

Understanding volume, mass and temperature



Learner guide

Working with numbers

Pre-employment skills

Understanding volume, mass and temperature

Version 1.1

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Understanding volume, mass and temperature

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Volume

Volume is the measurement we use to say how much something holds. For example, to find the volume of a cup, you would work out how much liquid it holds. You may also hear people talk about something's 'capacity'. This is another word for volume.

Volume of liquid is measured in:

- millilitres – this is abbreviated (shortened) to mL
- litres – this is abbreviated to L.

$$1000 \text{ millilitres} = 1 \text{ litre}$$

Other numbers you may see when measuring liquid are:

- $\frac{1}{2}$ litre = 500 millilitres
- $\frac{1}{4}$ litre = 250 millilitres.

Story

Jay and Susan have offered to help out with the school fete. Jay has offered to help on the drinks stall while Susan has offered to make food for the day. Both Jay and Susan are good at being creative, but are a bit nervous about serving the right amounts of drink and following measurements in recipes. They decide to go through their cupboards and containers in their fridge and pantry to get a basic understanding of the volumes of different things.

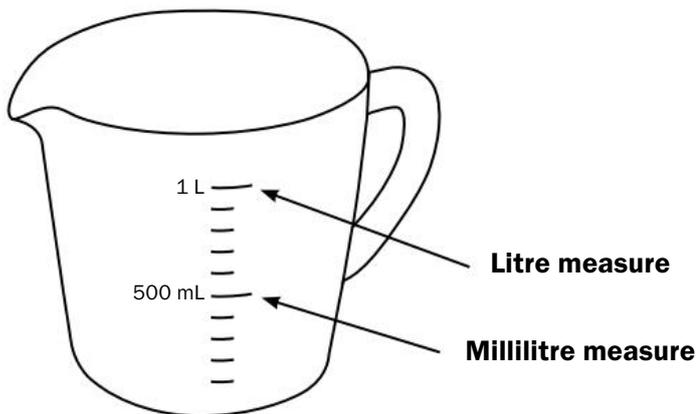
Activity 1

Think about containers or bottles you may have at home or look at them when you visit a supermarket. Make a list of the different things you find that are measured in millilitres or litres.

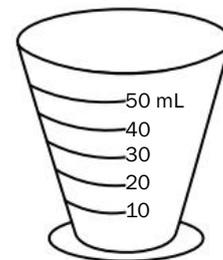
[Click to complete Activity 1](#)

Instruments used for measuring volume

The easiest way to measure a volume of liquid is to use a measuring jug. Jugs may come in different forms, but always have millilitres and litres marked on them. You may also have seen a medicine cup, which has measurements written on the side. This is used for measuring very small amounts of liquid. Other measuring instruments you may have seen, particularly in cooking, are measuring cups. These are different sized cups that each hold a specific amount of liquid.



Jug

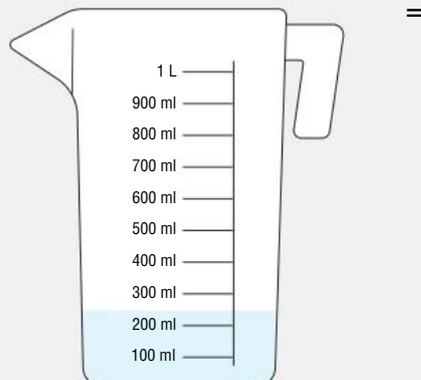


Medicine cup

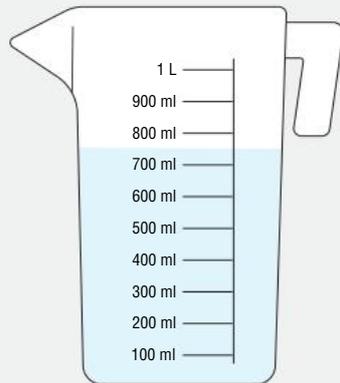
Activity 2

Look at the following jugs. Each jug has a volume of liquid in it, shown by the shading. Write down the volume of millilitres or litres each jug is holding.

1.

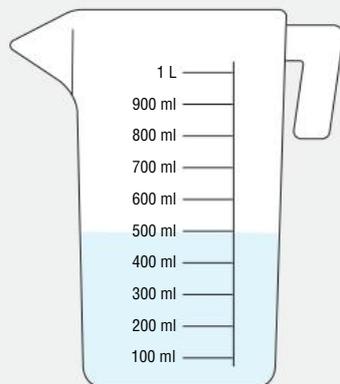


2.



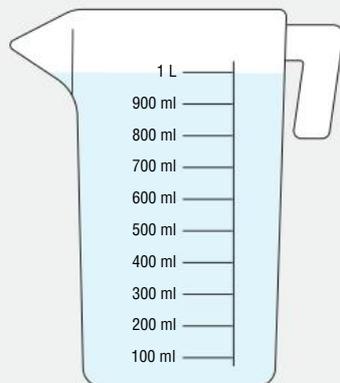
=

3.



=

4.



=

[Click to complete Activity 2](#)

Measurements of more than one litre

Sometimes containers, such as bottles, have volumes that are more than one litre. In this case we write the measurement using either millilitres or litres.

Measurements up to one litre (or 1000 mL) are written in millilitres. Measurements of more than one litre may be written using millilitres or litres; for example:

- 1 litre and 500 millilitres = 1500 mL or 1.5 L
- 3 litres and 200 millilitres = 3200 mL or 3.2 L

Remember, there are 1000 mL in one litre. So if you are working out a measurement from litres to millilitres, multiply the number of litres by 1000. For example:

$$\begin{aligned} 2 \text{ litres and } 250 \text{ millilitres} &= 2 \times 1000 \\ &+ 250 \text{ mL} \\ &= 2000 + 250 \\ &= 2250 \text{ mL} \end{aligned}$$

When writing a measurement in litres, you need to use a decimal point. The decimal point comes after the whole number of litres. You then write the amount of millilitres; however, you can leave off the zeros. For example:

$$2 \text{ litres and } 250 \text{ millilitres} = 2.25 \text{ L}$$

The decimal point comes after the whole number of litres (2). Then you write the amount of millilitres (250) but leave off the zero, so it is written as 25.

For more information about decimals, read Aspire's learner guide *Fractions, percentages, decimals – basic*.

Activity 3

Convert the following volumes into measurements of just litres or millilitres. The first one has been done for you.

Combination	Litres	Millilitres
1 L and 250 mL	1.25 L	1250 mL
2 L and 100 mL		
5 L and 600 mL		
1 L and 750 mL		
2 L and 500 mL		
7 L and 300 mL		
3 L and 250 mL		

[Click to complete Activity 3](#)

Standard units of measurement

Standard units are measurements that everyone agrees on and uses. Imagine you are reading a recipe and it asks for one cup of milk. When you look in your cupboard for a cup to use for measuring, you see four cups of different sizes. Each has a different volume, so which one do you use? To avoid using the wrong amount of milk, you should use a standard cup.

Standard units of measurement have been given millilitre measurements, so you can measure exactly. The standard measurements in millilitres for different measurements used in cooking are:

- 1 cup = 250 mL
- 1 tablespoon = 20 mL
- 1 teaspoon = 5 mL

So, if you need to add one cup of milk, you know you can measure 250 mL.

Activity 4

Convert the volumes of the following measurements from non-standard measurements into millilitres.

For example: 2 cups = 2×250 mL or 500 mL

2 teaspoons = 2×5 mL or 10 mL

Non-standard measurement	Standard measurement (mL)
3 cups	
3 teaspoons	
4 tablespoons	
5 teaspoons	
4 cups	
6 tablespoons	

[Click to complete Activity 4](#)

Story

Jay is working on the drinks stall at the fete. He has been told that the glasses of soft drink he is selling have a line marked on them showing 200 mL. He has been told to fill the glass only to that line so they can sell the most glasses for each bottle. Jay can see that the juice bottles and water bottles come in different sizes, and he wonders how many glasses they will be able to pour for each one.

Activity 5

Calculate how many glasses Jay will be able to sell if the bottles have the following volumes. Remember that each glass holds 200 mL, so divide the size of the bottle (in millilitres) by 200 mL to find the number of glasses.

Bottle	Number of glasses
Water 600 mL	
Cola 1 L	
Lemonade 1.6 L	
Raspberry 2 L	
Fruit juice 3 L	

[Click to complete Activity 5](#)

Story

Jay has just built a sandpit for his children in the backyard. He now needs to buy sand to fill it. He wonders how much he should buy to fill it to the top. He remembers that last time he was at the gardening centre he heard someone asking for sand and they said they wanted two cubic metres. He wonders what this means.

Cubic centimetres and cubic metres

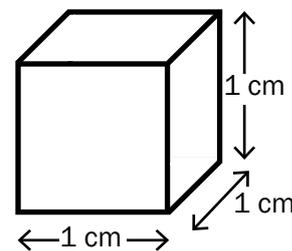
We have looked at measuring the volume of containers holding liquid; however, volume also refers to the amount of space solid objects take up. We measure the volume of solid objects in cubic centimetres and cubic metres. We know that centimetres are smaller than metres. So, cubic centimetres (cm) measure smaller volumes, while cubic metres (m) measure larger volumes.

1 cubic cm is a cube (or area) measuring:

1 cm in length \times 1 cm in width \times 1 cm in height.

It is written as 1 cm^3 .

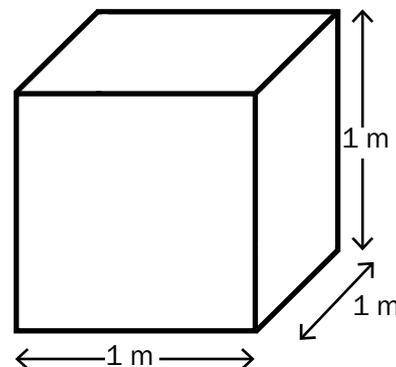
(The number three refers to the three dimensions of the object – the length, width and height.)



1 cubic m is a cube (or area) measuring:

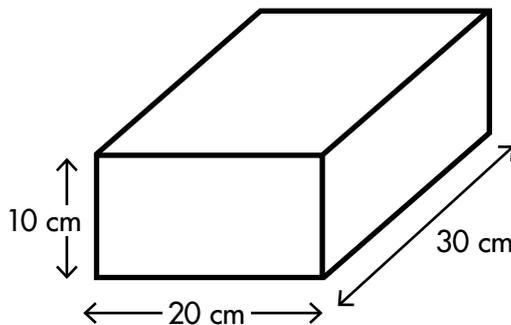
1 m in length \times 1 m in width \times 1 m in height.

It is written as 1 m^3 .



Calculating the volume of solid objects

Boxes or containers in the shape of a rectangle are called rectangular prisms. A shoebox is a rectangular prism. Say the shoebox measures 30 cm long, 20 cm wide and 10 cm high.



To work out the volume of the shoebox, or how many cm^3 the shoebox is, the sum we need to do is:

length \times width \times height

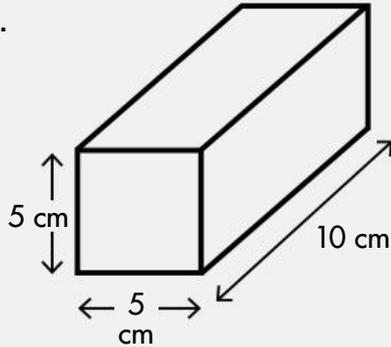
OR

$$30 \times 20 \times 10 = 6000 \text{ cm}^3.$$

Activity 6

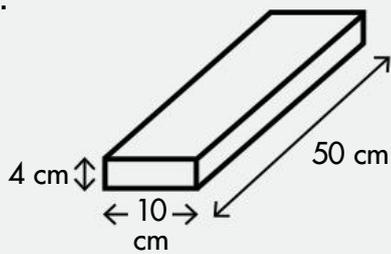
Look at the pictures of the following rectangular prisms and work out the volume using the sum: length \times width \times height = volume.

1.



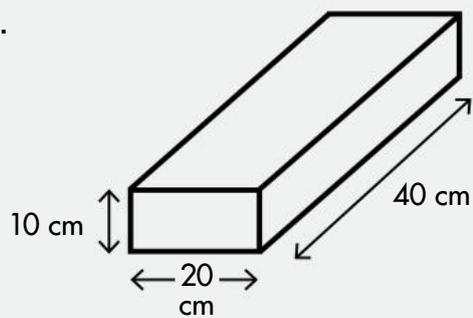
Volume =

2.



Volume =

3.



Volume =

[Click to complete Activity 6](#)

Mass

Mass is another word for weight. So, when you want to know the mass of something, you are working out its weight.

Here are the units of measurement used to measure mass:

- Grams – this is abbreviated to g. Grams are used to measure the mass of small things such as salt, herbs and small amounts of fruit and vegetables.
- Kilograms – this is abbreviated to kg. Kilograms are used to weigh larger, heavier objects such as people, luggage and bulk bags of food, fruit or vegetables.
- Tonnes – this is abbreviated to t. Tonnes are a very heavy weight of measurement and are rarely used to weigh household items. Objects like cars, loads on trucks and building materials like bricks are measured in tonnes.

1000 grams = 1 kilogram

1000 kilograms = 1 tonne

Other weight measurements you may come across that are useful to know are:

- $\frac{1}{2}$ kilogram = 500 grams
- $\frac{1}{4}$ kilogram = 250 grams.

Weight words

Here are some other words you may hear that refer to mass:

- Lighter or lightest – if something is lighter, it weighs less than something else. If something is the lightest, it has the least amount of mass.
- Heavier or heaviest – if something is heavier, it weighs more than something else. If something is the heaviest, it has the most amount of mass.

Activity 7

Think about each of the following objects. Then place a tick in the column to say what unit of measurement (grams or kilograms) you would choose to weigh each object.

Object	Grams	Kilograms	Tonnes
Two mushrooms			
Yourself			
An elephant			
A semitrailer			
Two dozen apples			
A cupcake			

[Click to complete Activity 7](#)

Story

Susan's son is going on a school excursion to the fruit market. Susan has offered to help on the day. The children need to buy different fruits and vegetables to make a meal. The teacher has worked out how much of each ingredient they need to buy in order to follow the recipe. Susan is not really sure how to weigh things correctly or what the numbers mean. She is worried that she may buy too much or too little, so she decides to ask her friend who works at the market for help.

Weighing food

When buying most fresh foods, including fruit, vegetables and meat, the item is weighed. This is because these foods are sold by their weight; for example, apples are sold for \$2.99 per kilogram. So, loose food such as fruit or vegetables need to be weighed to calculate how much you have bought, and how much you must pay.

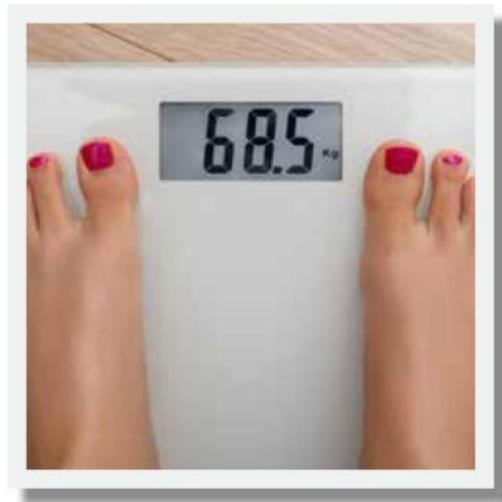
If you look around the fruit section at your supermarket you will see scales available for weighing. This allows you to measure the mass of what you are buying. There are also scales at the cash register, which calculate how much you need to pay for the food you buy.

Some foods come pre-packaged. These have already been weighed and have their mass marked on them in grams or kilograms.



Measuring mass

Scales are used to measure an object's mass and come in many shapes and forms. Scales may be small enough to measure a grain of sand, or big enough to weigh the contents on a semitrailer. Scales need to be suitable for the object they are weighing. For example, you wouldn't try to weigh yourself on a set of supermarket or kitchen scales.



Reading measurements on scales

Most scales used today are digital, like the ones pictured. This means they have numbers displayed on a screen to give the measurement. Scales all start at zero and then measure in grams and kilograms. It is important to check the scales before you place your goods on them. Make sure the screen says '0'. Also make sure the scales are on a flat and even surface. This will make sure you get an accurate reading.

Activity 9

Look at the following scales and write the weight in grams that each set of scales is showing.



[Click to complete Activity 9](#)

Story

Susan has learnt about weighing from her friend and is now confident about helping the children buy their goods. Their shopping list has the quantity for some of the fruit they need to buy; for example, 10 bananas. But for other fruits, the amount is listed in kilograms; for example, 1.5 kilograms of tomatoes.

Susan knows she'll need to weigh the tomatoes to buy the right amount. When the children put some tomatoes on the scales, the reading goes past 1 kilogram, but doesn't quite make it to 2 kilograms. The children ask Susan how many kilograms she has bought. Susan explains that this weight is a mixture of kilograms and grams.

She then explains the different ways of saying these weights. For example; 1 kilogram and 600 grams can be written as 1.6 kilograms or 1600 grams. They mean the same thing.

Activity 10

Complete the following table. Look at the combination of weights and then fill in the two different ways they can be written – in kilograms and grams.

Note: writing the mass in kilograms using a decimal point is the same as when writing a measurement in litres. So, the decimal point comes after the whole number of kilograms, and then you write the grams. Remember, you can leave off the zeros in the kilogram measurement.

Combination	Kilograms	Grams
1 kg and 500 g	1.5 kg	1500 g
2 kg and 100 g		
3 kg and 250 g		
1 kg and 100 g		
2 kg and 200 g		
7 kg and 900 g		
4 kg and 150 g		

[Click to complete Activity 10](#)

Volume and mass

After looking at the ways we measure volume (capacity) and mass (weight), you now need to learn how to choose the right measurement for your needs.

Choosing the right units of measurement

When you look at the object you need to measure, think about what you have already learnt. Volume is the measurement of how much something can hold or how much space an object takes up. Volume measures both liquids and solids. Mass refers to how much something weighs – usually the substance is in a solid form.

Activity 11

1. Write the abbreviations for the following measurements.
 - a. Millilitre = _____
 - b. Litre = _____
 - c. Cubic centimetre = _____
 - d. Cubic metre = _____
 - e. Gram = _____
 - f. Kilogram = _____
2. Choose the most appropriate unit to measure the following objects.
 - a. Water in a bath = _____
 - b. The amount of space in a shoebox = _____
 - c. A glass of water = _____
 - d. A tub of butter = _____
 - e. The amount space in your bedroom = _____
 - f. Yourself = _____

[Click to complete Activity 11](#)

Story

Susan is on the parents' committee at her daughter's school. They are trying to raise funds to build a new garden for the children. They decide to run a cake stall at the local market to raise money. Susan is happy to help and is a good cook. She doesn't usually follow recipes – she just adds ingredients as needed.

This time, the committee has given her four cakes to make, which means she'll need to follow the recipes exactly. Susan will have to find her kitchen scales and measuring cups for these recipes. Before she starts, Susan goes through all the recipes and adds up the ingredients so she can work out how much of each item she needs to buy.

Activity 12

Add up the following ingredients and get a total amount. For each answer, write the amounts in both grams and kilograms, or millilitres and litres.

Make sure you use the correct unit of measurement in your answers.

	Flour	Milk	Sugar	Water
	100 g	150 mL	250 g	250 mL
	500 g	250 mL	400 g	500 mL
	250 g	300 mL	500 g	400 mL
	300 g	500 mL	200 g	300 mL
TOTAL (g or mL)				
TOTAL (kg or L)				

[Click to complete Activity 12](#)

Note: sometimes recipes use cup measurements instead of grams or kilograms. If this is the case, follow what the recipe says. There is no set weight for a cup to equal a solid amount of food, because different foods have different weights. For example, one cup of rice weighs more than one cup of icing sugar and one cup of sugar weighs more than one cup of flour.

Story

Susan takes her shopping list of ingredients to the supermarket. When she goes to get the ingredients, she can't decide if it's cheaper to buy the big packets of flour and sugar or the smaller packets. She wonders the same for the bottles of milk.

Calculating the best buy

When food comes in packets or bottles, look at how much each packet or bottle costs. You then need to work out the best buy: how to buy the amount you need for the least amount of money. For example, if you need to buy 2 kg of flour, is it cheaper to buy one 2 kg packet, two 1 kg packets or four 500 g packets?

To work out the best buy, calculate how much 1 kg costs and then compare the other amounts. For example, say:

- 500 g flour is \$0.80
- 1 kg flour is \$1.20
- 2 kg flour is \$2.50.

If you need 2 kg, you'd need:

- 4×500 g bags, which is $4 \times \$0.80 = \3.20
- 2×1 kg bags, which is $2 \times \$1.20 = \2.40
- 1×2 kg bag, which is \$2.50

From your calculations, you can see that it is the best to buy 2×1 kg bags for \$2.40, because this is the least amount of money.

Activity 13

These are the totals of the ingredients that Susan needs to buy for her cakes.

Flour – 4 kg Sugar – 2 kg Milk – 6 L

Look at the prices of the following packets and bottles to work out which is the best way for Susan to buy the ingredients to spend the least amount of money.

1. Flour: 1 kg packet costs \$1.20
 2 kg packet costs \$2.50
 4 kg packet costs \$4.75

The best way to buy the flour is:

2. Sugar: 500 g packet costs \$1.00
 1 kg packet costs \$1.50
 2 kg packet costs \$3.20

The best way to buy the sugar is:

3. Milk: 1 L bottle costs \$1.50
 2 L bottle costs \$2.50
 3 L bottle costs \$3.30

The best way to buy the milk is:

[Click to complete Activity 13](#)

Story

After Susan helps at the school cake stall, they find they have raised \$500. This is enough to set up a vegetable garden and a sandpit. The parents decide to mark out the area for the sandpit. The other parents wonder how much sand they'll need to fill it. Susan tells them she and her husband have done this at home and that they need to work out how many cubic metres the sandpit is.

Remember when we looked at cubic metres? To work out cubic metres you have to do the following calculation:

$$\text{length} \times \text{width} \times \text{height} = \text{m}^3$$

Activity 14

The size of the sandpit is:

- 4 m long
- 5 m wide
- 1 m high

What is the volume of the sandpit in cubic metres?

[Click to complete Activity 14](#)

When you buy garden products like soil or sand, they are often sold by the cubic metre. They may also be sold in 10 kg or 20 kg bags, or bigger. If so, you need to find out how many cubic metres one bag fills, and then buy as many bags as you need.

Activity 15

You now know that the sandpit is 20 m^3 .

The garden supply store that the school uses only sells sand in 40 kg bags. If one cubic metre contains 12 bags of sand, how many bags does Susan need to buy to fill the sandpit?

[Click to complete Activity 15](#)

Estimating volume and mass

Sometimes you may not have an instrument available to measure volume or mass. In this case you need to estimate (guess) how much something weighs or how much liquid an object can hold.

Estimating mass

When you are at home, try to find a packet in your cupboard that weighs 1 kg. Hold this in one hand. Hold the object you want to know the weight of in your other hand and compare them. Does the object you have feel heavier or lighter than the 1 kg? For bigger objects, instead of holding them, compare them to yourself; for example, do you think an object is heavier or lighter than you?

Estimating volume

To estimate volume, find something in your house that is 1 litre; for example, a litre of milk or an empty 1-litre bottle. You can then fill the empty bottle with the liquid you have, to see if it is more or less than one litre. Or, compare the two containers and decide if the one you are estimating looks bigger or smaller than one litre.

Activity 16

Estimate the volume or mass of some household objects. Then, check your estimate by measuring or weighing the item or reading the label.

[Click to complete Activity 16](#)

Temperature

Temperature is the measurement of how hot or how cold something is. Temperature is measured in degrees Celsius. It is named Celsius after the Swedish astronomer Anders Celsius who designed the Celsius temperature scale in the 1700s.

Degrees Celsius is abbreviated to °C

There are different temperatures that can be measured; for example:

- air temperature, which is dictated by the weather and the seasons
- body temperature, which should be about 37 °C in a healthy person.

Other set temperatures are:

- the boiling point of water is 100 °C
- the freezing point of water is 0 °C.

Different objects or instruments can alter temperatures. For example, you can use an oven to heat the temperature of food, or a freezer to cool the temperature of food. An air conditioner cools the temperature of the air, and a heater warms it.

These appliances have thermostats built into them, which help maintain the right temperature. In fact, many household appliances have thermostats built into them.

Activity 17

Make a list of appliances in your home that have a thermostat built into them to help control temperature.

[Click to complete Activity 17](#)

Temperature words

When talking about temperature, some common words used are:

- hottest – meaning something has the highest temperature
- coldest or coolest – meaning something has the lowest temperature.

Instruments used to measure temperature

The main instrument used to measure temperature is called a thermometer.

There are different types of thermometers including:

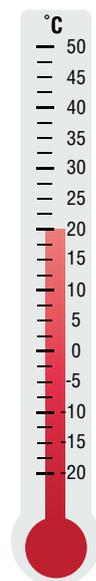
- ambient temperature thermometers – these are used to measure air temperature
- clinical thermometers – these are used to measure body temperature.

Story

Jay's friend Dave has come from England to stay with him for three weeks over Christmas. Dave isn't used to the very hot weather. He asks Jay how he knows exactly what the temperature is. Jay keeps a weather station outside his house and explains to Dave how to read the thermometer.

How to read a thermometer

Inside a thermometer there is a line. This is a liquid metal called mercury. When the temperature changes, the mercury goes up or down according to how hot or cold it is. A thermometer has a temperature scale marked along the line. The scale usually increases by 5 or 10 degrees and there are lines marking the numbers in-between, similar to the millimetre markings on a ruler.



Ambient thermometer

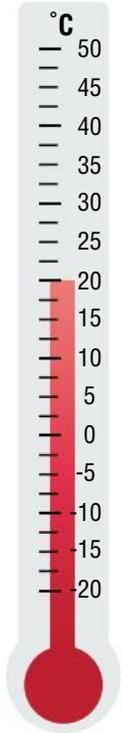
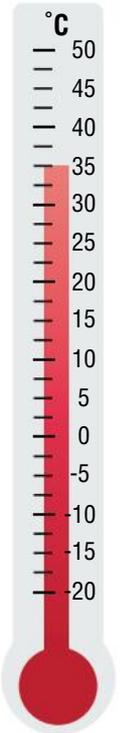
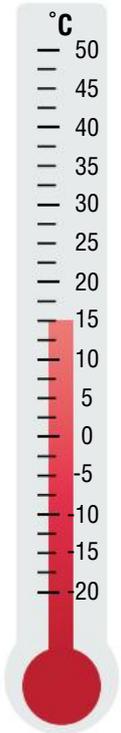
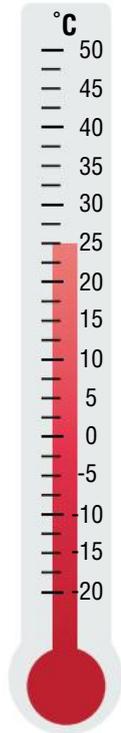
A thermometer is different from other measuring devices because it does not start at zero. A thermometer goes below zero into negative numbers. This is because during the cold months of winter the temperature can drop below zero. Have you ever heard someone say it is minus 20 °C (–20 °C)? This means the temperature is 20 degrees below zero.

Today, most thermometers are digital. This means they don't have scale markings on them, they just give you a readout of the temperature, similar to the display on a digital clock.



Activity 18

Look at each of the thermometers. Next to each one, write the temperature they are displaying. Remember, if the mark is not exactly on a number you must add on the lines. The first one has been done for you.

			
20 degrees celcius	1.	2.	3.

[Click to complete Activity 18](#)

Story

Jay's friend Dave decides that he would like to come back to Australia for another holiday, but not when it is so hot. He asks Jay what the weather is usually like at other times of the year. Jay explains that if Dave doesn't like hot weather then it is best not to come from December to January. Jay says that the best time to visit is in spring, during September, October and November, when the temperature is around 20 °C.

Air temperature and the weather

The temperature we feel around us inside and outside is called air temperature. This temperature is affected by the weather and the seasons.

In Australia the seasons occur in the following months:

- Summer – December, January, February
- Autumn – March, April, May
- Winter – June, July, August
- Spring – September, October, November

Summer has the hottest temperatures and winter has the coldest temperatures. Some days may be unusually hot or cold, but generally the temperatures are fairly even throughout the seasons.

Activity 19

Look at the following temperatures and place each one next to the season that you think would have this temperature.

37 °C

24 °C

5 °C

16 °C

Season	Temperature
Summer	
Autumn	
Winter	
Spring	

[Click to complete Activity 19](#)

Body temperature

The ideal body temperature for a healthy person is about 37 °C. Today, most thermometers used to take your body temperature are digital. A sensor is inserted into your ear and a temperature reading is provided almost instantly.

You can also use a clinical thermometer. This is a small thermometer that you usually put under your tongue for a few minutes. You then read the thermometer by looking where the mercury goes up to. If it is much over 37 °C, this means you have a fever and may need to go to the doctor.

Story

Jay's friend Luke has just moved out of home and into a unit by himself. He goes shopping for the first time and now has bags full of groceries to unpack. When he lived at home his mum knew where everything went. But now when Luke looks at all his groceries, he wonders what should be kept in the pantry, the fridge and the freezer.

Luke calls Jay for advice. Jay tells him that it's a good idea to read the packets as they usually have storage instructions on them. Jay also tells Luke that some things, like a tin of baked beans, can be kept in the pantry until they are opened. They should then be covered and put in the fridge.

Food temperatures

Things that are kept in the pantry are kept at what we call room temperature. This is the temperature of the air in the house. However, some foods, such as fresh fruit, vegetables and meat, must be kept cool or they may go bad. These things should be kept in the fridge below 5 °C.

Some foods should be kept in a place even colder than the fridge. These foods should be kept in the freezer. Remember we said that freezing point is 0 °C? Your freezer should ideally be set to less than 0 °C. About -5 °C is an ideal temperature. You can tell if your freezer is broken if the food in it doesn't stay frozen. This means the temperature in the freezer is higher than 0 °C, and the food has started to defrost.

Story

Luke decides he will cook for his first night in his new home. He follows the recipe exactly, but when he goes to put his dinner in the oven he is confused. The recipe says to cook his dinner for one hour at 375° Fahrenheit. Luke checks his oven and sees that it only goes up to 300 °C. Luke has heard the word Fahrenheit and knows it is a temperature measurement, but doesn't know how to convert the temperature in the recipe to °C. He rings his friend who is a chef and will know what temperature to set the oven at.

Fahrenheit and Celsius

Sometimes you may see temperatures written in degrees Fahrenheit (°F). This is a temperature scale that was used in Australia until the 1970s, when the Celsius temperature scale was introduced. When using the Fahrenheit scale, the freezing point of water is 32°F and the boiling point is 212°F. They are very different measurements from the Celsius measurements.

You may see oven temperatures in some recipes given in degrees Fahrenheit, because some countries, such as the United States, still use the Fahrenheit temperature scale.

Here are some basic conversions of degrees Fahrenheit to degrees Celsius. These are high temperatures that would only be used in cooking.

Fahrenheit	Celsius
250 °F	121 °C
275 °F	135 °C
300 °F	149 °C
350 °F	177 °C
400 °F	204 °C
450 °F	232 °C
500 °F	260 °C

What you have learnt

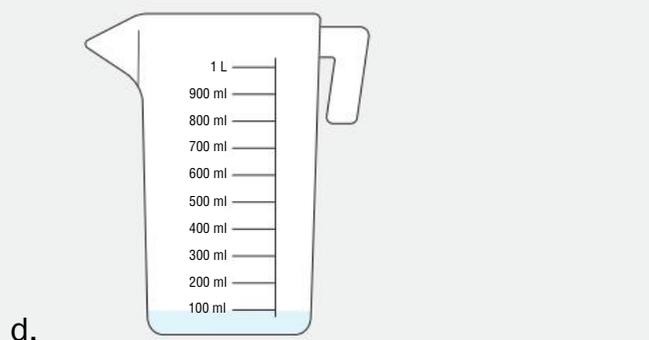
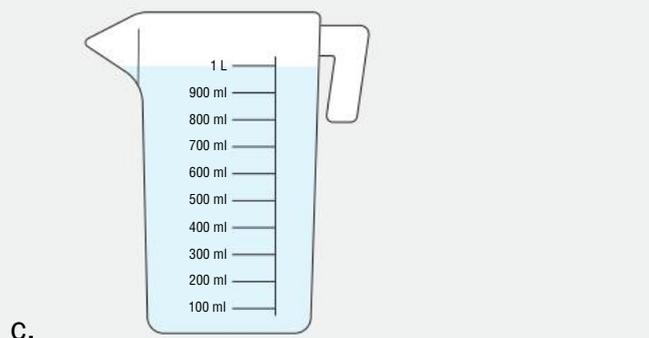
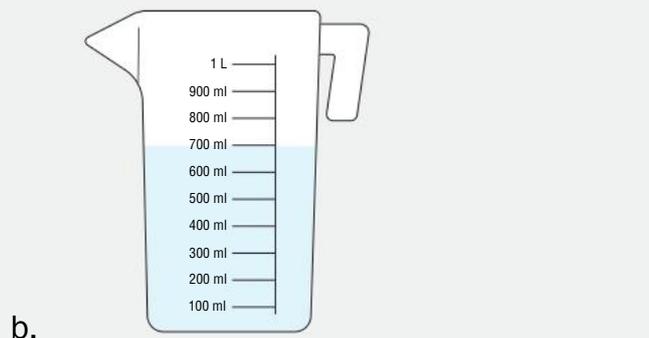
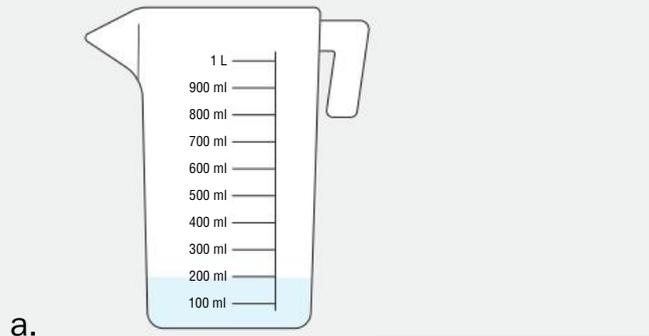
Put a ✓ in the box when you have learnt these things.

- Volume (or capacity) is a measurement that tells us how much something holds.
- Liquid volume is measured in millilitres (mL) or litres (L) and may be written in millilitres, 2500 mL or litres, 2.5 L.
- There are also standard units of measurement; for example, 1 cup = 250 mL, 1 tablespoon = 20 mL and 1 teaspoon = 5 mL.
- The volume or amount of space a solid object takes up is measured in cubic cm (cm³) and cubic metres (m³).
- The volume of solid objects is calculated using the following sum: length × width × height = volume.
- Mass refers to an object's weight and is measured in grams (g), kilograms (kg) or tonnes (t).
- Scales are the most common instrument used to measure mass.
- Temperature is the measurement of how hot or cold something is and is measured in degrees Celsius (°C).
- Set temperatures include the boiling point of water (100 °C) and the freezing point of water (0 °C).
- The most common instrument used to measure temperature is a thermometer.

Check your learning

Answer the following questions.

1. Next to each jug, write the amount it contains.



2. Put the following volumes in order from largest to smallest. You may need to convert the volumes to the same unit of measurement to make it easier.

1.75 L	500 mL	750 mL	0.4 L
1000 mL	1300 mL	1.9 L	250 mL

3. Complete the following table to show the volume of each box.

Length	Width	Height	Volume (cm ³)
5 cm	2 cm	4 cm	
5 cm	4 cm	3 cm	
8 cm	3 cm	2 cm	
10 cm	5 cm	2 cm	

4. Look at the following objects in Column 1 and place them in order from lightest to heaviest in Column 2.

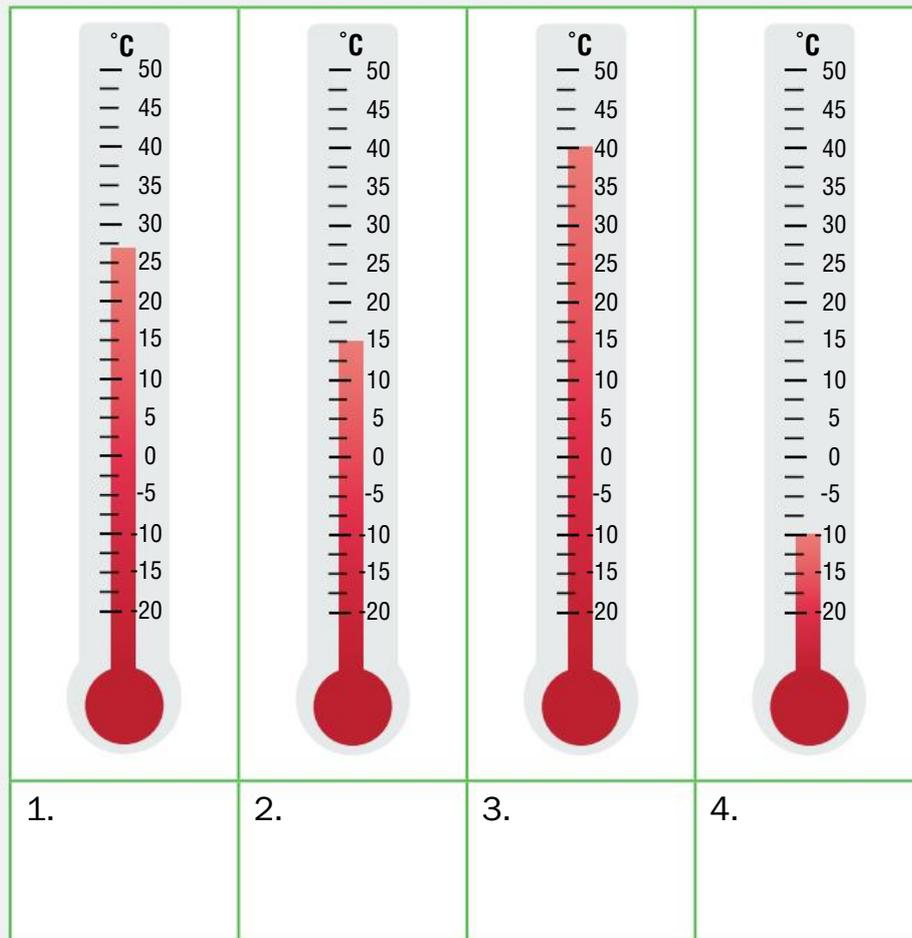
Column 1	Column 2
A banana	
A bus	
A feather	
5 bricks	
A watermelon	
A cow	

5. Look at the following amounts of money and work out how many kilograms of oranges you could buy if they cost \$2.50 per kilogram.
- \$10.00 = _____ kilograms
 - \$5.00 = _____ kilograms
 - \$2.50 = _____ kilograms
 - \$15.00 = _____ kilograms
 - \$20.00 = _____ kilograms
6. Use the words heavier, lighter, more or less to fill in the gaps in the following sentences.
- An elephant is _____ than a dog.
 - A bucket holds _____ water than a swimming pool.
 - A coin is _____ than a tub of butter.
 - A tablespoon holds _____ liquid than a teaspoon.

7. Choose the best estimate for the following objects. Remember the amounts shown are estimates and not the exact weight.

Object	Estimate
An orange	200 g or 2 kg
A kitchen sink filled with water	500 mL or 5 L
A glass of water	2 L or 200 mL
A laptop computer	2 kg or 2 tonnes
A trailer of soil	2 m ³ or 5 kg
A bottle of milk	2 L or 20 mL

8. Next to each thermometer, write the temperature it is showing.



9. Choose the correct option.

100, 37 and 0

- a. The boiling point of water = _____ °C
- b. The freezing point of water = _____ °C
- c. The ideal body temperature = _____ °C

Click to complete

Answers

Answers to activities

Activity 1

Many things may be measured in millilitres and litres; for example: soft drink, cans of soup, milk, juice, ice-cream, yoghurt, sauce, cooking oil, liquid washing detergent, petrol, etc.

Activity 2

Answer to Question 1

250 mL

Answer to Question 2

750 mL

Answer to Question 3

500 mL

Answer to Question 4

1000 mL or 1 L

Activity 3

Combination	Litres	Millilitres
1 L and 250 mL	1.25 L	1250 mL
2 L and 100 mL	2.1 L	2100 mL
5 L and 600 mL	5.6 L	5600 mL
1 L and 750 mL	1.75 L	1750 mL
2 L and 500 mL	2.5 L	2500 mL
7 L and 300 mL	7.3 L	7300 mL
3 L and 250 mL	3.25 L	3250 mL

Activity 4

Non-standard measurement	Standard measurement (mL)
3 cups	750 mL
3 teaspoons	15 mL
4 tablespoons	80 mL
5 teaspoons	25 mL
4 cups	1000 mL (or 1 L)
6 tablespoons	120 mL

Activity 5

Bottle	Number of glasses
Water 600 mL	3
Cola 1 L	5
Lemonade 1.6 L	8
Raspberry 2 L	10
Fruit juice 3 L	15

Activity 6**Answer to Question 1**

$$5 \times 5 \times 10 = 250 \text{ cm}^3$$

Answer to Question 2

$$50 \times 10 \times 4 = 2000 \text{ cm}^3$$

Answer to Question 3

$$40 \times 20 \times 10 = 8000 \text{ cm}^3$$

Activity 7

Object	Grams	Kilograms	Tonnes
Two mushrooms	✓		
Yourself		✓	
An elephant			✓
A semitrailer			✓
Two dozen apples		✓	
A cupcake	✓		

Activity 8

Examples of food measured in grams or kilograms include flour, sugar, salt, pasta, canned fruit, frozen vegetables, fresh fruit and vegetables, cereal, biscuits, frozen fish, chocolate and lollies.

Activity 9**Answer to Question 1**

200 g

Answer to Question 2

575 g

Answer to Question 3

1000 g

Answer to Question 4

2025 g

Activity 10

Combination	Kilograms	Grams
1 kg and 500 g	1.5 kg	1500 g
2 kg and 100 g	2.1 kg	2100 g
3 kg and 250 g	3.25 kg	3250 g
1 kg and 100 g	1.1 kg	1100 g
2 kg and 200 g	2.2 kg	2200 g
7 kg and 900 g	7.9 kg	7900 g
4 kg and 150 g	4.15 kg	4150 g

Activity 11**Answer to Question 1**

- Millilitre = mL
- Litre = L
- Cubic centimetre = cm^3
- Cubic metre = m^3
- Gram = g
- Kilogram = kg

Answer to Question 2

- Water in a bath = litres
- The amount of space in a shoebox = cubic centimetres
- A glass of water = millilitres
- A tub of butter = grams
- The amount space in your bedroom = cubic metres
- Yourself = kilograms

Activity 12

Flour	Milk	Sugar	Water
100 g	150 mL	250 g	250 mL
500 g	250 mL	400 g	500 mL
250 g	300 mL	500 g	400 mL
300 g	500 mL	200 g	300 mL
1150 g or 1.15 kg	1200 mL or 1.2 L	1350 g or 1.35 kg	1450 mL or 1.45 L

Activity 13**Answer to Question 1**

The 4 kg pack for \$4.75

Answer to Question 2

2 x 1 kg packs for a total of \$3.00

Answer to Question 3

2 x 3 L bottles for a total of \$6.60

Activity 14

20 m³

Activity 15

20 x 12 = 240 bags of sand

Activity 16

Answers will vary depending on the items chosen.

Activity 17

Appliances include: a hot water service, kettle, air conditioner, heater, hair dryer, washing machine, dishwasher, clothes dryer, microwave, oven, electric blanket, fridge, freezer, etc.

Activity 18**Answer to Question 1**

35 °C

Answer to Question 2

15 °C

Answer to Question 3

25 °C

Activity 19

Season	Temperature
Summer	37 °C
Autumn	16 °C
Winter	5 °C
Spring	24 °C

Answers to Check your learning

Answer to question 1

- a. 200 mL
- b. 700 mL
- c. 1000 mL or 1 L
- d. 100 mL

Answer to question 2

- 250 mL
- 0.4 L (or 400 mL)
- 500 mL
- 750 mL
- 1000 mL
- 1300 mL
- 1.75 L (or 1750 mL)
- 1.9 L (or 1900 mL)

Answer to question 3

Length	Width	Height	Volume (cm ³)
5 cm	2 cm	4 cm	40 cm ³
5 cm	4 cm	3 cm	60 cm ³
8 cm	3 cm	2 cm	48 cm ³
10 cm	5 cm	2 cm	100 cm ³

Answer to question 4

Column 1	Column 2
A banana	A feather
A bus	A banana
A feather	A watermelon
5 bricks	5 bricks
A watermelon	A cow
A cow	A bus

Answer to question 5

- a. \$10.00 = 4 kg
- b. \$5.00 = 2 kg
- c. \$2.50 = 1 kg
- d. \$15.00 = 6 kg
- e. \$20.00 = 8 kg

Answer to question 6

- a. An elephant is **heavier** than a dog.
- b. A bucket holds **less** water than a swimming pool.
- c. A coin is **lighter** than a tub of butter.
- d. A tablespoon holds **more** liquid than a teaspoon.

Answer to question 7

Object	Estimate
An orange	200 g
A kitchen sink filled with water	5 L
A glass of water	200 mL
A laptop computer	2 kg
A trailer of soil	2 m ³
A bottle of milk	2 L

Answer to question 8

- a. 27 °C
- b. 15 °C
- c. 40 °C
- d. -10 °C

Answer to question 9

- a. The boiling point of water = 100 °C
- b. The freezing point of water = 0 °C
- c. The ideal body temperature = 37 °C