

7–10

Fiona Matthews
Chrissy Collins
Sally Lasslett

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Please be aware that this publication may contain images of Aboriginal and Torres Strait Islander people who are now deceased. Several variations of Aboriginal and Torres Strait Islander terms and spellings may also appear; no disrespect is intended. Please note that the terms 'Indigenous Australians' and 'Aboriginal and Torres Strait Islander peoples' may be used interchangeably in this publication.

Cambridge University Press & Assessment acknowledges the Australian Aboriginal and Torres Strait Islander peoples of this nation. We acknowledge the traditional custodians of the lands on which our company is located and where we conduct our business. We pay our respects to ancestors and Elders, past and present. Cambridge University Press & Assessment is committed to honouring Australian Aboriginal and Torres Strait Islander peoples' unique cultural and spiritual relationships to the land, waters and seas and their rich contribution to society.

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FOREWORD

Food for Life, as the title suggests, has never been a more important and crucial text. As our society redefines their understandings about food, we look for ways to learn how to grow and source food, how to eat for health, and how to create budget-friendly, nutrient-dense meals that inspire and spark joy in the kitchen.

The authors of this textbook have thoughtfully considered the needs of our curriculum. This includes coverage of environmental and sustainable food issues and explicit learning about design thinking and the design process. The inclusion of Aboriginal and Torres Strait Islander food cultures within the text will help to you to respectfully understand and learn about the world's longest living and surviving food culture.

Food for Life demonstrates the power of learning about food to ignite your excitement for this subject. Using a consistent structure, the range of teaching and learning activities in the text explicitly linked to the Australian Guide to Healthy Eating include a diverse range of classroom recipes that you will love.

Use of this text in your food classroom will help you connect, transform and stimulate thinking about food, both now and for the future. It will inspire you to consider your role in the food systems and how your impact matters. It aims to empower you, our future leaders and citizens, to be informed about food choices, make deliberate changes to improve food systems and actively participate in your local food systems for a better future.

Overall, the text has shifted with the change of curriculum and is a fresh and adaptable text to suit a variety of classrooms. Links to all critical topics within this text will enhance the teaching and learning of your school curriculum. It will inspire your generation on the importance of having nourishing and delicious foods part of everyday life.

Food for Life will be the textbook that helps you to take up the challenge of being a food citizen and part of a sustainable food future for generations to come. What a wonderful time to be in a food classroom.

Hannah Smith
Co-author of *Food for VCE*
Reviewer of *Food for Life*

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ABOUT THE AUTHORS

Fiona Matthews

Fiona is an experienced Food Studies, Health and Human Development, and Science teacher who has dedicated her career to education. She has been an author of VCE Health and Human Development and junior Food Technology texts for numerous publishers.

Fiona's passion lies in professional development, curriculum and pedagogy. She has held leading teacher roles in these areas and has conducted teaching and learning coaching in both secondary and primary schools. Fiona served as a VCAA coach in the Health and Physical Education domain, incorporating respectful relationships, and has held sessional teaching roles at tertiary level.

Fiona believes that all students can be encouraged to learn, and she brings this philosophy into the classroom. She works on developing mutual respect with her students in order to help them to achieve their personal best.

Chrissy Collins

Chrissy is an experienced Health and Human Development and Food Studies teacher. She has been an author for Cambridge University Press since 2007, developing junior and senior Health and Human Development and Food Studies textbooks.

Chrissy regularly presents at professional development events on student engagement, pedagogy and exam success. She is also an experienced VCAA exam assessor and a writer of trial exams and support material.

Chrissy aims to motivate and inspire her own students by sharing her love of learning and passion for her subject areas, and by working with each individual student to help them reach their full potential.

Sally Lasslett

Sally has been an educational leader in a variety of school settings and roles for over 25 years. She is an advocate for successful pathways and transitions for disengaged young people. Sally is a leading principal in an independent flexible senior school setting and has been innovative in ensuring that essential wellbeing supports are provided in this setting.

Sally is also an active Home Economics professional with a passion for developing real-life skills. She has been a lead author on numerous VCE and other secondary level textbooks and is currently a board member of Home Economics Victoria.

Sally has a keen interest in assisting students to find a passion for learning and ensuring that they are successful in developing post-school pathways.

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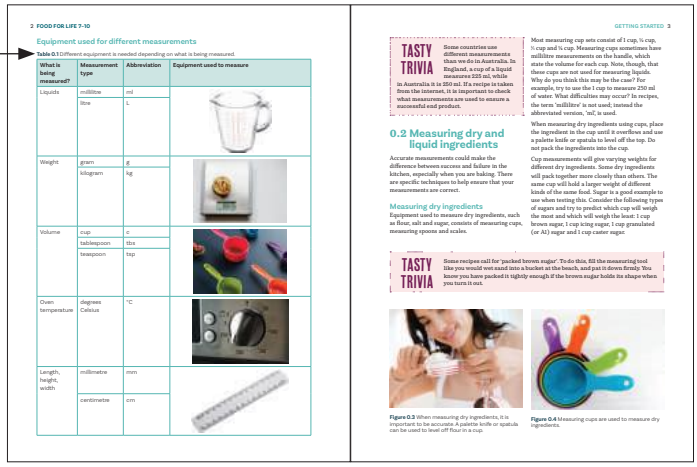
HOW TO USE THIS RESOURCE

Food for Life 7–10 has been developed by experienced teachers who know what works in the Food Technology classroom. It has been designed to offer multiple entry points to the knowledge and skills content to support teachers in tailoring individualised learning for a mixed-ability classroom.

Getting started At any time during the study of Design and Technology – Food specialisations, the skills and knowledge needed may need refreshing. The **Getting started** chapter serves as a reference for equipment, the design process and sustainable living. It can be used at any time, from all students at the start of Year 7, to Year 10s new to the subject, as revision for students as they start a new year, or to brush up on prior learning.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Equipment used for different measurements

Table 0.1 Different equipment is needed depending on what is being measured.

What is being measured?	Measurement type	Abbreviation	Equipment used to measure
Liquids	millilitre	ml	
	litre	L	
Weight	gram	g	
	kilogram	kg	
Volume	cup	c	
	tablespoon	tbs	
	teaspoon	tsp	
Oven temperature	degrees Celsius	°C	
Length, height, width	millimetre	mm	
	centimetre	cm	

GETTING STARTED 3

TASTY TRIVIA Some countries use different measurements than we do in Australia. In England, a cup of a liquid measures 225 ml, while in Australia it is 250 ml. If a recipe is taken from the internet, it is important to check what measurements are used to ensure a successful end product.

Most measuring cup sets consist of 1 cup, ½ cup, ⅓ cup and ¼ cup. Measuring cups sometimes have millilitre measurements on the handle, which state the volume for each cup. Note, though, that these cups are not used for measuring liquids. Why do you think this may be the case? For example, try to use the 1 cup to measure 250 ml of water. What difficulties may occur? In recipes, the term 'millilitre' is not used; instead the abbreviated version, 'ml', is used.

0.2 Measuring dry and liquid ingredients

Accurate measurements could make the difference between success and failure in the kitchen, especially when you are baking. There are specific techniques to help ensure that your measurements are correct.

Measuring dry ingredients

Equipment used to measure dry ingredients, such as flour, salt and sugar, consists of measuring cups, measuring spoons and scales.

When measuring dry ingredients using cups, place the ingredient in the cup until it overflows and use a palette knife or spatula to level off the top. Do not pack the ingredients into the cup.

Cup measurements will give varying weights for different dry ingredients. Some dry ingredients will pack together more closely than others. The same cup will hold a larger weight of different kinds of the same food. Sugar is a good example to use when testing this. Consider the following types of sugars and try to predict which cup will weigh the most and which will weigh the least: 1 cup brown sugar, 1 cup icing sugar, 1 cup granulated (or A1) sugar and 1 cup caster sugar.

TASTY TRIVIA Some recipes call for 'packed brown sugar'. To do this, fill the measuring tool like you would wet sand into a bucket at the beach, and pat it down firmly. You know you have packed it tightly enough if the brown sugar holds its shape when you turn it out.

Figure 0.3 When measuring dry ingredients, it is important to be accurate. A palette knife or spatula can be used to level off flour in a cup.

Figure 0.4 Measuring cups are used to measure dry ingredients.

Chapter features

Before we begin activities at the start of every chapter to establish prior knowledge and understanding of the topic and focus attention on the subject matter and learning to come.


CHAPTER 4
Vegetables

BEFORE WE BEGIN
1 What is a vegetable? Identify the different types of vegetables.
2 Describe how vegetables get to our plates.
3 Describe how to store vegetables to maximise their qualities.
4 Explain why vegetables are good for us.
5 Explain why we rarely see blemishes on the vegetables we buy.

Learning intentions open each chapter section, with corresponding **Learning reflections** at the end, to progressively consolidate understanding throughout the chapter.

Glossary terms appear in coloured text, are defined in the margins and collated at the end of the textbook for easy reference.


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2.1 Purpose of cooking food

LEARNING INTENTIONS
1 To understand why we cook food.
2 To understand what it means to cook food.
3 To understand what happens in food when we cook it.

digestibility The ability to swallow and process the food that is being eaten

spoilage Microbial or enzymatic damage that occurs to the original nutritional value, texture and flavour of food. The food then becomes unsuitable to eat and may be harmful to people.

Food is cooked for a number of reasons. Cooking improves its digestibility, taste and appearance; it kills microorganisms; it delays spoilage; and it creates new food items or new combinations of foods. Preparing and cooking food results in a variety of changes to the food.

Figure 2.2 Cooking changes the sensory and chemical properties of food, such as raw eggs in a cake.

When we cook food, we are also changing its sensory properties. The cooking process involves the following elements:
- applying heat
- destroying harmful microorganisms
- changing the physical, sensory and chemical properties of food
- combining or developing new ingredients, flavours and textures
- measuring accurately
- understanding cooking processes.

Figure 2.1 Cooking is the application of heat.

COLLABORATE 2.1

Brainstorm a list of foods that are eaten without cooking (raw) and another list of foods that must be eaten cooked. Are there foods on both lists? Why can some foods be eaten raw, while other foods must be cooked?

Some foods can be eaten without cooking, but other foods, like chicken, need to be cooked before eating. This is partly because some raw foods are difficult to chew, or taste awful, but it is also because they contain bacteria and microorganisms that are harmful if we consume them. These bacteria and microorganisms are destroyed by the heat used in the cooking process.

Figure 2.3 Cooking destroys harmful microorganisms, some of which cannot be seen, smelt or tasted in food.

LEARNING REFLECTION
1 Explain why it is important to make food more digestible by cooking.
2 Why must chicken be cooked, but celery can be eaten raw?

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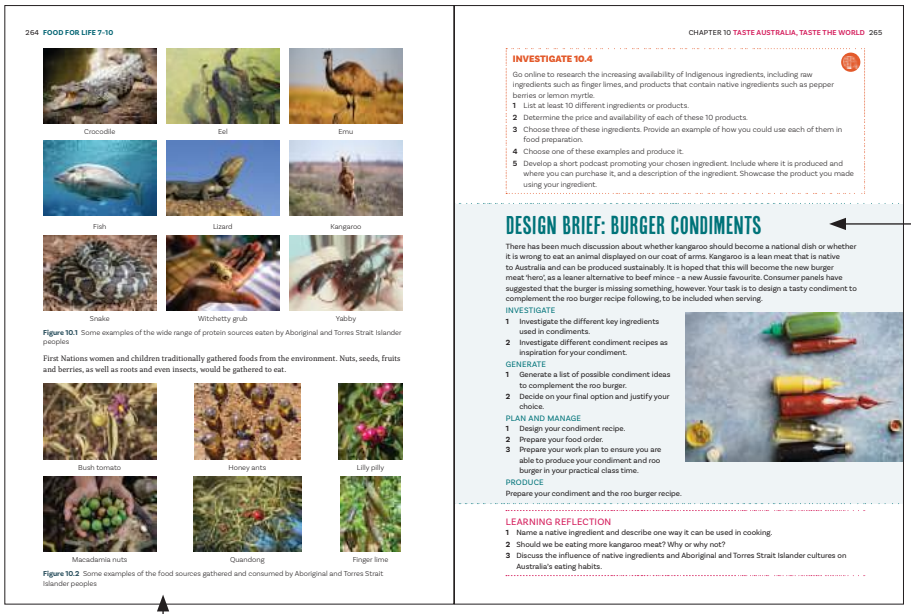
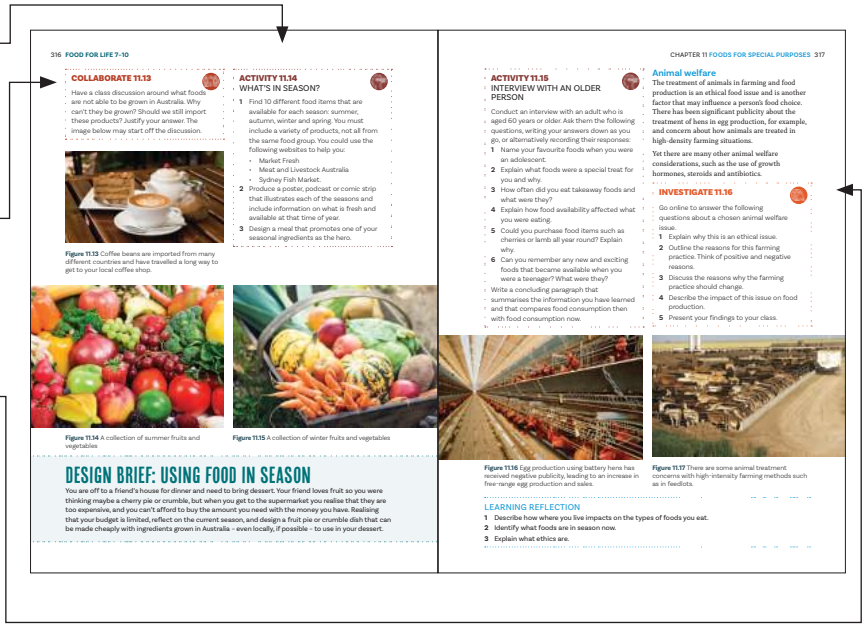


Design briefs throughout the book, often linked to sample recipes, provide opportunities to apply design thinking and create innovative solutions to meet specific needs.

They include discussion of ethical and sustainable practices in food systems, to ensure food security into the future.
Included throughout are Indigenous Australian ingredients and **Aboriginal and Torres Strait Islander food techniques and processes,** as well as foods and practices from around the world.

Activities

A wide variety of activities for individual and group learning are included, which explore key concepts, develop skills and link back to the general learning capabilities and cross-curriculum priorities.



ACTIVITY

Activity – tasks to develop, apply and demonstrate understanding of the knowledge and skills learned.

COLLABORATE

Collaborate – activities for two or more students working together, to share and develop knowledge and understanding.

INVESTIGATE

Investigate – opportunities to apply research skills through online investigation and individualise learning to an item or area of particular interest.

EXTENSION

Extension icons – differentiate the activity material to cater for a range of age and ability across the four years covered by the text.

TASTY TRIVIA

Tasty trivia boxes highlight interesting information as class discussion points or ideas to consider to enrich your learning.

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Recipe feature pages

For recipes with a video icon, access the Interactive Textbook to watch a video demonstration of this recipe.

RECIPE

LEBANESE FLATBREAD

Makes 8 flatbreads
Main tools and equipment Bowl, measuring spoons and cup, spoon, griddle pan or grill plate with grooves, pastry brush
Production skills Mix, knead
Cooking processes Dry-fry

Preparation time 10 minutes plus approx. 60 minutes to rise
Cooking time 10 minutes
Serving and presentation time 10 minutes
Total time 30 minutes plus 60 minutes to rise

Skill demonstration: Kneading

INGREDIENTS
- 1 teaspoon salt
- 1 teaspoon sugar
- 1 sachet dry yeast
- 1 cup warm water
- 3 cups plain flour
- Olive oil for griddle

TASTY TRIVIA Yeast is a living single-celled organism which will be killed if put into water that is too hot. When first combining water and yeast, test the temperature by putting your clean finger into the water. If it feels neither hot nor cold, it is perfect.

METHOD
1 Mix salt, sugar, yeast and water together in a large bowl. Set aside in a warm place until it begins to go frothy, about 5 minutes. Sift the flour into a separate bowl, then mix in the yeast mixture until well combined. If the dough is very dry, add more warm water, a tablespoon at a time to moisten it. Mix until the dough forms a pliable ball. Cover the bowl with a damp tea towel and let it rise until it has doubled in size, about 1 hour.
2 Transfer the dough to a well-floured surface and knead until soft and silky, about 6–8 minutes.
3 Cut the dough into 8 pieces and knead each into a smooth ball. Roll each out until it is about 15 cm in diameter. If it is not perfectly round, do not worry; just make sure the bread is the same thickness.
4 You can cook these on a barbecue griddle pan (one with grooves on it) or on a griddle pan on the stove or even in a frying pan on the stove. Put the griddle on medium-high heat.
5 Brush one side of the bread with a little olive oil and put the bread oiled side down onto the griddle. Brush the top side with more oil as the bottom cooks.
6 When the bread starts to brown and puff up, flip it over and cook the other side until brown.
7 Serve immediately. These can be reheated the next day by dropping them in a heated pan and cooking for 30 seconds each side.

EVALUATION
1 Describe what happened when you left the yeast, sugar and water mixture to sit for a while. Why was this process necessary?
2 Complete a sensory analysis of your flatbread.
3 Explain the type of dip you used as an accompaniment for your Lebanese flatbread.
4 Reflect on the decisions you made and your level of skill and explain how you could improve your skills if you were to repeat this production.

Carefully timed and tested recipes include step-by-step methods, and identify production skills, cooking processes and the main tools and equipment needed.
Most recipes also include evaluation questions to reflect on knowledge and skills learned from the activity.
Note: All oven temperatures are for conventional oven, unless fan-forced is specified.
If a conventional oven setting is not available, reduce the recipe temperature by 20°C.

Chapter review

The end of chapter activities include a combination of tasks to help apply learning and promote understanding.

Review section – summarising the main ideas of the topic to revise and consolidate learning.

Test your knowledge – a variety of questions at the end of the chapter help to check recall and understanding, reinforce key concepts, and apply learning and skills.

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Review

1 Food is needed for energy, the growth and maintenance of cells and tissues, and regulating body functions.
2 Nutrients – protein, carbohydrate (and fibre), fat, vitamins, minerals and water – are supplied through food and have specific functions in the body. The best way to ensure you get the nutrients you need is to consume a balanced diet.
3 The digestive tract is responsible for the digestion, absorption and metabolism of food nutrients.
4 Food nourishes our bodies and helps to reduce the risk of diet-related diseases and other health problems.
The key food groups are the basis of many food-selection models. The food groups are:
- vegetables and legumes/beans
- fruits
- grain (cereal) foods, mostly wholegrain and/or high cereal fibre varieties
- lean meats and poultry, fish, eggs, tofu, nuts and seeds, and legumes/beans
- milk, yoghurt, cheese and/or alternatives, mostly reduced fat.

5 Each nutrient has a specific function in the body. We should therefore ensure that we consume a variety of foods in the recommended proportions.
6 Food-selection models are tools to help people choose the correct foods in the correct proportions. Two examples of these are the Australian Dietary Guidelines and the Australian Guide to Healthy Eating.
7 Diet-related diseases contribute significantly to Australia's burden of disease.
8 Healthy eating is a protective factor, reducing the risk of dietary-related diseases such as obesity, cardiovascular disease, type 2 diabetes, bowel cancer and osteoporosis.

Test your knowledge

Multiple-choice

1 The Australian Guide to Healthy Eating is based on five basic food groups. These are:
a vegetables and legumes, fruits, grains, lean meat and poultry, nuts, tofu, etc., and milk and dairy alternatives.
b dairy alternatives, cereals, milk, vegetables and legumes, and fats and oils.
c whole milk dairy, vegetables, fruit, grains and lean meat.
d meat, dairy, fruit and vegetables, fats and oils, and cereals.

2 The six main nutrients include:
a protein, fibre, carbohydrates, vitamins, minerals and fats.
b protein, carbohydrates, fats, vitamins, minerals and water.
c protein, carbohydrates, vitamins, minerals, water and soluble fibre.
d macronutrients, micronutrients, water, sugars, fats and proteins.

3 The nutrients that provide energy to the body include:
a vitamins, minerals, sugars and fats.
b meat and legumes, dairy and cereals.
c vitamins, minerals, water and fats.
d fats, carbohydrates and proteins.

True or false?

1 All absorption of nutrients occurs in the small intestine only.
2 The Australian Dietary Guidelines only provide information about how to choose foods wisely.
3 Some vitamins can be manufactured in the body from other raw materials.

Short-answer

1 What is the function of water in the body?
2 Explain what happens to a salad sandwich in your digestive system after you bite into it.
3 Using the Australian Guide to Healthy Eating, which food groups provide the body with energy? Explain your answer.
4 Describe what mindless eating is and how it can lead to poor health outcomes.

Extended-response

Obesity is a condition which is in part a result of poor nutritional habits.
1 Explain why obesity is a significant health risk.
2 Explain how poor nutritional choices may lead to obesity.
3 Using a food-selection model, outline how an individual may work towards maintaining a healthy weight. In your explanation, provide an example of a day's meals.

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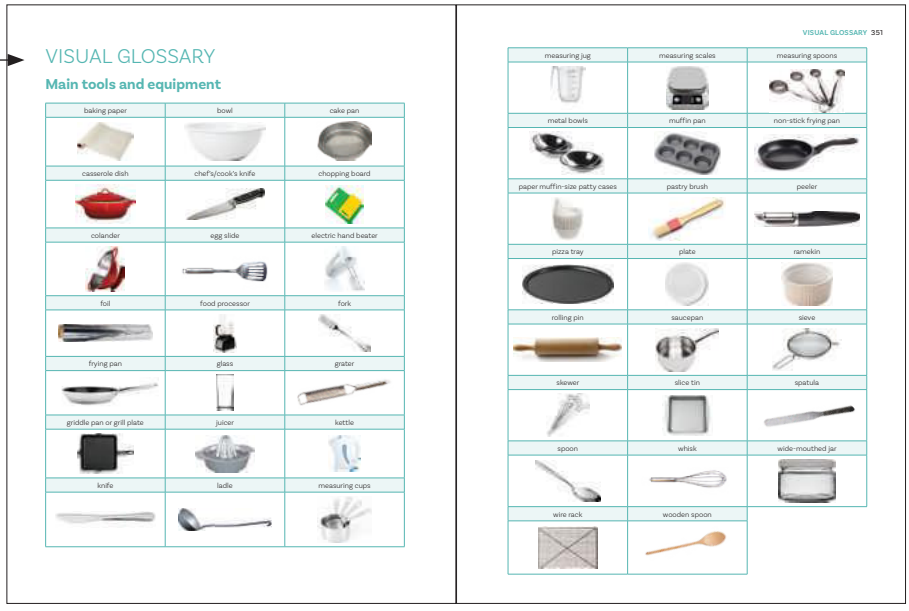
Reference section

Visual glossaries of equipment and ingredients – students can identify at a glance any items they are unfamiliar with or have not previously encountered.

Recipe index – for easy reference of all recipes throughout the book.



VISUAL GLOSSARY

Main tools and equipment

baking paper	bowl	cake pan
casserole dish	chef's/cook's knife	chopping board
colander	egg slide	electric hand beater
foil	food processor	fork
frying pan	glass	grater
griddle pan or grill plate	juicer	kettle
knife	ladle	measuring cups

measuring jug	measuring scales	measuring spoons
metal bowls	muffin pan	non-stick frying pan
paper muffin-size patty cases	pastry brush	peeler
pizza tray	plate	ramekin
rolling pin	saucepan	sieve
skewer	slice tin	spatula
spoon	whisk	wide-mouthed jar
wire rack	wooden spoon	

Further digital resources are included in the Interactive Textbook on *Cambridge GO*:

- **Video demonstrations** of selected recipes, processes and key skills to enhance understanding and skill development.
- **QR codes** in the print textbook provide instant access to the skills videos, ideal for class demonstration or instant revision of key skills.
- **Auto-marked** drag and drop activities allow you to quickly check your recall and understanding of information.
- **Links to external websites** for additional information, data and other resources.
- **Roll-over** definitions to immediately define key terms.
- **Access to the Offline Textbook**, a downloadable version of the student text with note-taking and bookmarking enabled.

A separate Teacher Resource Package is available and includes:

- **Planning documents** – comprehensive course outlines, including weekly teaching programs.
- **PowerPoint presentations** – two per chapter.
- **Curriculum grids** – aligned to Australian curriculums.
- **Downloadable worksheets** – additional modifiable worksheets and assessment tasks, including design briefs.
- **Suggested responses** – to all activities and questions in the student book.

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UNITS OF MEASURE

Cups	
30 ml	⅛ cup
60 ml	¼ cup
80 ml	⅓ cup
125 ml	½ cup
180 ml	¾ cup
250 ml	1 cup
310 ml	1¼ cups
375 ml	1½ cups
430 ml	1¾ cups
500 ml	2 cups
625 ml	2½ cups
750 ml	3 cups
1 L	4 cups
1.25 L	5 cups
1.5 L	6 cups
2 L	8 cups
2.5 L	10 cups

Spoons	
1.25 ml	¼ teaspoon
2.5 ml	½ teaspoon
5 ml	1 teaspoon
10 ml	2 teaspoons
20 ml	1 tablespoon (4 teaspoons)
30 ml	1½ tablespoons
40 ml	2 tablespoons
50 ml	2½ tablespoons
60 ml	3 tablespoons

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GETTING STARTED

0.1 Equipment used for measuring

Successful and consistent food preparation requires accurate measurement of ingredients. There are times when a 'dash' of something or a 'pinch' of another are called for, but like science experiments, to get a good result every time requires consistent measurement techniques.

Measuring equipment used for food includes measuring cups, measuring spoons, measuring jugs and scales. In Australia, cups, spoons and jugs are based on Australian Standards of measurement. When a cup or teaspoon is referred to, it does not mean a cup that a family member might use for their tea or coffee or the teaspoon you use daily, as these can vary considerably in size.

There are different types of scales, from older-style and traditional balance scales to very accurate electronic digital scales. Scales are used to measure weight.

TASTY TRIVIA

The oldest examples of weighing scales were found in the Indus River Valley (today Pakistan) and were used more than 4000 years ago. Until Bernard Salter invented the first spring scale in 1770, all scales were variations of the balance scale.

Recipes often use special abbreviations to describe quantities of ingredients. These are shortened versions of the word, such as 'kg' for kilogram and 'tsp' for teaspoon.

If you are using a recipe from an English or American site from the internet or a very old Australian recipe, it may have measurements in ounces (oz) or pounds (lb) for solids and pints or fluid ounces (fl oz) for liquids. These are imperial system measurements, which were once used in Australia and are still used in some other countries. Today in Australia, we use the metric system.

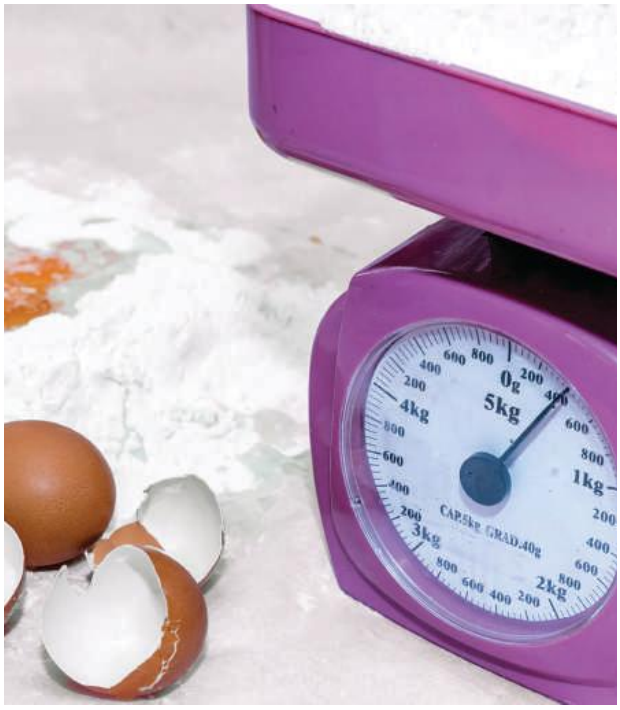

Figure 0.1 Spring balance scales

Figure 0.2 Electronic digital scales

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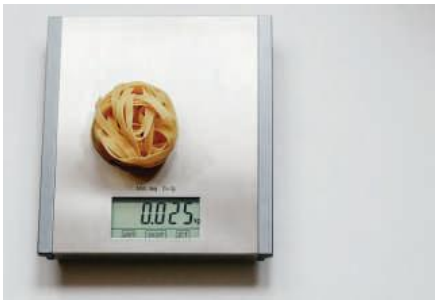
Equipment used for different measurements

Table 0.1 Different equipment is needed depending on what is being measured.

What is being measured?	Measurement type	Abbreviation	Equipment used to measure
Liquids	millilitre	ml	
	litre	L	
Weight	gram	g	
	kilogram	kg	
Volume	cup	c	
	tablespoon	tbs	
	teaspoon	tsp	
Oven temperature	degrees Celsius	°C	
Length, height, width	millimetre	mm	
	centimetre	cm	

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TASTY TRIVIA

Some countries use different measurements than we do in Australia. In England, a cup of a liquid measures 225 ml, while in Australia it is 250 ml. If a recipe is taken from the internet, it is important to check what measurements are used to ensure a successful end product.

0.2 Measuring dry and liquid ingredients

Accurate measurements could make the difference between success and failure in the kitchen, especially when you are baking. There are specific techniques to help ensure that your measurements are correct.

Measuring dry ingredients

Equipment used to measure dry ingredients, such as flour, salt and sugar, consists of measuring cups, measuring spoons and scales.

Most measuring cup sets consist of 1 cup, ½ cup, ⅓ cup and ¼ cup. Measuring cups sometimes have millilitre measurements on the handle, which state the volume for each cup. Note, though, that these cups are not used for measuring liquids. Why do you think this may be the case? For example, try to use the 1 cup to measure 250 ml of water. What difficulties may occur? In recipes, the term 'millilitre' is not used; instead the abbreviated version, 'ml', is used.

When measuring dry ingredients using cups, place the ingredient in the cup until it overflows and use a palette knife or spatula to level off the top. Do not pack the ingredients into the cup.

Cup measurements will give varying weights for different dry ingredients. Some dry ingredients will pack together more closely than others. The same cup will hold a larger weight of different kinds of the same food. Sugar is a good example to use when testing this. Consider the following types of sugars and try to predict which cup will weigh the most and which will weigh the least: 1 cup brown sugar, 1 cup icing sugar, 1 cup granulated (or A1) sugar and 1 cup caster sugar.

TASTY TRIVIA

Some recipes call for 'packed brown sugar'. To do this, fill the measuring tool like you would wet sand into a bucket at the beach, and pat it down firmly. You know you have packed it tightly enough if the brown sugar holds its shape when you turn it out.

Figure 0.3 When measuring dry ingredients, it is important to be accurate. A palette knife or spatula can be used to level off flour in a cup.

Figure 0.4 Measuring cups are used to measure dry ingredients.

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ACTIVITY 0.1
MEASURING CUPS

Identify the cup/s you would use to measure ⅔ cup and 1¾ cups.

Measuring spoons are used for smaller quantities of dry and wet ingredients. For dry ingredients, a spatula or palette knife is also used to level off the ingredients in a spoon to ensure accurate measurement.

Measuring liquid ingredients

Measuring spoons are used for wet ingredients. When collecting wet ingredients such as soy sauce or oil, make sure you collect the liquid over a larger cup or small bowl to avoid spills.

ACTIVITY 0.2
MEASURING SPOONS

Why do you think it is incorrect to use a dry measuring cup to measure large quantities of liquids? Why is it correct to use a dry measuring spoon to measure small quantities of liquids?

Figure 0.5 Measuring spoons are used to measure both dry and wet ingredients.

Measuring spoons also have millilitre measurements on them. This is useful for measuring small amounts of liquids. Check the millilitre (ml) measurements on measuring spoons. The Australian Standards tablespoon is 20 ml. If the measuring spoons have been made in another country, the tablespoon may only be 15 ml, as this is the quantity used in many other countries, such as the United Kingdom.

Larger amounts of liquids are measured using a measuring jug. Australian Standards measuring jugs are 250 ml, equivalent to 1 measuring cup, or 1 litre (1000 ml). When measuring liquids, pour the liquid into the jug while it is sitting on a flat surface and check the quantity at eye level.

ACTIVITY 0.3
MEASURING LIQUIDS

1. Explain how you would measure 25 ml of liquid accurately and safely.
2. What measurement unit is used on the beakers below?
3. For each beaker shown, state how much liquid is in the beaker.

Figure 0.6 Beakers with different measurements

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Figure 0.7 A measuring jug is used to measure liquids.

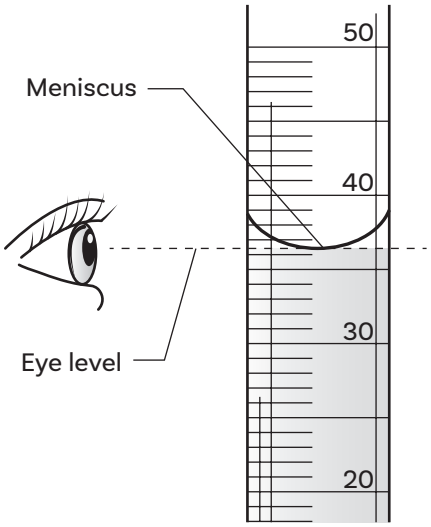

Figure 0.8 Liquids should be measured at eye level at the lowest point of the meniscus.

TASTY TRIVIA

If you observe closely the surface of a liquid such as water, it does not sit flat; it curves slightly at the edges. This is called the meniscus, which is a result of the attraction of the molecules of water to each other. You might like to research the term 'meniscus'. When reading a measurement at eye level, the measurement should be taken at the bottom of the meniscus, not the top.

0.3 Cooking equipment

Kitchens have a number of different tools that a cook can use to prepare and produce food. In order to get the best out of these tools, it is necessary to understand how they work and how they are best used.

Stoves

Electric or gas stoves are the main cooking equipment used in the kitchen. There is considerable variation in the design of stoves, with options on the controls to make the food-production techniques simpler or more efficient.

TASTY TRIVIA

The first fully enclosed cooking stove was invented in the nineteenth century but was too large to fit into a normal house. Perhaps that is why the original meaning of the word 'stove' meant 'heated room'!

The basic stove consists of three main design features: a stove top, an oven and a grill. These may be separate units or combined into one unit. Stoves are designed to do the basic cooking functions referred to throughout the text, such as boiling, frying, stewing, baking, roasting and grilling. Boiling, frying and stewing usually take place on top of the stove. Stewing can also occur when the food is cooked in the oven. Baking and roasting occur in the oven. Grilling is done under the grill. Each method uses different containers and cooks the food in a different way.

Stoves cook food by **convection**, **conduction** and **radiation**.

Induction stove tops are becoming more popular in kitchens and at home. These stoves do not heat up an element (electric stove) or use

convection Cooking food by the circulation of hot air or steam, such as in an oven or a steamer or in hot liquid, such as boiling

conduction Cooking food by heat transference through a flat metal surface onto the food or liquid, for example, frying or poaching

radiation Cooking food by direct heat from a flame or element, such as in a grill, or when electromagnetic waves pass through food, such as in a microwave

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Figure 0.9 You can find many different cooktops in kitchens. Shown here are gas, electric and induction types.

a gas flame (gas stove) to cook food. Induction stoves heat the pot directly through magnetic induction which then transfers heat to the food through conduction and then convection currents. Because there is no flame or element, the stove top will remain relatively cool, although care must still be taken, as the glass surface of the stove can get warm from the heat of the pot which is sitting on it.

TASTY TRIVIA

You can tell if a pot is able to be used on a induction stove. Bring a magnet towards the pot, if it sticks to the metal, it can be used.

ACTIVITY 0.4
PARTS OF A STOVE

1 Draw the stove you work with most of the time. Label the stove top, oven and grill.

2 Copy and complete the following table in your workbook:

Part of a stove	Circle the way/s this part of the stove cooks food	Two safety rules you should observe when using this part of the stove
Stove top	Conduction Convection Radiation	1. 2.
Oven	Conduction Convection Radiation	1. 2.
Grill	Conduction Convection Radiation	1. 2.

3 Identify an example of a food that can be cooked using each part of the stove.

Safety with stoves

In order to prevent burns and scalds, remember to do the following:

- Turn the handle of a saucepan towards the back of the stove. When using a gas stove do not turn the handle so it is over a flame.
- Use the back hot plates on the stove before using the front hot plates.
- Choose the right-sized burner for the piece of equipment you are using.
- Use dry oven mitts, not tea towels, to remove hot trays from the oven.

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Figure 0.10 Care needs to be taken around stoves to prevent burns. What rules are being broken here?

- Carry a large pot of hot liquid or food with two hands, and warn others when you are doing this.
- Do not remove the lid from a saucepan while your face or hands are over the saucepan – this will help avoid steam burns. Use the lid as a shield.
- Do not overfill a saucepan – choose the right piece of equipment for the right job.
- Do not leave hot fat or oil unattended.
- Do not leave tea towels, oven mitts or other flammable items close to a stove that is turned on.
- Be careful when lighting an oven or a stove, particularly a gas stove.

Ovens

Ovens have controls on them that allow you to set the oven at a given temperature. Recipes will tell you what temperature to set the oven at to ensure correct cooking. Some recipes will tell you to set the temperature 10–20°C cooler if the oven being used is **fan-forced**. Some ovens only have a heating element at the bottom. This is because heat rises, so the top of the oven will be hotter than the bottom, with the 'ideal' temperature in the middle. Many older recipes will tell you to 'cook in the centre of the oven' to capture this ideal zone.

fan-forced oven An oven with a fan, which distributes the heat evenly throughout the oven

Figure 0.11 Some ovens are fan-forced, which distributes the heat evenly.

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Figure 0.12 Stainless steel cookware is strong and resists wear and tear. Not all stainless steel cookware can be used on induction stove tops.

Figure 0.13 Ensure you use the correct size and type of bakeware pan as specified in the recipe; otherwise, you will have to adjust the cooking time and the temperature.

Figure 0.14 Silicone bakeware is naturally non-stick, flexible and easy to clean, but it can be difficult to carry once filled as it is not rigid.

Stove top and oven equipment

There are many pieces of equipment that can be used when cooking in the oven and on the stove top. Careful selection is necessary to ensure success.

ACTIVITY 0.5
SAFETY WITH STOVES AND OVENS

1. Explain how you would safely light a gas oven. How might this process be different if you were to start an electric oven?
2. You have a recipe from a recipe book that is dated 1958. It says to cook the biscuits in the middle of the oven at 180°C. Your oven is a fan-forced oven. Explain what temperature you would use for your oven and what shelf you would put the biscuit tray on in your oven.
3. Explain how you might use the silicone bakeware shown in Figure 0.14 safely to cook cupcake batter.

Microwave ovens

The microwave oven is one of the most useful kitchen equipment inventions. Just think of how many times you have used the microwave to cook or reheat food and drinks.

Microwaves provide an alternative for cooking food, although the design features have limitations in cooking some foods.

Figure 0.15 A microwave oven is a useful implement but is not always the best option for what you need to do in the kitchen.

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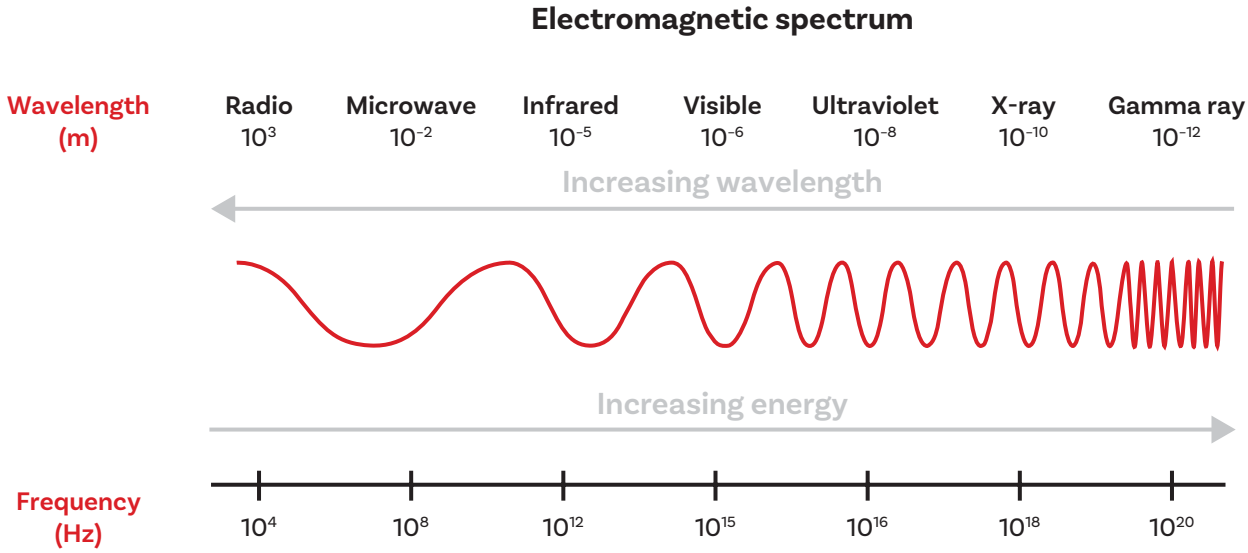

Figure 0.16 Microwave radiation has a different wavelength than the infrared radiation used in conventional ovens, so a microwave cooks food differently.

Food cooks in a microwave oven because it generates electromagnetic radiation which acts on water and oil molecules, causing them to vibrate very rapidly. When molecules vibrate, the resulting friction causes heat. Think what happens when you rub your hands together rapidly. They feel warmer because you are creating friction. It is this heat caused by friction that heats the food. The microwave radiation only penetrates about 2 cm into most foods, so in larger pieces of food, heat penetrates deeper than this by conduction.

Microwave cooking equipment

There are advantages and disadvantages relating to the equipment selected for cooking. These vary with different foods and different cooking methods. For example, microwaves will lose their efficiency when a large quantity of liquid is involved or long, slow cooking is necessary.

Microwave oven safety

When using the microwave, always remember the following:

- Foods and liquids in the microwave can reach scalding temperatures very quickly. The heat is often uneven, so it is important to shake, stir and stand the contents carefully before serving.
- When food is heated or cooked in a covered container, steam that can scald is trapped inside. Remove the lid or plastic covering from the far side of the container so that the steam rises away from you.
- Do not use glass bottles to cook foods in the microwave as they can crack or even explode.
- Do not use metal bowls, aluminium foil or plates with a silver or gold trim in the microwave, as these items can cause sparks and even fires.

TASTY TRIVIA

The microwave radiation is reflected back into the oven space not by the glass door, but by the mesh that can be seen behind the glass. In fact, many industrial microwaves do not have glass at all.

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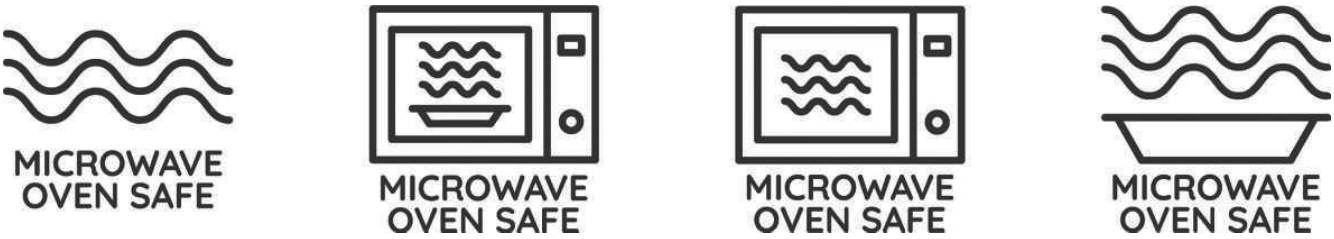

Figure 0.17 Not all cookware is suitable for use in a microwave oven. Look for microwave safe labels or stick with glass and most plastics.

Table 0.2 Microwave cooking

	
Microwaves are quick for heating food that is already cooked (best for small amounts).	Metal equipment cannot be used in a microwave. Only specialist microwave containers should be used, such as microwave-safe plastics, glass and ceramics.
They are good for cooking small quantities of vegetables with minimal liquid, so there is minimal nutrient loss.	Browning and crisping of foods will not occur unless there is a special feature, so microwaves are not recommended for cooking pastry or meats that require browning.
Cooking is faster for many items – they can reduce cooking time by 60–70 per cent, therefore saving energy and time.	Some foods, such as meat stews, require a long, slow cooking process to develop their flavour.
Snacks and small meals can be prepared quickly.	Accurate timing is essential. A difference of seconds can have drastic consequences, for example, when melting chocolate or butter.
Foods can be defrosted.	To cook food evenly, it must be of uniform size.
Washing up is easier because food can be cooked and served in the same dish.	Cooking items with a large amount of water is less economical, and in fact may take the same amount of time as other methods, for example, cooking rice.
Minimal skill is required for preparation or heating a snack or quick meal.	It is difficult to cook large quantities.

ACTIVITY 0.6
COOKING IN A MICROWAVE OVEN

1 Using the information in Table 0.2, which of the following foods could you cook successfully using a microwave oven?

steaming carrots and peas	beef stew
boiling potatoes	apple pie
a roast lamb	pre-packaged meal
instant noodles	steamed rice
bread	fried rice

2 Explain why the jam on the inside of a doughnut re-heated in a microwave is much hotter than the rest of the doughnut.

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VEGGIE FRITTATA

Serves 2
Main tools and equipment Chef's knife, measuring cups, measuring spoons, chopping board, non-stick frying pan, plate
Production skills Slice, beat, measure, chop
Cooking processes Fry, grill

Preparation time 10 minutes
Cooking time 15 minutes
Serving and presentation time 3 minutes
Total time 28 minutes

Skill demonstration: Cut into batons

INGREDIENTS

- 2 teaspoons olive oil
- 1 bunch asparagus, cut into batons
- ½ red capsicum, thinly sliced
- 4 eggs, lightly beaten
- ½ cup thawed frozen corn kernels
- 1 tablespoon chopped flat-leaf parsley

METHOD

1. Heat oil in a small frying pan over medium–high heat. Add the asparagus and the red capsicum to the pan, stirring for 3 minutes until they start to soften. Turn down to medium heat. Add the eggs, corn and parsley. Cook without stirring until the base is set.
2. Meanwhile, preheat the grill on high. Grill frittata in the pan for 3–5 minutes or until set and starting to turn golden.

   Note: If your frying pan has a plastic handle, cover it with foil before placing it under the grill. Remove the pan from the grill using an oven mitt.
3. Serve immediately or allow to cool. If the frittata is to be eaten later, cut it into quarters and store in an airtight container in the fridge to eat cold or reheat in the microwave the next day.

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Figure 0.18 It is important to know what the process terms mean in a recipe, for example, slice, beat and dice.

0.4 Food preparation processes

A process is a series of actions carried out in the cooking or production of food. These processes are aimed at developing a final food item.

Many of the processes and culinary terms used in cooking are based on French cooking. If we think about particular food items, there are many processes or actions that can be carried out in making that individual item. Some of the basic processes used in the preparation of the recipes that you will find throughout this book are:

- blend
- dice
- simmer
- bake.

ACTIVITY 0.7
ANALYSING PROCESSES

Look at the veggie frittata recipe and make a list of all the processes required to complete the recipe. These are the actions that must be carried out to complete the recipe. Provide a definition for each of the processes you have identified.

COLLABORATE 0.8

Flick through a recipe book with a classmate and find a recipe you both like. List the actions (processes) that are required to make that recipe. Compare your list with your classmate. Were there any processes you or your partner missed? Discuss with your partner what equipment might be needed to carry out these processes.




Figure 0.19 What might each of these tools be used for in the kitchen? Do any of them have more than one purpose?

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0.5 Sensory analysis

Food should be eaten for enjoyment. Your favourite foods and meals you remember are those that delight all your senses!

The sensory properties of food are related to the human senses, as outlined in Figure 0.20. Our appreciation and enjoyment of food is based on the food's sensory properties. When we evaluate foods, we draw on these sensory properties and use our own senses to make judgements about whether we like or dislike a food item.

Figure 0.20 We enjoy food using our five senses: smell, sight, sound, taste and touch, although touch is often the touch of food on the tongue.

Appearance

Consumers are often quick to judge food by its **appearance**, or that of the product's packaging. Sight is the dominant sense and accounts for 80 per cent of our experiences. It is very important that the food appeals to the senses when designing and creating food products. Have you ever seen any foods that didn't look right? Did you eat them?

appearance The 'look' of the product, packaging or food

Consumers often have an expectation of how a food should look, and if it does not meet expectations, it is often not consumed. For example, a high-quality risotto will look creamy and be a white colour. If you were served a grey risotto, would you eat it? The colour of the dish may highlight that it has not been produced correctly.

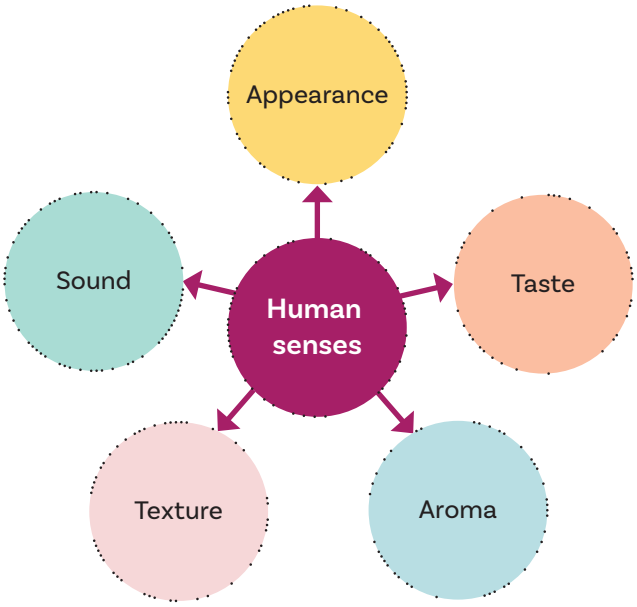

Figure 0.21 The human senses – the TATAS

Taste

We eat food for the taste and pleasure it can give us, as well as for the nutritional benefits.

There are five basic **tastes**: sweet, salty, sour, bitter and umami. However, new studies show that we might have a sixth taste related to certain types of fat.

taste The sense that perceives the flavour or savour of things using the mouth and tongue

Flavour is a combination of taste and aroma, with the mouth and nose sending signals to the brain.

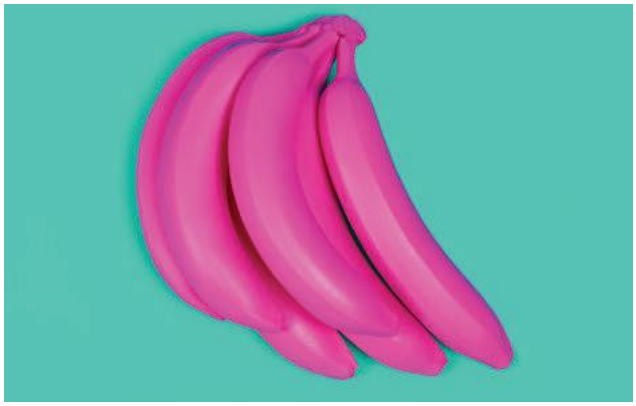

Figure 0.22 Would you like to eat this food? What appeals to you? What don't you like?

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Figure 0.23 Sometimes the smell of something can be so enticing that the appearance of it doesn't matter – like this black truffle.

Aroma

Have you ever smelled onion or garlic cooking? **Aroma** plays an important role in our experience of food. In fact, when selling homes, many real-estate agents have muffins or cakes baking in the oven or use the smell of cooking to make a kitchen feel enticing and comforting. Often the aroma of food can bring back memories of past food experiences. This can be positive or negative. While aroma is often used to enlighten the senses, it can also be used to make judgements about food and food quality. Have you ever smelled milk to see whether it was spoiled before you used it?

aroma The smell arising from the food

Texture (mouthfeel)

The texture of food (**mouthfeel**) is the feeling created inside your mouth: biting, chewing and swallowing. Think about eating a piece of chocolate. It is smooth and coats the roof of your mouth with a rich texture. Consumers enjoy the different textures that foods provide. In a well-planned product or meal there will be many ingredients that provide different textures to make the food interesting to consume; for example, the crunch of lettuce in a salad compared with the moist softness of a ripe tomato.

mouthfeel How a food or drink feels in the mouth, both on the tongue and palate and between the teeth

Figure 0.24 Can you describe the senses that this girl is experiencing as she eats the popcorn?

Sound

The **sounds** that food makes when being cooked, cut up or chewed is also a sense that we can use to help us judge what the food is like before we eat it. Think about the sound a carrot might make when fresh. If snapped, it breaks with a sharp crack. Would you think a carrot that breaks silently is appetising? Think about the crunch of crackling on a roast pork, the slurp of a frozen drink being consumed or the pop of popcorn cooking.

sound The sense that perceives the sound that a food makes when being cooked, prepared or eaten

0.6 The design process

Design is a part of everyday life and is primarily about problem solving. Small items, such as the shoes you wear, or much larger items, such as your school building, have all gone through a **design process**. What we grow, eat, make, wear or build, our health and safety, how we travel and how we spend our spare time are all related to design.

What does this have to do with food? Every day, food presents

design An activity that translates an idea into something useful, making it better and improving quality of life; it fulfils a need

design process A process that typically involves investigating, generating, producing, evaluating, planning and managing to create a designed solution that considers social, cultural and environmental factors

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people with the chance to create **designed solutions** through problem solving and decision making.

Figure 0.25 This roll was the design solution for a dish that was required to be a healthy lunch dish that could be prepared quickly and eaten without cutlery.

The process of planning and preparing a meal or snack is no different from the process through which other designs go. The problem of what to eat, the options available and the solution you find are all part of working through the design process in order to find design solutions.

The chapters that follow will build your knowledge to enable you to make decisions about food options. Knowledge of food, equipment and processes is critical in the design process so you can develop a quality final **product** solution.

designed solutions The products, services or environments created for a specific purpose or intention as a result of design thinking, design processes and production processes

product One of the outputs of the design and production processes. Products are the tangible end results of natural, human, mechanical, manufacturing, electronic or digital processes to meet a need or want.

Stages of the design process

In order to ensure a successful design, it is necessary to follow basic steps and adequately complete each stage.

Figure 0.26 Stages in the design process

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COLLABORATE 0.9

1 As a class, brainstorm the factors that had to be considered to design the dish shown in Figure 0.25.
2 With a friend, design an alternative dish that would also meet the design brief stated.

Identifying a need or opportunity

The design process starts from recognising a need or an opportunity.

design thinking The use of strategies for understanding design problems and opportunities, visualising and generating creative and innovative ideas, and analysing and evaluating those ideas that best meet the criteria for success and planning

design brief A concise statement clarifying the project task and defining the need or opportunity to be resolved after some analysis, investigation and research. It usually identifies the users, criteria for success, constraints, available resources, timeframe for the project, and may include possible consequences and impacts.

In food preparation, new problems or scenarios arise all the time. What will I have for lunch? This fried rice needs to be made for a vegan. I have sport in an hour, but I need to have a quick meal first. This savoury muffin would taste better if it had some fresh herbs in it. In **design thinking**, these problems are written as a **design brief**.

In responding to each of these problems, you are actively identifying needs, wants, opportunities and areas that can be changed or improved, simultaneously with considering any restrictions or guidelines that may have been provided.

The design brief

The design brief provides the designer with a range of factors that must be considered when thinking of possible solutions to the problem; for example, who is it for (intended audience)? How is it to be used? What food is available? Are there any time or equipment considerations? A design brief never contains the solution to the problem – it simply sets out the problem, need or opportunity waiting to be solved. For each problem, barriers will exist that limit possible solutions. For example, 'What will I have for lunch?' may be influenced by how much money you have, whether you have food allergies, or an ethical or cultural consideration. These barriers are referred to as specifications.

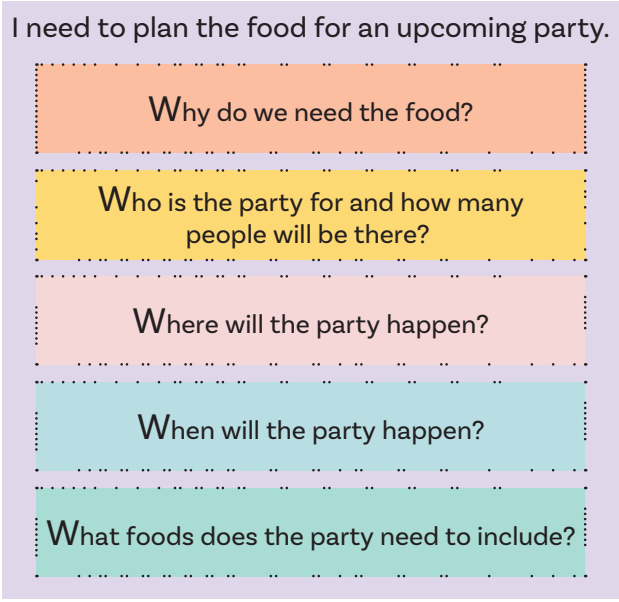

Figure 0.27 Design briefs often include information that reflects the 'five W' questions: Why, Who, Where, When and What.

A design brief is a statement that contains:

- an opportunity, problem or need – what has to be solved
- the background to the problem, usually written as a scenario
- all **specifications** or guidelines that apply to the problem
- the **constraints** – the aspects that are 'fixed'
- the **considerations** – the aspects that have some flexibility.

specifications Constraints and considerations or issues that will need to be thought about when you come up with a solution

constraints The aspects of a design brief that are fixed and must be covered in the chosen solution

considerations The aspects of a design brief that have some flexibility within the chosen solution

Developing criteria for success

From the design brief, the designer should be able to identify the most important parts – these will assist in the development of the criteria for a successful solution. During the last stage of the

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criteria for success Questions developed to check whether you have made something to meet the requirements of the design brief. The criteria for success should come out of the design brief.

investigating The problem is developed as a result of critiquing needs or investigating opportunities of designed solutions

design process, these **criteria for success** will be used to evaluate the product.

Investigating

Gathering information and building knowledge about the impact of the specifications, as well as the best way to design possible solutions, make up the **investigating** stage of the design process. In this stage, you will look at possible alternatives that exist or solutions that have been applied to similar problems.

It may also be necessary to look at how to improve existing solutions or come up with new and innovative ideas. This stage in the design process is an important step in transforming ideas into creative and practical realities by making the most of the different foods and pieces of equipment available.

Sources of information (research) include:

- existing solutions – recipe books
- guiding information available – people, books, magazines, the internet, television, tablet and/or smartphone apps
- target market for the product – who the product is for, their general likes and dislikes that you know about.

Investigating also involves looking at the resources that currently exist. In food preparation, this includes issues relating to health and safety requirements; nutrition; the availability of resources such as money, time, knowledge, skills and equipment; and the properties of food – physical, sensory, chemical and functional.

Generating

Creating design solutions means **generating** lots of ideas – even ideas that initially may seem to be unrealistic.

generating Developing and creating a number of different ideas or solutions

In food preparation, the problem is often solved by finding a recipe that is suitable or, when you are more experienced and understand the properties of foods better, by designing your own recipe. Adapting or making changes is an excellent way to try something new or to improve a product solution. It can also help you to turn what may not meet the design brief into something that does.

Recipe adaptions might include:

- changing an ingredient, for example, changing a dried to a fresh product such as pasta
- swapping the protein, for example, chicken to turkey or a vegetarian alternative
- changing the cooking method, for example, roasting to grilling
- altering how the ingredients are prepared, such as crushing to dicing.

Once you are aware of the options that are available, it is time to make the final decision. This decision making includes being able to justify your final choice by linking it directly to the design brief. You also need to explore how your final product will look and be presented. This can be done by simply drawing a picture of how you would like your product to look and then labelling it, or perhaps creating a model of your product using online tools.


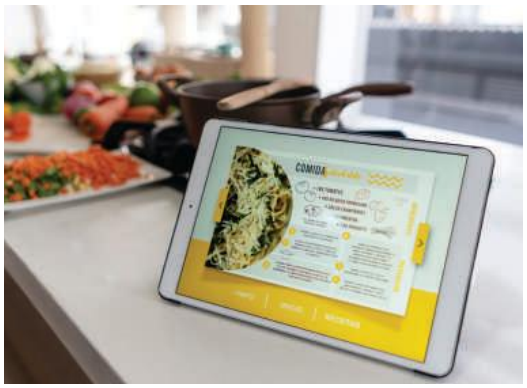


Figure 0.28 Research can be carried out using a variety of information.

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Planning and managing

project management The process of planning, organising, controlling resources, monitoring timelines and activities, and completing a project to achieve a goal that meets identified criteria for judging success

A successful solution is the result of successful **project management**. As you work through the design process, you will be responsible for a number of different tasks using a variety of skills and knowledge; for example, planning solutions during the generation stage, using the plan during the production stage and reviewing management skills during the evaluation stage. At times, this will be done collaboratively and at other times it may be done individually, depending on the requirements of the problem or project.

When you are cooking for yourself or your family, one person can usually easily carry out the tasks required – especially if they have a plan in place or have done it often before. Catering for a large group of people or hosting a function may involve more than one person. There are often many tasks and problems to solve, and these are tackled more effectively if a team of people is involved.

Working collaboratively in a team ensures everything that needs to be completed in time gets done. When working in a team, planning and organisation are essential as everyone needs to work towards the common goal, ensure they know what they have to manage and be able to fit in with others. The key here is teamwork – good planning and effective communication.

Figure 0.29 Good teamwork involves working together to meet a common goal and each member knowing what their role is.

Producing

producing Actively realising (making) the designed solution using appropriate resources and means of production

Once all the design options have been explored and the solution has been reached, it is time to make the food item by logically following the recipe. **Producing** is when you apply the skills and knowledge you have acquired about safety and hygiene, use tools and equipment appropriately and utilise correct techniques. The aim is to make the highest-quality product possible while meeting the requirements of the design brief.

Developing a work plan or production plan helps you to think through all the steps of the production process, not just the steps in the recipe. It also helps to identify where management of health and safety, and of quality, is necessary. This helps you to project manage your product effectively.

prototype A trial item made to test an idea or process in order to inform further design development

If a trial food item is made, this is referred to as a **prototype**. Prototypes are common in industry as the manufacturer must be sure that everything will work correctly in all aspects of the design process; otherwise, they can waste a lot of money. When a food item is made at home, it is not an official prototype, but you will obviously change any part of the process or final product that does not work before you prepare it again or else not make it again.

During production, you may make modifications or changes if it is apparent that something will not work as well as expected or a piece of equipment is not available. In the school food-preparation area, modifications are also frequently made. For example, if the microwave is not available to melt some chocolate, it is done in a basin over hot water on the stove. However, to make successful modifications, you need knowledge of equipment and ingredients so that you maintain the quality of a product.

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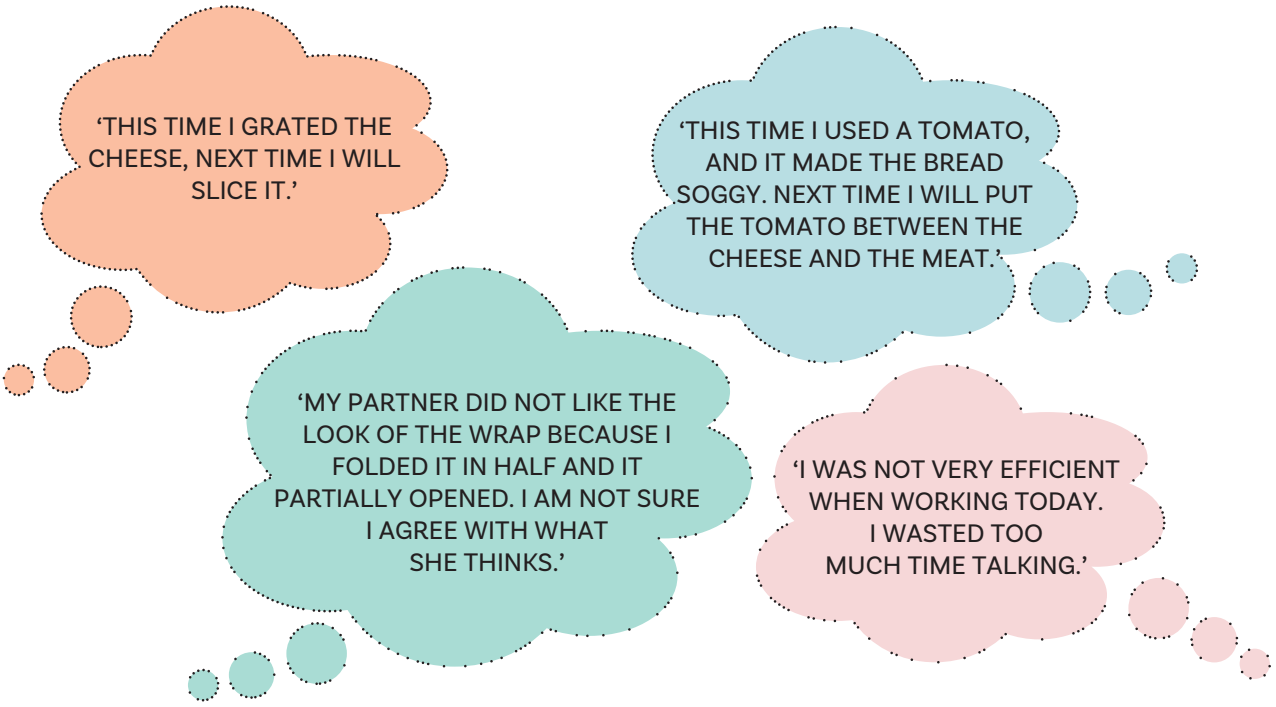

Figure 0.30 Responding to criteria for success from the design brief

Evaluating

The evaluation process gives you the opportunity to ensure that the final product solution solves the problem stated in the design brief.

Using criteria for success

In food preparation at home, at the school canteen or in a restaurant, this step in the process may be informal. Commercially, when a new product is introduced and there are not a lot of sales, the company needs to question why. Evaluations assess the properties of food, the processes that occurred and whether the finished product meets specific requirements in the brief.

Evaluating the properties of food

Satisfying the senses is one of the key objectives of food preparation and processing. A lot of evaluation of food is **subjective** – in other words, it is based on opinions rather than facts. However, opinions are very important when it comes to food: if a dish does not look, smell, taste and feel good, no one will eat it! Often, **descriptive words** are used to give impressions about sensory properties of the food, particularly the taste.

subjective A view about food that is based on opinion rather than facts; for example, based on taste, appearance, texture, aroma and sound

descriptive words Words used to describe characteristics of food; for example, for appearance: translucent, watery, colourful, bright red, and for texture: crunchy, slimy, crisp

The simplest test used for evaluation is a hedonic scale. It can be used for an overall opinion about the properties or a specific property such as taste.

Another test used for evaluating food is ranking. This is when you decide which food you prefer when you compare foods.

Figure 0.31 A hedonic scale is a simple test that can be given where people respond by choosing the face that best describes how they feel about the food.

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Analysing the processes and reflecting on your work

As well as responding to the criteria for success, it is also worth analysing the actual processes that have occurred. In analysing the final product solution, you should take note of any feedback from others and complete a self-assessment.

Your analysis of the process and use of equipment could be presented as a table. Write up what worked, areas for improvement and what you would do next time in a table like the one shown.

This worked	Areas for improvement	Next time I could try ...

Self-assessment

As well as assessing the food you have produced and the processes you have used, take time to think about how well the product works. Don't be disappointed if your product has not worked to your satisfaction, as long as you can identify what needs improving. The following are several questions you can ask yourself to think about your progress:

- Today I learned ...
- My strength today was ...
- I supported my friends in class today by ...
- One thing I was not sure about today was ...
- An area I can improve on is ...

0.7 A sustainable future

It is almost impossible to ignore the ever-increasing information and statistics indicating that the changes that are occurring in our climate are due to the impact of humans. Since people have been utilising fossil fuels such as coal, oil and gas to run machines, we have been gradually increasing the amount of **greenhouse gases** in the atmosphere, which have the effect of acting as a blanket over the world. Heat from the sun enters the atmosphere and Earth absorbs a lot of this heat. Excess heat is radiated back into space.

greenhouse gas
A gas that adds to the greenhouse effect as it can absorb infrared radiation, for example, carbon dioxide and methane

Figure 0.32 Greenhouse gases act as a blanket in Earth's atmosphere; the more carbon gases in the atmosphere, the warmer the planet.

Because the greenhouse gas blanket is becoming thicker, it prevents some heat escaping back into space, having the effect of heating the planet. This gradual warming has led to the growing concern we know as **climate change**.

climate change
A change in regional and global climate patterns indicated by an increase in temperature and severe weather patterns

Impact of climate change

With increasing global average temperatures there is a corresponding increase in the strength of weather patterns, for example, more droughts and floods, and extreme weather events such as cyclones and storms. Average temperature increases are leading to melting of the icecaps at the poles and areas that were once frozen year-round. If we do not change what we are doing, the United Nations states that by the end of the century global average temperature is projected to increase by 3.2°C. This does not sound a lot, but it would have a catastrophic impact on weather patterns, and all the species on Earth that rely on certain temperatures and weather conditions to survive. We are already experiencing the impact of global warming with increased bushfires, droughts and floods.

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Figure 0.33 Bushfires, such as in the Blue Mountains near Sydney, and flooding events, such as in Melbourne, will increase as global warming increases.

Where are these greenhouse gases coming from?

According to the Center for Climate and Energy Solutions, the main sources of greenhouse gas emissions around the world come from producing electricity and heat (31%), transportation (15%), agriculture (11%), manufacturing (12%) and forestry (6%).

We may feel that these emissions are largely out of our control. It is electricity companies, transport and manufacturing groups or forestry and agricultural bodies who need to make changes to how they operate in order to reduce their contribution to greenhouse gas emissions.

But, if we think about it, these companies operate because there is a market for their services and products. We demand electricity, gas, wood, food or cars. In a way, we are part of the problem. There are alternatives to using fossil fuels, many of which are more expensive or more difficult to use at the moment. But as the demand for these alternatives increases, their cost will decrease, leading to an increase in access to and ease of use of these resources.

TASTY TRIVIA

One third of all food produced is either lost or wasted globally.

Source: United Nations Environment Program (UNEP) 2021.

Figure 0.34 As consumers, we demand goods and services which have been produced by using fossil fuels. Identify where fossil fuels might have been used to manufacture or are used in some of the products in this image.

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Think global, act local

As consumers of food, we can reduce our own contributions to climate change in many significant ways. It may feel like it is only a tiny contribution, but it is an important one. From planning what we are going to eat, to recycling, to choosing our food consciously, our choices can all contribute to helping reduce carbon emissions.

COLLABORATE 0.10

As a class, brainstorm reasons why it is important to reduce our contribution to greenhouse gas emissions, given that a single consumer's emissions are insignificant in comparison to those of a big business.

Figure 0.35 How might this motto relate to your impact on global warming?

Figure 0.36 There are many ways households can reduce their impact on Earth. For each of the suggestions, explain why it will reduce greenhouse gases. Can you think of any more ways you can reduce your own impact on Earth?

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CHAPTER 1

Managing food production safely

BEFORE WE BEGIN

1. Explain why it is important to observe personal hygiene practices when preparing food.
2. Go to the tap and wash your hands. Observe and analyse this personal hygiene practice. Do you think it is good practice? Explain the reason for your answer. List the areas for improvement that may be required.
3. Food needs to be safe to eat. Discuss what this means. Provide an example of a safe food.
4. Summarise the hygiene practices that are needed to prevent the cross-contamination of food.
5. Identify the conditions that **bacteria** need to grow in food.
6. Compare and contrast the terms 'food safety' and 'food hygiene'.

bacteria Single-celled microorganisms responsible for the decay, fermentation and, ultimately, spoilage of food

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1.1 Safety in the kitchen

LEARNING INTENTIONS

1 To understand the terms 'ergonomics' and 'efficient' and how these terms relate to kitchen safety.
2 To develop awareness of safety issues in the kitchen.
3 To develop skills in dealing with safety issues in the kitchen.
4 To put safety skills into practice.

When working in a kitchen, whether the school kitchen, your kitchen at home or the kitchen at a workplace, it is essential that the food you prepare is safe to eat and that the people preparing the food avoid injury and accidents.

When professionals design kitchens, they must think about many important safety aspects. Your school kitchen is no exception. **Ergonomics** is about ensuring that each individual worker carrying out the production skills is working in a safe, **efficient** and comfortable environment. More accidents occur in the kitchen than any other room in the home, and this is especially so for children. It is therefore important that we manage the physical environment so that we are able to prevent burns, scalds, cuts, electric shock and any other accidents from occurring.

ergonomics A science that seeks to adapt work conditions and equipment to suit the worker and limit injuries and accidents

efficient Performing in an organised manner

TASTY TRIVIA

Work health and safety is concerned with protecting the safety, health and wellbeing of all people engaged in work or employment. Regardless of the nature of their work, workers should be able to carry out their responsibilities in a safe and secure working environment, free from hazards.

ACTIVITY 1.1
KITCHEN INJURIES

1 Brainstorm a list of equipment that can be found in the kitchen that may create a safety concern for children or workers. Next to each piece, state one possible injury that may happen.
2 For five of the pieces of equipment identified, develop a safety rule for the use of each.

COLLABORATE 1.2

In a group consider the following questions about cuts in the kitchen.

1 How many of your group have cut themselves in the kitchen? What knife was being used? What food was being cut? Was the knife sharp or blunt? How bad was the cut?
2 Develop a list of factors that have contributed to the cut, such as the type of food or the cutting surface. For each factor decide what could have been done to prevent the accident.

What are kitchen hazards?

The best way to ensure someone's safety in the kitchen is to be aware of the potential safety hazards that are common to most kitchens.

Sharp and breakable objects

The kitchen is home to many sharp objects. Knives are of primary concern and are a common cause of kitchen injury, as are breakable objects such as glassware or crockery.

Heat and fire

The stove is the greatest heat and fire safety hazard in the kitchen, but there are other hazards from the increasing number of new pieces of equipment being used to cook food, such as hibachis and steam ovens. Loose clothing and hair are also a danger around fire.

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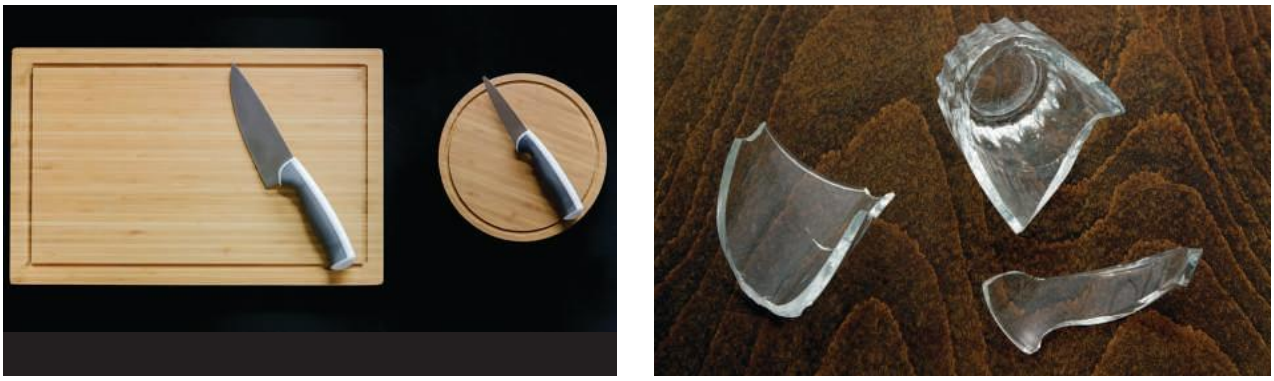

Figure 1.1 Knives and broken objects can have very sharp edges and should be handled with care.

Figure 1.2 Hibachis and steam ovens are new pieces of equipment making their way into modern kitchens.

Electricity

Electricity is the flow of electric power or charge. If not used correctly, this power or charge can cause **electric shock**, leading to extensive injury or even **electrocution**. Electricity is an invisible form of energy that is extremely important in the kitchen.

electric shock Non-fatal exposure to electricity

electrocution Death by electric shock

Hazards on the floor

Water or other liquids spilt on the floor can cause a significant slipping hazard. Also, dropped equipment or cables lying across the kitchen floor can be a source of tripping. Slips and trips are dangerous enough but can be worse if a person is carrying sharp or hot materials.

ACTIVITY 1.3
PREVENTION IS BETTER

1 For each of the potentially dangerous situations listed in the 'What are kitchen hazards?' section, list two possible prevention strategies.

2 What strategies are in place in your school kitchen to help prevent these hazards?

Figure 1.3 Look at the image of someone cutting carrots. Explain what is wrong with the production skill as demonstrated. What is the best way to use a knife to cut vegetables? Investigate the claw grip.

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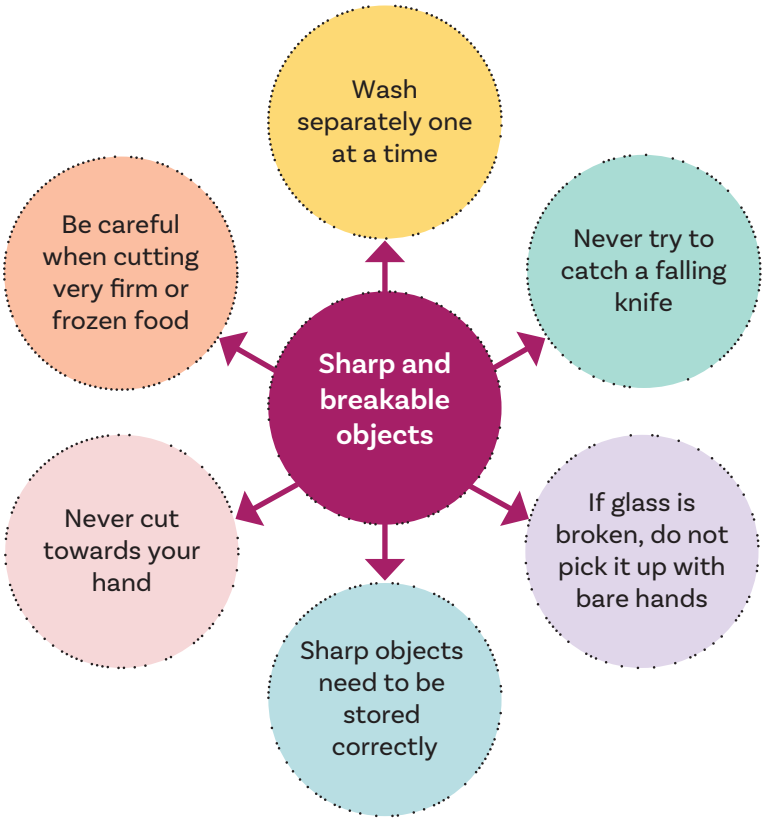

Figure 1.4 Rules for dealing with sharp and breakable objects

Safety practices around hazards

Sharp and breakable objects which can lead to cuts and abrasions need to be treated with care.

COLLABORATE 1.4

Consider each of the suggestions in the mind map in Figure 1.4. In a group, suggest ways that each rule can be achieved.

The stove is the greatest heat and fire safety hazard in the kitchen. The following safety practices need to be considered:

- Be extra careful when lighting gas stoves.
- Don't allow excessive gas to be released from the stove or oven. Wait for any gas that has leaked from the stove to disappear before carefully relighting with a match or gas lighter.
- Keep all flammable materials like clothing, hair or aprons at a safe distance from open flames.
- Always keep pot handles turned inwards to prevent spillage from knocks or snagging on clothing.
- Use oven mitts when handling hot items.
- Always remove pot lids by allowing steam to escape away from you. Despite being invisible, steam can cause serious burns.
- Be alert at all times when cooking with large quantities of oil. Be aware of spills; never allow water or other liquids near hot oil. If dropped into the oil, they will turn into steam and spray with force.
- In the event of a kitchen fire, it is important to assess the situation and act accordingly. Turn off the heat source if it is safe to do so. If the fire is confined to a pot or pan, cover it tightly with a lid. Don't attempt to carry the pan away. If the fire is unmanageable, use a fire blanket or fire extinguisher. Never use water or flour, which can cause a grease fire to spread.
- Always keep a fire extinguisher accessible; extinguishers should be tested on a regular basis to ensure that they work properly.

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Figure 1.5 If you burn yourself, immediately run the burn under cool water and tell your teacher. Burning can continue, so it is important to keep it under the water for 20 minutes.

Figure 1.6 What would you do if this happened at your workbench? Stove safety in the kitchen is of paramount importance as unsafe practices can lead to significant injury and even death.

Floor hazards, such as spilt liquids or solids, cords lying across the floor, or other tripping hazards such as brooms left unattended, need to be dealt with immediately. If you spill something, mop it up promptly and warn others around you that there has been a spill. If you see a hazard and you didn't cause it, don't walk away as someone else has done; you have an obligation to yourself and others to be proactive and fix the hazard, or alert the teacher to the hazard.

DESIGN BRIEF: WINTER SOUP

It is a winter day on a weekend and you want something warming to eat for lunch. You don't want to go to the shops to buy all the ingredients in the vegetable soup recipe so you decide to use the ingredients you already have in your kitchen. What other ingredients could you use to make this soup? How could you ensure the soup was suitable for a vegetarian? How could you ensure the soup was suitable for someone who cannot eat cereals made from wheat? How could you ensure the soup was suitable for a toddler who cannot chew lumps?

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VEGETABLE SOUP

Working in pairs, make this delicious soup. It can be served with croutons or wholemeal bread.

Serves 2
Main tools and equipment Large saucepan, knife, chopping board, measuring spoons, cup, jug
Production skills Dice, julienne, shred
Cooking processes Simmer, boil, sauté

Preparation time 20 minutes
Cooking time 50 minutes
Serving and presentation time 2 minutes
Total time 72 minutes

Skill demonstration: Slicing techniques

INGREDIENTS

- 1 tablespoon olive oil
- ½ brown onion, diced
- 1 carrot, julienned
- ½ small sweet potato, diced
- 1 400g can crushed tomatoes
- 2 garlic cloves, crushed
- ½ teaspoon dried oregano
- 1 bay leaf
- Pinch of chilli flakes (optional)
- 3 cups vegetable stock
- ¼ cup spiral pasta
- 8 green beans, chopped into 4 cm lengths
- ½ zucchini, diced
- ½ 400g can chickpeas, drained
- 2 silverbeet or kale leaves, shredded
- 1 tablespoon white wine vinegar
- Salt and pepper

TASTY TRIVIA

Croutons are small pieces of re-baked or fried bread, often cut into cubes and seasoned. They are used to provide texture and flavour to salads, such as the Caesar salad, but also to soups and stews.

METHOD

1. Heat the oil in a large saucepan over medium heat. Add the onion to the pan and sauté, stirring occasionally for 8 minutes. Add the carrot and the sweet potato to the pan. Cook for a further 2 minutes, stirring.
2. Add the tomatoes, garlic, oregano, bay leaf and chilli flakes to the saucepan. Stir. Add the stock to the pan. Bring to the boil, then reduce to a simmer and cook covered for 10 minutes, stirring occasionally.
3. Stir in the pasta and green beans, cover and cook for 5 minutes until you are ready to add the remaining vegetables.
4. Add the zucchini, chickpeas, and silverbeet or kale and cook for a further 5–6 minutes or until the zucchini is cooked and the pasta is **al dente**.
5. Stir in the vinegar and add salt and pepper to taste.

al dente Cooked 'to the tooth' – not too soft, but chewy with some bite or texture to it

EVALUATION

1. Explain the difference between chop, dice, julienne and shred.
2. List the potential hazard points in the recipe. What did you do to reduce your risks?
3. Explain why you might have been required to use an apron, tie long hair back (or even use a hat) and wear closed-toe shoes.

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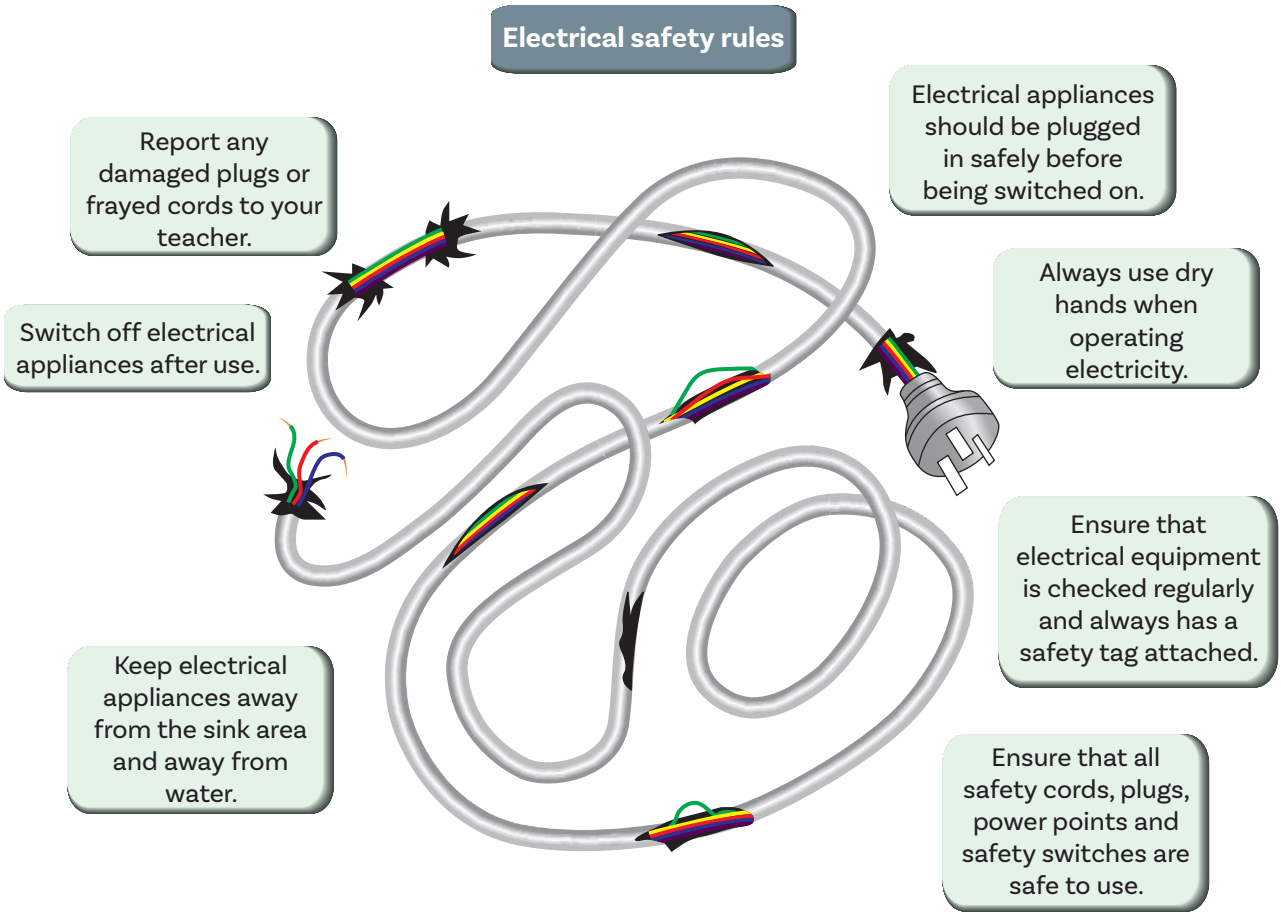

Figure 1.7 Electrical safety rules

Figure 1.8 Floor hazards are a significant source of danger in the kitchen. Find out how you would deal with each of these hazards should you come across them when you are cooking in your kitchen at school.

LEARNING REFLECTION

1. Explain the term 'ergonomics' and how it relates to kitchen safety.
2. Think about an electric hand beater and a grater. What accidents may happen while using these two pieces of equipment? How might these accidents be prevented?
3. An egg's shape makes it prone to falling off a bench. Explain how you may prevent this happening and how you would ensure other people's safety should an egg fall and break.
4. Explain what you would do should you or your work partner burn themselves.
5. Carrots are round and hard, so they are difficult to cut. This is a hazard that can cause cuts. Describe how you could make the process of chopping a carrot safer.

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1.2 Hygiene in the kitchen

LEARNING INTENTIONS

1 To understand the difference between kitchen safety and hygiene.
2 To understand the role of personal hygiene in overall kitchen hygiene.
3 To understand the role of microorganisms in kitchen hygiene.
4 To develop and practise skills in managing kitchen hygiene.

contaminated Unsafe to eat due to contact with chemicals, foreign objects or bacteria that are harmful for people to eat

personal hygiene Ensuring good cleaning and washing practices to prevent illness and maintain the health of food and food handlers

kitchen hygiene The prevention of illness and the maintenance of health in the kitchen

We know that the kitchen is a common site of accidents and injuries, but it is also one of the places where food can become spoiled and **contaminated**. This can result in illness to ourselves or our customer or client – the person for whom we are making the food. Paying attention to a number of important **personal hygiene** safety rules or practices can help to prevent this from happening. A high standard of **kitchen hygiene** and good personal hygiene are important, as they help to control the spread of harmful germs. There are many surfaces in the kitchen where harmful bacteria and **microorganisms** can live, grow and multiply.

microorganism Single-celled organism that is only visible through a microscope. Three types connected with food are yeast, mould and bacteria.

COLLABORATE 1.5

Write on a sticky note each area of your workspace where bacteria might grow. You may find it easier if you go into your kitchen to do this. As a class, collate these sticky notes and come up with a list of areas to be most concerned about. What foods might come in contact with each of these areas? What is another way these areas might contaminate food other than by coming in direct contact with them?

Utensils, kitchen surfaces and your hands must be washed thoroughly before contact with other foods, especially cooked and ready-to-eat foods.

To ensure kitchen hygiene and prevent food poisoning, it is important to wash and dry all utensils and equipment properly. The water used to wash dishes should be warm to hot, soapy and changed regularly.

Figure 1.9 Dishes should be washed in warm or hot soapy water, which should be changed regularly. Clean items such as glassware, cutlery and crockery first, and then dirtier dishes after, but still change the water if it becomes dirty. Rinsing dishes under running water can be done after they are washed in soapy water.

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DESIGN BRIEF: FROZEN MANGOES

There are several frozen mangoes in the freezer that were left over from summer. They are too mushy to eat but still safe to eat. You are to use a piece of electrical equipment safely to develop a nutritious drink using these mangoes. You should create solutions to promote healthy eating.

INVESTIGATE

1 Find two recipes that could be used to make the nutritious drink.
2 Choose one of these recipes and explain the reason for your decision.

PRODUCE

Make the drink and present it.

EVALUATE

Evaluate your drink, considering the following:

1 Taste test your designed solution for the mangoes and write down your evaluation.
2 Evaluate how successful you were at creating a solution to the 'mango issue'.
   - Did you use a piece of electrical equipment? What was it?
   - Did you use the equipment safely? Explain.
   - Was the solution nutritious? How can you tell?
3 Develop two improvements to the recipe that you could make if you were to complete this task again. Explain your answer.
4 Consider the process that you followed. Suggest two improvements you could make to the processes that you followed. Explain your answer.

TASTY TRIVIA

Dishcloths and tea towels contain more bacteria than any other piece of equipment in the kitchen. They can be a source of cross-contamination. Be sure to use them only if they have been cleaned and completely dried.

Figure 1.10 Tea towels and dishcloths harbour many microorganisms and should only be used if clean and dry.

A person who handles food is responsible for ensuring good personal hygiene. It is important that food and surfaces used for handling food are not contaminated by contact with the food handler's body or clothing.

One of the best ways to ensure personal hygiene and prevent the contamination of food is to wash your hands well. Germs can stay alive on our hands for up to three hours. In this time, they can spread to anything and everything that we touch. Regular handwashing is important when preparing food, between the handling of raw foods, after going to the toilet, after touching rubbish or the rubbish bin, and after coughing or sneezing.

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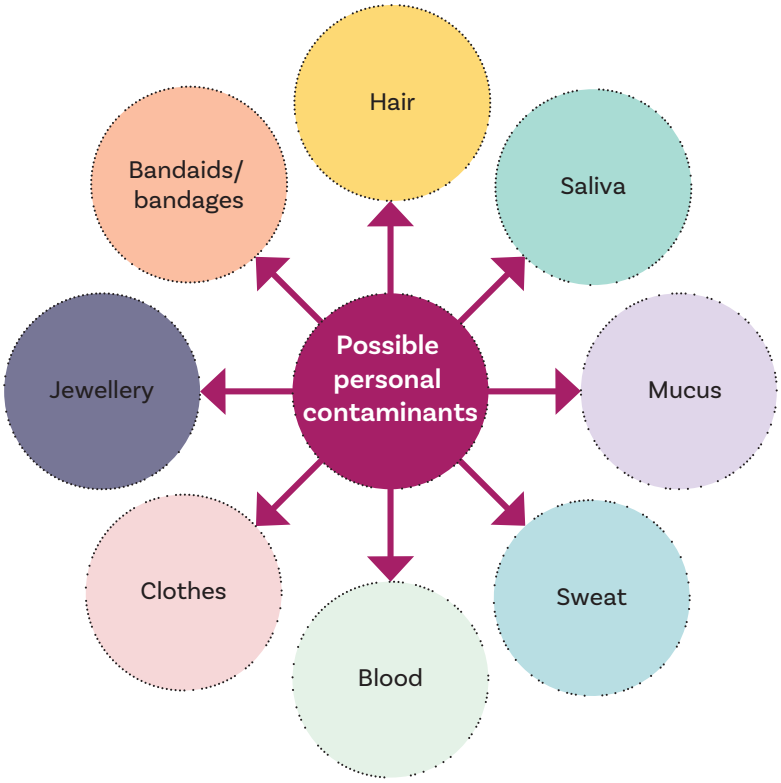

Figure 1.11 Possible personal contaminants. How can you ensure you don't contaminate the food you are cooking?

TASTY TRIVIA

In a commercial kitchen, it is a requirement that a separate handwashing station is provided, which often has a foot-controlled tap, or one with large handles that can be turned off with the forearm. Why?

The correct method for washing your hands before handling food

How to wash your hands

We all think we know how to wash our hands, but many of us don't do it properly. Rinsing your fingertips under cold water is not sufficient to prevent food contamination.

When you wash your hands, remember to:

- use warm water
- wet your hands before applying soap – this prevents irritation
- rub your hands vigorously, washing both sides of your hands, down to the wrists, around the thumb, between each finger and around and under the nails for approximately 15 seconds (sing 'Happy Birthday' twice)
- rinse with clean water
- dry your hands thoroughly – use a clean, dry towel, paper towel or an air dryer if it is available
- use the paper towel you used to dry your hands to turn the tap off if you can.

Figure 1.12 There is a right and a wrong way to wash your hands to prevent possible food contamination. Here the person is ensuring the webbing between their fingers is clean.

INVESTIGATE 1.6

Check out YouTube for a video on how to wash your hands properly – the World Health Organization advocates good hand hygiene and has good examples. What are the areas on the hands that you have to be especially diligent about when washing? Why? How long should you continue to wash your hands? Watch someone washing their hands. Do they follow these routines?

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BLONDE SNICKERDOODLE SLICE

Serves 12
Main tools and equipment Oven, bowl, measuring spoons, measuring cups, wooden spoon, 20 x 20 cm slice tin, baking paper, skewer
Production skills Measure, preheat, grease and line, melt, stir, spread, sprinkle, sift
Cooking processes Bake, melt

Preparation time 20 minutes
Cooking time 25 minutes
Serving and presentation time 10 minutes
Total time 55 minutes

Skill demonstration: Measuring dry ingredients

INGREDIENTS

- 115 g butter
- 1 cup sugar
- 1 tablespoon milk
- 1 egg, beaten
- ½ teaspoon vanilla extract
- 1¼ cups self-raising flour
- ¼ teaspoon salt

TOPPING

- 1½ tablespoons sugar
- 1 teaspoon cinnamon

TASTY TRIVIA

Snickerdoodles are an American favourite; although, the name is said to be of German origin, being a corruption of the word 'schneckennudeln', which means snail noodle. In the blonde snickerdoodle slice recipe, the traditional biscuit is made into a slice somewhat like a brownie.

METHOD

1. Preheat oven to 175°C conventional (no fan).
2. Grease and line the slice tin with baking paper.
3. Add the butter to a bowl. Melt the butter in the microwave in 20-second bursts, checking each time. Allow butter to cool to room temperature before mixing the sugar and milk into the melted butter.
4. Add the egg and vanilla extract to the butter mixture, and stir.
5. Sift the self-raising flour into another bowl. Add the salt and liquid ingredients to the flour. Stir to combine.
6. Spread the batter evenly into the prepared slice tin.
7. To prepare the topping: stir together the sugar and cinnamon. Sprinkle over the batter evenly.
8. Bake for 25 minutes in the centre of the oven. To check that the slice is cooked, insert a wooden skewer into the middle of the slice. If the skewer comes out clean or with moist crumbs, not wet batter, then it is cooked.

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ACTIVITY 1.7
SAFE KITCHENS

Use the blonde snickerdoodle slice recipe to answer these questions.

1 List where there may be issues with safety. Explain.
2 List where there may be personal and/or workspace hygiene issues.
3 Write a short statement that might be attached to the recipe stating what should be done to prevent these safety and hygiene issues.

COLLABORATE 1.8

The food we eat is handled many times before we buy it. Think about this orange and consider where it came from and how it got there. As a group make a list of all the people who could have handled it before you may get to eat it. What precautions could you take to keep you safe from possible contaminants?

LEARNING REFLECTION

1 Explain the difference between kitchen hygiene and personal hygiene and give an example of each.
2 Explain how each of the two examples you gave in Collaborate 1.8 will keep the consumer of the food being produced safe.
3 Explain why singing 'Happy Birthday' twice (in your head, of course) is helping ensure food safety.
4 'From paddock to plate.' Explain this statement using a strawberry and how it may be handled by different people. Explain why it is important to wash your fruit before consuming it.
5 Should you wash watermelon before consuming it? Why? Should you wash mushrooms before consuming them? Why?

Figure 1.13 This home cook is using a wooden chopping board. Why might this be a contamination risk in a commercial kitchen?

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1.3 Food poisoning and the kitchen

LEARNING INTENTIONS

1 To understand what the causes of food poisoning are and how to manage them.
2 To understand that food poisoning is not caused by one source.
3 To understand the optimum conditions required for bacterial growth and understand that to manage food poisoning is managing these conditions.
4 To understand what cross-contamination is and how to manage it in the kitchen to prevent food poisoning.
5 To develop skills in minimising potential food poisoning.

food poisoning A common illness, usually mild but sometimes deadly, caused by eating contaminated food or drink. Typical symptoms include nausea, vomiting, abdominal cramping and diarrhoea that occur suddenly (within 48 hours) after consuming contaminated food.

cross-contamination Indirect contamination of food caused by contact with a raw food or non-food source such as clothes, cutting boards or knives that are themselves contaminated

Food poisoning is a serious health problem caused by poor personal hygiene on the part of food handlers, poor storage of food or **cross-contamination**. It is important that a person who is handling and preparing food protects those people who are going to eat the food from getting sick.

Figure 1.14 Food poisoning has many symptoms, including stomach cramps and diarrhoea.

TASTY TRIVIA

A 1 mm hair follicle can harbour 50 000 bacteria. Humans have between 90 000 and 150 000 hairs on their head.

Food poisoning causes vomiting, diarrhoea and stomach cramps. It is a very unpleasant illness, but one from which most people recover. However, for some people – especially young children and the elderly – it can be life-threatening or leave sufferers with serious ongoing health problems.

Types of food poisoning

There are two types of food poisoning: toxic and infective. Toxic food poisoning is caused by the action of a **toxin** released by bacteria found in food prior to it being eaten or in the body after it is eaten. Infective food poisoning is caused by living, food-borne pathogens that invade the tissues of the body.

toxin A poisonous substance produced by living cells or organisms that is active at very low concentrations

ACTIVITY 1.9
RESEARCH ASSIGNMENT

Choose one of the food-poisoning bacteria listed below, ensuring that in your class all of the bacteria listed are covered.

- *Salmonella*
- *Campylobacter*
- *Listeria monocytogenes*
- *Escherichia coli* (*E. coli*)
- *Staphylococcus aureus*
- *Clostridium botulinum*
- *Clostridium perfringens*
- *Bacillus cereus*

Develop a presentation, such as a slide show, short video, poster or website, that provides information in the following areas:

- effects and/or symptoms of this bacteria on humans
- food sources of this bacteria
- best way to prevent the bacteria from making someone sick
- microscopic picture of the bacteria.

You will present your findings to your class. While your classmates are presenting their work, you should complete a summary of their findings.

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ACTIVITY 1.10
PREVENTING FOOD POISONING

1 For each of the following situations, state why they may cause food poisoning.
   - **a** Poor handwashing
   - **b** Not wearing an apron
   - **c** Not tying hair back
   - **d** Using the same knife to cut meat and then immediately to cut cheese
   - **e** Not washing dishes with soapy water

2 Why might it be very important to not allow unwell people to cook food?

How do bacteria grow?

One cause of food poisoning is bacteria. Food poisoning bacteria can grow and multiply very quickly in the right conditions (see Figure 1.15).

The growth of food poisoning bacteria can be prevented by controlling the four links in the food poisoning chain (see Figure 1.16).

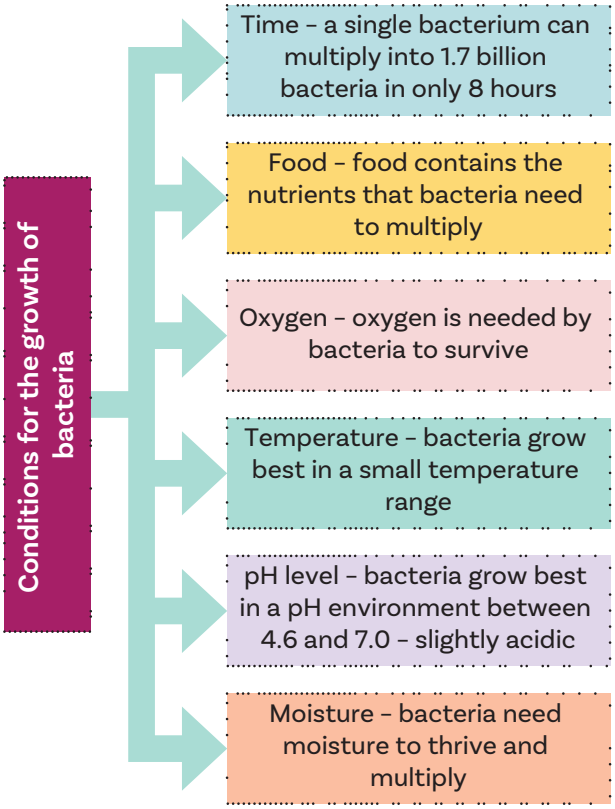

Figure 1.15 Conditions needed for the growth of bacteria

Over five million cases of food poisoning could be avoided in Australia each year if all food handlers followed three simple steps:

1 Control temperature.
2 Kill harmful bacteria.
3 Prevent cross-contamination.

Step 1: Control temperature

Bacteria in food grow to unsafe levels when the potentially dangerous food is warmer than 4°C and cooler than 60°C (see Figure 1.17). This is the 'temperature danger zone'. Keeping food at the right temperature will prevent food-poisoning bacteria from multiplying.

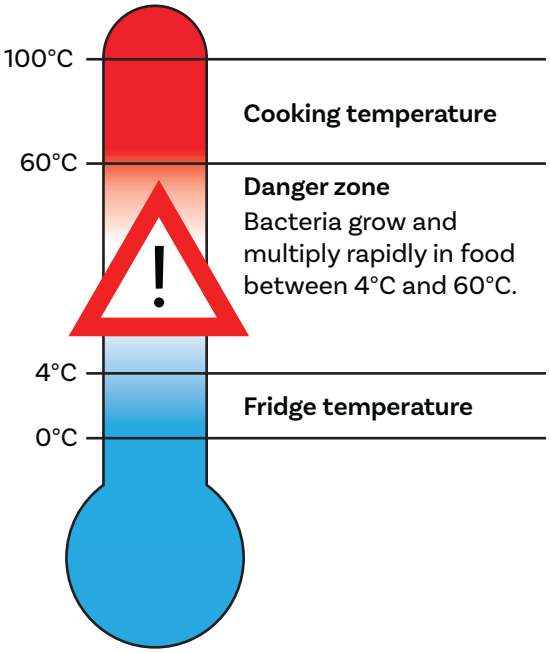

Figure 1.17 The temperature danger zone

Figure 1.16 The food poisoning chain

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Even if food is kept outside these temperatures, for example, in the refrigerator or kept hot on a stove, the food will eventually become unsafe to eat. Generally, food kept in the 'danger zone' should be consumed within four hours. After that time, the number of potentially harmful bacteria could have multiplied to dangerous numbers.

INVESTIGATE 1.11

Undertake some research on the Food Standards website to find out what foods are considered potentially hazardous. List these foods.

Many of these foods are often found in takeaway foods and may be stored in your home refrigerator for consumption later. What safeguards could be taken at home to ensure these leftovers are safe for consumption?

Figure 1.18 A meat thermometer is used to measure the internal temperature of meats to ensure they are at a temperature that is high enough for safe consumption. Checking the internal temperature of meat is a good way to ensure that **pathogenic** bacteria do not cause food poisoning.

pathogenic Bacteria that can cause illness, including food poisoning, in humans

Table 1.1 Safe temperatures for heating of different foods

 For red meats like beef, sear the outside to or above 75°C	 Poultry of any kind must be heated to an internal temperature of 75°C	 Foods made of minced meat must be cooked to an internal temperature of 75°C
 Any leftover foods must be reheated to an internal temperature of 75°C	 For whole egg dishes like quiche, cook to an internal temperature of 72°C	 Egg white should be cooked until firm (around 65°C), but the yolk will still be a little runny

Step 2: Kill harmful bacteria

In order to kill harmful bacteria, it is important to cook food properly. When cooking meat products like chicken, mince, meat with bones, hamburgers, stuffed meats and sausages, ensure that they are thoroughly cooked and that the meat juices run clear.

COLLABORATE 1.12

Discuss how you might test a hamburger patty to check if the 'juices run clear'. Using the information in Table 1.1, what do you predict the internal temperature of a hamburger might be when the 'juices run clear'?

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COLLABORATE 1.13

In your group, discuss the following questions related to Figures 1.19 and 1.20.

Why do you think meat that has been boned (the bone taken out, for example, a boned and rolled leg of lamb) must be taken to an internal temperature of 75°C? Why do think that a whole roast leg of lamb only needs to have the surface taken to 75°C, with the internal temperature lower?

Figure 1.19 Boned, rolled and roasted lamb shoulder

Figure 1.20 Roasted lamb shoulder

ready-to-eat foods
Foods that have been processed before they reach the home kitchen and need limited (if any) further preparation

Step 3: Prevent cross-contamination

Bacteria can spread if raw meat or poultry touches or drips onto **ready-to-eat foods**. This is dangerous because ready-to-eat foods often receive no further cooking, and therefore the bacteria are not killed.

DESIGN BRIEF: DESSERT

Most of us like a sweet treat now and then. This brief requires you to investigate and generate a variety of after-dinner treats that include some fruit. Select one and then produce it. The item that you choose should have appealing sensory properties and involve baking in the oven and the use of an electric appliance. It should be completed in the time that you have available for practical classes.

INVESTIGATE

1. Create a list of personal hygiene practices that must be followed in the kitchen. From this list, develop a web page that highlights safety issues.
2. Create a list of kitchen hygiene practices that must be followed in the kitchen.
3. Summarise the cleaning and sanitising that needs to occur in the kitchen.
4. Write three criteria for success questions.
5. Develop a list of constraints and considerations that you need to take into account when preparing your after-dinner treat.

An example recipe – choc-orange self-saucing pudding – is provided for you. Study this recipe to determine whether it suits the time constraints that you have in class.

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CHOC-ORANGE SELF-SAUCING PUDDING

Serves 6
Main tools and equipment Oven, casserole dish, bowls, measuring spoons, cups, jug, grater
Production skills Mix, sift, cream, stir, combine
Cooking processes Bake, boil, dust

Preparation time 30 minutes
Cooking time 40–45 minutes
Serving and presentation time 5 minutes
Total time 80 minutes

Skill demonstration: Sifting

INGREDIENTS

BATTER

- 1 cup self-raising flour
- 2 tablespoons cocoa
- ¼ cup butter
- ½ cup caster sugar
- 1 egg, beaten
- Zest of 1 orange, finely grated
- ½ cup milk

SAUCE

- ¾ cup brown sugar
- 2 tablespoons cocoa
- 1 cup of boiling water
- Juice of 1 orange

METHOD

1. Set the oven at 175°C and grease a 1.5L casserole dish with a little extra butter.
2. To make the batter: sift the self-raising flour and 2 tablespoons of cocoa into a bowl.
3. Cream the butter and caster sugar in another bowl. Add the orange zest and egg to the butter mixture. Mix well.
4. Stir ⅓ of the flour mixture into the butter mixture, and then stir in ⅓ of the milk. Continue alternating adding these ingredients until it is all combined. Pour this mixture into the greased casserole dish.
5. To make the sauce: combine the brown sugar and 2 tablespoons of cocoa into a bowl. Sprinkle this on top of the batter.
6. Mix the boiling water with the orange juice in a heatproof jug. Gently pour it over the brown sugar mix in the casserole dish, using the back of a spoon to distribute the liquid gently.
7. Place the casserole dish in the oven. Bake for 40–45 minutes.
8. Serve with cream or ice-cream.

Tip: This dish can be microwaved for 5 minutes or until the batter has risen to the top and set.

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COLLABORATE 1.14

1 There has been an explosion of ready-to-eat foods on the market. Suggest reasons for this.
2 As a class, brainstorm a list of the different types of ready-to-eat foods that are available. Think about supermarkets, online, home delivery and advertised on various media streams, including TV.

ACTIVITY 1.15
STORING FOODS

You have done the weekly shopping and bought the ingredients listed in the following table and now need to put them away so they will remain safe to eat for the week. There are also non-food items which you have bought that need to be put away.

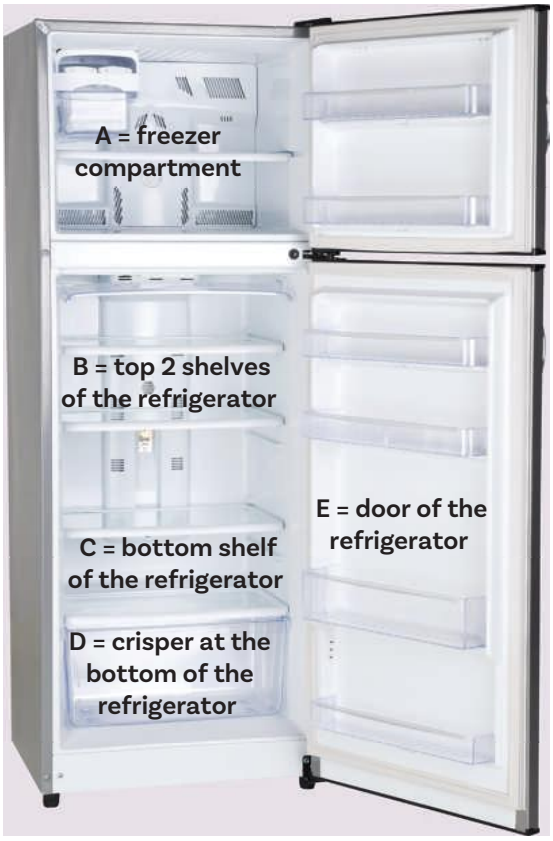

Figure 1.21 There are different zones on a refrigerator that are suitable for storing different foods.

Figure 1.22 F = pantry. This is another area where foods can be stored safely.

Figure 1.23 G = under the sink or away from food. Some non-food items are used in the kitchen, which need to be stored safely.

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1 Copy and complete the following table, listing the appropriate letter from Figures 1.21–1.23 showing where you would put each of the items.

Item	Letter	Item	Letter
250 g shredded ham		10 kg potatoes	
2 kg apples		2 kg bananas	
1 bag oranges		500 g frozen beans	
4 L milk		300 ml cream	
2 dozen eggs		1 box tea bags	
1 kg self-raising flour		turmeric	
1 kg beef mince		1 kg chicken thigh fillets	
3 tins lentils		3 tins tomatoes	
1 bag dried chickpeas		1 packet silken tofu	
500 g arborio rice		1 bag shell pasta noodles	
cocoa powder		icing sugar	
250 g unsalted butter		curry powder	
1 tub chicken stock powder		dishwashing detergent	
4 L bleach		scourers	

2 Which of these foods need to be kept cold or cooled down rapidly once you get home? Why?

3 The food has been bought for the week. Which items may become unsafe to consume if stored for a week? How could you increase the storage time for these items? Explain your answer.

4 Which items have you put under the sink (letter G)? Why have you put these here? Why wouldn't you put them in the pantry? If there were young children in your family, where else could these items be stored?

ACTIVITY 1.16
WHICH CHOPPING BOARD?

Commercial kitchens often use different coloured chopping boards, and your school kitchen may also have these.

1 How can different coloured boards help prevent cross-contamination?

2 Each board colour has a different purpose. Research board colours and their purpose (Hint: there are more colours than shown in the image.)

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To prevent cross-contamination, it is important to:

- separate raw and cooked foods
- store raw foods covered at the bottom of the fridge
- keep the kitchen and utensils clean
- ensure that clothing is clean
- use personal protective equipment like aprons, hair ties or hats
- wash hands with soap, rinse and dry thoroughly before and after preparing raw food (remember to sing 'Happy Birthday' twice)
- cover a cut or sore with a bandage or, if the sore is too large, a glove should be worn on that hand.

Figure 1.24 Any sore or cut should be covered. A blue waterproof bandage is the commercial standard.

ACTIVITY 1.17
CROSS-CONTAMINATION

1 What is cross-contamination?
2 Explain how each of the suggestions on how to prevent cross-contamination listed above can prevent the spread of pathogenic bacteria.
3 Suggest reasons why a waterproof blue bandage is the preferred option in a commercial kitchen. These bandages often contain a metallic strip. Suggest why.
4 Why might ready-to-eat foods be potentially more hazardous? Explain.

TASTY TRIVIA

Bottled water may account for 12 per cent of infections by the bacteria *Campylobacter jejuni*, the biggest cause of food-borne infection in the world.

LEARNING REFLECTION

1 Explain the role of cross-contamination in food poisoning.
2 Tying hair back is essential in the kitchen. Explain this, using one safety and one hygiene reason.
3 Explain the difference between infective food poisoning and toxic food poisoning. How are they similar?
4 List the six conditions required for bacterial growth.
5 Dried fruit and nuts resist bacterial attack. Explain.
6 Canned tomatoes and chickpeas do not need to be refrigerated until after opening. Explain why, using the six conditions for the growth of bacteria.
7 Explain how your own hygiene practice in the kitchen can break the food poisoning chain.

1.4 Food contamination

LEARNING INTENTIONS

1 To understand the difference between food poisoning and food contamination.
2 To know what may cause food contamination.
3 To develop skills in managing food contaminants.

Consumption of food can be unsafe because they have been contaminated by a number of different items. The following are three main types of contamination:

- chemical
- physical
- microbiological.

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Table 1.2 Food contaminants

Type of contaminant	Explanation	Examples of contaminants
Chemical	This occurs when harmful chemicals contaminate food. Incorrect storage and cleaning are often the reasons why chemical contamination occurs.	Dishwashing detergent, disinfectants, pesticides and naturally occurring toxins and poisons, including bacterial toxins 
Physical	This occurs when foreign objects enter food. Good cleaning practices, personal hygiene and protective clothing can prevent this type of contamination.	Wood, glass, Band-Aids, hair, jewellery, cigarette butts, insects and animal faeces 
Microbiological	This occurs when microorganisms get into food and poison or spoil it.	There are five different types of microorganisms: yeasts, mould, viruses, protozoa and bacteria. 

ACTIVITY 1.18
FOOD POISONING

Listeria: how the cost of living crisis could increase the risk of food poisoning

More than half the people in the UK say that their health has been negatively affected by the rising cost of living, according to a YouGov poll. Rising energy and food prices can certainly harm people's health in many ways – but there's one way that hasn't been much discussed. As a food-safety expert, my concern is that it might increase rates of a particularly deadly food poisoning called listeriosis.

Listeriosis is food poisoning caused by the bacteria ***Listeria monocytogenes.*** Symptoms might begin a few days after a person has eaten contaminated food, but it can take 30 days or more before the first symptoms appear. These can include a high temperature, aches, tiredness, nausea, vomiting and diarrhoea. But for people with weakened immune systems, listeriosis can result in severe life-threatening issues, such as meningitis and sepsis.

Although the number of people who get listeriosis each year is low, the disease is particularly deadly. Even with antibiotic treatment, between 20% and 40% of people with listeriosis die. So even a small increase in cases is still bad news.

Listeria is commonly associated with chilled ready-to-eat foods that don't need to be cooked or reheated, such as smoked fish, ready-to-eat meats, unpasteurised cheeses, and salads and sandwiches. The steps we can take to reduce the risk of listeriosis are ensuring our fridges are

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running at temperatures below 5°C, sticking to the use-by dates on foods and following the opened storage duration instructions.

The Food Standards Agency recommends that home fridges be set at 5°C or below. However, Elizabeth Redmond, a professor of food safety at Cardiff Metropolitan University, and I have found that most fridges operate at 8°C.

Although this slows the growth of some bacteria, this is not the case with listeria. In a laboratory experiment, we also found listeria grows much faster and to significantly greater levels in food when stored in a fridge at 8°C than at 4°C.

So, to avoid listeriosis, use a fridge thermometer to check your fridge is running at a temperature below 5°C. It's also important to not eat foods that are past their use-by dates. And follow the opened storage duration instructions, for example: 'Once opened, consume within two days'.

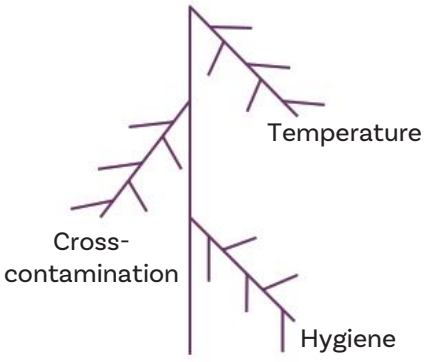
In contrast, other food poisoning is usually the result of poor food handling (such as not separating raw and cooked food, or failing to wash hands) that leads to cross-contamination, or failure to cook food to high enough temperatures to reduce the number of bacteria.

The increased cost of food and the rising cost of energy is having a significant effect on people's finances. But people could unintentionally put themselves at risk of listeriosis when attempting to reduce their energy usage or spending on food.

For example, people may be more tempted to eat foods beyond their use-by date or keep foods for longer than the recommended duration after opening to avoid wasting food and money. Also, people may be more likely to adjust the temperature of their fridge to reduce electricity usage.

Source: The Conversation website, 14 September 2022

1 Outline the symptoms of *Listeria* poisoning. Why is *Listeria* poisoning considered to be particularly dangerous?
2 What foods are commonly linked to *Listeria* contamination?
3 What steps can the householder take to reduce the risk of *Listeria* infections?
4 Explain how the rising cost of living may be associated with an increased risk of listeriosis.
5 Complete a fishbone chart like the one shown to explain how temperature, hygiene and cross-contamination can result in food poisoning.



6 Why do you think government health agencies need to find the source of a food poisoning outbreak when one occurs? The source of *Listeria* outbreaks is extremely difficult to pinpoint. From the information in the article, suggest why this may be the case.

LEARNING REFLECTION

1 State and give an example of the three main types of contaminants in food.
2 Write a rule that should be followed in the kitchen that will help prevent each of the three contaminants.
3 Explain how the recent COVID-19 pandemic may increase the number of food poisoning cases.

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Review

1 Food safety and hygiene are essential to ensure the safety of everyone in kitchens and to make sure the food we consume is free from contamination.
2 Kitchen hygiene and personal hygiene are ways by which a food handler can help to prevent contamination of food. Washing hands is the first step to maintaining Australia's reputation for having a clean and safe food supply.
3 Poor personal hygiene and incorrect storage of food can result in food poisoning. It is important to remember that bacteria are always present on food, and it is up to the food handler to ensure that bacteria do not have the right conditions to grow and multiply.
4 The two types of food poisoning that cause illness are toxic and infective food poisoning. Food can easily become contaminated by chemical, physical and microbiological contaminants that result in unsafe food and illness.

Test your knowledge

Multiple-choice

1 Cleaning spills on a stove top is important because:
   a they bake on and are hard to remove.
   b the spilled food is a hygiene and safety issue.
   c rodents and other pests are attracted to them.
   d all of the above.
2 If you see a puddle of water on the floor, do you:
   a clean it up?
   b tell your teacher-job done?
   c tell the person who is next to the spill to clean it up because it is theirs?
   d put a 'wet floor' sign next to it and leave it, as it is now safe?
3 Food poisoning is always caused by:
   a food that is past its 'best before' date.
   b contaminants.
   c using clean utensils.
   d eating food that has been cooked in the microwave and left there for 20 minutes while you answered your phone.

True or false?

1 Poor kitchen practices cause food poisoning.
2 It is essential to keep desiccated coconut in the refrigerator to ensure food poisoning bacteria do not grow.
3 You should put ice onto a burned finger immediately and leave it there.

Short-answer

1 What are the three broad categories of food contaminants?
2 Keeping insects away from food is essential for food safety. Explain why.
3 Is it likely that a fly landing on food that is eaten within 10 minutes will not cause food poisoning? Explain why.
4 What is the difference between food safety and food hygiene?
5 What are the conditions needed for food poisoning bacteria to grow?

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Extended-response

1 Watch an episode of a popular TV food show and critically evaluate the safety and hygiene practices they employ.
2 Study this image closely and evaluate the safety and hygiene issues you can observe. Explain why you have identified them.
3 Outline three practices this family could undertake that would reduce the potential safety issues that are evident in this picture.
4 Using the information in Figure 1.17, the 'temperature danger zone' diagram, and the speed at which bacteria multiply, explain why food can be kept warm in a bain-marie (warm water bath) in a shopping centre after cooking, without the restaurant's customers getting food poisoning.
5 Explain how food kept in the freezer can last much longer than food kept in the refrigerator.
6 Using Figure 1.15 showing the conditions required for bacteria to grow, explain how food preservation can allow foods to stay safe to eat for much longer than if they were fresh. Provide examples.
7 Using information that you have studied about one type of bacteria, outline the potential source, effect and impact of that bacteria on the human body. Outline how an individual may prevent getting food poisoning from this bacteria.

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CHAPTER 2
Let's get cooking

BEFORE WE BEGIN

1. List and detail the sections of a recipe. State three other pieces of useful information found in a recipe. Explain why this information is useful.
2. In food preparation, cutting is often the first task. Identify the best piece of equipment for cutting a tomato – a paring knife, a cook's knife or a serrated knife. State what task or process you would complete with the other knives that you did not choose.
3. Describe how you can ensure you have accurate measurements when making a cake.
4. List as many methods of cooking food as you can think of.
5. Define the terms 'conduction', 'convection' and 'radiation'.
6. Identify and explain two cooking methods that are completed when using the oven or stove top. Name one food item that you could cook using these methods.
7. List the best types of materials for bowls when you are cooking or heating in a microwave. Explain why microwave cooking is so fast.
8. Explain why we sometimes cook food and why we sometimes eat it raw.

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2.1 Purpose of cooking food

LEARNING INTENTIONS

1 To understand why we cook food.
2 To understand what it means to cook food.
3 To understand what happens in food when we cook it.

digestibility The ability to swallow and process the food that is being eaten

spoilage Microbial or enzymatic damage that occurs to the original nutritional value, texture and flavour of food. The food then becomes unsuitable to eat and may be harmful to people.

Food is cooked for a number of reasons. Cooking improves its **digestibility**, taste and appearance; it kills microorganisms; it delays **spoilage**; and it creates new food items or new combinations of foods. Preparing and cooking food results in a variety of changes to the food.

Figure 2.1 Cooking is the application of heat.

Figure 2.2 Cooking destroys harmful microorganisms, some of which cannot be seen, smelt or tasted in food.

Figure 2.3 Cooking changes the sensory and chemical properties of food, such as raw eggs in a cake.

When we cook food, we are also changing its sensory properties. The cooking process involves the following elements:

- applying heat
- destroying harmful microorganisms
- changing the physical, sensory and chemical properties of food
- combining or developing new ingredients, flavours and textures
- measuring accurately
- understanding cooking processes.

COLLABORATE 2.1

Brainstorm a list of foods that are eaten without cooking (raw) and another list of foods that must be eaten cooked. Are there foods on both lists? Why can some foods be eaten raw, while other foods must be cooked?

Some foods can be eaten without cooking, but other foods, like chicken, need to be cooked before eating. This is partly because some raw foods are difficult to chew, or taste awful, but it is also because they contain bacteria and microorganisms that are harmful if we consume them. These bacteria and microorganisms are destroyed by the heat used in the cooking process.

LEARNING REFLECTION

1 Explain why it is important to make food more digestible by cooking.
2 Why must chicken be cooked, but celery can be eaten raw?

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2.2 Cooking changes the sensory properties of foods

LEARNING INTENTIONS

1. To understand the term 'sensory properties'.
2. To understand how our senses perceive food.
3. To develop a language to help us describe the sensory properties of food.
4. To develop an understanding of how our own food preferences are based on the sensory properties of food.

blanched When a food substance is plunged into boiling water, removed after a short time, and then plunged into ice-cold water to stop the cooking process

Colour

When food is cooked, it looks completely different. In some foods the colour becomes more intense; for example, when beans are **blanched**. Some foods, like meat, undergo a total colour change. A piece of raw meat is bright red; add heat, and the colour becomes brown.

Figure 2.4 The colour of food changes when it is cooked. What colour was this cake before it was cooked?

Figure 2.5 The flavour of food changes when it is cooked. Would you eat these hamburgers as they are? Why or why not?

Taste and flavour

The flavour change that occurs when food is cooked is the result of chemical changes and the combinations of foods. Consider the taste of raw minced meat – not very nice. Cook the meat and add the ingredients to make a bolognese sauce and the flavour is totally different and pleasing to the senses.

Smell or aroma

The chemicals found in food create their aroma. When food is cooked, the aroma becomes more intense as the chemicals change.

COLLABORATE 2.2

Think of cooking aromas that you absolutely love and ones that you intensely dislike. What effect do these aromas have on your perception of the food that you eat? Compare your choices with your partner.

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TASTY TRIVIA

The world's most smelly fruit is the durian. When it is ripe, it has a sweet custardy taste with the texture of cheesecake, but it can smell like a dead animal. In some countries it is banned from being carried on public transport.

Texture

When food is cooked, chemical and physical changes take place and alter its texture. Take an apple, for example – before cooking it is crunchy, but when cooked it becomes much softer and can even be mashed.

Figure 2.6 When cooked, apples become softer, and change colour and flavour.

INVESTIGATE 2.3

Cooking can be a long or a short process, depending on what you are cooking and the cooking method used. One challenge for many families is what to cook for dinner once they get home. Life can be very busy, with different activities, work and school.

The New South Wales Government's Healthy Kids website provides inspiration for meal solutions that are quick and easy to cook at home with a focus on young people.

Review its online recipe lists. Highlight three recipes you could cook at home to include in your family meal planning. Suggest three recipes that you could include in your own Busy Family Cookbook.

LEARNING REFLECTION

1 List the four senses that are used to appreciate food. Can you think of a fifth sense? How might this sense be used in food preparation and eating?

2 Using sensory vocabulary, explain how cooking changes cake batter into a cooked cake.

2.3 First steps in food preparation

LEARNING INTENTIONS

1 To know why we need to understand the science of food and food preparation.

2 To understand what a recipe is, how it is written and the function of each part of a recipe.

Cooking food is a science. Understanding the way food behaves when you prepare, stir, **bake**, freeze or process it in other ways will help you to enjoy and have success in food preparation. It will also help you to be able to make changes to suit different design plans and **resource** options.

bake To cook food using the hot air produced by an oven

resource Something you use to achieve a goal; for example, it could be money, time, available food or your own skills

COLLABORATE 2.4

Look at the recipe for mirepoix. List the production skills, cooking processes and main tools and equipment that are needed to complete it. Which ones do you know? Explain them to another person. How might you find out the things that you don't know? Are there any ingredients with which you are unfamiliar? How would you know how to make the recipe?

ISBN 978-1-009-39592-2 Matthews et al.

MIREPOIX

Serves 6 as a soup or sauce base
Main tools and equipment Cook's knife, medium saucepan, wooden spoon
Production skills Dice, macedoine, drain
Cooking processes Sauté, deglaze

Preparation time 20 minutes
Cooking time 35 minutes
Total time 55 minutes

Kitchen skill: Making vegetable stock from trimmings

INGREDIENTS

- 100 g fatty belly pork
- 200 g carrots
- 1 celery stalk
- 100 g onions
- 1 *bouquet garni*
- 2 bay leaves
- 100 ml vegetable stock

METHOD

1. Finely dice the pork. Make a macedoine of the carrots, celery and onions.
2. Sauté the pork on a medium heat in a pan until the fat runs out.
3. Add the vegetables, *bouquet garni* and bay leaves. Cook for about 15 minutes on medium heat until brown.
4. Drain off the fat and remove the flavouring herbs.
5. Use the meat and vegetables to flavour your desired soup or sauce.
6. Deglaze the pan with the stock, then reduce by half.

ACTIVITY 2.5
RECIPE FOR MIREPOIX

Referring to the recipe for mirepoix, complete the following:

1. All recipes include three main parts: the title, the ingredients and the method. What is the purpose of each of these three parts?
2. Why might this recipe also include main tools and equipment, production skills, cooking processes, and cooking and preparation times?
3. Which of the following ingredients are combined first?
   - **a** Bay leaves and *bouquet garni*
   - **b** Carrots, celery and onion
   - **c** Pork and vegetables
   - **d** Stock and pork
4. Which of these ingredients are not needed in the recipe? Onions, garlic, carrots, celery
5. List and explain the method for preparing the vegetables.

EXTENSION

6. Explain the terms '*bouquet garni*', 'deglaze' and 'reduce by half'.
7. The mirepoix recipe uses carrots, onions and celery for flavouring. What other vegetables can be used in a mirepoix?
8. Describe the history of the recipe for a mirepoix and the term *bouquet garni*.
9. Find three other recipes which use the mirepoix as a flavouring base. Make one of these recipes and complete a sensory evaluation of it.
10. Using this mirepoix recipe as a base, design a recipe you could make for an adult's birthday party dinner.

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ACTIVITY 2.6
DIVIDING AND SEPARATING

Some recipes are written differently to the one for mirepoix. The ingredients and method may be written like directions to the cook as they cook the dish. An example of this is lamb fillet with capsicum, chickpea and almond salad. Read the recipe and answer the following questions.

1. Rewrite the lamb fillet recipe in the same way the recipe for mirepoix has been written.
2. Suggest three reasons why it is easier to follow a recipe written as in the mirepoix recipe. Compare your suggestions with those of other students.
3. Slicing, chopping and draining are three preparation techniques listed in the lamb fillet recipe. Select one and describe it in your own words.
4. List all possible equipment that would be needed to complete the lamb fillet recipe.
5. Chicken is suggested as an alternative ingredient in the lamb fillet recipe. Suggest two other alternatives for each of the ingredients in this recipe.

RECIPE

LAMB FILLET WITH CAPSICUM, CHICKPEA AND ALMOND SALAD

This recipe serves one. Combine ¼ red onion (thinly sliced) with 1 teaspoon of fresh oregano and 1 teaspoon each of lemon juice and olive oil in a bowl. Set aside for 10 minutes. Pan fry 125 g lamb fillet in a pan, sprayed with oil. Set aside to rest for 5 minutes, then slice thickly. Combine 100 g chargrilled red peppers (capsicum), 1 tablespoon of roasted almonds (chopped), ½ cup chickpeas (drained and rinsed), 1 cup baby spinach leaves and sliced lamb in a bowl. Toss with the onion mixture before serving. You could use chicken breast instead of lamb.

LEARNING REFLECTION

1. State two reasons why it is important to understand what happens to food when we cook it.
2. State three broad headings that most recipes have that make them easier to follow.

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2.4 Following an order of work

LEARNING INTENTION

1 To understand the purpose of an order of work.

A clear sequence or order of work is necessary to produce a quality product, along with accurate use of tools and careful presentation. This may take the form of a timeline or what needs to be done to complete a dish. It is not simply a rewrite of the recipe you are using. There are many other tasks required to make a food other than following the recipe, such as ensuring personal hygiene and safety, cleaning up, finishing off and ensuring your teacher has checked your workbench. In more complex activities, for example, when working in teams, you need to ensure each member of the team knows what their contribution to the task is, and what to do and when. You don't want your vegetables cooked and served when there is still 20 minutes left on the clock before the pie has finished cooking!

Changes can be made with knowledge of ingredients and functional properties of food. In new food product development, you can work with a basic recipe and make changes to suit different requirements; for example, to increase the fruit content in a muffin or produce a low-fat muffin. Basic recipes can be adapted to make quite different products. For example, bread dough can be made into a loaf, pizza base, rolls of all sizes and shapes, and sweet bread.

LEARNING REFLECTION

1 Explain why it is important to have a well-written and clearly presented recipe.
2 Write down three types of information that you get from an ingredients list in a recipe.
3 Describe two important types of information provided in the method section of a recipe.
4 It is possible to modify a recipe. Suggest what information you would need to do this.
5 Describe a situation where you might want or need to modify a recipe.
6 Discuss the reasons why we cook food.
7 Choose a vegetable that you like to eat, for example, a potato. Compare the changes to the physical properties of your vegetable when cooked from its raw state.
8 Define the term 'digestibility' and list two foods that need to be cooked for this reason.

2.5 Principles of heat transfer

LEARNING INTENTIONS

1 To understand the difference between moist and dry heat.
2 To understand the terms 'conduction', 'convection' and 'radiation' and know how these apply to the cooking of food.

Food is cooked through the application of heat. This can be wet or **moist heat**, **dry heat** or microwaving. The heat that is used to cook the food involves one of three principles of heat transfer: conduction, convection or radiation. Food can also be cooked through the action of microwaves.

moist heat Any cooking technique that involves cooking with moisture: steam, water, stock, wine or some other liquid. Low temperatures generally are used.

dry heat Any cooking technique in which the heat is transferred to the food without moisture. Dry-heat cooking involves high temperatures.

Conduction

Conduction is the diffusion of heat through a substance such as the wall of a saucepan, or between substances such as from a stove element to a saucepan, into the food. Molecules in a hot object vibrate rapidly. When they come in contact with a cooler object, the vibrating molecules bump the cooler, calmer molecules, making them vibrate faster and thus becoming warmer. For example, a spoon in a cup of hot soup becomes warm because the heat from the soup is conducted along the spoon.

Conduction occurs best in solid foods like a leg of lamb, but it can happen in fluids.

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Figure 2.7 Molecules in the hot tea in the cup are moving rapidly because of their heat energy. As these molecules bump the cooler, calmer molecules in the spoon, these then begin to vibrate, causing the metal in the spoon to heat up. This heat can transfer along the handle of the spoon.

Figure 2.8 The materials used in these kitchen tools are good heat conductors.

Figure 2.9 The wood and plastic used in these kitchen tools are not good heat conductors.

TASTY TRIVIA

Have you ever noticed that metals tend to feel cold? They are not colder than the environment in which they are in. They feel cold because they conduct heat away from your hand. You perceive this heat leaving your hand as being cold.

ACTIVITY 2.7
CONDUCTION

Using the information on conduction, answer the following questions:

1. Explain why it is a good idea to use a wooden spoon when stirring food while it is cooking.
2. Look at Figure 2.8 showing good conductors of heat. Give a reason why these materials are used in cooking.
3. Look at Figure 2.9 showing poor conductors of heat. State a use for each and explain why they are suitable for this use.
4. A cooler or a portable icebox is made of non-conducting materials. Why?

Convection

Convection is the transfer of heat through the movement of gas and liquid molecules. Molecules will move from areas of higher heat to areas of cooler heat. Cooler, more densely packed molecules will move downwards, displacing the hotter, less dense molecules.

As liquids or gases are warmed, they become less dense and rise. The cooler, denser liquid or gas then sinks down towards the heat and creates convection currents.

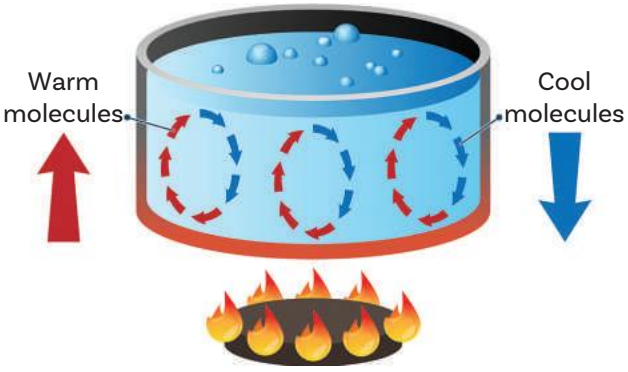

Figure 2.10 Convection currents occur in liquids and solids and are one way to distribute heat when cooking.

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TASTY TRIVIA

Convection is responsible for making pasta spirals and rice rise and fall in a saucepan of boiling water. Heat always moves towards areas of lesser heat. The warmer portions of the water are less dense, and therefore they rise. Meanwhile, the cooler portions of the water fall because they are denser.

Figure 2.11 Rice rises and falls in a pot of boiling water due to convection currents.

Radiation

Radiation is the transfer of heat directly from a heat source to the food. An example of cooking using radiation is grilling. When using radiant energy, heat is transferred by waves of energy

Figure 2.12 Marshmallows being toasted over an open fire do not come in direct contact with the flames but cook from the radiant heat given off by the fire.

that vibrate at a high frequency and travel rapidly through space. When these heat and light waves are absorbed by food, only the surface of the food is heated, as the waves cannot penetrate the food. The rest of the food is heated via conduction. In order for food to be heated, a combination of radiation and conduction is necessary.

Microwave cooking is also a form of radiation that is used in cooking. Instead of the infrared radiation that is emitted by a grill, microwaves emit electromagnetic radiation, which has the effect of vibrating water and fat molecules in the top two centimetres of the food. These vibrating molecules cause heat and so the food is cooked.

Radiant energy is rapid because it moves at the speed of light.

Figure 2.13 A microwave oven produces electromagnetic radiation that vibrates water and fat molecules in the food, which causes heat. Grills produce infrared radiation.

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ACTIVITY 2.8
SUMMARISING METHODS OF HEAT TRANSFER

Copy and complete the following table summarising the different methods of heat transfer.

Method of heat transfer	Diagram of the cooking method	Explanation of how the heat is created	Explanation of how the heat is transferred	Example of a food that can be cooked this way

ACTIVITY 2.9
COOKING EGGS

There are multiple ways of cooking eggs, such as those shown in Figures 2.14 to 2.16. Poaching, frying and microwaving eggs demonstrate examples of the way heat can be transferred.

1 State which egg image shows:
   - **a** conduction
   - **b** convection
   - **c** radiation.
2 Describe how heat is transferred to the egg in each example.
3 State which one of the three ways you think is the healthiest way of cooking an egg. Explain your answer.
4 Cook eggs in the three ways shown in the images and complete a sensory analysis of each.
5 Identify the method of cooking eggs that you found most visually appealing.
6 Discuss the reasons for your preferred egg.
7 Which egg had the most pleasing aroma?
8 Which egg did you like most and which did you like least? Provide reasons and an explanation for your decision.

Figure 2.14 Poaching eggs

Figure 2.15 Frying eggs

Figure 2.16 Scrambled eggs made in a microwave oven

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DESIGN BRIEF: EGGS FOR ALL MEALS OF THE DAY

Eggs are a versatile ingredient that can be cooked in many ways.
Design a healthy meal solution (it can be for breakfast, lunch or dinner) that incorporates eggs but also uses the three methods of heat transfer when being produced. You must also include at least two vegetables in your final product. The recipe for Hanoi-style eggs is an example of a recipe that would meet this design brief.

INVESTIGATE

1 Investigate the different methods of heat transfer.
2 Suggest different ways of cooking eggs.
3 Prepare a list of ingredients for each method.
4 List the aspects that need to be considered when making a decision about the meal solution featuring eggs that you will produce.

GENERATE

1 Generate a list of possible meal solutions that will meet the specifications of the brief.
2 Determine which option you will produce.

PLAN AND MANAGE

1 Design how you will present your final meal solution, including any garnish.
2 Prepare a food order to submit to your teacher.
3 Develop a work plan for your production.

LEARNING REFLECTION

1 Define the three ways by which heat is transferred.
2 Describe the reason we use a wooden spoon when cooking on the stove top.
3 Outline how an egg is cooked when it is poached.
4 Outline how an egg is cooked when it is fried.
5 Explain why rice and pasta rise and fall in the saucepan when they are being cooked.

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HANOI-STYLE EGGS

Hanoi-style eggs is a dish that incorporates eggs and vegetables and uses toasted bread as a crispy element.

Serves 2
Main tools and equipment Measuring cups and spoons, frying pan, saucepan
Production skills Combine, measure, cut, slice, peel, crush
Cooking processes Grill, fry, boil, toast, blanch

Preparation time 10 minutes
Cooking time 35 minutes
Serving and presentation time 5 minutes
Total time 50 minutes

Skill demonstration: Grating

INGREDIENTS

- 2 slices of sliced wholemeal bread
- 2 tablespoons sunflower oil
- 2 eschalots, peeled and thinly sliced
- 1 clove of garlic, crushed
- 2 teaspoons ginger, finely grated
- ½ stalk of lemongrass – white part, finely sliced
- 2 tomatoes, chopped
- 200 g can diced tomatoes
- 2 teaspoons fish sauce
- 75 g green beans, top and tail trimmed
- 2 eggs
- Mint leaves for garnish

VIETNAMESE *DUKKAH*

- 2 teaspoons sesame seeds
- 2 teaspoons raw peanuts, chopped
- ½ teaspoon coriander seeds, crushed
- 1 teaspoon chilli flakes (optional)

METHOD

1. To make croutons: cut the crusts off the wholemeal bread and grill each slice until golden and crispy. Cut into cubes. Set aside.
2. To make the *dukkah*: toast all ingredients for 1–2 minutes in a dry frypan and combine in a small bowl. Set aside.
3. Heat half the oil in a frying pan over medium heat. Add the eschalots to the oil and cook until soft, about 2–3 minutes. Add the garlic, ginger and lemongrass to the pan. Cook 1 minute, stirring. Add all the tomatoes to the pan and bring to the boil. Add the fish sauce to the mixture and cook for 15 minutes, stirring occasionally.
4. While the tomato mixture is simmering, blanch the beans by bringing a small saucepan of water to the boil, then drop the beans in carefully and cook for 3 minutes. Remove from the pan and refresh in cold water. Set aside.
5. In a clean frying pan, heat the remaining oil over medium heat and fry the eggs until cooked to your liking.
6. Divide the tomato mixture and the beans between two plates, top with egg, *dukkah*, croutons and mint.

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2.6 Methods of cooking

LEARNING INTENTIONS

1 To develop an understanding that the correct cooking method should be used in different circumstances.
2 To develop a knowledge of the different methods of cooking that are considered to be 'dry' methods.
3 To understand under what circumstances dry cooking methods are most appropriate.
4 To develop a knowledge of the different methods of cooking that are considered to be 'moist' methods.
5 To understand under what circumstances moist cooking methods are most appropriate.
6 To understand how a microwave oven operates, and how it is different to both dry and moist cooking methods.
7 To develop practical skills in utilising different methods of cooking.

Food is cooked by the application of heat, which may be either wet (moist) or dry. Cooking is impossible without heat. In many cases, the area of cooking that requires the most skill and experience is when heat is involved, as many decisions need to be made. If incorrect decisions are made, then food can be overcooked, burnt or undercooked, which can in some cases cause food poisoning.

Figure 2.17 Undercooking chicken can lead to salmonella food poisoning. Having knowledge and skills in cooking is essential.

COLLABORATE 2.10

Apart from food poisoning, what may be the issues or concerns that can occur if a food is not cooked properly, either under- or over-cooked, or the incorrect method is used?

ACTIVITY 2.11
COOKING CHICKEN

Chicken fillets can be cooked in many ways, including wet methods, dry methods and using the microwave.

1 List all the ways a chicken fillet can be cooked.
2 Choose a cookery method that best cooks a chicken fillet to enhance its sensory properties.
3 Find two recipes that cook chicken in this way.
4 Select one recipe.
5 Produce a food order for your teacher and then prepare and cook the chicken fillet.
6 Develop a list of decisions that needed to be made when heat was applied to this chicken fillet.
7 Describe the sensory properties of the chicken fillet once cooked compared with its raw state.
8 Justify your choice and recipe given the final sensory properties of the chicken fillet.
9 Critically evaluate your level of skill in using the method of cooking involved.

Table 2.1 Dry and moist methods of cooking

Dry heat	Wet (moist) heat
Roasting	Boiling
Baking	Poaching
Grilling	Steaming
Frying	Stewing

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sauté Cook food in a small amount of fat or oil, in a shallow pan on medium–high heat

tenderise The process of making food softer to eat to make it more palatable for consumption; for example, breaking down collagen in meat to make it softer

caramelisation The heating of sugar or foods containing sugar until a brown colour and characteristic flavour develops

Cooking with dry heat

There are many ways in which dry heat is used to cook food, such as roasting, baking, grilling, frying and **sautéing**. These methods involve the food being exposed to a source of heat or placed in a closed oven and subjected to heated air.

Foods cooked with dry heat are cooked to add crispness, colour and flavour. Dry heat does not **tenderise** foods, so it is very important to choose the correct foods to cook with dry heat. Thin, tender and small food items should be fried and grilled. Larger, denser food items should be baked and roasted.

Figure 2.18 Roasting is a dry-heat method of cooking foods.

Roasting

Roasting is a cooking method that utilises dry heat from an open fire, oven or other heat source. Roasting generally is carried out in an oven where the food is surrounded by heat. This method of cooking causes the **caramelisation** of the food's surface; this enhances the appearance and flavour of the food.

When meat is roasted in the oven, it generally is cooked by convection and radiation because only a small proportion of the meat comes into direct contact with the heated roasting pan.

Large, thick and compact cuts of meat usually are selected for roasting, as are potatoes and other larger pieces of vegetables. The food needs to be coated in fat – either fat naturally found on the meat or fat added to the food and pan before cooking.

ACTIVITY 2.12
DRY AND HOT

Copy and complete the following table and answer the questions below.

Dry method of cooking	Definition	Example of a meat or protein that can be cooked by this method	Example of a non-meat product that can be cooked by this method
Roasting			
Baking			
Grilling			
Frying			

1 How have the properties of the foods you have listed been enhanced by the process of dry-heat cooking?

2 Why is frying considered to be a dry method of heat transfer?

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TASTY TRIVIA

Originally, the term 'roast' meant 'to cook before an open fire'. Food to be roasted was placed before a fire in a device that reflected heat, open on the side towards the fire and closed on the side towards the room. The meat to be roasted was suspended in this device, slowly turned and cooked (see Figure 2.19). Have you ever seen modern food being prepared like this?

dextrinisation The process whereby dry heat breaks down starch in foods into a type of sugar called dextrin, which develops a characteristic appearance and flavour

Baking

Baked food is cooked by the process of convection, whereby hot air is created and circulated in an oven. High temperatures generally are created by an oven, but hot ash or hot stones can also be used to bake foods.

The dry heat of baking changes the structure of the starch granules found in food. This causes the surface of the food to brown, a process called **dextrinisation**.

TASTY TRIVIA

Because many baked or roasted items are very large, they can take a long time to cook in the centre. Large and dense items, such as meat or dense fruit cakes, must be cooked at a lower temperature so the internal temperature can rise by conduction, before the outside becomes burned.

Figure 2.19 Originally, meat was cooked over an open-fire spit.

Figure 2.20 Fire or other forms of heat, such as a gas flame, is used to heat the stones in the bottom of this pizza oven. This gives the oven cavity its heat, and at the same time heats the base of the pizza to give it a brown, crisp finish.

Figure 2.21 A probe thermometer is often used to ensure the internal temperature of large pieces of meat have risen to the correct temperature to ensure safety and doneness.

DESIGN BRIEF: FILO PASTRY

Filo pastry is a fantastic pastry to work with. The word 'filo' comes from the Greek word meaning 'leaf'. Lighter than most pastries, it is a healthier alternative to use in baked products. But working with filo can be tricky, due to its delicate nature. Your task is to design a baked product that uses filo pastry. Your product needs to be healthy, tasty and easy to eat. You need to prepare either a sweet dish that incorporates fruit or a savoury dish that incorporates vegetables. An example of a recipe that would meet this brief is the apple and pear triangles recipe.

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RECIPE

APPLE AND PEAR TRIANGLES

Serves 4
Main tools and equipment Oven, knife, bowl, baking tray, baking paper
Production skills Core, peel, slice, fold, sift
Cooking processes Preheat, bake

Preparation time 25 minutes
Cooking time 30 minutes
Serving and presentation time 7 minutes
Total time 62 minutes

Skill demonstration: Dicing

INGREDIENTS

- 1 medium green apple
- 1 small pear
- 1 tablespoon lemon juice
- 3 dates
- ¼ teaspoon ground cinnamon
- 1 tablespoon caster sugar
- 4 sheets filo pastry
- Cooking oil spray
- 1 tablespoon icing sugar, to serve

METHOD

1. Preheat oven to 180°C. Line a baking tray with baking paper.
2. Peel, core and finely dice the apple and the pear. Place both in a small bowl and mix with the lemon juice.
3. Remove the seed from each date and cut the dates finely. Add the dates to the apple/pear mixture along with the caster sugar and cinnamon.
4. Lay one sheet of filo out on the baking tray, spray very lightly with oil and fold into thirds lengthwise.
5. Place ¼ of the apple mixture in one corner of the filo strip, being careful not to overcrowd the filling. Fold the pastry over to form a triangle, then continue to fold until you have formed your finished triangle.
6. Repeat the process with the remainder of the filo and the apple mixture.
7. Spray the top of the filo triangles very lightly with oil and bake for 25–30 minutes or until the triangles are puffed and golden.
8. Sift a little icing sugar over the warm triangles and serve with ice-cream or whipped cream.

EVALUATION

1. List two safety rules and two hygiene rules you followed when making this dish.
2. Complete a sensory analysis of your finished product.
3. Write a list of rules someone needs to follow to use filo pastry successfully.
4. If you were to make this recipe again, what changes would you make? Why?

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Grilling

Grilling is a quick method of cooking by radiant heat. The food usually has to be turned at least once while it is cooking. This method of cooking generally is carried out underneath an electric or gas grill. Food can also be cooked over glowing charcoals or an open fire, which is referred to as barbecuing. Foods suitable for grilling are those that are tender and require quick cooking. Items such as steak, fish and some vegetables can be grilled. High temperatures are used to cook foods, and the food is positioned close to the heat source. Food is cooked on a barbecue by the heat radiating from the hot coals or the gas flame, and through the process of conduction. The barbecue has its origin in prehistoric times, when hunters and gatherers used open fires and hot coals to cook the foods that they killed and collected.

Figure 2.22 The barbecue is a popular radiant heat cooking method.

COLLABORATE 2.13

As a class, develop a list of foods that can be cooked under the grill and over a barbecue.

TASTY TRIVIA

A grill or a salamander can be used to brown the top of some dishes, for example, browning cheese on top of a pasta dish. The sugar on top of a *crème brûlée* caramelises with the use of a grill. Alternatively, a *flambé* torch can be used.

Figure 2.23 A *flambé* torch can be used to caramelise the top of a *crème brûlée*.

DESIGN BRIEF: BRÛLÉE

Crème brûlée is a thick, creamy dessert custard topped with a crisp crust. Develop a fruit *brûlée* recipe. What safety rules will you use to ensure you are safe when using the grill?

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DESIGN BRIEF: A SUMMER BARBECUE

Your family are going to have a summer barbecue and you have been allowed to invite a friend; however, they do not eat meat. You have been asked to make a dish that can be barbecued that would be suitable for your friend. The food must also be suitable to hold in the hand or in bread, a bread roll or flat bread. Salads will be available.

INVESTIGATE

1 Develop a list of criteria for success questions that could be used to evaluate the dish you design.
2 Prepare a list of considerations and constraints associated with the development of this dish.
3 Research the possible choices for non-meat barbecue options.

GENERATE

1 Prepare a list of at least three different options for your dish.
2 Choose one which meets the considerations and constraints of the design brief.

PLAN AND MANAGE

1 List the safety requirements for the preparation and cooking of your dish.
2 Prepare a food order.

PRODUCE

Make your non-meat barbecue dish.

EVALUATE

1 Write an answer to the criteria for success questions you developed.
2 Evaluate the sensory properties of your dish. What changes might you make if you were to repeat the process?
3 Outline the changes that barbecuing your dish made to the food. How did this cooking method alter the sensory properties of the food?

Frying

Frying food entails cooking the food in fat or oil. Food is totally or partially immersed in hot fat, and it cooks rapidly as heat is conducted from the fat into the food by convection currents. There are three main types of frying: deep-frying, shallow- or pan-frying, and stir-frying.

TASTY TRIVIA

There are a number of different animal fats which can be used to fry foods. Butter and ghee are made from the cream separated from whole milk, lard and leaf lard are from pork, and suet and tallow are from beef, lamb or bison. Duck fat is also used.

TASTY TRIVIA

The temperature of fat can be considerably higher than that of boiling water. The fat or oil is often heated to between 150 and 220°C.

Deep-frying

Deep-frying involves totally immersing food in hot oil. Deep-fried foods often have an outer layer of crumbs or batter, which protects the food from the high temperature of the fat as well as adding a textural or flavour layer.

To check that the oil is hot enough before beginning to cook, place a small portion of food into the pan. If the oil is hot enough, it will bubble as soon as the food is added. Because the oil is hotter than boiling water, any moisture on the surface of the food can almost instantly turn to steam, which can cause the oil to spit. Care must be taken to avoid burns.

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TASTY TRIVIA

To see if oil is hot enough and ready for deep-frying, place the handle end of a dry wooden spoon in the oil and look for bubbles.

Figure 2.24 Deep-frying involves fully submerging food in oil.

COLLABORATE 2.14

As a class, brainstorm different food that can be deep-fried. Suggest reasons why many fast-food outlets utilise deep-frying to make their foods. What might be the advantage to these retail outlets of selling deep-fried foods?

TASTY TRIVIA

It is well known that deep-fried Mars Bars were invented in a shop in north-east Scotland. What other odd foods have you heard of being deep-fried?

INVESTIGATE 2.15

1 Copy and complete this KWL table about deep-frying.

What I KNOW	What I WANT TO KNOW	What I have LEARNED

2 Deep-frying is not known for its health benefits. Research what health issues deep-frying can contribute to.

3 Develop a list of safety rules that must be followed when deep-frying.

4 Research the explicit work health and safety rules that a commercial business must follow when deep-frying.

5 Some schools do not teach deep-frying until later years, if at all, as it is considered to be a challenging and difficult skill to master. Explain why.

Shallow-frying or pan-frying

Shallow-frying involves cooking food in a shallow pan. A small quantity of preheated fat or oil is used. Shallow-frying is a quick method of cooking that is only suitable for tender cuts of meat. This method of frying results in a final cooked product that has good colour and has lost minimal amounts of nutrients.

Figure 2.25 Shallow-frying involves a small amount of oil at fairly high temperatures and is used on thinner, more tender pieces of food, such as fish.

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INVESTIGATE 2.16

Palm oil is the most widely consumed vegetable oil in the world, and global demand for it is increasing. However, there are grave environmental concerns with its consumption.

1 What advantages are there in the cooking process to using palm oil?
2 What is palm oil? How is it made? Where in the world is it harvested?
3 Briefly outline environmental issues associated with the world's hunger for palm oil.

EXTENSION

4 Think about the farmers who are producing palm oil. What might be their issues if the world suddenly stopped demanding palm oil?
5 Suggest possible solutions to the ethical issues surrounding the production and consumption of palm oil.

Stir-frying

Stir-frying is an Asian technique for cooking meat, poultry, seafood, tofu and vegetables quickly, so that the food retains its texture and flavour. Stir-frying typically involves a quick sauté over high heat, occasionally followed by a brief steam in a flavoured sauce.

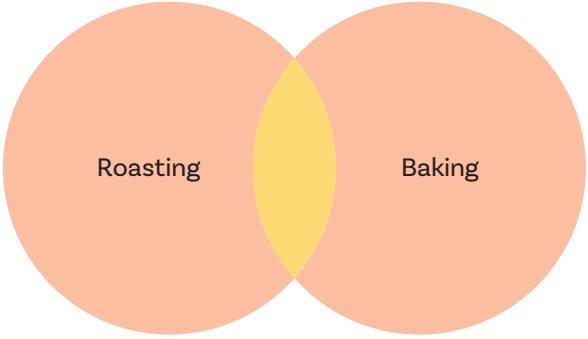
Figure 2.26 Stir-frying is often done in a wok and uses small pieces of food that cook quickly. In this way, the raw foods retain their colour, flavour and texture better.

TASTY TRIVIA

The sale of air fryers has seen a significant increase over the past few years. Air fryers use highly heated air that circulates around the food, which, if it has been seasoned and coated with a light spray of oil, will produce food very similar to deep-fried foods. Nutritionally, this is a positive.

LEARNING REFLECTION

1 List and define each of the methods of dry cooking. Provide an example of each.
2 Explain why dry cooking is most suitable for tender foods.
3 Dry cooking includes deep-frying. Explain why.
4 Copy and complete the following Venn diagram demonstrating the similarities and differences between roasting and baking. (Similarities will be listed in the overlapping section.)



5 Outline the changes that occur in foods that have been cooked using the dry method.

ISBN 978-1-009-39592-2 Matthews et al.

Figure 2.27 Vegetables boiling in water on a stove top. What changes occur in vegetables that are cooked this way?

boiling point The temperature at which water changes from a liquid to a vapour or gas

simmering When the cooking liquid is just below boiling point (between 85 and 96°C) and small bubbles are forming and rising to the top

albumen A water-soluble protein found in egg white and blood

cellulose One of the main components of plant cell walls. An indigestible carbohydrate and an important source of insoluble fibre.

Cooking with moist heat (liquids)

The moist method of cooking uses liquid (e.g. water or stock) as the medium of heat transfer, which includes boiling, poaching, steaming and stewing. Some foods cooked using this method require large quantities of liquid to be added, while for other foods small amounts of liquid, or even the steam created by the liquid, are enough to cook the food.

Boiling

Boiling involves cooking food in boiling liquid, usually water. The liquid boils when its temperature is raised to its **boiling point**. As the liquid heats, tiny bubbles appear on the bottom of the saucepan, then rise to the surface. At this point, the liquid is said to be **simmering**. Gradually, the bubbles increase in size until large bubbles form, which rise rapidly to the surface and break. This causes the constant agitation of the liquid.

Boiling has the following effects on foods:

- It toughens the **albumen** in an egg.
- It toughens the meat fibres and dissolves the connective tissues found in meat.
- It softens the **cellulose** in cereals, vegetables and fruits.

TASTY TRIVIA

The temperature at which water boils is determined by the atmospheric pressure. Water will boil at 100°C at sea level, but at the top of Mount Everest, it boils at about 68°C.

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ACTIVITY 2.17
HOW LONG TO BOIL?

In this activity you will be deciding what the optimum time is for boiling beans.

1 Half fill a medium saucepan with water. Bring it to the boil.
2 Carefully drop in four green beans, setting a timer as you do so.
3 Remove one bean from the boiling water at 3 minutes, 8 minutes, 15 minutes and 20 minutes and drain immediately on paper towel.
4 Complete a detailed sensory analysis of each bean, making sure you do this as soon as possible so the bean does not continue to cook in its own heat. Copy and complete this table to record results.

Time interval	Appearance, including colour	Aroma	Taste	Texture
3 minutes				
8 minutes				
15 minutes				
20 minutes				

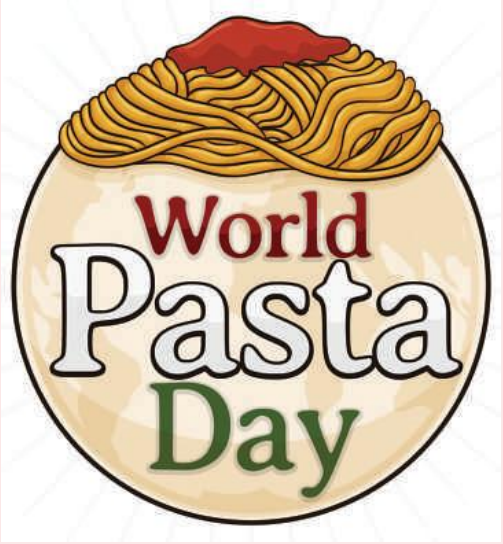
5 From your results, which cooking time produced the best bean? Explain your answer.
6 Describe how the bean changed when boiled for a long period of time.
7 Some foods may need to be, or are better when, boiled for a long period of time. Give an example of such a food and explain why.

DESIGN BRIEF: IT'S PASTA DAY

Pasta is a food that usually involves the process of boiling. Design a tasty five-ingredient pasta dish that could be served for lunch.

TASTY TRIVIA

World Pasta Day is held on 25 October each year. It was first named by 40 pasta producers, who gathered in 1995 for the first World Pasta Congress.



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Poaching

This is the process of gently simmering food in liquid – usually water, stock or wine. Poaching is particularly suitable for fragile foods like eggs, poultry, fish and fruit, which can easily dry out and fall apart.

When poaching food, it is important to keep the heat low and the cooking time to a minimum. This prevents the food from drying out or falling apart, and it also preserves the flavour of the food.

Figure 2.28 Poaching is the process of simmering food in a liquid. In this case, these tamarillos have been poached in a sugar syrup.

DESIGN BRIEF: HEALTHY CHICKEN SALAD

You have volunteered to make a healthy chicken salad for your uncle who is coming to lunch. Your uncle has a heart condition, and he has been told not to eat too much fat. You have decided to poach the chicken.

INVESTIGATE

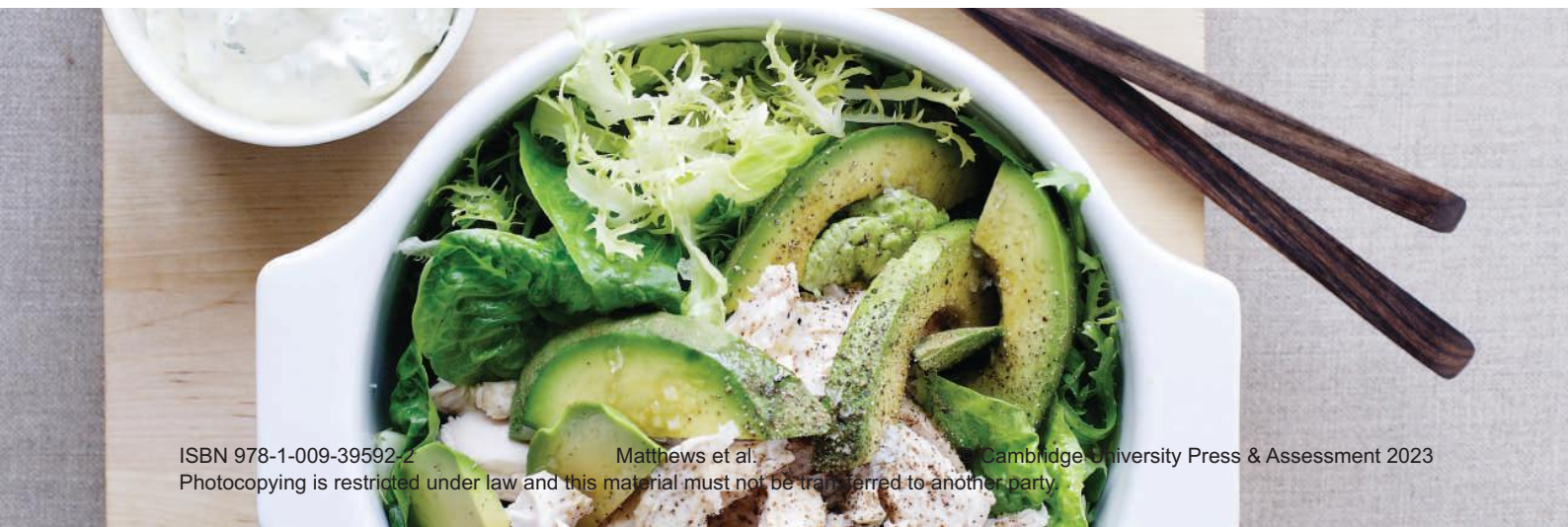
1 Explain how poaching differs from roasting.
2 Investigate how to poach chicken so it is safe to eat.
3 Develop five criteria for success questions that you will use to evaluate your dish.

GENERATE

1 Develop a list of at least three different recipes you could use to make your chicken salad. Annotate your recipes to show the positives and negatives about each.
2 Choose an option and justify your choice.
3 Design how you will present your finished salad. Think about what else you may serve with your chicken salad to make it a complete meal.

PLAN AND MANAGE

1 Write a food order for your teacher.
2 Develop a plan that shows what you will need to be doing in each 10-minute block so you will finish the preparation, cooking and serving on time.



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RECIPE

POACHED CHICKEN SALAD WITH PESTO AND SUN-DRIED TOMATOES

Poaching chicken produces a very succulent finish; however, visually it is quite bland. Suggest why the addition of this vibrant sauce may improve the sensory properties of this chicken.

Serves 2
Main tools and equipment Medium saucepan, measuring spoons, cups, jug, fork
Production skills Combine, shred, chop
Cooking processes Poach

Preparation time 15 minutes
Cooking time 25 minutes
Serving and presentation time 20 minutes
Total time 60 minutes

INGREDIENTS

- 1 litre water
- 2 teaspoons salt
- 1 large boneless, skinned chicken breast
- 2 tablespoons basil pesto (bought or homemade)
- 2 tablespoons mayonnaise (bought or homemade)
- 1 teaspoon lemon juice
- 2 tablespoons sun-dried tomatoes, drained and chopped finely
- Freshly ground black pepper

METHOD

1. In a saucepan combine water and salt. Add chicken and put on a medium–high heat until water reaches poaching temperature (between 80 and 90°C). Adjust the heat so the water stays in this temperature range.
2. Cook the chicken for 23–30 minutes at this temperature. If you use a thermometer, the inside of the chicken at the thickest point should be at least 75°C.
3. Remove from the liquid, and when cool enough to handle, shred the chicken meat into bite-sized pieces.
4. In a bowl, stir together the pesto, mayonnaise and lemon juice until well combined.
5. Mix in the shredded chicken and sun-dried tomatoes. Season with pepper to taste.

EVALUATION

1. Answer your criteria for success questions you developed.
2. Complete a sensory evaluation.
3. Why might poaching the chicken be more favourable than roasting it in an oven for this recipe?
4. Copy and complete the table below, explaining what worked, what areas need improvement and how you might improve your task for next time.

This worked	Areas for improvement	Next time I could try …

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stewing Slow, moist method of cooking less-tender cuts of meat

reduction A process of decreasing the amount of liquid, such as in a stew, to make the sauce thicker

searing Browning the surface of meat with the use of a quick application of high heat, sometimes using oil

roux A mixture of equal proportions of butter and flour used as a base for thickening sauces or to make sauces like gravy

Stewing

Stewing involves cooking food in water, or another liquid, at a temperature below boiling point. The liquid used to cook the food is generally simmered in a pot on the stove top or cooked in a covered casserole dish in the oven.

Tough cuts of meat can be made tender and tasty by long, slow stewing. This softens the meat fibres and helps to develop flavour in foods. The liquid used for stewing often needs to be thickened before eating. Stews can be thickened by **reduction**, but are most often thickened with flour, either by coating pieces of meat with flour before **searing** or by using a **roux**. This process can be carried out in the oven, on the stove top or using a slow cooker.

Figure 2.29 A slow cooker is often used to make stews, because it can be set on a very low temperature for a very long time.

COLLABORATE 2.18

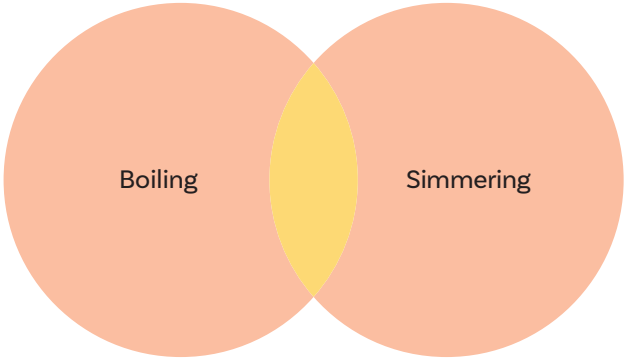
You have learned that dry cooking methods are best for smaller, thinner and more tender pieces of meat and food. Stewing these foods often leads to a product that is either very tough or very mushy. Using this information, as a class brainstorm a list of foods that might be suitable to stew and write these down. Write down five pieces of equipment that might be used to stew food. Explain the method of heat transfer used in stewing.

Figure 2.30 Casseroling is a way of stewing food in the oven. This casserole contains okra. What might the okra be used for in this recipe?

The slow cooker is a popular slow-cooking appliance. Slow cooking involves raw food and a cooking liquid – usually water, wine or stock. The food is cooked over a very long time period – up to eight hours. The long, moist nature of this cooking gives good results using cheap, tough cuts of meat. Often, the cheaper the cut of meat, the more flavour develops.

LEARNING REFLECTION

1 Define each of the moist cooking methods. Provide an example of each method.
2 List four food ingredients that are best cooked using moist cooking methods. Explain why this is the case.
3 State the methods of moist cooking that are the most nutritious. Justify your response.
4 Copy and complete the Venn diagram to show the similarities and differences between boiling and simmering. (Similarities will be listed in the overlapping section.)



5 Describe the changes that occur to foods when cooked using moist cooking methods.

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Microwave cooking

Microwave cooking should be treated as a separate cooking method as no heat is transferred even though it is a form of radiation, as discussed previously. Microwave ovens provide a convenient way of cooking and re-heating food. The popularity of these ovens is largely due to their ease of operation and their time-saving properties. More information on how a microwave oven works and microwave safety can be found in the *Getting started* section at the front of the book.

Figure 2.31 A microwave oven is useful for many quick tasks in the kitchen and makes many tasks like melting butter much simpler and easier to clean up.

TASTY TRIVIA

In 1946, Dr Percy Spencer was testing a vacuum tube called a magnetron when a candy bar melted in his pocket. He tried other experiments with food and then created a metal box to channel and contain microwaves. Engineers developed and refined the idea, and the first commercial microwave oven hit the market in 1947.

The microwave is most often used to provide quick and easy heating of food, since it cooks food more quickly than an ordinary oven. It also allows for a greater variety of cooking tasks. For example, a microwave can heat water, cook a casserole, thaw frozen foods and even re-heat that cup of tea that went cold or re-heat last night's leftovers for lunch! It can heat food quickly and decreases the risk of burning foods as the microwave's timer is pre-set and will turn off if it is forgotten. Plastic containers can be placed in the microwave, which is often more convenient when cooking.

For the best results when using a microwave:

- undercook rather than overcook foods
- alter the cooking time to suit the amount of water in the food – more water, more time
- allow food to rest after the cooking time
- stir the food several times during cooking to help distribute heat
- pierce the skin of unpeeled vegetables, plastic packets and egg yolks to allow steam to escape to prevent them from bursting.

ACTIVITY 2.19
CHEESE MELTING

For this activity you will need two slices of bread and two slices of cheddar cheese.

1. Place each slice of cheese on a piece of bread.
2. Melt one slice of cheese using the microwave.
3. Melt the other slice using the grill.
4. Describe the differences between the appearances of both cheeses.
5. Describe the differences between the aroma of both cheeses.
6. Describe the differences between the taste of both cheeses.
7. Describe the differences between the mouthfeel of both cheeses.
8. Determine which is the best piece of equipment for melting cheese. Justify the reasons for your final conclusion.
9. List some foods that are best cooked in the microwave.
10. List some food items that are best not cooked in the microwave.

COLLABORATE 2.20

In this task you will be comparing baked products cooked in a microwave to those cooked in a conventional oven. You will be working in a team to make two different types of cakes – a sticky date cupcake and a vanilla cupcake – using two different cooking methods, which you will then evaluate for suitability. Each of these recipes will make 12 cupcakes.

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RECIPE 1: VANILLA CUPCAKES

Makes 12
Main tools and equipment Bowl, measuring spoons, scales, hand mixer, wooden spoon, cupcake liners. *Version 1*: 12-cup muffin pan, conventional oven; *version 2*: 12-cup microwave-safe muffin pan, microwave oven
Production skills Measure, mix, beat
Cooking processes *Version 1*: bake; *version 2*: microwave

Preparation time 15 minutes
Cooking time *Version 1*: 15–20 minutes; *version 2*: 5–8 minutes
Serving and presentation time 5 minutes
Total time
Version 1: 40 minutes; *version 2*: 27 minutes

Skill demonstration: Creaming butter and sugar

INGREDIENTS (BOTH VERSIONS)

- 80 g butter
- 190 g caster sugar
- 100 g self-raising flour
- 2 eggs
- 125 g milk
- 65 g sour cream
- 1 teaspoon vanilla essence

METHOD

1. *Version 1*: Take a note of the time. Preheat oven to 180°C and line a 12-cup cupcake tin with paper liners.
   Version 2: Take a note of the time. Line a 12-cup cupcake container with paper liners.
2. Cream the butter and caster sugar with a hand beater until pale and fluffy.
3. Add eggs to the butter mixture, one at a time, beating well between each addition.
4. Combine the milk, sour cream and vanilla essence in another bowl.
5. Using a wooden spoon, add the liquid ingredients to the dry ingredients 1/3 at a time, mixing gently until combined.
6. Divide the mixture evenly between the cupcake liners.
7. *Version 1*: Bake 15–20 minutes or until a wooden skewer inserted comes out clean. Take a note of the time.
   Version 2: Bake 5–8 minutes or until a wooden skewer inserted comes out clean. Take a note of the time.

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RECIPE 2: STICKY DATE CUPCAKES

Makes 12
Main tools and equipment Bowl, measuring spoons, scales, hand mixer, wooden spoon, cupcake liners. *Version 1*: saucepan, 12-cup muffin pan, conventional oven; *version 2*: microwave-safe bowl, 12-cup microwave-safe muffin pan, microwave oven
Production skills Boil, cream, mix, beat
Cooking processes *Version 1*: boil, bake; *version 2*: microwave

Preparation time 15 minutes
Cooking time *Version 1*: 15–20 minutes; *version 2*: 5–8 minutes
Serving and presentation time 5 minutes
Total time *Version 1*: 40 minutes; *version 2*: 27 minutes

INGREDIENTS (BOTH VERSIONS)

- 200 g chopped dates
- 1 cup water
- 90 g butter
- ½ cup packed brown sugar
- 2 eggs
- 1 teaspoon vanilla essence
- 1½ cups self-raising flour

METHOD

1 *Version 1*: Take a note of the time. Preheat oven to 180°C and line a 12-cup cupcake tin with paper liners.
Version 2: Take a note of the time. Line a 12-cup cupcake container with paper liners.
2 *Version 1*: Bring chopped dates and water to the boil in a saucepan, turn off heat and leave to cool. Do not drain.
Version 2: Put water and dates in a microwave-safe bowl and microwave on high for 2 minutes or until boiling. Remove from microwave and leave to cool. Do not drain.

Both versions:

3 Cream butter and brown sugar using an electric hand mixer until light and fluffy.
4 Add eggs one at a time, beating well between each addition. Stir in vanilla essence.
5 Stir in flour gently.
6 Add date mixture and mix gently.
7 Divide the mixture evenly between the cupcake liners.
8 *Version 1*: Bake 15–20 minutes or until a wooden skewer inserted comes out clean. Take a note of the time.
Version 2: Bake 5–8 minutes or until a wooden skewer inserted comes out clean. Take a note of the time.

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EVALUATION

1 Copy and complete the following table.

Recipe completed	Time taken (Finish time – start time)	Sensory evaluation – taste, appearance, texture, aroma
Baked vanilla cupcake		
Microwaved vanilla cupcake		
Baked sticky date cupcake		
Microwaved sticky date cupcake		

2 Which of the cupcake versions did you like the best? Which version did you like the least? Justify your answer.

3 Consider the cupcake you liked least. How could this cupcake be improved? Think about what could be added to or included in the recipe.

4 List advantages and disadvantages of using an oven versus a microwave to cook a cupcake.

5 Consider the two cupcake recipes and the finished cupcakes. Which recipe suited microwaving better? Explain your answer.

TASTY TRIVIA

Microwaveable meal packaging has been designed especially for the high temperatures of a microwave. This innovative style of packaging incorporates susceptors (surface layers) to compensate for some of the limitations of microwave cooking. Susceptors consist of a plastic film metallised with aluminium and laminated paper or paperboard to hold the required shape. These packages are designed to enhance the browning and crisping of a product and to improve its texture.

LEARNING REFLECTION

1 Suggest two reasons why microwave ovens are popular pieces of equipment in homes and businesses.

2 State two types of cooking containers that can be used in the microwave.

3 Discuss reasons why commercial companies develop meals specifically for heating in microwave ovens.

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Review

1 Food is cooked in order to increase its palatability. Cooking also changes the sensory properties of a food, helping to enhance its aroma, colour, flavour and texture.
2 Food is cooked through the application of heat. There are three methods of heat transfer for cooking: conduction, convection and radiation.
3 Wet or moist heat (the use of a liquid) and dry heat are the methods by which most food is heated and cooked.
4 Dry heat exposes the food to a source of heat. This method of cooking includes roasting, baking, grilling, frying and sautéing.
5 Liquid such as water, stock, fruit juice or wine can also be used to cook foods. Heat is transferred via the liquid and can be completed by boiling, poaching, steaming or stewing foods.
6 Microwave cooking is a method of cooking food that is quick, convenient and relatively safe. It uses electromagnetic waves to agitate molecules within the food, which generate heat through friction.

Test your knowledge

Multiple-choice

1 Conduction is:
   a heat transferred by the circulation of hot air or steam.
   b the use of microwaves to vibrate food molecules.
   c heat transferred through collisions between neighbouring atoms or molecules.
   d heat transferred through air via infrared rays such as in a grill.
2 Moist cooking methods:
   a produce a browning reaction such as caramelisation or dextrinisation.
   b include poaching, frying and roasting.
   c are best used on foods that are high in fibre or collagen.
   d are quick.

True or false?

1 Foods are cooked to increase digestibility.
2 Dry heat tenderises foods such as meat.
3 Caramelisation occurs when starches are changed into a form of sugar.
4 Frying is a dry form of cooking.
5 During any preservation technique, food spoilage bacteria are killed completely.

Short-answer

1 Explain how cooking changes the sensory properties of an apple.
2 A pizza oven cooks a pizza from above and below. Using the principles of heat transfer, explain how this happens.
3 Copy and complete the following table, outlining the cooking methods.

Dry cooking methods	Wet or moist cooking methods

4 Explain why deep-frying is neither a wet nor moist method of cooking.

Extended-response

James Cook, in his voyages of science and discovery, had many preserved foods onboard to feed his crew on the two-year journey: flour, salt beef and pork, beer, wine, dried peas, oatmeal, vinegar, raisins, salt, sauerkraut, dried soup base (bouillon), mustard and marmalade.

1 Explain how each of the foods that Cook took with him were able to last for extended periods of time.
2 Cook was renowned for keeping his crew healthy by preventing them from getting scurvy, a diet-related disease which is caused by lack of vitamin C. Sauerkraut, marmalade and raisins all contain some vitamin C.
Plan two days' meals (breakfast, lunch and dinner) using the ingredients available to the cook on the ship, but also including a source of vitamin C in each meal.

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CHAPTER 3

Food choices for healthy living

BEFORE WE BEGIN

1. Discuss the statement 'Without nutritious food, our bodies do not function efficiently'.
2. List the key food groups.
3. Identify the six nutrient groups.
4. Explain the function of one of the key nutrient groups.
5. Name a food-selection model. Discuss how this food-selection model helps us to make healthy food choices.
6. Name the diseases that link directly to diet.

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3.1 Food: its definition and purpose

LEARNING INTENTIONS

1 To understand the function of food in our bodies.
2 To develop an understanding of the role food has in facilitating a healthy body.

food A substance composed primarily of carbohydrates, fats, water and/or proteins, which is a source of nutrients consumed by humans and animals. Food is required for growth and energy.

nutrients The chemical compounds found in food that are used by the body to enable it to function and grow

Food is any substance that we eat or drink. We eat food to nourish our bodies and to gain the energy we need to move and think. We also often eat for pleasure, to enjoy the taste of food, or to enjoy the company of friends in a social setting. Food contains a number of **nutrients** that we must eat in order to survive:

- carbohydrates
- fats
- proteins
- vitamins
- minerals
- water.

COLLABORATE 3.1

1 Conduct a survey of the class to answer the following questions.
   a What's your favourite food?
   b What's a food you eat every day?
   c What's a food you only eat sometimes?
   d What's a food you eat for pleasure?
   e What's a food that you eat just because you have to?
   f What's your least favourite food?
2 Are there similarities and differences in the class? Suggest reasons why this may be so.

Figure 3.1 Food is eaten for nourishment, but also for pleasure.

LEARNING REFLECTION

1 What are the six main nutrients that we must eat?
2 List two reasons why we eat.

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3.2 What does healthy eating mean?

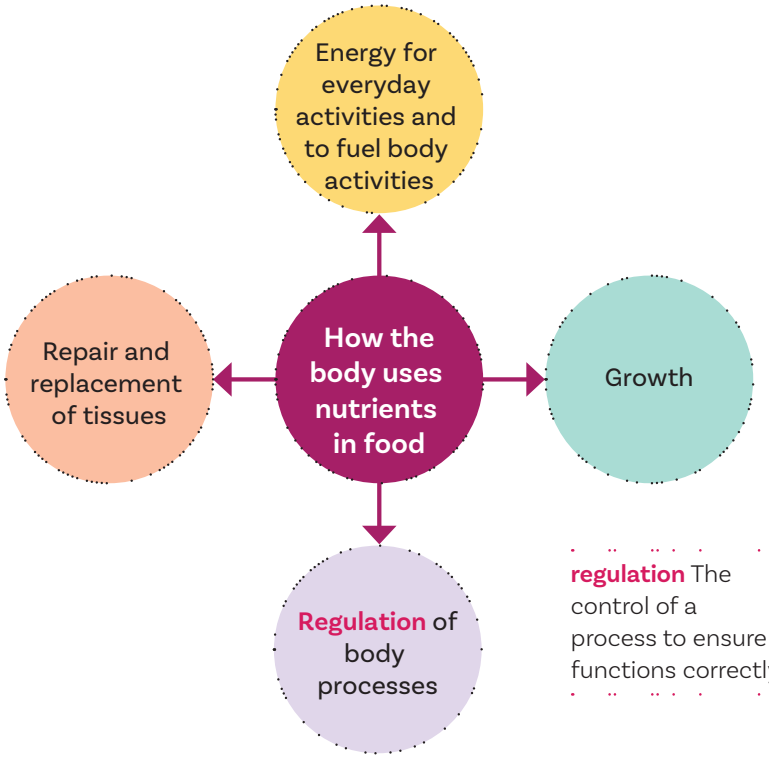
LEARNING INTENTIONS

1 To identify the main food groups necessary for good nutrition.
2 To develop an understanding of how to determine what a healthy diet is.
3 To practise designing a healthy meal using the food groups as a basis.

Healthy eating provides nutritious foods in the correct quantities to keep the body functioning efficiently. If we don't choose healthy foods, our bodies do not work as well as they should. Choosing healthy foods ensures that our bodies have the necessary nutrients required for us to be fit and healthy.

Eating from the key food groups

So that we can be assured of a balanced diet, we need to eat a wide variety of foods from each of the key food groups in the recommended amounts. The key food groups are outlined in Table 3.1 on page 80.



regulation The control of a process to ensure it functions correctly

Figure 3.2 Food provides nutrients which have a number of roles in the body.

Figure 3.3 Nutrients are required throughout life to provide energy to help the body grow, replace and repair itself and for the regulation of body processes.

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Table 3.1 A nutritionally balanced diet is crucial for a healthy body and mind.

Vegetables and **legumes**/beans **legumes** A plant from the pea family which is high in protein	
Fruits	
Grains (**cereals**), mostly wholegrain and/or high-cereal fibre varieties. **cereals** Grains used for food, such as wheat and maize (corn)	
Lean meat and poultry, fish, eggs, tofu, nuts and seeds, and legumes/beans **lean meat** Meat with the least amount of fat possible	
Milk, yoghurt, cheese and/or alternatives, mostly reduced fat	

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COLLABORATE 3.2

1 Brainstorm as many examples as you can of foods from each of the food groups. Did you have difficulty putting some of the foods in a group? Where, for example, might you put a salad sandwich?
2 How many of the five food groups do you eat every day? In every meal?
3 Are there any of the food groups you have very little of? Lots of? Is this similar among your classmates?

A well-balanced and healthy diet

In a healthy diet, it is important to ensure that we consume enough foods from each food group every day. It is also important to include a variety of different foods from each of the groups so that we supply our bodies with all the nutrients they require to function, as well as to drink plenty of water and get sufficient exercise.

TASTY TRIVIA

Exercise is essential for good health and wellbeing. In fact, the Australian Government has guidelines recommending that children and youths between 5 and 17 years old have one hour of moderate to vigorous activity per day and should perform vigorous activities at least three days a week. It also recommends to do several hours of light activity every day. Read more at https://cambridge.edu.au/redirect/10084.

COLLABORATE 3.3

As a class, discuss the following questions.

1 Do you meet the exercise guidelines set out by the government?
2 What reasons might there be for someone not getting adequate exercise?
3 How much water do you drink in a day?
4 If you don't drink water, or much water, what do you drink instead? Why might this not be as healthy a choice as water?

INVESTIGATE 3.4

Visit the Australian Government's Eat for Health website. Analyse the information on the section of the website titled 'Eating Well' and answer the following questions.

1 What reason is provided to explain why it is hard for Australians to choose nutritious foods?
2 Check out the 'Tips for eating well'. Copy and complete the following table to list five of these tips and how to apply them in your own life.

Tips for eating well	How can I apply this tip so that I eat well?
1.	
2.	
3.	
4.	
5.	

3 Were there any tips that you could not apply to your own eating? Explain why.
4 Go to the section titled 'Healthy eating throughout all of life'. What are the reasons given for why teenagers have special food needs?

EXTENSION

5 Follow the link titled 'More information on healthy eating for infants, children and teenagers' to answer these questions.
   a Teenagers are more likely to be overweight than ever before. Outline suggestions that are made to help manage weight.
   b What are discretionary foods? What special instructions are given with regards to these foods in a teenager's diet?
6 Discuss the importance of activity or physical activity in the life of an adolescent.
7 Outline the reasons why this website is a source of information that can be trusted and believed.

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DESIGN BRIEF: WARM SNACK

It is your family's turn to supply morning tea for your younger sister's hockey team. The coach likes the players to have a healthy snack before they play to help sustain their energy throughout the game. As it is the middle of winter, a warm snack would be preferred. Create a solution that could be eaten by the members of the team, would be liked by most of the 10–12-year-olds, and contains at least one food from each of the five key food groups.

Figure 3.4 An English muffin is an ideal base for a warm, healthy snack that does not need utensils to eat.

LEARNING REFLECTION

1. Explain why healthy food is so important to the human body.
2. Food provides us with several different nutrients. Explain the term 'nutrients'.
3. List 10 of the foods that would be included in a healthy and nutritious diet.
4. Suggest why children and adolescents need to consume different foods.
5. Designing healthy food choices and then preparing them can be difficult for some people. Explain why this might be the case.

3.3 Essential nutrients

LEARNING INTENTIONS

1. To develop an understanding of the types and roles of macronutrients in the diet.
2. To develop an understanding of the types and roles of micronutrients in the diet.

It doesn't matter what age you are; it is important to eat well. Food is not only something to enjoy, but it also provides the body with nutrients, which are needed for your body to function efficiently. Eating a **balanced diet** is the best way to guarantee that you are getting all the essential and non-essential nutrients that your body needs every day.

balanced diet Dietary intake that includes the nutrients needed by the body for good health

Nutrients are the chemical compounds found in food that are used by the body to function and grow. Some nutrients are referred to as **macronutrients**, which are large molecules that the body requires in large quantities. **Micronutrients** are small molecules, and the body only needs small quantities of them.

macronutrients Energy-yielding nutrients that are required by the body, with the recommended intake measured in grams

micronutrients Nutrients required in small amounts by the body

There are six main nutrients essential for the body: protein, carbohydrates (including fibre), fats, vitamins, minerals and water.

These nutrients will be explored in more detail throughout this text as each is associated with different food groups, although many nutrients can be found in varying amounts in most food groups. For example, protein is predominantly associated with the meat and meat alternatives

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group, while the dairy group features a number of important minerals as well as water (and protein). Fruits and vegetables contain significant amounts of vitamins, and cereals are a great source of carbohydrates.

LEARNING REFLECTION

1 Explain the difference between a macronutrient and a micronutrient.
2 Macronutrients are energy-yielding nutrients. What does this mean?

3.4 Foods for good health

LEARNING INTENTIONS

1 To develop the knowledge of food selection models designed to help us eat in a healthier manner.
2 To develop skills in the use of these food selection models in planning and making meals.
3 To understand the term 'evidence-based', and how it relates to the Australian Dietary Guidelines.
4 To develop skills that enable students to develop design criteria independently and use these to evaluate food products.

When we choose foods to eat each day, several factors influence this selection. Most people do not choose foods just for their nutritional value. Our food selection is influenced by our family, peer group, culture, **religion**, personal likes and dislikes, types of foods available and the prices of different foods.

religion The belief in and worship of a god or gods, or a system of belief and worship

Food-selection models have been developed in Australia to provide us with knowledge about choosing healthy foods and to influence our food choices. These models aim to help people choose the best foods for good health. Over time, many of these models have been reviewed and updated to reflect developments in nutrition and the increasing understanding of links between diet and disease.

COLLABORATE 3.5

Consider the sorts of foods you choose to eat when you are at school. List the factors that have an influence on these food choices. Compile a class list of factors. Now think about the foods that you ate when you were in primary school. Are these different? Suggest reasons why.

A range of Australian food-selection models with a similar message are available, all providing information on how to eat well. Only the presentation of the models and the complexity of the information provided vary.

Australian Dietary Guidelines

The Australian Dietary Guidelines were first published in 1979 by the Commonwealth Department of Health and have been revised several times, responding to changes in nutritional information and the needs of Australians. The most recent guidelines were released in 2013. These changes are a result of ongoing research into human nutrition and are based on evidence that has been collected and verified by multiple sources. This evidence-based information is drawn from the best available scientific evidence, including scientific journals and peer-reviewed studies.

The Australian Dietary Guidelines highlight groups of foods and lifestyle patterns that promote good health and nutrition. No guideline is considered more important than another, and together they are the best guide to food, nutrition and health. Because nutrition needs are different during the lifespan stages, this is reflected in the different dietary guidelines available.

There are five principal recommendations featured in the Australian Dietary Guidelines. Each guideline is considered to be equally important in terms of health outcomes.

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Guideline 1: To achieve and maintain a healthy weight, be physically active and choose amounts of nutritious food and drinks to meet your energy needs.

- Children and adolescents should eat sufficient nutritious foods to grow and develop normally. They should be physically active every day and their growth should be checked regularly.
- Older people should eat nutritious foods and keep physically active to help maintain muscle strength and a healthy weight.

Guideline 2: Enjoy a wide variety of nutritious foods from these five food groups every day.

- Plenty of vegetables, including different types and colours, and legumes/beans
- Fruit
- Grain (cereal) foods, mostly wholegrain and/or high fibre varieties, such as breads, cereals, rice, pasta, noodles, polenta, couscous, oats, quinoa and barley
- Lean meats and poultry, fish, eggs, tofu, nuts and seeds and legumes/beans
- Milk, yoghurt, cheese and/or their alternatives, mostly reduced fat (reduced fat milks are not suitable for children under the age of two years)

And drink plenty of water.

Guideline 3: Limit intake of foods containing saturated fat, added salt, added sugars and alcohol.

a Limit intake of foods high in saturated fat, such as many biscuits, cakes, pastries, pies, processed meats, commercial burgers, pizza, fried foods, potato chips, crisps, and other savoury snacks.
  - Replace high-fat foods that contain predominantly saturated fats such as butter, cream, cooking margarine, coconut, and palm oil, with foods that contain predominantly polyunsaturated and monounsaturated fats such as oils, spreads, nut butters/pastes and avocado.
  - Low fat diets are not suitable for children under the age of two years.

b Limit intake of foods and drinks containing added salt.
  - Read labels to choose lower sodium options among similar foods.
  - Do not add salt to foods in cooking or at the table.

c Limit intake of foods and drinks containing added sugars such as confectionary, sugar-sweetened soft drinks and cordials, fruit drinks, vitamin waters, energy and sports drinks.

d If you choose to drink alcohol, limit intake. For women who are pregnant, planning a pregnancy or breastfeeding, not drinking alcohol is the safest option.

Guideline 4: Encourage, support, and promote breastfeeding.

Guideline 5: Care for your food; prepare and store it safely.

Source: Australian Dietary Guidelines (2013). National Health and Medical Research Council, Canberra (CC BY 4.0)

ACTIVITY 3.6
USING THE AUSTRALIAN DIETARY GUIDELINES

1 Using the information in the Australian Dietary Guidelines, and what you have learned about nutrition in this chapter, copy and complete the table below to place these foods in the correct column: Vegetables and legumes/beans, starchy vegetables, refined cereals, fruits, potato chips, low-fat milk, cakes, biscuits, seafood, poultry, eggs, soft drink, alcohol, nuts and seeds, chocolate.

Eat more	Eat less

2 For each of the foods in the 'Eat more' list above, name the nutrients it contains.

3 Find three recipes that could be included in the diet of a young adult to ensure that they eat these foods.

4 Consider the list of foods of which Australians need to eat less. Outline the diet-related diseases that are associated with these foods.

5 Prepare a meal plan for an adult for one week that ensures that they do not consume these foods.

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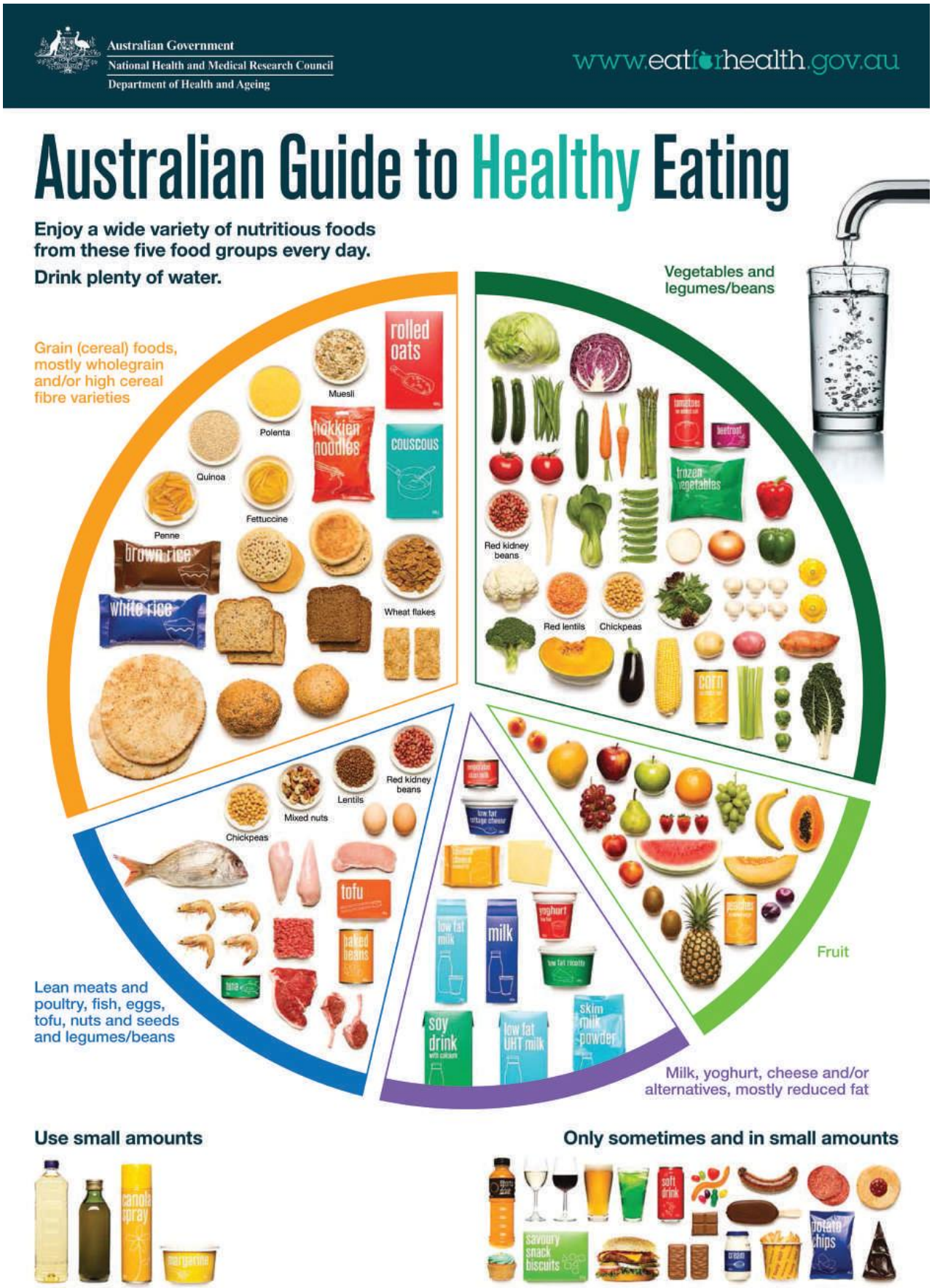

Figure 3.5 The Australian Guide to Healthy Eating

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Australian Guide to Healthy Eating

The Australian Guide to Healthy Eating was introduced in 1999 and revised in 2013. It is a practical guide for food selection; a simple visual that was designed to make remembering and implementing good food choices easier. It was developed to encourage the consumption of a variety of foods from the five food groups listed in the Australian Dietary Guidelines every day; the size of each segment represents the amount that should be consumed. The foods illustrated in the guide are the most commonly eaten foods from each section by Australians.

Foods not in the circle

Some foods do not fit into the five food groups. These foods do not contain essential nutrients but contribute to the enjoyment of eating. These foods typically contribute a large amount of energy. The inclusion of these foods in the guide allows consumers to consider these foods in their selection of a healthy eating pattern but illustrates that they should not be consumed daily or in large amounts.

COLLABORATE 3.7

Water is also left out of the circle used in the Australian Guide to Heathy Eating; however, as we have found out, it is not only essential but the preferred healthy beverage. Discuss why it is placed outside the circle.

ACTIVITY 3.8
FOOD GROUPS

1 Identify each of the five food groups in the Australian Guide to Healthy Eating.
2 Write down all the foods illustrated for each group. Hint: there are over 30!
3 Identify the foods not in the circle and write down the food group to which they belong. Explain why these foods are not included in the circle.
4 Think about the foods you have eaten today. Do the types and proportions match those given in the circle? What might you have to change to make your diet today meet these guidelines?

EXTENSION

5 If a person follows the Australian Guide to Healthy Eating when planning their food intake, it provides an excellent outline for sustainable food choices. Explain.

DESIGN BRIEF: RECIPE SELECTION

1 Work in a group of three to find at least five recipes each that promote the healthy eating messages contained in one of the food-selection guides discussed in this chapter.
2 Spread the 15 recipes out on the table and rank the recipes from 1 to 15 (with 1 being the best recipe), according to their ability to promote the message of the food-selection guides.
3 Make a group decision about the best recipe – consensus must be reached, ensuring the recipe can be made in time in class.
4 Prepare a food order for your teacher.
5 Prepare the recipe in class time.
6 Reflect on your decision-making process once you have taste-tested your food item.
7 Describe your thoughts about the ability of the group to reach a consensus, the overall cooperation of all group members and the taste and suitability of your food item.

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RICE FLOUR PANCAKES WITH BANANA

Makes 10 small pancakes
Main tools and equipment Bowl, wooden spoon, whisk, measuring spoons, measuring jug, knife, ladle, frying pan
Production skills Whisk, slice, mix, measure, ladle
Cooking processes Fry

Preparation time 30 minutes (including 15 minutes resting)
Cooking time 20 minutes
Serving and presentation time 5 minutes
Total time 55 minutes

INGREDIENTS

- 1 egg
- 125 ml soy milk
- 1 teaspoon vanilla extract
- 3 tablespoons caster sugar
- 1 cup brown rice flour
- 2 teaspoons baking powder
- ½ banana, sliced
- A little oil for cooking

METHOD

1. Whisk liquid ingredients together with caster sugar.
2. Add the dry ingredients to the liquid mixture and mix until smooth. Add sliced bananas, stirring gently to combine. Leave the batter for at least 15 minutes before cooking, longer if possible.
3. Heat a non-stick frying pan on medium heat, add a little oil and smear it around with a pastry brush.
4. Ladle about ¼ cup of the batter into the pan and cook gently until bubbles start to rise and pop on the surface, approximately 2 minutes.
5. Flip the pancake and cook for a further 1 minute, or until the bottom is golden brown.
6. Serve with yoghurt and drizzle with honey or maple syrup if desired.

EVALUATION

1. List the aspects of the recipe you found difficult.
2. Explain how you could improve your cooking, including your organisation, if you were to make these pancakes again.
3. Complete a sensory analysis of your brown rice flour pancake.
4. Using the Australian Dietary Guidelines, evaluate how well this recipe meets its recommendations.
5. What other recipes might be suitable for breakfast that meet the Australian Dietary Guidelines? Justify your answer.

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DESIGN BRIEF: EATING BETTER

Most of Australians' diet disorders relate to overnutrition – having too much fat, sugar and salt in their diets. However, there is some concern that young people, especially athletes and women, do not consume enough iron to satisfy their dietary needs. The local athletics club is going on a 'boot camp' with their adolescent members, and you have been charged with planning and making a dinner-time meal that meets the recommendations made by the Australian Guide to Healthy Eating, with special emphasis on ensuring the iron content of the meal is high. It must be a meal that is delicious, appeals to adolescents and is able to be made in one hour.

INVESTIGATE

1. Investigate foods that are high in iron, and meals that are suitable for an athlete. You will need to research the food-selection model and at least three possible recipes that may meet the brief. Remember to document your research as you go.
2. Write three criteria for success questions to help you evaluate the meal you plan to make.
3. Choose the meal you plan to make and submit a food order to your teacher.
4. Make the meal. As you cook, take note of any changes or improvements you would make should you make the meal again.

EVALUATE

1. Complete a detailed sensory analysis of the meal.
2. Evaluate your meal using your criteria for success to make sure you have met the brief successfully.
3. Plot your meal onto a copy of the Australian Guide to Healthy Eating. Does it meet the recommendations of the model? Mark the foods that are high in iron. Have you met the requirements for iron content?

LEARNING REFLECTION

1. List the five guidelines given in the Australian Dietary Guidelines.
2. Explain why the Australian Dietary Guidelines were developed.
3. Explain how the Australian Dietary Guidelines are evidence based.

3.5 Good food and healthy life

LEARNING INTENTIONS

1. To understand what a healthy lifestyle incorporates.
2. To develop skills in data interpretation.

Food selection models have been developed to have a positive impact on the health of Australians, as many of the poor health outcomes suffered by Australians can be in part traced back to a poor diet. Research suggests that diet plays an integral role in the prevention of disease and can be a major factor in reducing your chance of experiencing poor health. Overall, Australians are healthy, with most Australians stating they are experiencing good levels of health and wellbeing.

The lifestyle habits, practices and values that you develop today, together with food intake and exercise, can influence your health now and in later years.

Good food choice is important because it can:

- control your weight
- improve your cholesterol levels
- control your blood glucose levels
- reduce your risk of dietary-related diseases, such as some cancers, cardiovascular disease and type 2 diabetes
- protect against weak and brittle bones
- improve your general health and wellbeing.

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Figure 3.6 Most Australians have very good health.

ACTIVITY 3.9
LEADING CAUSES OF DEATH

Use the table in Figure 3.7 to answer the following questions.

1. Identify the top two leading causes of deaths for each age group.
2. Identify what you think are the top five major health concerns for Australians.
3. Highlight any causes of death that you believe diet contributes to or for which diet is a protective factor.
4. Discuss the age at which you believe it is important to eat for health and the prevention or reduction of the incidence of diet-related diseases.
5. Consider the Australian Dietary Guidelines and the table. Explain why the guidelines recommend increasing the intake of certain foods and limiting the intake of others.

Age group (years)	Rank 1st	2nd	3rd	4th	5th
Under 1	Perinatal and congenital condidtions	Other ill-defined causes	Sundden infant death syndrome	Accidental threats to breathing	Selected metabolic disordres
1–14	Land transport accidents	Perinatal and congenital conditions	Brain cancer	Othe ill-defined causes	Suicide
15–24	Suicide	Land transport accidents	Accidental poisoning	Other ill-defined causes	Assault
25–44	Suicide	Accidental poisoning	Land transport accidents	Coronary heart disease	Other ill-defined causes
45–64	Coronary heart disease	Lung cancer	Suicide	Colorectal cancer	Breast cancer
65–74	Lung cancer	Coronary heart disease	Chronic obstructive pulmonary disease	Colorectal cancer	Cerebrovascular disease
75–84	Coronary heart disease	Dementia incl. Alzheimer's disease	Lung cancer	Cerebrovascular disease	Chronic obstructive pulmonary disease
85 and over	Dementia incl. Alzheimer's disease	Cerebrovascular disease	Cerebrovascular disease	Chronic obstructive pulmonary disease	Heart failure

Heart failure = Heart failure and complications and ill-defined heart disease

Source: AIHW National Mortality Database (Table S3.2).

Figure 3.7 Leading underlying causes of death in Australia, by age group, 2018–2020

LEARNING REFLECTION

1. How does a person's diet and their health relate to each other? In your description, provide examples to show how good diet can have positive health outcomes.

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3.6 Obesity

LEARNING INTENTIONS

1 To define obesity and understand why it is on the increase.
2 To develop an understanding of the impact obesity can have on health.
3 To develop skills in planning food intake that helps prevent and manage obesity.

overweight Having a body mass index over 25

obesity Having a body mass index of 30 or over; being 20 per cent or more above the person's ideal weight according to their height and sex

hypertension Persistently elevated blood pressure

Over the last few decades, the prevalence of **overweight** people and **obesity** has increased significantly. Obesity is a major concern because it increases the risk of many chronic diseases, such as heart disease, stroke, **hypertension** and diabetes. More concerning is the increasing rate of childhood obesity.

TASTY TRIVIA

Childhood obesity is associated with a higher chance of premature death and chronic diseases in adulthood, as well as social problems, such as bullying and low self-esteem, during childhood and adolescence.

COLLABORATE 3.10

Can you think of any fast-food outlets that encourage the consumer to 'upsize' their meals? What strategies (if any) do they use? (Think about price, for example.) In 1991 Kentucky Fried Chicken changed their name to KFC. Suggest reasons for this change in branding of the company. Discuss with your partner any other changes you have seen in the menus of fast-food companies to meet consumer demand. Are any of these changes due to a growing health consciousness?

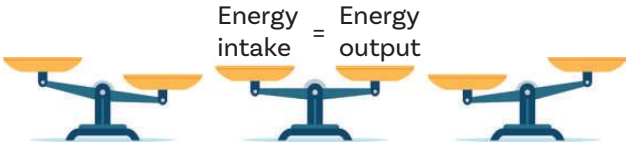

Figure 3.8 Obesity is a long-term imbalance. If energy intake is greater than energy output, excess food energy is stored in the body as fat and body weight increases. Which of these scales shows energy intake exceeding energy output?

Obesity is defined using the body mass index (BMI). BMI is an approximate measurement of total body fat. The following equation is only suitable for adults whose bodies have finished growing. Figure 3.8 includes a scale to understand the BMI measurement. Adult BMI is calculated using the following equation:

$$\text{BMI} = \frac{\text{weight(kg)}}{\text{height(m)}^2}$$

Reducing obesity risk

Obesity can largely be prevented through lifestyle changes to achieve energy balance. Foods that reduce the risk of obesity include those high in **fibre**. It is very difficult to gain weight if low energy foods such as fresh vegetables, fruits and wholegrain foods are being consumed every day.

fibre Nutrients that cannot be digested by humans and therefore don't contribute to energy input, but are important to gut health

TASTY TRIVIA

In the 1960s, a typical dinner plate size was 25 centimetres in diameter. Now it is 30 centimetres. Try measuring your plate in the kitchen and compare it with any old-fashioned plates your parents or grandparents might have.

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Figure 3.9 Body mass index (BMI) for adults

Changes you can make for good health and to prevent obesity include the following.

- Increase physical activity and incidental exercise – be active every day.
- Replace soft drinks with water.
- Be aware of your portion size.
- Limit energy from fats, especially saturated and trans fats.
- Eat fresh fruits and vegetables.
- Choose foods high in fibre to fill you up for longer.
- Watch for mindless eating – only eat when you are hungry, not when you are bored or feeling emotional.
- Plan your meals and follow the recommendations in the Australian Dietary Guidelines.

COLLABORATE 3.11

List different foods someone may eat in a 'mindless' way. In a group, compare your lists and discuss the following questions. Is there a pattern to this eating? Why might someone turn to food when they are feeling emotional or bored? What strategies might someone employ to help remind them not to eat mindlessly?

Figure 3.10 Mindless eating should be avoided to help prevent obesity.

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ACTIVITY 3.12
LIFESTYLE CHOICES

1 Explain how each of the listed factors on the previous page helps prevent or reduce obesity.
2 List 10 ways you could increase your incidental exercise every day, for example, walk up the steps instead of taking the escalator.
3 Add any other change ideas that you can think of that may help educate people on making good lifestyle choices for health.

DESIGN BRIEF: HEALTHY FAKE-AWAY

When COVID-19 lockdowns occurred, your family did not use take-away food outlets. This habit has led to the family having a 'fake-away' meal once a week to replace the take-away meal they had before. It is your turn this week to provide the fake-away meal and, in the tradition of pre-COVID times, you are going to make a healthy version of your favourite take-away meal at home.

INVESTIGATE
1 Investigate the menu of your favourite fast-food restaurant and list the foods most bought from this by you and your family.
2 Research alternative recipes and healthy ingredients that you could use in your own fake-away meal.
3 Think about how you will present your meal so it best reflects its 'take-away' origins.

PLAN AND MANAGE
1 Prepare your food order for the meal.
2 Complete a work plan to ensure your production lesson runs smoothly and your meal components are all ready to serve at one time.

LEARNING REFLECTION
1 Define the term 'obesity'.
2 Obesity has been identified as a National Health Priority Area in Australia. Explain why this dietary disease has been identified.
3 List the foods that should be reduced or avoided to prevent obesity. Describe the reasons why this is so for each food.
4 Explain the term 'energy balance'.
5 Provide your top five tips or strategies for helping people to lose weight.

3.7 Cardiovascular disease

LEARNING INTENTIONS
1 To understand what cardiovascular disease is and what causes it.
2 To understand the role poor dietary choices play in the prevention of cardiovascular disease.

Cardiovascular disease (CVD) is the leading cause of death in Australia. The majority of these deaths are largely preventable, and the most important consideration in preventing heart disease is what you eat. People who are obese or overweight, or who are suffering *hypertension*, are more likely to suffer CVD.

cardiovascular disease A class of disease that affects the heart and blood vessels

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plaque A fatty deposit on the inner wall of an artery

atherosclerosis Narrowing of the arteries due to the deposit of fatty plaques on artery walls

cholesterol A waxy, fat-like substance used by the body to stabilise cell membranes, either produced in the liver or absorbed from animal fats eaten. It is necessary for good health; however, excess levels are detrimental.

angina Chest pain caused by insufficient flow of blood and oxygen to the heart

stroke Damage to the brain caused by interrupted blood flow due to a blood clot blocking or partially blocking an artery

What is heart disease?

Coronary heart disease is a form of CVD that is characterised by a narrowing of the arteries caused by a build-up of **plaque** in your arteries. This is commonly known as **atherosclerosis**. Plaque is made up of fat, **cholesterol**, calcium and other substances found in your blood. Plaque clings to and clogs artery walls, and blood clots are more likely to form. A blood clot then blocks an artery, causing a heart attack. This prevents blood flow and oxygen supply to the heart, resulting in damage or death to the heart cells.

Angina occurs periodically when the heart has temporary deficiencies in its blood supply. Reducing your saturated fat intake will reduce your chance of clogged arteries.

Blocked blood supply to the brain causes a **stroke**.

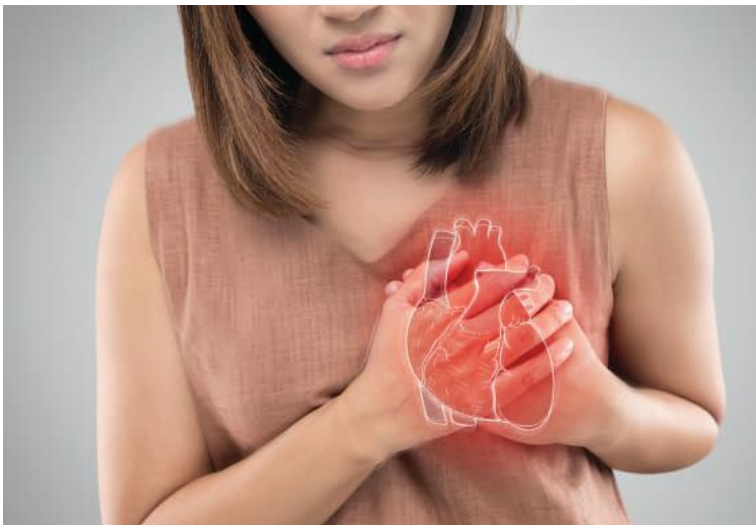
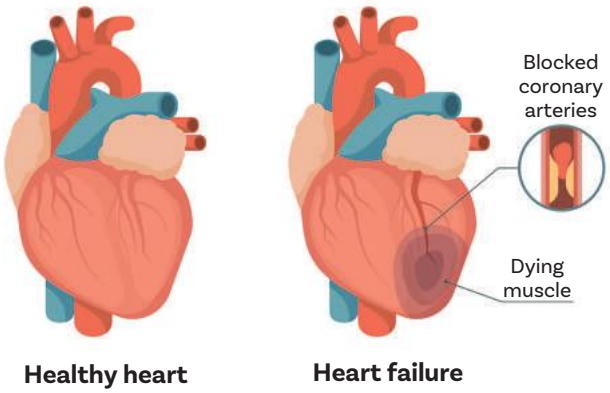


Figure 3.12 A heart attack and angina are both related to insufficient blood being provided to the heart muscle.

Foods for heart health

One of the most important considerations in preventing or reducing the risk of heart disease is a diet low in saturated and trans fats. Not only does a diet high in both saturated and trans fats increase your chance of obesity, but it also increases cholesterol, leading to CVD.

There is evidence supporting a link between food products and a decrease in heart disease. Polyunsaturated and monounsaturated fats, as well as wholegrain cereals and plant foods, lower the risk of heart attacks because they help to lower cholesterol levels.



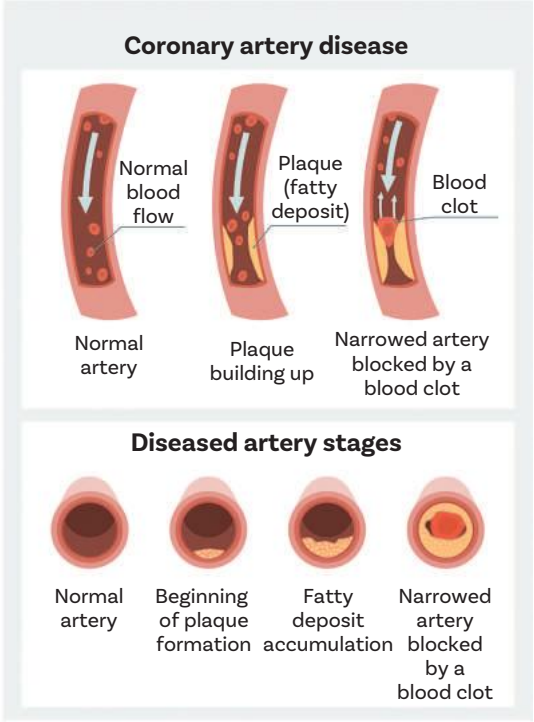


Figure 3.11 Atherosclerosis is the narrowing of the arteries.

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Table 3.2 These foods can help reduce the risk of heart disease.

Recommended heart healthy foods	
Oily fish, which contains omega-3 fatty acids and helps to lower cholesterol and thin blood	
Fruits, which contain antioxidants and offer protection against heart disease	
Wholegrain cereals, which are high in fibre, low in fat and have no cholesterol	
Legumes, which are high in fibre, and soy proteins, which have been shown to lower cholesterol	
Antioxidants, which are found in large quantities in tea, especially green tea, may reduce the build-up of fatty deposits in arteries	

antioxidants Substances, such as vitamins C and E, thought to help fight free radicals in the body that can cause disease

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Table 3.3 Foods to limit when reducing intake of saturated and trans fats.

Foods high in saturated fats		Foods containing trans fats	
Fatty meats		Commercially prepared cakes and biscuits	
Full cream dairy		Margarine	
Butter		Baked goods like pies and sausage rolls	
Coconut and palm oil		Fried foods	
Fried takeaway		Some microwave popcorns	

INVESTIGATE 3.13

The benefits of lowering cholesterol in your diet for improved health are firmly established. As a result, food manufacturers are creating more heart healthy foods or new functional foods. Flora's Proactive range is an example of a food product that has been developed to improve health. Visit the Flora website to learn more about this product and answer the following questions:

1. Describe what plant sterols are.
2. Outline the stated health benefits of Flora Proactive.
3. Name the target market for which this product has been developed.
4. Identify the active ingredient in Flora Proactive that is proven to lower cholesterol and state where it comes from.
5. Explain how the plant sterols in Flora Proactive work.
6. List the other products available in the Proactive range.
7. Do you want to make the switch to Proactive? Explain your response.

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LEARNING REFLECTION

1 Explain what cholesterol is and its role in CVD.
2 Describe the benefits of eating oily fish.
3 List some of the foods that contain trans fats.
4 Outline three risk factors for CVD and explain how they can be prevented.
5 Discuss the reasons why CVD is the leading cause of death in Australia.

3.8 Type 2 diabetes

LEARNING INTENTIONS

1 To develop an understanding of the causes of diabetes.
2 To develop skills in planning food intake that helps manage and/or prevent the onset of diabetes.

diabetes A group of different conditions characterised by too much glucose in the blood

glucose A simple sugar energy source produced by plants along with fructose

Diabetes is the fastest-growing chronic disease in the world, with two people being diagnosed and one person dying from diabetes-related causes every 10 seconds. Diabetes is also Australia's fastest-growing chronic disease, with approximately 280 Australians developing diabetes every day.

What is diabetes mellitus?

Diabetes mellitus is a condition in which the body is unable to maintain normal blood **glucose** levels. For our bodies to function properly, we need insulin, which is produced by the pancreas. Insulin controls the uptake of glucose from the blood into body cells. People with diabetes experience problems with insulin production or function, so when they consume products containing glucose, such as breads, fruits, dairy products and sugary foods, the body is unable to convert the glucose to energy. If untreated, high blood glucose levels can cause kidney damage, eye damage, nerve damage to the feet and other body parts (sometimes resulting in the need for amputation) and heart disease.

There are two main types of diabetes: type 1 and type 2. Both have similar effects on the body, but the cause of each is quite different. Type 1 is an autoimmune disease that stops the pancreas from producing enough insulin, and can only be managed medically. Type 2 is when body cells become resistant to insulin, due to a high glucose diet being sustained for long periods. It can be managed to some degree by lifestyle and dietary management. Risk factors for type 2 diabetes include a family history of diabetes, physical inactivity, unhealthy diet and excess body weight, especially around the waist. People from some Asian, Pacific Islander, and Aboriginal and Torres Strait Islander populations are at higher risk of type 2 diabetes.

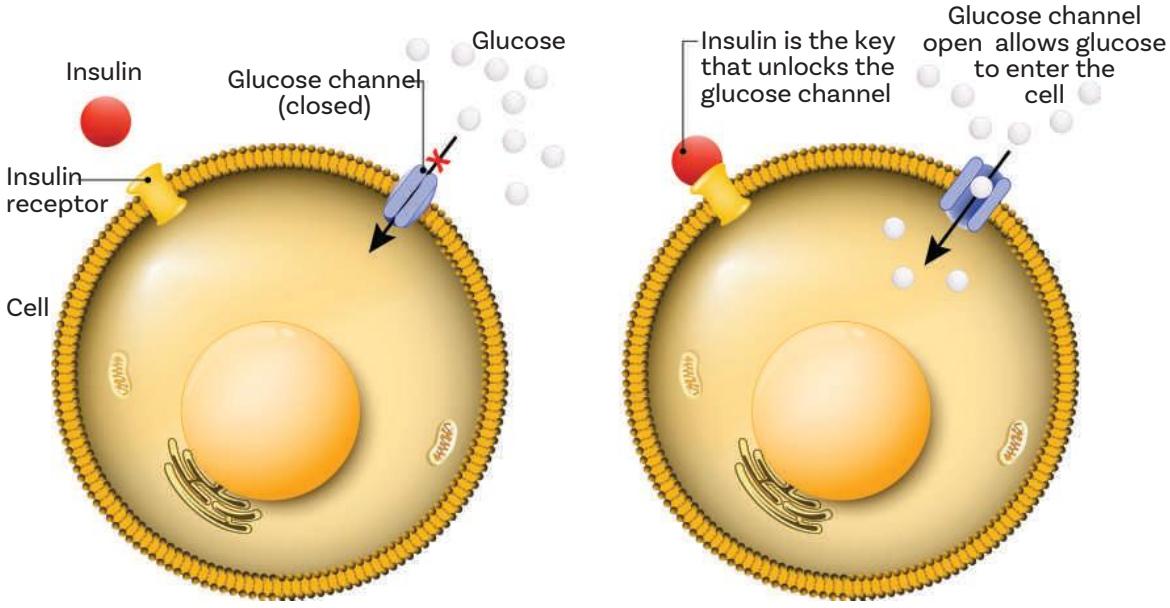

Figure 3.13 Insulin acts as a key that allows glucose to enter a cell. If there is insufficient insulin, then glucose will remain in the bloodstream and blood sugar levels will increase.

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Figure 3.14 Type 2 diabetes can be managed with a combination of regular physical activity, healthy eating and weight reduction; however, medication may also be required.

What should be eaten?

Type 2 diabetes is related directly to diet, and up to 60 per cent of type 2 diabetes cases can be prevented. It is recommended that people with type 2 diabetes eat:

- regular meals spread evenly throughout the day
- mostly vegetables, legumes, wholegrain cereals, and fruit in moderation
- meals low in saturated fat
- foods with no added sugar
- foods that have a low **glycaemic index**
- less processed and packaged foods.

glycaemic index The ranking of carbohydrates according to their effect on our blood glucose levels. A low GI means the food raises blood sugar levels slowly.

DESIGN BRIEF: TREATS COOKBOOK

You are redesigning a 'treats' cookbook that is suitable for people who have type 2 diabetes, and have been given the list above detailing recommended foods to guide you in your planning. Develop a recipe that could be included in this recipe book for a dish that could be a treat.

LEARNING REFLECTION

1 Define type 2 diabetes. Describe how it is similar to and different from type 1 diabetes.
2 Explain why just avoiding sugar is not enough in the management of diabetes.
3 Describe the role of insulin in the body.
4 Suggest why diabetes is the world's fastest-growing chronic disease.
5 Design a day's menu for a type 2 diabetic and explain each of your food choices.

3.9 Cancer

LEARNING INTENTIONS

1 To develop an understanding of the link between our food intake and cancers, particularly bowel cancer.
2 To be able to identify foods that are low in fibre, and how to substitute these for higher fibre options when planning healthy meals.

Cancer is a major cause of death in Australia. Current research suggests that there is a link between the foods we consume and our risk of developing certain cancers.

What is cancer?

Cancer is a disease of the body's cells. It develops when normal body cells divide in an uncontrolled (malignant) way. This abnormal cell division may turn into cancer and can occur anywhere in the body. If the cancer cells continue to divide uncontrollably, they can cause the affected organ to no longer function properly. Cancer can occur in almost any tissue in the body.

Bowel cancer

Bowel cancer, also known as colorectal cancer, is the fourth most common cancer in the world and the second most common in Australia. To reduce the risk of developing bowel cancer, it is recommended that we should aim for a healthy weight; be physically active; increase our consumption of dietary fibre, especially resistant starch; eat wholegrain cereals and vegetables; and reduce consumption of red meats, especially processed meats.

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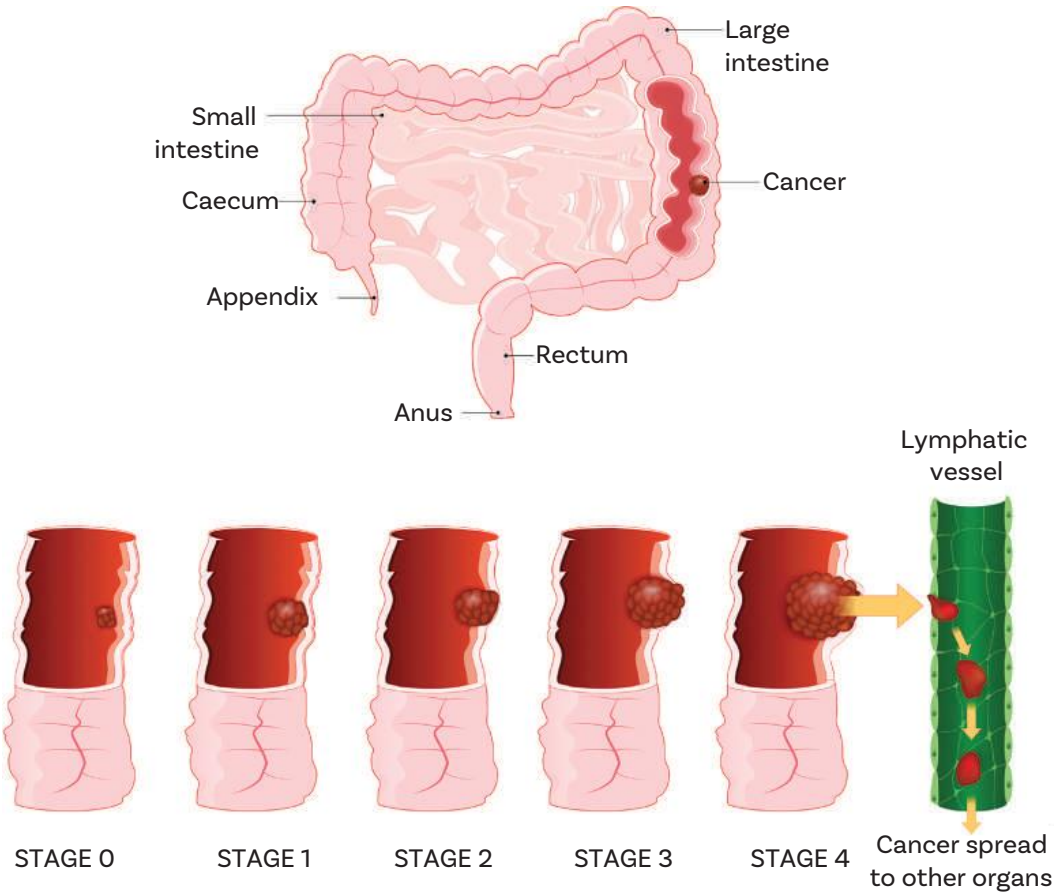

Figure 3.15 Bowel cancer can occur in any part of the large intestine, including the rectum, and can spread to other parts of the body through blood vessels or lymphatic vessels.

Figure 3.16 Dietary sources of resistant starch are thought to be a protective factor for bowel cancer.

ACTIVITY 3.14
BOWEL CANCER AWARENESS

Research bowel cancer online and create an educational pamphlet to spread awareness of this disease. Include in your pamphlet some statistics about bowel cancer, risk factors and ways to help prevent it.

TASTY TRIVIA

Each Australian between the ages of 50 and 74 is sent a free bowel screening kit every two years, which can be done at home. This program is expected to save 470 lives over the next 50 years and save $46 million in direct health care between now and 2070.

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Foods for fibre

Bowel cancer is one of the most curable cancers if it is found early. You can lower your risk with a healthy diet and regular physical exercise. One key recommendation to reduce risk is to consume a high-fibre diet.

Choose multigrain or wholemeal breads, pastas and cereal products. Start your day with a high-fibre breakfast cereal (check the nutritional panel). Eat fresh fruits and vegetables with the skin, rather than drinking juices. Include legumes in salads, soups and pasta dishes. Read product labels and look for fibre.

Figure 3.17 Consumption of a diet high in fibre is a protective factor for bowel cancer.

ACTIVITY 3.15
HIGH-FIBRE

1 Fibre is not only a risk reducer for bowel cancer but can be valuable in maintaining general health and reducing the risk of other diet-related illnesses. Copy and complete the following table, providing a high-fibre alternative to those listed.

Food	High-fibre alternative
Apple juice	
Pasta	
Hot chips	
Basmati rice	
Pasta-based lasagne	
Chocolate	
Rice bubbles	
Mashed potatoes	
Plain sweet biscuit	
Peeled kiwi	

2 Now, come up with 10 more high-fibre examples to increase the fibre intake in your diet.

LEARNING REFLECTION

1 Explain why it is important to reduce the amount of saturated fats in your diet.
2 List five foods that are high in saturated fat.
3 Outline the nutritional recommendations addressing bowel cancer.
4 Bowel cancer is a leading cause of death in Australia. Discuss why this might be the case.
5 Describe one disadvantage of a high-fibre diet.

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3.10 Osteoporosis

LEARNING INTENTIONS

1 To understand the incidence of and the causes of osteoporosis.
2 To understand the link between diet and osteoporosis.
3 To develop skills in designing and producing foods that can provide some protection from osteoporosis.

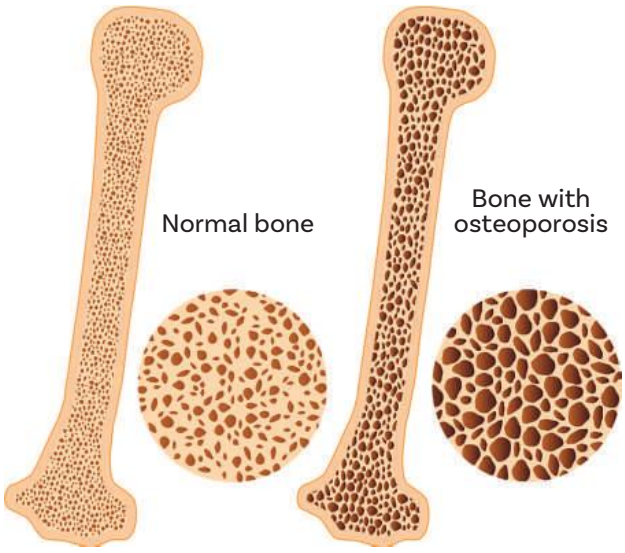

Figure 3.18 Osteoporosis causes weaker bones that break more easily, muscle weakness, loss of height, chronic pain and premature death.

osteoporosis A condition where bone density decreases to such a state that bones become fragile and brittle, leading to a high risk of fractures

peak bone mass When the body contains the greatest amount of bone

Osteoporosis is often considered to be a disease of old age, but since **peak bone mass** is achieved by the age of 30, your diet and lifestyle determine your risk of developing osteoporosis as you age. Osteoporosis has no symptoms and is only diagnosed when a fracture occurs, often later in life. Are you getting enough calcium?

Over one million Australians are thought to have osteoporosis disease, and 20 per cent of people aged 75 years and over have an osteoporosis-related condition. Almost three times more women than men have osteoporosis.

Foods for strong bones

Our bodies cannot make calcium, so it needs to be supplied through food. The following foods are some of those that supply the body with calcium:

- cheese and other dairy products
- sardines (especially the very fine bones)
- spinach (dark-green leafy vegetables)
- almonds.

The body also requires an adequate intake of vitamin D to help absorb the calcium we eat in our diet. This can be obtained from the diet but is also made in the skin when it is exposed to sunlight.

Factors affecting absorption of calcium

The following factors can reduce the absorption of calcium by the body:

- caffeine
- smoking
- salt
- alcohol.

INVESTIGATE 3.16

How good is your bone health? Visit the Healthy Bones Australia website and do their online test to find out. As you do it, take note of the risk factors they ask about.

DESIGN BRIEF: BREAKFAST 'ON THE RUN'

Early on in this chapter, you looked at the foods that were high in calcium and vitamin D. Design a breakfast that could be eaten by a teenager 'on the run' that is high in both calcium and vitamin D. The breakfast needs to be able to be eaten in the hands and be tasty and appealing to a teenager.

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HIGH-CALCIUM BREAKFAST BLISS BOMBS

Serves 2 generously
Main tools and equipment Food processor, knife, measuring cups and spoons
Production skills Combine, roll

Preparation time 20 minutes
Serving and presentation time 5 minutes
Total time 25 minutes

INGREDIENTS

- ¼ cup plus 3 tablespoons sesame seeds
- ½ cup whole almonds
- ½ cup dried apricots
- ½ cup dates
- 4—5 tablespoons almond, or other, nut butter
- ¼ teaspoon cinnamon
- ¼ teaspoon ground ginger
- 1 teaspoon vanilla extract

METHOD

1. Place ¼ cup of sesame seeds in a shallow bowl and set aside.
2. Place almonds, apricots, dates, nut butter, 3 tablespoons sesame seeds, spices and vanilla extract in a food processer and blitz on high speed until the ingredients are combined well. It may look dry, but it will hold together.
3. Roll tablespoons of the mixture into balls. If the mixture is too dry, or sticks to your hands, wet your hands.
4. Roll the balls into the sesame seeds to coat.
5. Store in the refrigerator or freeze.

EVALUATION

1. Complete a nutritional analysis of the high-calcium breakfast bliss balls at the Verywell Fit website.
2. Complete a sensory evaluation of the food.
3. Suggest modifications or additions to the recipe to change its flavour profile.
4. Why is it important that breakfast be consumed, especially for adolescents?
5. Why might a recipe like this, that can be eaten on the run, be a good alternative for an adolescent for breakfast?

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DESIGN BRIEF: SMORGASBORD LUNCHEON

Your class are going to cater for a smorgasbord luncheon for a support group for one of the diet-related diseases you have studied in this chapter. This support group meets at your school monthly. As a class, decide which of the diseases you will be catering for.
Start by writing a design brief as a class by asking the What? Where? When? Why? Who? How Much? questions. Don't forget that you will need to include considerations and constraints in your design brief.

INVESTIGATE

1 Research the necessary requirements for your brief, including suitable and unsuitable foods for the chosen disease.
2 Write three criteria for success questions, using the constraints and considerations you developed.
3 Investigate what other students in the class are making so there is a good mix of dishes.

GENERATE

1 Generate different dish options that you could make that would be suitable. Ensure you collaborate with the rest of the class, who are making different dishes.
2 Choose the one you will be making and justify why you chose it.
3 Using a computer-generated mind-map program, model and annotate your chosen dish.

PLAN AND MANAGE

1 Determine the dishes being prepared by the whole class.
2 Prepare a food order for your product.
3 Prepare a production plan for your food.

PRODUCE

1 In your practical class, produce your smorgasbord dish and present it along with the dishes of others in your class.
2 During the production, take note of any changes you have made or improvements you wish to make to assist you during the evaluation stage.

EVALUATE

1 Complete a sensory analysis of your dish.
2 Answer the criteria for success questions you set.
3 Discuss any modifications or improvements you would make to your dish should you make it again. Outline how you felt you performed during the planning and production stages.
4 Outline how effective the collaboration and final production was within the whole class. Were there any changes that would have made the final product work better together?

LEARNING REFLECTION

1 Outline the important factors in calcium absorption.
2 Describe what causes osteoporosis.
3 Explain what people can do to reduce their risk of osteoporosis.
4 List five good food sources of calcium.
5 Discuss why osteoporosis is considered an old person's disease, when really it should not be.

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3.11 Refuelling our bodies

LEARNING INTENTIONS

1 To understand how our body converts food into what it needs.
2 To develop skills in designing meals that meet the body's needs.

We know that food and water are basic human needs, and we cannot survive for a long period without either. The body is a complex and amazing system. It knows when it needs to be refuelled, so this is why we feel hungry at various times throughout the day.

A specialised structure called the **hypothalamus** monitors the nutrient levels in our bloodstream and coordinates signalling processes that create feelings of **hunger** or thirst when nutrient levels fall below what the body needs to function. However, the body is not able to tell us what it needs or what to eat; this is a decision we make for ourselves based on a number of factors, including our **appetite**.

hypothalamus The central area in the brain that controls involuntary functions

hunger The feeling of emptiness in the stomach; your body's signal that it needs food

appetite The desire or need for food

Figure 3.19 Our body will tell us when we need to refuel so it's important to listen to it!

The digestive system

When foods are eaten, the body breaks the food down into a form that it can absorb and digest. A number of organs are responsible for digesting, absorbing and metabolising your food to provide the energy and nutrition your body needs. These make up the digestive system (see Figure 3.20 on the following page).

TASTY TRIVIA

The surface area of the small intestine has been estimated to be about 32 m^2, about half the size of a badminton court.

ACTIVITY 3.17
DIGESTION

1 Find a recipe that includes all the main food groups.
2 Develop a graphical representation of the digestive system and annotate on it where each of the main food groups is digested and absorbed. You may use a software program to help you present it.

TASTY TRIVIA

The small intestine of an adult is about 6.7 metres in length.

LEARNING REFLECTION

1 Explain how the body lets us know we are hungry.
2 List the organs involved in the digestion of food. How does the liver contribute to the digestive system?
3 Name the substance released by the pancreas. Explain the function of this in the body.
4 Describe the role of saliva in the digestion of food.
5 Prepare a summary chart showing where each nutrient is digested and absorbed.

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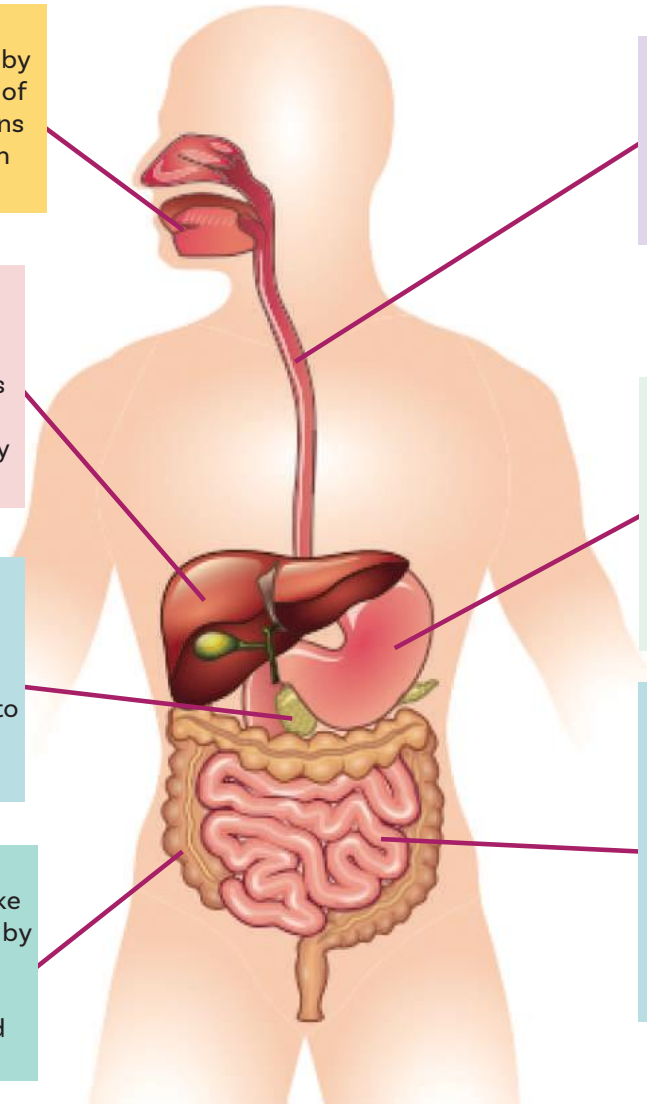
Mouth
Saliva release is stimulated by the aroma and appearance of food. Salivary amylase begins to digest cooked starches in the food.

Liver
Filters the blood, removing toxins. Processes carbohydrates and proteins and breaks down fats. Produces short-term energy requirements for the body.

Pancreas
Produces enzymes and feeds them into the small intestine. Also produces insulin, which is released into the bloodstream to help regulate blood sugar levels.

Large intestine
Final stages of digestion take place. Fibre is broken down by bacteria. Water is absorbed from the food. Any undigested fibre is excreted as faeces from the rectum.



Oesophagus
Tube taking chewed food from the mouth to the stomach. Regular muscular contractions push the food down to the stomach.

Stomach
Food is now at body temperature, fats melt and mix with gastric juices. Pepsin starts to break down proteins. Small amounts of water-soluble vitamins and glucose are absorbed into the bloodstream.

Small intestine
Protease breaks down proteins into amino acids, amylase breaks down carbohydrates into glucose and lipase breaks down fats into fatty acids which are small enough to be absorbed into the bloodstream by the small intestine, along with most other nutrients.

Figure 3.20 The human digestive system

DESIGN BRIEF: LAMB BACKSTRAP

Lamb backstrap is a very lean and tender meat which incorporates many of the nutrients discussed in this chapter. Design your own delicious and nutritious meal based on lamb backstrap and give it an appealing name. A sample recipe – Moroccan-style lamb backstrap – is included to get you started.

1. List the nutrients that you need to include in your meal and possible food sources.
2. Investigate the different flavouring ingredients you could use.
3. Choose your preferred solution and justify your choice. Make sure your choice reflects the design brief specifications.
4. Complete a nutritional analysis of the meal idea. Visit the Verywell Fit website to input the information for your meal and the program will analyse the nutrition information for you.
5. Produce your meal.
6. Complete a sensory evaluation of your meal. How could you change your meal to better meet the nutritional and sensory properties?

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MOROCCAN-STYLE LAMB BACKSTRAP

Serves 2
Main tools and equipment Bowl, spoon, knife, frying pan, measuring spoons, scales, paper towel, plates
Production skills Combine, fluff, heat, fry, arrange, slice, serve, rest
Cooking processes Fry, boil

Preparation time 20 minutes
Cooking time 20 minutes
Serving and presentation time 5–10 minutes
Total time 45–50 minutes

Skill demonstration: How to rest meat

INGREDIENTS

- 3 sprigs of flat leaf parsley, chopped
- 1 sprig of chopped coriander, chopped
- 1 garlic clove, crushed
- ½ teaspoon harissa
- ¼ teaspoon dried thyme
- 2 tablespoons olive oil
- 1 tablespoon lemon juice
- ½ teaspoon ground cumin
- ⅓ lamb backstrap
- salt and pepper to season

SALAD AND DRESSING

- 25 g couscous
- 1 teaspoon harissa
- 2 tablespoons olive oil
- 1 teaspoon lime juice
- 3 sprigs of coriander, plus 3 whole leaves to serve
- 3 sprigs of mint
- 25 g blanched almonds, whole
- 2 lettuce leaves
- 2 spring onions, thinly sliced on an angle

METHOD

1. To make the marinade: combine parsley, coriander, garlic, harissa, thyme, olive oil, lemon juice and cumin in a bowl. Add the lamb and turn to coat. Chill until ready to use.
2. Place the couscous in a heatproof bowl, pour over 30 ml boiling water, cover and set aside for 5 minutes, then fluff it up with a fork. Cool.
3. To make the dressing: combine harissa, 1 tablespoon olive oil, lime juice, chopped coriander and mint. Season and set aside.
4. Heat remaining oil in a small frying pan over medium-high heat to toast almonds. Cook almonds for 1–2 minutes, turning regularly until they turn golden. Drain on paper towel.
5. Preheat the frying pan once more (the oil left over from the almonds will suffice). Generously season the lamb and cook for 2–3 minutes each side for medium cooked lamb, or cook to your liking. Remove the lamb from the pan and rest for 5 minutes.
6. Arrange the lettuce on two plates, divide the couscous and almonds between them, and drizzle with the dressing. Scatter with extra coriander leaves and spring onions.
7. Thickly slice the lamb and serve with the salad.

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Review

1 Food is needed for energy, the growth and maintenance of cells and tissues, and regulating body functions.
2 Nutrients – protein, carbohydrate (and fibre), fat, vitamins, minerals and water – are supplied through food and have specific functions in the body. The best way to ensure you get the nutrients you need is to consume a balanced diet.
3 The digestive tract is responsible for the digestion, absorption and metabolism of food nutrients.
4 Food nourishes our bodies and helps to reduce the risk of diet-related diseases and other health problems.
The key food groups are the basis of many food-selection models. The food groups are:
- vegetables and legumes/beans
- fruits
- grain (cereal) foods, mostly wholegrain and/or high cereal fibre varieties
- lean meats and poultry, fish, eggs, tofu, nuts and seeds, and legumes/beans
- milk, yoghurt, cheese and/or alternatives, mostly reduced fat.

5 Each nutrient has a specific function in the body. We should therefore ensure that we consume a variety of foods in the recommended proportions.
6 Food-selection models are tools to help people choose the correct foods in the correct proportions. Two examples of these are the Australian Dietary Guidelines and the Australian Guide to Healthy Eating.
7 Diet-related diseases contribute significantly to Australia's burden of disease.
8 Healthy eating is a protective factor, reducing the risk of dietary-related diseases such as obesity, cardiovascular disease, type 2 diabetes, bowel cancer and osteoporosis.

Test your knowledge

Multiple-choice

1 The Australian Guide to Healthy Eating is based on five basic food groups. These are:
   a vegetables and legumes, fruits, grains, lean meat and poultry, nuts, tofu, etc., and milk and dairy alternatives.
   b dairy alternatives, cereals, milk, vegetables and legumes, and fats and oils.
   c whole milk dairy, vegetables, fruit, grains and lean meat.
   d meat, dairy, fruit and vegetables, fats and oils, and cereals.
2 The six main nutrients include:
   a protein, fibre, carbohydrates, vitamins, minerals and fats.
   b protein, carbohydrates, fats, vitamins, minerals and water.
   c protein, carbohydrates, vitamins, minerals, water and soluble fibre.
   d macronutrients, micronutrients, water, sugars, fats and proteins.
3 The nutrients that provide energy to the body include:
   a vitamins, minerals, sugars and fats.
   b meat and legumes, dairy and cereals.
   c vitamins, minerals, water and fats.
   d fats, carbohydrates and proteins.

True or false?

1 All absorption of nutrients occurs in the small intestine only.
2 The Australian Dietary Guidelines only provide information about how to choose foods wisely.
3 Some vitamins can be manufactured in the body from other raw materials.

Short-answer

1 What is the function of water in the body?
2 Explain what happens to a salad sandwich in your digestive system after you bite into it.
3 Using the Australian Guide to Healthy Eating, which food groups provide the body with energy? Explain your answer.
4 Describe what mindless eating is and how it can lead to poor health outcomes.

Extended-response

Obesity is a condition which is in part a result of poor nutritional habits.
1 Explain why obesity is a significant health risk.
2 Explain how poor nutritional choices may lead to obesity.
3 Using a food-selection model, outline how an individual may work towards maintaining a healthy weight. In your explanation, provide an example of a day's meals.

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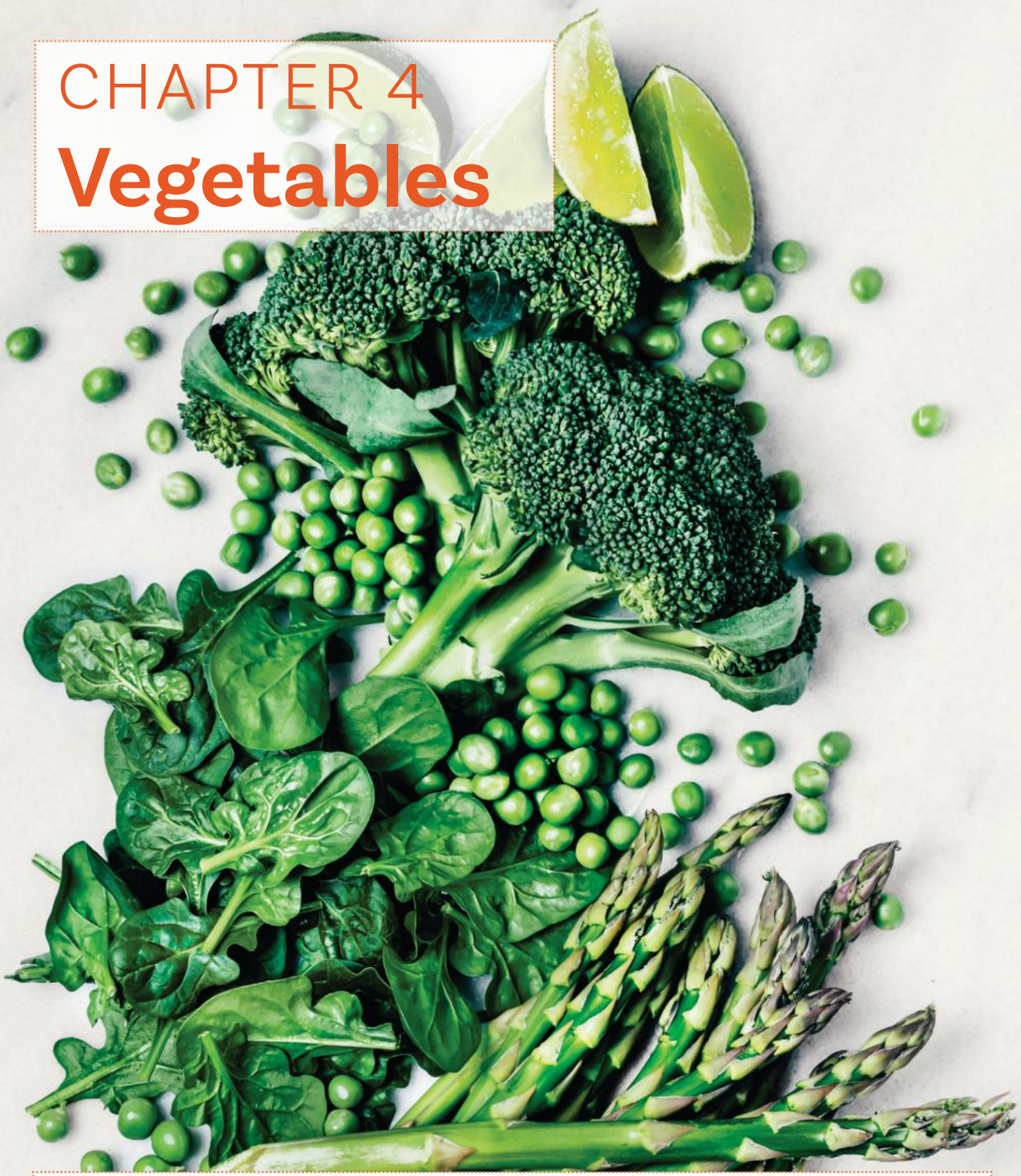
CHAPTER 4
Vegetables



BEFORE WE BEGIN

1. What is a vegetable? Identify the different types of vegetables.
2. Describe how vegetables get to our plates.
3. Describe how to store vegetables to maximise their qualities.
4. Explain why vegetables are good for us.
5. Explain why we rarely see blemishes on the vegetables we buy.

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4.1 What is a vegetable?

LEARNING INTENTIONS

1. To understand what a vegetable is.
2. To gain knowledge on the history of vegetables in our diet.
3. To develop a deeper understanding of the range of traditional Aboriginal and Torres Strait Islander vegetables that are becoming more widely available.

Figure 4.1 Vegetables are the edible parts of plants.

vegetables The edible parts of a plant. There are many different vegetables, and we eat different parts of the plant.

Vegetables are the edible parts of plants. They can be many different parts of the plant and grow in a large variety of ways. Fruits, on the other hand, contain the seeds of plants and are attached to the plant by a stem or stalk. We will be looking at fruit in greater detail in another chapter. Some vegetables are in fact **botanical** fruits, such as tomatoes, zucchini and eggplants, because these contain the seeds of the plant, but they are considered a vegetable in the culinary sense. Fruits are generally sweet and served as desserts, while vegetables are more often treated as savoury foods.

botanical Relating to plants and/or plant life

COLLABORATE 4.1

Write the letters A–Z down the left-hand side of a piece of paper and see if you can think of a vegetable that starts with each of these letters. Share your list with other students. How many vegetables did your class identify? Are there any vegetables that you have never heard of or have never eaten? Do you have any Indigenous Australian vegetables on your list?

TASTY TRIVIA

In some cultures, avocados are used in desserts. In Vietnam, *Sinh Tố Bơ* is an avocado milkshake. A similar drink in Indonesia, an avocado shake with chocolate, is called *Jus Alpukat*.

Figure 4.2 Some vegetables are actually botanical fruits, meaning they contain the seed of the vegetable. Which of the vegetables in this image are botanical fruits?

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The history of vegetables

hunter-gatherer
Nomadic people whose diet consisted primarily of wild foods, including those found through hunting and fishing

The first forms of vegetables were wild plants eaten by **hunter-gatherer** tribes, who consumed edible roots, greens, nuts and berries. There is evidence of the cultivation of vegetables dating to over 7000 years ago. Some of the earliest cultivated vegetables were peas and fava beans (broad beans) in the area we now know as the Middle East, and corn, potato and peppers in South America.

The pyramids in Egypt have revealed evidence of onions, garlic, beans and radishes growing in ancient Egypt. Vegetables were often the main source of food when meat was in short supply. As the ability to travel between countries increased, excesses of food crops were taken to other countries, and this increased the variety of vegetables available.

Figure 4.3 Some of the earliest evidence of vegetables was found in the pyramids of Egypt.

INVESTIGATE 4.2

Choose a vegetable from the following list: beetroot, carrot, potatoes, corn, tomatoes, cucumber, cabbage.
Go online and investigate its historical background to prepare a report including the following information:

- What are the earliest records of this vegetable being eaten and cultivated?
- Where did this vegetable originate in the world?
- Images and/or descriptions of what this vegetable looked like historically.
- How has this vegetable changed since it was first used?
- Where is it grown today?
- How do we use it today?

Your report could be a written document or timeline in the form of a poster, a class presentation created using an online program, or a recording of a short podcast or video.

Indigenous vegetables

For over 50 000 years, Aboriginal and Torres Strait Islander peoples have gathered many different types of native vegetables growing wild in Australia. There are plenty available, if you know when, where and how to find them. Depending on the season, they include saltbush, samphire, Warrigal greens, youlk and bush tomatoes. These products are becoming more available on the market as commercial production of them increases. As our knowledge of the properties of these vegetables increases, we can begin to use them to make delicious meals.

TASTY TRIVIA

Bush tomatoes are tangy, with a fruity aftertaste. When dried and crushed into powder, they can absorb large amounts of liquid during cooking. This has led some manufacturers to consider their potential use as a thickener, especially for people who are not able to consume gluten.

Figure 4.4 In Australia, there are more than 100 different species of *Solanum* (wild tomatoes). Only six of these 'bush tomatoes' are edible, with Kutjera, also known as desert raisins, being the best-known and most popular variety.

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RECIPE

WARRIGAL GREENS PESTO

Makes 6–8 servings
Main tools and equipment Saucepan, tea towel, food processor OR mortar and pestle, airtight jar
Production skills Blanch, grind, pulse, drain, pat dry, chill
Cooking processes Boil, blanch

Preparation time 10 minutes
Cooking time 20 minutes
Total time 30 minutes

Skill demonstration: Blanching

INGREDIENTS

- ½ cup firmly packed Warrigal greens
- 1 cup spinach leaves, stems removed
- ¼ cup macadamia nuts
- 30 g parmesan cheese, grated
- ¼ cup extra virgin olive oil
- 1 teaspoon salt

METHOD

1. Half fill a medium saucepan with water and bring to the boil over medium heat. Add the Warrigal greens and blanch for 1 minute. Drain. Immediately place the greens into iced water to stop the cooking process.
2. Chill Warrigal greens for 2–3 minutes, then drain. Pat dry with a clean tea towel.
3. Place Warrigal greens, spinach, nuts, parmesan and olive oil into a food processor and pulse until roughly combined. Taste, season and, if preferred, make a smoother paste. Traditionally, a mortar and pestle would be used to grind the ingredients to the desired consistency.
4. Spoon the pesto into an airtight jar, smooth the top surface of the pesto and cover with a thin layer of oil to prevent a change in colour. This pesto can be stored in an airtight jar in the refrigerator for about a week.
5. Serving suggestion: Serve with cooked spaghetti or gnocchi (about 2 tablespoons of pesto per serve).

EVALUATION

1. Pesto is traditionally made with pine nuts. How are pine nuts and macadamias similar? What physical properties do these nuts provide to this dish?
2. Apart from pasta, suggest how else this sauce may be used in cooking.

LEARNING REFLECTION

1. Explain what a vegetable is.
2. If a fruit is the part of the plant which contains the seeds, explain why tomatoes and capsicums are considered to be vegetables.
3. Why do you think Indigenous vegetables are not common on our supermarket shelves?

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4.2 Structure of vegetables: physical properties

LEARNING INTENTION

1 To understand how vegetables are classified.

Vegetable classification is based on the part of the plant that is eaten; for example, for leaf vegetables like lettuce and cabbage you eat the leaves of the plant. Knowing the classification is useful, as often vegetables of the same classification can be prepared in similar ways. This means that you can often substitute a vegetable of a similar classification. For example, in a stir fry, if the recipe asked for a Chinese green such as bok choy and you could not obtain it, you could substitute it with a similar green, leafy vegetable such as spinach.

ACTIVITY 4.3
CLASSIFYING VEGETABLES

There are 10 classifications of vegetables, which are:
tuber, bulb, shoot, flower, fruit, sprout, root, stem, seed, fungus.

1 Try to match these images with their classification:


Yam


Turnip


Parsnip


Asparagus


Broccoli


Celery


Cucumber


Pea


Mushroom

2 Find three other examples of vegetables for each of the classifications.

DESIGN BRIEF: SUBSTITUTE VEGETABLES

If you know what classification a vegetable is in, you can often substitute other vegetables from that group in a recipe. Using the stir-fry tempeh recipe as the base recipe, complete a taste test for this recipe and other recipes substituting other vegetables for the bok choy and broccolini. Ensure a range of vegetables are used among the class, such as spinach, cauliflower and carrots.

ISBN 978-1-009-39592-2 Matthews et al.

STIR-FRY TEMPEH

Serves 2
Main tools and equipment Cook's knife, chopping board, wok, measuring spoons and cups
Production skills Stir fry, wilt
Cooking processes Chop, crush, grate, slice

Preparation time 15 minutes
Cooking time 15 minutes
Serving and presentation time 15 minutes
Total time 45 minutes

Skill demonstration: Chopping

INGREDIENTS

- ½ teaspoon sesame oil
- 2 teaspoons peanut oil
- 1 clove garlic, crushed
- 2 teaspoons grated ginger
- ½ red chilli, seeds removed, chopped (optional)
- 2 spring onions, sliced diagonally
- 150 g tempeh, cut into 1 cm cubes
- 1 small carrot, sliced finely
- ½ onion, sliced finely
- 1 bunch baby bok choy, separated
- 1 bunch broccolini, cut into 5cm lengths
- ¼ cup mushroom oyster sauce
- 1 tablespoon rice vinegar
- 1 tablespoon fresh coriander leaves
- 1 tablespoon cashew nuts, roughly chopped

METHOD

1. Heat the oils in a wok over high heat. Add the garlic, ginger, chilli and spring onion to the wok. Cook for 1 minute, ensuring the garlic does not burn.
2. Add the tempeh and cook for 5 minutes, or until golden. Remove and keep warm.
3. Add the carrots and onion and stir fry for 2 minutes. Add the bok choy and broccolini and 1 tablespoon of water to the wok. Cook, covered, until the greens are wilted.
4. Return the tempeh mixture to the wok with the greens, add the oyster sauce and rice vinegar and warm through. Top with coriander and cashew nuts.
5. Serve with steamed rice.

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TASTY TRIVIA

People seem to either love or hate coriander. Unlike many other foods that are strongly disliked, some people are genetically predisposed to strongly taste the soapy-flavoured aldehydes contained in coriander, which is not pleasant. Do you love or hate coriander?

Figure 4.5 Coriander leaves (also known as cilantro) look like flat-leaved parsley; however, there is no mistaking the distinctive smell. All of the coriander plant is eaten and is often found in recipes using the roots, stems and leaves.

ACTIVITY 4.4
VEGETABLE ENCYCLOPAEDIA

Select a particular vegetable and, using a program such as Canva or WordPress, design a page which will provide background information for your vegetable. An example of a completed 'encyclopaedia page' follows:

Vegetable: Tomato
Botanical name: *Solanum lycopersicum*
Originated from: South and Central America, particularly Peru and Ecuador
Family relations: If you observe the flower of the tomato, it is very similar to the potato and eggplant, and even deadly nightshades.

Tomato flower

Potato flower

Eggplant flower

Figure 4.6 The flower of the tomato is like that of the potato and eggplant, which are also in the *Solanum* genus.

Best flavour pairings: Basil, oysters, gruyere cheese, lemon balm, apricots, berry fruits
Nutritional benefits: Tomatoes are a good source of vitamin C, fibre, potassium and vitamin K. They are also an excellent source of the antioxidant lycopene. Tomatoes are low in kilojoules.
Storage: If the tomato is not yet ripe, store in a cool dry place for a few days, until they have a slight fragrance. Once ripe, keep them in the refrigerator.
Appearance: Tomatoes are usually red; however, they can also come in yellow, green and purple varieties, and some are even striped. They vary in shape from round to egg shaped to large folded and sometimes flattened spheres.

Figure 4.7 There are a multitude of varieties of tomatoes, each having different sensory properties.

Purchasing tomatoes: Tomatoes can be bought fresh, canned, bottled, sauced, dried, concentrated, salted, oiled and in other dishes. They are the basis for many dishes.
Interesting facts: Tomatoes belong to the Solanaceae family, which are also called nightshades. This family ranges from edible foods to spices, medicines, weeds, ornamental plants and some poisonous plants, such as belladonna or deadly nightshade.

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RECIPE

BREAKFAST HALOUMI WITH FRIED TOMATOES

Serves 2
Main tools and equipment Cook's knife, chopping board, frying pan, bowl, measuring spoons
Production skills Chop, slice, whisk, marinate
Cooking processes Fry

Preparation time 10 minutes plus as long as possible to marinate
Cooking time 20 minutes
Serving and presentation time 10 minutes
Total time 40 minutes plus marinating time

INGREDIENTS

- 1 clove garlic, crushed
- 1 tablespoon lemon juice
- 2 teaspoons balsamic vinegar
- ¼ teaspoon dried lemon myrtle (can substitute 1 teaspoon of fresh lemon thyme)
- 1½ tablespoons extra virgin olive oil
- 200 g haloumi cheese, cut into 4 slices
- 125 g red cherry tomatoes, halved
- 125 g yellow cherry tomatoes, halved
- 1 tablespoon olive oil (for frying)
- 4 thick slices of wholegrain bread

METHOD

1. To make the marinade: whisk together the garlic, lemon juice, balsamic vinegar, lemon myrtle and extra virgin olive oil.
2. Put haloumi and tomatoes in a bowl and cover with the marinade. Cover the bowl and leave in the fridge as long as possible, preferably overnight.
3. Drain the marinade from the haloumi and tomatoes into another bowl. Reserve the marinade.
4. Heat the olive oil in a non-stick frying pan over medium heat. Add haloumi and cook for 1 minute each side or until golden brown. Transfer to a plate and keep warm. Add the tomatoes and cook, stirring for 5 minutes, or until they soften slightly. Transfer to a plate and keep warm.
5. Toast the bread until golden.
6. Place the haloumi onto the toast, pile the tomatoes on top, and drizzle with some of the marinade. Serve immediately.

LEARNING REFLECTION

1. Outline the way vegetables are classified.
2. Are there any vegetables that can be classified into two categories depending upon the part of the plant that is being used?

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4.3 Primary production of vegetables

LEARNING INTENTIONS

1 To understand and be able to apply the term 'food system'.
2 To define the term 'primary production' as it relates to vegetables.

The food we eat each day has, at some time, been growing somewhere in the world. Before it lands on our plate it goes through a series of stages or **food systems**, which can be as simple as you going to your vegetable garden and picking some mint to go in a mint sauce, right through to complex food systems involved with you consuming a frozen dinner or barbecue pizza.

food system The web of activities and processes that food goes through as it travels from paddock to plate

Figure 4.8 A food system can be as simple as picking, chopping and eating home-grown herbs.

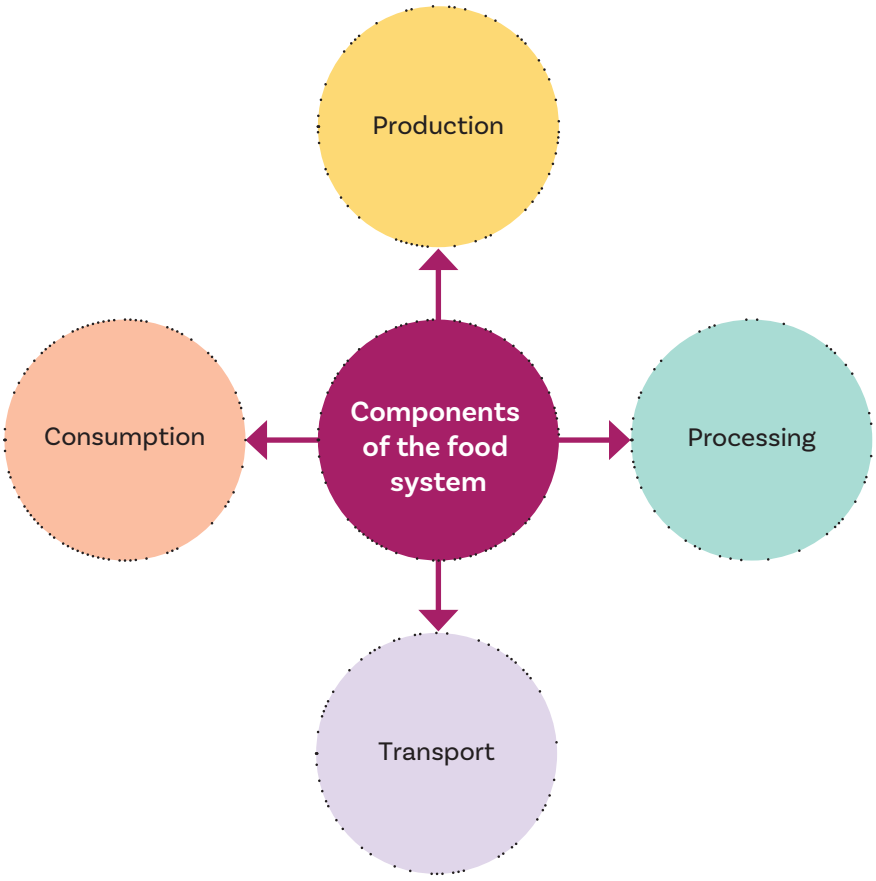

Figure 4.9 The food system involves the components production, processing, transport and consumption of food as it travels from paddock to plate.

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ACTIVITY 4.5
WHAT PART OF THE FOOD SYSTEM IS THIS?

1 Copy the following table into your book and enter the following tasks into the correct column:

- eating nachos at home
- planting corn
- transporting corn from warehouse to supermarket
- harvesting corn
- making corn chips
- taking food home from the shop
- packaging corn chips
- eating at a Mexican restaurant.

Production	Processing	Transport	Consumption

2 Food systems can be as simple as a flow chart or as complex as a web. Using the information in question 1 for the production and consumption of corn chips, draw a flow chart showing the various stages of this food system.

EXTENSION

3 Draw a flow chart of the food system that may have provided you with the last food you ate; for example, a sandwich from the canteen for lunch or bacon and eggs you had for breakfast. For each of the steps you stated on your flow chart, explain sustainability issues that may arise and, for one of the steps, suggest how sustainability issues may be addressed.

Primary production of vegetables involves the growing of vegetables for consumption and there are several steps involved. Take potatoes, for example: sowing, harvesting, washing, sorting, grading and then packaging ready for sale, either to a processing company or directly to the consumer.

TASTY TRIVIA

The green colour seen on some potatoes is caused by the toxin solanine, which can be poisonous if eaten. This develops when the potato has been exposed to too much light either during growing or storage.

LEARNING REFLECTION

1 Explain what a food system is and list the four main components of one.

2 Define the term 'primary production'.

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4.4 Best-quality vegetables: sensory properties

LEARNING INTENTION

1 To determine the characteristics of good-quality vegetables.

It is important when buying vegetables that you look for the best quality as this ensures that they provide the highest level of nutrition for your body, but also last long enough to be consumed. Look for vegetables that:

- are well coloured and evenly shaped
- have no signs of wrinkly skin
- are free from signs of bruising, damage, insects or mould.

Vegetables should be stored carefully to maintain their properties. Most vegetables are best kept in the fridge below 5°C to ensure the longest possible shelf life; the exceptions are potatoes and onions, which should be stored in a cool, dark, dry place. Remember to wash your vegetables, especially your leafy greens. But never wash mushrooms – just give them a wipe down to remove any dirt as they will absorb water and go slimy when stored.

TASTY TRIVIA

When stored, onions produce a gas called ethylene which will cause potatoes to ripen and spoil quickly. Conversely, potatoes are very high in moisture, which can cause onions to rot. So, it is not a good idea to store these together!

LEARNING REFLECTION

1 Suggest reasons why being able to identify vegetables that are of the highest quality when purchasing is a good skill to have.

4.5 Cooking with vegetables

LEARNING INTENTIONS

1 To develop skills in the successful cooking of vegetables.

2 To understand how vegetables can be substituted for each other in recipes.

The versatility of vegetables means they can be prepared and cooked in different ways, and in many cases, they can be eaten raw. In Chapter 3, we learned about the role of vegetables in our diet and how we should be consuming a diet rich in them. Do you consume five serves of vegetables every day as recommended?

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COLLABORATE 4.6

1 Undertake a class survey of how many serves of vegetables each member of the class consumed over the last three days. (One serve is, on average, ½ cup.)
2 Record your answers in a graph, recording the number of students who daily ate less than five serves, exactly five serves or more than five serves on average over the three days.
3 Comment on how successful your class may be at meeting the daily five serves of vegetables a day.

EXTENSION

4 Suggest reasons why the survey was done over three days.
5 What may be the health consequences of not consuming adequate amounts of vegetables in the diet on an ongoing basis?

INVESTIGATE 4.7

Go online to the Sustainable Table website http://cambridge.edu.au/redirect/10076 to explore what vegetables are in season right now. Produce a poster which highlights the season, the vegetables that are available and the benefits of consuming vegetables in season.

DESIGN BRIEF: MINESTRONE SOUP

Minestrone soup is an excellent example of a meal-in-one soup. Using the minestrone soup recipe as a basis, design a five-vegetable minestrone soup. The recipe gives you some suggestions about flavourings and quantities. You can also add a meat ingredient if you wish.

INVESTIGATE

1 Make a list of the vegetables that could be used in a soup.
2 Make five different possible combinations of vegetables that would be ideal for a soup. Think of colour, texture variations and taste variations.
3 Discuss what will happen during cooking by comparing the impact on properties of cooking a potato, tomato, carrot and celery.
4 Soup usually has different flavourings. How can the soup be flavoured?

GENERATE

1 Select your preferred combination. Justify your choice.
2 What will be the best way to prepare the vegetables in the soup, for example, dice, slice or purée?

PLAN AND MANAGE

1 Determine the tools and equipment you will need to use, making sure you know how to use each item safely.
2 Prepare a production plan to ensure you are organised and ready for production.
3 Complete a food order for your soup.

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MINESTRONE SOUP

Serves 2 generously
Main tools and equipment Large saucepan, cook's knife, wooden spoon, chopping board, measuring spoons and jug
Production skills Chop, stir
Cooking processes Boil, simmer

Preparation time 15 minutes
Cooking time 40 minutes
Serving and presentation time 5 minutes
Total time 60 minutes

Skill demonstration: Crushing garlic

INGREDIENTS

- 1 tablespoon extra virgin olive oil
- ½ medium brown onion, peeled and chopped finely
- 1 carrot, peeled and chopped finely
- 1 stalk celery, chopped finely
- 1 cup seasonal vegetables
- 1 clove garlic, crushed
- ¼ teaspoon dried mixed herbs
- 1 tablespoon tomato paste
- ½ 400 g can crushed tomatoes with their juice
- 2 cups vegetable stock
- 1 cup water
- 1 bay leaf
- Ground black pepper and salt
- ¼ cup macaroni pasta
- ¼ cup canned cannellini beans, drained
- ½ cup chopped spinach, kale or silverbeet
- ½ teaspoon lemon juice
- 2 teaspoons parmesan cheese for serving

METHOD

1. Heat the oil in a large saucepan over medium heat, then add the onion, carrot, celery and a pinch of salt. Cook for about 7 minutes, stirring occasionally until the vegetables have softened and the onion is translucent.
2. Add the seasonal vegetables, garlic and mixed herbs. Cook for about 2 minutes until you can smell the herbs, stirring all the time.
3. Pour in stock, tomato paste, tomatoes and water. Add bay leaf and season with salt and pepper to taste.
4. Increase the temperature and bring to the boil, cover the pot loosely with a lid to allow steam to escape, and reduce heat to a simmer.
5. Cook for 20 minutes. Remove the lid and add the cannellini beans, pasta and green leafy vegetables. Continue to cook, without the lid on, until the pasta is just cooked, about 12 minutes.
6. Remove from the heat, stir in the lemon juice and adjust seasoning to taste.
7. Serve, sprinkled with parmesan cheese.

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EVALUATION

1 Suggest two ways in which you would change the vegetables to give different flavours and textures. Hint: apart from different vegetables, think how the preparation of the vegetables may alter the flavour and texture.
2 Suggest reasons why the lid was loosely placed on the pot so steam could escape.
3 Many people say that minestrone soup improves in flavour the longer it is left to cook. Why might this be true?
4 Reflect on your work practices. Describe where you went well, providing evidence to support your discussion. Describe an area you would like to focus on improving when next designing.

EXTENSION

5 Look back at the soup recipe on the previous page. Suggest vegetables that could be added to make a rainbow.
6 What else could you serve with this soup to make it a complete meal, according to the Australian Guide to Healthy Eating?

One of the easiest ways to ensure you have a balance of nutrients from vegetables is to eat a 'rainbow' of vegetables. If you mix the colours, you will be naturally eating a mix of essential vitamins and minerals. The deeper the colour, the higher the nutritional content.

COLLABORATE 4.8

As a class, write down the colours of the rainbow on the board, and then try to think of vegetables that are those colours.

DESIGN BRIEF: A BURGER FOR VEGETARIANS

Your family is having a barbecue. One of the guests is a vegetarian and you do not want them to feel left out. Design and create a vegetarian burger. Vegetarian burgers can often be dry or not have much flavour, so the goal is to make a delicious vegetarian burger. What will make it work? It needs:

- an ingredient to hold it together
- to contain similar nutrients to meat (what are they?)
- to have an interesting colour and texture to make it appealing
- to be tasty.

INVESTIGATE

Start with a basic recipe using the basic vegetarian burger formula recipe.

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BASIC VEGETARIAN BURGER FORMULA

Serves 2
Main tools and equipment Knife, grater, non-stick frying pan, food processor
Production skills Chop, mix, roll, season, pulse
Cooking processes Fry

Preparation time 20 minutes
Cooking time 20 minutes
Serving and presentation time 5 minutes
Total time 45 minutes

INGREDIENTS

- Oil for cooking
- ¼ brown onion, grated
- 1 clove garlic, crushed
- ½ cup finely chopped, cooked vegetables of your choice
- ¼ cup cooked rice
- ⅓ cup tinned legumes, reserve the liquid
- 2 tablespoons flavour/texture boosters (pick two). Choose from:
  - fresh herbs
  - spring onions
  - chopped nuts
  - chopped sundried tomatoes
  - chopped olives
  - chia, sesame or flax seeds
  - mashed avocado
  - nut butter
  - tahini
- ¾ teaspoon spices of your choice
- 2 tablespoons dry base (choose one):
  - ground oats
  - cornmeal
  - breadcrumbs
  - panko
  - almond meal

METHOD

1. (Optional) Preheat oven to 175°C. Rinse the tinned legumes, then lay them out on a baking tray. Place them in the oven for approximately 20 minutes, or until they are slightly dehydrated and the skin starts to split.
2. Heat 1 tablespoon of oil in a non-stick pan over medium heat. Add the onion and cook for 1 minute. Add the garlic and continue to cook, stirring until the onion is translucent. Add the remaining vegetables and cook for 5–10 minutes until soft, stirring constantly.
3. Put the cooked vegetables in a food processor, add all the remaining ingredients EXCEPT the liquid from the legumes and frying oil. Pulse until just combined, but do NOT turn the mixture into a paste.
4. Try to roll some of the mixture into a ball. If it holds, good. If it is too dry, add the reserved legume liquid a teaspoon at a time until it sticks together. If it is too wet, add a teaspoon more of the dry base ingredient until you reach the right consistency. Taste, and season to your liking.
5. Form the mixture into two patties, place on a plate and refrigerate until firm. This helps the patty to stay together.
6. Heat oil in the non-stick frying pan over medium heat, and when the oil is hot cook the patties until brown on one side. Flip and brown the other side (it should take about 3–4 minutes each side). Do not be tempted to flip continually, as they may fall apart.
7. Serve.

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EVALUATION

1 Look at the requirements in the design brief: a burger for vegetarians. Did you create a solution by fulfilling all the requirements? Respond to each of these requirements.
2 "...the goal is to make a delicious vegetarian burger." How well does your burger fit this criterion from the brief? Evaluate the burger for taste and texture. Use the hedonic scale for your taste test. Justify the position on the scale using descriptive words.
3 Explain how well the burger held together. Suggest a change if it did not hold together.
4 Explain how the burger met the requirements of 'interesting colour and texture to make it appealing' and 'tasty'.
5 Discuss alterations you could make to the ingredients if you made it again.
6 Suggest other methods you could use to cook your burger that would produce a similar result.

LEARNING REFLECTION

1 How many serves a day of vegetables are recommended for optimum dietary health?
2 Why is it good nutritional practice to eat vegetables that have a variety of colours?

4.6 The nutritional content of vegetables

LEARNING INTENTIONS

1 To develop a deeper understanding of the Australian Guide to Healthy Eating.
2 To understand what a vitamin is, their sources and their functions in the body.
3 To know the difference between a water-soluble and a fat-soluble vitamin.

Figure 4.10 Vegetables are one of the five essential food groups recommended in the Australian Guide to Healthy Eating. Along with cereals, it is one of the two largest groups. *Based on material provided by the National Health and Medical Research Council.*

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Essential nutrients: vitamins

vitamin An organic substance vital for correct functioning of the body which is required in small quantities

water-soluble vitamins Vitamins that dissolve in water

fat-soluble vitamins Vitamins (A, D, E and K) that are not soluble in water and that need to be stored in the body in either the liver or in fatty tissues. They are transported around the body by special proteins.

Vegetables contain significant amounts of one of the major nutrient groups, **vitamins**. Vitamins are micronutrients that are vital for the body in small amounts. There is a wide variety of different vitamins, and many have differing functions in the body. Some foods contain only one or two vitamins, while others contain many. The body cannot produce most vitamins, so they must be obtained from food. The best way to ensure you are meeting all your vitamin requirements is to consume a wide variety of fresh foods. Freshness is especially important, as vitamins are often lost during the processing and/or storage of foods. There are two groups of vitamins: **water-soluble** and **fat-soluble**.

Water-soluble vitamins (B group and C)

These vitamins dissolve in water and are not stored in the body. This allows them to be carried around the body in the blood. These vitamins are easily destroyed if foods are cooked in water.

Fat-soluble vitamins (A, D, E and K)

These vitamins do not dissolve in water and can be stored in the body, either in fat tissue or in the liver. These vitamins are usually not damaged by cooking. Because these vitamins can be stored in the body, excessive amounts can be toxic – although this is rare.

Figure 4.11 Fresh vegetables are an excellent source of vitamins, especially if a variety of different coloured vegetables are chosen in the diet.

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Table 4.1 Major sources and functions of vitamins in the body

Vitamin	Source	Major function in the body
Vitamin A (retinol)	Liver, kidneys, carrot, egg yolk, butter, oily fish Dark green and orange fruits and vegetables such as spinach, mango, pumpkin and rockmelon	Maintains eyesight Protection from infection Growth of soft and hard tissue
Vitamin B_1 (thiamine)	Wholegrain cereal products, legumes, nuts, liver, kidney, lean pork, yeast extracts	Enables energy to be released from food Promotes functioning of the nervous system and heart
Vitamin B_2 (riboflavin)	Liver, kidneys, milk, cheese, green vegetables, yeast extracts	Growth of new tissue, especially skin and eyes Enables energy to be released from food
Vitamin B_3 (niacin)	Liver, meat, fish, wholegrain breads and cereals, yeast products, legumes	Enables energy to be released from food Healthy skin
Vitamin B_6 (pyridoxine)	Meat, legumes, poultry, wholegrain breads and cereals	Enables energy to be released from food Formation of red blood cells
Vitamin B_{12} (cyanocobalamin)	Eggs, liver, kidney, meat, milk, fish, seafood	Formation of red blood cells Formation of DNA
Vitamin C (ascorbic acid)	Citrus fruits, berries, capsicum, broccoli	Assists iron absorption Needed for soft tissue formation and healing
Vitamin D (cholecalciferol)	Fatty fish, eggs, sunlight, dairy products, margarine	Absorption and metabolism of calcium and phosphorus
Vitamin E (tocopherols)	Nuts, seeds, fish, wholegrain cereals, eggs, vegetable oils	Maintenance of healthy cell membrane
Vitamin K	Leafy green vegetables, eggs, liver, cheese, made by bacteria in the intestine	Blood clotting
Folate	Leafy green vegetables, yeast, liver, kidney, lentils, oranges, asparagus	Cell division and multiplication Red blood cell formation Assists in the prevention of neural tube defects such as spina bifida Assists in the metabolism of protein

TASTY TRIVIA

Newborn babies are given a vitamin K injection at birth to prevent severe bleeding, which can sometimes happen in the brain and can cause brain damage. Infants are born with very low levels of vitamin K, which is not found in breast milk or milk formula and is not consumed until infants are eating solid foods at around six months of age. A lot of vitamin K is produced by bacteria in the gut.

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ACTIVITY 4.9
VITAL VITAMINS

1 Working collaboratively, choose one of the vitamins listed in Table 4.1. Investigate the consequences of being deficient in this vitamin and then produce a computer-generated information poster or oral presentation detailing the information that you have collected. Your poster or presentation must include the following information:
   - the vitamin chosen
   - the condition caused by a deficiency
   - signs and symptoms of a deficiency
   - prevalence of this condition in Australia and around the world, and who generally is affected by this condition
   - food products you should consume to avoid this deficiency
   - a recipe for a food item that could be included in a school lunchbox and that would be a good source of the vitamin.
2 Use a program such as Photoshop or Illustrator to present your information professionally.
3 Each member of the team should take on one of the following roles to equally share the research and presentation work fairly:
   - time manager – monitors the team's use of time to ensure everyone stays on task
   - recorder – writes down ideas as they are discussed
   - summariser – asks questions to clarify the team's thinking and ensures that everyone in the team has the same understanding of what is being discussed.
4 At the conclusion of this task, reflect on your participation in this activity by detailing what you have learned about the vitamin you studied.

LEARNING REFLECTION
1 What is a vitamin?
2 Why must we consume foods with adequate vitamins?
3 Explain why eating fresh vegetables is preferable to processed vegetables.
4 Why can fat-soluble vitamins become toxic if consumed in excessive quantities, yet water-soluble ones cannot?
5 What is special about vitamin K?

4.7 Vegetables and environmental sustainability

LEARNING INTENTIONS
1 To develop an understanding of the waste associated with vegetable production.
2 To understand what food loss and food waste are and the impact these have on the environment.
3 To develop knowledge and skills in effectively managing the storage of vegetables.
4 To investigate what commercial businesses are doing to reduce wasted vegetables.

Have you ever wondered how it is that all the vegetables in the supermarket seem to be identical? Have you ever grown vegetables at home and found that you can never seem to grow the lovely straight carrots that are available in the supermarket?

Consumers have grown used to having perfect vegetables, not only perfect in terms of no bruising or insects or mould, but perfectly shaped and sized. Consequently, when they go to the shops, they will choose the vegetables that meet their standards, and leave behind the ones that do not.

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This has led to vegetables being left behind on the shelf that do not meet consumer ideas of the perfect vegetable, meaning that the shop ends up with wastage. To combat this wastage, commercial businesses only bought vegetables that met consumer wants, to minimise waste and maximise profits. But what happens to the imperfect vegetables?

International Year of Fruits and Vegetables

In 2020, the United Nations (UN) declared 2021 as the International Year of Fruits and Vegetables. Their goal was to increase awareness of the health benefits of fruits and vegetables as part of a balanced diet. Apart from nutritional benefits, fruits and vegetables are also important in gut health and immunity.

The UN also directed attention to reducing **food loss** and **food waste** associated with fruits and vegetables. Most of the vegetables that are ultimately thrown away occur as food waste, and as consumers we can learn about handling and storing vegetables to preserve their quality and prevent spoilage for as long as possible.

food loss Occurs in the food system from harvest until arrival at the wholesale market

food waste Occurs in retail, the food service sector and households

Figure 4.12 When supermarkets decide not to buy imperfect foods, such as these apples with small blemishes, these foods are simply dumped. This waste is not only costly and could feed many people, but as it rots in landfill, it releases greenhouse gases which contribute to global warming.

ACTIVITY 4.10
GUT HEALTH

EXTENSION

1 What is gut health?
2 What is the role of vegetables in supporting gut health? (Hint: pre-biotics)
3 What is the link between gut health and mental health?

INVESTIGATE 4.11

Visit the website Half Your Plate http://cambridge.edu.au/redirect/10077 and develop a list of 10 rules a household could follow to maximise the quality and storage time of vegetables at home.

Businesses saving vegetables

With awareness campaigns of the major food waste that was occurring run by Greenpeace, the UN, major supermarket chains worldwide, celebrities like Jamie Oliver, and commercial businesses are now promoting the sale and use of imperfect fruits and vegetables. Perceptions of what is 'good food' is slowly changing, with a growing understanding that imperfect is still perfectly good.

INVESTIGATE 4.12

Go online and investigate 'ugly', 'odd bunch' and/or misfit vegetables. What are commercial businesses doing to promote the sale of imperfect fruits and vegetables, and what are the benefits to businesses, farmers, consumers and the environment?

EXTENSION

Draw a food system flow chart for a vegetable of your choice. For each component of the food system you have drawn, annotate how vegetables may be wasted and suggest ways that manufacturers and the public may reduce waste at each stage.

LEARNING REFLECTION

1 Suggest reasons why large chain supermarkets reject imperfect fruit.
2 What is the difference between food loss and food waste?

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Review

1 Vegetables are the edible parts of plants.
2 There is evidence that vegetables were cultivated over 7000 years ago.
3 Traditionally, Aboriginal and Torres Strait Islanders consumed many vegetables that we are now starting to appreciate.
4 Vegetables are classified according to the part of the plant that is eaten.
5 A food system is the journey food takes from paddock to plate.
6 Food needs to be stored properly to maximise shelf life and to minimise waste.
7 Vegetables need to be consumed daily as part of a healthy diet.
8 Vegetables contain many essential vitamins.
9 Wasted vegetables contribute to our global warming.

Test your knowledge

Multiple-choice

1 The number of serves of vegetables that people should eat per day for good health is:
   a two.
   b three.
   c four.
   d five.
2 An example of primary production is:
   a advertising bananas.
   b harvesting bananas.
   c transporting bananas.
   d making banana chips.
3 It is best that one eats from a 'rainbow' of vegetables because:
   a the food value of the meal is perfect.
   b the visual appeal of the meal is best.
   c it is better for the environment as a greater variety of vegetables will be grown, therefore increasing sustainability.
   d it optimises the nutrient content the meal provides for the body.

True or false?

1 You should store most vegetables in the refrigerator below 5°C.
2 Onions and potatoes should both be stored in a cool, dark place, and therefore can be stored next to each other.
3 Blanching foods means to boil until cooked through, then plunging into cold water to soak.

Short-answer

1 Explain how vegetables are classified, giving an example of a vegetable from each classification group.
2 List two water-soluble vitamins that are found in vegetables and explain their function in the body.
3 Outline ways that vegetables can be prevented from being thrown away at home.

Extended-response

Your team has been employed by a selected vegetable company to create a brochure to advertise the versatility of the identified ingredient. The brochure will be titled '10 ways with…' The brochure is to target beginner cooks or people who are becoming more independent. Work in small groups to investigate using one vegetable in 10 different ways. Present the information in a brochure to promote the use of the selected fruit or vegetable.
Within the brochure, include the following:

- varieties of the vegetable available
- when the vegetable is in season
- its use in a breakfast, light lunch or snack item
- its use as a part of a main dish – sweet or savoury
- its use in a traditional dish.

The 10 different ways need to be economical and reasonably quick and easy to prepare. Each recipe should include a short two-line discussion about the recipe and why it would be a good choice for a beginner cook.

1 Before you start, as a group, discuss and write down four statements that you all should follow to make sure the group will work well together to achieve the best outcomes. At the end of the activity, you will comment on your effectiveness in working to the four statements.
2 Work as a group to divide up the different sections of the task.
3 Start the investigation by coming up with spontaneous ideas within the group. Try to do this without extensive research into recipe books.
4 Collect the required information and present it as a leaflet. This may include photographs.
5 On completion, evaluate the effectiveness of the group according to the statements.

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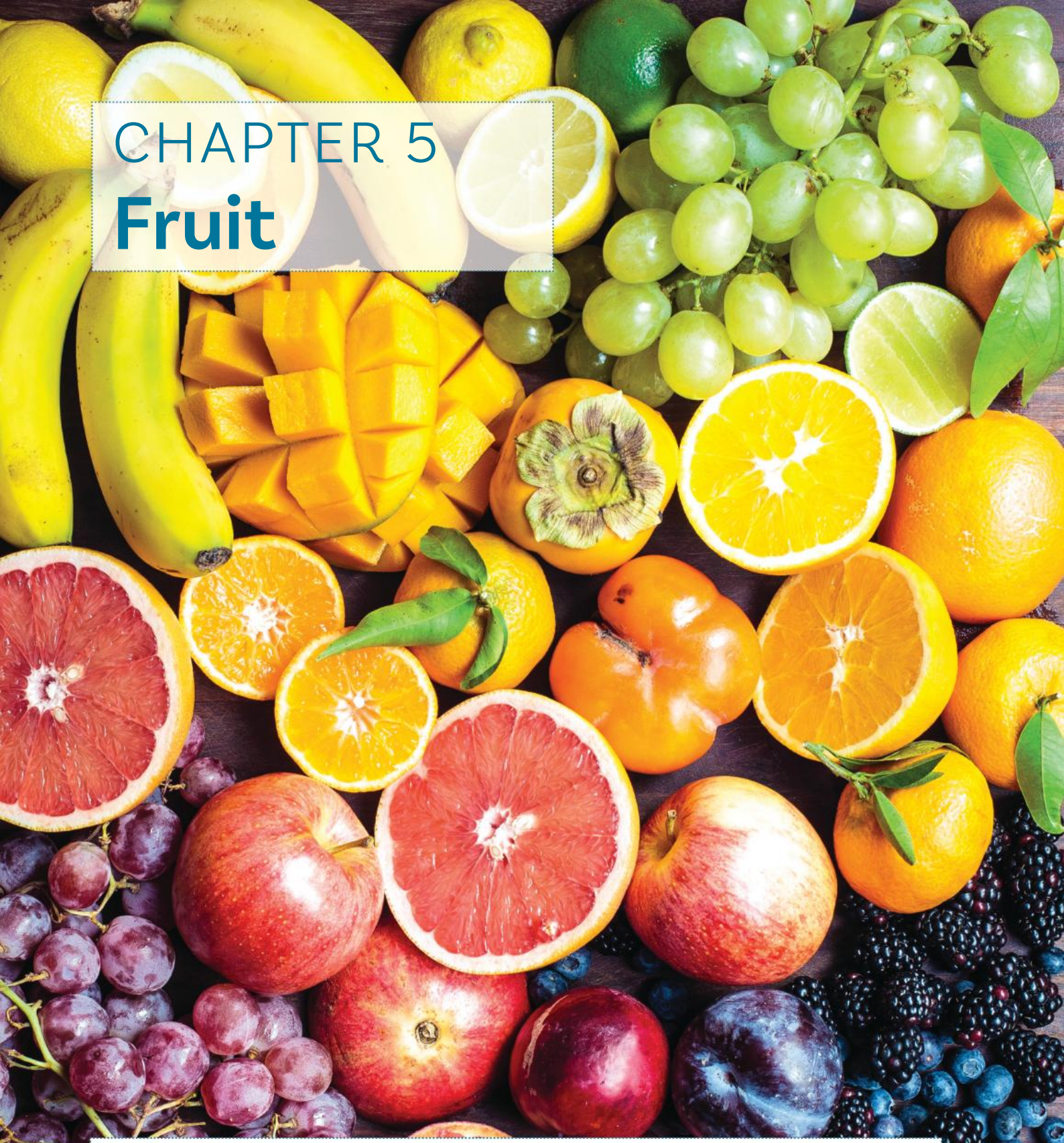

CHAPTER 5
Fruit

BEFORE WE BEGIN

1. Describe how a fruit is different from a vegetable.
2. Identify the nutritive benefits of fruit.
3. Explain how fruit should be cooked.
4. Describe how we can minimise our impact on the environment.

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5.1 Do you know your fruits from your vegetables?

LEARNING INTENTION

1 To compare and contrast fruits and vegetables.

Whereas fruits and vegetables are both the edible parts of plants, fruits are distinguished as they contain the seeds of plants and are attached to the plant by a stem or stalk. A significant difference between fruits and vegetables is that the carbohydrate in fruit is mainly sugar, whereas the carbohydrate in vegetables is mainly starch, which means fruits are mainly used in desserts in Western culture.

TASTY TRIVIA

The supreme court of the United States ruled that tomatoes were a vegetable in 1893!

COLLABORATE 5.1

Discuss with the person sitting next to you what fruit is the result of a cross between a plum and an apricot. Discuss other **hybrid** fruits and try to work out if there are any other ones. You could look online to add to your list.

hybrid An object that combines two different elements

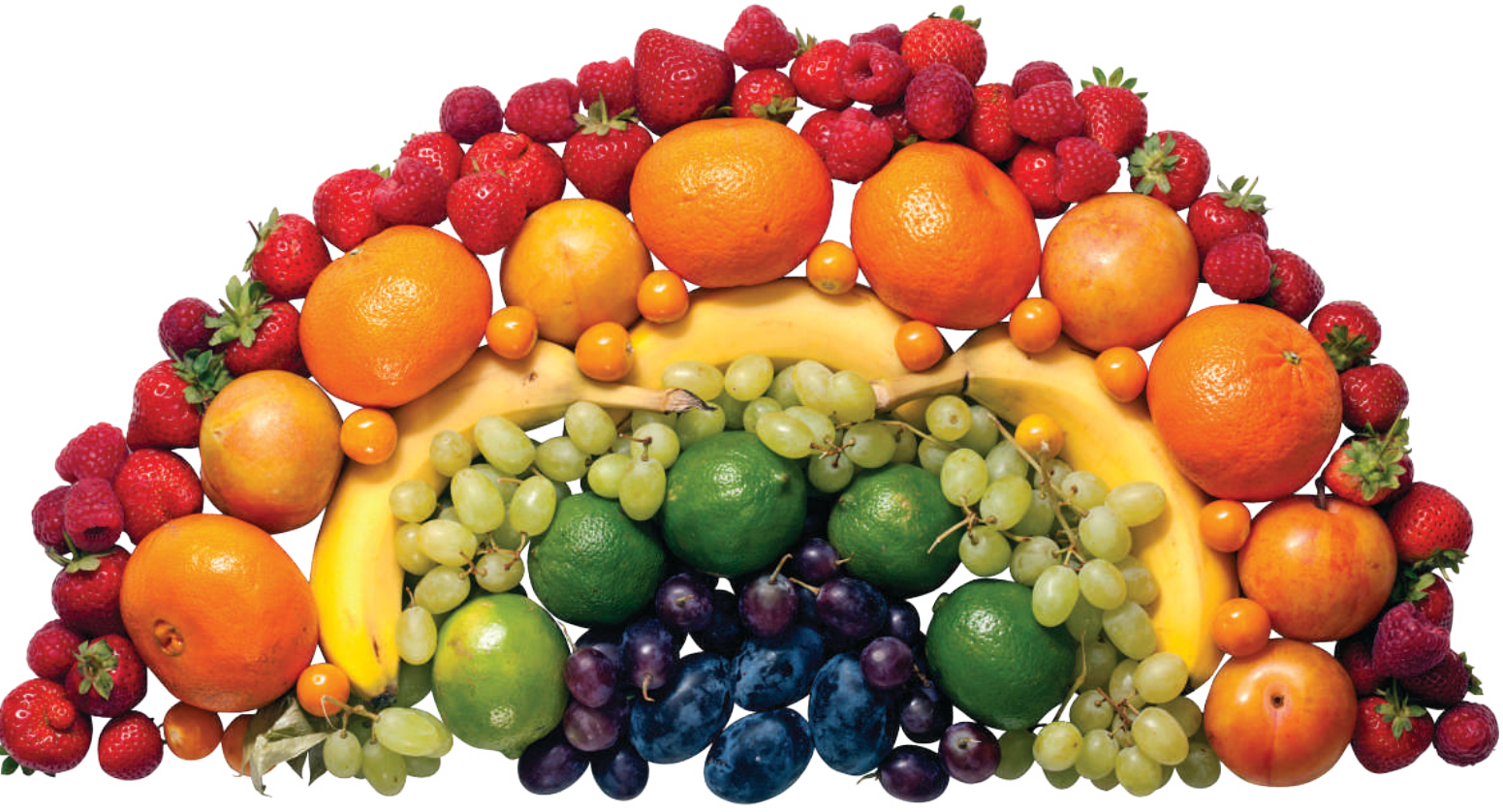

Figure 5.1 Fruits come in a rainbow of colours.

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KOREAN PEACH JELLY

This recipe is much firmer than other jellies and can be eaten with fingers, making it an ideal snack.

Makes 15–18 pieces
Main tools and equipment Bowl, measuring spoons and jug, saucepan, knife, peeler, jelly mould, refrigerator
Production skills Bloom, dice, mix, peel
Cooking processes Boil, simmer

Preparation time 15 minutes
Cooking time 10 minutes
Serving and presentation time 10 minutes
Total time 35 minutes, plus 4 hours setting time

INGREDIENTS

- 4 tablespoons cold water
- 16 g powdered gelatine
- 1 firm large peach
- 350 ml water extra
- 70 g caster sugar
- 1 teaspoon lemon juice

METHOD

1. **Bloom** the gelatine in the 4 tablespoons of water in a bowl.
2. Peel the peach and dice the flesh finely.
3. Put the peach skin and 350 ml of water with the sugar into a saucepan. Bring to the boil. Remove the peach skin and discard.
4. Put the peach flesh into the boiling water and simmer until just soft. Add the lemon juice.
5. Stir the gelatine liquid into the peaches, mix well.
6. Pour the mixture into a shallow jelly mould and place in the refrigerator until set, about 4 hours.
7. Cut into cubes and serve.

bloom Soften gelatine by sprinkling gelatine powder onto cool water and leaving for 10 minutes, and then microwave the mixture in 10-second bursts, stirring between each burst, until the mixture is clear

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History of fruit

The first forms of fruit eaten by hunter–gatherers were wild berries. Between 6000 and 3000 BCE, dates, olives, grapes, figs and pomegranates were domesticated in the Mediterranean area, whereas citrus, banana, apples, pears and stone fruits (e.g. apricots, cherries, peaches and plums) were domesticated in Central and East Asia around the same time. The Egyptians also cultivated fruit, which appeared in artworks as date palms and grape vines. During the fifteenth and sixteenth centuries, fruits from the Americas became available in Europe, including pineapple, strawberries, papaya and, of course, cacao. Perhaps the most recent fruit to become widely consumed are some of the tropical fruits such as kiwi, durian and mangosteen.

Figure 5.2 Fruit found by the hunter–gatherers or early farmers would not look a lot like the fruit we have today. Some fruits like the pomegranate still resemble their ancestors, but the pomelo is the ancestor of grapefruits and mandarins, and the fingered citron, or Buddha's Hand, has been bred over millennia to be our lemons and limes.

Figure 5.3 Some of the more recent additions to the selection of fruits available to us are the kiwi, durian and mangosteen, tropical fruits from Asian areas.

LEARNING REFLECTION

1. Describe the difference between a fruit and a vegetable. How are they similar?
2. Identify the difference between the carbohydrates found in fruits and vegetables.

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5.2 Indigenous fruits

LEARNING INTENTIONS

1 To recognise a few native Australian fruits.
2 To understand that traditionally Aboriginal and Torres Strait Islander peoples have the knowledge and skills to be able to process and eat foods that are toxic.
3 To develop skills in utilising Indigenous ingredients in cooking.

Many of the fruits native to Australia have unique qualities and have the potential to provide functional properties in commercial foods. We looked at the ability of the bush tomato to thicken foods in Chapter 4 on vegetables, but many fruits also have extremely high levels of antioxidants like vitamin C, which can be a rich source of nutrients. Fruits like Davidson's plum, quandong, finger limes and Kakadu plum are just a few of the native fruits that are becoming more available.

Zamia palm nuts are poisonous unless treated. The Noongar people developed a food-processing technique using **anaerobic fermentation** to make it easier to remove the fruit from the toxic seed, which they discarded.

anaerobic fermentation The chemical breakdown of substances by bacteria, yeasts or other microorganisms

Figure 5.4 Australian native fruits are becoming more available as cultivation of them for commercial sale increases. Shown here are the finger lime, desert quandong and Zamia palm. The Zamia palm seeds are poisonous unless processed correctly.

DESIGN BRIEF: AUSTRALIAN NATIVE INGREDIENTS

You have been asked to prepare a recipe for a Western Australian travel company that uses an ingredient native to Australia. They plan to showcase your recipe and the food that you have made at a travel expo to be held at the weekend. Use the internet to locate a recipe that contains an Australian native fruit or vegetable. Research where and how you can purchase this fruit or vegetable.
Work with your teacher to purchase the ingredient and prepare the recipe. Evaluate and analyse the recipe in terms of:

1 ease of purchasing the ingredient
2 cost of the ingredient
3 length of time to receive the delivered ingredient
4 sensory properties – appearance, aroma, taste/flavour and texture.

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FINGER LIME CUPCAKES

Makes 12
Main tools and equipment Knife, bowl, mixer, muffin pan, paper patty cases
Production skills Cream, mix
Cooking processes Bake

Preparation time 15 minutes
Cooking time 15 minutes plus 15 minutes to make the icing
Serving and presentation time 20 minutes
Total time 65 minutes plus cooling time

INGREDIENTS

CUPCAKES

- 150 g caster sugar
- 150 g room temperature butter
- 2 large eggs
- 175 g self-raising flour
- Pinch of salt
- Juice of 1 conventional lime, plus the pearls from 2 finger limes

LIME ICING

- 225 g room temperature butter
- 350 g icing sugar
- 1 tablespoon lime juice (from conventional lime)
- Pearls from a finger lime to decorate

METHOD

1. Preheat oven to 180°C. Put 12 paper patty cases into a 12-hole muffin tin.
2. Cream butter and caster sugar in a mixer until light and fluffy.
3. Add the eggs to the butter mixture, one at a time, beating well between additions (see note below).

Note: If the mixture curdles when you add the eggs, do not worry as it will fix itself when you add the flour.

4. Add the flour, salt and finger lime pearls and mix until combined.
5. Add a little lime juice until the mixture drops off the spoon easily. You may not need all of it.
6. Spoon the mixture evenly between the paper patty cases.
7. Bake for 15–20 minutes until well risen, golden brown and a skewer will come out clean.
8. Cool on a wire rack. Apply the icing when the cupcakes are completely cold.
9. To make the lime icing: cream the butter and icing sugar together until very fluffy. Add the lime juice and incorporate well.
10. To serve, pipe icing onto the cold cupcakes, and squeeze a few finger lime pearls on the top for decoration.

LEARNING REFLECTION

1. Suggest reasons why the native fruits of Australia are not available in commercial quantities as yet.
2. Aboriginal and Torres Strait Islander peoples have lived for thousands of years in Australia, adapting their lifestyle to the climate and the food supply available to them. Explain this statement.

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5.3 Structure of fruits: physical properties

LEARNING INTENTION

1 To understand how fruits are classified, and to be able to identify and name fruits from each classification.

The classification of fruit is based on common characteristics between fruits. This may be structural – for example, apples and pears – or where they are grown, such as tropical fruits. How fruits are classified can vary, as some fruits may fit into more than one group or category.

ACTIVITY 5.2
FRUIT CLASSIFICATION

Copy and complete the following table, which has been partially completed.

Classification	Description of the common characteristics	Examples
Citrus	The part commonly eaten is the soft and juicy segments. The fruit is covered in a thin, fragrant, shiny rind over a white pith. The rind is often used in food preparation. Some citrus fruits are sour, and some are sweet.	Mandarins, tangelo
Pomes		Apples, pears
		Pineapples, bananas, mangoes
Stone or drupes	One stone in the centre of the fruit surrounded by soft, sweet flesh and a thin skin that can be eaten. Often eaten raw but can also be cooked.	
Vines		Grapes
Melons		Rockmelon
	Small summer fruit, often deep red or purple in colour; sometimes having seeds on the outside. They make tasty jams but are also eaten raw.	

1 Complete the missing information in the boxes.
2 If a cell only lists one fruit example, provide at least two more.
3 Identify any fruits that do not fit into any of these categories.

LEARNING REFLECTION

1 Explain how fruit are classified.

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5.4 Primary production of fruit

LEARNING INTENTION

1 To investigate what and where fruit is grown in Australia.

Fruit is grown extensively in Australia. Because of its size and wide variation in climate and soil types, Australia can grow fruits that suit temperate zones such as apples and cherries in the south, but also tropical fruits such as mangoes and pineapple in the north, and everything in between.

Australia exports millions of dollars' worth of fruit each month. At one time citrus was our greatest export, now this has been replaced by strawberries.

INVESTIGATE 5.3

Go online to undertake research into a fruit of your choice that is grown in Australia. Present your information in a website or on a poster. Focus your research on the following:

- Background on your chosen fruit including description, uses, nutritional content and its classification. Also include a picture and a recipe that heroes your fruit.
- History of the fruit including where it originated
- Region/s in Australia where the fruit is grown – provide a map
- How the fruit is grown and how much is grown
- If the fruit is exported, how much and to where is the fruit sent. Also include the value of the export to Australia's economy.

LEARNING REFLECTION

1 Explain why Australia is able to produce an extremely wide variety of fruits.

5.5 Best-quality fruit: sensory properties

LEARNING INTENTIONS

1 To be able to say what good-quality fruit is.
2 To understand how to store fruit for maximum shelf life.

When buying fruit, you need to look out for indications of quality:

- plump and not mushy
- free from signs of bruising, damage, insects or mould
- well coloured and evenly shaped
- no sign of wrinkly skin.

Fruit should be stored carefully to maintain its properties. Most fruits are best kept in the fridge below 5°C to ensure the longest shelf life possible once they have ripened. Remember to wash your fruit, but only immediately before you are about to eat it.

TASTY TRIVIA

Bananas hate being stored in the fridge; they like to be kept at room temperature. Cold temperature causes a discoloration of the flesh.

Figure 5.5 Understanding what to look for when purchasing fruit is important to ensure value for money, but also so that it will last until it is consumed. This rotten apple will make the other apples rotten if not taken away. But is it wasted fruit?

LEARNING REFLECTION

1 How should fruit be stored?
2 Explain how you would identify fruit that is past its best quality.

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5.6 Cooking with fruit

LEARNING INTENTIONS

1. To understand the different ways that fruit can be cooked.
2. To be able to plan meals using fruit.
3. To understand the properties of different types of apples and how to prepare each to optimise their particular properties.

compote Fruit stewed or cooked in a syrup, usually served as a dessert

purée To blend process, sieve, mash and/or strain cooked food to the consistency of a soft paste or thick liquid

Fruit can be left raw or cooked whole or in large portions, referred to as **compote**, stewed, baked, mashed or **puréed**.

You will be familiar with fresh fruit in dishes such as fruit platters or perhaps in your lunchbox, which require minimal preparation. Fruit is also available processed, for example, canned, dried or frozen.

In Australia, fruit is most often associated with sweet dishes. However, in other cultures, such as in Middle Eastern societies, many meat dishes, such as tagines, contain dried fruit – like dried apricots, prunes, dates or sultanas. In Asia, sweet and sour dishes require the addition of a fruit such as pineapple to provide the sweet element of the dish.

ACTIVITY 5.4
APPLE TASTE TESTING

There are many different varieties of apples – have you thought about the differences in taste, texture or appearance? Are all apples the same?

1. Select four different apples that are in season at the same time, one classified as a cooking apple, such as a Granny Smith, and the others classified as eating apples, such as Royal Gala, Pink Lady and Jonathan.
2. Brainstorm words that could be used to describe the taste, texture and appearance of each type of apple, for example, sour or soft.
3. Give an opinion about each apple. Select the preferred apple. Justify your choice based on the properties of the apple.

Figure 5.6 Rhubarb purée and rhubarb compote

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TASTY TRIVIA

The apple variety Granny Smith originated in Australia. It was discovered by Maria Ann Smith, who had an apple orchard, in 1868. It was an entirely new variety of apple that must have been a cross pollination of two other varieties of apples. She found a chance seedling, allowing it to grow to maturity and fruit. This apple has become popular world-wide as a cooking apple.

Check out apples

The apple is the most popular fruit in Australia. The best loved older varieties are Granny Smith and Red Delicious, and the most popular new varieties are Royal Gala and Australian Fuji. Many varieties are available to suit a range of tastes and food-preparation situations.

The apple and pear crumble recipe following is a good dessert as it has a low glycaemic index (GI), which means that not only is it tasty, but unlike most desserts, you feel full for some time after you have eaten because it breaks down slowly and takes some time to digest.

Figure 5.7 There are a multitude of different apples, each with different physical characteristics and suitable for different purposes. What characteristic might you want in an eating apple? A cooking apple?

DESIGN BRIEF: WHAT'S THAT FRUIT?

EXTENSION

1. Choose a type of fruit that you have not worked with before.
2. Design a product that will showcase this fruit as the 'hero', and thus encourage more people to try it.
3. Prepare a sensory analysis card that you can give to people who taste your final product. Include a tasty trivia fact about the type of fruit with which you are working.

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APPLE AND PEAR CRUMBLE

Serves 2 generous portions
Main tools and equipment Knife, spoon, measuring spoons, measuring cup, grater, ramekins, bowl
Production skills Core, peel, chop, rub in
Cooking processes Simmer, bake

Preparation time 30–40 minutes
Cooking time 20–30 minutes
Serving and presentation time 5 minutes
Total time 55–75 minutes

Skill demonstration: Rubbing in

INGREDIENTS

FILLING

- 1 Granny Smith apple
- 1 Packham pear (firm)
- 30 ml grape or apple concentrate (available in health food stores)
- ½ tablespoon water
- ½ cinnamon stick
- 2 cloves

CRUMBLE

- 6 tablespoons wholemeal flour
- ¼ teaspoon cinnamon
- ¼ teaspoon mixed spice, nutmeg or allspice
- ½ teaspoon baking powder
- 40 g butter
- 1 tablespoon rolled oats
- 1 tablespoon grape or apple concentrate, honey or brown sugar to bind
- ¼ cup shredded coconut
- 1 tablespoon slivered almonds
- Zest of 1 small lemon

METHOD

1. Preheat oven to 190°C.
2. To make the filling: peel, core and chop the apple and the pear.
3. Place the apple and the pear into a saucepan with the grape or apple concentrate, water and whole spices. Simmer on medium heat until apples are tender but not mushy. Take out spices.
4. Place the apple mix into individual ramekins. Place ramekins on an oven tray.
5. To make the crumble: mix flour, spices and baking powder in a bowl.
6. Rub in the butter until mixture is crumbly.
7. Mix in rolled oats, juice concentrate (alternatively honey or brown sugar), coconut, almonds and lemon zest until it clumps together a little.
8. Add a thick layer of crumble over the top of the apple mix. Bake in the oven at 190°C for 20–30 minutes, until golden.
9. For a fuller flavour, drizzle a little olive oil over the top of the crumble before serving. Serve warm with cream, ice-cream or vanilla yoghurt.

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COLLABORATE 5.5

In a group of four you will be comparing apples before and after cooking for taste, texture, appearance and the impact of air on **oxidation**.

oxidation The chemical combination of a substance with oxygen

1 Working in your group, select one apple of each variety.
2 Cut each apple in six pieces, leaving the skin on.
3 Use one piece to test oxidation, four pieces for tasting, and reserve one piece to cook.
4 Oxidation: Leave one piece sitting on a plate for as long as you can (at least as long as it takes to complete the other steps). Observe what happens and record your results in the table below. Make sure each person in your group tests each apple and records their own results. Copy and complete this table to record results.

Oxidation	Taste	Texture	Appearance
Apple 1			
Apple 2			
Apple 3			
Apple 4			

5 Uncooked pieces. Copy and complete this table to record results.

Uncooked pieces	Taste	Texture	Appearance
Apple 1			
Apple 2			
Apple 3			
Apple 4			

6 Cooked pieces. Place the apple pieces in a small saucepan or microwave dish with 1 teaspoon water. Microwave for one minute or simmer gently for two minutes, making sure the water does not evaporate and the apple burn. Copy and complete this table to record results.

Cooked pieces	Taste	Texture	Appearance
Apple 1			
Apple 2			
Apple 3			
Apple 4			

7 Compare and contrast the results for each apple. Comment on the impact oxygen and heat have on the properties of the apple.
8 Select your preferred apple and justify.

EXTENSION

9 Explain why each student in the group needed to test their own apple pieces and not just share results.
10 What properties are desirable in a piece of fruit that will be used for eating fresh? What properties would be desirable for a piece of fruit that will be cooked? Will the properties differ with different dishes? Explain.

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LEARNING REFLECTION

1 Write the classification of the following fruits: lychee, strawberry, lemon and blueberries.
2 Outline the benefits of eating two pieces of fruit every day.
3 Compare the characteristics of a citrus fruit and a pome fruit.
4 List two different methods of cooking fruit. Describe the impact this cooking method has on the properties of fruit.
5 Name a recipe where fruit is used in a savoury meal. Prepare this savoury meal and evaluate the sensory properties.

5.7 The nutritional content of fruit

LEARNING INTENTIONS

1 To determine how we can easily tell if we are eating a nutritionally balanced diet of fruit.
2 To understand the place of fruit in the Australian Guide to Healthy Eating plan.
3 To understand the term 'carbohydrates'.
4 To understand the difference between starches and sugars and to be able to identify that sugars are more often associated with fruit.

For most of us, fruits and vegetables are an everyday part of our diet – although probably not in the amounts that nutritionists recommend.

What fruits and vegetables should you eat? A simple suggestion is, like vegetables, consume the rainbow for the best mix of nutrients provided by fruits. If you mix the colours, you will naturally be eating a mix of essential vitamins and minerals. Mix as many colours as possible.

COLLABORATE 5.6

Working as a class, for each colour of the rainbow think of fruits that would be classified under this colour.

The value of eating plant foods is becoming more and more apparent. When people refer to fast food, they are usually referring to hamburgers or fish and chips, but what could be faster than an apple or celery stick? Let's look at what a banana offers as a natural 'fast food'. Bananas offer:

- a biodegradable package
- flexibility in how they can be processed
- flexibility in how they can be prepared
- many different ways of serving
- long-lasting energy.

Carrots offer lots of vitamins, minerals and dietary fibre. The variety of fruits and vegetables available means it is easy for them to be part of our everyday diets.

INVESTIGATE 5.7

Go online to the Nutrition Australia website for information about packing a lunch box.
1 Analyse the contents of your lunchbox – does it contain enough fruits and vegetables?
2 Set yourself a challenge to improve your lunch box contents for a week, using what you have learned from your research.

In the Australian Guide to Healthy Eating, fruit and vegetables are separated. It is recommended that we consume at least two serves of fruit a day, but five of vegetables, even though both fruits and vegetables, especially fresh ones, are a great source of vitamins, minerals, water and other essential nutrients. So why are they separated?

The explanation for this has been answered a little earlier in this chapter – the carbohydrates in vegetables are mainly starches; however, in fruit the main carbohydrates are in the form of sugar, which when over-consumed has been linked to many lifestyle diseases (see Chapter 3). Carbohydrates are also found in large quantities in cereals, but again they are predominantly in the form of starches and more complex molecules which take longer to digest. We will look at carbohydrates in a little more detail in the next section.

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Figure 5.8 Fruit is one of the five essential food groups recommended in the Australian Guide to Healthy Eating.
Based on material provided by the National Health and Medical Research Council.

INVESTIGATE 5.8

EXTENSION

The Australian Government recommends we consume five serves of vegetables and two serves of fruit a day to maintain health.

Search online for the Fruit & Vegetable Consortium to read their advocacy report, which recommends a joint action plan to improve the health of Australians, by increasing our consumption of fruits and vegetables.

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DESIGN BRIEF: FRUITS AND VEGETABLES MEAL PLAN

Are you consuming enough fruits and vegetables a day? List the fruits and vegetables you have eaten over the last week.
Design a meal plan that will ensure you increase the amounts of fruits and vegetables you are eating every day, swapping the 'sometimes' foods for 'everyday' foods. See if you can stick to your plan.

Figure 5.9 Plants use the energy of the sun to convert simple molecules from the air into the carbohydrates we eat.

Essential nutrients: carbohydrates

Plants **photosynthesise**, meaning they take simple carbon dioxide and water and the energy from the sun, and turn these into sugars. These sugars are then converted by the plant into starches and cellulose. It is from plants that we obtain the carbohydrates in our diet.

photosynthesis The process by which green plants and other organisms turn carbon dioxide and water into carbohydrates

Carbohydrates are the preferred energy source for the body, and 55 per cent of your daily energy should come from this nutrient. When digested, all carbohydrates – both starch and sugar – are broken down into glucose, which is then used as energy during any bodily activity. If not used, carbohydrate is stored as glycogen in the liver and muscle tissue to be released as glucose when required.

Carbohydrates are divided into two groups: **complex carbohydrates** and **simple carbohydrates**.

complex carbohydrates Molecules that supply energy, fibre and other nutrients that the body needs

simple carbohydrates Quick energy sources that do not supply any other nutrients except energy

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Table 5.1 Simple and complex carbohydrates

Name			Description
Simple carbohydrates	Monosaccharides	Glucose	Simple sugar made by plants; however, the human body can manufacture it from other substances. 
		Fructose	Also known as fruit sugar. Honey is made up of 21 to 43% fructose. 
		Galactose	Found in milk, but recent studies show tiny amounts appear in some fruits and vegetables. 
	Disaccharides	Sucrose	One molecule of glucose + one of fructose. It is the white, crystalline sugar we cook with. 
		Lactose	One molecule of glucose + one of galactose. Sugar of milk. Many people are intolerant to this sugar. 
		Maltose	Two molecules of sucrose. This sugar is made by seeds as they break down stored energy to sprout. Barley is sprouted and malt extracted to make beer. 
Complex carbohydrates			Also known as polysaccharides. Includes plant-based starch and fibre, but also animal-based glycogen. 

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Functions of carbohydrates in the body

Carbohydrates have many functions in the body, including providing energy.

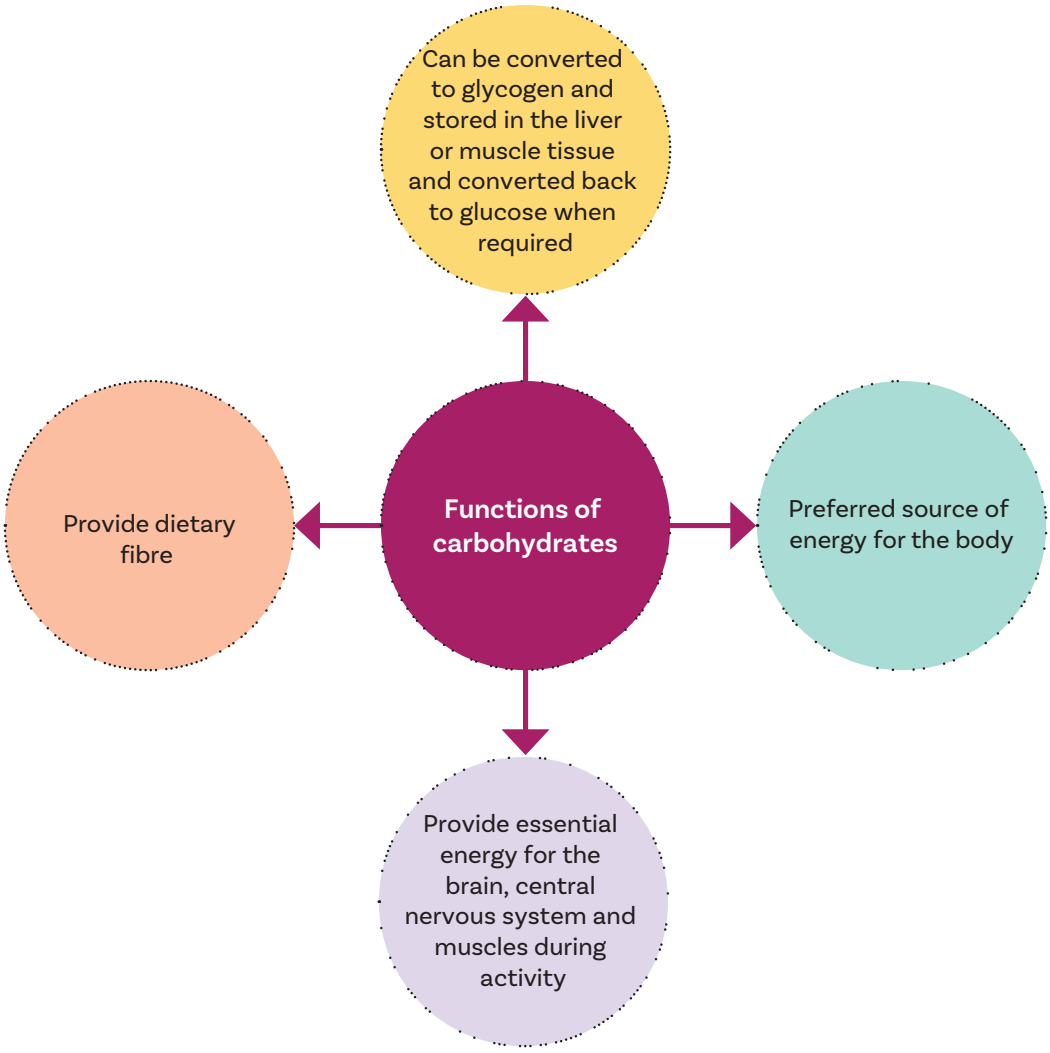

Figure 5.10 Functions of carbohydrates

Good carbohydrate foods

The carbohydrates that are the best for good nutrition are those that are found in foods that are starch based, not sugar based. **Nutrient-dense** carbohydrate foods are recommended, for example:

- vegetables
- fruits
- wholemeal pasta
- potatoes
- bread and wholegrain cereals.

nutrient-dense
Containing a large amount and number of different nutrients in comparison to the amount of energy they provide

In Chapter 6 Grains and cereals, we will be looking in more detail at fibre, which is also associated with fruits and vegetables.

TASTY TRIVIA

Have you ever noticed that if you eat a high-sugar (often brightly coloured) breakfast cereal that you become hungrier quicker than if you eat a cereal that is high in fibre, wholemeal and contains no added sugar? If you read the boxes of cereal, you will find that usually they contain a similar number of kilojoules per 100 g to each other. Why, then, do you get hungry quicker with the high-sugar cereal? This is partly because wholemeal cereals take longer to digest, so you feel fuller for longer.

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INVESTIGATE 5.9

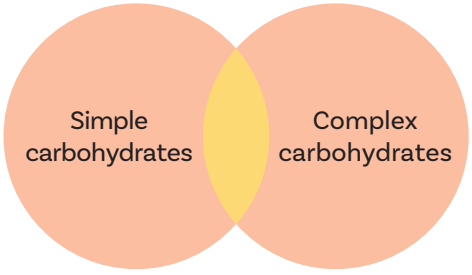
EXTENSION

Go online to research information on the glycaemic index (GI). This is a measurement of how quickly carbohydrates are digested, absorbed and metabolised in the body. The GI measurement is often used by those wishing to improve their diet, particularly if they have type 2 diabetes.

1 What is type 2 diabetes? What are the symptoms? What are some of the causes of this disease?
2 How may the GI be used by sufferers of type 2 diabetes?
3 List all the foods you have consumed in the last 24 hours.
4 Research the GI values of the foods on your list to analyse your diet. Use the University of Sydney Glycaemic Index site or the Glycaemic Index Foundation site to help you get started.
5 Place an up arrow next to those foods that are high GI and a down arrow next to those foods that are low GI.
6 How good is your diet in relation to the GI? How could it be improved?
7 Plan a day's food intake that will enable you to consume a low-GI diet.
8 Try putting your plan into action.

LEARNING REFLECTION

1 State the functions of carbohydrates.
2 Explain the difference between a simple and a complex carbohydrate.
3 Copy and complete the following Venn diagram to illustrate the similarities and differences between simple and complex carbohydrates.



4 Sugary foods provide the body with carbohydrate but are not considered a good source of carbohydrates. Explain why this is so.

5.8 Fruit and environmental sustainability

LEARNING INTENTIONS

1 To develop skills to reduce a person's carbon footprint when selecting and consuming fruit.
2 To understand the term 'carbon footprint' and how it relates to fruit.
3 To develop skills in repurposing food that would usually be waste, and to identify the advantages of this process.

Fruits and vegetables are cheaper and at their best when purchased in season, and Australia is well known for its fresh and tasty fruit. But when you visit the supermarket, you are always able to purchase fruits out of season because they are imported from other countries, for example, oranges from Spain, cherries from the United States, blueberries from New Zealand and coconuts from Samoa.

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Figure 5.11 Foods made in Australia will have travelled less distance than those imported from other countries, and therefore the impact of the transport on the environment will be lower.

Why do we have out-of-season, non-local fruits in our supermarkets, and should we buy these? If we purchase locally grown Australian fruits and vegetables, it creates jobs and boosts our economy. Australia has the resources to produce enough fresh food to feed everyone, so do we really need to import fruits and vegetables from other countries?

Many people choose not to buy foods out of season because of the effects on our local farmers and environment. Imported fruits and vegetables have a high carbon footprint, often travelling thousands of **food miles** before hitting our stores and tables. So how important is it to be able to eat cherries all year round? Only you can be the judge of that.

food miles The distance food products travel from where they are produced to where they are purchased and consumed

INVESTIGATE 5.10

EXTENSION

Go online to a food miles calculator, such as the one on the Food Miles website.
Go to your pantry or look on a supermarket shelf to find a fruit that was produced in Australia, and another that was produced in another country. These do not have to be fresh fruit; they can be processed fruit such as canned. Use the food miles calculator tool to calculate the number of food miles that each fruit has travelled.

1. Which fruit cost more? Suggest reasons why one is cheaper than the other.
2. If the imported fruit is cheaper, why don't the food miles travelled seem to have an impact on the price? If the food product is more expensive, why is it being sold in Australia?
3. What impact might the food miles travelled have on the environment?
4. What can you do as a consumer to reduce your impact on the environment?

What can you do to reduce your environmental impact?

Apart from consciously choosing fruit that has been produced in Australia and eating fruits that are 'in season', there are inevitably going to be times when you must waste some of the fruit that the family has purchased, because it is not palatable or may be inedible. This may be fruit that has sat around

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for too long and gone soft or may be the peel off the orange or banana you ate for lunch. Even this fruit can contribute to greenhouse gas emissions, both while decomposing in landfill and when it was being produced.

Composting of these organic 'wastes' can be done at home. This process is especially good for the soil and growing plants including vegetables and fruits.

But there are other uses for kitchen scraps such as banana skins. See the banana skin cake recipe for how to use banana skin waste.

Figure 5.12 Green wheelie bins are provided by many councils and are designed to take organic waste such as lawn and pruning clippings, but some councils also allow food scraps like fruit peel to be included. This organic waste is then composted and recycled into plant fertiliser for farmers.

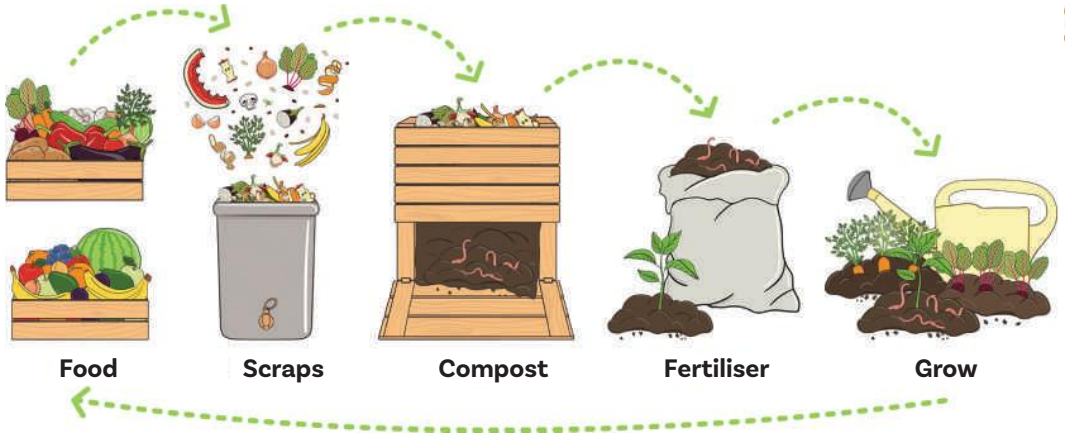

Figure 5.13 The lifecycle of compost in a home garden

Figure 5.14 Apple cores and peels can also be used to make preserves, such as apple jelly or apple syrup to pour over ice-cream. Orange and other citrus fruits can be candied to use as a decoration, put into a cake or biscuits, or used as a garnish. Dried citrus peel can also be used as firelighters!

INVESTIGATE 5.11

Go online to discover what other fruit waste can be repurposed away from the rubbish.
To start you off, look for recipes for watermelon rind.

LEARNING REFLECTION

1 Define the term 'carbon footprint'.

2 Explain how you can reduce your carbon footprint as it relates to fruit consumption.

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RECIPE

BANANA SKIN CAKE

Note: some people may have a reaction to banana skins, especially those who are intolerant to latex.
Makes 1 large cake
Main tools and equipment Wooden spoon, measuring spoons, measuring cup, bowl, 2 x 20 cm round cake tins, small saucepan, knife, skewer
Production skills Cream, mix, sift
Cooking processes Boil, simmer, bake

Preparation time 30 minutes
Cooking time 25 minutes
Serving and presentation time 5 minutes (more if frosting is being made)
Total time 60 minutes

Skill demonstration: Separating eggs

INGREDIENTS

- 2 skins from large bananas, with hard ends removed. Ensure they are well washed.
- 1 cup water
- 125 g softened butter
- 1½ cups raw sugar
- 2 large eggs, separated
- ½ cup buttermilk
- 1⅔ cup self-raising flour
- ½ teaspoon salt

METHOD

1. Preheat oven to 180°C. Grease and line the base of the cake pans.
2. Cut the peels into 2 cm pieces, place in a small saucepan with the water and bring to the boil over medium heat. Reduce to a simmer and cook for 10 minutes. Remove the pan from the heat and cool slightly. Strain the banana peels, reserving ¼ cup of the cooking liquid. Using a stick blender, process the skins and reserved liquid until smooth.
3. Cream butter and sugar in a bowl until pale and fluffy. Add the egg yolks one at a time, mixing until incorporated. Scrape the sides of the bowl as you go.
4. Mix in the banana mixture and salt, and then stir in the buttermilk until well combined.
5. Sift the flour, add to the butter mixture, and mix gently until just combined.
6. Put the egg whites into a clean dry bowl and whip until soft peaks form. Gently fold this mixture into the cake batter. Divide this mixture between the cake pans.
7. Bake for approximately 25 minutes, or until the cake pulls away from the sides and a skewer inserted in the middle comes out clean.
8. Cool on a rack.

EXTENSION

Search online to find a cream cheese frosting recipe to make for your cake, if desired.

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Review

1 Fruits are the edible part of a plant that contains the seed.
2 There is evidence of the cultivation of fruit dating back over 8000 years.
3 There are many fruits native to Australia and their use is becoming more familiar.
4 Fruits are classified according to how and where they grow and common characteristics between them.
5 Australia has an extensive horticultural program growing fruit.
6 There is a considerable flexibility in the way fruits can be cooked, served and eaten.
7 Fruit provides us with significant nutritive value.
8 It is possible to reduce our impact on the environment by wise use of fruits.

Test your knowledge

Multiple-choice

1 The number of serves of fruit a day you should eat is:
   a one.
   b two.
   c five.
   d seven.
2 Which one of the following are examples of fruit classifications?
   a Stone, tubers, vines, pomes
   b Citrus, seed, stone, berries
   c Pomes, vines, bulb, shoots
   d Citrus, stone, pomes, vine

True or false?

1 Once fruit has become wrinkly, it should be thrown out.
2 Some parts of fruits, like the peel of bananas and the core and peel of apples, are always waste because they cannot be consumed.
3 A purée and a compote are cooked the same way.

Short-answer

1 The carbohydrates from fruit and from vegetables are the same, but they are also different. Explain.
2 Describe two different things you can do to reduce your carbon footprint in relation to your consumption of fruit.

Extended-response

EXTENSION

'What we eat not only affects our health, but also has major environmental, ethical and economic implications.'
Source: © Victorian Health Promotion Foundation (VicHealth), 31 March 2009. Source material available at www.vichealth.vic.gov.au.

In a group of two or three, you are to make a podcast that explores this statement in relation to fruit consumption. You can look at this in terms of the consumer or you can look at this in terms of the whole country and/or world.

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CHAPTER 6
Grains and cereals

BEFORE WE BEGIN

1. What is a cereal?
2. Identify what a staple food is and the staple foods of Australia, China and Japan.
3. List the parts of a cereal grain and the nutritive content of each.
4. Suggest ways that wheat can be used in the preparation of different food products.

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6.1 Cereals: the basics

LEARNING INTENTIONS

1 To define the terms 'cereal' and 'staple foods'.
2 To understand the ancient history of cereal growing in the world.
3 To understand the primary production of rice in Australia.

cultivate To prepare the land and soil for the growing of crops and cereal grains

Cereals or cereal grains are grasses **cultivated** (grown) for their edible parts or seeds. Grain foods, which include cereals, are the dietary staples for many cultures. For many of us in Australia, wheat is the most important cereal.

History of cereals

The word 'cereal' is derived from Ceres, the name of the ancient Roman goddess of harvest and agriculture. People have enjoyed grain foods for at least the past 10 500 years. It is believed that people started to cultivate weeds and grasses in fertile regions in the Middle East. In China, 1000 years later, rice and millet were cultivated from wild grasses, and corn was the main grain being cultivated in the Americas.

staple food A food that makes up the dominant part of a population's diet

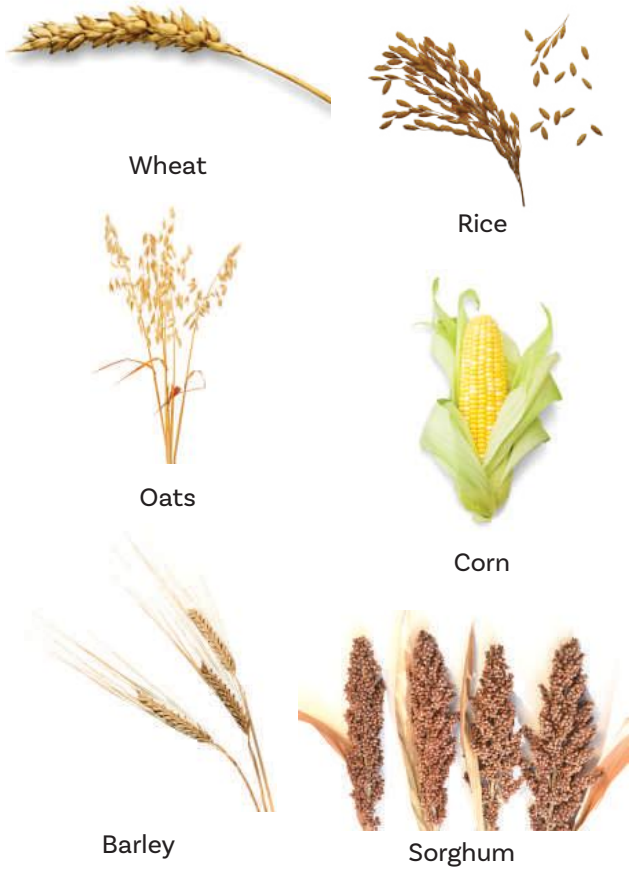

Figure 6.1 Cereal plants

COLLABORATE 6.1

As a class, brainstorm where the following **staple foods** were first domesticated, then complete some research to verify your answers:

- maize/corn
- wheat
- rice
- sorghum
- barley
- oats
- sago
- spelt
- rye
- millet
- quinoa
- amaranth
- kamut.

Divide the cereal grains among your class and prepare a visual display (poster or PowerPoint) to explain where the cereal originated and provide a little information about the cereal:

- what it looks like
- where it grows
- where in the world it is consumed.

Include a recipe that uses this grain.

ACTIVITY 6.2
RICE GROWING IN AUSTRALIA

EXTENSION

Rice in Australia is grown mainly in the Murray–Darling basin using irrigation from these rivers. The amount of rice planted each year is dependent upon the amount of water that is available to farmers. We predominantly grow medium grain rice, of which over 70 per cent is exported. Australians consume over 300 000 tonnes of rice annually, of which around 150 000 tonnes (mainly long grain) is imported.

Discuss the advantages of saving food miles by producing our own rice and not importing it versus the environmental disadvantages of growing rice in Australia.

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BUBBLE TEA MILKSHAKE

This is a Taiwanese drink originally made with brewed tea, either black, green or white; however, nowadays the 'bubbles' can be added to almost any chilled drink, including milky or fruity flavoured drinks. This recipe uses sago (seed tapioca) as the pearls; however, the boba (pearls) can be made and the recipe is also provided for you on the following page. Note that tapioca pearls come in different sizes, and larger pearls will require longer cooking time.

Serves 1
Main tools and equipment Spoon, glass, measuring jug, measuring spoon
Production skills Stir, drain, pour
Cooking processes Boil

Preparation time 15 minutes
Cooking time 20 minutes
Serving and presentation time 5 minutes
Total time 40 minutes

INGREDIENTS

- 1 tablespoon of sago (seed tapioca)
- 1 tablespoon of your favourite topping (e.g. strawberry, chocolate)
- 250 ml milk
- 1 tablespoon skimmed milk powder (optional)

METHOD

1. Cook the sago in a small saucepan of boiling water for 10 minutes or until the sago is soft, stirring occasionally so the sago doesn't stick.
2. Remove the pan from the heat, cover and let stand for a further 10 minutes.
3. Drain the sago, and rinse under cold water. Place in a small bowl, cover with cold water and refrigerate until needed.
4. Blend the topping with the milk and milk powder until frothy.
5. Drain the sago and spoon it into a tall glass. Pour the milk mixture over the top of the sago and stir.

TASTY TRIVIA

Sago comes from the sago palm, which grows in South-East Asia. When it is processed, it looks like little balls or pearls. To collect the sago, the bark from the trees is peeled back from the trunk and the inner section is cut into pieces. The pith is scooped out and ground into powder, which is then washed and dried into flour. The pearls are made by washing the wet starchy paste through a sieve, which is placed on a hotplate to dry the paste quickly into small balls. Pearl tapioca is made from the root of the cassava plant. It is processed in a similar way to sago but is more widely available and commonly used in bubble teas.

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EXTENSION

BOBA

Serves This recipe makes many boba, which can be stored in the refrigerator for 2 days in a sealed jar
Main tools and equipment Measuring spoons, jug and scales, saucepan, metal spoon, wooden spoon, knife, sieve, bowl, plastic wrap
Production skills Stir, drain, pour, sieve, measure
Cooking processes Boil, simmer

Preparation time 20 minutes
Cooking time 40 minutes
Serving and presentation time 10 minutes
Total time 70 minutes

INGREDIENTS

- 3 tablespoons water
- 2½ tablespoons dark brown sugar
- 90 g tapioca starch
- 70 g brown sugar
- 140 ml water

METHOD

1. Combine the 3 tablespoons of water and the dark brown sugar in a medium-sized pan and put over a low heat to dissolve the sugar, stirring constantly until it has dissolved and boils. Take it off the heat.
2. Add 1 tablespoon of the tapioca starch and stir vigorously to dissolve the starch, ensuring you get no lumps.
3. Return to a medium–low heat and cook gently, stirring continuously until the mixture starts to bubble. Turn off the heat immediately and continue to stir vigorously as the mixture thickens.
4. Add the remaining tapioca starch and mix gently. It will feel a little dry to begin with but continue until the starch is incorporated.
5. Turn the dough onto a smooth surface and knead until very smooth. It will feel dry and 'squeaky' at first.
6. Wrap the dough in plastic wrap to prevent it drying out.
7. Divide the paste into eight pieces. Working with each piece at a time, roll into a long sausage 5 mm in diameter and then cut these into 1 cm pieces.
8. Roll each small piece into a ball between your palms and place them in a shallow bowl with extra starch, rolling the balls around to coat. If your hands get sticky, dust them lightly with a little tapioca starch.
9. Bring a large pot of water to the boil over high heat. When the water is boiling, slip the balls in and return to the boil, stirring constantly to prevent them from sticking.
10. When the boba float, turn the heat down to a simmer and cook for 20 minutes, stirring occasionally to prevent sticking. The mixture will thicken.
11. Turn off the heat and cover and let sit for 20 minutes.
12. Use a sieve to remove the balls from the excess liquid, rinse with cold water to remove excess starch.
13. Place the boba pearls into iced water and rinse again.
14. Return the boba to a medium saucepan, add 70 g brown sugar and 140 ml water. Bring to the boil and cook for about 5 minutes until the mixture thickens, stirring constantly.
15. Store the boba in their syrup in the refrigerator.

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LEARNING REFLECTION

1 What is a staple food? Name three staple foods and an example of a country they come from.

2 Make a list of the different cereal grains and highlight the ones you have eaten.

EXTENSION

3 Staple foods are often cereals. Suggest reasons for this. What part does a staple food play in the culture of a country?

6.2 Structure of cereals: physical properties

LEARNING INTENTION

1 To be able to state the three parts of a cereal grain and the nutritive contribution each makes to the diet.

Grains consist of three main parts:

- The **bran** – the protective outer layer of the grain. This outer husk is often removed during processing, such as when making white rice. The bran is high in dietary fibre and B group vitamins.
- The **endosperm** – the main part of the grain. The endosperm contains starch: carbohydrates, protein and some vitamins and minerals.
- The **germ** – the smallest part of the grain and the seed for a new plant. This part of the grain contains B group vitamins, some proteins, minerals and **essential fatty acids**.

bran The protective outer layer of the grain

endosperm The main part of the grain

germ The smallest part of the grain where the new plant will grow from

essential fatty acids 'Good' fats; the body does not produce these, so they must be consumed from food such as nuts, avocado and fish

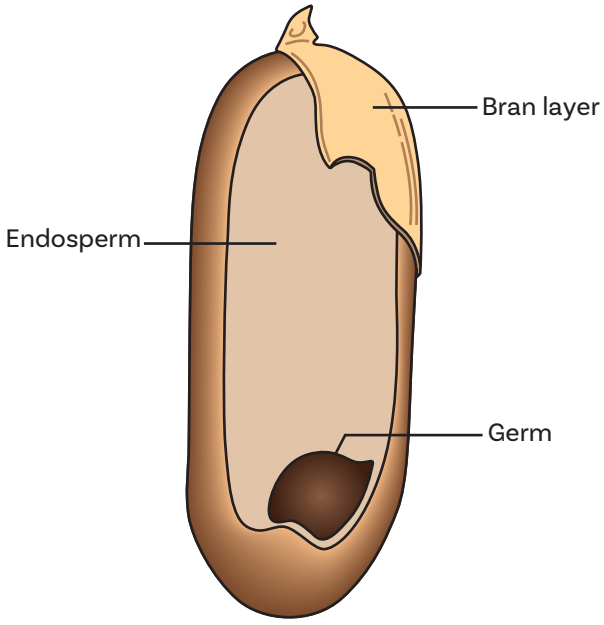

Figure 6.2 Cross-section of a cereal grain

LEARNING REFLECTION

1 Copy and complete the table below.

Part of the grain	Description of this part	Nutritive contribution of this part of the grain
Bran		
Endosperm		
Germ		

EXTENSION

2 Find a recipe that uses extra bran and another that uses extra wheat germ. Explain why these ingredients have been added to each recipe. What effect might these ingredients have on the sensory properties of each dish?

6.3 Primary production of cereals

LEARNING INTENTIONS

1 To understand the terms 'agriculture', 'horticulture' and 'aquaculture'.

2 To gain an insight into the contribution cereals make to the Australian economy.

3 To consolidate skills in clarifying the components of a food system.

Australia earns a huge amount from its agricultural exports. Indeed, they reached a record $67.5 billion in 2021–22.

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Figure 6.3 Wheat is one of Australia's main exports.

So far, we have learned about fruit and vegetable production. Both of these are considered to be **horticultural** farming, as they involve the farming of fruit and vegetables, but also trees, flowers, shrubs, turf, fruits and nuts. **Agriculture** includes the cultivation of crops and the farming of animals. Australia's export market also includes **aquaculture**, which is the raising of aquatic animals and plants for food.

horticulture The branch of agriculture that deals with plant cultivation, particularly fruits, nuts, seeds, herbs, mushrooms

agriculture The science or practice of farming, including cultivating the soil for the growing of crops and rearing of animals for food and fibre

aquaculture The cultivation of aquatic plants and animals

Cereal production significantly contributes to Australia's agricultural income. Wheat is a major crop; however, barley, oats, oil crops like canola, beans and lentils are also grown.

ACTIVITY 6.3
FOOD SYSTEM: WHEAT

A food system involves four components, as outlined in Chapter 4. Think about a piece of bread that you may consume. Draw a flow chart showing the components of production, processing, transport and consumption that were involved in making that piece of bread.

EXTENSION

Draw a food system web that includes the components in a ham and cheese sandwich.

Figure 6.4 The ingredients in a ham and cheese sandwich have been through many stages in their journey through the food system before you get to eat them.

LEARNING REFLECTION

1 Define the terms 'agriculture', 'horticulture' and 'aquaculture'.

2 Give at least three examples of food products that are produced in Australia for each of these three farming methods.

EXTENSION

3 Using a diagram, describe the difference between a flow chart and a web chart.

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6.4 Cereals and wholegrain foods

LEARNING INTENTIONS

1 To be able to define refined and wholegrain cereals.
2 To be able to identify and list refined and wholegrain cereals.
3 To recognise the health benefits of consuming more wholegrain cereals and less refined cereals.

Many different cereal grains are eaten throughout the world. They include wheat, rice, barley, oats, rye and corn. They can be eaten as wholegrain cereals and are often processed or made into refined cereals. Both wholegrain and refined cereals play a significant part in the diet of most Australians.

TASTY TRIVIA

Research has shown that consuming one serve of wholegrain cereal every day can reduce the risk of developing type 2 diabetes.

Health and wholegrain foods

According to the Better Health Channel:

> High-fibre foods such as wholegrain cereal products increase movement of food through the digestive tract. The result is increased stool (faeces or poo) bulk, softer and larger stools, and more frequent bowel actions. This provides a good environment for beneficial bacteria, while decreasing levels of destructive bacteria and the build-up of carcinogenic compounds. Wheat fibre can bind certain toxins and remove them from the large bowel. A high-fibre diet, especially one high in insoluble fibre, has been associated with decreased risk of developing colon cancer and diverticular disease (a condition where 'pouches' form in the wall of the intestine).

Figure 6.5 Refined flour is made of the endosperm that has been ground.

COLLABORATE 6.4

As a class, list the cereals (not just breakfast cereals, but all cereal products) that everyone has eaten over the last week. Put a tick next to the ones that people have eaten that are wholegrain. Discuss with the class how the cereals that were not wholegrain could be swapped out for wholegrain ones.

Wholegrain cereals

Wholegrain cereals contain all three layers of the grain and are a rich source of many essential vitamins, minerals and **phytochemicals**.

wholegrain The fibre-rich outer coating of bran, the central endosperm, and the nutrient-packed inner germ of the grain

phytochemicals Chemicals found in plants that can help to prevent disease

The beneficial nutrients and phytochemicals found in cereals occur in the outer layers of grains such as wheat, rice, corn, millet, sorghum, barley, oats and rye.

Wholemeal foods are made from wholegrains that have been milled to a finer texture rather than being left whole in the final product. Nutritionally, wholegrain and wholemeal foods are similar.

Wholegrain cereal products include wholemeal or wholegrain breads or crispbreads, dark seedy breads, wholegrain breakfast cereals, wheatgerm, brown rice, puffed wholegrains, bulgur, popcorn and oatmeal.

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Figure 6.6 Unrefined and refined flours are made into bread.

refined When the composition of the cereal grain is altered, the bran is often removed to make the cereal grain easier to use

Refined cereals

When grains are **refined**, milled or ground – for example, to produce white flour – the bran and germ layers generally are removed, leaving only the endosperm. This refining process results in the loss of many nutrients, including dietary fibre, vitamins, minerals and important phytochemicals. Refined cereals generally have a higher glycaemic index than wholegrain cereals. This means that eating refined cereals causes a sharp rise in blood sugars, demanding a strong response by the body to reduce them as prolonged high blood sugar levels are detrimental to many body systems. Ultimately, excessive consumption of these food products can result in many diet-related health issues.

Refined cereals include cakes, desserts, white bread, pasta, muffins, sweet or savoury biscuits, refined breakfast cereals, white rice, pancakes, waffles and pizza.

TASTY TRIVIA

Sometimes fibre is added back into a refined cereal product, such as high fibre white bread. This fibre is not always a fibre but is sometimes a hi-maize starch. This starch is called a resistant starch and comes from a special variety of corn, and unlike other starches, it resists being digested in the small intestine and so helps with 'feeding' healthy large intestine bacteria, thus improving gut health.

COLLABORATE 6.5

Working with a group of two or three, develop a list of diet-related health diseases.

INVESTIGATE 6.6

Go online to find out more about hi-maize at the Ingredion website. Find out what food products are on Australian shelves that contain hi-maize.

DESIGN BRIEF: NO TREE NUTS

You are going to a picnic organised by your karate club, where you will be sharing food with all the other club members. You have been asked to make a muesli bar that does not contain any tree nuts as there is a club member who cannot eat them because they are allergic.
The recipe for the five-ingredient muesli bars is a starting point. Alter the recipe by adding or changing ingredients to produce your own healthy muesli bar.

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RECIPE

FIVE-INGREDIENT MUESLI BARS

Makes 10
Main tools and equipment Baking tray, knife, bowl, food processor, measuring spoons and cups
Production skills Chop, process, pit, press, cut
Cooking processes Warm

Preparation time 15 minutes
Cooking time 2–5 minutes
Serving and presentation time 15 minutes
Total time 32–35 minutes

INGREDIENTS

- ½ cup tightly packed fresh dates that have been pitted
- ½ cup unsalted almonds, roughly chopped
- ¾ cup rolled oats
- 1½ tablespoons maple syrup or agave nectar
- 1½ tablespoons peanut butter
- Optional additions: chocolate chips, dried fruit, banana chips, vanilla

METHOD

1. Line a 20 x 20 cm baking tray with baking paper.
2. Process the dates in a food processor until small bits remain (about 1 minute). It should be able to be rolled into a ball between the fingers.
3. Place the oats, almonds and dates in a large mixing bowl and set aside.
4. Warm the maple syrup and peanut butter in a small saucepan over low heat. Stir, and pour over the oat mixture and mix, making sure the dates are dispersed.
5. Turn the mixture into the prepared tin. Press down very firmly until uniformly flattened, using a flat-based cup or glass. The tighter the better.
6. Cover with parchment or plastic wrap and allow to firm up in the fridge or freezer for 15–20 minutes.
7. Turn the mixture out onto a chopping board and cut into 10 even bars. Store in an airtight container for up to three days or in the freezer so they keep longer.

EVALUATION

1. Explain why your version of this biscuit is healthier than the original recipe.
2. Explain the condition known as anaphylaxis. In your response, state how it relates to tree nuts.
3. Copy and complete the following table with your analysis and that of one other classmate.

	Taste	Appearance	Texture	Aroma
Me				
Classmate				

4. Based on the two sensory analyses you completed, critically evaluate your biscuit. How would you change the recipe if you did it again?

LEARNING REFLECTION

1. Name the three parts of a cereal grain, and state what each contains.
2. Which parts of the cereal grain are removed when making refined cereals? Suggest why the removal of these parts reduces the nutritional value of the cereal.

EXTENSION

3. How is the glycaemic index affected when the cereal is refined? What effect may this have on blood sugar? Why is this effect an issue for health?
4. Explain what a prebiotic is and how it relates to cereals.

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6.5 The nutritional content of cereals

LEARNING INTENTIONS

1. To be able to state the link between carbohydrates and grains.
2. To be able to state the role carbohydrates have in the body.
3. To understand the reason that grains are in the Australian Guide to Healthy Eating, how much we should consume, and what sorts of grains are best and why.
4. To gain an understanding of the role of fibre in the body and how fibre is associated with grains.

Cereal grains are an excellent source of energy; they provide the body with large amounts of carbohydrates, starch, dietary fibre and protein. Wholegrains are also excellent sources of dietary fibre, essential fatty acids and B group vitamins.

Cereal grains supply the average person in Australia with about 20 per cent of their daily nutritional requirements.

Starch is the main carbohydrate found in cereals. Starch is a polysaccharide, a natural substance found in the cereal grain; when digested, it produces **glucose units**.

glucose units A sugar energy source produced in plant products

The Australian Guide to Healthy Eating

The grain (cereal) foods wedge is the second of the two biggest wedges of the Australian Guide to Healthy Eating plate. It is recommended that teenagers consume six serves a day and adults eat four to six serves a day. Most Australians do not consume anywhere near the recommended amount of wholegrain cereals, but they instead consume refined cereal products. It is recommended that at least two-thirds of the cereals consumed be wholegrain.

Wholegrain cereals are high in vitamins, minerals and antioxidants, which are often missing in refined cereals because these nutrients are concentrated in the outer layer of the grain, which is removed in refining. The outer layer also contains significant amounts of fibre.

Figure 6.7 Grain (cereal) foods, mostly wholegrain and/or high cereal fibre varieties, are one of the five essential food groups recommended in the Australian Guide to Healthy Eating. *Based on material provided by the National Health and Medical Research Council.*

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TASTY TRIVIA

At the beginning of the Middle Ages, the preference was to eat white bread, as medieval physicians recommended that this bread was healthier.

TASTY TRIVIA

Wholemeal and wholegrain cereals are the same; wholemeal has just been crushed to a finer texture.

Figure 6.8 Most plant-based foods contain both soluble and insoluble fibre, especially if the skin is eaten.

Fibre

soluble fibre The digestible fibrous parts of plants

insoluble fibre The indigestible fibrous parts of plants

Fibre is a form of carbohydrate and is made up of the indigestible parts of plants. There are two types: **soluble fibre** and **insoluble fibre**. Fibre is essential for a healthy diet and digestive system.

Table 6.1 Properties of soluble and insoluble fibre

Soluble fibre	Insoluble fibre
Includes pectin, gum and mucilage mostly found in plant cells.	Includes cellulose, hemicellulose and lignin, the structural parts of plant walls.
Helps lower blood cholesterol.	Prevents constipation by adding bulk to faeces, ensuring regular healthy visits to the bathroom.
Completely digested by bacteria.	Promotes good digestive health by providing roughage through the intestine.

Figure 6.9 Good sources of resistant starch in the diet come from cooked and cooled foods such as potatoes in the skin, rice and pasta. Reheating increases the amount of resistant starch even further.

Resistant starch

resistant starch The starchy component that is unable to be digested in the small intestine

Resistant starch is not technically 'fibre' but acts in a similar way. It is a starchy component that cannot be digested in the small intestine and is an important nutrient to support gut (bowel) health. Bacteria in the large intestine consume this starch and produce a chemical called butyrate, which supports healthy cells within the bowel. These bacteria also break down the resistant starch into short-chain fatty acids, which are absorbed into the bloodstream and may help reduce blood cholesterol levels.

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Functions of fibre in the body

Fibre provides many functions in the body. See Figure 6.10 for a description of these functions.

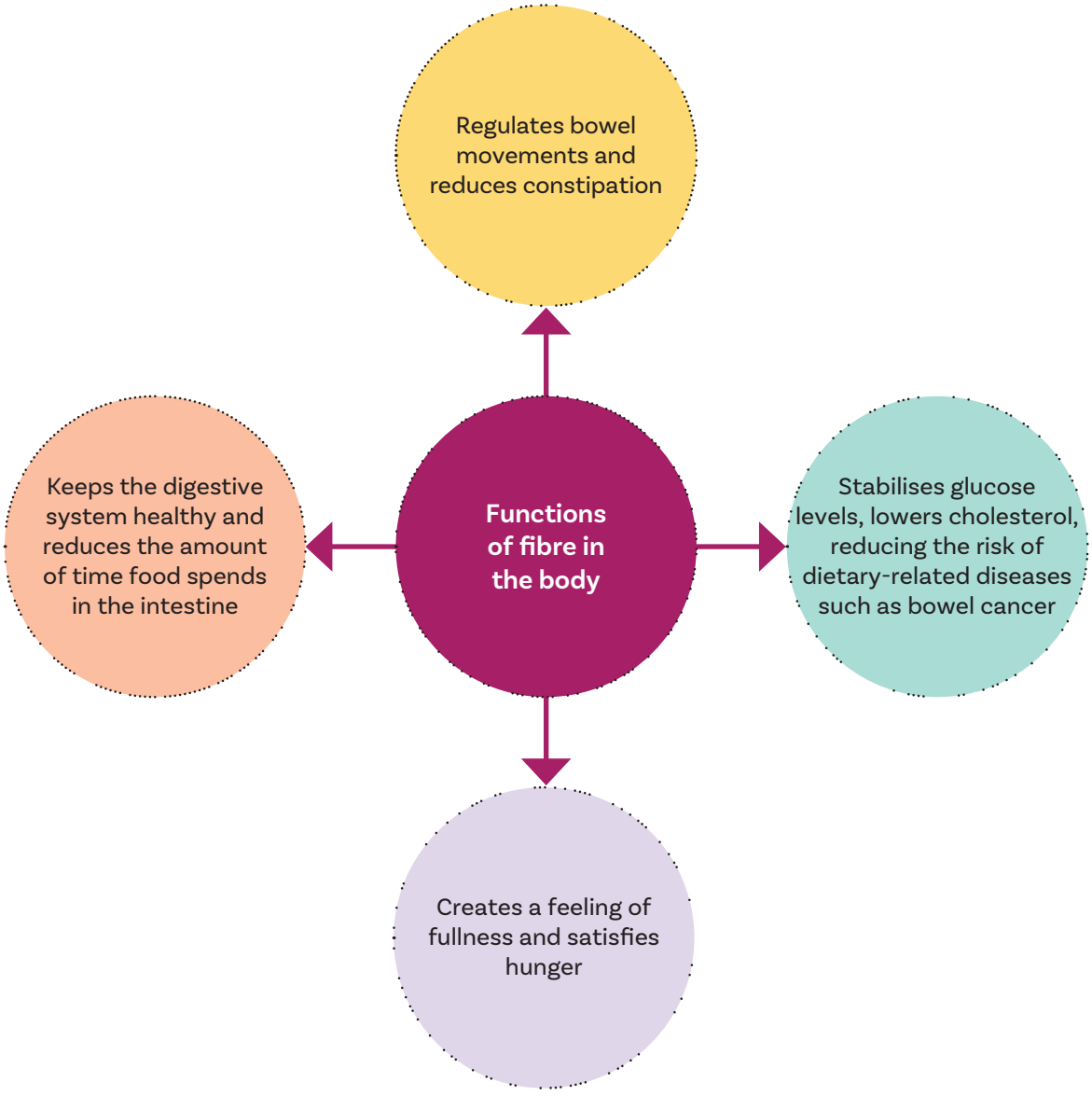

Figure 6.10 Functions of fibre in the body

ACTIVITY 6.7
HIGH FIBRE

1 For each of the following foods, suggest an alternative that may have a higher fibre content: flour, rice, fruit juice, pasta, bread.

2 Design a day's meals for someone who requires a high-fibre diet. Justify your choices of food.

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VEGETARIAN PASTIES

Makes 2
Main tools and equipment Sieve, bowl, spoon, knife, box grater, oven tray
Production skills Sift, knead, rub-in, grate, chop, roll, bake, glaze, mix
Cooking processes Bake

Preparation time 45 minutes
Cooking time 30 minutes
Serving and presentation time 5 minutes
Total time 80 minutes

INGREDIENTS

PASTRY

- 1 cup wholemeal flour
- ½ teaspoon baking powder
- ¼ cup margarine
- ¼ cup icy cold water

FILLING

- ½ potato
- ¼ small onion
- ¼ medium carrot
- 50 g tasty cheese, grated
- 50 g feta cheese, crumbled
- Pinch of salt and pepper
- 2 tablespoons chopped parsley
- 2 tablespoons peas and corn
- 1 egg
- Water

METHOD

1. To make the pastry: sift the flour and the baking powder into a bowl.
2. Rub the margarine into the flour mixture.
3. Gradually add enough water to mix to a firm dough.
4. Sprinkle the bench lightly with flour, turn out dough and knead lightly until smooth.
5. Divide the pastry into two even-sized pieces and shape into a round. Wrap in plastic and set aside while you make the filling.
6. Preheat oven to 220°C and cover a tray with baking paper.
7. To make the filling: grate the onion, potato and carrots, and place them in a bowl.
8. Add the cheeses, peas and corn, parsley and seasoning. Mix well.
9. Roll each piece of pastry out into a circle, approximately 20 cm in diameter.
10. Place an equal portion of the filling onto each round.
11. Whisk egg and water together to make an egg wash. Brush the edges of the pastry with egg wash and join over the top of the mixture, pinching the edges together.
12. Place the pasties onto the baking tray and prick the top with a fork. Glaze with egg wash.
13. Bake for 10 minutes, then turn the oven down to 180°C and bake for a further 15 minutes.

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EVALUATION

1 Suggest why the oven temperature needs to be high to start and then reduced halfway through cooking.
2 Which ingredients include fibre? Explain the link between high fibre and a feeling of satiety.
3 This is a vegetarian pastie; however, it contains dairy products. How could you modify the recipe for someone who does not eat any animal products (vegan)?

LEARNING REFLECTION

1 What is a polysaccharide? Describe how it relates to sugars.
2 What proportion of the Australian Guide to Healthy Eating is taken up by cereals? How many serves of cereals should an adult consume daily?
3 Plan a day's menu for an adult taking into consideration the required servings of cereals required.
4 Describe the difference between soluble and insoluble fibre.
5 Describe how resistant starch is similar to fibre.
6 Outline the functions of fibre in the body.

6.6 Cooking: the functional properties of cereals

LEARNING INTENTIONS

1 To be able to state the reason/s and methods for cooking cereals.
2 To gain an understanding of the importance of wheat to our diet.
3 To be able to list the types and uses of the different wheat flour products.
4 To be able to state how gluten improves the quality of baked products.
5 To understand that there are more flours than that provided by wheat, and to understand the background and properties of one other in detail.
6 To understand the term 'dextrinisation' and be able to give examples of it.
7 To develop skills in the planning and production of a pasta dish for a designed solution.

Raw wholegrain cereals cannot be taken in by the body – they are not very tasty, and the body is unable to digest them. The cooking of cereal grains softens the outer bran layer of the grain and breaks this down, which makes it more digestible.

When cooking cereals using any method, except browning or toasting, it is always necessary to use liquid of some kind. The quantity used, however, varies with the kind of cereal that is to be cooked. Whole and coarsely ground cereals require more liquid than those that are finely crushed.

Cooking time also varies with the kind or form of cereal to be prepared. The coarse cereals require more time than the fine cereals. A good rule to remember when cooking cereals is that they should always be allowed to cook until they can readily be crushed between the fingers, but not until they are mushy in consistency.

COLLABORATE 6.8

Discuss with a partner and list the dishes that can be made using rice. Give yourself three minutes. Have a class competition to see which partnership can develop the longest list.

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Figure 6.11 Compare the difference between raw and cooked grain in these images. What differences can you observe? Cereals that are wholegrain and less finely ground, such as rolled oats, require more liquid to cook, for example, to make porridge. Finely ground cereals, such as in the cookie dough, need almost no liquid to facilitate cooking, such as in these cookies where the cereals help to brown the cookie.

parasite A plant or animal that lives in or on another plant or animal

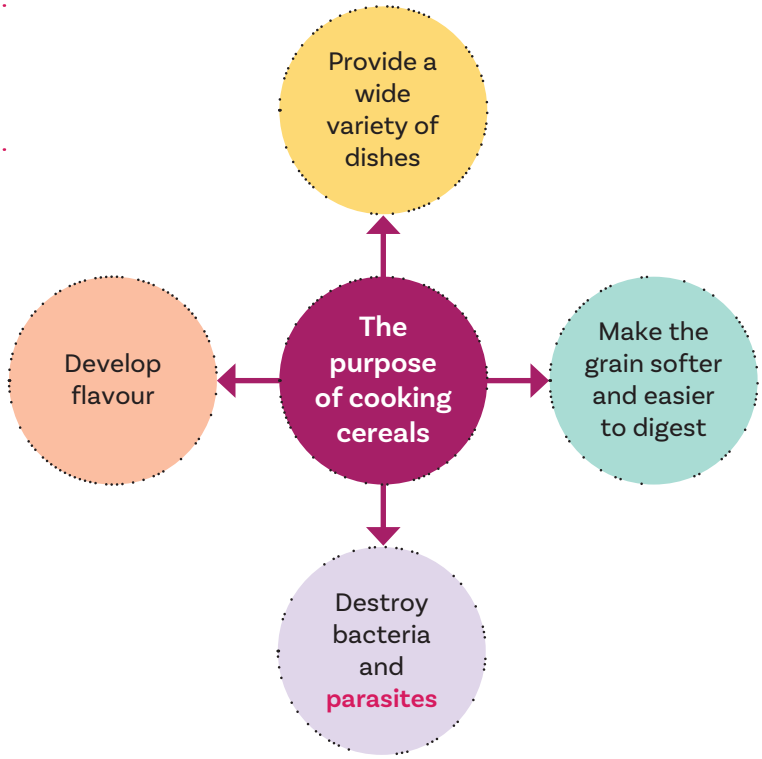

Figure 6.12 The purpose of cooking cereals

Wheat

Wheat is **milled** into flour and other products, and these are used to make many types of food. Bread is one of the oldest and most diverse foods that is made from wheat. Biscuits, cakes, pastry dough made for biscuits, flat or pocket breads, pasta and noodles are all produced from wheat as well as many commercially made breakfast cereals.

milling The grinding process that turns cereal grains into flour

Flour that is used in baking comes mainly from wheat, although it can be milled from corn, rice, nuts, legumes, and some fruits and vegetables. The type of flour used is vital for getting the product you are making right. Different types of flour are suited to different recipes and all flours are different. You cannot switch from one type of flour to another without consequences that could ruin the recipe. To achieve success in baking, it is important to know what the right flour is for the job.

Several different types of flour products are outlined in Table 6.2.

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Table 6.2 Different wheat flour products

Flour product	How it is produced	Uses in cooking
Plain flour (all-purpose flour)	All-purpose flour is a blend of hard and soft wheat and can be bleached or unbleached. It is one of the most used and accessible flours in Australia.	Cakes, biscuits, scones, batters, food thickeners and coatings
Self-raising flour (SR flour)	Self-raising flour is low-protein flour with salt and a **leavening** agent already added.	Biscuits, quick breads, muffins
Wholemeal flour	This type of flour is made from the whole kernel of wheat and is higher in dietary fibre and overall nutritional content than white flours. It does not have such a high gluten level, so often it is mixed with all-purpose or bread flour when making yeast breads.	Bread, biscuits, scones, cakes
Bread flour	Bread flour is white flour made from hard, high-protein wheat. It has more gluten strength and protein content than all-purpose flour. It is unbleached and sometimes conditioned; this increases volume and creates better texture.	All types of bread products
Semolina flour	Semolina is made from durum wheat, the hardest type of wheat grown. This type of flour has the highest gluten content.	Pasta, Italian puddings

Gluten

Wheat and many other grains contain two proteins, gliadin and glutenin, which form another protein called gluten when mixed with water. Gluten has many useful functions in baking as it has the ability to form a stretchy network which can trap and hold gas as a product is baking, thus making it light and fluffy. Gluten has negative effects for those who have coeliac disease or gluten intolerance. These will be looked at in Chapter 11.

leavening A chemical that when in contact with water will react and produce carbon dioxide, which is used to help make a product lighter

Figure 6.13 It is the elastic structure of gluten that allows this dough to stretch and hold bubbles of carbon dioxide gas. When this dough is cooked, the gluten and starches in the dough set firm, trapping the bubbles permanently.

ACTIVITY 6.9
IMPACT OF GLUTEN ON A BAKED PRODUCT

EXTENSION

Working in a pair, each student will make one batch of plain muffins using different flour – gluten free and regular self-raising flour.

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PLAIN MUFFINS

Makes 6 large muffins
Main tools and equipment Muffin pan, muffin-size paper patty cases, bowl, measuring spoons and jug, wire rack
Production skills Sift, melt, combine
Cooking processes Bake

Preparation time 15 minutes
Cooking time 15–20 minutes
Serving and presentation time 5 minutes
Total time 35–40 minutes

INGREDIENTS

- 1½ cups self-raising flour (or gluten free self-raising flour, depending on which muffin is being made)
- ¼ teaspoon salt
- 2 tablespoons caster sugar
- 2 tablespoons butter or margarine
- 190 ml milk
- 1 egg, beaten

METHOD

1. Line 6 holes of a muffin pan with paper patty cases.
2. Preheat oven to 200°C.
3. Sift dry ingredients into a bowl.
4. Melt the butter in the microwave, mix in milk and beaten egg.
5. Make a well in the centre of the dry ingredients, add liquid ingredients.
6. Combine ingredients using a metal spoon by stirring 12–15 times (make sure you count), so that they are just combined. The mixture will be moist and lumpy and drop easily from a spoon.
   Tip: The mixture must not be beaten too much as it will over-develop the gluten and carbon dioxide will be lost, making a denser and less risen muffin.
7. Fill the paper patty cases ⅔ full, making sure you put the mixture into the case all at once.
   Tip: Do not double fill, as adding more mixture on top results in the muffin having a peaked top. (Try this with one of your muffins so you can compare with the rest.)
8. Bake for 15–20 minutes.
9. Remove from the oven and allow to sit in the tin for 2 minutes, then remove and cool completely on a wire rack.

EVALUATION

1. Compare the two different muffins to each other by copying and completing the table below.

	Self-raising flour	Gluten-free self-raising flour
Average height of the muffin		
Air hole size (cut muffin in half)		
Taste		
Appearance		
Texture		
Aroma		

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2 Which batch had the best physical and sensory properties? Justify using the data you collected.
3 Write a paragraph describing the impact gluten has on this baked product.
4 List all the ingredients found on each of the packets of flour. Explain the function of each of these ingredients (there will be numbers you will have to look up).
   a What grains are used to make the gluten-free flour?
   b Apart from the grains, what ingredients are in the gluten-free flour that are not in the self-raising flour?
   c What role may these have in the baking process?
5 Suggest why specific instructions about how many times to stir the muffin mix, and how to put the muffin mix into the patty papers, was provided in the recipe. What did you learn from these instructions?
6 Design a muffin for a person with coeliac disease, using this recipe as a base. Test your result, once again comparing your designed muffin with a muffin that has gluten in it.

Other flours

COLLABORATE 6.10

EXTENSION

There are many different types of flour. Each can make a wide variety of food products. You could do this activity on your own or in pairs or small groups.

1 Choose one of the flour types from the list below:
   - arrowroot flour
   - banana flour
   - barley flour
   - buckwheat flour
   - cassava flour
   - chickpea flour
   - cornflour
   - gluten-free flour
   - potato flour
   - rice flour
   - rye flour
   - tapioca flour
   - taro flour.

2 Investigate the flour. Identify the cereal grain or other plant food from which the flour type originates and the country that makes the most use of this flour type.
3 List five dishes or recipes that can be prepared using this flour. Explain the reason why this type of flour is most suitable for these dishes or recipes.
4 Choose one recipe using this flour type and then explain the decision-making process you used. Justify why you chose this recipe.
5 Produce this recipe in class and share your final food item with your fellow students.
6 Reflect on your decision-making process and critically evaluate how you could change or adapt this recipe if you were to produce it again.

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DESIGN BRIEF: BREAD AROUND THE WORLD

Figure 6.14 Bread comes in many forms, from the familiar baguette to the less familiar Egyptian *baladi* and the Ethiopian *injera*.

There are many different types of breads consumed throughout the world. Think about the different types of bread that you have eaten, such as damper, quick bread, cornbread, naan, tortilla and flatbread.

The Lebanese flatbread recipe is quick and easy. Your task is to prepare the bread and then work with a partner to find a dip recipe that could be eaten with it. You will then prepare the dip. You should complete a food order for your teacher so that the correct ingredients can be purchased for both your dip and the bread.

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LEBANESE FLATBREAD

Makes 8 flatbreads
Main tools and equipment Bowl, measuring spoons and cup, spoon, griddle pan or grill plate with grooves, pastry brush
Production skills Mix, knead
Cooking processes Dry-fry

Preparation time 10 minutes plus approx. 60 minutes to rise
Cooking time 10 minutes
Serving and presentation time 10 minutes
Total time 30 minutes plus 60 minutes to rise

Skill demonstration: Kneading

INGREDIENTS

- 1 teaspoon salt
- 1 teaspoon sugar
- 1 sachet dry yeast
- 1 cup warm water
- 3 cups plain flour
- Olive oil for griddle

TASTY TRIVIA

Yeast is a living single-celled organism which will be killed if put into water that is too hot. When first combining water and yeast, test the temperature by putting your clean finger into the water. If it feels neither hot nor cold, it is perfect.

METHOD

1. Mix salt, sugar, yeast and water together in a large bowl. Set aside in a warm place until it begins to go frothy, about 5 minutes. Sift the flour into a separate bowl, then mix in the yeast mixture until well combined. If the dough is very dry, add more warm water, a tablespoon at a time to moisten it. Mix until the dough forms a pliable ball. Cover the bowl with a damp tea towel and let it rise until it has doubled in size, about 1 hour.
2. Transfer the dough to a well-floured surface and knead until soft and silky, about 6–8 minutes.
3. Cut the dough into 8 pieces and knead each into a smooth ball. Roll each out until it is about 15 cm in diameter. If it is not perfectly round, do not worry; just make sure the bread is the same thickness.
4. You can cook these on a barbecue griddle pan (one with grooves on it) or on a griddle pan on the stove or even in a frying pan on the stove. Put the griddle on medium–high heat.
5. Brush one side of the bread with a little olive oil and put the bread oiled side down onto the griddle. Brush the top side with more oil as the bottom cooks.
6. When the bread starts to brown and puff up, flip it over and cook the other side until brown.
7. Serve immediately. These can be reheated the next day by dropping them in a heated pan and cooking for 30 seconds each side.

EVALUATION

1. Describe what happened when you left the yeast, sugar and water mixture to sit for a while. Why was this process necessary?
2. Complete a sensory analysis of your flatbread.
3. Explain the type of dip you used as an accompaniment for your Lebanese flatbread.
4. Reflect on the decisions you made and your level of skill and explain how you could improve your skills if you were to repeat this production.

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Browning of cereals

Caramelisation occurs when sugar is heated and one of the results of this process is a brown colour. Cereals also brown when heated as a result of chemical reactions that are occurring.

Dextrinisation occurs when starch from the cereal is broken down by a chemical reaction into sugars called dextrins. These dextrins are brown in colour and have a distinct taste and consistency. Dextrinisation requires temperatures significantly above 100°C, so if there is water present, it does not happen. Therefore, a cake will brown on the outside, but not in the inside. This is because the moisture from the liquid ingredients keeps the internal temperature much lower than that at the surface, which dries out from the oven temperature.

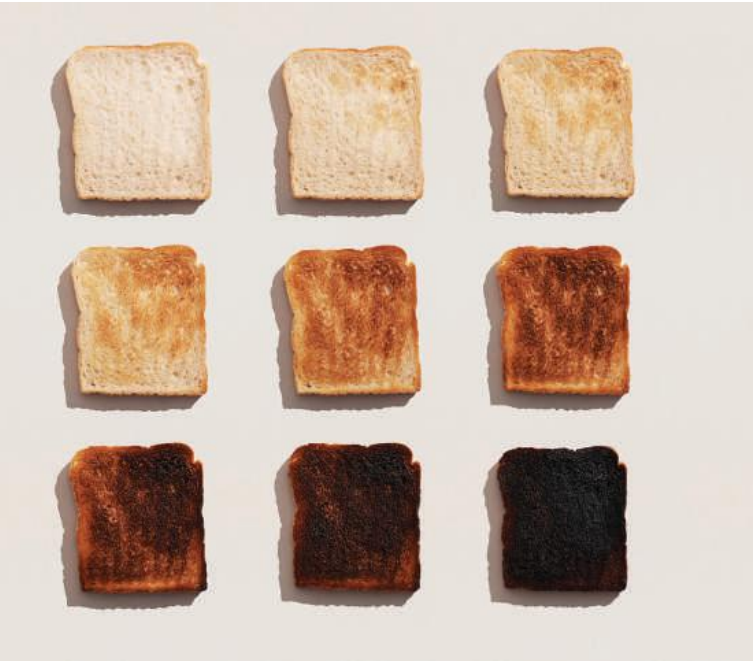

Figure 6.15 Bread browns because of the chemical reaction called dextrinisation.

Pasta is made from durum wheat. This is a wheat variety that has a very high gluten content. The wheat is coarsely milled, mixed to a stiff dough, extruded into shapes, and dried to form the different pasta varieties that we know. The dough can also include cooked vegetables, such as spinach or tomato, to add extra variety. Wholegrain pasta is made from whole wheat.

Pasta

Did you know pasta originally came from Asia? The Chinese were the first real inventors and owners of pasta; history tells us that they have been eating pasta since 5000 BCE. Their egg noodles were the first type of pasta to be consumed. Today, it is the Italians who are best known for the pasta they make.

TASTY TRIVIA

The word 'pasta' comes from the Italian word for paste, meaning a combination of flour and water. Pasta should be cooked 'al dente'. This means 'to the tooth' – in other words, not too soft, but still with a little texture to it.

COLLABORATE 6.11

Work with a friend to list as many different pasta types or shapes that you can think of. Now look up pasta shapes online. Were you surprised at how many there actually are?

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Making pasta

Making pasta is very easy. Fresh pasta can be made quickly with very few ingredients. To make fresh pasta, all that is required is durum wheat flour and eggs, which are formed into dough. The dough is kneaded until it is very firm and is then rolled into sheets before it is cut into the desired shape. Commercially, many varieties of fancy pasta shapes are extruded using a machine.

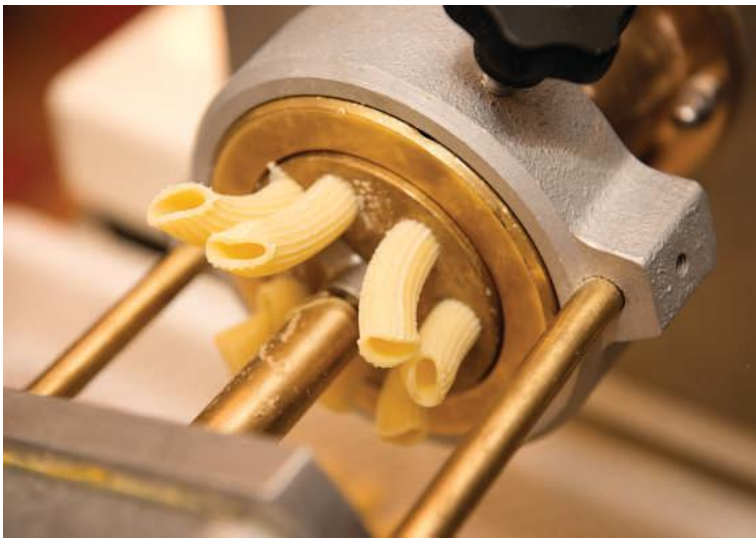

Figure 6.16 Fresh pasta is being extruded in a commercial machine.

DESIGN BRIEF: BOLOGNESE SAUCE

Pasta with bolognese sauce is a favourite dish for many people in Australia. The main ingredient in this dish is minced meat. This task requires you to alter the bolognese sauce recipe provided to create a dish that is suitable for someone who does not eat red meat.

EXTENSION

You are cooking for a vegan. Design a pasta and sauce that would be suitable to eat with pasta that has no meat products in it. (Hint: check the ingredients in the pasta itself. Are there any animal-based products?)

LEARNING REFLECTION

1 Suggest why wholegrain cereals require more water during cooking than refined cereals.
2 Outline the reasons why cereals are cooked.
3 List the different types of flour and suggest a recipe that can be cooked with each.
4 What are the two proteins in wheat that combine to form gluten? What other product is required for this combination to form?
5 Explain why raw cereals cannot be digested by the body.
6 Do fine or coarse cereal grains require more cooking time? Discuss the reason/s for this.

EXTENSION

7 The process of kneading is said to 'develop gluten'. Describe why kneading a dough will make more gluten. When is having more gluten in a product an advantage and when is it a disadvantage? What steps can you take to reduce the amount of gluten in a product?
8 Suggest one difference and one similarity between caramelisation and dextrinisation.
9 If the flour used to make pasta has the highest gluten content, what might happen if you tried to make pasta with flour that has less gluten in it?

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FETTUCCINE BOLOGNESE

Serves 2
Main tools and equipment Knife, measuring spoons, measuring jug, saucepan, wooden spoon
Production skills Stir, strain, dice, grate
Cooking processes Boil, simmer, sauté, brown, reduce

Preparation time 30 minutes
Cooking time 30–40 minutes
Serving and presentation time 5 minutes
Total time 65–75 minutes

INGREDIENTS

- ½ tablespoon olive oil
- ½ clove garlic, crushed
- ½ small onion, diced
- 150 g minced beef or pork (or a combination of both)
- 2 tablespoons tomato paste
- ¼ teaspoon dried oregano
- 100 g crushed tomatoes
- ½ cup water
- ¼ teaspoon beef stock powder
- ¼ teaspoon black pepper
- 125 g fettuccine or other pasta
- 25 g parmesan cheese, grated
- Fresh basil, for garnish

METHOD

1. Heat the olive oil in a saucepan.
2. Add the garlic and the onion. Sauté for two minutes, stirring occasionally.
3. Add the mince and tomato paste, and cook until browned.
4. Add the oregano, tomatoes, water, stock powder and black pepper. Stir to combine all ingredients.
5. Bring to the boil, reduce heat and simmer for 25 minutes until the sauce is reduced. Adjust seasoning to taste.
6. While the sauce is simmering, half fill a medium saucepan with water. Bring the water to the boil.
7. Once the water is boiling, add the pasta and cook until al dente.
8. Strain the water from the pasta. Serve with the sauce and grated parmesan cheese. Garnish with basil.

EXTENSION

Students can make their own fresh pasta as well as the sauce.

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Review

1 Cereals are the seeds cultivated from grasses and are staple foods for many nations.
2 People have been cultivating a variety of different cereals for over 10 000 years.
3 Cereal grains are made up of the endosperm, bran and germ layers.
4 Cereal production is important to Australia's agricultural economy. Wheat makes up a significant part of the income Australia gains from exports.
5 Wholegrain cereals contain the entire cereal grain, whereas refined cereals contain only the endosperm; therefore, wholemeal grains are more nutritious.
6 Carbohydrates can be found in large quantities in cereals and contribute significantly to the energy needs of an individual.
7 The grains (cereal) food section, mostly wholegrain and/or high cereal fibre varieties, is one of the larger portions of the Australian Guide to Healthy Eating.
8 There are two different types of fibre, soluble and insoluble. Insoluble fibre assists in bowel health, whereas soluble fibre helps reduce blood cholesterol levels.

Test your knowledge

Multiple-choice

1 The process that occurs when bread goes brown during toasting is called:
   a caramelisation.
   b dextrinisation.
   c gluten.
   d cholesterol.
2 Rice provides large quantities of carbohydrates, but it is also naturally free from:
   a fat, cholesterol and sodium.
   b dietary fibre.
   c starch.
   d all of the above.
3 Which part of the grain contains the majority of the starch?
   a Germ
   b Endosperm
   c Fibre
   d Bran

True or false?

1 All cereals contain gluten.
2 Insoluble fibre is found in all food products that are made from plants.
3 The Australian Guide to Healthy Eating recommends that everyone has four to six serves of cereals a day.

Short-answer

1 Explain what a staple food is, what Australia's staple food is and suggest reasons why.
2 Explain why you should not eat raw grains.
3 If we don't digest insoluble fibre, why is it important to consume?
4 The potato is a staple food. It is full of starch. Is it a grain? Explain your answer.

Extended-response

Choose one grain and explore it in detail. Present your findings in the form of a website.
In your research ensure you cover the following points:

- The ancient history of the grain, including where and when it was first domesticated.
- Provide pictures of your grain both in its whole state and during or post-production.
- The properties of the grain, including its nutritive content.
- Where in the world it is grown, and how much is grown. Provide a map.
- Provide a recipe for a dish that traditionally uses this grain.
- Adapt the recipe so it could be made in your kitchen at school.
- Make the dish, ensuring you provide images of your work before, during and after the practical.

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CHAPTER 7

Milk, milk products and alternatives

BEFORE WE BEGIN

1. Explain the difference between dairy and plant-based milks.
2. Outline the different dairy products that are available.
3. Explain why it is important to include dairy products in your diet.
4. Identify the ethical and environmental issues relating to the production of milk.

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7.1 Milk: the basics

LEARNING INTENTIONS

1 To understand what milk is and where it comes from.
2 To understand the terms 'pasteurisation' and 'microorganisms' and how these relate to milk production.
3 To develop knowledge on the history of milk production.

Milk is the one food newborn mammals need to live and thrive for the first few months of their lives. In fact, human babies need nothing else but milk until they are six months old. It is white in colour and is the secretion from the mammary glands of all mammals after a baby is born. In Australia, cows are the main source of commercial milk, with goats also supplying milk to a lesser extent. Milk contains many naturally occurring microorganisms, so in Australia all milk must undergo heat treatment, called **pasteurisation**, before it is sold. This destroys any microorganisms but retains the nutrients.

In other countries, a range of animals such as buffalo, camels, horses, reindeer, sheep and yaks are a source of milk. Milk can be made into an extensive range of products that have become a part of daily eating patterns. These include **butter**, cheese and yoghurt.

pasteurisation A process in which milk is heated to a temperature just below boiling point and held at that temperature to kill microorganisms. The milk is not boiled as this would also destroy nutrients.

butter A dairy product that is produced by churning cream until the fat solidifies and forms a spread

Figure 7.1 Milk is produced and consumed by mammals.

Rice milk

Almond milk

Soy milk

Figure 7.2 These products are called 'milk', but they are not really milk according to the official Australian Standards for milk, which state that it must come from an animal.

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ACTIVITY 7.1
NON-MILK MILKS

EXTENSION
1 Do the milks shown in Figure 7.2 provide the nutrition that animal-based milks do? How are they the same/different?
2 What advantages are there to consumers in drinking milk from non-dairy sources?

TASTY TRIVIA
In Kazakhstan, the popular milk drink called *koumiss* is fermented horse milk. Refrigeration is not readily available, so the milk is served warm. The local people are used to the taste and love it.

History of milk
More than 10 000 years ago, humans began domesticating animals. Sheep, goats and cows were all domesticated, becoming a source of milk and other dairy products for human consumption.

For nomadic people in many African countries and northern China, camels and yaks were ideal animals with which to travel. They not only supplied milk, which could be drunk, churned into butter and fermented for yoghurt, but they also provided meat when needed, and their skin became clothing and lining for the walls of houses. The animals were like a moving mini-department store.

Milk is now usually purchased in cartons and plastic containers from a shop, but up until the late 1960s it could be delivered daily to your door. People would leave out empty glass bottles and the milk deliverer would replace these with full ones. The milk was delivered daily because not everyone had refrigerators, but as these became common in households, the need for a daily delivery of milk decreased.

Figure 7.3 The milk of many different animals has been used by nomadic peoples for centuries. Here, a yak and a camel are milked.

LEARNING REFLECTION
1 Explain why pasteurisation is required before milk can be sold in Australia.
2 Explain why milk was such a useful commodity to many cultures thousands of years ago.
3 Identify the source of the majority of milk consumed in Australia.

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7.2 Food systems: producing cow's milk in Australia

LEARNING INTENTION

1 To develop an insight into the production of milk from farm to table.

COLLABORATE 7.2

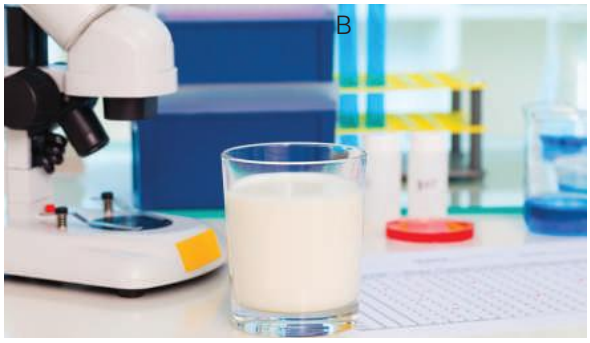
Working in pairs, match each picture (A–H) to the food systems processes listed below, to identify how milk goes from paddock to plate.

Stages of milk production:

- milking
- transport to factory
- analysis
- pasteurisation and homogenisation
- packaging
- distribution
- sales
- consumption.

A

B



C

D

E

F

G

H

LEARNING REFLECTION

1 Briefly research two important steps in the processing of milk.

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7.3 Types and properties of milk

LEARNING INTENTIONS

1 To gain a knowledge of the properties of different types of milk.
2 To develop an awareness of how milk products can be consumed by people with different dietary needs.

Dairy milk has gone from being available only as the traditional full-cream variety to many different product types. Not only are there several varieties, but also several different ways of buying milk:

- powdered milk
- condensed milk
- ultra-heat treated
- long-life milk
- evaporated milk.

INVESTIGATE 7.3

Go online and investigate the processing that occurs when each of the milk types listed are produced. Suggest reasons why customers would buy these products rather than fresh milk.

COLLABORATE 7.4

Discuss with a partner whether you drink milk and, if you do, what type of milk you drink. If you don't, explain why you don't. How many varieties of liquid milk can you think of? Share your ideas with the class.

ACTIVITY 7.5
MILK TASTING

Your teacher will be providing samples of a number of different milks that can be bought at the supermarket for you to taste. You are to compare the physical and sensory properties of different varieties of milk by copying and completing this table, using sensory analysis terminology, and then answering the questions on the next page. If you can't taste one or more of the milks due to allergies, intolerance or diet, ask your teacher or a class member to describe it to you.

Milk	Appearance	Taste	Aroma	Texture (mouthfeel)
Full-cream milk				
No-fat milk				
Reduced-fat milk				
Farmhouse milk				
Lactose-free milk				
Organic milk				
A2 milk				
Soy milk				
Rice milk				
Almond milk				
Goat's milk				
Oat milk				

(continued)

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1 Explain why there are so many different types of milk available.
2 Rank the milks 1–12, with 1 being your most preferred milk and 12 the least. Justify your answers.
3 On which of the sensory properties did you put most importance? Why?
4 If one of these milks was near its use-by date on the carton, which sense would you use to check whether to consume it or not? Suggest why you would use this sense.
5 Which of these milks might you consume if you … (explain your answer)
   a are vegetarian?
   b are vegan?
   c don't want to consume fat?
   d are lactose intolerant?
   e are making a smoothie for your two-year-old brother?

EXTENSION

The following questions may require further research online.

6 How are plant-based milks produced?
7 Do the plant-based milks in the table on the previous page contain the same amount of calcium as the animal-based milks? Provide evidence to support your answer.
8 Phytate is found naturally in soybeans. What is it? How does it affect calcium absorption in the body?
9 Discuss the ethics of calling a product milk if it does not come from a cow.

INVESTIGATE 7.6

EXTENSION

Go online and research what A2 milk is and how it is produced. Investigate and explain the statement that A2 milk can be consumed by people who feel discomfort when consuming regular cow's milk.

INVESTIGATE 7.7

The sale of 'raw' (unpasteurised) milk for human consumption is illegal in Australia.

- Go online and visit the Food Standards Code on the Food Standards Australia New Zealand website and find the definition of milk.
- See whether you can also find out the differences between 'milk' and a 'milk drink' or 'milk beverage'. List three examples in your response.

LEARNING REFLECTION

1 Explain why milks such as condensed and evaporated were used much more commonly at the start of the twentieth century than they are now.
2 Suggest what might be the advantages to purchasing UHT milk.

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7.4 Nutritional value of milk

LEARNING INTENTIONS

1. To gain knowledge in the nutritive value of milk.
2. To understand where milk falls in the Australian Guide to Healthy Eating and the amount of milk that is required to be consumed daily.
3. To develop knowledge of the role of minerals in the body and focus on calcium as a significant mineral provided by milk.

Milk is an almost perfect food; it is called a 'super food' because of the number of nutrients that can sustain life and growth, the most important of these being protein and calcium. Dietary fibre and iron are two significant nutrients that are lacking in milk.

The Australian Guide to Healthy Eating

The Australian Guide to Healthy Eating is shown in Figure 7.4. The milk, yoghurt, cheese and/or alternatives wedge is smaller than that of the cereals and vegetables groups; therefore, in terms of the total day's intake, it should be less than these two groups. However, the nutrition provided by this wedge is essential for good health now and later in life. It is recommended that adults consume two-and-a-half serves a day to meet the needs of the body. This is the only food group where older adults, particularly women, should consume more as they get older. It is recommended that they consume four serves a day.

Life starts with milk being a critical food, and the importance of milk or milk-product consumption continues for the rest of our lives. Milk is a major source of protein, which is essential for body growth, as well as calcium, which is also essential for bone growth and maintenance.

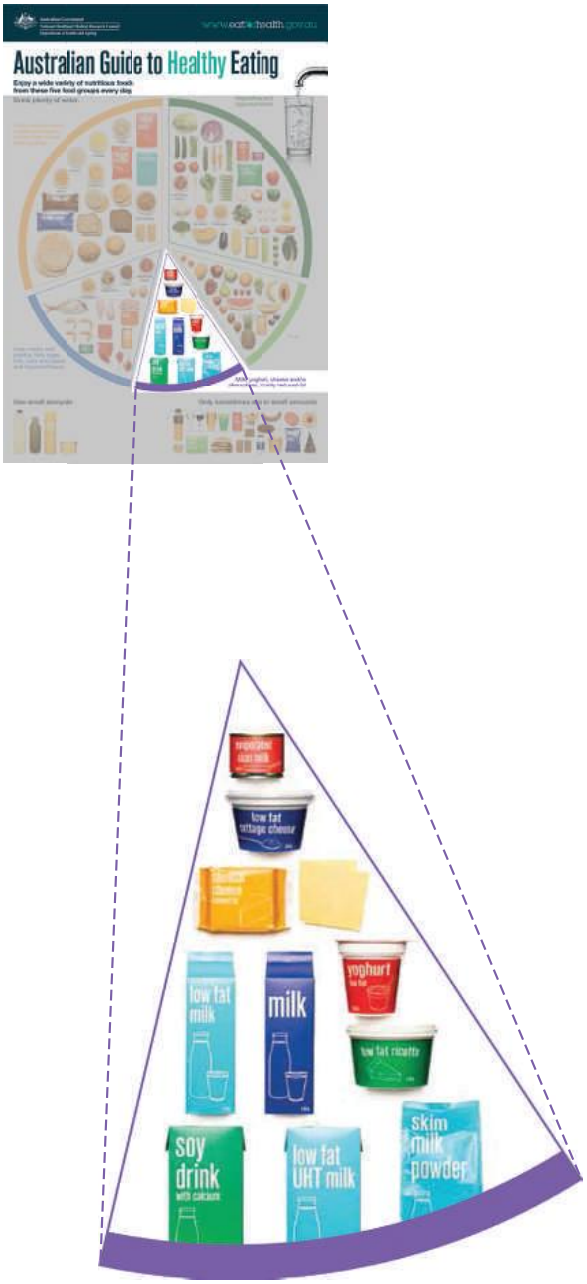

Figure 7.4 Milk, yoghurt, cheese and/or alternatives, which are mostly reduced fat, combine as one of the five essential food groups recommended in the Australian Guide to Healthy Eating. *Based on material provided by the National Health and Medical Research Council.*

COLLABORATE 7.8

Discuss with a classmate why older adult women may need the greatest amount of milk.
Undertake a survey of your class and create a graph showing how many serves of dairy foods each person consumes in an average day.
Research how many serves are recommended for the age groups in your class, then look up how much calcium can be obtained from non-dairy foods.
What is the impact of insufficient calcium consumption on the current and future health of people?

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Figure 7.5 Milk is an essential part of children's diets.

Young children up to the age of two should have full-fat milk because it is an excellent source of vitamin A, which is important for brain development. After the age of two, low-fat milks are acceptable. Weight-conscious people can choose low-fat varieties, although many other popular foods have a much higher fat content than milk.

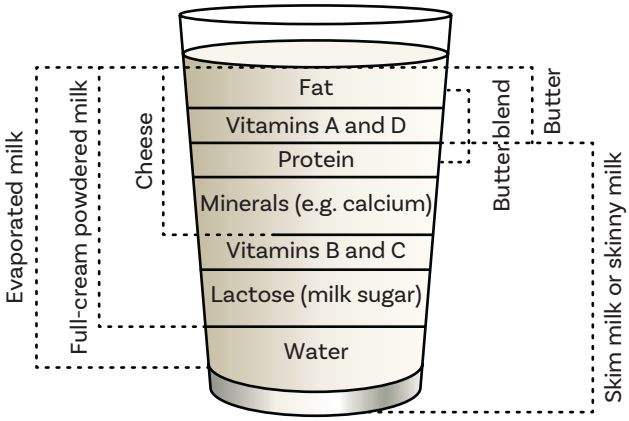

Figure 7.6 Nutrients in full-cream fresh milk and other milk products.

COLLABORATE 7.9

Cream is not listed in Figure 7.6. Discuss the nutrient/s you think it contains. Is it an everyday food, or something that should be eaten as a 'sometimes' food? What other dairy products might be considered a 'sometimes' food? Why?

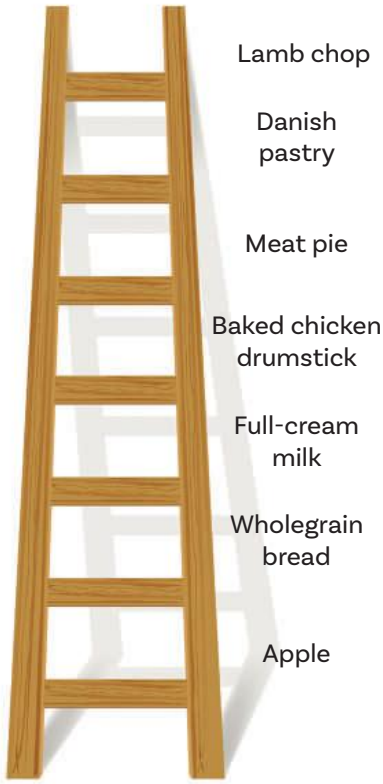

Figure 7.7 Many people are concerned that whole milk is high in fat, and so avoid drinking it. The diagram above shows how full-cream milk compares to other foods: the lower down the ladder, the lower the fat content.

Essential nutrients: minerals

Minerals are chemicals that are found in the body. They are necessary for good health and form part of many hormones and enzymes. Minerals are classified as either trace or major. The body requires larger quantities of major minerals, such as calcium and iron, whereas trace minerals such as iodine are only needed in small amounts.

minerals Elements required by the body and found in foods

The most common mineral deficiencies are calcium (leading to osteoporosis) and iron (resulting in anaemia). The best way to ensure you are consuming the minerals you need for good health is by eating a balanced diet that includes a wide variety of foods, as food is the best source of minerals.

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TASTY TRIVIA

Most of Australia's diet-related illnesses relate to overconsumption of certain nutrients. However, there are two nutrients which are underconsumed that government health bodies are focused on: the minerals calcium and iron.

Table 7.1 Major functions of minerals in the body

Mineral	Source	Image of examples	Major function in the body
Calcium	Milk, yoghurt, cheese, tofu, bones of canned fish, green leafy vegetables, nuts and seeds		• Growth and ossification of bones and teeth
Copper	Organ meats, seafood, shiitake mushrooms, nuts and seeds, wheat bran cereals, wholegrain foods, dark chocolate		• Formation of red blood cells, functioning of the nervous system
Fluoride	Fluoridated drinking water		• Maintenance of strong bones and teeth
Iron	Meat, poultry, seafood, eggs, nuts, dried fruit, wholemeal pasta and bread, legumes, dark leafy green vegetables, oats, tofu		• Formation of red blood cells • Carries oxygen around the body
Phosphorus	Dairy, red meat, poultry, seafood, legumes, nuts		• Builds strong bones and teeth
Potassium	Leafy green vegetables, vine fruit and root vegetables, beans and peas, tree fruits, milks, yoghurt, meats		• Fluid balance • Metabolism of carbohydrates

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Mineral	Source	Image of examples	Major function in the body
Magnesium	Most green vegetables, legumes, peas, beans, nuts, some shellfish, spices		• Bone structure • Assists the control of nerve functioning and muscle contraction
Sodium	Salt, added to most foods, especially processed foods		• Fluid balance
Zinc	Oysters, red meat and poultry, beans, nuts, crab, lobster, whole grains, breakfast cereals, dairy		• Functioning of the immune system and healing of wounds • Maintenance of sex glands, including maturation and reproduction

DESIGN BRIEF: HIGH-CALCIUM DRINK

Calcium is one of the most important minerals for adolescents. Design a high-calcium flavoured smoothie to encourage young people to increase their calcium intake. You will need to use two high-calcium ingredients in your drink to ensure calcium needs are met. Your product needs to serve two people and be presented in a way that would appeal to adolescents.

EXTENSION

You are to make this drink for someone who is either intolerant to lactose (milk sugar) or who is a vegan.

TASTY TRIVIA

Fluoride can be found naturally in foods; however, it is often added to water supplies to supplement natural supplies. It has been found that children living in areas where water is not fluoridated are five times more likely to have dental decay.

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LEARNING REFLECTION

1 Identify the type of milk that is a suitable choice for an elderly person who needs to maintain strength in their bones. Justify your response.
2 List the two most common minerals in which people are more likely to be deficient. Provide two ideas for increasing adolescent intake of these minerals to help decrease the risk of deficiency.
3 How many serves of milk and alternatives are required by an adolescent each day? Plan a day's meals that takes this amount into consideration.

7.5 Milk products

LEARNING INTENTIONS

1 To be able to list and describe different milk products.
2 To develop skills in the use of different dairy products.
3 To understand how cheese is made and the different classifications of cheese.

There are many varieties of milk products. These are foods made from milk and are available to buy to help vary your diet and act as milk substitutes. Milk products on the market are also referred to as dairy products.

Cheese, yoghurt and butter, or butter blends, are the most popular milk products. Other well-known milk products are different types of cream and ice-cream, and dairy desserts like custard. All the main products are available in low-fat, no-fat, low-salt and high-calcium versions. A less well-known milk product is **buttermilk**.

buttermilk The liquid that remains after butter is made from cream. It has a tangy, almost sour, taste and is used to make muffins, pancakes and some breads.

Figure 7.8 There are many different dairy products available on the market.

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BUTTERMILK SPELT PANCAKES

Serves 2
Main tools and equipment Measuring spoons, cups and jug, whisk, spoon, non-stick frying pan, baking paper, spatula or egg slide
Production skills Melt, sift, stir, heat, pour
Cooking processes Fry

Preparation time 15 minutes
Cooking time 15 minutes
Serving and presentation time 5 minutes
Total time 35 minutes

INGREDIENTS

- 1 tablespoon butter, plus extra for greasing pan
- 2 tablespoons golden syrup or maple syrup
- 1 cup spelt flour
- 1½ teaspoons baking powder
- ¼ teaspoon **bicarbonate of soda**
- ¼ teaspoon salt
- 1 large egg
- 1 cup buttermilk

bicarbonate of soda Also sometimes written as baking soda, is an alkali which when mixed with an acid, like lemon juice or buttermilk, will make a batter rise well. Be careful, as too much can make the product taste metallic.

METHOD

1. Melt the butter and syrup together in a saucepan or microwave. Set aside to cool completely.
2. Sift the flour, baking powder, bicarbonate of soda and salt together into a bowl.
3. Whisk together the egg, buttermilk and cooled butter mixture.
4. Stir the liquid ingredients into the dry ingredients and mix until just combined.
5. Heat a non-stick frying pan over medium–low heat. When the pan is hot (water flicked onto it will sizzle), wipe the pan's surface with a knob of butter held in a piece of baking paper.
6. Pour ¼ cup of mixture into the pan and let it cook for 1–2 minutes, or until bubbles form on the surface and they begin to pop.
7. Flip and cook the other side for 1–2 minutes or until the pancake is cooked through.

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DESIGN BRIEF: PANCAKE TOPPINGS

Your buttermilk spelt pancakes are ready to eat, but there is no garnish or topping. Design a garnish or topping to complete your pancakes that you will be eating for breakfast.

EXTENSION

Use the buttermilk spelt pancake recipe to make pancakes made with full-cream milk instead of the buttermilk. Complete a comparison of the full-cream milk pancakes with the buttermilk pancakes. Complete a sensory analysis comparing the two different pancakes. What effect does buttermilk have on the taste and texture of pancakes? Draw a conclusion of the function of buttermilk in this recipe.

starter A culture that starts the process of coagulation of the protein

rennet Made from rennin; an enzyme used for clotting milk. It occurs naturally in the stomach lining of mammals. It coagulates or clots the protein in milk, making it easier to digest.

curds The solids in milk, formed when the protein has coagulated after the addition of rennet or lactic acid

whey The liquid in milk, left when cheese is made

Cheese

Cheese is made from the coagulated milk of cows, goats, buffalo and sheep. The milk needs a **starter** such as **rennet** to start the coagulation process. Because cheese contains a lot of protein it will toughen and go rubbery if over-cooked. As there are many different cheeses produced in different ways, you need to select the best type for food preparation. For example, have you noticed that when you eat a good pizza, the cheese has melted and it stretches into very thin strands? This is often a soft cheese called mozzarella. A very hard cheese such as parmesan is best for grating on top of a lasagne or for flavouring cheese sauces.

Cheese is made by adding rennet to milk. This sets the milk solids, and **curds** and **whey** form. The curds are drained, and salt is added, resulting in soft, fresh cheese. The cheese is then pressed; the amount of pressing determines whether you get a soft cheese or a hard cheese. A hard cheese has been firmly pressed over a period of time and then left to mature to develop flavour and texture. Have you ever tried blue-vein cheese? Some cheeses such as blue-vein varieties are injected with harmless moulds that spread throughout the cheese, giving it a sharp or salty flavour.

You could conduct a cheese tasting of one of each of the cheeses mentioned in Table 7.2.

Figure 7.9 There are many different types of cheese.

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Table 7.2 Types of cheese and their varieties

Fresh cheese: Unripened curd, which is eaten while fresh. Examples are cottage cheese, ricotta, mozzarella, feta and cream cheese. 	**Soft cheese**: Briefly ripened cheese, which usually has a high percentage of fat and moisture, and it spreads easily. Examples are brie, camembert and feta. 
Semi-hard cheese: Matured cheese with less moisture which can be grated and melted, and it is easy to cut. Examples are cheddar, edam and gouda. 	**Hard cheese**: Cheese matured for a long time, with a low moisture content and a high fat content. It is good for grating and melts easily. Examples are parmesan and pecorino. 
Specialty cheese: Blue, smoked and fruit cheeses have a strong flavour; they may be soft, semi-hard or hard. Examples are stilton and smoked cheese.  	

DESIGN BRIEF: PIZZA

Decide which pizza you prefer, your own homemade one or a frozen purchased one. Using the basic pizza recipe, produce your own pizza. Make sure you time how long it takes to prepare and produce it.

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BASIC PIZZA

Serves 2
Main tools and equipment Small bowl, rolling pin, measuring spoons, measuring cups, measuring jug, pizza tray, spatula, large saucepan
Production skills Activate yeast, slice, knead, roll, prove
Cooking processes Bake

Preparation time 30 minutes
Cooking time 15–20 minutes
Serving and presentation time 2 minutes
Total time 47–52 minutes

Skill demonstration: Rolling out

INGREDIENTS

- 1 tablespoon olive oil
- 1 sachet dried yeast
- ½ teaspoon sugar
- ½ teaspoon salt
- ½ cup warm water
- 1 cup plain flour
- 2 tablespoons tomato paste
- ¾ cup grated mozzarella cheese
- ¼ onion, grated
- ¼ cup pineapple pieces
- 1 slice ham, thinly sliced
- 1 slice salami, thinly sliced
- ¼ capsicum, diced
- ½ teaspoon mixed herbs

METHOD

1. Preheat oven to 220°C.
2. Grease a pizza tray with a tiny amount of oil.
3. Combine the yeast, sugar, salt and water in a small bowl. Cover and stand for 10 minutes until frothy.
4. Sift the flour into a large bowl.
5. Add the yeast mixture and 1 tablespoon of olive oil to the flour and mix to form a dough.
6. Flour the bench and knead the dough until smooth and elastic.
7. Lightly oil a large bowl. Place the dough in the bowl, cover and prove for 15 minutes or until it has doubled in size.
8. Turn the dough onto a floured surface and roll into a round shape to fit the pizza tray. Line the tray with the dough.
9. Mix tomato paste, onion and mixed herbs. Spread tomato mixture on the base. Do not spread the tomato mixture all the way to the edge or it will burn.
10. Top with your choice of cheese, pineapple, ham, salami and capsicum.
11. Bake at 220°C for 15–20 minutes, or until cooked through and the base is browned.

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EVALUATION

Purchase a frozen pizza and prepare it according to the instructions provided. Copy and complete the table below. Answer the questions that follow to help you investigate and compare the two pizzas and evaluate which is your preferred option.

	Homemade pizza	Frozen pizza
Time taken to prepare the pizza		
Taste		
Appearance		
Texture		
Aroma		
Rate each pizza out of 5 (where 1 is the lowest and 5 is the highest score)		

1 Identify which pizza presentation you preferred and explain why.
2 Identify which pizza you think had the best flavour and explain why.
3 List the ingredients you used to make your pizza.
4 List the ingredients used to make the frozen pizza as written on the label.
5 Identify which pizza is the healthier option.
6 Compare the time taken to prepare both pizzas.
7 Discuss which pizza was the more time efficient.
8 Determine which pizza was your favourite. Explain why.

DESIGN BRIEF: WHAT WILL I DO WITH ALL THIS MILK?

You have an excess of milk left over from a canteen that you run each month. It is still good, but it will go to waste if it is not used. You decide to make ricotta cheese, and then make something with it that you can freeze and serve at the canteen the following month. It must be something that children aged from 5 to 18 will like. You only have the time you normally have in your practical class to complete your dish.

Note: you can make your ricotta or, if time is short, purchased ricotta may be used.

1 **Establish** four criteria for success questions based on the design brief.
2 **Investigate** the properties of ricotta cheese and recipes that use ricotta cheese.
3 **Generate**: Choose three recipes that you could make that meet the brief. Choose one that you will make and justify your choice.
4 **Plan**: Develop a production plan to ensure you can complete the work in time.
5 **Produce**: Make your ricotta-based product and prepare it for freezing.
6 **Evaluate**: Freeze your dish, then defrost it and complete the evaluation questions below:
   a Answer your criteria for success questions.
   b Complete a sensory analysis of your defrosted product.
   c What changes might you make should you make this product again?

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EXTENSION

CHANGING MILK INTO CHEESE

Serves 2
Main tools and equipment Measuring jug, measuring spoon, colander, cheesecloth, ladle, wooden spoon, large saucepan
Production skills Line, stir, heat, ladle, drain, read a thermometer
Cooking processes Heat

Preparation time 10 minutes
Cooking time 45 minutes
Serving and presentation time 2 minutes
Total time 57 minutes

INGREDIENTS

- 4 cups full-cream milk
- ¼ teaspoon salt
- 2 tablespoons freshly squeezed lemon juice OR white vinegar for a more neutral flavour

METHOD

1. Line a colander with a large piece of cheesecloth that has been folded over at least three times. Put this colander over a bowl and set it aside.
2. Heat the milk in a large heavy-based saucepan on medium heat.
3. Add the salt and stir occasionally, making sure the milk does not scorch at the bottom.
4. Heat gently to 85°C; it should take about 20 minutes.
5. Lower the heat and add the lemon juice or vinegar. Stir over low heat for about 2 minutes.
6. The curds should be separating from the yellowish liquid whey. If not, add another teaspoon of acid and continue stirring gently.
7. Remove the pot from the heat, cover and allow to stand for about 20 minutes. Try to hold the temperature between 75–85°C while standing, reheat briefly over low heat if needed.
8. Carefully ladle the ricotta into the cheesecloth-lined colander.
9. The longer the ricotta is left in the colander, the firmer it will become. For a creamy ricotta, let it sit for 3–5 minutes. It can sit for up to 20 minutes for a drier ricotta.
10. Use immediately, or cover and refrigerate for up to 3 days.

EVALUATION

1. This is a fresh cheese. What other fresh cheeses are there on the market?
2. Complete a sensory evaluation of your cheese compared to a commercial ricotta cheese.

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Yoghurt

cultured milk A culture of lactic acid bacteria such as lactobacillus is added to milk to sour it

Yoghurt is a **cultured milk** product to which two types of bacteria are added. These cultured bacteria act on the lactose and the protein found in milk to give it a soft curd with a slight acidic taste. Yoghurt is rich in protein and calcium, making it a tasty and nutritious snack option as well as being a great addition to meals.

TASTY TRIVIA

Some yoghurts are labelled as 'pot set'. This means that the milk with the live bacteria was poured into the tub and the fermenting process allowed to occur in the pot. Because no stabilisers have been added, when it is spooned out of the tub it will often separate into milk solids and whey.

LEARNING REFLECTION

1. Name three of the most common milk products.
2. When cooking, heat has a similar impact on egg and cheese. Describe these similarities.
3. Identify the nutrient that causes the changes in cheese while heating.
4. Explain the differences in processing between a fresh cheese like ricotta and a hard cheese like parmesan.
5. Describe what properties cheese adds to a meal (like an omelette) when sprinkled on top.

Figure 7.10 Yoghurt can be a healthy breakfast or snack.

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7.6 Milk, ethics and environmental sustainability

LEARNING INTENTION

1 To consider the ethical and environmental issues surrounding the production of milk and milk substitutes.

Milk has been and continues to be an important part of our diet. However, due to several factors there has been some decrease in the sales of fresh milk, even though our population has increased. Part of this reduction can be attributed to the increase in the availability of plant-based milk alternatives. But why have these increased in sales? Animal welfare issues and changes in lifestyles, such as veganism and flexitarianism, are two reasons for an increase in the sales of plant-based milks.

Animal welfare

Milk is produced by mammals to feed their young. Humans harvest this milk for their own consumption. Although it is possible to feed a calf *and* get milk from the cow at the same time, it is not really viable in the volumes that humans want, so this raises the question: what happens to the calves?

Dairy Australia is aware that this issue can cause some people concern and address this ethical issue on their website.

COLLABORATE 7.10

EXTENSION

Discuss with your class the reasons why lifestyle changes and animal welfare issues have caused an increase in the sales of plant-based milks.

Figure 7.11 Mammals must produce offspring before they can produce milk.

INVESTIGATE 7.11

Go online to the Dairy Australia website and navigate to the 'Approach to Animal Welfare' page, or follow the link https://cambridge.edu.au/redirect/10085.

1 Why would having unhappy and mistreated animals be a problem for a dairy farmer?
2 What safeguards does Dairy Australia provide to ensure that farmers are meeting animal welfare issues?
3 Despite the measures taken by farmers and Dairy Australia, there are still many who do not consume milk and milk products because of their ethical and environmental concerns. But are plant-based milk alternatives a perfect solution?

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Plant-based milk production

Sales of alternatives to dairy-based milks, such as those produced from soy, almond and rice, are increasing rapidly. In a 2022 media release, the Australian Bureau of Statistics said, 'The amount of dairy and meat substitutes purchased from Australian supermarkets and other food retailers jumped another 14 per cent in 2020–21, following a 14 per cent increase between 2018–19 and 2019–20'.

Source: Australian Bureau of Statistics (30 March 2022), Australians buy more dairy and meat substitutes in 2020–21, ABS website.

These products are increasing in popularity, partly because of the rising concern about ethical and environmental issues.

INVESTIGATE 7.12

Research the manufacturing of plant-based milks.

1. How are they produced?
2. Are there any environmental issues related to the production of these milks?
3. Discuss the advantages and disadvantages of the production and consumption of non-dairy milk products.
4. Debate the issue that milk should only refer to dairy milk.

Figure 7.12 Almonds being produced for consumption, and to be used for almond milk production. What issues might result from this type of intensive farming?

Figure 7.13 Alternative milks are growing in popularity and accessibility.

LEARNING REFLECTION

1. How is the production of milk potentially an ethical issue?

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Review

1 Humans have been consuming milk from a number of different animals for over 10 000 years. To consume milk safely, it must be pasteurised before it is sold. We also consume other products manufactured from milk. There are also plant-based milks available for those who cannot or do not want to consume milk from animals.
2 Milk goes through a number of steps before it arrives in our fridge at home.
3 There are a number of different milk products available for sale which meet specific needs of consumers. Each has its own characteristics.
4 Milk is considered an almost perfect food as it contains most nutrients.
5 Milk is an important part of the Australian Guide to Healthy Eating model. It is suggested that most people consume two-and-a-half serves of milk a day.
6 Calcium is a significant mineral that is found in large amounts in milk.
7 Milk is processed into a number of different products such as cheese and yoghurt.
8 There are ethical and environmental issues relating to the production of both dairy products and plant-based milk alternatives.

Test your knowledge

Multiple-choice

1 Skimmed milk powder has had the:
   a water removed.
   b water and fat removed.
   c fat removed.
   d lactose or sugar removed.
2 Pasteurisation is the process of:
   a killing bacteria by filtering them out.
   b making the fat molecules stay suspended in the milk, so it doesn't separate.
   c killing bacteria by heat.
   d making yoghurt from milk.
3 The recommended daily intake of dairy products for older women is:
   a 2–4 serves.
   b more than recommended for youth.
   c the same as it is for older men.
   d not recommended because of the high-fat content.
4 The mineral found in large quantities in milk is:
   a calcium.
   b iron.
   c magnesium.
   d fluoride.

True or false?

1 Humans consume milk sourced only from cows.
2 It is illegal to sell milk for human consumption in Australia that has not been pasteurised.
3 As you get older, the need to consume foods from the milk, yoghurt, cheese and/or alternatives category decreases.

Short-answer

1 What nutrients can be found in full-cream milk that cannot be found in cheese? What might be the implications of this if a person did not consume whole milk but did consume cheese?
2 Choose one of the scenarios below and explain possible reasons for the changes in consumption of dairy product as described:
   a From the mid 1990s we have been consuming less and less milk.
   b The amount of cheese we eat has stayed about the same since the 1990s, but we are eating less cheddar.
   c The amount of butter we ate slowed during the 1970s and 1980s, but this pattern has reversed over the last 15 years, and we are eating more butter.
   d The amount of yoghurt has shown a steady increase since the 1990s.

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Extended-response

For the range of milks that you tasted in Activity 7.5, copy the table below into your workbook and write the milk varieties in the left-hand column. Complete the table to compare the nutrient content of the different milks.

Milk	Protein content	Calcium content	Sugar	Fat content	Any added nutrient, e.g. iron
Full-cream milk					
No-fat milk					
Reduced-fat milk					
Farmhouse milk					
Lactose-free milk					
Organic milk					
A2 milk					
Soy milk					
Rice milk					
Almond milk					
Goat's milk					
Oat milk					

1 Rank each type of milk individually for their content of protein, calcium, sugars, fats and other nutrients. Copy and complete the table below for each milk you tested with your results. In each box, list the milk with the highest to lowest content of each of these nutrients, with the highest at the top. For the added nutrients column, list the milk with the highest number of added nutrients at the top.

Protein content	Calcium content	Sugars content	Fat content	Any added nutrient, e.g. iron

2 Identify a target market for each of these milks.

3 Using the information from this chapter, suggest the type of milk or milks that would best suit you if you had the following requirements:

- **a** You are vegan.
- **b** You would like to consume no-fat milk.
- **c** You are 15 years old and you want to make sure your bones develop as well as possible.
- **d** You are lactose-intolerant.
- **e** Your grandpa likes the taste of real milk.
- **f** You are making a milk drink for your two-year-old brother.
- **g** You are calcium deficient.

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CHAPTER 8

Lean meat and poultry, fish, eggs, nuts and seeds, legumes and beans

BEFORE WE BEGIN

1. Identify the purpose of protein in the body.
2. List the best protein sources.
3. Explain how plant-based proteins can be just as nutritious as animal-based proteins.
4. Describe why it is important to carefully plan the intake of protein for health and environmental sustainability.

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8.1 Meat: the basics

LEARNING INTENTIONS

1 To understand the structure of meat and why some cuts of meat are more tender than other cuts.
2 To develop knowledge in the different sources of meat.
3 To develop skills in the use of meats indigenous to Australia.
4 To understand why some meats are considered white and others red, and to provide examples of each.

meat The flesh of an animal that is edible

Meat is the edible part of the flesh or muscles of animals. In Australia, we commonly eat meat from cattle, sheep, chicken and pig. Many people also eat rabbit, deer, kangaroo, goat or birds such as duck.

Figure 8.1 A butcher sells meats and meat products.

COLLABORATE 8.1

Talk with a classmate about the types of meat that provide food for humans. Discuss which animals provide us with lamb, beef, pork, venison, bacon, ham, mutton, squab and veal.

Structure of meat: physical properties

Meat is made of tiny muscle fibres that are held together by connective tissue or collagen. The three main structures of meat that can be seen under a microscope are shown in Figure 8.2.

Tenderness of meat

The way in which an animal is raised and slaughtered influences how tender the final product will be. When an animal is slaughtered, the carcass becomes stiff due to the chemical changes in the body of the animal after death. After approximately six hours, the carcass returns to normal as the muscles relax under the influence of other body chemicals. After this period of time, the meat can be aged for five days and up to two weeks. During the time the meat is allowed to age, muscle fibres break down, causing the meat to become more tender. The practice of hanging a carcass helps this process.

Fresh meat can be tenderised before cooking by physically changing the muscle fibres and the connective tissues of the meat. This is done by mincing, dicing, pounding or slicing it. Meat can also be made more tender by chemical methods, such as marinating the meat with ingredients such

Fat: small amounts of fat found between meat fibres. There is also a thick layer of fat underneath the skin.

Muscle fibres: the bundles of meat strands that are made up of protein and water. These strands make up the muscles of the animal.

Connective tissue: the tissue that holds the muscle fibres together. This tissue is made up of a protein substance called collagen. The collagen is thicker in the parts of an animal that have the most activity. The collagen is the tough part of of the meat.

Figure 8.2 The structure of meat

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as oil, soy sauce, garlic and ginger. Marinating meat helps to make meat tender, but it is also one of the best ways to give it more flavour.

TASTY TRIVIA

The process of dry ageing means beef is kept at a temperature between 1°C and 3°C in a humid room with good ventilation. By doing this, meat can be aged up to 30 days; during this time 10–15 per cent of the water content will evaporate. This makes very tender beef, but it is also much darker in colour.

Different meat products

The three main mammals bred for human consumption in Australia are cattle, sheep and pigs. Meat is named according to the animal from which it comes and the age at which it is slaughtered.

Beef and veal are the meat from cattle. Veal comes from an animal that is approximately six months old; the meat is white to pale pink in colour and has a very small amount of fat. Yearling beef is approximately one year old. It has a deeper pink colour, firm flesh and clearly visible fat.

Sheep give us lamb; spring lamb comes from an animal that is up to 12 months old, with a pink flesh and creamy-looking fat. Yearling mutton is aged between 12 and 20 months of age, and mutton older than that. Mutton is much darker in colour and has a stronger flavour and aroma.

Pork comes from pigs. These animals are approximately six to nine months old; the flesh is pale pink, and the fat is white in colour. Pork can be purchased in many different ways – fresh, smoked or salted – and it is used in sausages and many other smallgoods.

Native Australian meats

Australia's natural wildlife supplied the traditional owners of this land with ample foods. Apart from the huge variety of nuts, seeds and fruits, meat was also plentiful. Kangaroo, wild turkey, possum, emu and reptiles, like lizards and snakes, were caught, cooked and eaten. We consume very few of these protein sources; however, kangaroo is becoming more widely available and consumed in both commercial and domestic settings.

INVESTIGATE 8.2

Go online to research which parts of a sheep or cow produce tough meat, and which parts produce the most tender meats. Draw an outline of a sheep and/or cow and label these parts.

TASTY TRIVIA

It is only recently that native Australian meats have become available commercially; in fact, kangaroo could only be sold as pet food in New South Wales, Queensland and Victoria up to 1993.

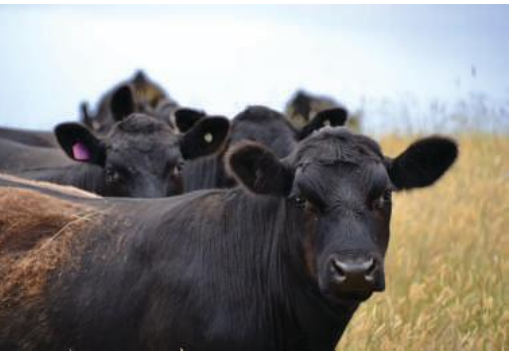

Figure 8.3 In Australia we mainly breed cattle, sheep and pigs for human consumption.

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ACTIVITY 8.3
EATING WILD ANIMALS

Many other types of animals are hunted or raised for their meat. Investigate the farming of one of these animals:

- buffalo
- crocodile
- deer
- duck
- emu
- goanna
- goose
- possum
- quail
- rabbit
- wallaby.

Produce a visual display to explain the following:

1. List and describe the cultures that mainly eat the animal chosen.
2. List the physical properties of the meat when it is raw and when it is cooked.
3. Compare the nutritional value of beef and the animal you are investigating.
4. Detail the price you would expect to pay per kilogram for this type of meat.
5. Suggest three recipes or meals that could be prepared using this animal.




In the Kangaroo fillet with macadamia and saltbush *dukkah* recipe, the loin of the kangaroo is crusted with a bush-inspired *dukkah*. The loin is a tender but lean cut of meat, so it is essential that it be cooked to medium–rare to retain moisture and tenderness.

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KANGAROO FILLET WITH MACADAMIA AND SALTBUSH *DUKKAH*

Serves 2
Main tools and equipment Measuring spoons and cups, non-stick frying pan, baking paper, saucepan or microwave safe bowl, sieve, whisk, spoon, egg-slide, foil
Production skills Brush, roll
Cooking processes Toast, fry

Preparation time 15 minutes
Cooking time 20–25 minutes
Serving and presentation time 5 minutes
Total time 45–50 minutes

INGREDIENTS

- 200 g kangaroo fillet
- 1½ tablespoons olive oil
- 1 tablespoon finely chopped macadamias
- 1 teaspoon sesame seeds
- 1 teaspoon chopped pumpkin seeds
- 2 teaspoons dried, ground saltbush leaves
- ¼ teaspoon coriander seeds
- Pinch cumin seeds
- Pinch freshly ground black pepper

METHOD

1. Preheat a fan-forced oven to 160°C. Line an ovenproof dish with baking paper.
2. Brush the kangaroo fillets with a little oil and a pinch of salt, then set aside.
3. To make the *dukkah*: toast the macadamias and pumpkin seeds in a small frying pan for two minutes, tossing to make sure they do not burn. Set aside in bowl to cool.
4. Toast the sesame, cumin and coriander seeds in the same frying pan for 1–2 minutes or until browned, tossing continually. Set aside to cool.
5. Once all ingredients are cool, blend the seeds, nuts and pepper briefly in a small food processor or spice grinder. This is the *dukkah*.
6. Place the *dukkah* onto a plate, then roll the oiled fillet in this to coat generously.
7. Place the fillet in the prepared ovenproof dish, cook until the meat reaches an internal temperature of 52°C for a medium-rare fillet, or up to 15 minutes, depending on the size of your fillet. Take care not to cook the fillet past medium-rare, as this will toughen the meat.
8. Cover the dish with foil and rest for at least 5 minutes to allow the meat to relax and absorb the juices.

EVALUATION

1. Complete a sensory evaluation of the kangaroo fillet dish, paying particular attention to the meat.
2. Make a list of the processes you needed to undertake to complete this dish.
3. List two safety and two hygiene procedures you followed during this production task.
4. Debate the proposition that we should not be consuming an animal that is on our national coat of arms.

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DESIGN BRIEF: SIDE DISH

Design some side dishes for the kangaroo fillet recipe protein part of a meal. What else could you add that would complement this dish and meet your nutritional needs for both cereals and vegetables?

salmonella A bacterium that causes food poisoning

myoglobin A protein found in the muscle tissues which helps provide oxygen to the tissue. It is red in colour and is what colours the liquid that seeps from meat before and after cooking.

White meats

Chicken, duck, turkey, pigeon, quail, goose and pheasant are among the different types of poultry that are eaten. Chicken is the most commonly eaten poultry in Australia.

Poultry is cooked in order to ensure that microorganisms are destroyed, to tenderise the meat and to develop flavour.

Undercooked chicken is a common cause of **salmonella** food poisoning, so it is important to ensure that all chicken is cooked properly. When chicken is cooked properly, the meat changes colour from pink to white, the flesh will feel soft and will break away easily if it is on a bone, and the juices will be clear rather than red or pink in colour.

TASTY TRIVIA

Each Australian eats on average 46.2 kg of chicken meat per year. About 50 years ago, Australians ate just 7 kg of chicken per person per year. Suggest reasons why this increase may have happened.

Figure 8.4 Poultry and fish are both considered white meats because they contain significantly less **myoglobin** than red meat.

Figure 8.5 Do you know where each of these cuts come from, and how to cook each to bring out the best flavour?

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Fish

Fish, prawns, scallops, muscles, lobster, pipis, Morton Bay bugs, Murray cray, trout, yabbies ... the list of fish and **aquatic** animals we consume goes on. Seafood includes not only the animals but also seaweed that is served as food. Fish that can be caught and consumed are also freshwater, including various shellfish.

aquatic Relating to water

vertebrates Animals or fish with a backbone

invertebrate A water animal that has a shell

Fish is very similar in structure to meat, although it has very little connective tissue, so cooking only needs to be quick and gentle. If fish is overcooked, the protein shrinks and squeezes out moisture, leaving the flesh dry and rubbery.

COLLABORATE 8.4

Brainstorm and record the aquatic **vertebrates** and **invertebrates** that we consume that the class is aware of.

LEARNING REFLECTION

1. Define the term 'meat'.
2. Make a list of the animals we eat for meat.
3. Describe how meat can be tenderised.
4. List the three main structures of meat.
5. Discuss the component of meat that makes it tough.
6. Identify the sections of a cow that will produce tough meat. Explain why this is the case.
7. Compare the age and appearance of spring lamb and pork.

8.2 Cooking with meat

LEARNING INTENTIONS

1. To understand why meat is cooked, and the methods of cooking meat for best quality.
2. To understand how and why the cooking of fish differs to that of other meats.

The cooking of meat helps to obtain a **palatable**, high-quality product. Tough cuts of meat need to be cooked slowly in liquid to soften the meat fibres. Tender cuts of meat should be cooked quickly without liquid as muscle fibres are softer.

palatable Having a good taste or mouthfeel when eaten

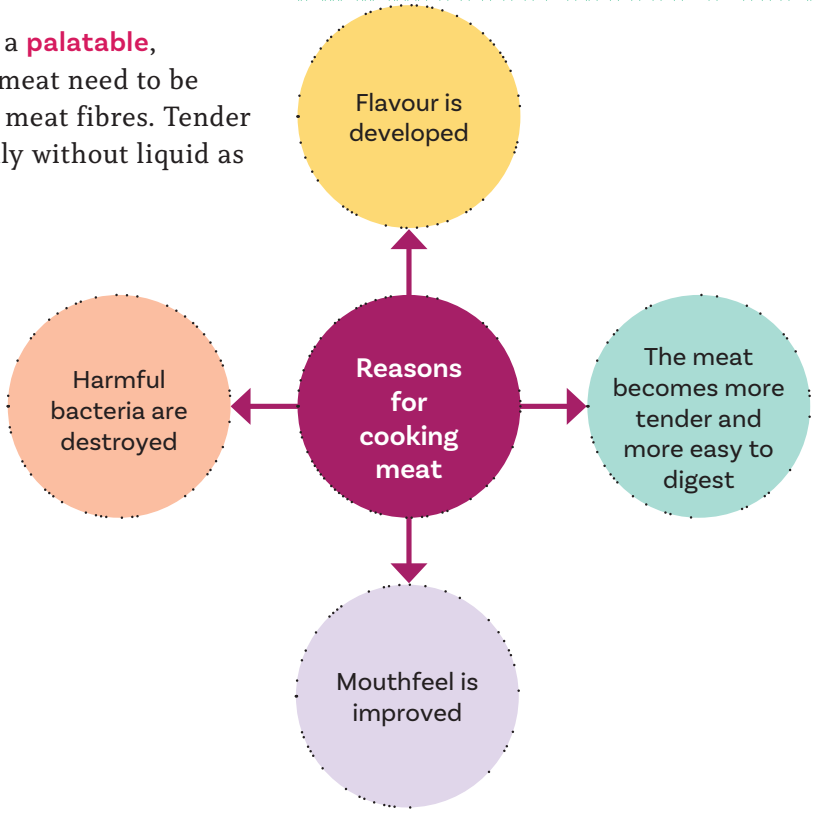

Figure 8.6 Reasons for cooking meat

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Methods of cooking meat

Meat can be cooked by dry heat or moist heat.

ACTIVITY 8.5
MOIST AND DRY HEAT

Review the terms 'moist' and 'dry heat' from Chapter 2. What is the difference between the two methods? List at least two different methods of cooking for each.

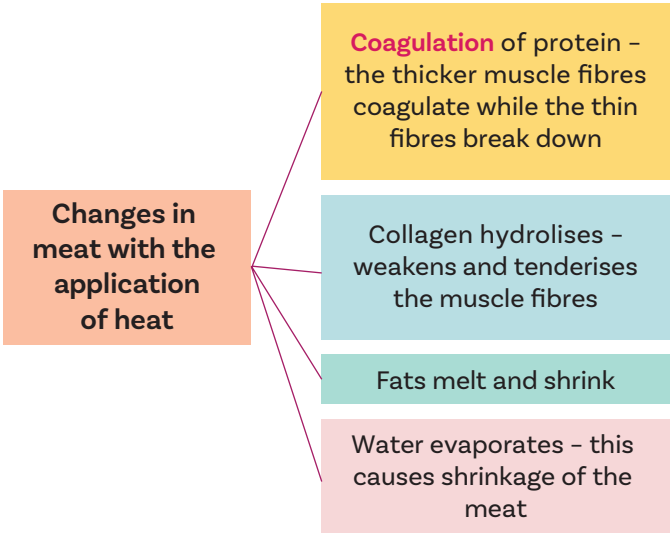

Figure 8.7 Changes in meat with the application of heat

coagulation The changing of a protein from a liquid to a solid when heated, agitated or an acid is added

hydrolysis A chemical reaction with water that causes decomposition of the muscle fibres

Dry heat methods

Dry heat methods are used to cook tender cuts of meat. These cuts of meat have small amounts of connective tissue, so cooking is not needed for **hydrolysis** of the collagen.

Moist heat methods

Moist heat cooking involves cooking meat with the use of moisture. Lower temperatures are used as opposed to dry heat cooking. Tougher cuts of meat are generally cooked by this method, as it softens the collagen of the meat. Seasoning, sauces and flour are added during cooking to enhance the flavour and texture of the final meat dish.

COLLABORATE 8.6

With a partner, research and list two tender and two tough cuts of meat and state a way of cooking that would be suitable for each cut. Find a recipe that uses this cut and this method of cooking.

TASTY TRIVIA

Goannas are one of the animals traditionally hunted by Aboriginal and Torres Strait Islander peoples. Goannas usually are cooked whole in their skins on the hot coals of a campfire. This makes the meat juicy and sweet.

ACTIVITY 8.7
MOIST METHOD FOR COOKING MEAT

Investigate recipes to cook meat by moist heat.

1 Explain how this method of cooking is carried out.
2 Search a variety of recipe books to find two recipes to cook meat using this method. Find one recipe for beef and one recipe for lamb.
3 For each of the recipes, do the following:
   - **a** Identify the cut of meat that is used for your moist heat cooking method.
   - **b** Explain the types of liquid used in heat transfer for this moist heat cooking method.
   - **c** List the seasonings or flavours used in this recipe.
   - **d** Discuss how long it takes to prepare this recipe.
   - **e** List the reasons why you think many people choose not to prepare meat using this method of cooking.
   - **f** Outline reasons why this type of cooking of meat is not often done in a school setting.

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Cooking fish

Most fish, like other animal products, needs to be cooked in order to destroy microorganisms, tenderise or soften it and develop its flavour. **Moderate temperatures** and a quick cooking time method, such as poaching and steaming, and dry cooking methods, such as grilling, deep frying and baking, can be used to cook fish.

moderate temperature 160 to 180°C

Fish can also be preserved: it can be dried, smoked, frozen, salted, pickled and canned.

COLLABORATE 8.8

Think about dishes where fish is served raw. Talk about this with a friend, discussing whether you would eat or have eaten fish this way.

Figure 8.8 Exceptionally high-quality fish is often eaten raw in Japan in a dish called *sashimi*. Seaweed is also used in salads, to wrap sushi and provide flavour to many other Asian dishes.

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MILD FISH CURRY

Serves 4
Main tools and equipment Knife, chopping board, measuring spoons, measuring jug, frying pan
Production skills Chop, split, measure, slice, peel, grate, crush
Cooking processes Fry, boil, simmer

Preparation time 10 minutes
Cooking time 15 minutes
Serving and presentation time 5 minutes
Total time 30 minutes

INGREDIENTS

- 600 g firm white fish fillets, cubed
- 1 tablespoon vegetable oil
- 1 brown onion, thinly sliced
- 1 long red chilli, split, seeds removed and finely chopped (optional)
- 2.5 cm piece fresh ginger, peeled and finely grated
- 2 cloves garlic, crushed
- 1 tablespoon mild curry paste
- 140 ml coconut cream
- ¼ bunch fresh coriander leaves
- 1 tablespoon lime juice

METHOD

1. Heat oil in a medium frying pan, cook the onion until soft, but not brown. Add the chilli (if using), ginger, garlic and curry paste and cook, stirring all the time until it is fragrant.
2. Add the coconut cream, bring to the boil. Reduce the heat and simmer uncovered, until the sauce thickens slightly.
3. Add the fish and cook, covered, for about 5 minutes or until the fish is just cooked through. Do not leave too long; it will flake and fall apart.
4. To serve, sprinkle the curry with the coriander leaves and lime juice.

EXTENSION

Curry pastes are extremely varied in their ingredients, the purpose that they serve, the level of heat or spice they contain and the country in which they originated. You can make your own curry paste to replace the purchased paste. Research curry pastes and find a suitable one to substitute in this recipe.

DESIGN BRIEF: SIDE DISH

Design a side dish to serve with the mild fish curry recipe to make it a balanced meal, including vegetables and cereals.

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LEARNING REFLECTION

1 Define the terms 'palatable', 'moist heat', 'dry heat', 'coagulation' and 'hydrolysis'. Explain how each term relates to meat cooking.
2 Outline the changes that occur in meat when heat is applied.
3 Describe one example of moist cooking and one of dry cooking methods.
4 Explain why fish should be cooked.

8.3 Nutritional content of meat

LEARNING INTENTIONS

1 To be able to state the nutritional requirements that meat provides.
2 To describe the place of protein foods in the Australian Guide to Healthy Eating.
3 To understand the functions of protein in the body and the relationship of proteins to amino acids.
4 To understand the terms 'complete proteins' and 'incomplete proteins' and be able to apply these to improving the quality of food intake.

The nutritional value of meat depends on the type of animal and the part of the animal that is eaten. The muscle tissue of meat is high in protein; it contains all of the essential amino acids and is a good source of iron and B group vitamins.

Meat – particularly red meat – can be high in saturated fat. The fat content of meat varies widely, depending on the species and breed of the animal, the way in which it was raised, and the methods of butchering and cooking used.

You will learn more about fats in Chapter 9.

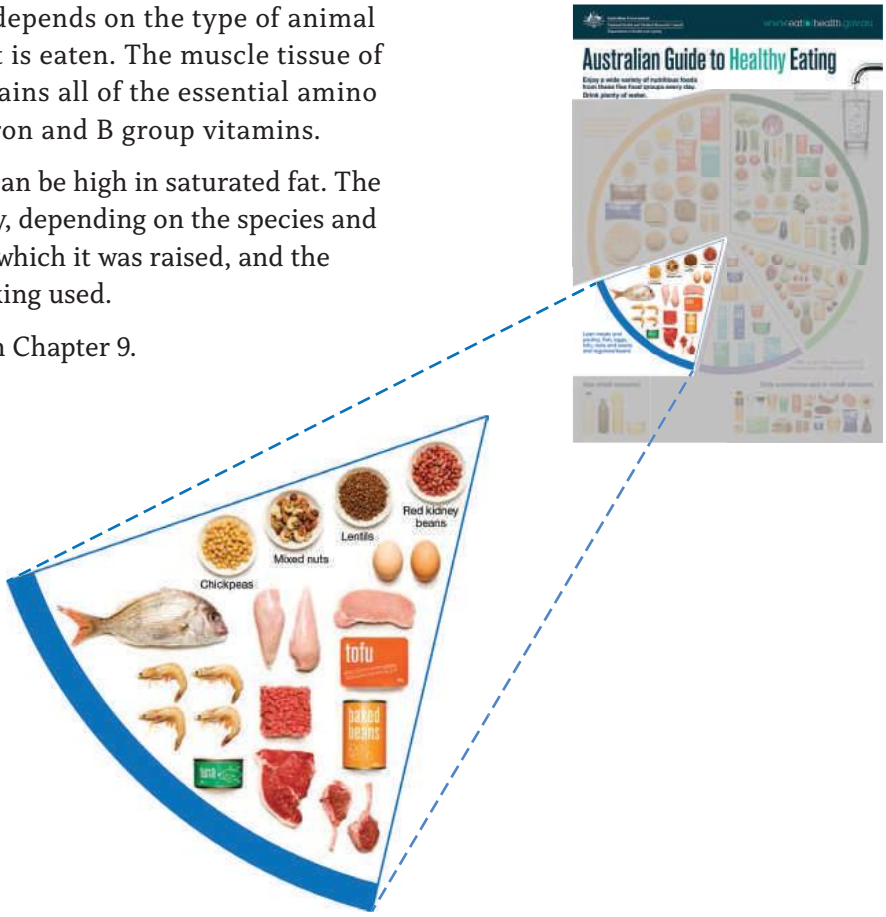

Figure 8.9 Lean meat and poultry, fish, eggs, nuts and seeds, and legumes/beans is one of the five essential food groups recommended in the Australian Guide to Healthy Eating. *Based on material provided by the National Health and Medical Research Council.*

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The best meats for our health are those which are lean. Removing visible fat from red meat and taking the skin off chicken are two easy ways to reduce the fat intake from meat products.

The lean meat and poultry, fish, eggs, nuts and seeds, and legumes/beans wedge of the Australian Guide to Healthy Eating is another smaller wedge, indicating its importance, but in terms of volume of food consumed in a day in comparison to vegetables and grains, it should be eaten less.

The recommended number of serves per day for men of all ages is slightly higher than that of women. Men (19–50) require three serves per day while women of the same age require 2½ serves. This is because on average men have a higher lean body mass than women, so this extra muscle and bone requires more protein for maintenance.

This wedge of the Australian Guide to Healthy Eating includes non-animal proteins such as nuts, seeds and legumes/beans, which we will look at in more detail later in the chapter, along with eggs.

COLLABORATE 8.9

Working with another student, brainstorm and record a day's meals for an adult male that contains the required servings of protein foods. While you are planning, ensure you also meet the needs of an adult male for grains, vegetables and fruits.

Essential nutrients: protein

All cells in the body contain proteins, so it is necessary to maintain levels of protein – especially because it is necessary for growth and repair of tissues. Because the body is not able to store amino acids, it is important to consume protein every day. Although there are hundreds of different amino acids in nature, there are only 20 that make up all proteins in the human body. There are eight **essential amino acids**. They are essential because the body must have them to function but is unable to produce them, so they must be supplied by food. The foods containing essential amino acids are called **complete proteins** and are found in animal foods such as meat, fish, chicken and eggs, as well as soybeans.

If a protein does not contain all the essential amino acids, it is called an **incomplete protein**. These are found in plant foods; meaning it can be difficult for **vegetarians** and **vegans** to guarantee consumption of complete proteins. It is possible to plan food intake combining **complementary proteins** to make complete proteins in a diet.

essential amino acid The building blocks of protein that the body cannot manufacture, so they must be supplied through food

complete protein Protein that contains all the essential amino acids for body function

incomplete protein Protein, usually from plant sources, that lacks one or more essential amino acids

vegetarian Generally, a person who eats eggs and dairy products, but does not eat any animal flesh (also called lacto-ovo)

vegan A person who eats only plant foods – that is, they do not eat any animal products

complementary protein Protein that lacks one or more of the essential amino acids, but when eaten together can supply a complete protein

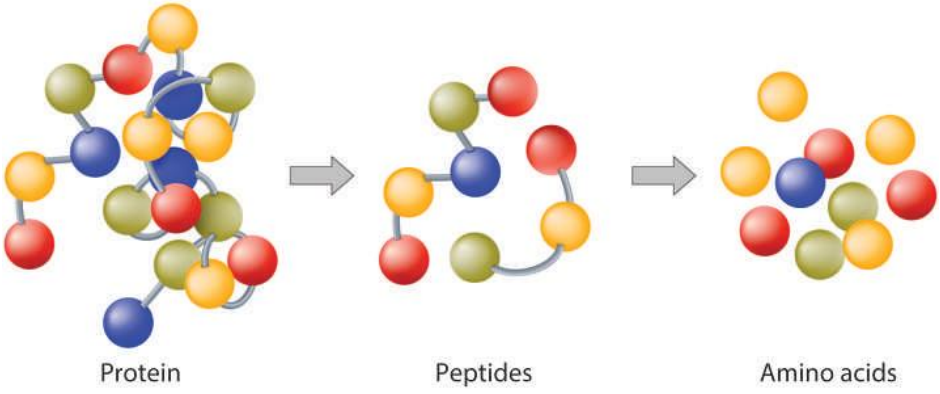

Figure 8.10 Protein is made up of peptides, which are themselves made of amino acids. These are found in every cell in the body.

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Function of protein in the body

Protein is used in the body for a range of functions. See Figure 8.12 for a full list.

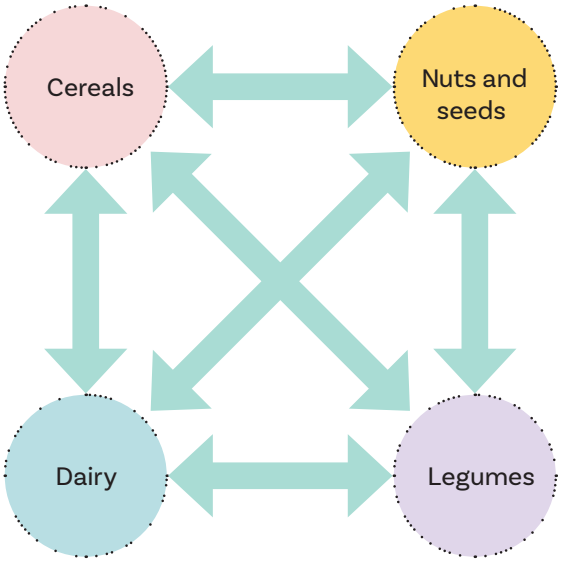

Figure 8.11 Making complementary proteins. Foods from the four groups shown on the diagram can be combined to form complete proteins. For example, consuming nuts and seeds with legumes will provide the body with all essential amino acids.

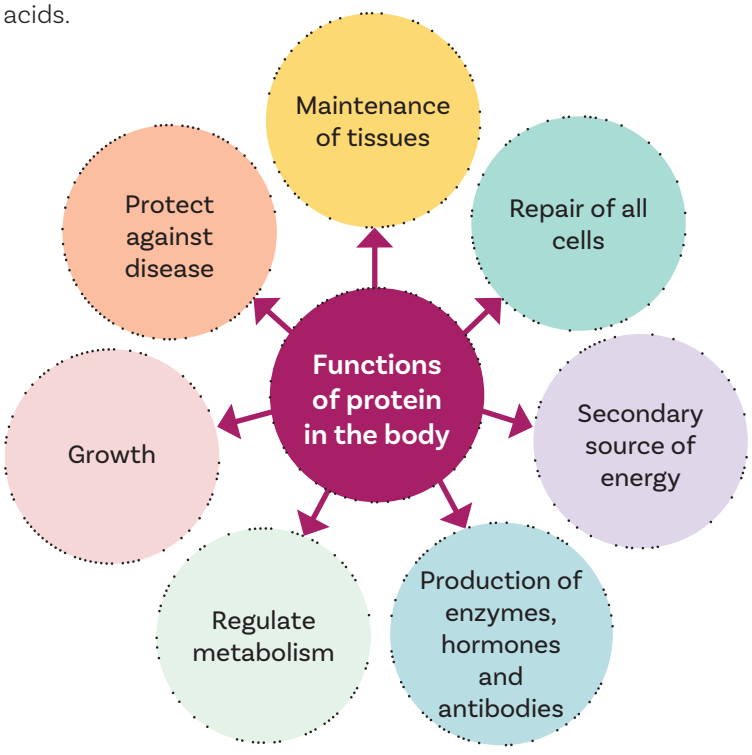

Figure 8.12 Functions of protein in the body

DESIGN BRIEF: VEGAN LUNCH

You are planning to make lunch for your best friend who is vegan and health- and diet-conscious. Design a simple lunch that contains all the essential food groups, but also includes complete proteins.

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LEARNING REFLECTION

1 Explain the difference between macronutrients and micronutrients.
2 Making nutritional food choices is important. Explain why nutrients are required by the body.
3 Describe the difference between essential and non-essential amino acids. Include food sources in your response.
4 Explain the function of a complete protein. List four food sources of incomplete proteins.
5 People who consume a vegetarian or vegan diet can struggle to consume the essential amino acids. Explain why this is the case and describe how this can be prevented.

8.4 Eggs: the basics

LEARNING INTENTIONS

1 To explain why eggs are in this portion of the Australian Guide to Healthy Eating.
2 To provide examples of why eggs are a valuable part of a diet.

As eggs contain considerable amounts of complete protein and many other nutrients, they are an excellent food source. Because of the nutrient content they belong in the lean meat, poultry and fish portion of the Australian Guide to Healthy Eating.

Eggs are one of the most versatile ingredients you can use in cooking. They are economical, they come with their own fragile packaging and they include different parts that can be used for different purposes, or you can use the whole lot together.

COLLABORATE 8.10

Discuss with the class who has eaten eggs other than chicken eggs. Describe what you have eaten, how it was served and how it tasted.

Figure 8.13 Eggs are very versatile. They can be served simply as boiled eggs or as one of most admired and honoured dishes in cooking – a soufflé.

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Quail eggs are tiny. They are often used in fine dining for their delicate appearance.

Hen eggs are the most widely available and frequently used eggs. Come in a range of colours from blue to deep brown; however, brown ones are the most commonly sold in Australia.

Duck eggs are larger than hen eggs. They can be substituted for hen eggs, especially in baking, but being bigger means the recipe needs to be altered to cater for the size. Generally, one duck egg = two hen eggs.

Figure 8.14 Different sources of eggs which are commonly used in cooking.

TASTY TRIVIA

Did you know the colour of the egg usually reflects the colour of the chicken that laid it? Brown eggs, the most commonly purchased eggs in Australia, come from a brown chicken. Blue eggs are laid by several chicken breeds, one of them the Araucana.

Figure 8.15 Eggs come in many shapes. These are the world's most expensive eggs: caviar, or fish eggs.

DESIGN BRIEF: USING EGGS

Your next-door neighbour is going on holiday, and you are looking after her chickens. They are laying 3–4 eggs a day. Generate recipe ideas that use eggs and design a healthy breakfast, lunch or dinner solution to prevent the eggs being wasted. For a totally sustainable approach, create a way to utilise the eggshells as well, ensuring there is no landfill waste.

LEARNING REFLECTION

1 Why are eggs found alongside meat in the Australian Guide to Healthy Eating?

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8.5 The structure and nutritional content of eggs

LEARNING INTENTIONS

1 To be able to state the structures that make up an egg.
2 To develop skills in identifying fresh from stale eggs.
3 To know how to store eggs to optimise storage time.
4 To understand the difference in the nutritive value of the yolk to the white of an egg.

The egg is broadly made up of the shell, the white and the yolk. There are, however, other structures you may observe when you crack an egg open.

TASTY TRIVIA

If you have leftover raw egg whites, you can freeze them to use later. Egg yolks are harder to freeze due to the gelatinous nature of the yolk, which makes them thicken when frozen.

Quality considerations

Eggs are often in their own package that you cannot see through, so it can be difficult to tell whether they are fresh or stale or even if some are broken. It is a good idea to open the package gently to see whether any of the eggs are damaged before you buy them.

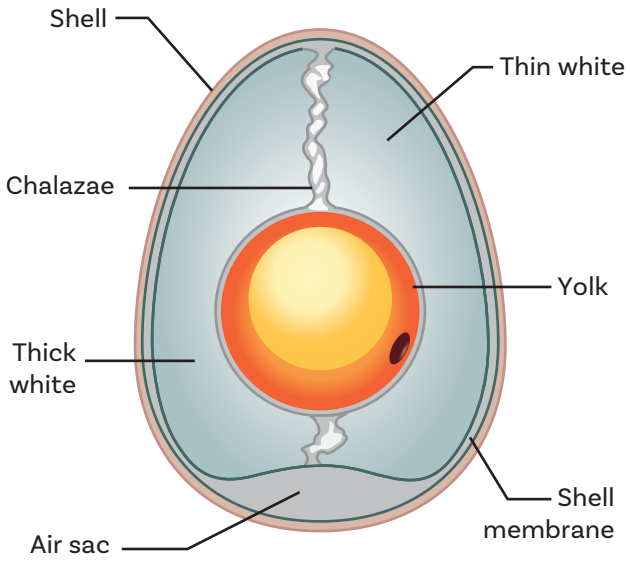

Figure 8.16 The structure of an egg

ACTIVITY 8.11
TESTING FRESHNESS OF EGGS

When you are at home and unsure of the freshness of your eggs, the easiest test is to place them in a clear bowl or jug.

1 Identify the part of the structure of the egg that has changed to create this difference.
2 The shell of the egg is hard. Explain the structure of the shell that allows air to pass through.
3 Safely store a raw egg for one month and then retest the egg. Describe the differences between each test. (You may like to use a diagram with annotations.)

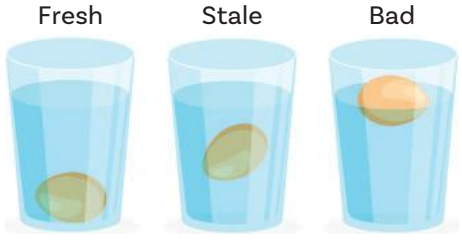

Figure 8.17 Testing for the freshness of eggs

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Eggs are best stored in the fridge in their egg carton. Cartons are designed to sit the egg with the point facing downwards, keeping the yolk in the centre of the egg. But remember, when cooking with eggs, use them at room temperature for the best results.

The nutritional value of an egg

Eggs, along with milk, are almost the perfect food; indeed, they are both often referred to as 'super foods' because they contain many nutrients in one complete package. The only nutrient not in either of these foods is dietary fibre. Eggs have all the nutrients necessary for a chick to develop – in particular, high protein content.

The nutritional content of the yolk and that of the white are slightly different, and this means they can be used differently in cooking and that they cook at a different rate.

ACTIVITY 8.12
WHITE VS YOLK

Complete a Venn diagram to compare the nutrient differences between the white and the yolk of eggs. Try to think of all the differences and similarities, including sensory and functional.

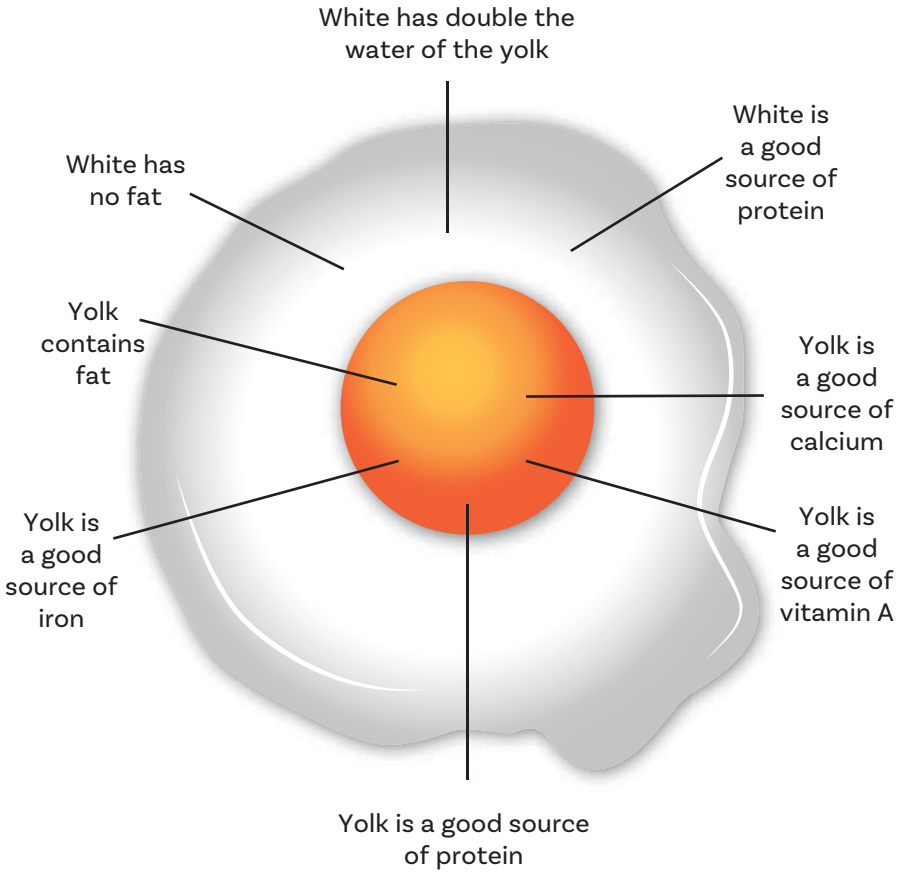

Figure 8.18 Differences in nutrients between a yolk and a white of an egg

LEARNING REFLECTION

1 State two differences in the nutrient content between the white and yolk of an egg.
2 Describe how to test whether your egg is fresh without breaking the shell.
3 Outline two physical property differences (colour, shape or size) between the white and yolk of an egg.

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8.6 Cooking with eggs

LEARNING INTENTIONS

1 To be able to explain what is happening when eggs cook, and why it is possible to cook an egg so that the white is solid and the yolk runny.
2 To be able to list and provide examples of the uses of eggs in cooking.

During the cooking process, eggs change significantly because of their high protein content. As shown in Figure 8.18, the yolk and white have a slightly different nutrient content, which influences how they cook. This is most noticeable when you fry an egg; the white sets before the yolk does.

The white has a higher protein content, so cooks at a lower temperature (about 65°C), cooks more quickly and will toughen very quickly when overcooked. The yolk contains fat and iron, so sets at a slightly higher temperature (about 70°C). Note that this is well below boiling point.

The protein content makes eggs useful in cooking, but it also means it is necessary to understand what changes occur because the protein in eggs can trap air and also sets when heated. This means they can be used for lots of different purposes in cooking.

COLLABORATE 8.13

Think of as many ways as you can that you can use eggs in cooking, both in the raw and cooked forms. Pair with another person and discuss your ideas. Share your answers with the rest of the class.

Figure 8.19 When cooking an egg, the white sets before the yolk.

Figure 8.20 This egg has a runny yolk, and a firm white. Using your knowledge of the temperatures at which the proteins in eggs set, explain what has happened in this egg.

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RECIPE

CHEESE AND LEEK SOUFFLÉ

Serves 4–6
Main tools and equipment Measuring equipment, cook's knife, chopping board, measuring spoons and cups, bowl, ramekin dishes, saucepan, wooden spoon, grater, electric beater
Production skills Julienne, separate, preheat, melt, stir, combine, beat
Cooking processes Simmer, bake

Preparation time 20 minutes
Cooking time 20 minutes
Serving and presentation time 2 minutes
Total time 42 minutes

Skill demonstration: Folding in

INGREDIENTS

- 4 large eggs
- 55 g unsalted butter
- 1 leek, cleaned and both white and green parts julienned
- 55 g flour
- 2 teaspoons Dijon mustard
- 1 cup, plus 3 tablespoons milk
- 75 g Emmental cheese (cheddar can be substituted), grated
- Salt and pepper to taste

METHOD

1. Collect your ingredients and separate the eggs. Be *absolutely sure* there is not even a trace of yolk in with the egg whites or this recipe will not work.
2. Preheat oven to 200°C. Grease four large or six small individual ramekin dishes with a little butter and place on an oven tray.
3. Melt the butter in a large saucepan over low heat, add the julienned leeks and cook gently until they are soft, but not brown.
4. Stir the flour and mustard in with the leeks. Cook, stirring for 3 minutes. Take off the heat.
5. Add the cup of milk a little at a time to the leeks, stirring to combine thoroughly. It will thicken and go lumpy at first; keep stirring until all the milk has been combined.
6. Return to the heat and bring to a simmer, stirring all the time. Remove from the heat, season with salt and pepper to taste.
7. Add the egg yolks one at a time, beating well between each addition with a wooden spoon.
8. Add the grated cheese and stir until cheese is melted. Set aside to cool.
9. Place the egg whites in a spotless bowl and beat with an electric beater until firm peak stage.
10. Using a metal spoon, gently stir 2 tablespoons of the egg white into the cheese mixture to loosen the mix. Carefully fold the remainder of the egg white into the cheese mixture, ensuring you keep as much of the foaminess as possible. Be gentle.
11. Spoon the mixture into the prepared ramekins, filling to 1 cm from the top. Place the ramekins on a baking tray and cook for 15 minutes, or until the soufflés are golden and risen. Check the soufflés through the closed oven door, as they will fall if the door is opened.
12. Serve immediately, as the soufflé will sink in a few minutes.

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EVALUATION

1 Explain the increase in volume of the egg whites as you beat them.
2 Describe what would happen if you were rough mixing your egg whites in with your cheese mixture. What effect would this have on the finished product?
3 Name three other ingredients you could add or substitute in this recipe.
4 Design what could be made to complement this dish and add to its nutritive value.
5 Identify the most challenging part of this recipe. Discuss how successful you were in this area and suggest ways you could have improved your performance.

Uses of eggs in cooking

Because of the content of eggs, they are exceptionally versatile and can be used in many different ways.

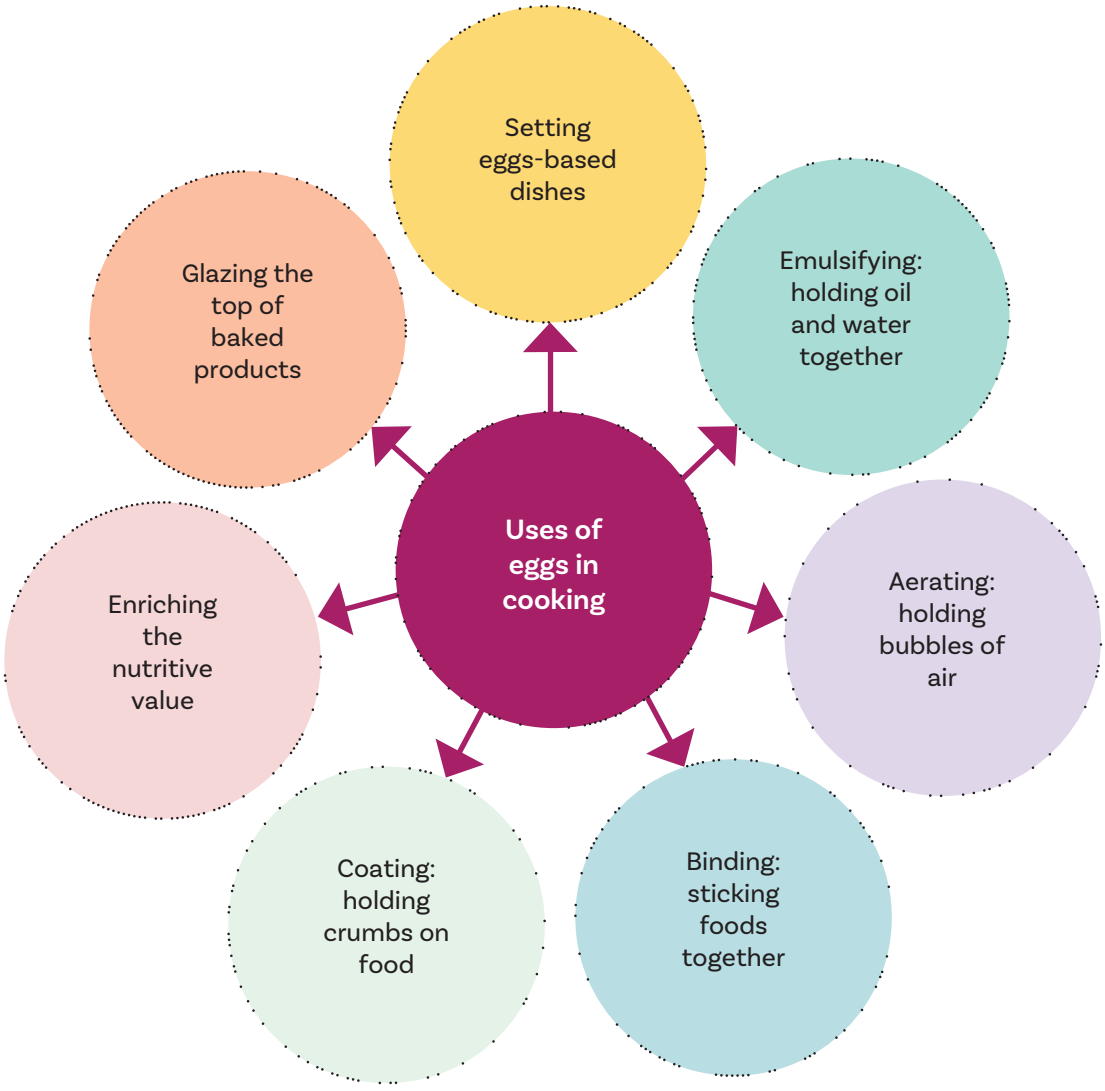

Figure 8.21 Uses of eggs in cooking

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Figure 8.22 Eggs play many roles, such as holding vinegar and oil together in a mayonnaise, holding the bubbles of air in the top of a lemon meringue pie, setting a lemon curd base, helping brown the bun of the hamburger, and holding the meat patty together.

DESIGN BRIEF: OMELETTES

An omelette is a quick, tasty meal that is a traditional dish in many countries. Omelettes can be savoury or sweet. The main ingredient is beaten egg, which is quickly and lightly fried. It can be eaten for breakfast, a light lunch or as a starter for a meal or a snack.

Each country has a slight variation, usually with regard to the filling, but omelettes can also vary in the way they are cooked. For example, a plain omelette is folded and a Spanish omelette is flat. A Swiss omelette is a variation that uses cheese.

You are planning to have an omelette for lunch, as it is economical, but you want a variation as friends are joining you. You want the omelette to be filling and tasty.

INVESTIGATE

1. Prepare three criteria for success using the information in the design brief.
2. A plain omelette is one of the fastest meals you can cook. Omelettes cook quickly, so any filling must also cook quickly. Suggest three different fillings for an omelette for breakfast.
3. Different fillings suit different occasions. Generate three ideas for fillings suitable for a lunch omelette.
4. Investigate the main ingredients in a Spanish omelette.
5. Frittatas are similar to Spanish omelettes. List three different flavouring ideas for frittatas.

GENERATE

Design your own omelette. Copy and complete the table below. Write your idea, suggest what the ingredients could be, include possible issues and justify your choice. For example, if you select tomato, it will need to be firm or the omelette will be watery.

My omelette	Ingredients	Justify	Possible issues

PLAN AND MANAGE

Create a production plan as a flow diagram for your omelette production. Create a design sketch to show how you will present your omelette.

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PLAIN OMELETTE

Serves 1
Main tools and equipment Fork, measuring spoons, frying pan
Production skills Measure, beat
Cooking processes Fry

Preparation time 3 minutes
Cooking time 3 minutes
Total time 6 minutes

Skill demonstration: Beating eggs

INGREDIENTS

- 2 eggs
- 1 tablespoon milk
- Salt and pepper
- 1 tablespoon butter
- Small sprig of parsley for garnish

METHOD

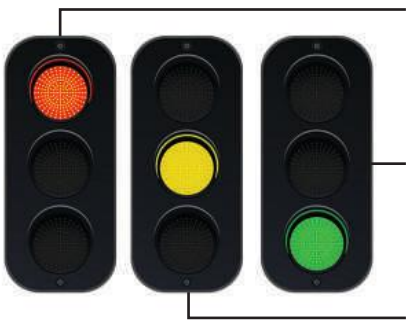
1. Lightly beat the egg and milk with a fork, add the salt and pepper.
2. Melt the butter in an omelette pan or small non-stick frying pan over a moderate to low heat.
3. Pour the egg mixture into the pan and gently stir, moving the cooked mixture away from the edge of the pan and allowing the raw mixture to flow to the edge while rolling the pan. Only do this process three or four times.
4. Allow the mixture to set. If flavourings are being used, these can be placed on one half of the omelette. Fold the omelette over in half.
5. Slide the omelette onto a plate. Garnish with parsley and serve immediately.
6. The omelette can be flavoured with 2 tablespoons of tasty cheese, 2 slices of chopped ham or 1 tablespoon of fresh herbs such as parsley, basil and/or thyme.

TASTY TRIVIA

A traditional Japanese-style omelette called *omurice* is served over fried rice and chicken and seafood can be added. It is often served with a *demi-glace* or tomato sauce over the top.

EVALUATION

1. Evaluate your omelette by answering your criteria for success questions.
2. Reflect on your production-management skills by completing a self-assessment of work in the investigation and production of your omelette by copying and completing the traffic lights graphic shown.



My progress and learning stopped when ... To avoid this, I need to ...

The part I was most comfortable with and could continue with was ... because ...

I had to think before proceeding to ... because ...

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LEARNING REFLECTION

1 Discuss the reasons why there is a difference in the cooking time of the egg white compared with the egg yolk.
2 An egg is often called a 'super food'. Explain why.
3 Describe two uses of eggs in cooking and give an example of a food for each use.
4 Eggs are a perishable food item. Define this term and explain the best way to store perishable items.

8.7 Legumes, nuts and seeds: the basics

LEARNING INTENTIONS

1 To explain why legumes, nuts and seeds are in this part of the Australian Guide to Healthy Eating.
2 To define and give examples of legumes, pulses, nuts and seeds.
3 To know how to choose high-quality legumes and how to optimise storage of them.
4 To define the term 'rancid' and how to prevent rancidity.
5 To consolidate knowledge in the meaning and consequences of incomplete proteins.
6 To understand the nutritional differences between nuts, seeds and legumes.

As legumes, nuts and seeds contain considerable amounts of protein and many other nutrients, they are an excellent food source. Due to their nutrient content, they belong in the lean meat, poultry and fish portion of the Australian Guide to Healthy Eating. As they are not animal products, they are the perfect source of protein for vegetarians.

nut Edible kernel in a hard shell

seed The dried unit of reproduction of a flowering plant such as a poppy

pulses Dried legumes

Legumes, **nuts** and **seeds** taste great and feature in many popular and delicious meals and food products around the world. Legumes are the seeds from some pod-bearing plants, but they are commonly recognised by people as beans, lentils, chickpeas and peas.

Figure 8.23 There are many different legumes. How many of these can you name?

Legumes are often referred to as **pulses**. While legumes grow on plants, nuts are the edible kernels of fruit encased in a hard shell. Seeds are the reproductive units that are made after flowers such as poppy, sesame, pumpkin and sunflower grow and are fertilised. Legumes, nuts and seeds are all good sources of protein and are an important part of ensuring a balanced diet.

COLLABORATE 8.14

1 Organise a poll in your classroom to see how many people know and have eaten the following examples of foods that are or have legumes, nuts and seeds in them: Hummus, baked beans, dhal, falafel, frijoles, tofu, baklava, tahini, friand, chilli con carne, minestrone, almond milk, sesame snaps, praline, soy sauce, pesto, poppy seed cake.
2 Try to classify these as legumes, seeds or nuts.
3 As a class, brainstorm any other foods that have legumes, nuts and seeds as a significant ingredient.
4 Suggest reasons why legumes are a common staple food around the world.

TASTY TRIVIA

The macadamia and bunya nuts are the only nuts indigenous to Australia. All other nuts grown in Australia have been introduced and cultivated.

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Figure 8.24 Legumes and nuts for sale in bulk. How else can they be purchased?

Quality considerations

When purchasing legumes, nuts and seeds, you should consider the following characteristics:

- no signs of dirt or discolouration
- packaging should show no signs of damage; in particular, cans are not dented
- skin should not be wrinkly.

Dried and canned legumes and seeds should be stored in a cool, dry pantry in an airtight container. Although they do have an extended shelf life, they should be consumed within six months. Once cooked, legumes need to be refrigerated and eaten within two or three days.

rancid A stale smell and flavour in fats and oils

good fat Fat that tends to lower cholesterol levels when it replaces saturated fats in the diet, thus reducing the risk of heart disease

Storing nuts

Because of their fat content, correct storage of nuts is important. They do have a shelf life and will go **rancid** after a while. To keep nuts fresher for longer, it is a good idea to store them in your refrigerator; otherwise, they can be kept in a cool, dry pantry in an airtight container.

The nutritional value of legumes, nuts and seeds

Legumes, nuts and seeds are often described as some of nature's 'super foods', because they have a high nutritional value and are a cheap source of protein. They are inexpensive to produce, which makes them affordable. In many countries, legumes and nuts are used instead of meat in everyday meals, with meat only being eaten on special occasions, as meat is costly to produce and expensive to consume.

Legumes, nuts and seeds have been an important protein source throughout history and continue to be the major protein source for vegetarians and vegans, as they are a great alternative to meat. As discussed earlier, legumes and nuts are incomplete protein sources, and therefore need to be combined correctly to ensure they provide a complete source of protein to make up a healthy diet.

TASTY TRIVIA

The soybean is the only legume that is a source of complete protein. Legumes are high in carbohydrates (but low in GI carbohydrates), fibre, folate and iron, making them a healthy food choice. Legumes are also low in fat.

Some people are cautious about eating nuts due to their high fat content, but nuts are a sensational snack food as they not only taste great but also contain many vitamins and minerals. They are, in fact, a source of **'good' fats**. (Fats are discussed further in Chapter 9.) As you can see from the Venn diagram in Figure 8.25, the significant nutritional difference between legumes, nuts and seeds is fat content. While there are many similarities in nutritional composition, nuts do contain amounts of fat and some nuts are extremely high in polyunsaturated fat. Overall, nuts are generally a nutritious food. They are a high source of protein and therefore another good food choice for vegetarians. It is important to eat small amounts of nuts at a time due to their high fat content. It is recommended that we eat only a handful of nuts per day, but we are encouraged to eat more legumes, which are very low in fat, every day.

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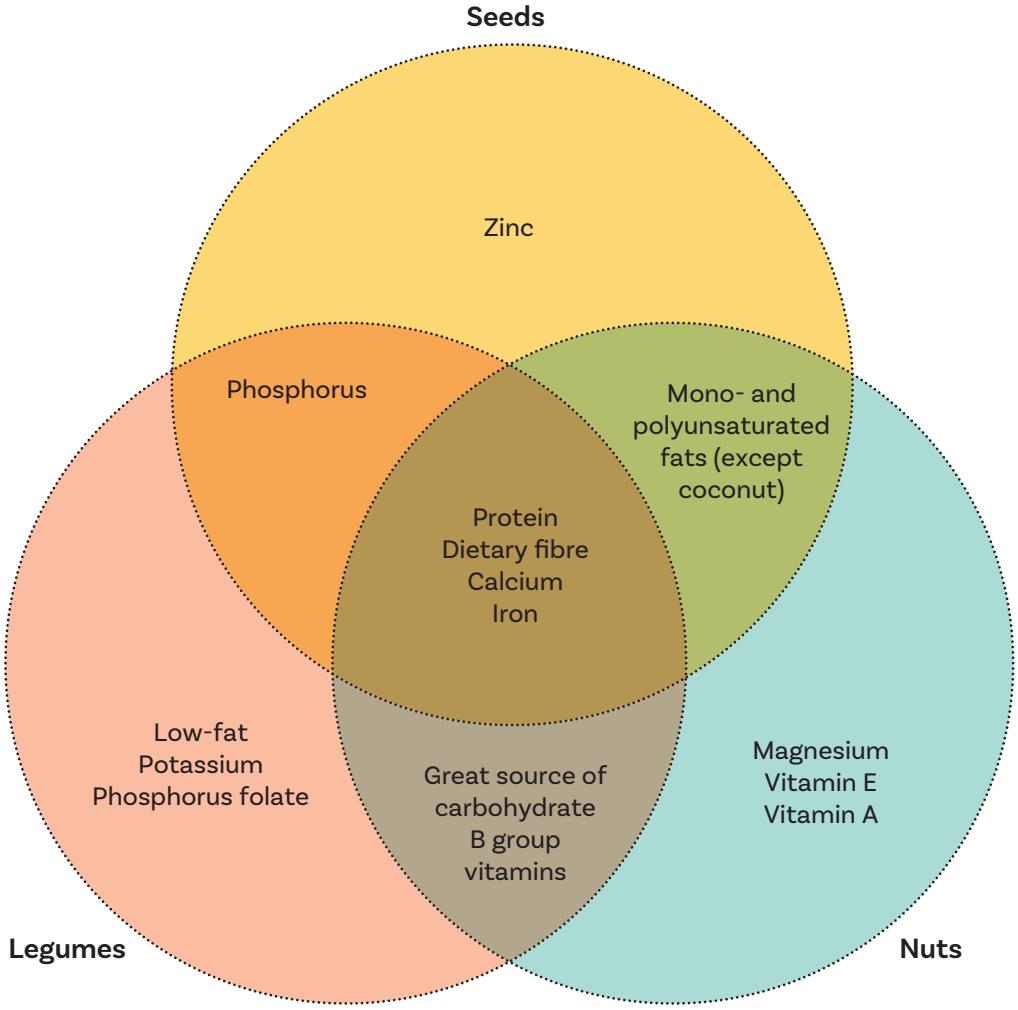

Figure 8.25 Comparing the nutritional properties of legumes, nuts and seeds

DESIGN BRIEF: TOFU RECIPE

You have a friend coming over for dinner who is a vegetarian. You have bought some tofu, so you either have to design your own tofu recipe or complete research to find one to prepare. You also need an accompaniment to ensure you prepare a filling, nutritious and tasty meal. You don't have much time, so whatever you make needs to be quick.

EXTENSION

Your friend is a vegan. Complete this brief for a vegan.

LEARNING REFLECTION

1 Discuss why legumes are commonly eaten by vegetarians.
2 Lentils were found in the tombs of the pharaohs. Suggest why they were left there.
3 Outline the reasons why legumes are a staple food source for many countries.
4 Describe why nuts are often used as a snack food.

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8.8 Cooking with legumes, nuts and seeds

LEARNING INTENTIONS

1. To develop skills in the preparation and cooking of legumes.
2. To demonstrate skills in the successful use of legumes in a production.
3. To understand why nuts rarely form a major part of a meal.
4. To understand the place that seeds have in cooking.
5. To better understand the food supply of Aboriginal and Torres Strait Islander peoples.

Legumes

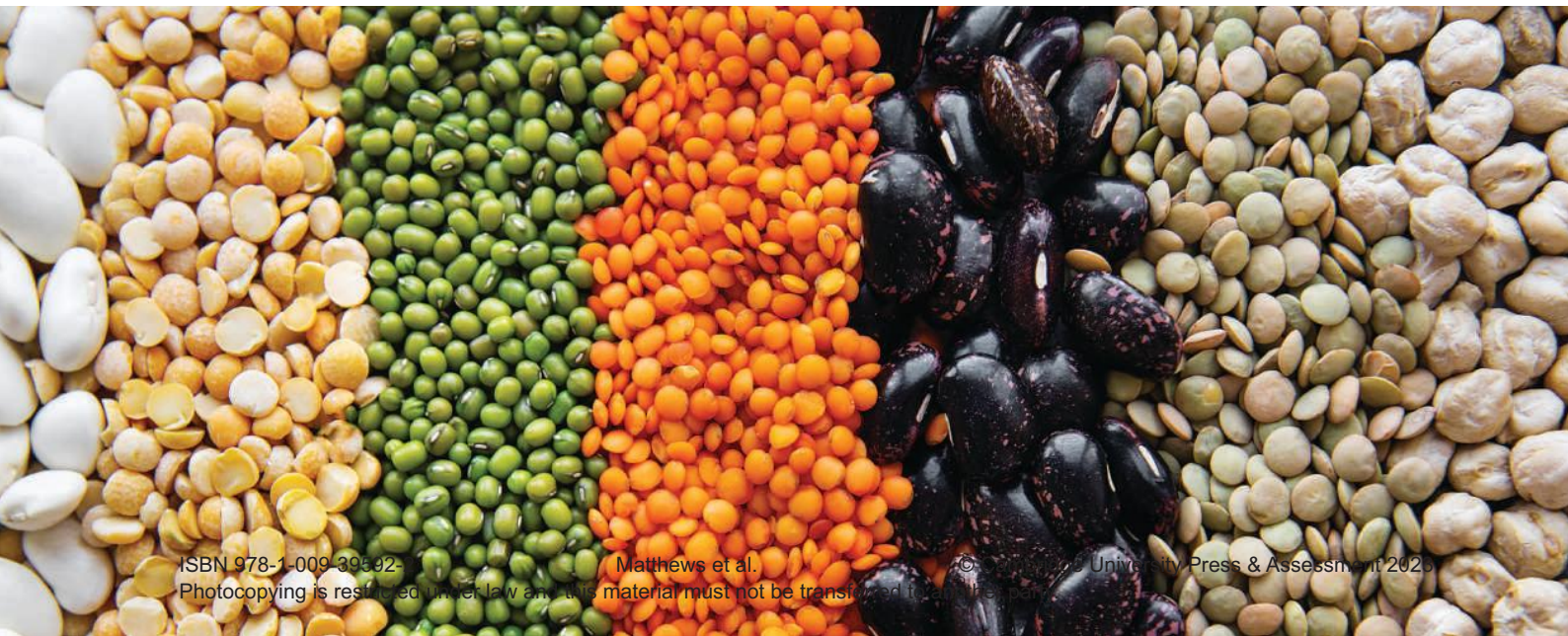
Some dried legume products such as beans and chickpeas need to be rehydrated before they can be used in cooking. Dried, whole legumes should be soaked at room temperature in water for six to eight hours, or overnight, to improve their digestibility. Legumes are high in resistant starch (as you learned in Chapter 6), which is great for our digestive health. Soaking also reduces their cooking time. Alternatively, you can use the 'quick soak' method – cover them in water and bring to the boil for two minutes. Then turn off, cover and leave to soak for an hour. Drain the legumes and they are ready for cooking.

Cooking tip: Try not to stir legumes too much while cooking, as this can make them start to fall apart. You can also buy canned legumes that are ready for use immediately.

DESIGN BRIEF: LEGUMES

Many people don't eat as many legumes as they should. Design your own affordable snack using a legume product. The final presentation of your dish must be visually appealing for your consumer and enhance the properties of your dish. Include the following design process steps when completing this brief:

1. Outline reasons why legumes do not appear in the everyday diet of many Australians as often as they are recommended.
2. Generate ideas to help you solve this brief.
3. Plan your production, including preparing a production plan.
4. Take a food-styled photograph of your final product to be displayed in your classroom to promote the consumption of legumes.



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SPICED CHICKPEA SNACKS

Serves 4
Main tools and equipment Bowl, measuring spoons, spoon, oven
Production skills Measure, drain, rinse, mix
Cooking processes Roast

Preparation time 10 minutes
Cooking time 45 minutes
Total time 55 minutes

INGREDIENTS

- 2 tablespoons extra virgin olive oil
- 1 tablespoon ground cumin
- 1 teaspoon garlic powder
- ½ teaspoon chilli powder
- 1 pinch salt and black pepper
- 1 x 400 g can chickpeas

METHOD

1. Preheat the oven to 190°C.
2. Drain the chickpeas and rinse well under running water. Spread on paper towels to blot off excess water.
3. In a bowl, mix all the ingredients except the chickpeas together thoroughly.
4. Add the chickpeas and toss to coat. Spread the chickpeas in a single layer on a baking tray.
5. Roast, stirring occasionally, for 45 minutes until browned and slightly crisp. Cool on tray before serving. Store any remaining snacks in an airtight container for a day or two.

EVALUATION

1. Complete a sensory analysis of your snack.
2. Rate your tasting experience out of 5. If you didn't give it 5, how could you change the recipe to improve the rating you gave it?
3. Suggest at least two other ways these spiced chickpeas could be used other than as a snack.
4. Nuts are an excellent snack, but they have some drawbacks. Explain this statement.
5. Explain why these chickpeas are a much healthier snack than nuts.

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Nuts

Nuts are a versatile food commodity. There are many different varieties of nuts to choose from and they can be eaten raw or cooked into a number of different food products, including both sweet and savoury. Nuts can be purchased whole, roasted, salted, flaked, blanched, slivered and ground.

Figure 8.26 How many of these nuts can you identify? What dishes might they be used in?

TASTY TRIVIA

Technically, a peanut is a legume; however, it is grouped with nuts as it shares more physical and chemical properties with nuts. Because they are so rich due to their high fat content, nuts are often an accompaniment or an ingredient in a recipe rather than forming the base of a recipe like legumes can.

COLLABORATE 8.15

With a partner, write down as many recipes as you can think of that contain nuts. Think about both savoury and sweet recipes. Share your list with the class.

Seeds

Seeds may look small and not very exciting, but they are packed with vitamins and minerals. They are used in a range of savoury and sweet dishes, and add colour, flavour and texture to your favourite dish.

A seed that is becoming increasingly popular and available is the wattle seed, which has been included in the diets of Aboriginal and Torres Strait Islander peoples for thousands of years. Wattle seed has long provided a rich source of protein and carbohydrate, especially during drought times. This seed is popular in cooking due to its nutty, mild, coffee-like flavour. Wattle seeds can be added to damper and muffins or ground to use a thickener in salad dressings, sauces and casseroles. The seed can be crushed into a flour or can be used in dessert dishes.

Wattle seed contains calcium, iron, zinc and potassium in high concentrations. Due to its low glycaemic index and being high in fibre, wattle seed is also good for diabetics.

TASTY TRIVIA

There are only a small number of edible wattle seed varieties, so don't gather your own!

Figure 8.27 Seeds can be used for flavouring, such as these peppercorns, or as an ingredient in a dish, such as these pumpkin seeds.

LEARNING REFLECTION

1. Draw a flow chart explaining the steps you need to follow to prepare legumes for cooking. Explain the reasons for each step.
2. You have a tin of red kidney beans in your pantry cupboard. Describe how you could incorporate these into tonight's dinner.
3. Describe the reasons why nuts might be cooked.
4. Research and then describe how poppy seeds are used in Indian cooking.
5. Explain how you might use pumpkin seeds.
6. Provide two tips for incorporating seeds into your diet.

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8.9 Environmental sustainability and high-protein foods

LEARNING INTENTION

1 To develop an awareness of the sustainability issues surrounding the production of adequate protein for the world's population.

Protein in the diet is essential to maintain adequate growth and health. However, when we think about the environment, not all protein sources are the same. The production of some protein sources has less impact on the environment than others.

ACTIVITY 8.16
LAND USE FOR PROTEIN PRODUCTION

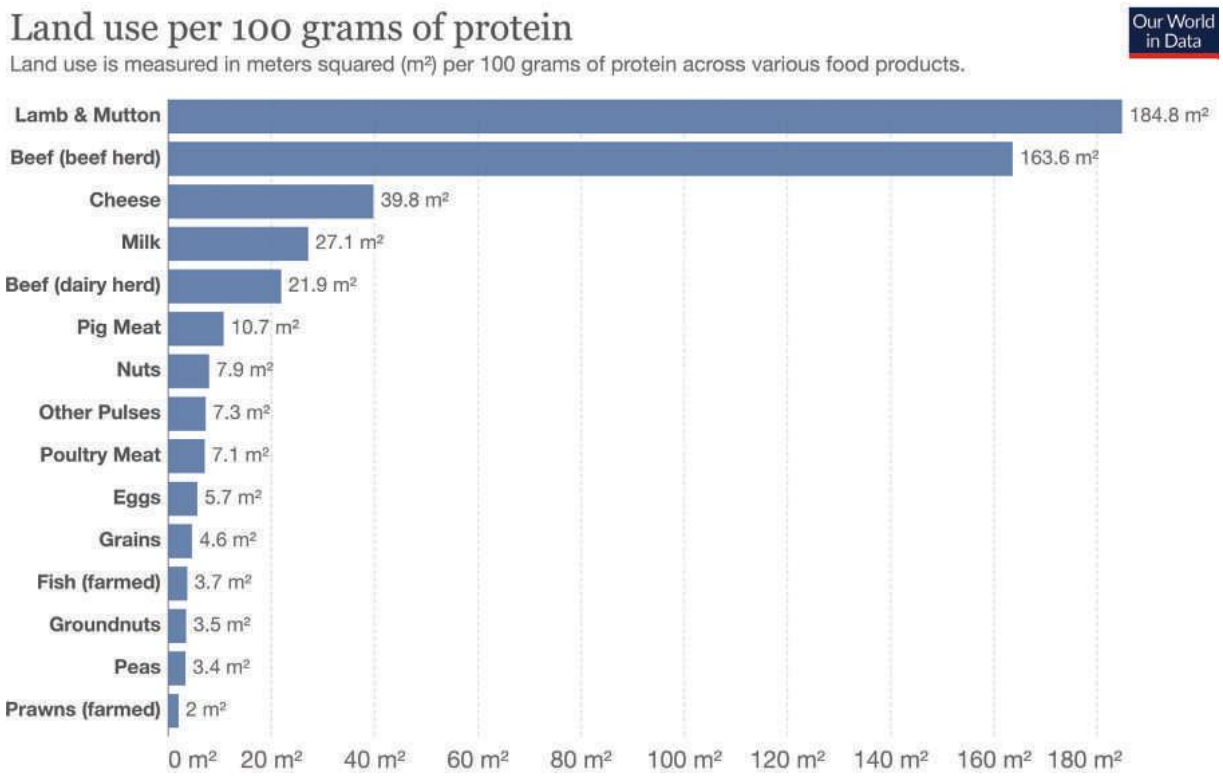

Figure 8.28 Land use per 100 g of protein
Source: Poore, J., & Nemecek, T. (2018). Additional calculations by Our World in Data.

1 What protein source/s requires the greatest land area to produce 100 g protein? What protein source/s requires the least land area to produce 100 g protein?
2 Identify any patterns you see in the chart.
3 Suggest reasons for the patterns you have described.
4 Identify the non-meat sources of protein in the chart. Explain the possible consequences to an individual if they chose to consume protein only from grains. How can these consequences be resolved?
5 Suggest reasons why both fish and prawn figures are farmed, not labelled as wild seafood.

(continued)

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EXTENSION

6 According to the National Health and Medical Research Council, girls aged 14–18 require 45 g and boys of this age 65 g protein per day. Using the information in the graph, work out how much land would be needed to feed a girl and how much land would be needed to feed a boy if they consumed their protein from:

- **a** beef
- **b** pork
- **c** eggs
- **d** peanuts (groundnuts).

7 The world population 'ticked' over to 8 billion people in 2022. If the average protein requirements for these 8 billion people is 50 g per day, how much land would be required to feed the world's population for a day if they consumed:

- **a** beef
- **b** pork
- **c** eggs
- **d** peanuts (groundnuts)?

8 Investigate the land surface available for farming. Is there enough space to grow enough protein for one year from beef sources? What about peas?

9 Write a statement about the sustainability of protein production now and in the future following your investigations about this. In your statement, provide some suggestions to ensure environmental sustainability for future generations.

LEARNING REFLECTION

1 Why is the production of protein foods from animals a sustainability issue?

Figure 8.29 There are a number of alternative sources of protein to meat products.

Review

1 Meat is the edible part of the flesh or muscles of animals.
2 In Australia, the main meats we consume are cattle, sheep, pig and chicken.
3 Meat is made up of muscle fibres held in bundles by collagen. Meat is also associated with fat.
4 Meat is more tender if it comes from a part of an animal that does not move much and if the cut has a lot of fat associated with it. It can be made more tender by storing it for extended periods, by mechanically cutting or chopping it or by marinating it.
5 White meats, such as poultry and fish, do not contain as much myoglobin as red meats.
6 We cook meat to enhance its physical properties.
7 Different cuts and types of meat require different cooking methods.
8 Meats contribute considerable amounts of protein in our diets, and it is because of this nutrient that they are classified with legumes, nuts and seeds in one of the five portions of the Australian Guide to Healthy Eating.
9 Protein is broken down into amino acids that are absorbed and utilised for growth, maintenance and repair of all body cells.
10 Vegetarians need to plan their food intake to ensure complete proteins are consumed.
11 Eggs are an excellent source of many nutrients including protein and are extremely versatile in cooking, having many different properties that we can use in cooking.
12 Legumes, nuts and seeds provide significant amounts of protein in the body and are essential ingredients for vegetarians to gain adequate protein in their diets, but they also contribute significantly to nutrients and the physical and sensory properties of food.
13 The production of protein from animal sources is less sustainable than the production of protein from plant sources.

Test your knowledge

Multiple-choice

1 Legumes, nuts and seeds are:
   a all high in fibre and low in fat.
   b all high in fat and low in fibre.
   c not very nutritious but taste great.
   d all a great source of fibre.
2 Which of these statements are true?
   a Red meats include pork, beef, lamb and chicken.
   b White meats include pork, chicken and fish.
   c Red meat contains haemoglobin to make it red.
   d White meat contains less myoglobin than red meat.
3 The flesh of a fish:
   a is firmer because it has to be stronger to help the fish swim.
   b is softer because there is less connective tissue.
   c needs to be cooked quickly and very gently.
   d is difficult to make tough as it has such little connective tissue.

True or false?

1 The tenderness of meat is related to the type of animal it comes from.
2 Tough cuts of meat should be cooked by a moist cooking method to help soften connective tissue.
3 When cooking meat, shrinkage will occur because of the changes occurring in the fat, water and protein in the meat.

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Short-answer

1 Outline the reasons why it is so important to eat lean meat.
2 The consumption of red meat products has decreased over the last 20 years. Discuss the reasons why you think this has occurred.
3 Describe the nutritional value of meat. Compare it to the nutritional value of legumes.
4 Legumes are very high in dietary fibre and resistant starch. Explain why this is important for health.
5 Legumes are listed in two food groups in the Australian Guide to Healthy Eating. What are they? Explain why they fit in both.
6 Define the term 'sustainability'. Discuss why sustainability is a critical consideration when thinking of the future provision of protein for the world's population.

Extended-response

Divide the legumes, nuts and seeds in the table among the class and produce a wall display that describes:

- the origin of it
- a description of it, including images
- the uses of it in cooking
- an interesting fact about it.

Legumes	Nuts	Seeds
Black-eyed peas Cannellini beans Lentils Red kidney beans Soybeans Split peas	Almond Brazil Chestnut Coconut Hazelnut Macadamia Peanut Pecan Pistachio Walnut	Caraway Pumpkin Sesame Sunflower Poppy

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CHAPTER 9

Eating outside the five food groups

BEFORE WE BEGIN

1 Explain the difference between oils and fats, and between bad and good fats.
2 Develop a list of reasons why extra virgin olive oil is better for your health.
3 Explain why fats, sugars and salt are not in the five food groups.
4 Identify the value that fats, sugars and salt provide in cooking.
5 Explain what happens to sugars when heated.
6 Discuss whether it is possible for coriander to be both a herb and a spice.
7 Discuss why sugar and salt are found in so many different food products.
8 Explain why it is important to drink water.
9 Explain how the production of cooking oils is damaging to the environment.

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9.1 Looking outside the five food groups

LEARNING INTENTIONS

1 To review the five food groups.
2 To understand how the five food groups relate to the discretionary sections of the Australian Guide to Healthy Eating.

COLLABORATE 9.1

With a partner, brainstorm the five food groups of the Australian Guide to Healthy Eating 'plate'. Next to each food group, write down the major nutrients that are found in that section and the major function/s of each. How easy was this? Were there any nutrients you could put into more than one segment?

Figure 9.1 The 'Use small amounts' and the 'Only sometimes and in small amounts' of the Australian Guide to Healthy Eating are known as the 'discretionary' sections. *Based on material provided by the National Health and Medical Research Council.*

The Australian Guide to Healthy Eating has been designed to help us choose foods that meet the needs of the body for growth, maintenance and repair of all tissues. These foods are found in the 'plate' part of the Australian Guide to Healthy Eating diagram, and as we have learned already these are broken up according to the five food groups.

The Australian Guide to Healthy Eating also contains information outside the plate model which shows other foods that we may choose to consume in the 'Use small amounts', or the fats and oils section, and the 'Only sometimes and in small amounts', or the discretionary foods section. These contain foods which, when consumed in

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large quantities, are associated with an increased risk of many lifestyle diseases. These groups contain significant amounts of salt, sugar and fats. They can provide significant energy and some nutrients and are a good source of healthy fats, such as omega-3 and omega-6 fats. These fats can help to reduce the risk of heart disease and lower cholesterol levels but can also be obtained from foods in the five food groups.

Because these foods contain a significant number of kilojoules, the number of additional servings recommended for each age group differs depending upon a person's lifespan stage, which of course influences their activity level, growth and maintenance requirements.

Table 9.1 Number of additional daily serves from the five food groups or discretionary choices for adults who are taller, more active or who have additional energy requirements

Age group	Approx. number of additional serves or discretionary choices
Men	
19–50	0–3
51–70	0–2½
70+	0–2½
Women	
19–50	0–2½
51–70	0–2½
70+	0–2
Pregnant	0–2½
Lactating	0–2½

Source: Based on material provided by the National Health and Medical Research Council.

LEARNING REFLECTION

1. List the five food groups and the main nutrients found in each.
2. List 10 examples of foods that are found in the 'only sometimes and in small amounts' section of the Australian Guide to Healthy Eating.
3. What do the foods in this group have in common? Why are these foods excluded from the five food groups?

9.2 Fats and oils

LEARNING INTENTIONS

1. To be able to define lipid, fat and oil, hydrogenated oil and trans-fatty acids.
2. To understand where fats are found in our food.
3. To develop an appreciation of the background of fats and oils in our diets.

When we look outside the five food group 'plate' in the Australian Guide to Healthy Eating, there is other information about the consumption of foods. 'Use small amounts' and 'Only sometimes and in small amounts' (also known as **discretionary foods**) are also listed, along with water.

These foods are regularly consumed by individuals, so are recognised on the Australian Guide to Healthy Eating, but are outside the plate because they are additions to a healthy diet. Let's look at these in more detail.

The correct term to describe both fats and oils is **lipids** but there are distinct differences between fats and oils. **Fats** are solid at room temperature and usually come from animal sources, whereas **oils** are usually liquid at room temperature and often come from plant sources (seeds and nuts). Lipids play an important role in food because they contribute to flavour, texture and aroma. For example, the smooth creamy texture created by chocolate as it melts in your mouth is due to its lipid content.

discretionary foods Foods that are not essential for our health and are characterised by being high in fat, salt and sugar

lipid Substance that is insoluble in water, such as fat and oil

fat Compound, usually derived from an animal source, which is solid at room temperature and liquid when heated, for example, butter

oil Compound, often derived from a plant source, which is liquid at room temperature, for example, nuts and seeds

TASTY TRIVIA

Fats and oils provide a pleasant 'mouthfeel' and flavour to food items. Imagine toast without butter ...

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Figure 9.2 Oils are liquid at room temperature.

Figure 9.3 Fats are solid at room temperature.

History of fats and oils

People have been using the fat from animals in their food preparation and cooking since early hunting and gathering days, about 12 000 years ago.

Butter was discovered by accident. Milk was carried by travellers and as a result of the milk being sloshed around in its container during transport, it was accidentally churned, and the first butter was produced. Butter was mostly a northern European food.

Figure 9.4 An 1893 price list for a Dutch 'Margarine-butter factory'. Margarine was invented in the nineteenth century.

Olive oil was more popular in Mediterranean countries like Greece and Italy. It is believed the cultivation of the olive began about 6000 years ago in the Mediterranean region. Olive oil became Greece's major export as far back as 3000 BCE.

The first margarine was developed by a French chemist in 1869 due to a butter shortage in Europe, when the French wanted a product that they could give to their soldiers. Today, margarines are generally made from vegetable oils and are designed to be lower in cholesterol, soft and easy to spread straight from the fridge.

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Margarine is naturally white in colour, and some countries passed laws that it had to stay white, or be dyed bright pink, to make sure it was not illegally substituted for butter.

Eventually these laws were withdrawn (margarine the colour of butter was illegal in Australia until the 1960s), and manufacturers have worked hard to imitate the taste, texture and colour of butter. Worries about cholesterol spread in the late 1950s, and margarine gained a reputation as a superior spread to butter.

However, more recent discoveries in nutrition have questioned the health qualities of margarine as an alternative to butter. Margarine is made from **hydrogenated oils**. The hydrogenation process changes liquid oils into solid fats, which produces **trans-fatty acids**. Recent research has shown that trans-fatty acids may raise a person's level of 'bad' (LDL) cholesterol and lower their level of 'good' (HDL) cholesterol.

hydrogenated oil Oil hardened by the addition of hydrogen gas, which makes the fat more saturated

trans-fatty acid Unsaturated fatty acid that can impact on health by adversely affecting cholesterol levels. This acid is formed during processing of vegetable oils when making semi-solid fats, such as margarine, and can also occur at low levels naturally in the fats of dairy products and meat.

LEARNING REFLECTION

1. The overall consumption of fats has decreased considerably since 1979. Explain why this trend has occurred.
2. Butter consumption dropped rapidly in the 1960s. Account for this change in consumption.
3. The consumption of butter is overtaking that of margarine. Suggest the reasons why you think this may be the case.

9.3 Fats: friend or foe?

LEARNING INTENTIONS

1. To understand the different types of fats, and the impact of each on dietary health.
2. To examine the difference between good and bad fats, and how these terms relate to the saturation of fats.
3. To be able to identify sources of monounsaturated, polyunsaturated, saturated and trans fats in our diet.
4. To define the term 'cholesterol' and how this relates to health and fat intake.

Essential nutrients: fats

Fatty acids are found in oils and fats. Some fatty acids can be made by the body, but others are only available from foods. These are known as essential fatty acids. Lipids may be **saturated** or **unsaturated** depending on their chemical structure. There are four main types of fats: saturated, **monounsaturated**, **polyunsaturated** and **trans**. Each type is determined by the chemical bond between the atoms.

Polyunsaturated fats and monounsaturated fats contribute positively to health and are often referred to as good fats, because they help to lower cholesterol levels and the risk of heart disease. Saturated fats are referred to as **bad fats**, because they are linked with many health concerns. We should replace saturated fats with monounsaturated and polyunsaturated fats for better health.

saturated fat Fat in which the fatty acid chains have all single bonds, such as those found in animal products like fatty meat and dairy products, and certain plant sources

unsaturated fat Fat that has a positive effect on health; these are divided into monounsaturated fat and polyunsaturated fat

monounsaturated fat Fatty acid that contains one double bond in the carbon chain

polyunsaturated fat Fatty acid that has two or more double bonds in the carbon chain

trans fat Unsaturated fat that has been processed and behaves like saturated fat; commonly found in processed foods

bad fats Fats that are considered harmful to health when consumed in excess

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Monounsaturated fats

Monounsaturated fats should replace saturated fats in your diet because they can help reduce cholesterol in the blood, reducing the risk of heart disease and stroke. They also provide compounds that help maintain cells. Foods high in monounsaturated fats include:

- avocados
- olive, peanut and canola oils
- nuts such as almonds, hazelnuts and pecans
- seeds such as pumpkin and sesame.

Figure 9.5 Examples of food sources of monounsaturated fats

DESIGN BRIEF: TRAIL MIX

Design a healthy trail mix that is high in monounsaturated fats, high in fibre and low in sugar.

Figure 9.6 Trail mix was designed as an easy to carry, highly nutritious snack to carry while hiking.

Figure 9.7 Sources of monounsaturated fats include peanuts, avocado, sesame seeds and olive oil.

Polyunsaturated fats

Like monounsaturated fat, polyunsaturated fat is also considered a 'good' fat. These fats contain omega-3 fatty acids and omega-6 fatty acids. Health benefits include lowering blood cholesterol, reducing blood pressure and reducing the risk of heart disease and strokes, as well as reducing inflammation in the body. These nutrients are also important for the development of the immune system.

Foods high in polyunsaturated fats include:

- sunflower, corn, soybean and flaxseed oils
- walnuts
- fish, especially oily types.

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INVESTIGATE 9.2

Develop a list of foods that contain omega-3 or omega-6 fatty acids. Discuss how you could include more of these in your weekly food intake.

Saturated fats

Saturated fats are found in all animal products and a few vegetable products. They are generally solid at room temperature and contribute to the risk of heart disease by increasing blood cholesterol levels. It is recommended that we replace saturated fats with monounsaturated and polyunsaturated fats for better health.

Figure 9.8 Some oils and oily fish contain polyunsaturated fats.

Figure 9.9 Saturated fats are found mainly in animal products such as fatty meat, butter, full cream milk, cheese, cream, pastries, cakes, deep-fried foods, coconut oil and milk chocolate.

Table 9.2 Food sources of fats

Monounsaturated fats	Polyunsaturated fats	Saturated fats
Peanuts	Polyunsaturated margarine	Visible fat on meat
Cashews	Sunflower oil	Full cream milk
Avocados	Tuna	Cream
Olive oil and olives	Soy sauce	Cheese
Canola oil	Vegetable oil	Deep-fried foods
Hazelnuts	Brazil nuts	Coconut oil
	Seeds	Palm oil
	Salmon	

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Trans fats

The fourth type of fat is known as trans fat. It is not needed by the body, and in fact is quite detrimental to health.

Trans fats, otherwise known as hydrogenated vegetable oils, are much like saturated fats, raising cholesterol levels and increasing the risk of heart disease. Small amounts of trans fats are found naturally in food, but most are created when liquid oil is changed into a solid fat during manufacturing processes. They are often referred to as 'ugly fats' because their impact on health is worse than that of saturated fats. Trans fats are mostly used in the food industry, as they are cheap to buy and have a long shelf life.

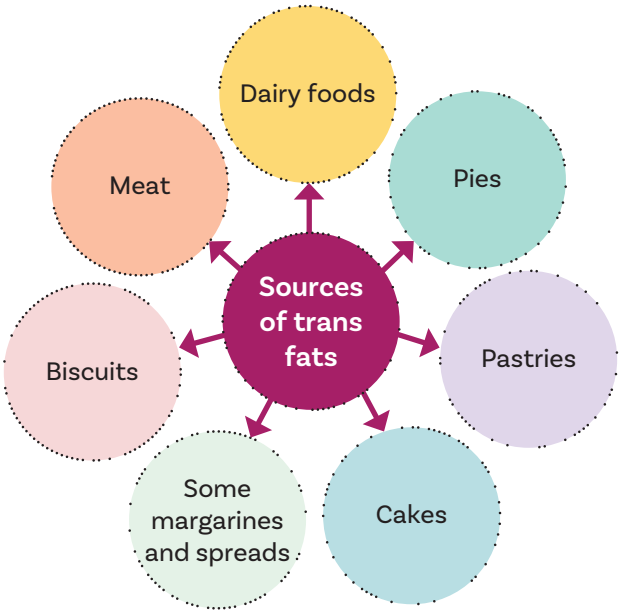

Figure 9.10 Sources of trans fats in the diet

Figure 9.11 Examples of sources of trans fats

LEARNING REFLECTION

1. Define monounsaturated, polyunsaturated, saturated and trans fats and provide examples of food sources of each.
2. Describe how monounsaturated, polyunsaturated, saturated and trans fats differ. Include in your description their respective impact on health.
3. What is the connection between omega fatty acids and cholesterol levels in the blood? Suggest why consumption of these are of benefit to an individual.
4. Why are trans fats more likely to be present in processed foods? Using this information, explain why the discretionary section of the Australian Guide to Healthy Eating includes processed foods.
5. List five foods that contain saturated fat and five foods that contain unsaturated fat. Which of these two lists of foods represents the most significant health risk? Justify your answer.

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9.4 Functions of fat in the body

LEARNING INTENTION

1 To develop knowledge of the essential functions fat plays in the body.

Fat has varied functions in the body. See Figure 9.12 for more information on of the many functions.

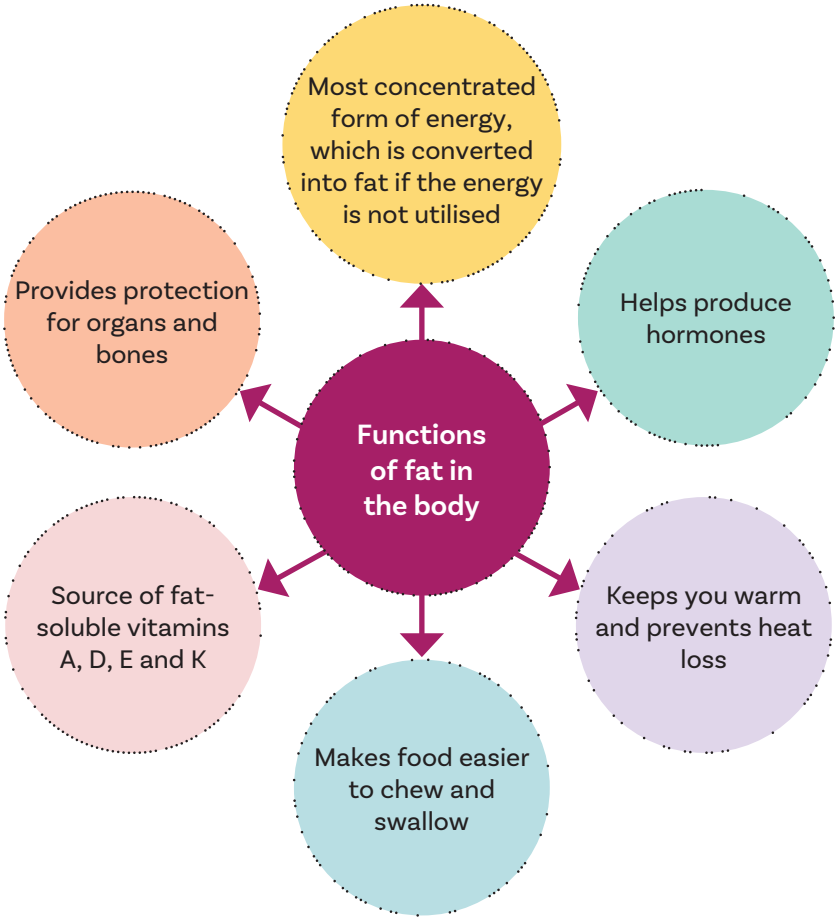

Figure 9.12 Functions of fat in the body

COLLABORATE 9.3

Work in a group of four to discover the meaning of the term 'fat-soluble vitamin'. Following this, each member of the group selects one of the fat-soluble vitamins A, D, E or K. Each member is to develop a detailed description of the function of their nutrient and will teach the others in their group what they have learned.

INVESTIGATE 9.4

Kangaroo meat is very low in fat – usually less than 2 per cent, yet it contains all the protein that is required for growth. This makes it a healthy meat alternative to regular beef, which often has 10 per cent fat. Visit the website of the Kangaroo Industry Association of Australia to investigate the following questions.

1 Kangaroo is claimed to be 'good for you and good for the environment'. Explain what this means.

2 Because kangaroo is very lean, if it is cooked like other red meats, it can be quite tough and unpleasant. Investigate the role of fat in tenderising meat as it cooks.

3 Find a recipe that uses kangaroo meat and develop a label that could be used by the Kangaroo Industry Association selling this recipe as a pre-packaged meal.

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ROO RISSOLES

Serves 2
Main tools and equipment Measuring spoons, bowls, spoon, frying pan
Production skills Crush, chop, beat
Cooking processes Fry

Preparation time 20 minutes
Cooking time 20 minutes
Serving and presentation time 5 minutes
Total time 45 minutes (time will increase if sweet potato mash and snow peas are added)

INGREDIENTS

- 125 g kangaroo mince
- 1 clove garlic, crushed
- ½ brown onion, finely chopped
- 1 egg
- ¼ teaspoon salt
- Pinch of pepper
- ¼ teaspoon lemon myrtle
- ½ cup breadcrumbs (fresh or dried)
- ½ cup plain flour
- 1 tablespoon curry powder
- 1 tablespoon oil
- 2 tablespoons lemon juice
- Sweet potato mash and snow peas to serve

METHOD

1. Combine the mince, garlic, onion, egg, salt, pepper and lemon myrtle in a bowl. Add breadcrumbs until the mixture holds together (you may not need them all). Divide the mince into four portions and roll into ball shapes.
2. In a separate bowl, combine the flour and the curry powder. Roll the rissoles in this dry mixture until they are coated.
3. Heat the oil in a frying pan over medium heat. Add the rissoles and gently press down to flatten a little. Cook 3–5 minutes on each side until golden and cooked through (the juices will run clear if you press down gently).
4. Drizzle lemon juice over the rissoles to serve.
5. Serve with mash and snow peas. You could add further native flavours with a bush tomato chutney that is available in supermarkets.

LEARNING REFLECTION

1. Discuss why it is suggested that an infant under four years should consume full fat, not fat-reduced and/or fat-free milk.
2. Explain what happens if a person consumes more energy than they use. How may fat contribute to this process?
3. Kangaroo meat is naturally low in fat. Are there any other meats, or cuts of meat, that are also low in fat? Find a recipe that uses this meat or cut of meat. How should a lean cut of meat be cooked to prevent toughness?

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9.5 Functional properties of lipids

LEARNING INTENTIONS

1 To develop knowledge of the functional properties of food in cooking.

2 To develop practical skills in the use of fat in cooking.

So, why do we consume fats and oils, and why are they part of the Australian Guide to Healthy Eating? We eat and prepare foods for many reasons: for the sensory appreciation, for the opportunities it provides for social interactions, and for the joy and satisfaction it brings to us.

The flavours of fats and oils vary significantly, but butter and olive oil are considered to be two of the tastier lipids. There are still considerable flavour variations in these lipids, depending on the source of the original main ingredients (milk or olives). The sources of animal fats used in food preparation are:

- butter, which is most likely made from cow's milk
- lard, which is pig's fat
- suet, which is the fat around animal kidneys
- dripping, which is the fat left in the pan after roasting.

The most frequently used oils are olive, sunflower, canola and vegetable oil. Common Asian cooking oils include sesame, rice bran and peanut oils.

COLLABORATE 9.5

Run a class discussion exploring the reasons we both cook and eat foods that are 'outside' the plate. Are these positive or negative reasons? Explain your reasoning.

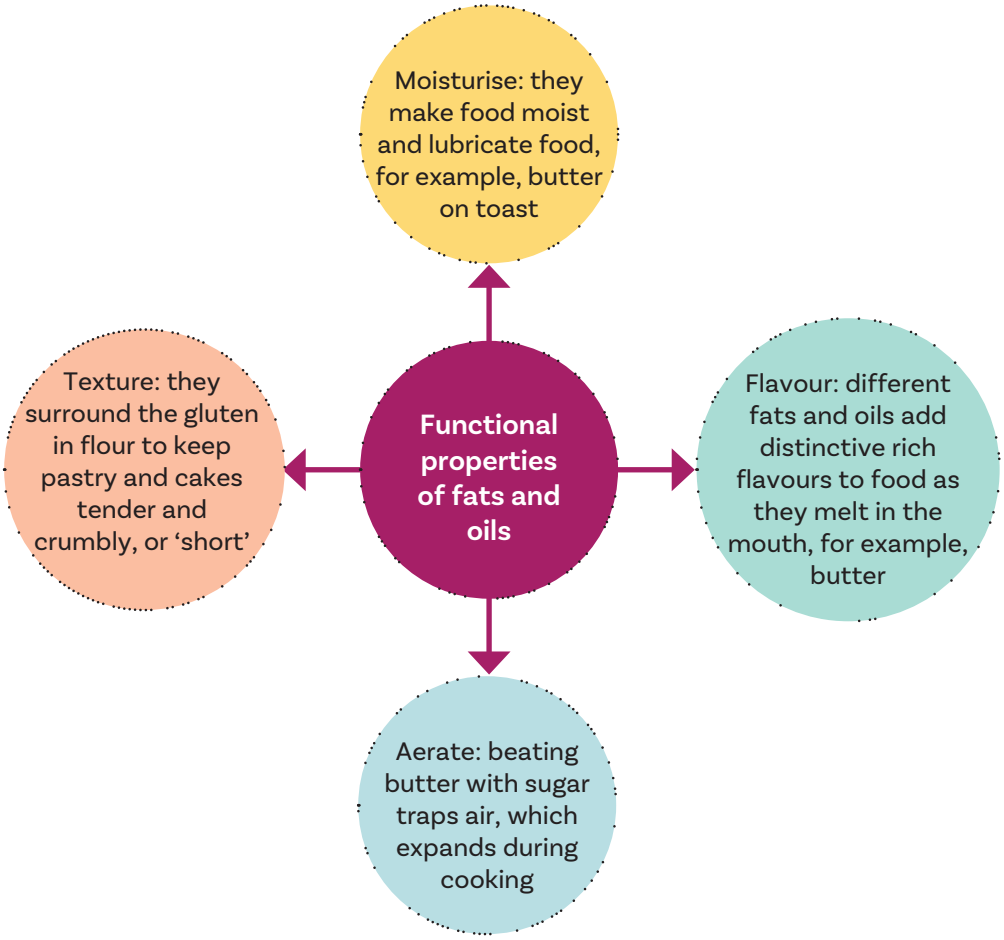

Figure 9.13 Functional properties of fats and oils in cooking

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ACTIVITY 9.6
SENSORY ANALYSIS: OLIVE OIL

For this activity, you will be 'taste testing' olive oils. You will need four or five different oils, matching the list in the table below, five small pieces of bread, and an apple. Toast the bread before you start. Core and slice the apple finely.

Copy the table below, and then taste one olive oil at a time by pouring some into a shallow dish and dipping the toast into it. Eat a slice of apple between each tasting to cleanse your palate. As you taste each oil, enter your results in the table. You will also need to read the bottle labels to collect all the information required.

Remember, you are tasting the oil, not the bread. After you have finished, complete the questions below.

Appearance	Texture	Aroma	Taste	Saturated fat per 100 ml	Total fat per 100 ml
Extra virgin olive oil					
Virgin olive oil					
Light olive oil					
Pure olive oil					
Olive oil produced in your region of Australia (if available)					

1 Identify the oil you liked the most. Explain your choice.
2 Identify the oil you liked the least. Explain your choice.
3 Compare the oils. Was there a difference between the oils? Explain your answer.
4 Suggest what the term 'light' means to you.
5 Explain what you think the term 'light' means to consumers.
6 Describe how light olive oil is 'lighter'.
7 Discuss whether labelling this oil as 'light' is misleading to consumers. Justify your opinion.

ACTIVITY 9.7
TEST IT

EXTENSION

1 Compare and contrast the making of pastry using:
   a high-fat and low-fat spreads
   b salt-reduced spreads and spreads containing salt.
2 Compare the different outcomes using a sensory analysis, then use the information you have gained about fats to explain the differences.

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RECIPE

YO-YOS

Makes 18 Yo-Yos or 36 biscuits
Main tools and equipment Measuring spoons and cups
Production skills Measure, rub-in, roll, flatten, cool
Cooking processes Bake

Preparation time 20 minutes
Cooking time 15–20 minutes
Serving and presentation time 20 minutes
Total time 55–60 minutes

INGREDIENTS

- 1 cup self-raising flour
- ½ cup custard powder
- ⅓ cup icing sugar
- 160 g butter

METHOD

1. Preheat oven to 170°C. Line a baking tray with baking paper.
2. Sift the flour, custard powder and icing sugar.
3. Rub in the butter and work to a stiff dough. Be patient, it will come together, but do not overwork it as your hot hands will make the butter melt.
4. Roll the mixture into 36 even-sized balls and place on your oven tray. Using a fork, flatten each ball a little to leave an imprint on your biscuit.
5. Bake until pale fawn in colour, 15–20 minutes. These biscuits are not meant to be brown.
6. Cool on a cake cooler. When completely cool, you can join with jam or with butter icing.

EVALUATION

1. Describe the process 'rubbing in' and explain why it is used in this recipe.
2. List two health and safety rules you needed to follow to complete this recipe.
3. Complete a sensory analysis of your Yo-Yos, using sentences to complete.
4. Explain how you tested to see if the Yo-Yos were cooked.
5. Suggest how this recipe could be modified to change its sensory outcomes.

DESIGN BRIEF: SNACKS

Nutritionists are encouraging all Australians to reduce their intake of saturated fats. One of the main sources of fat in our diet is in cakes and sweet treats, which many teenagers eat during the day or after school as a snack. Design a cake suitable for an after-school snack that includes a reduction in saturated and trans fats.
Think about the function of fats in a baked product and think of alternatives that could be used to mimic these functions. For example, to add moisture to a cake you may add a vegetable or some fruit.

LEARNING REFLECTION

1. Summarise three functional properties of fats and oils. Give an example where each is used.
2. Explain what 'short' means in pastry making. Explain how butter makes a pastry short.

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9.6 Sugar

LEARNING INTENTIONS

1 To understand the various uses of sugar in the diet and in cooking.
2 To develop knowledge of the health concerns relating to overconsumption of sugar.

Sugar is also a food we consume regularly in our diet, but which when consumed in large quantities is detrimental to our health. There are natural sugars in our diets, for example, lactose in milk or fructose in fruit, but when sugar is refined into its pure state it becomes of nutritional concern.

Sugar is used in most commercial products, even those you would not expect, like tomato soup and peanut butter, as it makes food tasty and brings out other flavours, encouraging people to consume more. Sugar has a particularly important role in many recipes and cooking techniques, the most important of these being to provide sweetness. Sugar is also a preservation agent, inhibiting the growth of microorganisms in products like jam and confectionery. Our diet would be very different without the use of sugar.

Nutrition and sugar

While there are many types of sugar, all sugars are nutritionally the same despite their different physical characteristics, and do not contain any nutrients other than carbohydrate in the form of sucrose. Sugar is high in energy but not nutrients.

While your body requires energy, the best energy source is not sugar but is the carbohydrates found in starchy foods like wholegrain cereal products. An exception is the sugar found in fruits called fructose, because consuming fruits provides other nutritional benefits such as dietary fibre and vitamins.

One major concern about high sugar consumption is the development of tooth decay. Sugar in the mouth is converted to a sticky substance that forms plaque on the surface of teeth, which eats away at the tooth enamel, causing decay and holes. Another concern is the **empty kilojoules** they add, which contributes to the growing obesity trends in Australia.

empty kilojoules Food that contains high levels of energy, such as fat and sugar, and very few, if any, other nutrients

LEARNING REFLECTION

1 Name a naturally occurring sugar. What food products can it be found in?
2 List the functions of sugar in the cooking process. Explain how sugar inhibits the growth of microorganisms.
3 Explain the statement 'our diet would be very different without the use of sugar'.
4 What is plaque? Describe how plaque contributes to dental decay. Describe how sugar facilitates the growth of plaque.

Figure 9.14 Sugar is sometimes called 'the sweet poison'. Do you know why?

Figure 9.15 Sugar contributes significantly to the development of dental caries (decay).

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9.7 Function of sugar in cooking

LEARNING INTENTIONS

1. To understand the different properties of different sugars in cooking.
2. To develop a deeper understanding of the role of sugar in caramelisation, aeration and on cellulose during cooking.
3. To understand that some foods have high levels of sugar in them naturally, and that these sugars contribute to the physical properties of the finished foods in which they are used.
4. To be able to list and explain the functional properties of sugar in foods.
5. To develop an understanding of the sources of sugar in the diets of Aboriginal and Torres Strait Islander peoples.

Cane sugar, or sucrose, in forms such as caster sugar, brown sugar or A1 sugar, easily dissolves in liquid and melts when heated, so it can add a sweet taste without being visible. These two characteristics, along with its availability and other properties, have made it an essential ingredient in food preparation.

INVESTIGATE 9.8

Go online and research different types of sugar that can be purchased. You are probably familiar with white sugar (also known as A1), caster sugar and brown sugar. But how else can sugar be purchased? Why are there so many different types of sugar? What are the uses of each? Is all sugar from sugar cane?

Impact of heat on sugar

If sugar is present in food, it adds colour to the food when cooked because it melts and goes brown when heated. This is called caramelisation. The process also enhances the aroma of food.

Figure 9.16 When sugar is heated, it changes colour, aroma and flavour.

DESIGN BRIEF: SUGAR CHOICE

Different sugars have different consistencies and even vary in taste. Select one type of sugar and design a recipe that specifically requires your chosen sugar. When investigating and creating your recipe, explain exactly why this sugar must be used.

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Caramelisation also occurs when dry heat is applied to fruit and vegetables that have a high sugar content. This browning process is evident with baked potatoes, sliced apples gently sautéed in butter and fried onions.

Onions are one of the vegetables with a high natural sugar content. Slowly cooked onions are very sweet compared with raw onions. The sensory properties of the aroma of an onion are also significantly changed with caramelisation. The aroma of onions on a barbecue can be detected from some distance.

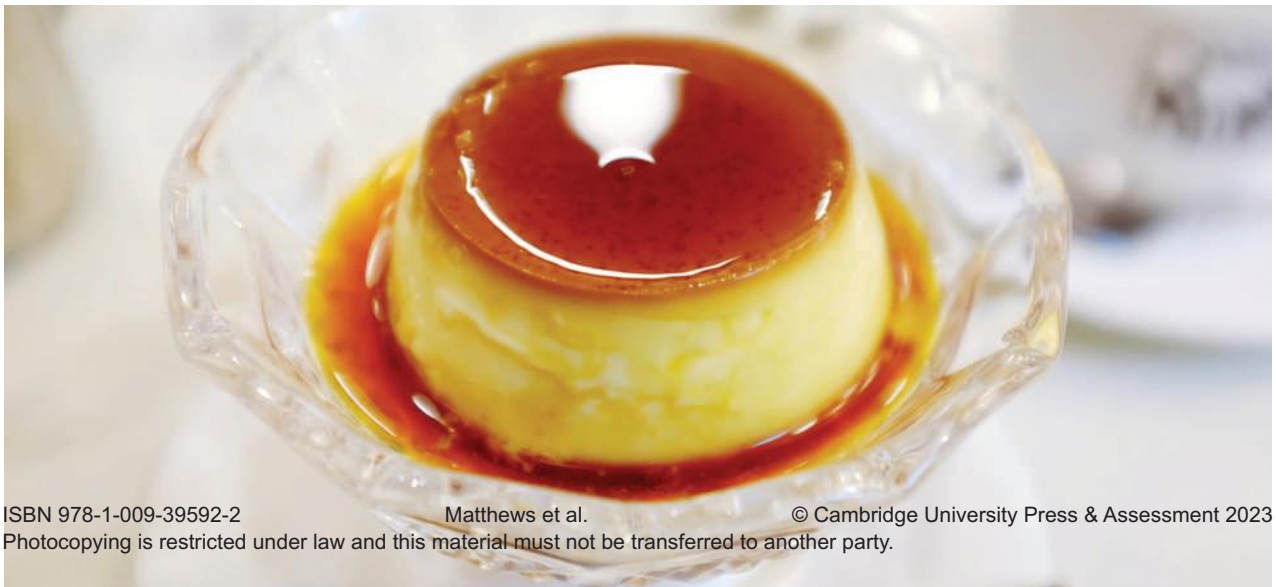
Figure 9.17 Browning in onions is caused by the caramelisation of their naturally occurring sugar.

ACTIVITY 9.9
CARAMELISATION OF SUGAR

Warning: When sugar is heated and caramelised, it becomes extremely hot and potentially dangerous. Be very careful when you carry out this activity!

1. Select four different sugars you researched in Investigate 9.8.
2. Compare the textures and colours of the sugars.
3. Discuss possible uses for the sugars and possible tasks for which each one would be best suited.
4. Bake some of each of the sugars by following this method and record the changes:
   - Place a teaspoon of each of the sugars onto non-stick baking paper.
   - Spread the sugar a millimetre thick and place the tray in an oven that has been preheated to 200°C. Cook for 5 minutes. Check and record the changes that have occurred in 5 minutes.
   - Return to the oven for another 5 minutes. Check and record the changes. Describe the impact of heat on the sugars.
   - Allow to cool. Do not touch while it is hot, as it can cause a serious burn. The end product is like hard toffee.
   - Crushed nuts can be mixed with the sugar before cooking; when it has cooled, the toffee and nut mixture (known as praline) can be crushed and sprinkled over ice-cream or a custard-based dessert.

Figure 9.18 *Crème caramel* is a dish that relies upon caramelisation of sugar to produce the brown surface.



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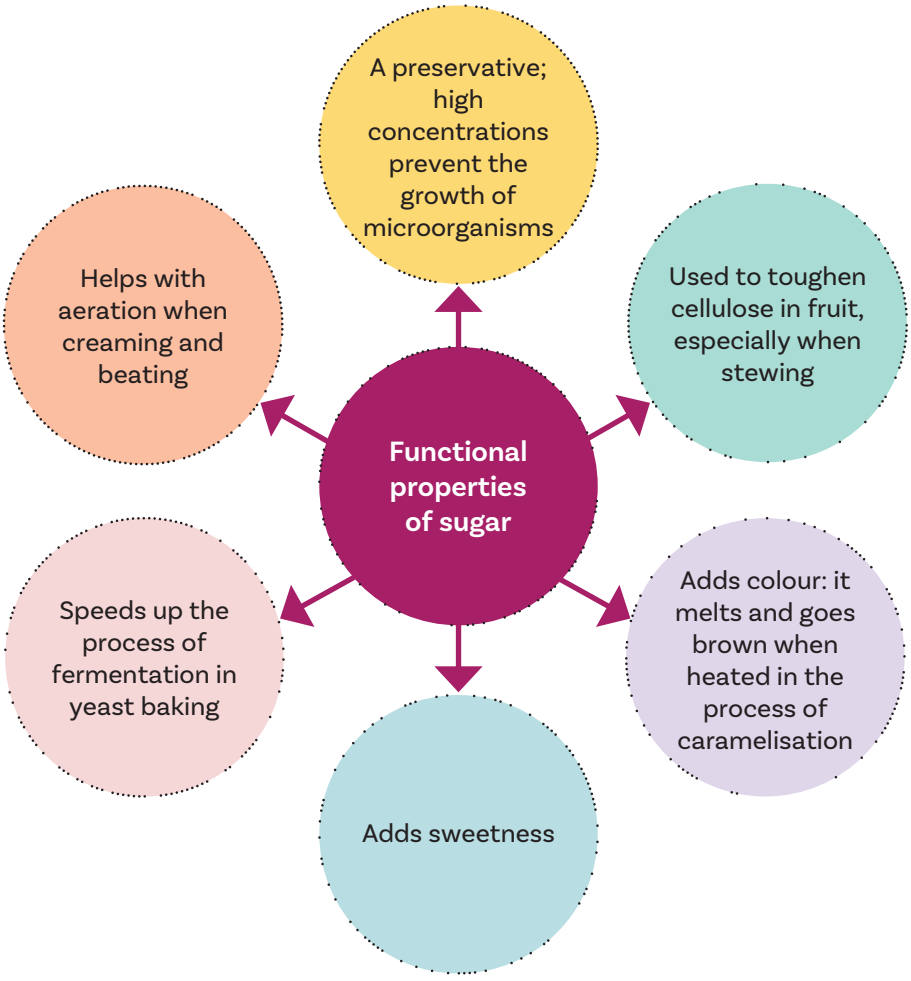

Figure 9.19 Functional properties of sugar

TASTY TRIVIA

Some First Nations peoples prize honey ants as a natural sweetener. The ants live in underground nests under mulga trees and have huge abdomens full of honey. To eat a honey ant, you pick it up by the head, put the abdomen in your mouth and bite it off.

INVESTIGATE 9.10

Go online to research the Australian honey ant (also known as the honeypot ant) and complete the tasks below.

1. Identify where First Nations communities can gather them today.
2. Explain how the hunting and gathering of such bush foods has changed over time.
3. Describe how the impact of changing environmental conditions has altered the availability of bush tucker.

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STICKY DATE PUDDING WITH CARAMEL SAUCE

Serves 2
Main tools and equipment Measuring spoons, jug and cups, knife, whisk, wooden spoon, muffin pan, saucepan
Production skills Whisk, melt, stir
Cooking processes Bake, simmer

Preparation time 7 minutes
Cooking time 37 minutes
Serving and presentation time 17 minutes
Total time 61 minutes

INGREDIENTS

PUDDING

- 1 teaspoon butter for greasing
- ⅓ cup pitted dates, chopped
- 2 teaspoons finely grated fresh ginger
- 2 tablespoons water
- ¼ teaspoon bicarbonate of soda
- ⅔ cup self-raising flour
- ¼ teaspoon mixed spice
- ¼ cup lightly packed brown sugar
- 1 egg, lightly beaten
- 1 tablespoon milk
- 30 g butter, melted
- ½ teaspoon vanilla essence

CARAMEL SAUCE

- ⅓ cup firmly packed brown sugar
- ⅓ cup thickened cream
- 25 g butter
- 2 teaspoons golden syrup

METHOD

1. Preheat oven to 180°C. Brush two 185 ml (¾ cup) capacity muffin pans with melted butter to grease lightly.
2. To make the pudding: combine the dates, ginger and water in a small saucepan over a high heat. Bring to the boil. Cook for 1 minute or until dates soften slightly. Remove from heat.
3. Stir in the bicarbonate of soda and set aside for 5 minutes to soak.
4. Sift the flour and mixed spice into a large bowl. Add the brown sugar and stir to combine.
5. Make a well in the centre of the flour mixture. Add the date mixture, egg, butter, milk and vanilla essence, and stir well until combined.
6. Spoon mixture into the prepared pans. Bake in preheated oven for 20–25 minutes or until a skewer inserted into the centre comes out clean. Remove from oven. Set aside for 5 minutes to cool slightly.
7. To make the caramel sauce: combine all ingredients in a medium saucepan over low heat. Cook, stirring for 2 minutes or until sugar dissolves.
8. Increase heat to medium and simmer for 2–3 minutes or until sauce thickens slightly.
9. To serve, turn out the puddings onto serving plates. Drizzle with a little of the caramel sauce and serve immediately.

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Sugar's role in aeration

When making a cake using the **creaming** or **beating** methods, sugar combines with other ingredients to aid aeration. In the creaming method, sugar and butter or margarine are beaten together, and air is trapped. In the beating method, eggs and sugar are beaten together. The sugar helps to stabilise the beaten egg and trap the air.

creaming The process of preparing the butter and sugar to create a soft and creamy texture; this ensures even distribution of the butter through the cake mixture

beating The process of combining ingredients to trap air and create lightness

The famous Australian pavlova is one example of a food in which sugar is beaten with egg white. In fact, the dessert consists mainly of sugar and egg white.

Figure 9.20 The shape of sugar crystals helps trap air in creaming butter and sugar.

Figure 9.21 Butter and sugar being beaten together. The mixture will turn light and fluffy and will change colour to a much paler yellow.

Sugar's impact on cellulose during cooking

As well as adding a sweet flavour to food, sugar has other qualities that make it a useful ingredient in food preparation.

When fruit is boiled or stewed without sugar, the fruit will break down and become a purée. But if sugar is added at the beginning of the cooking process, the fruit will hold its shape. This is called a compote.

Figure 9.22 A compote is fruit stewed or cooked in a syrup, usually served as a dessert.

ACTIVITY 9.11
HIDDEN SUGAR

Processed foods often have sugar in them as sugar acts to improve the sensory and keeping properties of the food. Sugar is not always listed as sugar on a food label and has many forms and names.

1. What other names are used for sugar?
2. Study the ingredients list for a fruit cake. Write down all the ingredients that add sugar to this cake.
3. Describe three functional properties of sugar in this cake.
4. How much sugar is there in 100 g of this product? Calculate how many teaspoons of sugar this is (1 teaspoon = 5 grams).
5. Complete questions 2–4 using another processed product.

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LEARNING REFLECTION

1 Name five different sugars and state a use of each in cooking.
2 Explain why sugar is used in the production of food.
3 Describe what happens when sugar is heated and explain how this is used to enhance the properties of cooked food.
4 How does sugar assist in the process of aeration? Why is aeration sometimes required in a recipe?
5 What is cellulose? What impact does sugar have on cellulose?

9.8 Salt

LEARNING INTENTIONS

1 To explore the impact that high salt levels have on health outcomes.
2 To develop knowledge of the function of salt in food production.

People have been using salt for preservation for thousands of years. Our appetite for salt grew when our ancestors started settling the land and learned about the functions of salt. Not only did salt preserve foods such as meat, thus increasing shelf life; it also enhanced food flavour. Salt has an indefinite shelf life, but does absorb moisture, which can make it go lumpy.

TASTY TRIVIA

A handy trick is to put a few grains of rice into a saltshaker to stop the salt going lumpy.

salt A seasoning and preserving agent made from sodium chloride crystals

The chemical term for salt is sodium chloride. **Salt** comes from two main sources: the sea (sea salt) and mining deposits (rock salt). Salt is used not only in savoury dishes, but also in sweet dishes to enhance flavour. While our bodies require a small amount of salt, there are concerns that we are consuming more salt than we should because we have developed a taste for it, just as we have for sugar. Like sugary foods, salty foods are classified as a discretionary food in the Australian Guide to Healthy Eating and fall outside the five food groups. This includes foods that are high in salt, such as snack foods, preserved meats, and many sauces and pickles.

Figure 9.23 Salt and salty foods are classified as discretionary foods in the Australian Guide to Healthy Eating because of their negative impact on health outcomes. Which of the foods in this charcuterie board are high in salt?

Nutrition and salt

Australians are probably eating more than double the daily recommended salt intake. It is estimated that 75 per cent of our salt comes from processed foods such as bread, margarine, butter, breakfast cereals and cheese. We do need some salt in our diet, as sodium is necessary to maintain the internal water balance within our bodies. However, a high sodium intake has been linked directly to high blood pressure.

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Salt occurs naturally in almost all foods and is important because it provides flavour, which is why 'salt' or 'sodium' is listed on the label of almost every food product at the supermarket. Salt is also used to preserve foods, as it draws out moisture and prolongs a product's shelf life. It is positive to see so many products catering for calls to reduce our salt intake. There are now many 'no added salt' and 'low-salt' products on the market. These products must contain no more than 120 mg sodium per 100 g.

INVESTIGATE 9.12

EXTENSION

Go online and investigate the role that salt plays on our health outcomes. What diseases are directly associated with the overconsumption of salt? What suggestions are made on how to reduce our salt intake?

Function of salt in cooking

Like sugar, salt has functions in cooking that go beyond adding flavour.

Salt has long been known as a preservative. It works by reducing the available water in a food, therefore depriving microorganisms of water used to multiply. However, it also has several other functional properties. When salt is put into yeast-based products, it will affect the final texture, as it alters the structure of proteins impacting on texture. It also controls the fermentation rate of yeast in the development of bread dough. In correct proportions, salt can add more body to cheese, make meat juicier and make breads firmer. Salt enhances other flavours, apart from the obvious addition of 'saltiness' to foods. It also acts as a binder or emulsifying agent in meat products, as it restructures proteins, giving them a different structure. This helps hold the product together as well as holds water and fat in the product, making the meat softer and more succulent.

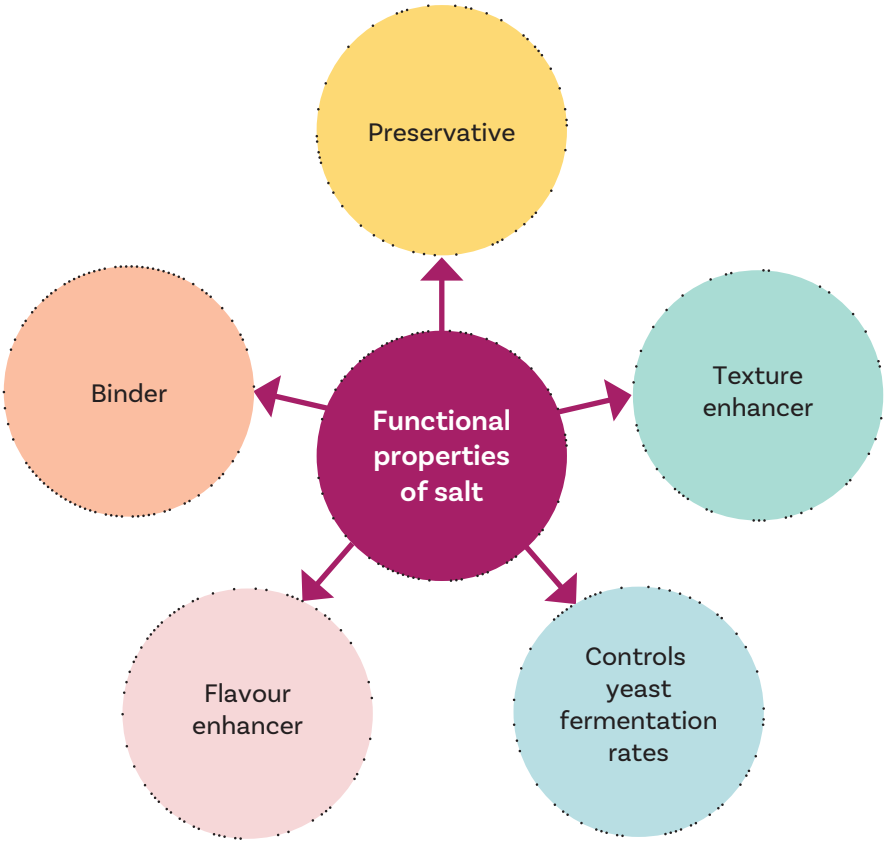

Figure 9.24 Functional properties of salt in food preparation

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PRESERVED LEMONS OR LIMES

Makes 500 g preserved lemons or limes
Main tools and equipment Scales, knife, freezer, one litre jar with a wide-mouthed lid
Production skills Cut, crush, freeze, defrost, dissolve, boil
Cooking processes Boil, simmer

Preparation time 60 minutes
Cooking time 10 minutes
Total time 70 minutes

INGREDIENTS

- 500 g thin-skinned lemons or limes
- 120 g salt
- 2 teaspoons coriander seeds, crushed lightly
- ½ cinnamon quill
- 1 bay leaf
- 1 tablespoon honey (use the same quantity of maple syrup to make the recipe vegan)
- 4 tablespoons lemon juice
- 250 ml warm water

METHOD

1. Wash and dry the lemons (or limes if you are using them). Sit the fruit on its end and cut in quarters, leaving it joined at the base. Place the lemons (or limes) in a bag and freeze overnight. (This speeds up the preservation process.)
2. Sterilise the jar you will be using.
3. Defrost the lemons (or limes).
4. Stuff the cut lemons (or limes) with a teaspoon of salt, rubbing it into the flesh.
5. Arrange the lemons (or limes) neatly in the jar, sprinkling each one with more salt and the coriander seeds. Put the bay leaf and cinnamon quill into the jar as you go.
6. Mix the honey, lemon juice and warm water in a small saucepan and heat gently until the honey dissolves.
7. Pour the honey mixture into the jar until the lemons (or limes) are fully submerged. Screw the lid on.
8. Put the jar into a saucepan that has a trivet or a piece of cardboard on the bottom to stop the jar rattling. Fill the saucepan with water so it goes halfway up the sides of the jar.
9. Slowly bring to the boil. Boil for 6 minutes. Remove the pan from the heat.
10. Lift the jar out of the pot and store in a cool, dry place for at least a month before opening. Once open, keep refrigerated. Rinse lemons (or limes) well under cold water before using. Use the rind only (discard the flesh).

DESIGN BRIEF: PRESERVED LEMONS

Research a recipe that uses preserved lemons as an ingredient.

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LEARNING REFLECTION

1 Discuss why nutritionists are concerned that we are consuming too much salt.
2 Identify the chemical name for salt.
3 List three functions of salt in cooking.
4 Outline three ways an individual could reduce the intake of salt in their diet.

9.9 Other flavour enhancers: herbs and spices

LEARNING INTENTIONS

1 To be able to explain the difference between a herb and a spice.
2 To understand the role of herbs and spices in the foods we eat.
3 To understand the historical importance of herbs and spices.
4 To explain the role herbs and spices play in nutrition.

Many of the foods we enjoy have salt, sugar, herbs and spices listed in their ingredients. The main reason we add sugar, salt, herbs and spices to food is to enhance flavour, aroma and colour. Many of the foods available today could not be produced without these ingredients.

Figure 9.25 Which of the above herbs and spices do you recognise? Which are herbs? Which are spices?

COLLABORATE 9.13

Working with a classmate, draw a table with two columns, putting the heading 'Herbs' in one and 'Spices' in another. Brainstorm as many herbs and spices as you can and write these down. Can you see any similarities between the examples of herbs and spices you have listed? Try to write your definition of a herb and of a spice. Share your brainstorm lists with the class.

Figure 9.26 Herbs can be used for a range of culinary and medicinal purposes.

herbs The leaves of plants, used to season food

spices The dried seeds, buds, fruits, bark or roots of plants used to season food

Herbs are the leaves of plants, which can be purchased fresh or dried. Herbs deteriorate as they age, losing their colour and flavour. Most herbs grown in the garden can be air-dried. Pick the herbs in the morning, clean the leaves to remove any traces of dirt and lay them flat on a cake rack in a dark, well-aired location. Alternatively, you can tie your herbs in bunches and hang them for drying. **Spices** are the dried seeds, buds, fruits, barks or roots of plants. Spices are often sold in their original state – for example, cumin seed – or as a ground powder. Spices do not have a long shelf life once ground, so it is important to buy them in small amounts. As they age, they lose their flavour and fragrant aroma.

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Figure 9.27 A selection of common spices are shown in their original state and as ground powders.

ACTIVITY 9.14
DRYING HERBS USING A MICROWAVE

It is possible to dry excess herbs in the microwave oven. The softer herbs like parsley and mint dry better this way.
Pick and clean the herbs and lay them in a single layer between layers of paper towel. Microwave on high for 1 minute and check to see if the herbs are dry and brittle. If they are not, re-wrap them and microwave a further 30 seconds. Repeat until the herbs are brittle. Crush the herbs gently and store them in an airtight container.

History of herbs and spices

All traditional cultures have used herbs and spices in their food products. They have often been used throughout history to hide the foul aromas and tastes of foods that may have spoiled or been preserved with large amounts of salt and eaten during the winter, when it was hard to find fresh food. Not only are herbs and spices bursting with flavour, aroma and colour, they are also used for their medicinal properties and to preserve foods. Many herbs and spices were used in traditional medicine and continue to be used in natural remedies today. For example, ginger tablets are a popular treatment for nausea and motion sickness and oil of cloves is used to calm a sensitive tooth in dentistry.

The search for spices was one of the reasons the great explorers such as Marco Polo and Columbus went on their sea expeditions. Spices were brought back to Europe from Asia and Africa, and they were highly valued for their medicinal properties, perfumes and flavour. This made spices very expensive during this time. Some of these spices include cardamom, ginger, cloves, coriander and cinnamon.

Figure 9.28 Spices were used to mask the unpleasant smells that arose due to poor sanitation and lack of personal hygiene . They were often placed in a posy, or nosegay, that women could smell when needed, or to mask their own odour.

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COLLABORATE 9.15

Your class is going to make an e-cookery book focusing on spices from around the world. First you will do some collaborative research and then you will divide the countries among your group's members. Complete the table and the questions below.

1 Copy and complete the table below as a class. Make sure everyone has a copy with all the gaps in the table completed.

Country/ cuisine	Spices	Two recipes using one or more of these spices
India	Coriander seeds, turmeric, cinnamon, cumin, fenugreek seeds and leaves, ginger, pepper, chilli, cloves, tamarind, cardamom, saffron	
Morocco	Coriander seeds, turmeric, paprika, cumin, cinnamon, ginger, cloves, pepper, chilli	
Coastal East Africa	Cumin seeds, turmeric, curry powder, coriander seeds, tamarind	
West Africa	Curry powder, black pepper, ginger, chilli, Cameroon pepper, nutmeg	
Middle East	Coriander seeds, cumin, fennel seeds, cassia, turmeric, lemongrass, galangal, ginger, pepper, cloves, chilli	
Malaysia		Satay Nasi Goreng
Thailand		Pad Thai Massaman curry
China		Pickled cucumber Stir fry Szechuan chicken
Japan		Miso soup Chicken karaage
Mexico		Chilli con queso Sweet Mexican corn cake

2 Add at least two more countries to the list and complete the columns for these.

3 Each student is to choose a different country and find two recipes for that country. The recipes must include at least one of the spices you have listed for the country.

4 Adapt the recipes you have found so that each serves four people.

5 Prepare copies of your recipes using the format used in this book.

6 Working as a class, using a shared document program or a website builder, prepare a class e-book that can be shared, providing spice recipes from around the world.

If you have time, you may like to test your recipes in class.

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Nutrition and herbs

Herbs and spices are used in relatively small quantities in cooking because of their intense flavours, so they are not considered as part of the Australian Guide to Healthy Eating and no recommended serves are suggested. However, herbs and spices add excitement to dishes. They can improve the flavour of any product and are often used to flavour healthier dishes that have had their fat, sugar and/or salt content reduced.

Figure 9.29 Herbs and spices are used in small quantities in dishes.

Research has shown that herbs and spices provide a wide range of nutrients and phytochemicals that help prevent disease and contribute to better health. They contain high concentrations of antioxidants, as well as a variety of vitamins, including vitamin C. Chinese medicine uses many herbs and spices in treatments; for example, garlic for protection against coughs and colds, and liquorice for the relief of constipation.

LEARNING REFLECTION

1 Other than for flavour, list two reasons for the use of herbs and spices in foods.
2 Explain two benefits of drying your own herbs.
3 Herbs contain phytochemicals. Explain what they are and why they are important for good health.

EXTENSION

4 Explain the link between cultural identity and herbs and spices.

9.10 Water

LEARNING INTENTIONS

1 To better understand the essential role of water in the functioning of the body.
2 To create awareness of daily water requirements.
3 To understand the role water plays in our health and body functioning outcomes.

The human body is able to last weeks without food, but only a few days without water. Water is essential for life and is responsible for many functions in the body; in fact, it makes up between 50 and 80 per cent of the total weight of the body. Every cell in the body uses water to maintain cell structure, and water is vital for energy production and growth.

The recommended intake for a teenage boy is between 1.6 to 1.9 litres per day (about 6–8 cups) and for a teenage girl 1.4 to 1.6 litres per day (about 5–6 cups). Amounts depend upon age, activity levels, body mass and health status of the individual, as well as the climate in which the individual lives.

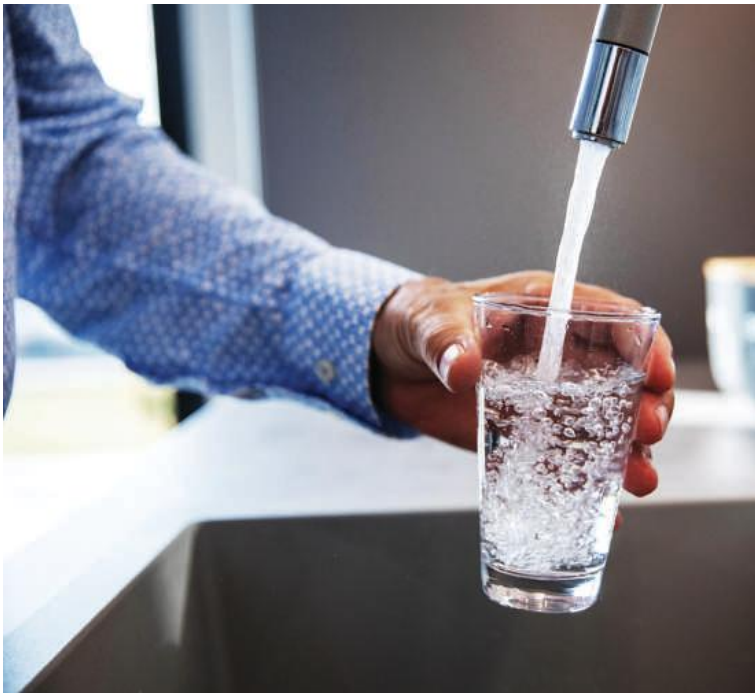

Figure 9.30 Our bodies require sufficient water every day for good health.

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Water from the liquids we drink accounts for nearly 80 per cent of our daily intake, but we also obtain around 20 per cent from the foods we eat.

Water loss

A loss of 5–10 per cent of body water results in serious **dehydration** and can be life threatening. The best way to tell whether you are getting enough water is to inspect your urine. It should be clear or pale yellow. If not, it is time to drink up!

dehydration A dangerous lack of water in the body

TASTY TRIVIA

If you go overseas to developing countries, do not drink or even brush your teeth in the tap water. Use bottled water, but first make sure the seal is unbroken. Also, do not have drinks with ice in them, as you cannot be certain the ice was made from clean water. This will help you avoid getting sick from the water.

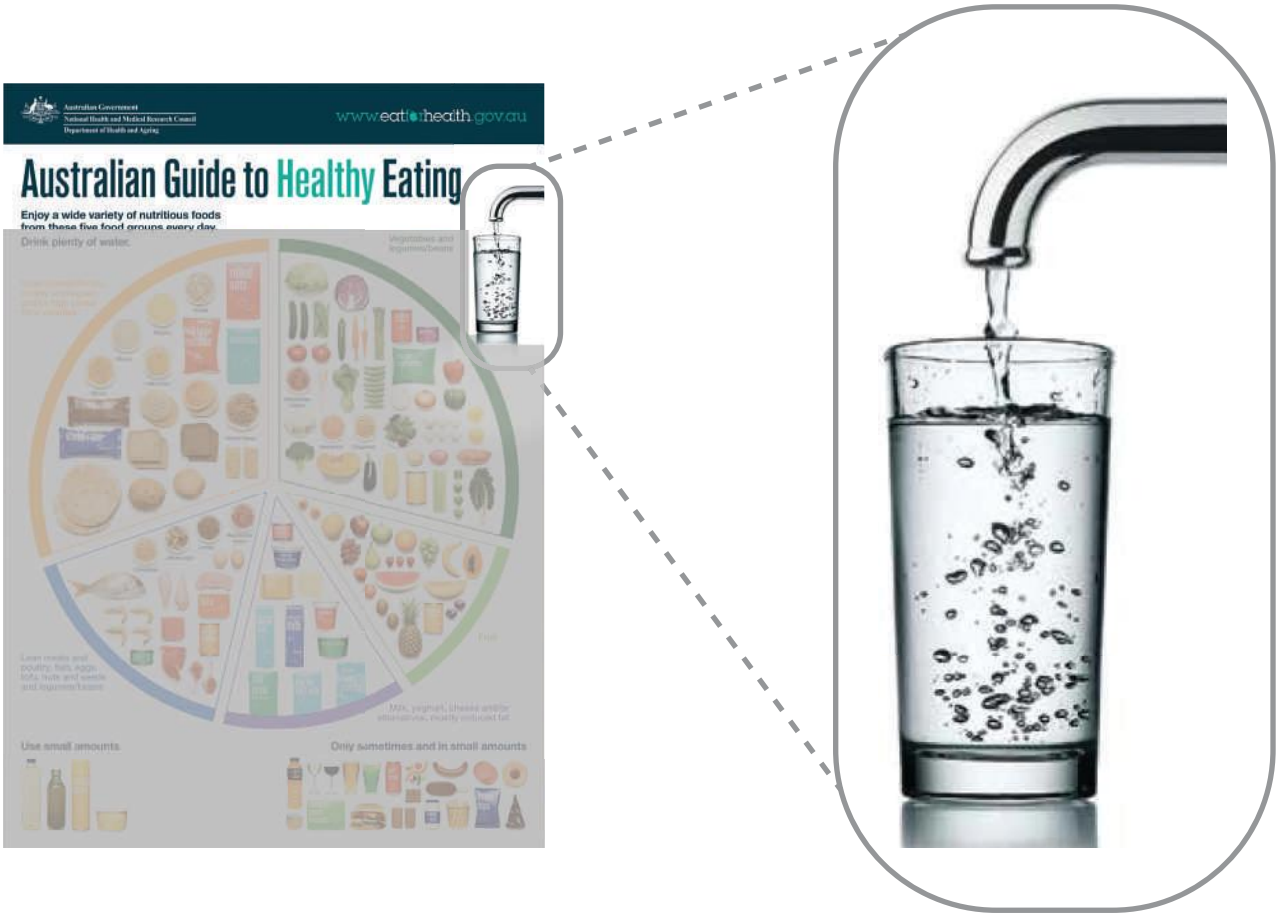

Figure 9.31 Water is featured on the Australian Guide to Healthy Eating. Although it is not in the 'plate', it is shown as a tap filling a glass. *Based on material provided by the National Health and Medical Research Council.*

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Functions of water in the body

Water is essential for life. See Figure 9.32 to discover the functions of water in the body.

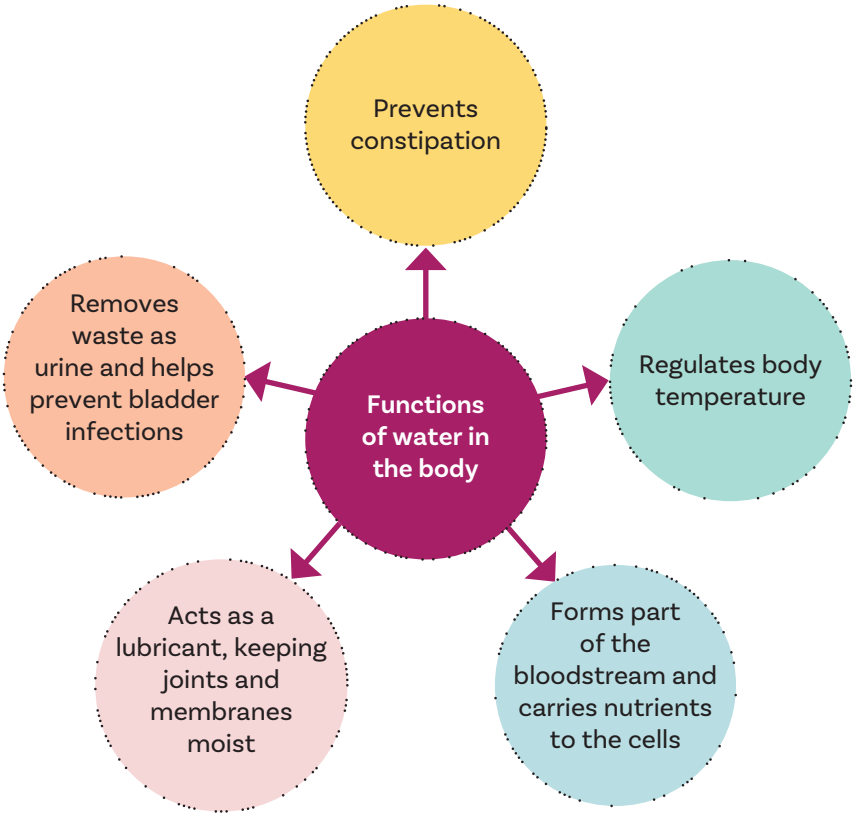

Figure 9.32 Functions of water in the body

Sources of water

Most foods contain water, but vegetables and fruit have more than other foods. At least half of your daily water intake should be consumed as plain tap water.

ACTIVITY 9.16
WATER IN FOOD

The dried fruit recipe following is an experiment in which you will be choosing a fruit and finding out how much water is contained within it by drying it. Dry your chosen fruit using the recipe and complete the evaluation questions.

INVESTIGATE 9.17

Go online to investigate the amount of bottled water sold in Australia annually. Is the amount of bottled water increasing or decreasing? Suggest reasons for this trend, also considering environmental concerns.

Figure 9.33 Is all water created equal?

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RECIPE

DRIED FRUIT

Main tools and equipment Knife or mandoline slicer, dehydrator, electronic scales
Production skills Slice

Preparation time 30 minutes
Drying time 8–16 hours depending on fruit
Total time Varies depending on fruit type

INGREDIENTS

- 1 piece of fruit of desired choice
- Lemon spray: made from 1 part lemon juice and 3 parts water in a spray bottle

METHOD

1. Prepare lemon spray. One bottle for the whole class will suffice.
2. Slice the piece of fruit very finely.
3. Weigh the sliced fruit accurately, record.
4. Layer the fruit on the dehydrator screen/sheet. Do not overlap the fruit.
5. Spray the fruit generously with the lemon spray (on the top only). This is not necessary if you are dehydrating citrus.
6. Set dehydrator to 50°C.
7. Dry for at least 8 hours, then check. If the fruit is leathery and flexible, but no longer sticky, then try to tear it. If it tears and there is no water in the torn face, it is done.
8. Weigh the fruit once more and record the result. (Note: this fruit will be safe to store in an airtight container for three months.)

EVALUATION

1. How much weight did your piece of fruit lose during the drying process?
2. Collect and record the data from other students in your class.
3. Which fruits lost the most weight? Water was removed during this process. Which fruits contribute the greatest amount of water to a person's diet?

LEARNING REFLECTION

1. List and explain the role of water in our body.
2. How much water should you be consuming per day? Are you? If not, how can you increase your water intake?

EXTENSION

3. Analyse the environmental issues relating to the consumption of bottled water.

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9.11 Environmental impact of the production of lipids

LEARNING INTENTION

1 To understand the impact on the environment of the large-scale production of oil crops.

There is growing environmental concern relating to the worldwide production of oil crops.

yield The measurement of the amount of crop grown per given area of land

The production of lipids worldwide from plant sources has seen huge increases in production, **yields** and areas of land used to produce them.

The chart in Figure 9.34 shows the production trends for four types of vegetable oils: palm, rapeseed (canola), soybeans and sunflower seed. These four accounted for 87 per cent of global vegetable oil production in 2022. However, while the trend has been upward for all, the rate of growth differs. Note that, in the early 2000s, palm oil production was lower than that of soybean oil, but it is now the largest source of vegetable oil. Palm oil represents 36 per cent of total production in 2022, compared to 28 per cent for soy.

Part of the issue is that to meet worldwide demand, oil crops are planted as a **monoculture**, which helps

monoculture The process of growing one crop only in a parcel of land

Figure 9.35 Endless fields of canola growing as a monoculture.

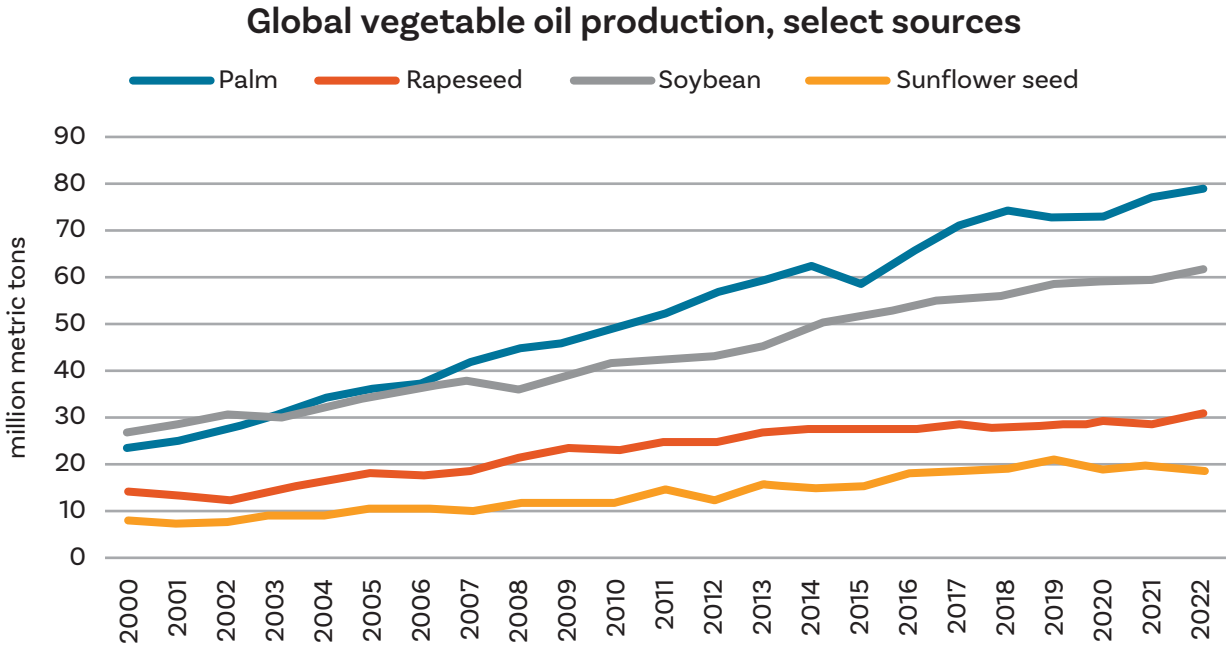

Figure 9.34 Vegetable oil production worldwide between 2000 and 2022 from major sources: palm, rapeseed (canola), soybean and sunflower seed.
Data Source: USDA FAS.

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farmers facilitate optimum harvest of a crop from a given parcel of land so they can get maximum income from their farm. When we think about the cost of any product that we purchase, we are often surprised and sometimes annoyed at its cost. Many products are simply beyond the reach of many people who need to budget tightly.

But why is it that these products are so expensive? If we look at the food systems through which these food products pass, they are often handled and processed by dozens of different companies, and each company must make a profit on their production costs.

ACTIVITY 9.18
WHICH OIL TO PRODUCE?

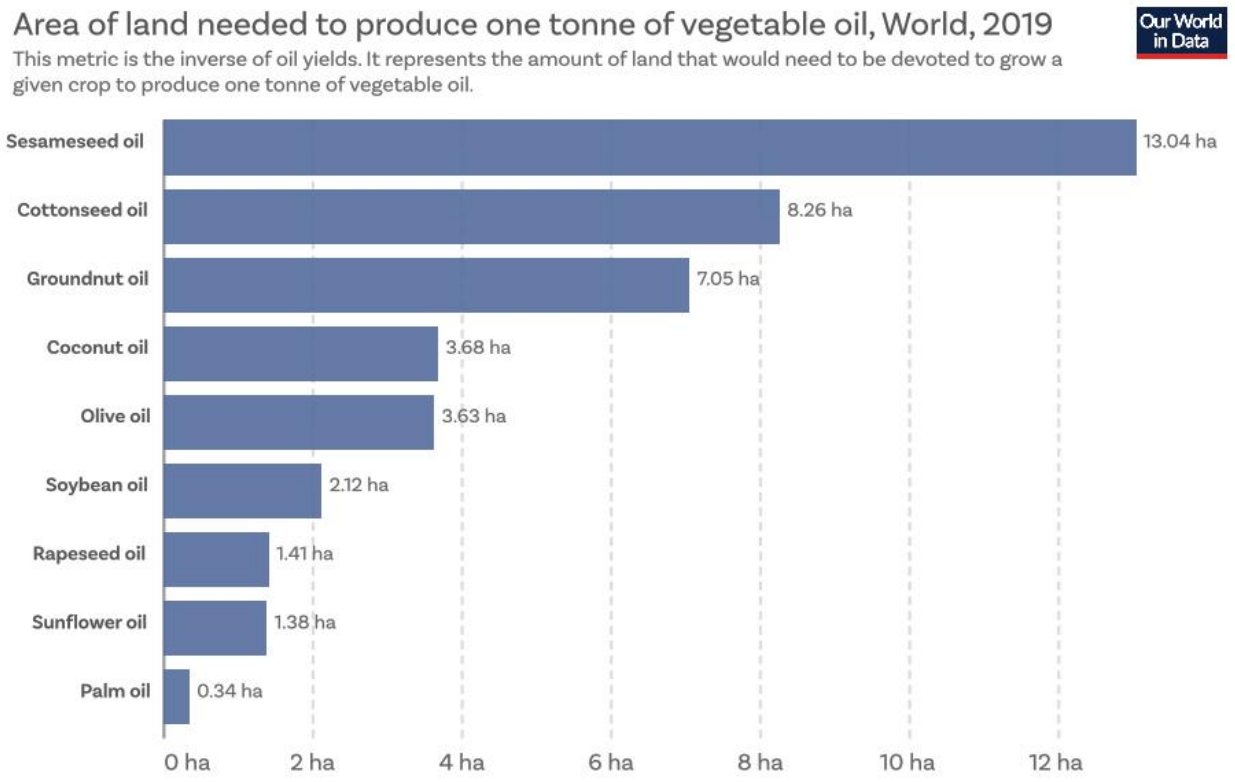

Figure 9.36 The area of land needed to produce one tonne of vegetable oil, 2019.
Source: Calculated by Our World in Data based on data from the UN Food and Agriculture Organization (FAO)

1 Choose one of the oilseed crops listed in Figure 9.36 and research:
   - growth conditions required for that crop, for example, climate, soil
   - countries that produce most of this crop
   - what this crop is used for primarily, including if it is used for non-human food purposes
   - what the physical properties of this oil are and how it is used in cooking.

2 Provide some examples of how this oil is used in industry and a recipe that you could make using this oil.

EXTENSION

3 If you were a farmer deciding which oil crop to grow on your farm and wanted to maximise yield, which oil would you choose to grow and why?

(continued)

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4 For each of the following factors, explain how it may impact on the farmer's decision on which oil crop to grow:
- price per tonne of the oil produced
- suitability of the oil crop to the soil
- suitability of the oil crop to the climatic conditions in the farm's location
- **topography** of the farm
- availability of transport services to take the oil crop away
- environmental impact the crop may have on the area around the farm
- ethical issues relating to the growing of the crop.

topography The forms and features of the surface of the land, for example, hills and water bodies

Palm oil

Palm oil is made from the fruit of the oil palm. It is a high-quality oil used in cooking in many developing countries; however, increasingly it is being used by developing countries for food products, detergents, cosmetics and even small amounts as **biofuel**.

biofuel A fuel for machinery which is derived from living matter such as plants, algae or animal waste

Production of this oil is increasing rapidly due to the high demand for it, in part because it is high yielding and inexpensive to produce. Palm oil plantations are spreading in countries throughout Asia, Africa and South America.

Figure 9.37 An oil palm plantation in South-East Asia

Oil palms only grow in tropical areas, and so tropical rainforest is cleared to make way for palm oil production. This has increased pressure on critical habitats for many endangered species, such as the Sumatran tiger, and has other environmental impacts, such as air, soil and water pollution; soil erosion; and contribution to climate change.

INVESTIGATE 9.19

Go online to the World Wildlife Fund website and search for palm oil to read about the environmental impact of palm oil production.
Explain how palm oil production can impact on climate change and on endangered species of both plants and animals.
Research palm oil free products and investigate the difference between these and products that contain certified sustainable palm oil.

LEARNING REFLECTION

1 What is an oil crop? List at least three different oil crops.
2 What is monoculture? Explain the benefit to the farmer of monoculture.
3 In your own words, explain how the production of palm oil crops may be damaging the environment.

EXTENSION

4 Explain why monoculture is detrimental to sustainable farming.
5 Develop a food system diagram for the production of a bottle of olive oil.

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Review

1 Fats, oils, sugar and salt all belong in the eat only sometimes and in small amounts categories on the Australian Guide to Healthy Eating and are also known as discretionary foods.
2 Fats are solid and oils are liquid at room temperature.
3 Mono- and polyunsaturated fats are considered to be 'good' fats as they help lower cholesterol levels and therefore the risk of heart disease. Saturated and trans fats are considered to be 'bad' fats as they contain cholesterol, which is linked with many health concerns. Essential fatty acids are those we are unable to make in the body and must come from the foods we eat.
4 Fats are an essential part of our diet. They have a number of essential functions in the body, including providing energy, producing hormones and providing fat-soluble vitamins.
5 Fats play an important role in the cooking process, including the provision of flavour and texture.
6 Sugar is found in many foods, both naturally and as an added ingredient. There are many different forms of processed sugars on the market.
7 Sugar contributes to poor health outcomes such as obesity and dental decay.
8 Sugar has many roles in cooking, including adding flavour, colour, texture and aroma.
9 High salt intake is associated with high blood pressure.
10 Salt is found naturally in foods, but it also is added to foods to improve flavour, texture, appearance and keeping qualities, among other functions.
11 Herbs are the leaves of aromatic plants, and spices are the dried seeds, buds, fruits, bark or roots of plants. They are both used to add to the sensory properties of foods.
12 Traditional medicine often uses herbs and spices; however, because they are only consumed in small quantities they do not feature on the Australian Guide to Healthy Eating.
13 Water is an essential component of our diets. It is found mainly in beverages, although some of our daily water is consumed in foods. Dehydration is when the body does not consume enough water. It is a serious problem that can led to death.
14 The production of oil crops can lead to a considerable environmental impact.

Test your knowledge

Multiple-choice

1 Sources of good fats include:
   a olives, nuts, coconuts, meat.
   b avocado, seeds, nuts, legumes.
   c salmon, olives, almonds.
   d milk, cream, ice-cream.
2 Which of these is an example of caramelisation?
   a Browning on the top of a cake when cooked
   b Bread browning in a toaster
   c The flesh of an apple turning brown when it is cut
   d Sugar cooked on a stove and accidentally burning
3 Coriander is:
   a a herb.
   b a spice.
   c a herb and a spice.
   d neither a herb nor a spice.

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True or false?

1 Discretionary foods are those foods listed in the five food groups.
2 The body can only use water that comes from drinks.
3 The number of serves of discretionary foods per day varies for different people because of age, body size and activity levels.

Short-answer

1 Outline possible negative health outcomes with an overconsumption of fats, sugars and salt.
2 Explain the possible environmental impacts of growing oil crops for biofuels.
3 Explain why an elite athlete may need to consume more water than another person of the same age. What might be the consequences for the athlete if they do not consume adequate water?
4 Suggest ways to avoid the consumption of trans fats while still eating processed foods.

Extended-response

Go online to the Eat for Health government website to learn more about the impact of fat, sugar and salt on our health, and why these three ingredients are of particular concern to Australia's health outcomes.

Navigate to information about Food labels and investigate what a consumer should be looking for on a label to help them reduce their intake of fat, sugar and salt.

Go to your pantry and find three products. Review their labels, and decide if these foods meet the suggested amounts of fat, sugar and salt per 100 g. Suggest alternatives to products that do not meet the suggestions made on the Eat for Health website.

Use an app such as 'Food Switch' to find healthier alternatives to these products.

What other names used to list fat, sugar and salt can be found on labels? Suggest reasons for these alternative names and outline the possible issues relating to having a broad range of names.

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CHAPTER 10

Taste Australia, taste the world

BEFORE WE BEGIN

1. Identify the influence that Indigenous Australian ingredients have had on our current cuisine.
2. List the cuisines that have influenced Australia's eating patterns.
3. Describe the sustainable hunting practices of Aboriginal and Torres Strait Islander peoples.
4. Describe how the cuisine of Vietnam links to French cuisine.
5. Thai food usually consists of five flavours. Identify each of these and name an ingredient for each one.
6. Describe all the uses you know for coconut. Explain why it is such an important fruit for Pacific Islanders.

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10.1 Indigenous Australian ingredients

LEARNING INTENTIONS

1 To develop an understanding of the traditional diet of Aboriginal and Torres Strait Islander peoples.
2 To explore the availability and uses of Indigenous ingredients in our own cooking.

Have you ever tried bush tucker? You might surprise yourself and realise you have eaten Indigenous Australian ingredients without even knowing it.

Aboriginal and Torres Strait Islander peoples have been eating native ingredients and hunting in sustainable ways for tens of thousands of years. Ingredients native to Australia are now available in much greater quantities and varieties for commercial use, and we are seeing the inclusion of Indigenous ingredients in restaurants, farmers' markets, commercial products and on the dinner table.

The traditional Aboriginal and Torres Strait Islander diet consisted of foods that could be sourced from the lands and waters.

INVESTIGATE 10.1

Research to discover which Aboriginal and Torres Strait Islander groups came from your local area. Find out about their cultural practices and the types of foods they sourced locally.

COLLABORATE 10.2

Discuss the social, economic and environmental impact of the increased availability of ingredients and foods from many different parts of the world.

Protein sources

Traditionally, in First Nations cultures, males would hunt for meat on land or in the waters, which would then be cooked over an open fire. Indigenous women also fished using line and hook, and they collected shellfish. They also hunted goannas, echidnas and other small animals using trapping techniques. Foods were sometimes wrapped in paperbark for protection, smoking and flavour, and food was cooked in the coals. Bark was also used to make vessels for holding liquids and boiling produce. The animals caught and eaten would depend on where in the country the people were. For example, southern peoples might have caught koalas or possums, whereas those in the northern parts of Australia hunted crocodiles and perhaps stingrays.

INVESTIGATE 10.3

Go online to research how First Nations peoples ensured that they did not hunt animals to extinction in their area.

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Crocodile


Eel


Emu


Fish


Lizard


Kangaroo


Snake


Witchetty grub


Yabby

Figure 10.1 Some examples of the wide range of protein sources eaten by Aboriginal and Torres Strait Islander peoples

First Nations women and children traditionally gathered foods from the environment. Nuts, seeds, fruits and berries, as well as roots and even insects, would be gathered to eat.


Bush tomato


Honey ants


Lilly pilly


Macadamia nuts


Quandong


Finger lime

Figure 10.2 Some examples of the food sources gathered and consumed by Aboriginal and Torres Strait Islander peoples

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INVESTIGATE 10.4

Go online to research the increasing availability of Indigenous ingredients, including raw ingredients such as finger limes, and products that contain native ingredients such as pepper berries or lemon myrtle.

1. List at least 10 different ingredients or products.
2. Determine the price and availability of each of these 10 products.
3. Choose three of these ingredients. Provide an example of how you could use each of them in food preparation.
4. Choose one of these examples and produce it.
5. Develop a short podcast promoting your chosen ingredient. Include where it is produced and where you can purchase it, and a description of the ingredient. Showcase the product you made using your ingredient.

DESIGN BRIEF: BURGER CONDIMENTS

There has been much discussion about whether kangaroo should become a national dish or whether it is wrong to eat an animal displayed on our coat of arms. Kangaroo is a lean meat that is native to Australia and can be produced sustainably. It is hoped that this will become the new burger meat 'hero', as a leaner alternative to beef mince – a new Aussie favourite. Consumer panels have suggested that the burger is missing something, however. Your task is to design a tasty condiment to complement the roo burger recipe following, to be included when serving.

INVESTIGATE

1. Investigate the different key ingredients used in condiments.
2. Investigate different condiment recipes as inspiration for your condiment.

GENERATE

1. Generate a list of possible condiment ideas to complement the roo burger.
2. Decide on your final option and justify your choice.

PLAN AND MANAGE

1. Design your condiment recipe.
2. Prepare your food order.
3. Prepare your work plan to ensure you are able to produce your condiment and roo burger in your practical class time.

PRODUCE

Prepare your condiment and the roo burger recipe.

LEARNING REFLECTION

1. Name a native ingredient and describe one way it can be used in cooking.
2. Should we be eating more kangaroo meat? Why or why not?
3. Discuss the influence of native ingredients and Aboriginal and Torres Strait Islander cultures on Australia's eating habits.

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RECIPE

ROO BURGER

Serves 2
Main tools and equipment Chef's knife, chopping board, bowl, fork, egg lift
Production skills Dice, beat, combine, shape
Cooking processes Fry, grill

Preparation time 15 minutes plus 20 minutes resting time
Cooking time 15 minutes
Serving and presentation time 10 minutes
Total time 40–60 minutes

INGREDIENTS

- 200 g kangaroo mince
- 1 small egg, beaten
- ⅓ cup fine breadcrumbs
- ½ onion, finely diced
- ½ clove garlic, crushed
- ¼ tomato, finely diced
- ½ teaspoon continental parsley, chopped
- Pinch of salt and black pepper
- Oil for cooking
- 2 hamburger buns
- Lettuce leaves
- 4 slices tomato

METHOD

1. Place the mince, egg, breadcrumbs, onion, garlic, diced tomato, parsley, salt and pepper in a bowl. Mix until well combined.
2. Shape the mixture into two burger patties.
3. Allow to rest for 20 minutes in the fridge if you have time.
4. Heat oil in a pan and quickly sear both sides of burgers on a high heat, then reduce to medium and cook for about 5 minutes until cooked through. Alternatively, cook the burger on a barbecue or under a preheated grill.
5. Cut the hamburger buns in half and lightly toast them under the grill.
6. Build the roo burger, top with tomato slices, lettuce and your homemade condiment.

EVALUATION

1. Complete a sensory analysis of your condiment.
2. Explain how you could improve the presentation of your final roo burger product.
3. Discuss the reasons for using kangaroo mince instead of beef mince for the burger patty.
4. Review your work practices against your work plan. Outline any areas where you had difficulty meeting the plan. Outline areas where your plan worked well.
5. Reflect on your final condiment. Outline what you are happy with and any areas you might modify or do differently if you were to produce this burger again.

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10.2 Contemporary Australian food

LEARNING INTENTIONS

1 To understand where Australian food patterns originate.
2 To consider the origins of the students in the class and understand other cultural backgrounds.

What type of food do you feel like eating today? Korean, Nepalese, Moroccan, Italian, Vietnamese or maybe Sri Lankan? Australia is truly a **multicultural** society, and we are extremely fortunate to be able to taste the globe right here on our own doorstep. The variety of different foods and the demand for their traditional ingredients come from the wide variety of ethnic groups living here.

multicultural From different cultures and countries

We take foods like *sushi*, *phở* and drinks such as *chai* for granted, but many of the foods we consume today were unavailable even a decade ago. In fact, some of our everyday meals, such as pasta and rice dishes, were less common 20 or 30 years ago. These products have slowly made their way into our everyday diet and have become popular, readily available and accepted foods. Consuming multicultural food is now part of our Australian **culture**, and something we celebrate proudly as a nation.

culture Beliefs, customs, traditions and social practices of a group of people

Figure 10.3 Different countries have traditional foods for which they are known. What countries do you think each of these foods come from?

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COLLABORATE 10.5

1 As a class, discuss which countries students or their relatives originated from and research some information about traditional dishes from those countries.

2 Copy and complete the following table.

Country	Traditional dish from that country	Main ingredients	Number who have tried it in the class

3 Now research five countries in detail and add them to the table.

Before World War II, Australian food typically was influenced by British traditions. The majority of **immigrants** were from the United Kingdom and Ireland, bringing with them knowledge of northern hemisphere foods, ingredients and cultural food traditions.

immigrant A person from overseas who has come to settle in a new country

COLLABORATE 10.6

Share with your class the traditions around food that your family follows. It might be around celebrations, special times of the year, religious or other festivals. Talk about the special foods that might be prepared and consumed.

Figure 10.4 British cuisine has influenced us with many traditions, such as tea with scones and cream (although we put the jam on the bottom) and the traditional roast dinner.

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After the war, Australia's migrant makeup changed, with people immigrating mainly from mainland Europe and Asia, bringing with them many interesting new dishes, techniques and tools, for example, pasta, pastries, stir-frying and steamer baskets.

Today we are seeing many immigrants from African, Middle Eastern and South American countries as well. The food products now available in our supermarkets reflect our immigration patterns. New ingredients and new food products, as well as new cooking techniques, have been brought to Australia because consumers have sought the products with which they cooked in their home country, here in their new land. Consequently, we now see more international products in our supermarkets, special sections reflecting different countries and cultures, an increased availability of a wider range of products, and specialist shops that cater specifically to certain cultures.

INVESTIGATE 10.7

Use Timetoast or another interactive tool to produce a timeline of Australia's food history. You will need to make references to:

- our native foods
- international influences.

Include specific foods and culture references as well as dates and relevant significant events, both here and overseas. Use pictures to help you summarise and present the information in a visual format.

Figure 10.5 Australia has seen an increase in the availability of different ingredients and cooking methods due to demand driven by our multicultural population.

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DESIGN BRIEF: TIM TAMS

Tim Tam biscuits are quintessentially Australian. There have been a number of different flavours of Tim Tams, some of which reflect Australian ingredients such as Vegemite and Murray River salt, and others that reflect complementary flavours to chocolate such as mint, strawberry and orange.
You are to design a series of three new flavours that reflect Australia's heritage. Present a detailed sensory description for your three Tim Tams that will be used as promotional materials.

LEARNING REFLECTION

1 Define the term 'multicultural' and explain how it relates to Australia's cuisine.
2 Explain the influences on Australian cuisine prior to World War II and include examples of foods that a person may have eaten at this time.
3 Why might ingredients such as olive oil and chillies be available now, and not before World War II?

10.3 Our Pacific Island neighbours

LEARNING INTENTIONS

1 To gain an understanding of who our near neighbours are geographically.
2 To develop an awareness of the traditional foods eaten by our Pacific Island neighbours and understand the reasons behind these being traditional foods.
3 To explore some of the cooking techniques used by our Pacific Island neighbours.

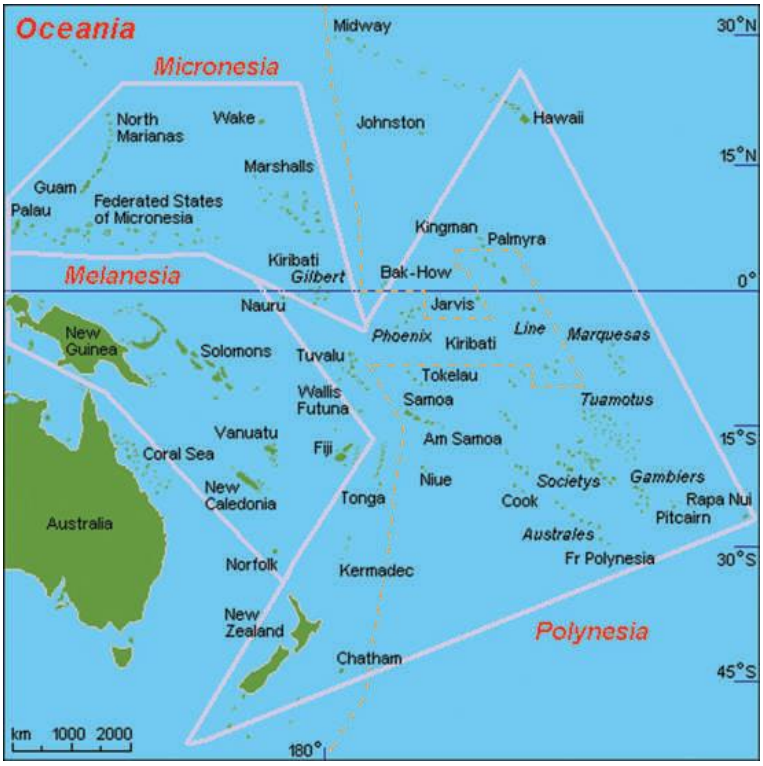

Figure 10.6 The Pacific Islands region covers a large part of the Pacific Ocean.

Throughout the Pacific Ocean lie a number of islands, including New Zealand, Fiji, Samoa, Papua New Guinea and Vanuatu. Some of these islands are our nearest neighbours, and the Australian Government works closely with these countries. Many Australians also visit them as tourists, enjoying their culture, climate and food.

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The Pacific Islands constitute a diverse group of countries, but they all have a wonderful palette of fresh local flavours that have been influenced by the people who live there, the environment and other cultural influences from colonisation.

The traditional Pacific Islands diet is based on:

- tropical starches like taro and sweet potato
- seafood
- fruits and vegetables such as coconut, banana and papaya
- flavourings such as ginger and chilli.

There are three areas within the Pacific Islands:

- Micronesia, the area to the north-west, which has predominantly Asian influences.
- Melanesia, the area in the west from Papua New Guinea across to the Solomons and through to Fiji, where its peoples have a hunter–gatherer background.
- Polynesia, the triangle between New Zealand, Easter Island and Hawaii, which means 'people of many islands'.


Taro


Bananas


Breadfruit


Papaya


Sweet potato


Snake beans


Coconut


Mango


Pineapple


Pandanus


Chilli


Ginger

Figure 10.7 Some of the traditional ingredients used in Pasifika cooking

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Mahi mahi


Tuna


Marlin


Kingfish


Trevally


Parrot fish


Shellfish


Octopus


Coconut crab

Figure 10.8 Seafood plays an important part in the diets of Pacific Islanders.

There is a strong culture of food in the Pacific Islands. No matter what the occasion is, there is always food to share. Traditionally, the family gathers to share lunch during the heat of the day. Elders and children eat first and the women eat last.

TASTY TRIVIA

The coconut provides liquid to drink, flesh to eat, fuel for fire, fibre for cooking utensils, matting and housing materials. The whole coconut can float on sea water and germinate on new islands, adding to its widespread availability in Pacific countries.

INVESTIGATE 10.8

The Māori people of New Zealand use the *hāngī* for cooking food when they are preparing a celebration feast. Many other Pacific nations also use this method of cooking, such as the Samoan umu. Research the *hāngī* method of cooking that is used as an oven to cook food. Answer the following questions:

1. Describe and draw a cross-section of a *hāngī*.
2. State the types of foods that are typically cooked.
3. Describe the cooking method used to cook the food.
4. Explain how the food is prepared prior to cooking.
5. Outline the impact this cooking method has on the physical and sensory properties of the foods being cooked.
6. Food around the world is often wrapped before putting it into hot coals. As we have learned, Aboriginal and Torres Strait Islander peoples sometimes use paperbark to wrap their foods before cooking. What other wrappings are used by other cultures internationally? What impact does the type of wrapping provide to the food being cooked?

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DESIGN BRIEF: PACIFIC BANQUET

A Pacific banquet is planned to celebrate the friendship of our regional neighbours, their culture, foods and festivities. Working in pairs, each group needs to prepare and present a Pacific dish for inclusion in the banquet. The combined effort of all groups should be a truly representative sample of food from our neighbours in the Pacific.

The feast is to include a range of dishes from across the Pacific; therefore, you will need to negotiate which country's cuisine you want to produce. The feast will take place in class and all food items must be ready for presentation at the designated time of the banquet.

So that everyone knows what the different dishes are at the banquet, you need to design and produce a place card for your dish that includes the name of the dish, its country of origin and the main ingredients or flavours.

The dish you bring to the banquet needs to be suitable to serve two people.

INVESTIGATE

1. Investigate possible countries you could represent.
2. Select a Pacific country.
3. Complete the investigation based on the cuisine of your chosen country.

GENERATE

1. Compile a recipe bank of three different recipes from your chosen country that will meet the demands of the design brief.
2. Determine which recipe you will produce for the banquet.
3. Identify the ingredients that are unique and authentic to your chosen dish.

PLAN AND MANAGE

1. Consider how you will present your dish for the banquet and prepare an annotated diagram or model of your final presentation, including garnish.
2. Submit an appropriate food order.
3. Develop a work plan.
4. Design a creative place card for your dish that will entice other diners.

EVALUATE

1. Explain how the dish met the specifications of the design brief.
2. Suggest modifications to the dish that would make it more suited to the design brief or improve its quality if you were to make it again.
3. Complete a sensory analysis of your product, using complete sentences for each of these.
4. Reflect on your performance and the performance of your team by answering the following questions:
    - I contributed to my group by ...
    - My strength in this task was ...
    - I believe our group performance could have been improved by ...
    - If I was to make this again, I would do ... differently because ...
    - I believe our group strength was ...
    - I would give our meal ... out of 10 because ...
    - The product that I enjoyed the most at the banquet was ... because ...

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LEARNING REFLECTION

1 Discuss the importance of coconut for the people living in the Pacific Islands.
2 Explain why fish is the staple protein in the Pacific Islands.
3 Identify the different regions within the Pacific Islands.
4 Suggest the reasons why tropical fruit are commonly consumed in the Pacific Islands.
5 Describe one cooking method used to cook foods for a feast.

10.4 France

LEARNING INTENTIONS

1 To describe the influences of French cuisine on the world of cookery.
2 To suggest reasons why French cuisine has had such an international influence.
3 To develop an understanding of some of the traditional ingredients, cooking and food preparation techniques used in French cooking.

Europe is an exciting continent because it has such a diverse variety of countries and cultures to explore, each with its own traditions, ingredients and cooking equipment.

pâté A paste made from meat, vegetables or fish

terrine A mixture of either meat, fish or poultry and other ingredients, which is cooked and served cold

The French have had a very strong influence in the world of cookery. Many of the foods you enjoy today, or the terms you read and follow in a recipe, are of French origin. The French are known for their fine cuisine, and many foodies visit France to experience the pleasures of French food – their rich sauces, **pâté** and **terrine**, soft cheeses and the *pâtisseries* selling beautiful cakes and pastries. Each region has its own food specialties, based on the ingredients produced there. *Boeuf Bourguignon* comes from and is named after the Burgundy region in Eastern France using Burgundy red wines and Charolais beef. Normandy is the main apple-growing area of France, with most of these apples going into making cider. This area is also famous for its dairy products, such as butter, cream and cheese, one of which is Camembert, named after the town of that name found in this region.

TASTY TRIVIA

Whenever French cooking or cuisine comes to mind, we think of eating *escargot* – snails. These are a delicacy prepared with garlic and parsley butter and often served at Christmas. Snails are thought to be one of the first animals to have been eaten by prehistoric humans.

Common foods

Common French foods are also many of our own common foods. They include the following:

- Breads: baguette – bread is baked and purchased three times a day in France
- Dairy: cheese (such as Roquefort), butter and cream
- Meat: poultry, beef, pork, lamb and game (e.g. rabbit or duck)
- Seafood: fish and shellfish
- Common fruits and vegetables: apples, pears, cherries, potatoes, green beans, eggplant and zucchini
- Flavourings: tarragon, sage, rosemary and marjoram.

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Figure 10.9 Classic French foods: *pâté*, *Boeuf Bourguignon*, *croque-monsieur*, *petit fours*

INVESTIGATE 10.9

You were introduced to the mirepoix and given a recipe in Chapter 2 when you were looking at production processes.

The mirepoix is a traditional French flavour base that is used in many different savoury dishes. Many other cuisines also have a similar flavour base using some of the same vegetables, but sometimes others more appropriate to their cuisine.

1. Review the processes that are required to complete a mirepoix.
2. Research the ingredients in the mirepoix and consider why these particular vegetables are used.
3. What other countries use a flavour base such as this? What other names are given to these flavour bases? What vegetables are used in these other countries?
4. Find a French recipe that uses a mirepoix recipe and make it in class.

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ACTIVITY 10.10
PARLEZ-VOUS FRANÇAIS?

1 Many cookery terms originate from France and French food. In your notebook, match up the terms below with their correct definitions from the table.

Term	Meaning
Purée	To cook foods in a frying pan with a small amount of fat or oil
Bouquet garni	To flame, usually done using alcohol
Julienne	Everything in its place, preparation before cooking
Flambé	Equal quantities of flour and butter to make a paste used to thicken sauces
Mise en place	Blending food until smooth, usually done using a food processor
Roux	A bundle of aromatic herbs and spices used to flavour stocks and casseroles
Sauté	Cut food into thin strips the size of a matchstick

2 Investigate another 10 French food terms and their definitions and add these to your list.

TASTY TRIVIA

In Paris, you may find shops called '*boucherie chevaline*'. The term *boucherie* refers to the shop being a butcher. A *cheval* is a horse. It is legal in France to eat horse, which we may find an unpleasant thought. It wasn't always eaten, in fact in the eighth century a Pope banned its consumption in all Christian countries. Find out more about how horse meat became a delicacy in French cuisine.

DESIGN BRIEF: DESIGN YOUR OWN TERRINE

Terrines are a popular traditional French food product. Research and design a terrine including at least four different ingredients and at least one protein source. Make sure you consider how the inside will present when sliced, as this is an important part of a terrine.

Figure 10.10 A terrine is a traditional French loaf usually made with a *pâté*-like meat and cooked in a **bain-marie**.

bain-marie
A device or a process for cooking foods that involves putting the food in a container into a pan of hot water

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INVESTIGATE 10.11

There are ethical concerns around the consumption of the French delicacy, *foie gras*. Complete the issues map in Figure 10.12 as you undertake research into this food. Ensure you record arguments for and against the production and consumption of *foie gras*.

Figure 10.11 *Foie gras* is a French delicacy made of duck livers.

Figure 10.12 Should we allow the production of *foie gras*?

DESIGN BRIEF: A 'MOTHER SAUCE'

The French are renowned for their skills in the culinary arts. One of the skills that the French are particularly good at is making sauces to go with the foods they make. There are several 'mother sauces': *béchamel*, *velouté*, *espagnole*, hollandaise and tomato.

For this practical assessment, you have an opportunity to demonstrate your skills in the kitchen. Your task is to demonstrate the making of a *velouté* sauce. You are to use the sauce as a base to make a light lunch meal, which includes three vegetables and uses chicken as the protein.

TASTY TRIVIA

Le petit déjeuner (breakfast) is usually a quick meal of baguette slices or croissants with jam, served with coffee or hot chocolate. The hot chocolate is often drunk out of a bowl and can be used for dunking your bread.

LEARNING REFLECTION

1. Outline the flavours used in French cookery.
2. Define the following terms commonly used in food production: 'sauté', 'julienne' and 'purée'.
3. Explain why each region in France has its own food specialties.
4. Discuss the controversy around the French product *foie gras*.
5. Describe how French cuisine has influenced food around the world.

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10.5 Greece

LEARNING INTENTIONS

1 To gain knowledge of the ingredients, food preparation and consumption patterns of the Greek people.

2 To gain an insight into the impact the Greek food culture has had on our own food patterns.

Food is extremely important in Greek culture. Many people in Greece eat a simple diet that has stayed more or less the same since 4000 BCE, based on fresh seasonal produce such as bread, olive oil, vegetables, figs and dairy products. Seafood is an important ingredient on the Greek menu, especially as Greece and the Greek Islands are surrounded by the Mediterranean, Aegean and Ionian Seas.

Figure 10.13 Feta is a key ingredient in a Greek salad. A traditional Greek salad contains cucumber, olives, tomato, red onion, capsicum, oregano and olive oil dressing.

Figure 10.14 Fresh calamari, or squid, before being prepared for cooking

Figure 10.15 Dolmades are delicious herb-flavoured rice rolls covered in grape vine or cabbage leaves.

A very popular 'fast food' meal in Greece is *gyros* – marinated meat (usually pork or chicken) layered on a skewer, pressed together, and turned slowly on a spit. The cooked meat is thinly sliced and served in pita bread with tomatoes, onion and tzatziki (a sauce of yoghurt, cucumber and herbs).

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Figure 10.16 A *gyros* spit with meat being carved off, and the finished *gyros*. In Australia, *gyros* is sometimes referred to as a souvlaki. It is a popular takeaway meal, often served with tzatziki, tomato and red onions.

Common foods

The following are some common Greek foods:

- Breads: pita breads and crusty bread
- Olive oil: many Greek dishes include olive oil, and fresh olives are also very popular. Olive oil is even used in cakes and biscuits.
- Legumes: lentils and chickpeas
- Dairy: yoghurt, feta and hard cheeses made from sheep or goat milk
- Meat: seafood, poultry and lamb, with lamb the most popular meat in Greece
- Fruits and vegetables: vine leaves, eggplant, olives, potatoes, spinach, zucchini, lemons and figs
- Flavourings: oregano, mint, parsley, bay leaves and honey.

Figure 10.17 *Saganaki* is a fried cheese appetiser. The white cheese used in *saganaki* is usually *kefalograviera* or *kefalotyri* cheese made from the milk of sheep or goats.

Figure 10.18 Brown lentils are a common ingredient in Greek food. They are low in fat, high in protein and provide an affordable, nutritious meal.

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GREEK OLIVE OIL CAKE

Serves 6
Main tools and equipment 20cm springform pan, measuring spoons, scales, bowls, spoon, grater, hand beater, juicer
Production skills Beat, fold, sift, whip
Cooking processes Bake

Preparation time 15 minutes
Cooking time 30–35 minutes
Serving and presentation time 5 minutes
Total time 70 minutes

INGREDIENTS

- olive oil spray
- 300 g **00 flour**
- 3 teaspoons baking powder
- Pinch of salt
- 3 eggs at room temperature
- 180 g sugar
- 100 ml olive oil
- 100 ml milk
- Grated zest of 2 lemons
- 3 tablespoons lemon juice
- Icing sugar to dust

00 flour Flour that has been very finely milled

METHOD

1. Preheat oven to 170°C.
2. Grease a 20 cm springform pan bottom and sides with olive oil spray. Line the base with baking paper.
3. In a bowl, sift the flour, baking powder and salt together.
4. In a large bowl, whip the eggs with a hand beater for 3–4 minutes until thick and pale. Add the sugar a little at a time and mix for another 2–3 minutes.
5. Add the olive oil, milk, lemon juice and zest and mix gently, but thoroughly.
6. Add the dry ingredients, folding in until well incorporated.
7. Pour into the prepared tin, smooth the surface, and sprinkle ½ teaspoon of icing sugar evenly over the top.
8. Bake the cake for 30–35 minutes or until a wooden skewer inserted in the middle comes out clean.
9. Remove the cake from the oven and allow to cool for 15 minutes.
10. Remove the cake from the pan and sprinkle with icing sugar to serve.

Tip: The cake will stay fresh for 4 days if wrapped in cling wrap, or it can be frozen for up to 3 months.

EVALUATION

1. What is the olive oil replacing in a regular cake recipe? What is the function of the olive oil in this recipe?
2. Explain why the eggs become thick and creamy when beaten. Air is being added during this process. Why is it important to incorporate air?
3. What is the function of the baking powder in the recipe?

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INVESTIGATE 10.12

Go online and find recipes for the following Greek traditional dips: *taramasalata*, tzatziki, *talatouri*, hummus, tahini, *skordalia*, *tirokafteri*, *melitzanosalata*.
What ingredients do they contain? What common ingredients can be found in many of them? How might these dips be eaten, and when in the day might they be eaten? Arrange a tasting of a few, served with pita bread.

A typical Greek day

The day usually starts with a cup of strong coffee, bread and a small pastry or biscuit. Lunch is usually a bigger meal and is eaten around 1 pm. It is common to eat three to four entree dishes, such as Greek salad, dips, calamari or meatballs. Then it's time for a siesta as everything closes between 3 pm and 5 pm, the hottest part of the day. Dinner is eaten later in the evening, usually around 9 pm. Again, the meal starts with entree dishes and is followed by a main meal, often a grilled meat or seafood dish, and then fresh fruit or a sweet dessert such as baklava.

LEARNING REFLECTION

1 Discuss why seafood and olives are important ingredients in the Greek diet.
2 Describe the influence Greek culture has had on the Australian diet. Why do you think this is the case?

10.6 Italy

LEARNING INTENTIONS

1 To understand the origins of some of our own favourite foods.
2 To gain knowledge in the types of, and preparation methods for, pasta.

Italian foods are popular dishes with most Australians, with many of us often consuming pasta and pizza dishes. Like France, each region in Italy has its own specialties, from the rich and creamy dishes of the north to the hot and spicy foods of the south. Northern Emilia-Romagna has produced the best-known dishes – *Ragu alla bolognese*, lasagne, tortellini – and is also the home of parmesan cheese.

Pasta

In Italian pasta means 'paste', and is a dough made of durum wheat combined with a liquid – usually egg or water. There are lots of varieties of pasta available, with many different shapes and different sauces to serve with them. Pasta is very easy to make at home using a pasta machine.

COLLABORATE 10.13

Share your pasta eating experiences with another class member. What types of pasta have you eaten, and what sorts of sauces have you had with the pasta? Make a list of the different pastas you have both eaten, then share your lists with the class.

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Figure 10.19 Traditional Italian food includes dishes that are well known in Australia such as pizza, gnocchi, and of course coffee and *gelati*.

INVESTIGATE 10.14

Go online and search 'Scientific Psychic Pasta Quiz' to test your knowledge of pasta types.

ACTIVITY 10.15
PERFECT PASTA PRODUCTION

Work in pairs to prepare your own fresh pasta and compare your fresh pasta to a commercial pasta to determine which is best. Investigate five tips for cooking pasta so it is al dente. Produce your own homemade pasta. Time how long it takes you to prepare and produce it.
Purchase a commercial packet of pasta and prepare it according to the instructions provided. Serve both pastas with a plain tomato sauce or Napoli sauce so that you can compare the two pastas fairly. Copy and complete the table below. Answer the questions following to help you compare the two pastas and decide which is best.

	Homemade pasta	Commercial pasta
Time taken to prepare		
Appearance		
Taste (flavour)		
Texture (mouthfeel)		
Aroma (smell)		
Rating out of 5		
Cost of the product		

1 Name which pasta's appearance you preferred. Explain why.
2 Name which pasta, in your opinion, had the best flavour.
3 List the ingredients you used to make your homemade pasta.
4 State the ingredients used to make the commercial pasta as written on the packet.
5 Discuss which pasta is the healthier option. Justify your response.
6 Compare the time taken to prepare both pastas. State which was the most time efficient.
7 Explain which pasta was the cheapest.
8 Identify your overall favourite and explain why.

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DESIGN BRIEF: PASTA SAUCE

Design a cream-based pasta sauce that would complement the homemade pasta you made in Activity 10.15.

Italian meals

A traditional Italian meal consists of many courses. ***Antipasti*** may include meats such as prosciutto and salami, cheeses such as mozzarella, and vegetables such as olives and artichokes.

antipasti The food served at the beginning of an Italian meal; its literal meaning is 'before the meal'

primi The second dish served as the first course of the main meal, literally meaning 'first'

secondi The third dish served as the second course of the main meal, literally meaning 'second'

The second dish is the first course of the main meal and is referred to as ***primi***, which is a pasta or rice dish. The third dish is the second course of the main meal and is referred to as ***secondi***, which contains the protein for the meal – usually chicken, fish, meat or eggs. *Secondi* is served with a side dish of vegetables or a salad often dressed with olive oil and balsamic vinegar. This side dish is called *contorni*. Another important part of the Italian meal is *formaggi* – cheese. A variety of cheeses is often served before dessert. The last course is *dolce*, dessert, which might be tiramisu, cakes, gelati or fresh seasonal fruit. *Molto buono* (very good)!

Figure 10.20 A delicious *antipasti* platter

DESIGN BRIEF: ITALIAN DINNER PARTY

1. Using the information above about Italian meal courses, design an Italian dinner party for two people. Copy the menu map below and use this to help you with planning.
2. Design a copy of the menu for your dinner party.
3. Choose one of your courses to make in your next food production class.

Course	Ideas	Final choice	Justification for choice
Antipasti			
Primi			
Secondi			
Contorni			
Formaggi			
Dolce			

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TIRAMISU

Serves 2
Main tools and equipment Electric beater, large bowl, spatula, serving dish, whisk
Production skills Beat, fold, layer
Cooking processes Chill

Preparation time 40 minutes
Refrigeration time 4–5 hours
Serving and presentation time 10 minutes
Total time (excluding refrigeration) 50 minutes

Skill demonstration: Whipping

INGREDIENTS

- 2 eggs, separated
- 2 tablespoons caster sugar
- 125 g mascarpone cheese
- Pinch of salt
- 250 ml strong coffee
- 100 g sponge finger biscuits
- Cocoa powder or chocolate for grating

METHOD

1. Beat the egg yolks and sugar with an electric beater until the mixture is thick and pale.
2. Add the mascarpone cheese and continue beating until well combined.
3. Using a large bowl, beat the egg whites with salt until stiff peaks form.
4. Gently fold the beaten egg whites into the mascarpone mixture.
5. Lightly brush the biscuits with the coffee 3–4 times or until you get an even colour on the surface. Place one layer of the coffee-coated biscuits on the bottom of a serving dish.
6. Spread a layer of the cheese mixture to cover the surface of the biscuits.
7. Repeat the process of layering the coated biscuits then cheese mixture until all the biscuits have been used. The last layer needs to be the cheese mixture.
8. Cover the tiramisu and refrigerate for a few hours until set, or overnight if possible.
9. Before serving, sprinkle with cocoa powder or freshly grated chocolate.

EVALUATION

1. Describe and justify three considerations when preparing to beat your egg whites.
2. Describe the process of folding. Explain why folding is important in this recipe.
3. Suggest three other ways you could garnish and/or present your tiramisu.
4. Complete a sensory analysis of your tiramisu.

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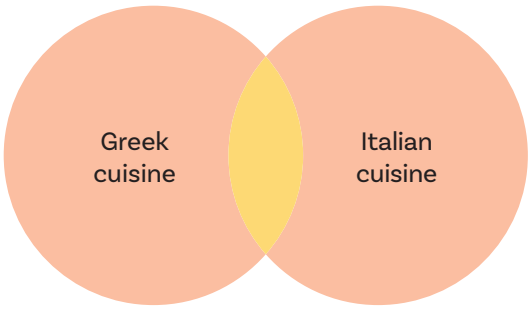
LEARNING REFLECTION



1 Copy and complete the Venn diagram shown to illustrate the similarities and differences between Greek and Italian cuisine. Write the similarities in the centre and the differences in the outside circles.
2 Explain why there are similarities between these two cuisines.
3 Define the term 'al dente'. Outline why this is important when cooking pasta.
4 Describe the influence of Italian culture on the Australian diet. Account for why this is the case.

10.7 Africa

LEARNING INTENTIONS

1 To understand the huge variety of cultures and associated foods when looking at Africa as a continent.
2 To explore the properties and uses of a few of the more common foods that are available that originate in African countries.

Africa's cuisine is extremely diverse due to the 54 different countries and more than 1500 language groups spread across the continent. While African cuisine is becoming more readily available and popular in Australia, you may encounter the food from only a few regions. Like every other cuisine in the world, African cuisine has a variety of interesting ingredients, cooking equipment and traditional foods. A lot of African cooking is done using one saucepan or piece of equipment, such as a tagine. This then creates wonderfully vibrant dishes with many different ingredients mixed into the one main dish.

Figure 10.21 Africa is not one country. It is a continent made up of many countries, each with its own customs, culture and food.

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A dish eaten widely across the continent is a starchy dough-like food, known as *fufu*, *mielie pap*, *ugali* or *sadza* (among many other names), depending on which part of Africa you are in.

Biltong is a popular spiced dried meat product in southern Africa, developed from a need to preserve meat. While *biltong* is occasionally used in dishes, it is commonly eaten as a snack. It is similar to jerky, coming from *ch'arki*, which is a traditional South American Incan dish.

Made from steamed and dried durum wheat, couscous is popular in North Africa. Couscous is served with a stew spooned on top, or mixed with raw tomato, onion and cucumber.

The tagine is an earthenware pot traditionally used for slow cooking meat, chicken or fish and vegetable dishes, which are also named tagine after the pot in which they are cooked.

Figure 10.22 *Fufu* is served here with a beef and tomato stew.

DESIGN BRIEF: USING COUSCOUS

Couscous is a versatile ingredient that can be used as a side for many different dishes. It has a bland flavour, which enables it to be adapted to suit almost any cuisine. It is also extremely quick to make, especially the very fine couscous; it only requires soaking in boiling water for several minutes.

You have run out of rice, which you usually serve with your ratatouille and crumbed chicken tenderloins, and are in a hurry to get dinner served, so you don't have time to go to the shops to buy more. You have couscous in the pantry. Design a couscous side dish to accompany your meal. The flavourings should complement the flavours in the rest of the dish. The recipe following will help you design your dish. You can also use the preserved lemons from the recipe made in Chapter 9.

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PRESERVED LEMON, MINT AND PARSLEY COUSCOUS

Serves 1
Main tools and equipment Knife, measuring spoons, measuring jug, kettle, small bowl, fork
Production skills Chop, drain
Cooking processes Boil

Preparation time 5 minutes
Cooking time 5–7 minutes
Serving and presentation time 2 minutes
Total time 12–14 minutes

INGREDIENTS

- ¼ cup instant couscous grains
- ¼ of a small preserved lemon, drained and chopped finely
- 2 tablespoons parsley, chopped finely
- 2 tablespoons mint, chopped finely
- ¼ cup boiling water
- 1 teaspoon butter

METHOD

1. Place dry couscous, preserved lemon and butter into a small heatproof bowl.
2. Boil the water in the kettle. Measure out ¼ cup of boiled water and stir into the couscous.
3. Allow to stand for 2–3 minutes, then add the parsley and mint, and fluff the couscous up with a fork.
4. Serve immediately.

EVALUATION

1. Outline the safety strategies you used while making this dish.
2. What is the purpose of the butter?
3. Evaluate the flavour profile of this dish. What might this couscous recipe complement? What other foods might you add with it to make a complete meal?

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TASTY TRIVIA

It is common in Ethiopia for people to eat without utensils. Food is served on top of *injera*, which is a spongy fermented bread made from teff flour. The bread collects the juices and is used to scoop the food up for eating.

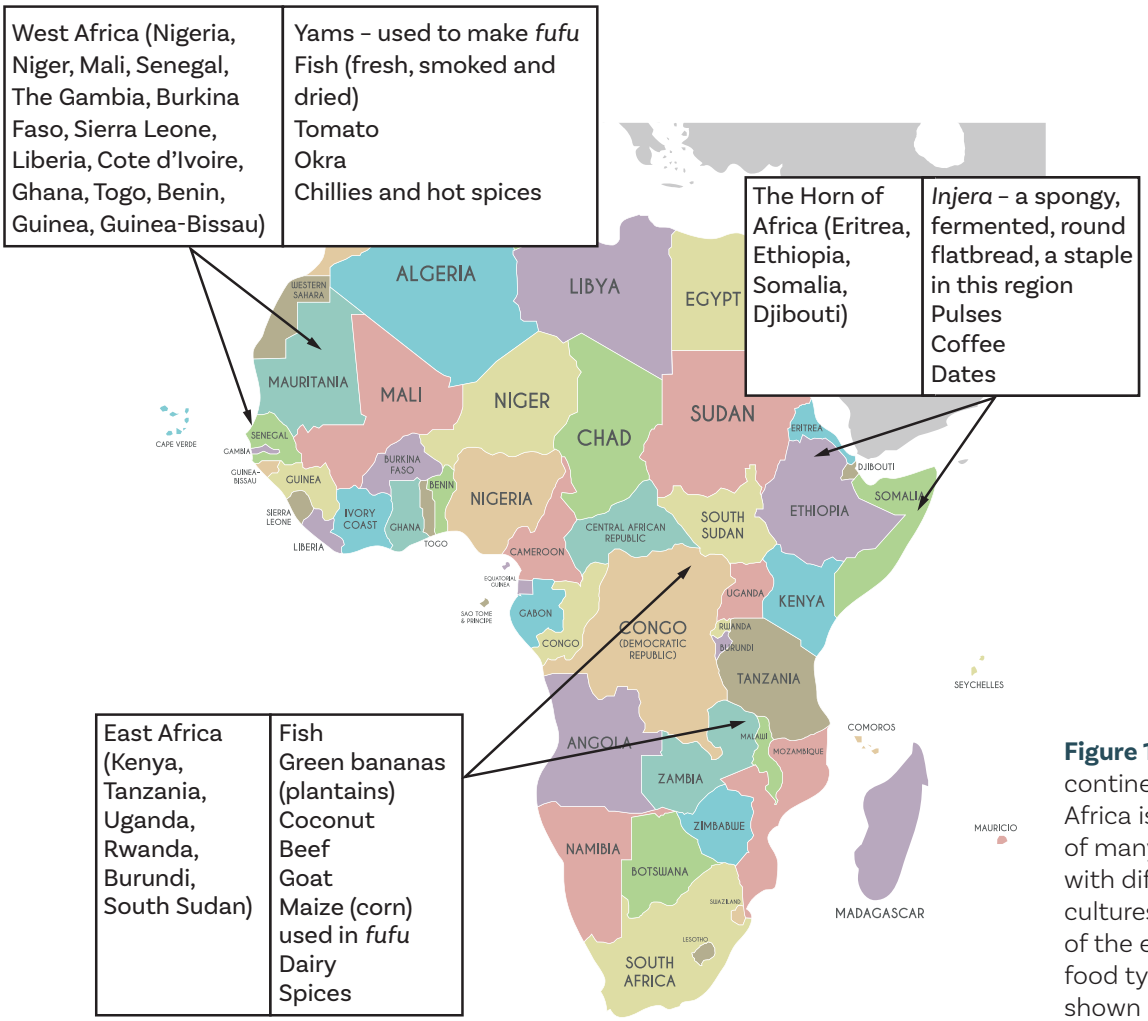

Figure 10.23 The continent of Africa is made up of many nations with different food cultures. Only a few of the extensive food types are shown here.

Figure 10.24 A tagine is a traditional earthenware pot originating in Northern Africa. It has a shallow earthenware base with a tall conical lid.

FISH TAGINE

Serves 2
Main tools and equipment Measuring spoons, measuring jug, stick blender, small bowl, saucepan
Production skills Slice, crush, marinate
Cooking processes Fry, simmer, boil

Preparation time 20 minutes
Cooking time 40 minutes
Serving and presentation time 5 minutes
Total time 65 minutes

INGREDIENTS

CHERMOULA AND FISH

- 2 teaspoons olive oil
- 1 clove garlic, crushed
- 1 teaspoon ground cumin
- ½ teaspoon paprika
- Handful chopped coriander
- Good pinch of salt
- Juice and zest of ½ lemon
- 1 large fillet of firm white fish, or 2 small pieces of fish

TAGINE

- 2 teaspoons olive oil
- ½ large onion, sliced thinly
- 1 clove garlic, crushed
- ½ teaspoon ground cumin
- ½ teaspoon paprika
- ½ 400g can chopped tomatoes
- 125 ml fish or chicken stock
- 25 g pitted olives
- 1 green capsicum, seeded and sliced
- 125 g baby new potatoes, halved

METHOD

1. To make the chermoula: place the olive oil, garlic, cumin, paprika, three-quarters of the coriander and the salt in a small bowl. Add the lemon juice and using a stick blender, blend until smooth.
2. Halve the fish fillet and place in the bowl, rub the chermoula into the flesh of the fish. Set aside to marinate.
3. Heat the olive oil in a medium saucepan and fry the onions until translucent. Add the garlic. Cook for 4–5 minutes on low heat. Add the cumin and paprika and cook, stirring, for 1 minute or until fragrant. Add the tomatoes, stock, olives and lemon zest. Stir in any chermoula that is not sticking to the fish and simmer uncovered for 5–7 minutes.
4. Stir in the capsicum and potatoes, cover and simmer for 15 minutes until the potatoes are tender. Small quantities of water may need to be added to prevent sticking.
5. Stir in the remaining coriander, arrange the fish fillets on top of the sauce and cook covered for 4–6 minutes until the fish is just cooked.
6. Serve with flat bread, like *injera*.

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INVESTIGATE 10.16

Go online and complete research on the traditional Ethiopian fermented bread '*injera*', which is often used to scoop up stews. Research a recipe for *injera* and produce it to serve with your fish tagine.

LEARNING REFLECTION

1 Discuss why, traditionally, most African countries have a version of *fufu*.
2 Explain the importance of *injera* bread in Ethiopia.
3 Africa is a diverse continent. Outline some of the similarities in ingredients throughout the region.
4 The tagine is a popular piece of cooking equipment in Northern Africa, especially Morocco. Explain what a tagine is and outline the food ingredients commonly used.

10.8 India

LEARNING INTENTIONS

1 To develop an understanding of the contribution India has made to Australia's cuisine.
2 To gain an insight into the cultural influences on Indian cuisine.

Asian countries are our close neighbours and have introduced fresh and flavoursome foods into our daily culinary life. Australians have learned about new and exciting ingredients like rice noodles, soy sauce, lemongrass and kaffir lime leaves, all of which can now be found in a large number of local supermarkets.

India has been called the 'spice bowl of the world', and the key to Indian food is the aromatic spices that create wonderful flavours and aromas. Each region in India has its own style of flavours and cooking. The north is known for cooking using a clay oven called a **tandoor**, creating foods such as tandoori, korma and meat-based dishes, while the south is known for its spicy vegetarian dishes.

tandoor An Indian clay oven that is able to cook food at a high temperature

Figure 10.25 A traditional clay oven from northern India known as a *tandoor*, shown here with a man cooking naan breads. They are stuck to the sides of the hot *tandoor* until they bubble and brown. They are then cooked and taken out.

India has the world's second largest population after China, and more than half the people of India are vegetarian. Many do not eat meat due to their religious beliefs, while others cannot afford to buy meat or fish. The cow is considered sacred by Hindus, so eating beef is forbidden. Lentils, legumes and rice are staple food sources for Indians, and many Indian curries are vegetarian.

An Indian meal

An Indian meal is commonly made up of several dishes with contrasting savoury, sweet and spicy flavours, with different colours and textures. There is often a meat dish (especially in northern India), *dhal*, a vegetable dish, rice, *raita* and maybe a fresh mango or lime chutney and a bread such as *chapati* or naan. The food is served in small metal bowls on a tray called a *thali*. All parts of the meal, including the accompaniments, are served together. Food traditionally is eaten with the right hand from the *thali*. Flat breads are commonly eaten with Indian meals.

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Figure 10.26 Naan

Figure 10.27 Roti

Figure 10.28 *Chapati*

Common foods

Common Indian foods include the following:

- Breads: *chapati*, naan, *paratha* and roti
- Legumes: lentils and beans
- Dairy: yoghurt
- Meat: some lamb, chicken, goat and fish
- Common fruits and vegetables: onion, okra, eggplant, tomatoes, mangoes, bananas and papayas
- Rice: basmati rice is the staple grain in India
- Flavourings: curry blends.

TASTY TRIVIA

India is the world's biggest producer and consumer of mangoes. The mango is officially India's national fruit.

Creating curry

The term 'curry' is not a word used by Indians. The term probably came from the Indian word for 'sauce', *kari*. Each dish has a name according to the ingredients used in it, which is why there is such a wide variety of Indian curries. The key to successful Indian cooking is in the blending of the herbs and spices used for cooking as well as the cooking of the spice mix to mellow or enhance the flavours included in the curry.

Indian curries are based around a number of different herbs and spices, with different combinations creating different flavours and dishes. Most contain a number of spices, including turmeric, coriander, cumin, cardamom, cinnamon, garam masala, cloves, curry leaves, mustard seeds, black pepper, fenugreek and chilli.

ACTIVITY 10.17
CURRY VARIETIES

1. Take a trip to a supermarket or visit an online supermarket store and check out all the different Indian curry blends. Look at the labels and list the ingredients used in each blend.
2. Divide your class into groups and prepare a curry using each variety of curry blend, making sure the same recipe and protein source is used for all curries. The only difference between each group should be the curry used.
3. Complete a sensory analysis of each curry prepared by the class. Which curry did you like best? Why?

DESIGN BRIEF: BOLLYWOOD MOVIE PREMIERE

India has the world's largest film industry. You have been asked to prepare a small product that could be served during a Bollywood movie premiere being held at the local Gold Class Cinema. The dish can either be vegetarian or contain meat. It must have at least five ingredients in it and reflect Indian culture. It needs to be able to be eaten with the fingers. You might like to include the following korma paste in your recipe.

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RECIPE

KORMA PASTE

Makes ¼ cup of paste
Main tools and equipment Frying pan, mortar and pestle or food processor, airtight container
Production skills Fry, roast

Preparation time 20 minutes
Cooking time 2 minutes
Preservation time 3 days

INGREDIENTS

- 2 teaspoons cumin seeds
- 2 tablespoons coriander seeds
- ½ teaspoon ground turmeric
- 2 tablespoons garam masala
- 1 teaspoon red chilli powder
- 1 tablespoon oil
- 3 cloves garlic
- 5 cm piece fresh ginger, chopped
- 1 tablespoon tomato paste
- 2 tablespoons desiccated coconut
- 2 tablespoons cashews, soaked in water for 10 minutes
- 2 tablespoons chopped coriander leaves

METHOD

1. Place the cumin and coriander seeds in a frying pan over low heat. Roast, stirring constantly, for 2 minutes or until slightly brown. Remove from heat and cool completely.
2. Transfer to a mortar and pestle or a high-powered food processor. Add turmeric powder, garam masala, red chilli powder, garlic, ginger, tomato paste, desiccated coconut, cashews, oil and coriander leaves. Grind or process to a smooth paste.
3. Store in an airtight container for up to three days in the refrigerator.

LEARNING REFLECTION

1. More than half of India's population is vegetarian. Discuss why this is so.
2. Explain why India is often referred to as the 'spice bowl of the world'.
3. Outline the impact Indian cuisine has had on our own food culture.

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10.9 Thailand

LEARNING INTENTIONS

1 To learn the five basic flavours found in authentic Thai foods and develop skills in recognising and using them.

2 To gain an insight into the importance food plays in Thai culture and daily life.

Thai food is a gastronomic delight for the senses. The vibrant and distinctive colours and flavours of Thai food have made this cuisine incredibly popular in Australian culture. Authentic Thai cuisine is based around five flavours: bitter, salty, sour, spicy and sweet. These flavours are blended and balanced in each meal. Plenty of fresh vegetables and salads are featured in this cuisine, with small amounts of fish, meat or poultry.

COLLABORATE 10.18

As a class, review the recipe for Thai red curry on page 296. Try to identify which of the ingredients provide the bitter, salty, sour, spicy and sweet flavours typical of Thai cooking.

TASTY TRIVIA

The word 'Thai' means 'free'. Thailand is the only South-East Asian country that has never been colonised by European powers.

Important ingredients

Important ingredients in Thai cooking include the following:

- Rice is the staple food item in Thai cooking. Rice or rice noodles are a component of every meal, including breakfast, usually boiled or steamed.
- Coconut milk is a very important ingredient in Thai cooking. It is the liquid component of most curries, and is also used in many desserts, such as coconut jelly.
- Lemongrass is used in many soups, curries, stir-fries, salads and marinades. It has an intense lemon flavour with a hint of ginger, but without the acidity of lemons. Lemongrass needs to be bruised before use to release its flavour.
- Kaffir limes look like regular limes, only with an extremely bumpy surface. Yet, unlike everyday limes, the fruit and juice are not eaten; only the rind and leaves are used for their flavour. A strong lemon flavour is released when the leaves are torn and used in soups or curries.
- Galangal is a member of the ginger family and like ginger, is a root, but its flavour is sharper. It has a citrusy, almost piney flavour, which is slightly peppery.
- Chillies not only provide the spicy flavour of Thai foods, but also add colour and are often used to garnish a meal.
- Tropical fruits are commonly used. The warmer temperatures of Thailand give it the perfect climate for growing fruits such as coconuts, pineapples, bananas, watermelon, guava, custard apples and lychees.

The heart of all Thai curries is the curry paste, which is made from fresh herbs and spices. This paste is then cooked in coconut milk to release the flavours before the meat or vegetables are added. Because they are based on fresh ingredients, Thai curries are light and refreshing, with a distinctive colour – quite different from Indian curries.

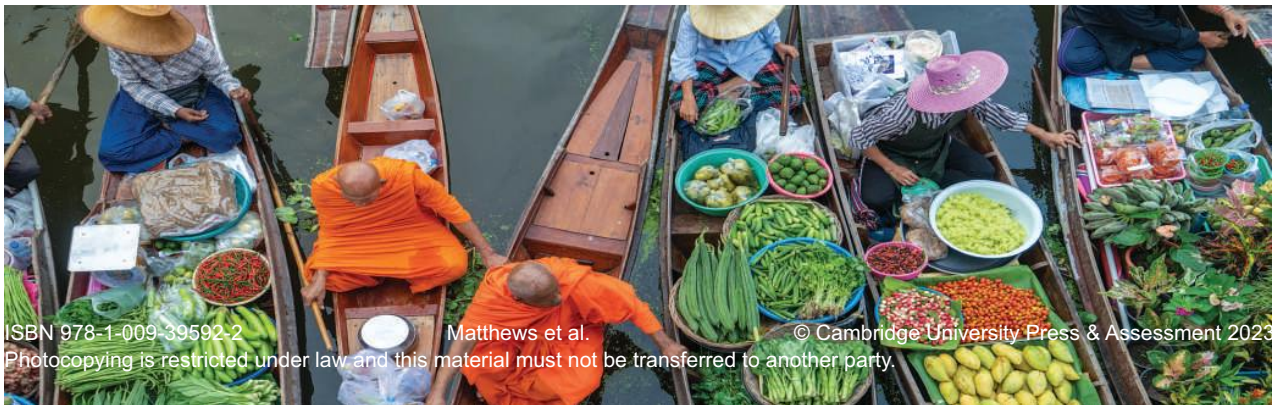



Figure 10.29 Kaffir limes and lime leaves, lemongrass and galangal are often the core of many Thai curries.

ACTIVITY 10.19
MAKE YOUR OWN COCONUT MILK

The liquid inside the coconut is fresh coconut water. This has become a popular drink in Australia. The juice from the pressed flesh of the coconut is the milk.

Fresh coconut milk

1. Purée the grated flesh of a mature coconut.
2. Strain, squeezing all of the liquid from the flesh.

Dried coconut milk

1. Add two cups of desiccated coconut with one cup of hot water.
2. Strain, squeezing all of the liquid from the coconut.
3. Chill and use within two days or freeze.

You may like to compare your homemade coconut milk with commercial coconut milk.

Street vendors

There are many street food vendors in Thailand, selling all types of foods, including noodles, satays and fruit. Stallholders start work around 4 am, preparing breakfast items: soup, fresh fruit, coffee and curry with steamed rice. At lunchtime there's a selection of many different curries to choose from, served with rice.

The food is bought and eaten in the street or taken home or to work for consumption later in the day. The lunch rush is usually over by 2 pm and the stalls are cleaned up and packed away so the vendors can go to the markets and purchase the ingredients needed for tomorrow's meals. In tourist areas, stalls stay open much later, providing snack and dinner items for hungry tourists.

Figure 10.30 Street vendors in Thailand are common.

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DESIGN BRIEF: DESIGN YOUR OWN CURRY

Curry is a popular style of meal throughout Asia, and many Asian countries have their own style of curry using local, fresh ingredients, like the Thai red curry recipe.

INVESTIGATE

1 Develop your own design brief based around designing your own curry theme, and include the constraints and considerations listed:
   - **a** It has to be prepared from scratch using at least four fresh ingredients (no prepared commercial pastes allowed).
   - **b** It should include the use of a mortar and pestle.
   - **c** It should have one source of protein and at least three vegetables.
   - **d** It must include an accompaniment.
   - **e** It needs to be made within your normal production class.
   - **f** It must include a garnish.
   - **g** It needs to serve one to two people.
2 Write four criteria for success questions based on the brief you have written.
3 Investigate the different types of curries available. List possible flavour combinations you could use in your curry.

GENERATE

1 Design and develop your own curry paste.
2 Generate different ideas for the final presentation of your curry and what accompaniments, if any, you will serve.

PLAN AND MANAGE

1 Prepare a food order for your curry.
2 Prepare a work plan for your curry.

PRODUCE

Prepare and produce your curry in class.

EVALUATE

1 Thai foods are based around five flavours. If you made a Thai-style curry, list these flavours, and then link each element with the appropriate ingredient in this recipe.
2 Indian curries are based around spice blends. If you made an Indian-style curry, list the herbs you used and describe how you created your spice blend.
3 Describe the appearance, aroma, taste and texture of your curry.
4 Answer the criteria for success questions you set at the beginning of this design process.
5 Explain why you need to fry your curry paste or blend before adding your other ingredients.
6 Rate your curry paste out of 5, with a score of 5 being outstanding.
7 Were the flavours balanced; that is, were any of the flavours too strong? Explain your answer.
8 Suggest any improvements you would make to your curry if you were to make this again. Comment on your planning, production and final product solution.
9 Explain what you found most difficult when completing this task.

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RECIPE

VEGETARIAN THAI RED CURRY

Serves 2
Main tools and equipment Knife, measuring spoons and jug, saucepan
Production skills Slice, crush, chop, grate, peel, season, stir
Cooking processes Simmer

Preparation time 10 minutes
Cooking time 30 minutes
Serving and presentation time 5 minutes
Total time 45 minutes

INGREDIENTS

- 2 teaspoons coconut oil
- ½ small white onion, chopped finely
- Pinch of salt
- 2 teaspoons grated fresh ginger
- 1 clove garlic, crushed
- ½ red capsicum, sliced
- ½ green capsicum, sliced
- 2 small carrots, peeled and sliced diagonally
- 1 tablespoon Thai red curry paste
- ½ 400g can coconut milk (you can make your own, see Activity 10.19)
- ¼ cup water
- ¾ cup tightly packed, thinly sliced kale
- ¾ teaspoon raw sugar
- 2 teaspoons fish sauce or soy sauce
- 1 teaspoon rice vinegar or lime juice
- Fresh coriander leaves, chopped (optional, to serve)
- Fresh red chilli, sliced (optional, to serve)
- Sriracha sauce (optional, to serve)

METHOD

1. In a medium saucepan, heat the oil, add the onion and cook until the onion starts to go translucent. Add the salt. Add ginger and garlic, cook for 30 seconds, stirring constantly.
2. Add the capsicum and carrots, cook until the capsicum is fork tender, 3–5 minutes, stirring occasionally. Add the curry paste and cook, stirring constantly for 2 minutes.
3. Add the coconut milk, water, kale and sugar. Stir and bring the pot to a simmer. Cook until the capsicum and carrots are cooked to your liking, about 5–10 minutes.
4. Remove from the heat and season with fish/soy sauce and vinegar or lime juice to taste. Add more soy or fish sauce if extra saltiness is needed or more vinegar if extra acidity is needed.
5. Serve with coriander leaves, sliced red chilli and sriracha sauce on the side.

LEARNING REFLECTION

1. Identify the staple ingredients in Thai cuisine and explain why these are used in Thai foods.
2. Identify the five major flavour profiles that are present in a Thai curry. Provide an example of one ingredient that provides that flavour profile.
3. Explain why there are so many street vendors in Thailand.

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10.10 Vietnam

LEARNING INTENTION

1 To develop an awareness of Vietnamese cooking and how it has influenced our own cuisine.

Vietnam is part of the Asia–Pacific region and a popular travel destination for Australians. Many Vietnamese people also immigrated to Australia after the Vietnam War, and brought their traditional ingredients, recipes and cultural practices with them, contributing to our multicultural society today.

Figure 10.31 Australia's cuisine has been influenced by our close proximity to the rich and varied food cultures of Asia, and the many diverse migrants bringing their customs and foods with them to Australia.

ACTIVITY 10.20
FINDING OUT ABOUT VIETNAMESE CUISINE

Complete an extended investigation researching Vietnam. In your investigation, include the following information:

- common ingredients – include pictures, descriptions and uses
- cooking methods used
- cultural influences
- five interesting facts
- one traditional recipe.

See the recipe for a Vietnamese-style noodle soup, based on the traditional dish, *phở*. It uses purchased stock as the broth.

EXTENSION

To improve the sensory properties of the finished product, you may like to find a recipe to make an authentic *phở* broth.

LEARNING REFLECTION

1 Summarise the impact of Vietnamese cooking on our own food culture.

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EASY *PHỞ*-STYLE NOODLE SOUP

Serves 1
Main tools and equipment Knife, measuring cup, spoons, saucepan, deep serving bowl
Production skills Slice
Cooking processes Boil, simmer, fry

Preparation time 20 minutes
Cooking time 15 minutes
Serving and presentation time 5 minutes
Total time 40 minutes

INGREDIENTS

NOODLE SOUP

- 50 g dried rice stick noodles
- 30 g beef tenderloin, very thinly sliced (freeze for 30 minutes before cutting, to enable finer slices)
- 30 g firm tofu, sliced thinly
- 2 teaspoons peanut oil
- 400 ml of high-quality liquid beef stock

TOPPINGS

- 1 handful beansprouts
- 3–5 sprigs of Vietnamese mint or Thai basil
- 3–5 sprigs of fresh coriander
- 2 lime wedges
- ¼ finely sliced red chilli
- Hoisin sauce
- Sriracha

METHOD

1. Prepare the rice stick noodles following the instructions on the pack.
2. Place the pre-prepared rice stick noodles into the serving dish.
3. Arrange the finely sliced beef tenderloin in a single layer on top of the noodles.
4. Fry the firm tofu in a little oil in a frying pan until lightly golden on the outside. Arrange the tofu in the serving bowl alongside the beef.
5. Warm the stock in a saucepan to boiling point. Spoon immediately over the noodles, beef and tofu mixture. The hot broth will cook the raw beef.
6. Serve with the toppings on the side. Traditional Vietnamese *phở* is served this way, and diners help themselves to toppings as they eat the soup.

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Review

1 The enormous variety of foods available in Australia today is due largely to the country's multicultural nature and the demand for traditional ingredients and foods from the wide variety of ethnic groups living here.
2 Up until World War II, Australia's food selection was typically influenced by British eating traditions and habits.
3 After World War II, there was an influx of migrants from different parts of the world, rather than just the United Kingdom, and this is reflected in our immigration patterns today.
4 Australian cuisine began with the many Aboriginal and Torres Strait Islander peoples, and has been influenced by migration from Pasifika, European, Asian, African and Middle Eastern countries, with their diverse cultures.

Test your knowledge

Multiple-choice

1 Foods hunted by Aboriginal and Torres Strait Islander peoples as a protein source include:
   a kangaroo, crocodile, sheep and possum.
   b emu, eels, goanna and yabbies.
   c fish, crocodile, snake and honey ants.
   d goanna, finger limes, fish and witchetty grubs.
2 Authentic Thai cuisine is blended and balanced for each meal around how many flavours?
   a Six – bitter, sour, sweet, umami, salty and spicy
   b Two – sweet and sour
   c Five – bitter, salty, sour, spicy and sweet
   d Four – sour, sweet, spicy and salty

True or false?

1 *Foie gras* is a staple French food product.
2 All countries in Africa have a carbohydrate food item typically served with each meal.
3 One of the many breads traditionally eaten in India is *injera*.

Short-answer

1 List all the different cuisines that are available in your local area. Describe the positive effects that these multicultural dishes have had on Australia and in your area. If your local area does not have different cuisines, suggest reasons why this may be so.
2 Paperbark is often used by Aboriginal and Torres Strait Islander peoples as a cooking vessel, and it is becoming more widely used in restaurants to wrap food in and give it a unique flavour. Undertake research to find out where it can be purchased, how it should be prepared before using and provide some examples of foods that can be cooked in paperbark. Explain the heat transfer used in this form of cooking.
3 What is your own cultural heritage or background? Describe the common foods that may have been eaten by your ancestors 80–100 years ago. How have they changed since then? Explain reasons for these changes.

Extended-response

Pre-prepared and semi-prepared meals have become very popular for busy working households. You have been asked to design a 'taste of the world' plan for one week of evening meals that a company will prepare and sell. The meal plan is to be healthy, quick and easy and is to serve two people. You must include one meat-free meal in your weekly plan. It is important that you reflect different cultures from around the world as it is intended that this be used during Multicultural Week. All meals must include a short recipe card with the following information:
Name of meal:
Country of origin:
Ingredients:
Cooking time:
Nutrition information panel:

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CHAPTER 11
Foods for special purposes

BEFORE WE BEGIN

1 Discuss how your family influences the foods that you eat.
2 Outline cultures and religions that have specific food rules and customs.
3 Describe how where you live impacts your food choices.
4 Describe the difference between an allergy and an intolerance.
5 Describe the impact on a coeliac of consuming gluten.
6 Name the most common food allergy.

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11.1 What factors influence the food choices of a young person?

LEARNING INTENTION

1 To understand that there are many influencing factors that shape food choices.

internal factors Factors that influence food choices of people, for example, family and culture

external factors Factors that influence food choices that are outside a person, for example, advertising and the media

peer group A social group of people who are equal in terms of age

ethics The science of how we should live or attempt to live. Behaviours and decisions that reflect right or wrong.

Choosing food for good health is often difficult. Think about the food that you have eaten today. Were you really hungry when you ate? Who prepared the food you ate? Did you really have any control over what you ate?

There are a large number of **internal** and **external** factors that influence the food choices of a young person. Our family, culture background, religion and beliefs, friends or **peer group**, our **ethics**, the properties of food and the way we are feeling (our emotional state) all have an influence over the foods that we choose to eat.

Social, ethical and **cultural factors** also play a major role in the foods that we eat.

social factors Factors influencing food choice that are related to the interaction of people

cultural factors The beliefs, customs and practices of a particular group of people that influence food choice

Figure 11.1 Your choice in foods is likely to be affected by your peer group.

Figure 11.2 Your family will play a significant role in choosing the foods you eat.

COLLABORATE 11.1

With a partner, discuss what foods you ate on one weekday and one weekend day. What foods did you eat? Where did you eat them? Who chose these foods, or were the foods made for you? Did you eat out? Were there any cultural influences on the foods you ate; for example, were there any foods that originated in other countries? Make a list of all the factors that influence your food intake. Share your list with the rest of the class.

LEARNING REFLECTION

1 For each of the following factors that influence the foods we eat, provide an example of a food that you or your family eats because of this influence. If you don't feel you are influenced by one or more factors, explain why.
internal factors, external factors, peer group, ethics

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11.2 Social influences

LEARNING INTENTIONS

1 To understand the role the family plays in forming food intake patterns.
2 To understand the role that peers play in forming food intake patterns.

family A group of people related by birth, partnerships or adoption. Family can also be a non-biologically related group of people chosen to mutually provide ongoing social support.

lifespan The length of time that a person can be expected to live and the stages through which they will progress, for example, infancy and adolescence

Some activities that we share with our family and friends involve food and eating. These two groups of people therefore play an important role in introducing us to new foods as well as in shaping our food opinions and preferences.

Family

Our **family** has a major influence on the foods that we choose to eat. Throughout our **lifespan** it is mainly our family who influence our food skills and knowledge. They have a major impact on our nutritional knowledge and therefore our food consumption.

Our food preferences (likes and dislikes) and willingness to try new foods are in part the result of family influences, as are the foods that are available to us. A family who is willing to try new foods and expose children to a wide variety of foods, particularly fresh fruits and vegetables, will encourage that child to be more adventurous with food, because their parents are adventurous and willing to give things a go. Furthermore, if a family doesn't like a food prepared one way, but they are willing to try it in another recipe or in another form and then find they like it, they are modelling to a child that if you don't like something, try again.

Until school age, what a child eats is almost exclusively controlled by their family. It is not until the child goes to school that they have some choice over what they eat. If the child has not learned to try new tastes, textures, aromas and appearances of food by this time, it is likely that this resistance will persist.

Of course, every person has genuine likes and dislikes. Some of these are genetic (for example, some people's intense dislike of bitterness or coriander), but the palate changes as a person ages and their experiences change perceptions.




Figure 11.3 Foods prepared in different ways can change a person's perception of them.

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COLLABORATE 11.2

Discuss with your class examples of food you don't like. Many likes and dislikes of food can be traced back to certain events or circumstances that occurred when first trying it. The food may have caused illness or the person may have been ill when trying it for the first time, and they subconsciously link that food with being sick. Can you think of any links that relate to you?

Family meal patterns also influence the foods we choose to eat. Research suggests that those people who sit down to the table to eat a meal together as a family are more likely to eat foods that are healthier. It also shows that families whose members do not sit at the table and eat together are more likely to eat foods higher in saturated fat and often not prepared with fresh ingredients.

COLLABORATE 11.3

As a class, identify the barriers to a family sitting down together to share a meal. Design a tweet that could be posted to encourage families to share at least one meal together each week.

ACTIVITY 11.4
FAMILY MEALS

1 Conduct a quick survey of your classmates. Find out the number of people who usually:
   - **a** sit at the dinner table as a family to eat their dinner
   - **b** sit on the couch to eat their dinner
   - **c** eat breakfast at the table with another person
   - **d** do not eat breakfast at all
   - **e** eat fast foods on the run.
2 Explain how breakfast is consumed in your family. Describe how this compares with the rest of your class.
3 Describe three factors that influence your eating habits at home.
4 Explain the reasons why you think people talk to each other more if they sit at the table to eat.
5 Outline the family values that can be reinforced when family members are eating meals at a table.
6 If you sit at the table, food is often eaten more slowly. Suggest why you think this is so. Explain why you think this is better for our digestive systems.
7 Discuss reasons why families are eating together less than they did in the past.

DESIGN BRIEF: MAKING PLEASANT OF THE UNPLEASANT

Your class has been hired by the Asparagus Farmers Group to help them increase sales of their product. Asparagus has a bad name, and many people won't try it because it is said that people can smell a particular way when they eat it. They want to produce a recipe book that features asparagus. Your class's task is to provide 10 recipes which have been tried and tested using asparagus. Each recipe needs to serve four people. The recipes can be for any meal, but one of them must be for a picnic, one for an entrée and one for a side dish to a main course.

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Figure 11.4 Families have different patterns of eating their meals.

ACTIVITY 11.5
OUR AUSTRALIAN FOOD AND CULTURE

Research the meal patterns of Aboriginal and Torres Strait Islander peoples living in traditional ways.
Develop a picture collage of 10 different foods often consumed.
Compare these with those of non-Indigenous Australian families such as those of European, Asian, African or Middle Eastern descent. Remember that when we compare, we should discuss both similarities and differences.

Social influences, such as the daily lives of our families, also have a major impact on the foods that we eat. Often, our parents have to go to work, and this influences the time they have available to prepare meals.

Our cooking skills, food and nutritional knowledge are a result of what we have learned from our family members. Grandparents or the elders of the family often pass their cooking skills on to their children and grandchildren.

COLLABORATE 11.6

Talk with a classmate about who is important in your family when it comes to teaching food skills. Describe what you have learned from your family about cooking and food choices.
Are there any cultural impacts such as Sauce or Sugo Day? This is an annual event in many Italian families, with members spending the day together making tomato sauce for the rest of the year. Are there any special or secret recipes in your family? Do you have celebrations or days based on cooking? Share your story with the class.

Figure 11.5 All children learn how to obtain and cook food from their families and community.

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ACTIVITY 11.7
SHARING FAMILY SECRETS!

1 Ask your family members about special family recipes, cooking secrets or signature dishes. Prepare a food order and time plan for your production.
2 Produce your special family dish at school. Invite family members to school and make it a social celebration of food sharing.

Peers

Peers are one of the major social influences on our food choices after the family. Peer influence is an indirect influence – this is where we learn from our peers' behaviours and often copy or model their behaviours subconsciously. The same is true when it comes to food choices. Peers can have a negative impact on food choices. Consider what happens when several young people visit the school canteen or go to the shops together – it is likely that they will copy each other's behaviour and choose the same or similar foods to eat. These foods are often poor food choices in terms of their nutritional content.

Figure 11.6 How do *your* friends influence the food you eat?

Peers can also have a positive influence on food choices. The social support provided by our peers can have a beneficial effect on food choices and on healthy dietary change. Social support provided by peers in terms of healthy food choices can mean that we have a sense of group belonging – it is like a 'we are all in this together' feeling.

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ACTIVITY 11.8
EVALUATE YOUR FOOD CONSUMPTION

Most meals these days are still eaten inside the home, although an increasing proportion of meals are now eaten outside it.

1 Think about your food consumption over the past two weeks. Copy and complete the table below to make a list of the times food was consumed inside the home or outside the home in another social setting.

Foods/meals consumed inside the home	Foods/meals consumed outside the home

2 In what social settings outside the home did you consume food with your family? Discuss how the food consumed inside and outside your home with family was different.

3 Discuss the foods that you ate when you were with your friends. Evaluate the nutritional value of these foods using the Australian Guide to Healthy Eating.

4 Analyse how the place or venue where you consumed food affected your choice of food. Explain your findings.

5 Discuss the types of foods that were available to be eaten at home. Do you consider these to be healthy food choices? Explain your response.

6 List the types of foods that were available to be eaten outside the home. Do you consider these to be healthy food choices? Explain your response.

Figure 11.7 There are both healthy and unhealthy options for foods eaten outside the home. What factors might impact on whether a person chooses unhealthy options while out of the home?

LEARNING REFLECTION

1 Explain the difference between internal and external influences on food choices. Provide examples to support your explanation.

2 Explain by using examples how a family can form a child's food preferences by exposing a child to a food, modelling food eating habits and repeating exposure to foods.

3 Suggest ways that a family could increase the times that it eats meals together.

4 Outline how peers can influence each other's food intake patterns.

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11.3 Cultural influences

LEARNING INTENTIONS

1 To understand the meaning of the term 'culture'.
2 To understand the impact of Australia's multicultural population on the increasing availability of international foods and ingredients.
3 To develop an insight into the customs of other religions and how these impact on food intake patterns.
4 To develop a deeper understanding of the role played by food in the lives of Aboriginal and Torres Strait Islander peoples.

exclusion Preventing someone from eating a certain food

Cultural influences come from different ethnic groups and can have a huge influence on people's food choices. Culture can influence the types of foods consumed, it can provide different traditional methods of food preparation and can lead to restrictions placed on the consumption of certain foods, such as the **exclusion** of meat and/or milk from the diet.

Culture has also influenced the breadth of foods available to Australians. Migrants to Australia have brought with them many different food products and ingredients, methods of cooking and other food knowledge. This knowledge and these products have now become part of our everyday Australian food culture.

If you walk through a supermarket today, you will probably find that there are aisles of food items from many different cultures. They may have sections on their shelves dedicated to imported or specialised foods from particular countries or regions.

TASTY TRIVIA

When people move to a new country, they may adopt particular food habits of the local culture, but research shows that the food people cook at home is the last to change. Australia truly has a multicultural food culture.



Figure 11.8 A person's culture is often reflected in some of the traditions followed by their families and cultural groups. The three kings cake is associated in many countries with Epiphany and traditionally eaten on 6 January. *Kulich* is a traditional Easter bread in the Orthodox Christian faith and is accompanied with painted eggs and willow branches. *Gulab jamun* is a popular Indian and South Asian dessert often eaten at festivals and celebrations.

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Figure 11.9 Australia has become so multicultural that we easily recognise foods that were unheard of in Australia 50 years ago.

DESIGN BRIEF: REDESIGNING THE AUSTRALIAN BARBECUE

Barbecues are popular in countries where there is good summer weather, like Australia. The best barbecue meats must cook quickly and be tasty to eat.

You want to celebrate the contribution that other food cultures have made to Australian cuisine by having an Aussie barbecue with a difference, one that represents barbecue foods from different countries.

Investigate barbecue foods from at least three different countries, for example, Greece, Italy and Fiji. One example of a barbecue dish from Greece is souvlaki. Traditionally, it is served with pork or lamb, onion and tomatoes or red capsicum. Name three other salad vegetables with which it could be served. Suggest a different sauce or flavouring with which the souvlaki could be served.

Write three criteria for success from the brief.

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GREEK-STYLE SOUVLAKI

Serves 2
Main tools and equipment Knife, grater, bowl, measuring spoons, measuring cup, skewers
Production skills Dice, grate, marinate
Cooking processes Grill

Preparation time 40 minutes
Cooking time 8 minutes
Serving and presentation time 5 minutes
Total time 53 minutes

INGREDIENTS

LAMB

- 250 g lamb, cut into cubes
- ½ tablespoon olive oil
- 2 tablespoons lemon juice
- 1 teaspoon finely grated lemon zest
- ¼ teaspoon dried oregano
- 1 clove of garlic, crushed
- ½ bay leaf
- ¼ teaspoon black pepper
- 2 pita bread rounds

GARLIC YOGHURT

- ¼ cup Greek-style, plain yoghurt
- 1 clove of garlic, crushed

METHOD

1. Place the cubed lamb into a small bowl.
2. Add the olive oil, lemon juice and lemon zest, oregano, garlic, bay leaf and black pepper.
3. Toss to coat the lamb. Place aside for 10 minutes.
4. Place the yoghurt and crushed garlic into a bowl and mix well.
5. Drain the lamb and pat dry.
6. Thread the lamb onto four skewers and cook under the grill for 5 minutes.
7. Turn and cook for a further 3 minutes.
8. Place the souvlaki into the warmed pita bread and serve with the garlic yoghurt.

EVALUATION

1. Evaluate the Greek-style souvlaki using the criteria for success you wrote.
2. Critically evaluate and analyse your own level of skill when producing the Greek souvlaki.
3. Analyse the sensory properties of your final product. Ensure you answer in full sentences.
4. Research other vegetables that traditionally would be served with souvlaki.
5. Design a grilled souvlaki that could be served to a vegetarian.

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Religion and personal beliefs

Religion and food are often closely related. Individuals and religious communities have sets of beliefs or opinions regarding food and food consumption. It is these personal beliefs or values by which a person lives that can influence their food choices.

Each religion has evolved with a set of rituals or customs that are important to the members of that religion and often include food customs.

Food plays a number of different roles in religion. For some people, food is considered a way by which the individual can communicate with their god. Food is also a way to demonstrate faith through acceptance of requirements concerning the consumption of certain foods. It could also be a way of developing discipline or faith through fasting.

For some religions, dietary restrictions can influence food choice, preparation and consumption. Dietary restrictions associated with religion may include foods that can and cannot be eaten; foods that can be eaten at certain times of the year or day; how food should be prepared; and when and how long to fast.

We all have our own personal beliefs about food, which for some are influenced by religion. Sometimes food is just about fun and enjoyment – many people get pleasure out of the experiences that they have when eating a particular food. At other times, the foods that are eaten are significantly influenced by religious or cultural beliefs. For example, people belonging to the Hare Krishna movement eat a vegetarian diet.

ACTIVITY 11.9
THE ROLE OF FOOD IN A RELIGION

You are to develop a deeper understanding of the role food plays in one of the religions that are practised in Australia. Choose from Christianity, Judaism, Islam, Buddhism, Hinduism or another religion agreed between you and your teacher.

1. Describe at least one religious festival or custom the religion may observe in a year.
2. Find one food-related custom that is practised by this religion.
   - **a** Describe the background of the custom; that is, what is being celebrated.
   - **b** Explain how food is linked to this custom. Explain why these foods are linked.
3. Are there any foods that are forbidden or limited by this religion? Explain the reasons.
4. Are there any special food preparation techniques that are practised by this religion? Describe what they are and why they occur.
5. Explain why food is an excellent way to help us understand other religions and cultures.

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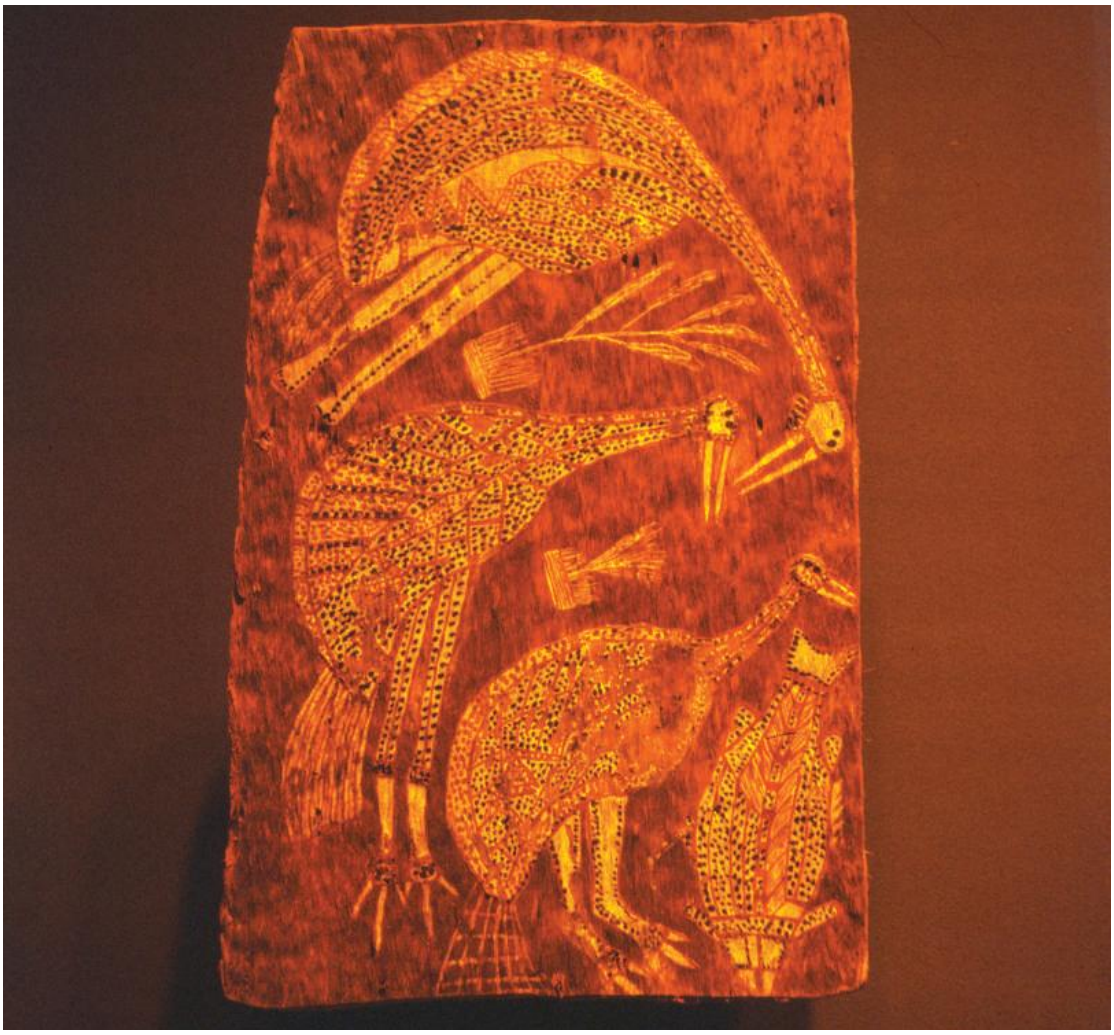

Figure 11.10 A totem, such as the emus shown in this dot painting, should not be eaten.

Aboriginal and Torres Strait Islander peoples

Aboriginal and Torres Strait Islander peoples' traditional beliefs and cultural practices vary according to region, although all groups do share in a common worldview that the land, sea and other natural beings possess living souls. The collection of stories of these powerful beings and the knowledge represented in these stories shape First Nations' cultures and influence traditional food choices.

totem An ancestral being represented by a natural object, plant or animal, as the spiritual emblem of a person, family or Country

The Dreaming is the English-language term for the spiritual beliefs of Aboriginal and Torres Strait Islander peoples. A person's **totem** has an influence over their food choices and other behaviours. It also carries a responsibility to care for the totem and its environment. Many people forbid an individual from eating their totem animal and others need permission to catch another person's totem on their land. A person might have several totems, representing their Nation, Clan and family group, as well as their personal totem.

LEARNING REFLECTION

1. Suggest reasons why eating patterns and cooking methods are one of the last changes a person makes when they move to another country.
2. Explain the differences and similarities between culture and religion.
3. Explain the importance of the totem in the food choices of Australian First Nations peoples.

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11.4 Influence of ethics

LEARNING INTENTIONS

1 To be able to describe the different types of vegetarian diets and reasons for eating a vegetarian diet.
2 To be able to use the Australian Guide to Healthy Eating to plan a balanced food plan for a vegetarian.

Another set of eating patterns based on strongly held beliefs is vegetarianism. It is thought that Christian groups led the initial vegetarian movement in Western culture. Members believed that Christ's teachings of mercy should be extended to animals as well as to people. They also believed that a vegetarian diet was healthier than one based on meat and that Christians had a duty to maintain good health in order to do God's work.

degradation Environmental deterioration through depletion of resources, pollution, destruction of ecosystems and extinction of species

Today, vegetarians hold many varied ethical and personal beliefs. Individuals become vegetarians for many different reasons, such as an awareness of the importance of diet in maintaining health, an interest in Eastern philosophy and religion, or ethical concerns about killing or mistreating animals or the **degradation** of the environment.

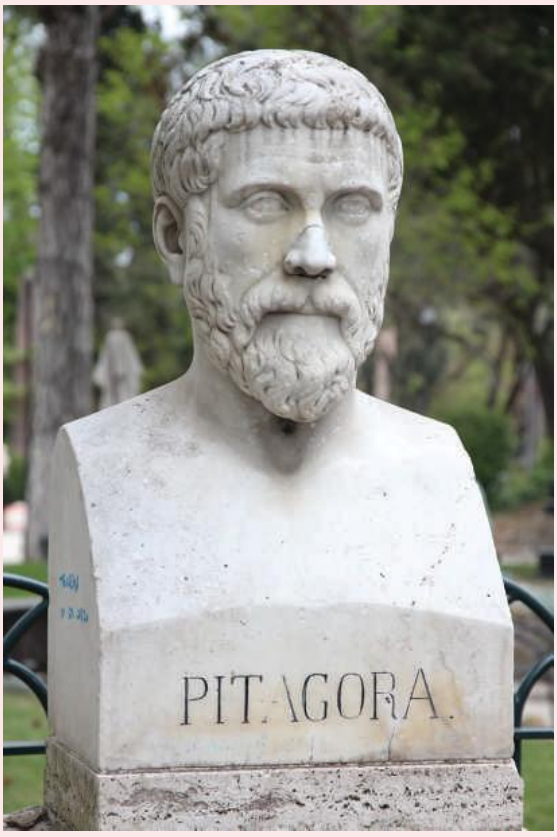
Some people who call themselves vegetarians are actually semi-vegetarians. They may have eliminated red meat because they dislike the taste or for health reasons, but they may still choose to eat fish and/or poultry. Others may choose to eat dairy products and/or eggs.

INVESTIGATE 11.10

Go online to find the meaning of the following words: ovo-vegetarian, lacto-vegetarian, lacto-ovo vegetarian, pescatarian, vegan, flexitarian.
For each type of vegetarian, design a packed lunch that would meet their dietary needs by using the Australian Guide to Healthy Eating. Make sure there are foods from each of the five food groups in each planned meal.
You could make this lunch in a class and share your ideas with the rest of the class.

TASTY TRIVIA

The Greek mathematician Pythagoras was a vegetarian – in fact, vegetarians were called Pythagoreans up until the 1800s. He may have been inspired by the ancient mystical teachings of India.



LEARNING REFLECTION

1 Outline the reasons why a person might choose to become vegetarian.
2 Compare and contrast veganism with ovo-vegetarianism.
3 Design a day's meals for a vegan that includes adequate amounts of protein and calcium.

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VEGAN SANDWICH: FALAFEL AND PEAR

Makes 1
Main tools and equipment Knife, chopping board, serving plate, butter knife
Production skills Slice, spread

Preparation time 10 minutes
Serving and presentation time 5 minutes
Total time 15 minutes

INGREDIENTS

- 3 falafels, halved
- 1 small firm pear, sliced
- 2 slices of soft wholemeal bread
- 3 tablespoons hummus
- A handful of mixed salad leaves
- 3 slices of cucumber
- 1 tablespoon mango chutney

METHOD

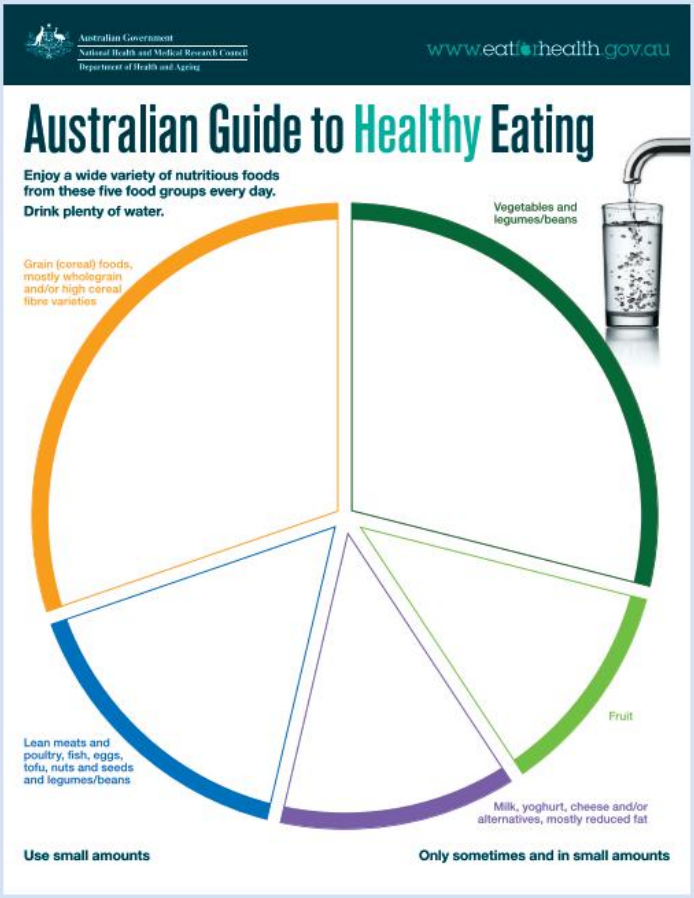
1. Cut the falafels in half and slice the pear thinly.
2. Spread both slices of bread with hummus.
3. Cover the bottom slice of bread with salad leaves, cucumber, falafel and pear slices.
4. Spread the mango chutney onto the other slice of bread on top of the hummus.
5. Place the mango chutney coated slice of bread on top of the salad. Cut sandwich in half and serve.

EXTENSION

Students could make their own falafel to use in this recipe.

EVALUATION

1. Complete a sensory evaluation of your sandwich. What would you do to improve the sensory properties of the sandwich if you were to make it again?
2. Copy and complete the following diagram of the Australian Guide to Healthy Eating, placing the ingredients in your sandwich in the relevant spaces. Does this sandwich meet the needs as listed on the Australian Guide to Healthy Eating? What should you do to improve the nutritional quality of the meal?
3. Using the Australian Guide to Healthy Eating as the basis for a nutritional meal, plan the food intake for a vegan for the rest of the day.



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11.5 Influence of sustainability concerns

LEARNING INTENTIONS

1. To understand the impact of sustainability issues on food production and consumption.
2. To explain the impact of location on the foods people consume.
3. To understand the term 'seasonal foods' and how this relates to environmental sustainability.
4. To understand how animal welfare issues and ethics have changed the production and consumption patterns of some people.

Consumers are demanding more and more of farmers – they have to produce more food and do so faster while simultaneously reducing the size of their environmental footprint and also ensuring that they can support their own families financially.

Access to foods

Food access can affect your food choices in a number of ways. Availability of food may be due to what is in season; the takeaway food shops near where you live; your nearest supermarket or other food services such as baker or butcher; and your ability to access these food resources because of lack of transport options or mobility issues. Some people may also live in a remote area and ready access is therefore limited.

People who live in **rural** or **remote** areas may have a greater access to the fresh foods that are produced in their area, but conversely may not have ready access to other fresh foods as it can be difficult and costly to deliver these food products to food stores in these areas. In some cases, fresh nutritious foods may not be available to purchase, or are so expensive they become treat foods. Only processed and/or packaged foods, which are often energy-dense, easy to transport, require no refrigeration or freezing and have a long shelf-life, are available at a reasonable price.

rural Describes an area determined by a population size of 25 000 to 99 000 people (large rural) or 10 000 to 24 000 people (small rural)

remote Describes an area determined by a population size of fewer than 5000 people

COLLABORATE 11.11

Have a class discussion to discover if anyone has visited central Australia. Talk about the price of foods there, and the extent of food availability in central Australia. Discuss why the cost of a can of soft drink is similar in Coober Pedy to one bought in Adelaide, but the price of a carrot is significantly more expensive in Coober Pedy.

Figure 11.11 This small remote rural town is unlikely to have the same range of foods available as there would be in a larger community.

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Seasonal foods

There are a number of food items that are **seasonal**. These include fruits, vegetables and some meats like lamb and veal. Understanding when certain foods are in season can assist in meal planning and help to keep food costs down. Foods that are out of season always cost more. Why do you think this might be the case? Season also impacts food choice, as there are times of the year when you may not be able to consume your favourite fruit and will need to find an alternative product.

seasonal Describes a type of food that is at its best or in abundance at a certain time of the year, determined by the weather

Figure 11.12 Rapid travel means almost anywhere in the world is accessible, but makes it seem smaller.

Globalisation and effective transportation have reduced the influence of season in the supermarket. You can purchase most foods all year round, thanks to their importation and transportation from wherever they are in season. Transporting food around the world does have an impact on our environment, particularly the amounts of carbon pollution created through air, road and sea transport.

globalisation The connectedness of the world

The distance that food travels from where it is produced to where it is consumed is known as food miles. Foods that are out of season and available to consumers may have travelled great distances to be available. However, in other circumstances, some foods can only be grown in another location and must be transported for production and purchase. So, importing this product might be best for the environment rather than utilising scarce resources, such as water, or adding chemicals to the soil to modify the environment to enable the food to grow.

INVESTIGATE 11.12

Go online to find a Food Miles calculator, which can give an indication of the distance a food item might travel. For example, an orange may travel from Florida in the United States to Australia. This calculator can work out the approximate number of miles (kilometres) the orange has travelled between the capital city of each country. It also estimates how much CO_2 or carbon this transport will emit into the atmosphere.

1. What role does the release of carbon have in environmental concerns?
2. Why is it important to consider food miles when purchasing foods if you want to support a sustainable future?
3. How might you use this calculator to reduce your own food miles?

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COLLABORATE 11.13

Have a class discussion around what foods are not able to be grown in Australia. Why can't they be grown? Should we still import these products? Justify your answer. The image below may start off the discussion.

Figure 11.13 Coffee beans are imported from many different countries and have travelled a long way to get to your local coffee shop.

ACTIVITY 11.14
WHAT'S IN SEASON?

1. Find 10 different food items that are available for each season: summer, autumn, winter and spring. You must include a variety of products, not all from the same food group. You could use the following websites to help you:
   - Market Fresh
   - Meat and Livestock Australia
   - Sydney Fish Market.
2. Produce a poster, podcast or comic strip that illustrates each of the seasons and include information on what is fresh and available at that time of year.
3. Design a meal that promotes one of your seasonal ingredients as the hero.

Figure 11.14 A collection of summer fruits and vegetables

Figure 11.15 A collection of winter fruits and vegetables

DESIGN BRIEF: USING FOOD IN SEASON

You are off to a friend's house for dinner and need to bring dessert. Your friend loves fruit so you were thinking maybe a cherry pie or crumble, but when you get to the supermarket you realise that they are too expensive, and you can't afford to buy the amount you need with the money you have. Realising that your budget is limited, reflect on the current season, and design a fruit pie or crumble dish that can be made cheaply with ingredients grown in Australia – even locally, if possible – to use in your dessert.

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ACTIVITY 11.15
INTERVIEW WITH AN OLDER PERSON

Conduct an interview with an adult who is aged 60 years or older. Ask them the following questions, writing your answers down as you go, or alternatively recording their responses:

1. Name your favourite foods when you were an adolescent.
2. Explain what foods were a special treat for you and why.
3. How often did you eat takeaway foods and what were they?
4. Explain how food availability affected what you were eating.
5. Could you purchase food items such as cherries or lamb all year round? Explain why.
6. Can you remember any new and exciting foods that became available when you were a teenager? What were they?

Write a concluding paragraph that summarises the information you have learned and that compares food consumption then with food consumption now.

Animal welfare

The treatment of animals in farming and food production is an ethical food issue and is another factor that may influence a person's food choice. There has been significant publicity about the treatment of hens in egg production, for example, and concern about how animals are treated in high-density farming situations.

Yet there are many other animal welfare considerations, such as the use of growth hormones, steroids and antibiotics.

INVESTIGATE 11.16

Go online to answer the following questions about a chosen animal welfare issue.

1. Explain why this is an ethical issue.
2. Outline the reasons for this farming practice. Think of positive and negative reasons.
3. Discuss the reasons why the farming practice should change.
4. Describe the impact of this issue on food production.
5. Present your findings to your class.

Figure 11.16 Egg production using battery hens has received negative publicity, leading to an increase in free-range egg production and sales.

Figure 11.17 There are some animal treatment concerns with high-intensity farming methods such as in feedlots.

LEARNING REFLECTION

1. Describe how where you live impacts on the types of foods you eat.
2. Identify what foods are in season now.
3. Explain what ethics are.

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11.6 Food allergies and intolerances

LEARNING INTENTIONS

1 To define and give examples of and explain the difference between food allergies and food intolerances.

2 To recognise the importance of consuming a diet that avoids foods that can cause allergic and intolerance reactions and know how to plan meals that support these conditions.

food allergy An abnormal immune response to a specific part of a food, usually a protein

allergen A substance that triggers an allergic reaction

anaphylaxis An extreme allergic reaction to a food product in which the airways are impacted

Other internal influences on our food choices include food allergies and intolerances. A **food allergy** is an abnormal immune response to a specific part of a food, usually a protein. Food allergies can be fatal and are a serious issue for many Australians. The **allergen** causes the immune system to produce antibodies to fight against this substance. Symptoms are generally severe and appear very quickly after consumption. A sudden or severe reaction is known as **anaphylaxis** and requires urgent medical attention.

There are many foods that can cause a food allergy. The most common are:

- peanuts and other nuts – the most common allergen for children and adolescents
- eggs

Figure 11.18 Because of the high incidence of food-driven allergic reactions, strict labelling laws have been introduced to warn consumers that a product may contain allergens.

- shellfish
- sesame
- soy.

The high incidence of allergies has resulted in very strict labelling laws. All food products must declare allergens clearly on food labels if they are contained in the product. These include gluten, nuts, fish and shellfish eggs, milk, soybeans, sesame seeds, sulphides, royal jelly and any products made from these known allergen ingredients.

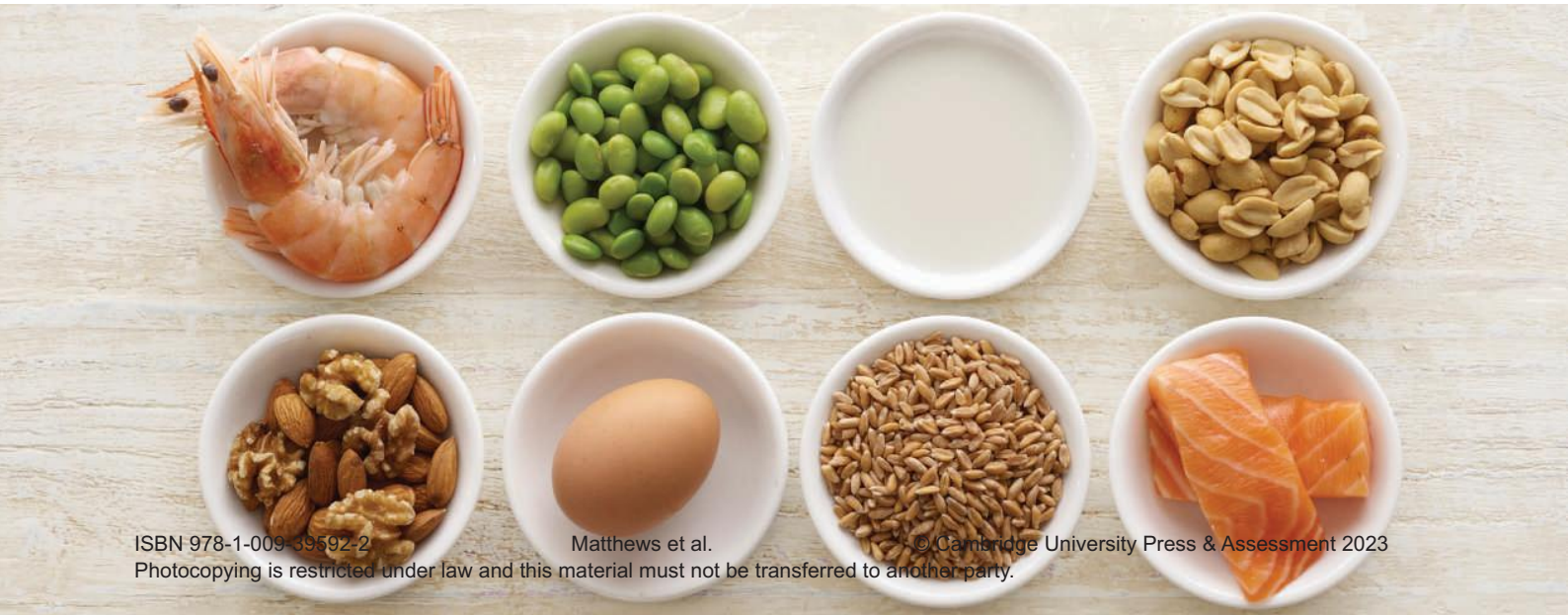

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Figure 11.19 Common food allergens: soy products, tree nuts and peanuts, eggs, shellfish and sesame seeds

ACTIVITY 11.17
UNDERSTANDING ALLERGIES

Working in teams of three, investigate one of the following food allergens: peanut, shellfish, fish, egg, soy, sesame, nut or another that you have negotiated with your teacher.

Your team is to produce an interactive presentation that includes information about:

- the allergen chosen
- signs and symptoms of an allergic response
- food products to avoid
- support groups and websites available for people with this particular condition
- a suitable meal that could be served for dinner.

Each member of the team is to take on one of the following roles to help ensure there is an equal share of the research and presentation between group members:

- time manager – monitors the team's use of time to ensure everyone stays on task
- recorder – writes down ideas as they are discussed
- summariser – asks questions to clarify the team's thinking and ensures that everyone in the team has the same understanding of what is being discussed.

At the conclusion of this task, complete the following tasks to reflect on your participation in this activity.

1. Summarise what you learned about the food allergen you studied.
2. Discuss how effectively you communicated with your team members. Reflect on how well you listened as well as talked.
3. Describe the strengths of your contribution to the group.
4. Explain the areas you need to focus on improving for next time you work collaboratively.
5. State what you found hardest about working collaboratively and explain your response.

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food intolerance A chemical reaction to eating a specific food or drink, due to improper digestion of food, which accumulates and causes inflammation

Food intolerances are more common than food allergies; they occur when the body has a chemical reaction to eating a particular food or drink, but not an immune response as with food allergies. Food intolerances occur when food is unable to be properly digested and the accumulation of food causes a physical response. These reactions are not usually life-threatening, and symptoms can occur directly after eating or up to 24–48 hours later. This often makes it difficult for people to determine what they are intolerant of. The easiest way to treat food intolerance is to eliminate the particular food from the diet. The most common foods that cause sensitivities are gluten and lactose.

LEARNING REFLECTION

1 Define the terms 'food allergy' and 'food intolerance'. Explain how they are different and how they are similar.
2 Why is it important for a person with an allergy to avoid foods which contain that allergen?

11.7 Coeliac disease

LEARNING INTENTIONS

1 To be able to understand the terms 'coeliac disease' and 'lactose intolerance' and how they both impact on the health of a person.
2 To recognise the signs and symptoms of coeliac disease and gluten intolerance.
3 To become experienced in planning meals that are suitable for a coeliac and someone who is gluten intolerant.

coeliac disease A disease of the small intestine that results in permanent intolerance to gluten

gluten A mixture of two different types of protein found in cereal grains

Coeliac disease is a disease of the small intestine that results in permanent intolerance to gluten. **Gluten** is the protein found in many cereal products. Coeliac disease affects approximately one in 100 people, but, surprisingly, four out of five people with this condition do not realise they are affected. Either they put up with the symptoms instead of seeking medical attention, which could give them a formal diagnosis to explain their problems, or they are asymptomatic, which means they do not have any digestive symptoms, even though the disease is affecting their bodies in other ways.

Figure 11.20 Gluten is found in many different foods and can make some people very unwell.

INVESTIGATE 11.18

Go online to investigate which cereals contain gluten, and which ones do not. Copy and complete this table to summarise your findings.

Cereals that contain gluten	Cereals that do not contain gluten

Visit an online supermarket website and search the range of gluten-free processed foods that are available.

The only treatment for coeliac disease is a gluten-free diet, as even the smallest amount of gluten can be enough for people to suffer the symptoms of the disease. The long-term effects of going undiagnosed, or not ensuring a gluten-free diet, include bowel damage, anaemia and osteoporosis because the gluten protein causes damage to the lining of the intestine (the villi), preventing the absorption of nutrients.

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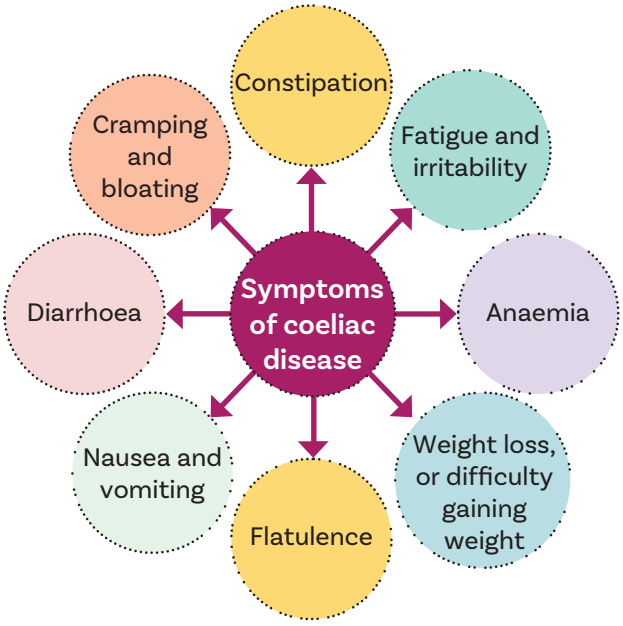

Figure 11.21 Those suffering from coeliac disease may experience one or more of these digestive symptoms, or they may have none.

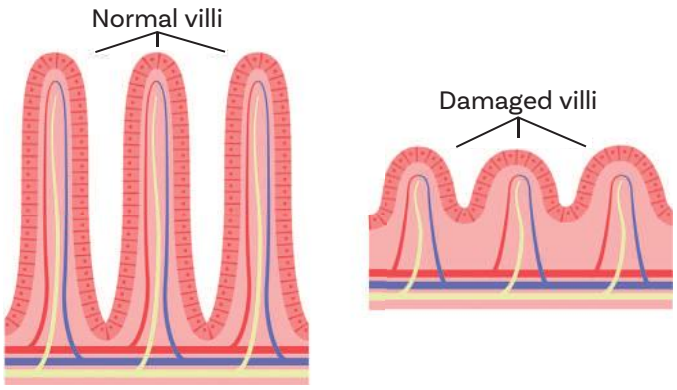

Figure 11.22 This image illustrates what happens to the normal villi (left-hand side) if a coeliac consumes gluten, where the villi become damaged (right-hand side), significantly reducing the surface area of the gut. If gluten is removed from the diet, the villi will return to normal. The gluten-free diet, however, needs to be maintained for life.

TASTY TRIVIA

Gluten-free cooking is not always as simple as swapping ingredients containing gluten to ingredients without, as many gluten-free flours behave differently in baking from flours containing gluten (such as wheat flour). This is due to the functional properties of gluten in food products.

DESIGN BRIEF: COELIAC LUNCH PARTY

Coeliacs are typically unable to consume many traditional lunch and party foods. Pastries, sandwiches, quiche, cakes and biscuits usually contain flour, so unless this flour is substituted with another ingredient or flour type that is gluten free, these products are off the menu.

Your best friend is coming over for lunch this weekend and you know they are coeliac. You need to design a lunch or party item, sweet or savoury, suitable for your friend that you can serve at your lunch party.

INVESTIGATE

1 Investigate gluten-free food or food ingredient substitutes.
2 Research food suitable to be served at your lunch party.

GENERATE

1 Generate a list of possible food solutions.
2 Justify your final choice and explain why it is a suitable choice.

PLAN AND MANAGE

1 Complete a food order for your production.
2 Prepare a production plan and include safety and hygiene considerations.

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RECIPE

GLUTEN-FREE LEMON AND PASSIONFRUIT BISCUITS

Makes 25
Main tools and equipment Scales, grater, measuring spoons, sifter, bowl, wooden spoon, baking tray, baking paper, hand beater
Production skills Cream, stir, mix, roll, spread
Cooking processes Bake

Preparation time 20 minutes
Cooking time 15–18 minutes
Serving and presentation time 15 minutes
Total time 50–53 minutes

INGREDIENTS

BISCUIT

- 150 g margarine
- 2 teaspoons finely grated lemon zest
- ⅔ cup pure icing sugar, sifted (must be pure)
- ½ cup fine polenta
- 1¼ cups gluten-free flour, sifted

ICING

- ½ cup pure icing sugar, extra, sifted
- Pulp of ½ passionfruit
- ½ teaspoon water

METHOD

1. Preheat the oven to 180°C, or 160°C if you have a fan-forced oven. Cover the baking tray with a piece of baking paper, set aside.
2. To make the biscuits: cream margarine, lemon zest and ⅔ cup icing sugar with a hand beater until creamy. Stir in polenta and flour. Mix to a soft dough.
3. Take generous teaspoons of the mixture and roll into balls. Place onto the biscuit tray and flatten slightly.
4. Bake for 15–18 minutes until lightly golden brown. Cool on a wire rack.
5. To make the icing: mix the passionfruit pulp and water into ½ cup icing sugar. Stir until it is a soft, dropping consistency.
6. Spread the icing onto each biscuit and allow it to set undisturbed.

EVALUATION

1. Complete a sensory evaluation of your product.
2. Explain how you have met the requirements of the brief.
3. Identify which ingredients you substituted in your recipe to make it suitable for a coeliac.
4. Describe how not containing gluten may have affected the finished product.
5. If you were to make this product again, what changes would you make?

LEARNING REFLECTION

1. What triggers an intolerance response in a person with coeliac disease?
2. What are the long-term effects of untreated coeliac disease?

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11.8 Lactose intolerance

LEARNING INTENTIONS

1. To understand the term 'lactose intolerance', including its signs and symptoms.
2. To understand the physiological reasons why a person may be lactose intolerant.
3. To evaluate the sensory properties of lactose-free milks through testing.

lactose intolerant Unable to digest lactose (milk sugar) found in milk and cheese

Lactose intolerance occurs because the body lacks sufficient amounts of the enzyme lactase to digest lactose, the sugar found in milk and milk products. Normally the body breaks down lactose into simpler components (glucose and galactose) with the help of this enzyme.

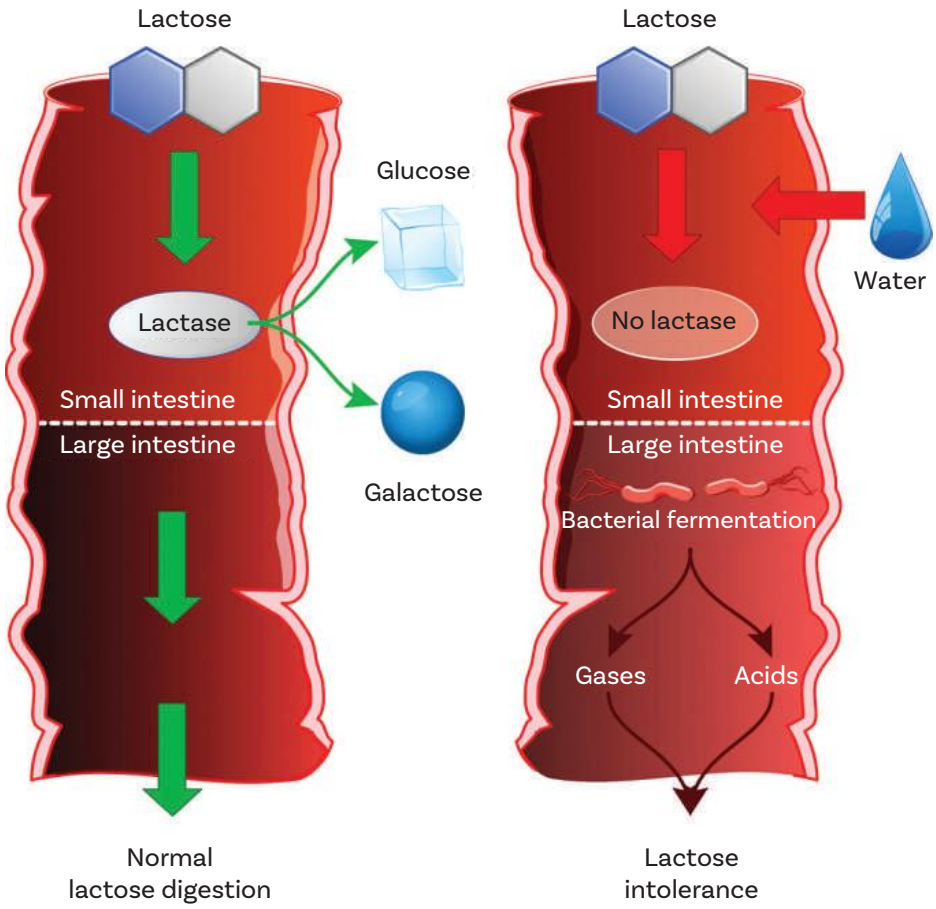

Figure 11.23 In a person whose body produces lactase (the enzyme that breaks down lactose), lactose is broken down and absorbed into the bloodstream before it gets to the large intestine. In a person who cannot break down the lactose, their body tries to dilute the sugar by adding water (causing diarrhoea), causing bacteria in the large intestine to feast on the lactose and produce gas (causing bloating) and acid (causing pain and cramping).

TASTY TRIVIA

The majority of people who are lactose intolerant have backgrounds from Asian, Middle Eastern, Aboriginal and Torres Strait Islander or Mediterranean cultures.

Figure 11.24 Non-dairy products are lactose free, as is dairy milk that has had the lactose converted to glucose and galactose by the addition of the enzyme lactase.

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Symptoms of lactose intolerance

People can have varying degrees of lactose intolerance. Many people who are lactose intolerant can consume a level of lactose with minimal symptoms, but most should avoid drinking milk. Cheese contains virtually no lactose, so it can be well tolerated, and yoghurt is generally well digested due to the natural level of bacterial cultures. Many dairy and milk substitutes that do not contain lactose are available, which are suitable for people suffering from lactose intolerance.

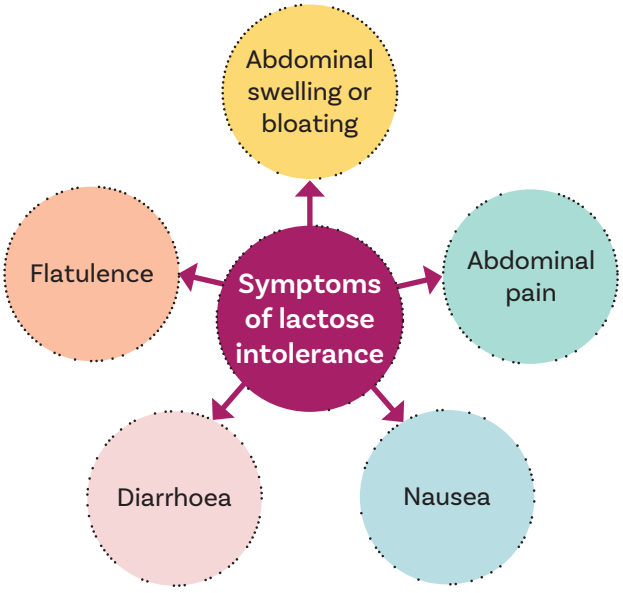

Figure 11.25 Those with lactose intolerance may experience one or more of these symptoms.

ACTIVITY 11.19
LACTOSE FREE: IS THERE A DIFFERENCE?

For this activity, you will need samples of soy milk, lactose-free milk, rice milk and cow's milk. Copy and complete the table below and fill it in as you taste each milk. You will need to read the labels to collect all the information required, and to answer the questions that follow.

Type of milk	Appearance	Taste	Aroma	Texture	Ingredients	Rating out of 5
Cow's milk						
Lactose-free milk						
Soy milk						
Rice milk						

1. Name the milk you drink at home (it may not be on this list).
2. Identify which of these milks you have tasted before today. Do you think having these milks before may have altered your perception of them? Explain.
3. State which milk sample you liked the most. Explain your choice.
4. State which milk sample you liked the least. Explain your choice.
5. Was there a difference between the tastes of the milks? Explain your answer.
6. Was there a texture/mouthfeel difference between the milks? Explain your answer.
7. List the ingredients that were common to all the milks.
8. Identify which ingredient/s in the cow's milk are not in the other milk samples.
9. Describe who the target markets are for each of the different milks.

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Figure 11.26 Lactose can be hidden in many common processed foods.

Hidden lactose: foods to avoid

Lactose can be hidden in foods, and people with lactose intolerance should read the food labels – looking for milk solids, whey, milk sugar and non-fat milk solids listed as ingredients – before eating any of the following foods:

- some breakfast cereals
- creamy soups
- custard
- scrambled eggs
- pancakes
- muesli bars
- chocolate.

ACTIVITY 11.20
COMPARING FOODS WITH AND WITHOUT LACTOSE

Working in groups of four you will be making a simple custard recipe using custard powder, with each member using one of four different milks: regular milk, lactose-free milk, soy milk and almond milk. Follow the directions on the custard powder pack to make the custards.

1. Complete a detailed sensory analysis of each custard.
2. State which custard sample you liked the most and which you liked the least. Explain your choice using sensory analysis language.
3. Write a short paragraph explaining what impact using lactose-free milks had on the finished custards.

COLLABORATE 11.21

Working with a friend and using the Australian Guide to Healthy Eating as a tool, evaluate what might be the nutritional consequences of not consuming many dairy products. Discuss what other products should be included in the diet to ensure they consume adequate quantities of the important nutrients.

LEARNING REFLECTION

1. Define the terms 'food allergy' and 'food intolerance'.
2. List the ingredients that need to be avoided by coeliacs and provide three alternatives.
3. Describe the nutritional considerations for coeliacs if they do continue to consume gluten.
4. Lactose-free milks are becoming popular food products. Suggest why people other than those who are lactose intolerant might be purchasing these.
5. Discuss how Australian food law has responded to the high incidence of food allergies to ensure a safe food supply for consumers.

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Review

1 There are a number of factors that influence a person's food choices. These include social, cultural and ethical influences.
2 There are a variety of different religions and beliefs that influence food choices. Each has its own food requirements and celebrations that incorporate food.
3 More and more consumers are demanding ethical and sustainable food choices.
4 Environmental food issues include farming practices and food miles.
5 Ethical food issues include the humane treatment of animals.
6 A food allergy is an abnormal response to a specific part of a food, such as in peanuts, eggs and soy.
7 A food intolerance occurs when the body has a chemical reaction to eating a particular substance, such as gluten or lactose.

Test your knowledge

Multiple-choice

1 A group of students visit the canteen. It is most likely that:
   a they will all choose the same or similar food to eat.
   b they will all choose something different.
   c they will all choose something based on their religious or cultural beliefs.
   d they will choose not to eat that day.
2 Vegetarians:
   a will only avoid animal products if the animal has been slaughtered humanely.
   b miss out on essential nutrients like protein because protein comes from animal products.
   c can plan nutritious meals using the Australian Guide to Healthy Eating.
   d are following cultural rules.

True or false?

1 All cereals contain gluten.
2 People who are lactose intolerant can drink fat-free milk.
3 Farmers are concerned about animal welfare issues because if an animal is not cared for properly, it will not thrive.

Short-answer

1 Describe the difference between a food allergy and a food intolerance. Include two examples of each.
2 Outline the reasons why people are choosing not to consume meat.
3 Explain the impact of food miles on the environment. Suggest why we have foods that travel long distances.
4 Briefly discuss all the factors affecting food choices.
5 Copy and complete the following table in your notebook:

Vegetarian type	Description – include foods they may avoid
Vegan	
Ovo-vegetarian	
Lacto-ovo vegetarian	
Lacto-vegetarian	
Pescatarian	
Flexitarian	

Extended-response

Conduct a class debate: work in teams, with one side the affirmative and the other the negative. Debate any of the following statements, or statements you negotiate with the teacher:

- Farmers are the best animal welfare protectors.
- Everyone should only eat a vegetarian diet.
- At the end of the day, I am responsible for what I eat.
- We should not import foods that are out of season.

You will need to research your topic and provide examples to support your point of view. Present your arguments to the rest of the class and vote on who has presented the best argument.

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CHAPTER 12
Making and marketing food

BEFORE WE BEGIN

1. Identify the methods used to prolong the life of fresh foods.
2. Outline the regulations relating to food production. Identify who is responsible for the development and review of these regulations.
3. Distinguish between yoghurt and kefir.
4. Explain how manufacturers design new food products.
5. Identify the legal requirements for labelling on foods.

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12.1 Making food last

LEARNING INTENTIONS

1 To understand date stamping on food products.
2 To understand how and why the shelf life of fresh food can be extended.
3 To develop an in-depth understanding of the fermentation process.

All food has a shelf life beyond which it is either not safe or not palatable to eat. Throwing out this food is not only harmful to the household budget but also to the environment if it isn't composted.

COLLABORATE 12.1

Talk with a classmate about what happens to the left-over foods in your household. Think about the fresh and packaged foods. List the foods and how they are disposed of. What might be some of the issues with throwing food away?

Food packaging dates

It is a governmental requirement that manufacturers put a date stamp on most packaged food. Food that can pose health and safety risks if consumed when it is not fresh is labelled with a 'use-by' date. This food cannot be sold after the stamped date, and consumers should discard food that is past its use-by date.

Food that is stamped with a 'best-before' date can legally be sold and consumed after this date, providing the food remains fit for human consumption. Foods which have a shelf-life of two or more years, such as canned foods, do not need to be labelled with a best before date. This is because it is difficult to gauge how long some of these foods will take to **spoil**.

spoil Changes in foods which make them unsuitable to eat

Another legally permitted type of date stamping is that of bread, which can be labelled with the 'baked-on' date if its shelf-life is less than seven days.

If a product will not keep to its best-before or use-by date without specific storage instructions, such as to keep refrigerated, then the label must also include specific storage details.

Figure 12.1 What do you do with leftovers?

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Figure 12.2 Many packaged foods are labelled with date markings to guide and inform retailers and consumers.

ACTIVITY 12.2
EXAMPLES OF EXPIRY DATES

1 Observe examples of foods with use-by and best-before dates, and those with no dates from either your home pantry, the school pantry or a supermarket. Remember to check out the freezer too. Copy and complete the following table in your notebook.

Type of date marking	Product example	Date recorded on the product
Use-by	1. 2. 3. 4. 5.	
Best-before	1. 2. 3. 4. 5.	
No dates	1. 2. 3. 4. 5.	

2 What patterns do you observe in the types or categories of foods within each date-stamp type?

3 From the list of the foods you observed, arrange them in order of when the foods should be consumed.

4 Outline the benefits which use-by and best-before dates provide to a food retailer. What benefits do they offer the consumer?

5 Explain how knowledge of use-by and best-before dates can help consumers who are concerned with food sustainability issues.

6 If most canned foods do not have a date on them, how can a consumer tell if a canned product found in the back of a cupboard is safe to consume?

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TASTY TRIVIA

Recently, an arctic exploration team in Greenland found a cache of canned foods that had been abandoned for 60 years by an exploration team in the 1960s. When the ration tins were opened, they were found to contain perfectly preserved crackers, jam, cocoa, meatballs and beans; all safe for the exploration team to eat.

Preserving food

As soon as food is harvested it begins to spoil. In general, food does not grow in abundance all year round. Foods come into season, and then out of season; there are food surpluses and food famines. Early humans solved this dilemma by following the food supply as it changed; they were nomads or hunter–gatherers following their food sources around.

In order for early humans to have sufficient food to last the whole year through, rather than only in the times of the year when there was plenty, they had to learn to save and store the excess foods until the times of lean food supply. They developed farming techniques which enabled them to form permanent settlements and explore other pursuits, such as art, science and cultural activities.

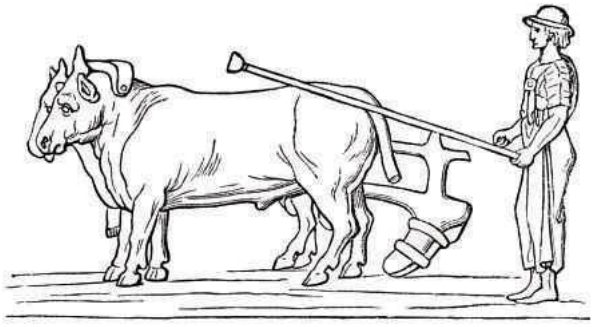

Figure 12.3 Early farming was extremely labour- and time-intensive.

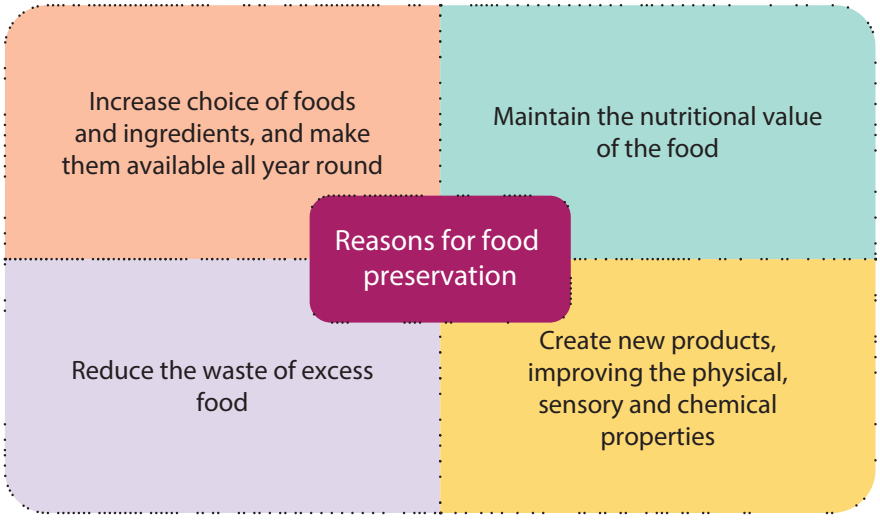

Figure 12.4 Reasons for food preservation

The process of food preservation is important because it allows us to use fresh produce and increase its shelf life by inhibiting the conditions for food spoilage and contamination.

These days, food preservation is used for many reasons, in addition to increasing the shelf life of a food. There are a number of different food preservation techniques used to prevent the spoilage of food.

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Table 12.1 Food-preservation techniques

Preservation technique	How food is preserved and spoilage inhibited	Food examples
Freezing 	Freezing foods below –18°C inactivates microorganism growth.	Meat, vegetables
Dehydration 	The removal of moisture from food to between 5 and 25%. Bacteria cannot survive these conditions.	Fruit, meat
Addition of sugar 	Strong concentrations of sugar inhibit the growth of microorganisms.	Jam, glacé fruits
Addition of salt 	Strong concentrations of salt remove moisture from food, inhibiting the growth of microorganisms.	Preserved lemons, pickles
Use of acids 	A high acidic content creates an environment in which microorganisms cannot grow.	Relishes, pickled onions
Canning and bottling 	Heating food in cans or bottles to high temperatures kills microorganisms and cooling then creates a partial vacuum, sealing the vessel and protecting the food from further contamination.	Tomato sauce, canned fruits

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COLLABORATE 12.3

1 With another classmate, brainstorm five more examples of foods that are preserved using each of the methods given in Table 12.1.
2 Using the information in Figure 12.5, summarise the ways we can reduce food waste, other than preserving it. You can download a copy of this poster at: https://cambridge.edu.au/redirect/10085.

Figure 12.5 Not only is preservation a great way to save money and increase the choices of foods we have all year round, but it is also a way of reducing the significant food waste we produce. This is an environmentally sound practice.

ACTIVITY 12.4
FRESH VS PRESERVED

1 Find fresh and preserved versions of a food item (such as sultana, apricot or tomato) that uses dehydration as a preservation technique.
2 Compare and contrast the sensory properties of the fresh and the dried food. Provide a detailed analysis with an explanation for the differences in taste and texture.
3 Determine when fresh is best versus when dried might be the best option in cooking.
4 Investigate ways to use your dried ingredient in cooking.
5 State which product you preferred and why.

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DESIGN BRIEF: EXCESS CHERRIES

Your cherry tree has finally fruited, and the cockatoos have been prevented from stealing your harvest. Apart from making friends by giving cherries away, what can you do to ensure they aren't wasted, and you can enjoy them all year round?
Investigate different ways and recipes to preserve cherries. Think about what the traditions are in different cultures around the world, preserving foods when they are in season to have products available all year round.

A focus on salting

Salting is one of the earliest methods of food preservation known to humans, with the ancient Egyptians being the first to recognise the preservation properties of salt. Salt draws out moisture from foods and inactivates or kills living cells, making it impossible for microbes to live and grow in the food.

Many cultures today have dishes that are highly salted. These dishes reflect the traditional practices these cultures used to preserve food in times of plenty, for use when food was scarce. Olives, anchovies and preserved lemons are examples of foods we eat today that had their origins in this way.

A focus on fermentation

pickling The process of preserving food in brine or vinegar

Fermentation is a slow method of **pickling** vegetables. It differs from simple pickling in salt or acid because the taste and texture of the food is changed by natural, beneficial bacteria. Preservation occurs through an acid that is produced by these bacteria that grow in the **brine** over a number of weeks. You must be careful when fermenting, as the wrong microbes will produce bad flavours and the vegetables will turn soft and slimy.

brine Water with salt dissolved in it, especially when used to preserve food

probiotic A substance that contains live bacteria which supplements a person's normal intestinal bacteria

The number of fermented products on the market has grown considerably in recent times, due to the growing understanding of their link to gut health. They are a source of **probiotics**, which are essential to the effective functioning of the intestines and contribute to health improvements, such as reduction in cholesterol levels and lowered risk of colon cancer.

INVESTIGATE 12.5

1. Go online to find examples of fermented products. You can start with kimchi, a Korean fermented cabbage dish, the recipe for which is in this chapter.
2. List five different fermented dishes, list their major ingredients and state the country or countries they originate from.
3. Conduct a taste test and determine which products you enjoy. Describe any common sensory attributes among the products.
4. Explain why fermentation is a popular preservation technique.
5. Investigate the health benefits of consuming fermented products.

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KIMCHI

Note: The specific type of kimchi being made in this recipe is *baechu-kimchi*. It is the most popular variety of kimchi. There are many other varieties of kimchi using other vegetables and seasonings.

Serves 3
Main tools and equipment Sterilised jar, chef's knife, chopping board, colander, large bowl, measuring jug, scales
Production skills Chop
Preservation processes Fermentation

Preparation time 4 hours
Fermentation time 2–3 days

INGREDIENTS

- 400 g wombok, roughly chopped
- ½ cup water
- 30 g cooking salt
- 1 clove garlic, crushed
- 1 cm slice fresh ginger, peeled and finely grated
- ¼–1 teaspoon ***gochugaru*** to taste (Chilli flakes can be used as an alternative.)
- ½ teaspoon rice wine vinegar

gochugaru
Korean red chilli powder that can be purchased at Korean grocery stores or online

METHOD

1. Rinse and chop the wombok into bite-sized pieces.
2. Combine the salt and water in a large bowl.
3. Stir in the wombok, cover and leave to sit for 4 hours, stirring occasionally. Weigh it down with a plate if necessary. When the wombok is soft and flexible, it is ready.
4. Drain the wombok, reserving the liquid from the bowl.
5. Place the wombok into another bowl, add the *gochugaru*, garlic, ginger and rice wine vinegar. Mix well to combine.
6. Pack the mixture firmly into a sterilised jar, covering with a little of the reserved liquid. Make sure the wombok is completely covered by the liquid. Add a small weight if necessary.
7. Place the jar on a plate or tray to catch any overflow and set aside for 2–3 days at room temperature to develop the flavours. Store in the refrigerator after this time.
8. Drain the liquid before using.

EVALUATION

1. Which ingredients formed the brine? Explain the function of the brine in this recipe.
2. Explain how you sterilised the jar. Why is it important to do this?
3. Explain why the kimchi is set aside at room temperature for 2–3 days, then put into the refrigerator.
4. Design a date label for your jar of kimchi.
5. Describe two ways you might use this kimchi in your diet.

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FRUIT CHUTNEY

Makes 1 kg chutney
Main tools and equipment Chef's knife, grater, peeler, saucepan, jars with lids, scales
Production skills Pit, dice, peel, chop, stone, grate, measure
Preservation technique Pickle

Preparation time 3 hours
Preservation time Keep in a cool dry place for 6 weeks before using
Storage time If stored in the refrigerator, at least 6 months

INGREDIENTS

- 250 g apricots, pitted and chopped
- 250 g cooking apples, peeled, cored and chopped
- 1 peach, pitted, peeled and chopped
- ½ brown onion, finely chopped
- 55 g raisins or sultanas
- 1 tablespoon fresh ginger, grated
- ¼ teaspoon grated nutmeg
- ¼ teaspoon ground allspice
- ¼ teaspoon dry mustard
- Finely grated zest of ½ lemon
- Finely grated zest of 1 orange and its juice
- 190 ml white wine vinegar
- 125 g sugar
- 125 g brown sugar

METHOD

1. Put the apricots, apples, peach, onion, raisins, ginger, nutmeg, allspice, mustard, lemon zest, orange zest and its juice and 150 ml of the vinegar into a saucepan. Stir well.
2. Bring to the boil, then turn down to a simmer, cover and cook, stirring occasionally, for 1 hour or until the fruit is very soft and pulpy.
3. Stir in the sugars and remaining vinegar and continue simmering, stirring occasionally, for another 30 minutes or until the chutney is very thick. To test, place a spoonful on a cold plate and spread it out. If the liquid does not pool in the centre, it is ready. Some liquid is fine; it will thicken as it cools.
4. Meanwhile, sterilise the jars and have them hot before ladling the chutney into them. This minimises the risk of the glass cracking when the hot mixture is added.
5. Cover and seal the jars.
6. Label and store in a cool, dry place for 6 weeks before serving.

Tip: You can substitute any fresh fruit or vegetables in season for this recipe.

EVALUATION

1. Why is it important to sterilise the jar before use?
2. Explain the role of the sugar in this recipe. How does it prevent food spoilage?
3. Explain the role of the vinegar in this recipe. How does it help prevent food spoilage?
4. Suggest why the chutney should be stored for a period of time before consumption.
5. Complete a sensory analysis of the chutney.
6. Suggest ways this chutney could be used in food preparation.

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LEARNING REFLECTION

1 Explain why food has a shelf life.
2 Describe the difference between use-by and best-before dates.
3 Why did early humans start to preserve foods?
4 For each of the four reasons for preserving food, provide two examples of food we eat today that are preserved for these reasons.
5 Explain the process of pickling and how it preserves food.

EXTENSION

6 Explain the link between the preservation of foods and the agrarian revolution.

12.2 Designing food safely in Australia

LEARNING INTENTION

1 To develop knowledge of the roles of government in maintaining safe food in Australia.

Food safety

The food supplied to us in Australia is renowned for being extremely safe for consumers. To ensure that we have a safe food supply, a number of strict regulations and standards exist at all levels of government.

INVESTIGATE 12.6

Go online to research the role each level of government plays to ensure the food you eat is safe. Copy and complete the template below using the information you find. You may need to add more boxes. You may use the following websites to help:

- Food Standards Australia New Zealand (FSANZ)
- Food Standards Code, including food labelling regulations
- Department of Agriculture.

The federal government ensures the food I eat is safe to eat by:	My state government ensures the food I eat is safe to eat by:	My local government ensures the food I eat is safe to eat by:

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Food safety standards

Food Standards Australia New Zealand has developed and constantly reviews standards for food production, sales and marketing which are enshrined in law and apply to all food businesses in Australia. These standards are designed to reduce the incidence of food-borne illnesses and place the responsibility onto food businesses to make food that is safe, and places health and hygiene obligations onto food handlers. There are also separate standards for farmers and primary processing sectors in their production of food.

Figure 12.6 A food inspector measures the temperature of stored food to check that it meets food safety standards.

ACTIVITY 12.7
ANALYSING POTENTIAL FOOD SAFETY ISSUES

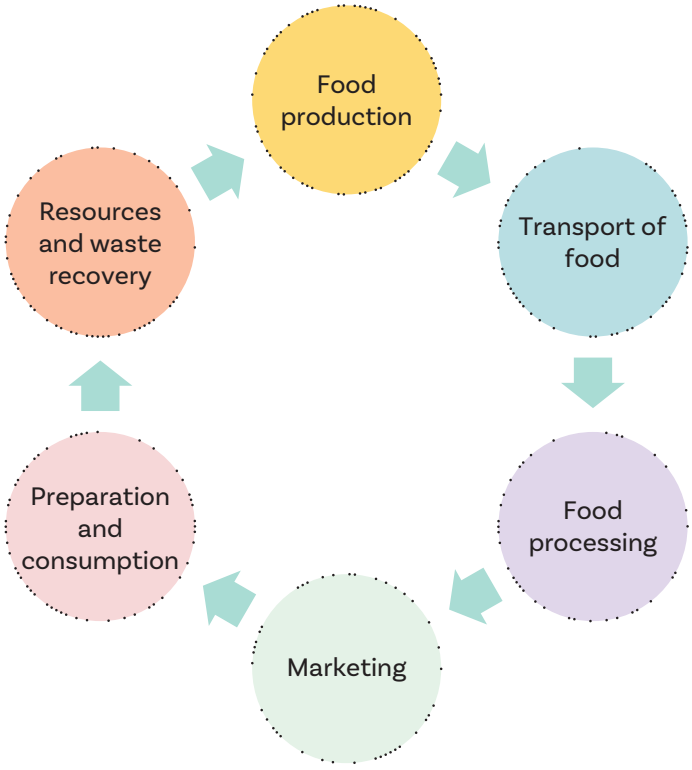

Figure 12.7 Elements of the food system

1 Using each element of the food systems cycle illustrated in Figure 12.7, give one example of how food may become unsafe for consumption.

2 For each example you gave in question 1, suggest a rule that could be followed to reduce the possibility of unsafe food.

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New food beginnings

When we think about the huge range of foods both fresh and processed, it is staggering. Have you ever thought about what goes into the successful invention of new foods? How many failures there may have been in comparison to the successes that are available? And why, sometimes, a new favourite you have disappears from the shelves?

Food manufacturers need to make profits, and new products don't just appear, but are a result of planning, managing and testing designs to make that sought-after profit. Sometimes the testing indicates the new products can succeed, and at other times, despite testing, they fail or may cover costs but not make enough profit, so they disappear.

COLLABORATE 12.8

Discuss with your class products that have come and gone on the market. Were there any that you tried and just hated? Were there any you wish were still 'around'? How did you find out about these new products?

Good ideas about new foods may come from someone in the company. The idea may arise from a niche in the market, or it may come from someone saying, 'You should sell that, it's great'. Television series have been built around just that concept, that is, someone having a great idea and a company taking the winning idea on, then marketing and selling it for a given period of time. Good ideas may also come as a result of new trends in foods driven by changing knowledge of health, or new cultures, new ingredients or new cooking tools and techniques being made available.

COLLABORATE 12.9

Talk with a classmate about foods that you make at home, or foods a relative or friend makes, that you think would sell if marketed.

LEARNING REFLECTION

1 If there are multiple cases of food poisoning, explain which level or levels of government will become involved, and how they will help combat the outbreak and follow up afterwards to ensure it is not repeated.

EXTENSION

2 Research a new production method, such as lab-grown meat, and explain its potential impact on food production processes.

12.3 Taking food from a thought bubble to a product

LEARNING INTENTIONS

1 To understand the links between the properties of food and the development of new products.
2 To be taken through the design process with the outcome of developing your own new food.

When innovative food products are being developed, they go through the design process, which has been featured throughout this book. Food manufacturers often have a system of

research and development that takes an idea into production. This process is not just a hit-and-miss process, but is well thought out and often based on science. Manufacturers use an in-depth understanding of the properties of foods to help them produce a food that will satisfy the needs of people.

Throughout this book you have been learning about the properties of foods; the sensory, the physical and the chemical. Understanding these properties helps manufacturers produce new products that meet standards that the general public will find acceptable and, more importantly for sales, desirable.

Figure 12.8 How to make an idea into a successful product?

COLLABORATE 12.10

1 Working with a classmate, define the terms 'sensory property', 'physical property' and 'chemical property'. In your definitions, provide an example of each.

2 Copy and complete the table below, outlining the benefits that knowledge of each of these properties may provide to a manufacturer when designing a new food.

Property of food	How may this help a manufacturer design a new food?
Sensory	
Physical	
Chemical	

3 Explain why it is important for a home cook to understand these properties when cooking for themselves or their families.

DESIGN BRIEF: CHOBBLESOME FOODS

You are going to design and make a brand-new product based around the following design brief. Using the design process, design a product that meets the criteria given below.

Chobblesome Foods Inc are a food company who are dedicated to producing wholesome and environmentally sustainable foods, while meeting the needs of Australia's changing population. They are looking for a product that will be available in the fresh chilled section of the supermarket. They do not specify whether the food is to be served hot or cold or if it is a main course or a dessert, but it cannot be a snack or breakfast food.
They want to capture the market, which is following the latest trends in styles of eating, food flavours and ingredients, while maintaining their sustainability values and supporting healthy eating.

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COLLABORATE 12.11

Work with another class member to complete the following:

1. Using the design brief, Chobblesome Foods, outline the basic problem that needs to be solved in detail. Write your agreed response down.
2. Discuss the constraints identified in the brief. Remember, constraints are the 'must-do's'. Write these down in your book under the heading: Constraints.
3. The design brief has some statements that need further clarification. These are called the considerations, which include:
   - wholesome or healthy eating
   - environmentally sustainable
   - Australia's changing population
   - latest trends in styles of eating, flavours and ingredients.
4. With your partner, develop an agreed list of considerations and write them down under the heading: Considerations.
5. Share your answers with the class and write down any considerations and/or constraints you missed.

Writing criteria for success

When manufacturers set themselves a task to complete, they need to be able to evaluate whether they have satisfactorily completed the task. They need to know where they are going to end up. If they don't, then they could find themselves going around in circles and not meeting the original goals. This is called starting with the end in mind. If you know what you want at the end, you can write evaluation questions at the start that will help you decide if you have met what you expect in the product. These questions reflect the design brief. The constraints and considerations of a design brief identify the areas where evaluation questions need to be written.

When writing evaluation questions, they should not all be written in a way that elicits a 'yes or no' answer. You will get more information and clarity with open-ended questions. Remember, the design process is a cycle: the product is designed, it is made, it is evaluated, and improvements are made using the feedback from the evaluation. The improved model is made again using the feedback and the cycle continues until a product is at a saleable (and profitable) standard.

Let's look at how to write better evaluation questions. This is an example of a yes or no question:

- Is this product within the required price range?

However, this is an open-ended question:

- What is the estimated cost of the finished product? How close is it to the required cost?

This gives more information, which can be used to improve the finished product to best meet the design brief.

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ACTIVITY 12.12
WRITE YOUR CRITERIA FOR SUCCESS

1 Write at least five criteria for success questions based on the design brief, Chobblesome Foods.
2 Re-read your questions. Do they all require a yes or no answer? If they do, try to reword some of them so you can gain more information from the evaluation.

Investigating
During the investigation phase you will need to develop knowledge that will guide you to design a product that reflects what the company wants. The constraints and considerations in the design brief are used to clarify what the finished product might look like.

The design brief contains the constraints: the things that the product must or mustn't be. For example, your product must be a food that is to be available fresh in the chilled section of the supermarket and it can't be a snack or breakfast.

COLLABORATE 12.13

Working in a group of four you will be brainstorming what each of the four considerations you looked at in Collaborate 12.11 might mean to the product development. Using one piece of A3 paper for each statement, each student in your group takes one consideration and for three minutes writes down everything they think might be appropriate, including where they might search for information on that topic. After three minutes, swap with the person next to you, read what the first person has written, then again in silence brainstorm ideas that have not yet been put onto the sheet, but this time spend only two minutes. Repeat this process until all four in your group have had a turn at writing on each page.

This activity provides a more complete list of possible directions you can go with your research so that your final product better meets the requirements set out by Chobblesome Foods.

You could also complete research into the possible fresh, chilled products that are available currently in the supermarket. It may give you some ideas on what is working commercially or ideas on what you don't want to make, because it is already on the market.

You will now complete research which enables you to become more knowledgeable, in order to make informed and defensible decisions about the product you finally choose to make. Make sure you record your research and provide references so that you can go back later to check details.

Recording your research
A great way to record your research is to complete a mind map (see Figure 12.9 on the next page). It will help you visually arrange all relevant information.

Once you have a better understanding of what these four considerations entail, you might also like to complete a mind map reflecting your findings or thoughts on the constraints you identified in your planning.

Designing
The designing step is particularly important to manufacturers, as this is the step where final decisions are made and the mechanics of making it are identified to see if the chosen design is viable.

Identify the potential foods that you could make to meet the design brief, then make a final decision. Use Activity 12.14 to help you do this.

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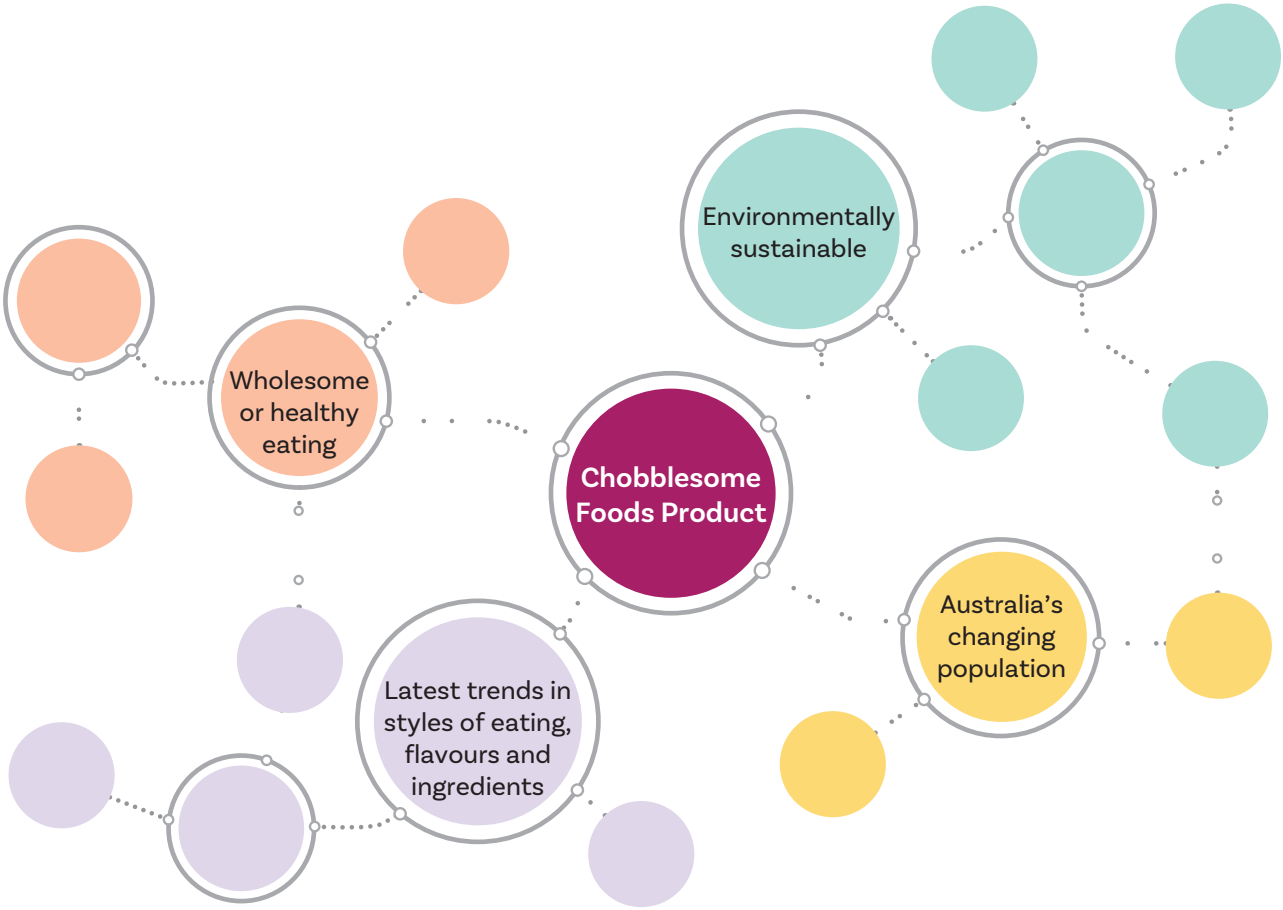

Figure 12.9 A mind map will help you organise your research. You might research the wholesome foods market and decide the product could follow the Australian Guide to Healthy Eating. For example, it could mean not processed, it may mean wholemeal, it may mean it does not have any potential allergens. Each of these ideas should be placed in different circles.

ACTIVITY 12.14
WHICH FOOD AND WHY?

1 Copy and complete the following table to clarify and justify your decision.

Potential dish	How this food meets the design brief: Chobblesome Foods
1.	
2.	
3.	

2 Complete this sentence: My final decision is … because …

The next task that manufacturers undertake is to write a recipe for their chosen design, as well as write plans for the manufacturing process to ensure that the equipment and skills they require are available to them. It may not be possible or profitable for them to buy a new piece of machinery to make their designed product if it is only going to be used for this one product.

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ACTIVITY 12.15
WRITING PLANNING DOCUMENTS

1 Write a recipe for your designed food for Chobblesome Foods. Ensure your recipe follows the format that has been used throughout this text, identifying the tools you will need, the production processes, the number of serves, the time it will take to make as well as the ingredients list and the method.

2 Complete a design plan. You need to:
- write a food order
- write an order of work and time plan to make sure you can get the recipe made in the time allocated
- write a work plan which includes consideration for equipment you will need, safety and hygiene you must follow and cooking processes you intend to use. This is critical so your production runs smoothly, and it shows that you are observing food safety regulations to ensure the safety of the consumer.

Producing: making the proposed solution

In this step you will be making and presenting the food ready to be evaluated for suitability for the design brief.

- Make sure you follow your time plan and make notes of any areas where you could improve your practices as you work.
- Take note of any extra equipment required or steps taken which were not in the plans you made.
- Ensure you take photographs of your progress throughout the production stage and your finished dish. These images will assist in your evaluation stage.

Evaluating

During the evaluation phase of the design process, you will be completing several different tasks. This is the time when you gauge the product you have made against several different evaluation tools.

Consumer testing

Sometimes, but not always, manufacturers undertake consumer surveys to see if a food is going to work before it goes into full manufacturing. They have a concept in mind, they make a trial of it and then get consumers to taste and comment.

Figure 12.10 Photographing your finished plated food product is a key step before evaluating your dish.

Figure 12.11 Consumer taste testing is sometimes undertaken on newly designed foods to gauge attitudes to the food.

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ACTIVITY 12.16
TASTE TESTING

There are several ways to do a taste test; the sensory analysis that you are familiar with is one way. Another was explained to you in the 'getting started' section where you learned about the hedonic scale and ranking tests. You will be completing all three tests in this activity. Working in pairs:

1 Choose a product that comes in different versions. Some biscuits, for example, copy well-known brands. You will need samples of the copy and the original versions. Make sure each person in the pair chooses a different product.
2 Remove all identification from the products, serve them on separate identical plates, and label them with random letter and number combinations (i.e. A1A, B2B)
3 Ask others (minimum of five people) to complete the information in the following table for both of your products.

Sample 1 (A1A)	Sample 2 (B2B)
Description of taste	Description of taste
Description of appearance	Description of appearance
Description of texture	Description of texture
Description of aroma (smell)	Description of aroma (smell)
Circle the face that reflects how you feel about the product overall:	
	
Rank below which of the products you liked most and least of the samples tested	

4 Collate your information from all your respondents.
5 Determine which products were preferred from those tested. Explain your answer.
6 If you were a manufacturer, how might you use this result to inform how you proceed with your plans to make a product?
7 Suggest which of the three sensory tests is easiest to analyse. Explain your answer.
8 Describe a situation where a manufacturer may use the results from the test that was more difficult to analyse.

ACTIVITY 12.17
EVALUATING YOUR PRODUCT

To evaluate your own product, you will be completing the following tasks:

1 Answer the criteria for success questions you devised about your finished product.
2 Complete a sensory analysis. You may complete one yourself, and you may decide to do some consumer testing using a tool similar to the one in the previous activity.
3 Complete an analysis of the processes you undertook to complete your dish. Remember an analysis looks at positive processes, as well as areas for improvement.
4 Write a paragraph summarising your successes and which areas of the design did not meet the brief well.

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You now have a completed and evaluated a product that could be presented to Chobblesome Foods for production. At this point in the process, a manufacturer may feel their prototype has met all the requirements of the brief and is now ready to go into production. However, sometimes the evaluation of the prototype and its manufacturing requirements identifies issues that need to be addressed before putting the recipe into production, or it may suggest not proceeding with production at all.

ACTIVITY 12.18
ANALYSIS OF EVALUATION

Using the information you gained in your sensory evaluations and your responses to your criteria for success questions, are there any areas where you could improve your product to meet the design brief better? Explain your answer.
If there are any changes that can be made, and if you have time, re-make your product reflecting these changes.

LEARNING REFLECTION

1 Explain why it is important that the chemical properties of food be understood when designing a food that is healthy.
2 Outline the most difficult part of the design process you have just completed. Explain why you found it difficult.
3 Explain the area of the design process you found most enjoyable or easy. Explain your answer.

12.4 Marketing food

LEARNING INTENTIONS

1 To understand the role of marketing in the food system.
2 To understand and demonstrate the legal requirements of food labelling.

Figure 12.12 When you or your family go to do grocery shopping and you see the vast array of foods that are available for sale, what is it that helps you make a choice about which foods to buy?

COLLABORATE 12.19

Working with another student, brainstorm the factors that influence what foods you and your family buy from the shops. If you think about the weekly grocery shopping, are these influences different to those which may influence you if you were buying party foods or a snack on the way home from school?
Are the influences different if you are buying food online?

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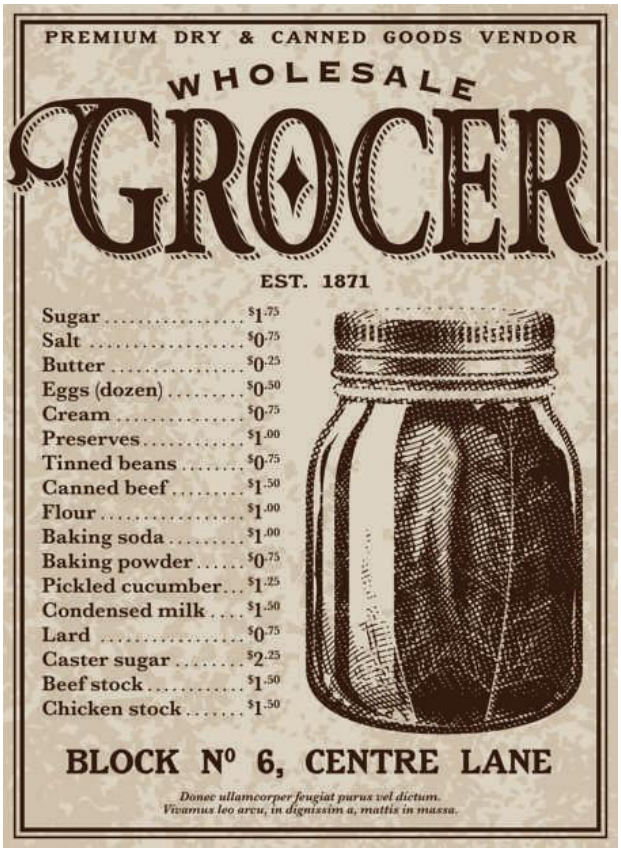

Figure 12.13 At one time, there may have been only one brand of a particular food, so there was no need to advertise the brand. Today there are many brand options available on the shelves to cater for a much larger and more diverse population.

The sale of food is extremely competitive, and because of this many foods are marketed heavily. Advertising in media streams (print and electronic) and at the point of sale are obvious to us. However, even the label on a product serves to not only provide information about the contents, but also to advertise and gain attention, setting it apart from other brands of the same food.

Labelling requirements

Food Standards Australia New Zealand sets food labelling standards in Australia for most packaged foods. These standards are subsequently enforced by Australian state and territory governments. By law, labelling must follow certain guidelines and contain particular elements.

TASTY TRIVIA

According to the National Obesity Strategy report, more than $550 million is spent annually in Australia by food companies on advertising foods and non-alcoholic beverages, with the majority spent on foods that are high in fat, salt and sugar.

COLLABORATE 12.20

1 Working with another student, list the different advertisements for food you can think of. Spend only five minutes on this task. Copy and complete the table below in your notebook to list these in two columns:

Advertisements for food in the five food groups	Advertisements for foods not in the five food groups

2 Did you find it easier to find foods for the second column? Suggest reasons why there may be more advertisements for these foods rather than fresh foods from the five food groups.

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Figure 12.14 The nutrition information label is required on most packaged foods. Food Standards Australia New Zealand provides a nutrition label calculator so businesses can create their own panels for foods they have developed.

INVESTIGATE 12.21

Before you go online, find an empty food box or a label from a packaged food, flatten it out and stick it onto a large piece of paper. Go online to the Food Standards Australia New Zealand website and search for the interactive 'Labelling poster'. Using this interactive, annotate the food label you found, pointing out each of the required elements.

1 Was there any other information that the label contained?
2 What was it?
3 What might be its purpose?

INVESTIGATE 12.22

Go online to the Food Standards Australia New Zealand website and search for the Nutrition Panel Calculator. Launch it and follow the instructions to enter a new recipe. Complete a nutrition label for the dish you designed for the design brief Chobblesome Foods, which you worked through in Section 12.3.

DESIGN BRIEF: MACARON BOX

You think there is a market for unfilled macaron shells which allow people to fill them with what they want, rather than buying macarons already filled which sometimes go soggy during storage. Using the information you have learned in this chapter, design a label for a box that will hold your 12 macarons. Make sure you include all the information required by law, including completing a nutrition panel. Present this label using a digital tool such as Adobe Illustrator, Gimp or Inkscape. Ensure the label is also going to attract attention and therefore improve sales.

LEARNING REFLECTION

1 Who sets the labelling standards in Australia? Who enforces them?
2 Explain why it is necessary to have laws regarding labelling.

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NO-FAIL MACARONS

Makes 12
Main tools and equipment Measuring spoons, scales, food processor, electric hand beater, bowl, spoon, piping bag, baking tray, baking paper
Production skills Sift, beat, stir, measure, fold
Cooking process Bake

Preparation time 20 minutes plus 30–50 minutes setting time
Cooking time 15 minutes
Total time 65–85 minutes

Skill demonstration: Using a piping bag

INGREDIENTS

- 100 g icing sugar
- 50 g almond meal
- 55 g egg white
- Pinch of cream of tartar
- 25 g caster sugar
- ¼ teaspoon vanilla extract
- Food colouring if desired

METHOD

1. To ensure the almond meal is a fine powder, place it and the icing sugar into the bowl of a food processor and blitz it. Sift, discarding any large lumps. If there are a lot of lumps, re-blitz it and re-sift it.
2. Put egg white and cream of tartar in a spotlessly clean bowl, ensuring that no egg yolk or fat of any kind contaminates it, and beat with a hand beater (that is also spotless) on medium speed until it forms soft peaks.
3. Continue to beat, adding 1 teaspoon of the caster sugar at a time. Once it has all been added, increase to high speed until it forms stiff peaks. Add vanilla extract and if you are colouring your macarons, add 1–2 drops of desired colour and stir to combine.
4. Add the egg whites to the almond meal mixture in three batches, folding gently so as to not beat out the air. Continue to gently stir until the batter forms a dropping consistency when you lift the spoon up.
5. Put batter into a piping bag with a large round tip. Pipe rounds approximately 4 cm in diameter onto a tray lined with baking paper. Try to keep the macarons the same size.
6. Tap the tray on a firm surface to remove bubbles and 'peaks' that might have formed when piping.
7. Preheat the oven to 150°C.
8. Allow the macarons to sit in a cool dry place for 30–50 minutes or until a skin forms on the top. You should be able to touch the surface of the macaron lightly and it will feel dry.
9. Bake for 15–18 minutes. The top should be shiny and the bottom crusty. Cool on the tray for 10 minutes and then transfer to a wire rack.
10. Stick macarons together with jam or a buttercream flavoured to your liking.

EVALUATION

1. What is the difference between soft and stiff peaks when beating egg whites?
2. Under which part of the Australian Guide to Healthy Eating do macarons fall? Why?

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Review

1 Food preservation refers to a number of techniques that are used to prevent food from spoiling. This allows foods to have an increased shelf life and can enhance the flavours and textures of foods.
2 Food Standards Australia New Zealand is the statutory body that develops and reviews food standards for use in Australia, which are then enforced by state and territory departments, agencies and local councils across Australia.
3 Businesses use the design process of investigating, designing, producing and evaluating to develop new food products and review existing ones.
4 Food marketing is widespread and covers many media forms and outlets.

Test your knowledge

Multiple-choice

1 The level of government that is responsible for checking food safety practices in a business is:
   a state.
   b federal.
   c local.
   d international.
2 Food preservation increases the shelf life of food by:
   a reducing the temperature of the food.
   b removing water from the food.
   c increasing the acidity of the food.
   d removing all bacteria and enzymes from the food.

True or false?

1 Food preservation is simply about increasing the shelf life of ingredients.
2 A hedonic scale is used to evaluate the sensory properties of food in a simple way.
3 Food Standards Australia New Zealand is a statutory body responsible for the approval of new foods.

Short-answer

1 Explain how a household can use date stamping on foods to plan for more sustainable food consumption patterns.
2 For each of the following examples of food properties, provide an example of how a manufacturer may use it to improve the quality of their food product:
   - The function of gluten in a baked product
   - The changes that occur in vegetables when cooked
   - The amount of fibre in wholemeal foods
3 What might be the impact on the future health of Australians if food advertising continues to focus primarily on foods that are not in the five food groups?

Extended-response

Design packaging for the food product you developed for Chobblesome Foods Inc that would be suitable to sell the product in and keep it in good condition until sold. Ensure the label you design for the product meets the legal requirements for labelling and marketing.

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VISUAL GLOSSARY

Main tools and equipment

baking paper	bowl	cake pan
		
casserole dish	chef's/cook's knife	chopping board
		
colander	egg slide	electric hand beater
		
foil	food processor	fork
		
frying pan	glass	grater
		
griddle pan or grill plate	juicer	kettle
		
knife	ladle	measuring cups
		

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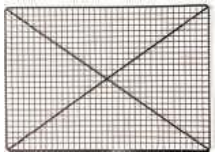
measuring jug	measuring scales	measuring spoons
		
metal bowls	muffin pan	non-stick frying pan
		
paper muffin-size patty cases	pastry brush	peeler
		
pizza tray	plate	ramekin
		
rolling pin	saucepan	sieve
		
skewer	slice tin	spatula
		
spoon	whisk	wide-mouthed jar
		
wire rack	wooden spoon	
		

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Ingredients

almonds, slivered	almonds, whole	almonds, whole blanched
		
apple, Granny Smith	apricots, dried	asparagus
		
avocado	baking powder	banana
		
banana chips	basil, fresh	bay leaf
		
beans, green	bean shoots	beef, minced
		
beef, tenderloin	bicarbonate of soda	bok choy
		
bouquet garni	bread, hamburger bun	bread, sliced wholegrain
		
breadcrumbs	breadcrumbs, panko	broccolini
		

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butter	cannellini beans	capsicum, green
		
capsicum, red	carrot	cashews
		
celery	cheese, cheddar	cheese, Emmental
		
cheese, feta	cheese, halloumi	cheese, mascarpone
		
cheese, mozzarella	cheese, parmesan	cheese, tasty – grated
		
chickpeas, canned	chilli, red	chocolate chips
		
cinnamon, ground	cinnamon quill	clove
		
cocoa powder	coconut, shredded	coffee
		

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coriander, fresh	coriander seeds	corn kernels, frozen
		
couscous	cream	cumin, ground
		
cumin seeds	curry powder	custard powder
		
dates, fresh	eggs	falafel
		
filo pastry	fish, white fillet	flour, plain
		
flour, self-raising	flour, spelt	flour, wholemeal
		
fruit, dried	garlic	gelatine, powdered
		
ginger, fresh	golden syrup	ham, sliced
		

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harissa	honey	kale
		
kangaroo fillet	lamb backstrap	leek
		
lemon	lemon juice	lemon, preserved
		
lettuce, iceberg	lime	lime, finger
		
macadamia	maple syrup	margarine
		
milk	milk powder, skimmed	mustard, Dijon
		
noodles, rice	oats, rolled	oil, olive
		
oil, peanut	oil, sesame	olives
		

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onion, brown	onion, spring	onion, white
		
oregano, dried	oyster sauce	parsley, flat-leaf
		
passionfruit	pasta, macaroni	pasta, spaghetti
		
pasta, spiral	peach	peanut butter
		
pear	peas	pineapple ring
		
pork belly, fatty	potato	potato, baby
		
potato, sweet	pumpkin seeds	rice
		
sago	salami	salt & black pepper
		

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sesame seeds	soy sauce	spinach
		
sponge finger biscuits	stock powder, beef	sugar, brown
		
sugar, caster	sugar, dark brown	sugar, icing
		
sugar, raw	tapioca starch	tempeh
		
thyme, fresh and dried	tofu, firm	tomato paste
		
tomatoes, cherry	tomatoes, crushed	tomatoes, sundried
		
topping (chocolate, strawberry, etc.)	vanilla extract/essence	vinegar
		
water	yeast, dry	zucchini
		

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GLOSSARY OF TERMS

00 flour Flour that has been very finely milled

agriculture The science or practice of farming, including cultivating the soil for the growing of crops and rearing of animals for food and fibre

al dente Cooked 'to the tooth' – not too soft, but chewy with some bite or texture to it

albumen A water-soluble protein found in egg white and blood

allergen A substance that triggers an allergic reaction

anaerobic fermentation The chemical breakdown of substances by bacteria, yeasts or other microorganisms

anaphylaxis An extreme allergic reaction to a food product in which the airways are impacted

angina Chest pain caused by insufficient flow of blood and oxygen to the heart

antioxidants Substances, such as vitamins C and E, thought to help fight free radicals in the body that can cause disease

antipasti The food served at the beginning of an Italian meal; its literal meaning is 'before the meal'

appearance The 'look' of the product, packaging or food

appetite The desire or need for food

aquaculture The cultivation of aquatic plants and animals

aquatic Relating to water

aroma The smell arising from the food

atherosclerosis Narrowing of the arteries due to the deposit of fatty plaques on artery walls

bacteria Single-celled microorganisms responsible for the decay, fermentation and, ultimately, spoilage of food

bad fats Fats that are considered harmful to health when consumed in excess

bain-marie A device or a process for cooking foods that involves putting the food in a container into a pan of hot water

bake To cook food using the hot air produced by an oven

balanced diet Dietary intake that includes the nutrients needed by the body for good health

beating The process of combining ingredients to trap air and create lightness

bicarbonate of soda Also sometimes written as baking soda, is an alkali which when mixed with an acid, like lemon juice or buttermilk, will make a batter rise well. Be careful, as too much can make the product taste metallic.

biofuel A fuel for machinery which is derived from living matter such as plants, algae or animal waste

blanched When a food substance is plunged into boiling water, removed after a short time, and then plunged into ice-cold water to stop the cooking process

bloom Soften gelatine by sprinkling gelatine powder onto water and leaving for 10 minutes, and then microwave the mixture in 10-second bursts, stirring between each burst, until the mixture is clear

boiling point The temperature at which water changes from a liquid to a vapour or gas

botanical Relating to plants and/or plant life

bran The protective outer layer of the grain

brine Water with salt dissolved in it, especially when used to preserve food

butter A dairy product that is produced by churning cream until the fat solidifies and forms a spread

buttermilk The liquid that remains after butter is made from cream. It has a tangy, almost sour, taste and is used to make muffins, pancakes and some breads.

caramelisation The heating of sugar or foods containing sugar until a brown colour and characteristic flavour develops

cardiovascular disease A class of disease that affects the heart and blood vessels

cellulose One of the main components of plant cell walls. An indigestible carbohydrate and an important source of insoluble fibre.

cereals Grains used for food, such as wheat and maize (corn)

cholesterol A waxy, fat-like substance used by the body to stabilise cell membranes, either produced in the liver or absorbed from animal fats eaten. It is necessary for good health; however, excess levels are detrimental.

climate change A change in regional and global climate patterns indicated by an increase in temperature and severe weather patterns

coagulation The changing of a protein from a liquid to a solid when heated, agitated or an acid is added

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coeliac disease A disease of the small intestine that results in permanent intolerance to gluten

complementary protein Protein that lacks one or more of the essential amino acids, but when eaten together can supply a complete protein

complete protein Protein that contains all the essential amino acids for body function

complex carbohydrates Molecules that supply energy, fibre and other nutrients that the body needs

compote Fruit stewed or cooked in a syrup, usually served as a dessert

conduction Cooking food by heat transference through a flat metal surface onto the food or liquid, for example, frying or poaching

considerations The aspects of a design brief that have some flexibility within the chosen solution

constraints The aspects of a design brief that are fixed and must be covered in the chosen solution

contaminated Unsafe to eat due to contact with chemicals, foreign objects or bacteria that are harmful for people to eat

convection Cooking food by the circulation of hot air or steam, such as in an oven or a steamer or in hot liquid, such as boiling

creaming The process of preparing the butter and sugar to create a soft and creamy texture; this ensures even distribution of the butter through the cake mixture

criteria for success Questions developed to check whether you have made something to meet the requirements of the design brief. The criteria for success should come out of the design brief.

cross-contamination Indirect contamination of food caused by contact with a raw food or non-food source such as clothes, cutting boards or knives that are themselves contaminated

cultivate To prepare the land and soil for the growing of crops and cereal grains

cultural factors The beliefs, customs and practices of a particular group of people that influence food choice

culture Beliefs, customs, traditions and social practices of a group of people

cultured milk A culture of lactic acid bacteria such as lactobacillus is added to milk to sour it

curds The solids in milk, formed when the protein has coagulated after the addition of rennet or lactic acid

degradation Environmental deterioration through depletion of resources, pollution, destruction of ecosystems and extinction of species

dehydration A dangerous lack of water in the body

descriptive words Words used to describe characteristics of food; for example, for appearance: translucent, watery, colourful, bright red, and for texture: crunchy, slimy, crisp

design An activity that translates an idea into something useful, making it better and improving quality of life; it fulfils a need

design brief A concise statement clarifying the project task and defining the need or opportunity to be resolved after some analysis, investigation and research. It usually identifies the users, criteria for success, constraints, available resources, timeframe for the project, and may include possible consequences and impacts.

design process A process that typically involves investigating, generating, producing, evaluating, planning and managing to create a designed solution that considers social, cultural and environmental factors

design thinking The use of strategies for understanding design problems and opportunities, visualising and generating creative and innovative ideas, and analysing and evaluating those ideas that best meet the criteria for success and planning

designed solutions The products, services or environments created for a specific purpose or intention as a result of design thinking, design processes and production processes

dextrinisation The process whereby dry heat breaks down starch in foods into a type of sugar called dextrin, which develops a characteristic appearance and flavour

diabetes A group of different conditions characterised by too much glucose in the blood

digestibility The ability to swallow and process the food that is being eaten

discretionary food Foods that are not essential for our health and are characterised by being high in fat, salt and sugar

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dry heat Any cooking technique in which the heat is transferred to the food without moisture. Dry-heat cooking involves high temperatures.
efficient Performing in an organised manner
electric shock Non-fatal exposure to electricity
electrocution Death by electric shock
empty kilojoules Food that contains high levels of energy, such as fat and sugar, and very few, if any, other nutrients
endosperm The main part of the grain
ergonomics A science that seeks to adapt work conditions and equipment to suit the worker and limit injuries and accidents
essential amino acid The building blocks of protein that the body cannot manufacture, so they must be supplied through food
essential fatty acids 'Good' fats; the body does not produce these, so they must be consumed from food such as nuts, avocado and fish
ethics The science of how we should live or attempt to live. Behaviours and decisions that reflect right or wrong.
exclusion Preventing someone from eating a certain food
external factors Factors that influence food choices that are outside a person, for example, advertising and the media
family A group people related by birth, partnerships or adoption. Family can also be a non-biologically related group of people chosen to mutually provide ongoing social support.
fan-forced oven An oven with a fan, which distributes the heat evenly throughout the oven
fat Compound, usually derived from an animal source, which is solid at room temperature and liquid when heated, for example, butter
fat-soluble vitamins Vitamins (A, D, E and K) that are not soluble in water and that need to be stored in the body in either the liver or in fatty tissues. They are transported around the body by special proteins.
fibre Nutrients that cannot be digested by humans and therefore don't contribute to energy input, but are important to gut health
food A substance composed primarily of carbohydrates, fats, water and/or proteins, which is a source of nutrients consumed by humans and animals. Food is required for growth and energy.
food allergy An abnormal immune response to a specific part of a food, usually a protein
food intolerance A chemical reaction to eating a specific food or drink, due to improper digestion of food, which accumulates and causes inflammation
food loss Occurs in the food system from harvest until arrival at the wholesale market
food miles The distance food products travel from where they are produced to where they are purchased and consumed
food poisoning A common illness, usually mild but sometimes deadly, caused by eating contaminated food or drink. Typical symptoms include nausea, vomiting, abdominal cramping and diarrhoea that occur suddenly (within 48 hours) after consuming contaminated food.
food system The web of activities and processes that food goes through as it travels from paddock to plate
food waste Occurs in retail, the food service sector and households
generating Developing and creating a number of different ideas or solutions
germ The smallest part of the grain where the new plant will grow from
globalisation The connectedness of the world
glucose A simple sugar energy source produced by plants along with fructose
glucose units A sugar energy source produced in plant products
gluten A mixture of two different types of protein found in cereal grains
glycaemic index (GI) The ranking of carbohydrates according to their effect on our blood glucose levels. A low GI means the food raises blood sugar levels slowly.
gochugaru Korean red chilli powder that can be purchased at Korean grocery stores or online
good fat Fat that tends to lower cholesterol levels when it replaces saturated fats in the diet, thus reducing the risk of heart disease
greenhouse gas A gas that adds to the greenhouse effect as it can absorb infrared radiation, for example, carbon dioxide and methane
herbs The leaves of plants, used to season food
horticulture The branch of agriculture that deals with plant cultivation, particularly fruits, nuts, seeds, herbs, mushrooms

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hunger The feeling of emptiness in the stomach; your body's signal that it needs food
hunter-gatherer Nomadic person whose diet consisted primarily of wild foods, including those found through hunting and fishing
hybrid An object that combines two different elements
hydrogenated oil Oil hardened by the addition of hydrogen gas, which makes the fat more saturated
hydrolysis A chemical reaction with water that causes decomposition of the muscle fibres
hypertension Persistently elevated blood pressure
hypothalamus The central area in the brain that controls involuntary functions
immigrant A person from overseas who has come to settle in a new country
incomplete protein Protein, usually from plant sources, that lacks one or more essential amino acids
insoluble fibre The indigestible fibrous parts of plants
internal factors Factors that influence food choices of people, for example, family and culture
invertebrate A water animal that has a shell
investigating The problem is developed as a result of critiquing needs or investigating opportunities of designed solutions
kitchen hygiene The prevention of illness and the maintenance of health in the kitchen
lactose intolerant Unable to digest lactose (milk sugar) found in milk and cheese
lean meat Meat with the least amount of fat possible
leavening A chemical that when in contact with water will react and produce carbon dioxide, which is used to help make a product lighter
legumes A plant from the pea family which is high in protein
lifespan The length of time that a person can be expected to live and the stages through which they will progress, for example, infancy and adolescence
lipid Substance that is insoluble in water, such as fat and oil
macronutrients Energy-yielding nutrients that are required by the body, with the recommended intake measured in grams
meat The flesh of an animal that is edible
micronutrients Nutrients required in small amounts by the body
microorganism Single-celled organism that is only visible through a microscope. Three types connected with food are yeast, mould and bacteria.
milling The grinding process that turns cereal grains into flour
minerals Elements required by the body and found in foods
moderate temperature 160 to 180°C
moist heat Any cooking technique that involves cooking with moisture: steam, water, stock, wine or some other liquid. Low temperatures generally are used.
monoculture The process of growing one crop only in a parcel of land
monounsaturated fat Fatty acid that contains one double bond in the carbon chain
mouthfeel How a food or drink feels in the mouth, both on the tongue and palate and between the teeth
multicultural From different cultures and countries
myoglobin A protein found in the muscle tissues which helps provide oxygen to the tissue. It is red in colour and is what colours the liquid that seeps from meat before and after cooking.
nut Edible kernel in a hard shell
nutrient-dense Containing a large amount and number of different nutrients in comparison to the amount of energy they provide
nutrients The chemical compounds found in food that are used by the body to enable it to function and grow
obesity Having a body mass index of 30 or over; being 20 per cent or more above the person's ideal weight according to their height and sex
oil Compound, often derived from a plant source, which is liquid at room temperature, for example, nuts and seeds
osteoporosis A condition where bone density decreases to such a state that bones become fragile and brittle, leading to a high risk of fractures
overweight Having a body mass index over 25
oxidation The chemical combination of a substance with oxygen

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palatable Having a good taste or mouthfeel when eaten

parasite A plant or animal that lives in or on another plant or animal

pasteurisation A process in which milk is heated to a temperature just below boiling point and held at that temperature to kill microorganisms. The milk is not boiled as this would also destroy nutrients.

pâté A paste made from meat, vegetables or fish

pathogenic Bacteria that can cause illness, including food poisoning, in humans

peak bone mass When the body contains the greatest amount of bone

peer group A social group of people who are equal in terms of age

personal hygiene Ensuring good cleaning and washing practices to prevent illness and maintain the health of food and food handlers

photosynthesis The process by which green plants and other organisms turn carbon dioxide and water into carbohydrates

phytochemicals Chemicals found in plants that can help to prevent disease

pickling The process of preserving food in brine or vinegar

plaque A fatty deposit on the inner wall of an artery

polyunsaturated fat Fatty acid that has two or more double bonds in the carbon chain

primi The second dish served as the first course of the main meal, literally meaning 'first'

probiotic A substance that contains live bacteria which supplements a person's normal intestinal bacteria

producing Actively realising (making) the designed solution using appropriate resources and means of production

product One of the outputs of the design and production processes. Products are the tangible end results of natural, human, mechanical, manufacturing, electronic or digital processes to meet a need or want.

project management The process of planning, organising, controlling resources, monitoring timelines and activities, and completing a project to achieve a goal that meets identified criteria for judging success

prototype A trial item made to test an idea or process in order to inform further design development

pulses Dried legumes

purée To blend process, sieve, mash and/or strain cooked food to the consistency of a soft paste or thick liquid

radiation Cooking food by direct heat from a flame or element, such as in a grill, or when electromagnetic waves pass through food, such as in a microwave

rancid A stale smell and flavour in fats and oils

ready-to-eat foods Foods that have been processed before they reach the home kitchen and need limited (if any) further preparation

reduction A process of decreasing the amount of liquid, such as in a stew, to make the sauce thicker

refined When the composition of the cereal grain is altered, the bran is often removed to make the cereal grain easier to use

regulation The control of a process to ensure it functions correctly

religion The belief in and worship of a god or gods, or a system of belief and worship

remote Describes an area determined by a population size of fewer than 5000 people

rennet Made from rennin; an enzyme used for clotting milk. It occurs naturally in the stomach lining of mammals. It coagulates or clots the protein in milk, making it easier to digest.

resistant starch The starchy component that is unable to be digested in the small intestine

resource Something you use to achieve a goal; for example, it could be money, time, available food or your own skills

roux A mixture of equal proportions of butter and flour used as a base for thickening sauces or to make sauces like gravy

rural Describes an area determined by a population size of 25 000 to 99 000 people (large rural) or 10 000 to 24 000 people (small rural)

salmonella A bacterium that causes food poisoning

salt A seasoning and preserving agent made from sodium chloride crystals

saturated fat Fat in which the fatty acid chains have all single bonds, such as those found in animal products like fatty meat and dairy products, and certain plant sources

sauté Cook food in a small amount of fat or oil, in a shallow pan on medium–high heat

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searing Browning the surface of meat with the use of a quick application of high heat, sometimes using oil

seasonal Describes a type of food that is at its best or in abundance at a certain time of the year, determined by the weather

secondi The third dish served as the second course of the main meal, literally meaning 'second'

seed The dried unit of reproduction of a flowering plant such as a poppy

simmering When the cooking liquid is just below boiling point (between 85 and 96°C) and small bubbles are forming and rising to the top

simple carbohydrates Quick energy sources that do not supply any other nutrients except energy

social factors Factors influencing food choice that are related to the interaction of people

soluble fibre The digestible fibrous parts of plants

sound The sense that perceives the sound that a food makes when being cooked, prepared or eaten

specifications Constraints and considerations or issues that will need to be thought about when you come up with a solution

spices The dried seeds, buds, fruits, bark or roots of plants used to season food

spoil Changes in foods to make them unsuitable to eat

spoilage Microbial or enzymatic damage that occurs to the original nutritional value, texture and flavour of food. The food then becomes unsuitable to eat and may be harmful to people.

staple food A food that makes up the dominant part of a population's diet

starter A culture that starts the process of coagulation of the protein

stewing Slow, moist method of cooking less-tender cuts of meat

stroke Damage to the brain caused by interrupted blood flow due to a blood clot blocking or partially blocking an artery

subjective A view about food that is based ion opinion rather than facts; for example, based on taste, appearance, texture, aroma, and sound

tandoor An Indian clay oven that is able to cook food at a high temperature

taste The sense that perceives the flavour or savour of things using the mouth and tongue

tenderise The process of making food softer to eat to make it more palatable for consumption; for example, breaking down collagen in meat to make it softer

terrine A mixture of either meat, fish or poultry and other ingredients, which is cooked and served cold

topography The forms and features of the surface of the land, for example, hills and water bodies

totem An ancestral being represented by a natural object, plant or animal, as the spiritual emblem of a person, family or Country

toxin A poisonous substance produced by living cells or organisms that is active at very low concentrations

trans fat Unsaturated fat that has been processed and behaves like saturated fat; commonly found in processed foods

trans-fatty acid Unsaturated fatty acid that can impact on health by adversely affecting cholesterol levels. This acid is formed during processing of vegetable oils when making semi-solid fats, such as margarine, and can also occur at low levels naturally in the fats of dairy products and meat.

unsaturated fat Fat that has a positive effect on health; these are divided into monounsaturated fat and polyunsaturated fat

vegan A person who eats only plant foods – that is, they do not eat any animal products

vegetables The edible parts of a plant. There are many different vegetables, and we eat different parts of the plant.

vegetarian Generally, a person who eats eggs and dairy products, but does not eat any animal flesh (also called lacto-ovo)

vertebrates Animals or fish with a backbone

vitamin An organic substance vital for correct functioning of the body which is required in small quantities

water-soluble vitamins Vitamins that dissolve in water

whey The liquid in milk, left when cheese is made

wholegrain The fibre-rich outer coating of bran, the central endosperm, and the nutrient-packed inner germ of the grain

yield The measurement of the amount of crop grown per given area of land

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