YEAR 7

SCIENCE ASSESSMENT
TERM 1

REVISION PACK

Topics:

- Introducing Science
- Cells
- Particles

SS25 Revision skills

What did you eat for breakfast on Wednesday two weeks ago? Very few people will be able to answer this question! Things that are not important to remember get stored in your brain's **short-term memory**. To remember things for a test or SATs paper, you need to store information in your **long-term memory**.

When revising

1 divide your revision into small chunks of between 20 and 40 minutes

2 take a break (5–10 minutes) between each 'chunk' of revision.

How to revise

1 This step gets things into your short-term memory.

Write down key words and short notes, while you are revising.

We can all read pages and pages of information without taking it in. Our minds are very good at day-dreaming! However, do not rewrite *all* your notes. That is a waste of time.

2 This step gets things into your long-term memory.

Once you have written down key words for a particular topic, look through them again.

If possible, spend 5 or 10 minutes in the evening, going through the key words and short notes you have made that day. The more you look at these brief notes (**reviewing**), the more likely the information is to stick in your long-term memory. Make sure you do this step, otherwise you will lose the information you have worked hard to get into your short-term memory.

3 This step makes sure that things stay in your long-term memory for years to come.

Use learning skills.

- You could try **repeating** things you need to learn, over and over again.
- You could try making up silly words of phrases (**mnemonics**) to help you remember.
- You could try drawing diagrams to help you remember. **Mind maps** are often helpful.
- You can find out more about Mind Maps on Skills Sheet 7.

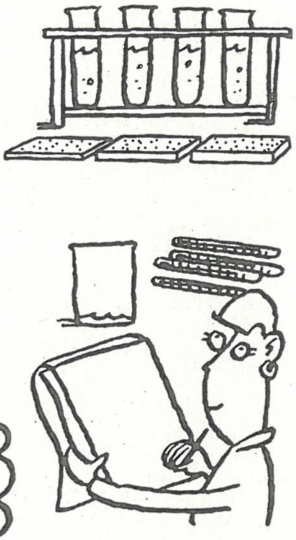
S Developing skills in: revision

SS10 More about investigations

SS 10

Planning

Think about what you want to investigate and write it down.



Write down what you are going to do and what ***apparatus*** *you will use. Also write down how you plan to do your investigation safely.*

Make sure you plan a ***fair test*** *and change only one* ***variable*** *at a time.*

Write down what you think will happen. This is your ***prediction.*** *Try to base your prediction on some scientific knowledge that you have and use scientific words.*

Obtaining and recording your results

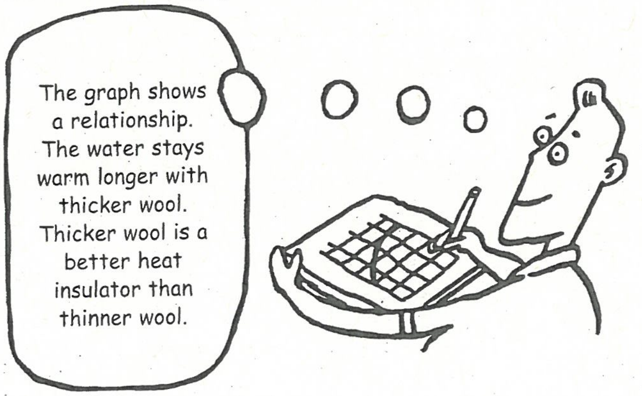
Make measurements and observations very carefully. Make sure you remember to write down the ***units*** *you use.*

Sometimes you might have to do part or all of your experiment again to check your results.

You need to write your results neatly as a table. Then draw a bar chart or a line graph to show your results. Bar charts are used when the variable that you have changed is written in words. Line graphs are used when the variable that you have changed can be shown as a regular series of numbers.

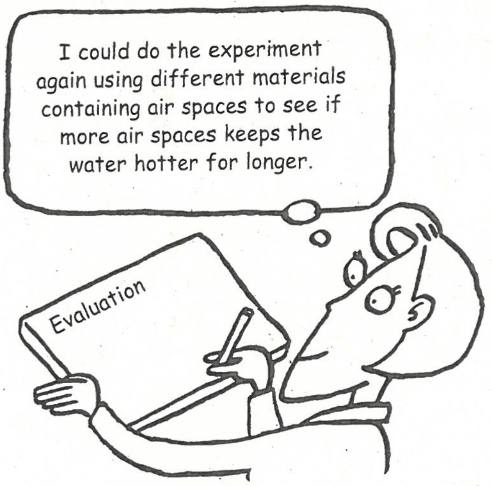
SS10 More about investigations (continued)

Considering your results

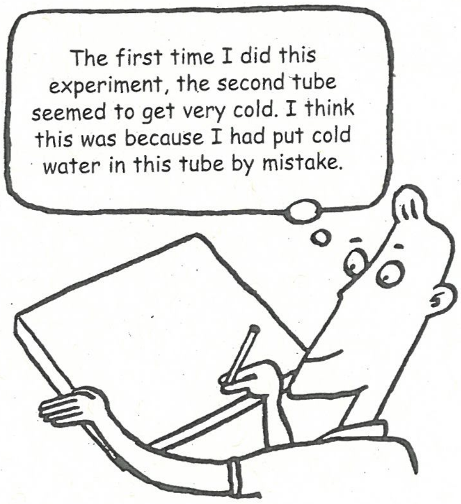


Use your graph to find the pattern in your results. Use scientific language.
Often one thing changes as you change your variable. If this happens in a simple way it is called a **relationship**.

Evaluation



Write down how you might improve your experiment or extend it to find out other things to support your ideas.



Write down why you think any part of your investigation did not work out as you expected.

1 What are **variables**?
2 a Which variable did the pupil change?
  b Which variables do you think he/she should have kept the same?
  c What **relationship** did he/she find?
3 When would you draw a bar chart of your results and when would you draw a line graph?
4 How do you think this experiment could be improved or extended?

Developing skills in: planning, observing, considering, evaluating

SS11 Going further with investigations

Use these questions to help you plan and do your investigation. Think carefully about each question.

Planning

- What are you trying to find out?
- What are the **variables** (the things that change)?
- Which variable will you change? (This is the **input** variable.)
- What variable will you measure? (This is the **output** variable.)
- Write down the input variable and the output variable.

The **input** (or **independent**) **variable** is the variable that you are going to change.
The **output** (or **dependent**) **variable** is the variable that you are going to measure. It is the variable that you think will change each time you change the input variable.
For example: if a football is dropped from a series of different heights it will bounce back up to a certain height. If you change the height that you drop the ball from (the input variable) you can measure how high it bounces (the output variable).

SS11

- What are you going to do make sure this is a **fair test**? Write down the **controlled variables**. Are there any variables which will be difficult to control? How might these affect your investigation?

The **controlled variables** are the things that you will keep the same. In the experiment above, the material that the ball is made out of, its size, and the surface it is being dropped onto are all examples of controlled variables.

- What equipment will you use? How will you use it to get accurate measurements?
- How will you make sure you are safe while doing your experiment?
- What do you think will happen? What scientific idea makes you think this? How do you know this? You may have to look some things up to help you **predict** what will happen.

SS11 Going further with investigations (continued)

Recording your results

- Write down your results, as accurately as you can, in a table. Don't forget to include all the units. Make sure you make enough measurements. The more you take the more likely you are to find a pattern. You should try to take at least 5 measurements.
- Try to identify any results that are not fitting the pattern and repeat those measurements.
- Show your results as a chart or graph. Decide which is the best to use. If you have drawn a line graph, decide whether you should use a **line of best fit**.
- Write down why you took the range of measurements that you did.

> Usually a bar chart (or sometimes a pie chart) is used to show results when your input variable is in words (or a range of numbers). A line graph is used if your input variable is a sequence of numbers.

Considering your results

- Write down what you have found out. What patterns can you see?
- Explain your results using scientific terms. Is there a scientific idea or theory which will help you explain your results? Use your chart or graph to help your explanation.
- Do your results match your prediction? If not, explain why.

Evaluation

- Have you collected enough data to support your explanation of the results? Do your results fully support your explanation?
- Were there any variables that you found difficult to control? What were they? How might you try to control them if you did the investigation again?
- Are there any things you would do differently if you did the investigation again? How could you improve your investigation?

S Developing skills in: planning, observing, considering, evaluating

SS11

SS32 Tables

A table is a way of showing a lot of information in a way that is easy to read.

This … is easier to read than this …

Bike	Number of pupils
Ordinary bike	16
Mountain bike	9
Racing bike	5
No bike	4

Out of all the children in the class, 16 of them have an ordinary bicycle. Four of the pupils did not have a bike at all. Racing bikes were owned by five pupils, and the other nine all had mountain bikes.

Results tables

When you do a practical, you often need to write your results in a table. You need to draw your table before you start your experiment. This table is for an experiment to find out how long it takes to dissolve different amounts of sugar in some hot water.

Amount of sugar (spatulas)	Time to dissolve (minutes)
1	
2	
3	
4	
5	

This is what you are changing in the experiment, so it always goes in the first column.

This is what you will be measuring.

Always put the units in.

These are the amounts of sugar you will be testing.

Use a ruler when you draw straight lines.

Sometimes you investigate more than one thing. You might want to find out how long it takes the sugar to dissolve in hot water and in cold water. Your results table for this experiment should look like this:

Amount of sugar (spatulas)	Time to dissolve (minutes)	
	Hot water	Cold water
1		
2		
3		
4		
5		

This heading applies to both the columns underneath it.

S Developing skills in: observing

SS32

SS33 Bar charts 1

Do you need a bar chart or a line graph?

The easy way to decide which kind of graph to draw is:

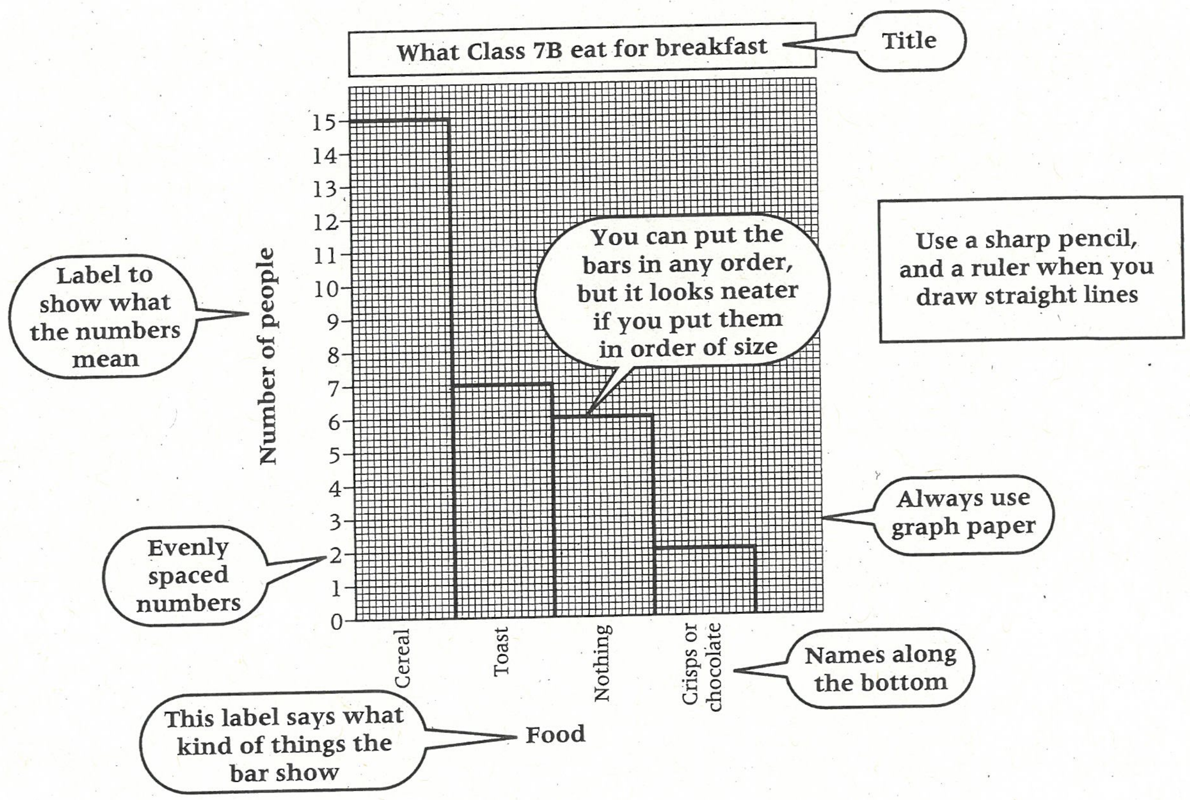
- If you have **measured two** things (e.g. time, length or temperature) you need a **line graph**.
- If you have counted something (e.g. how many insects live in different places) you need a **bar chart**.
- If one of the things you have studied can be described in words (e.g. different kind of food) you need a **bar chart**.

Breakfast

You have done a survey to show what the people in your class had for breakfast, and these are your results:

Food	Number of people
cereal	15
toast	7
crisps or chocolate	2
nothing	6

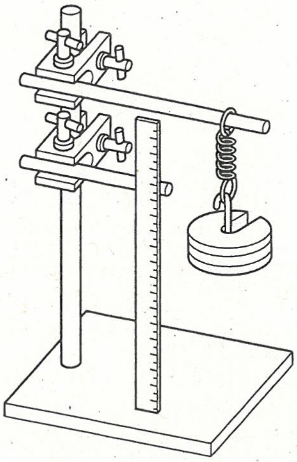
You would draw a bar chart like this one to show your results:



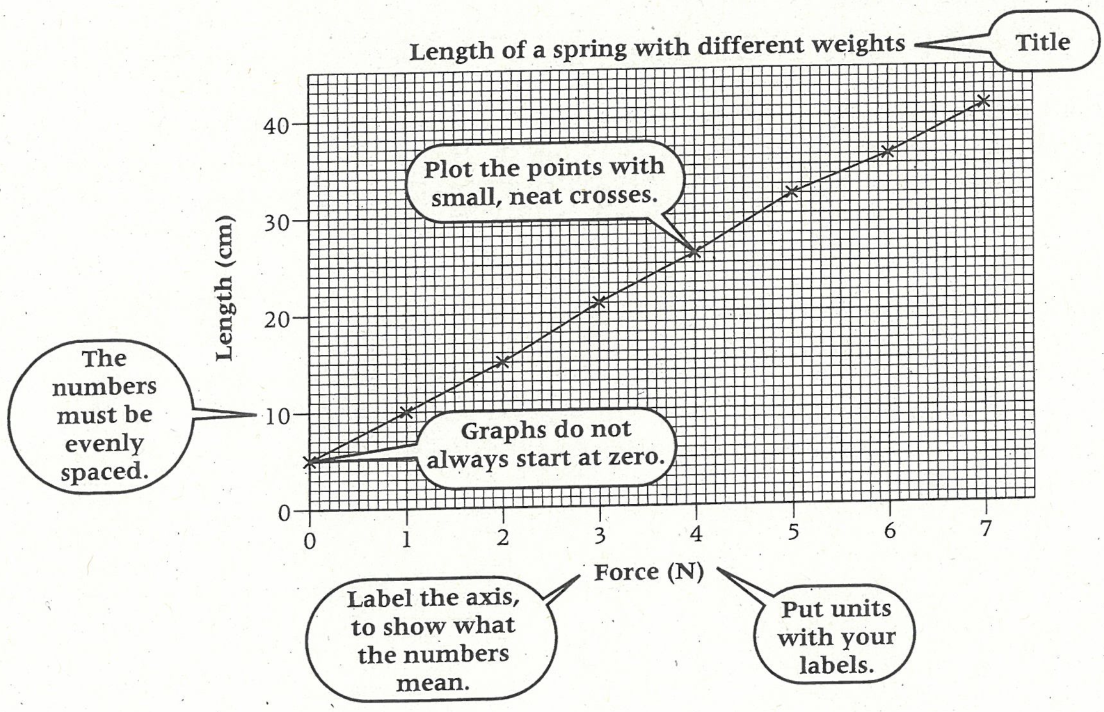
SS35 Line graphs 1

Line graphs can be useful for showing the results of an experiment. You usually use a line graph when you have to show two sets of measurements.

Here are the results of an experiment to find out how long a spring is when it has different forces on it.



Force (N)	Length (cm)
0	5
1	10
2	15
3	21
4	26
5	32
6	36
7	41



Working out the scale

First, look at your table of results and work out the largest number that has to go on each axis.

Now count the squares on your graph paper. If there are not enough, try again, counting in 2s, or 5s, or 10s, until you find a scale that fits on the paper.

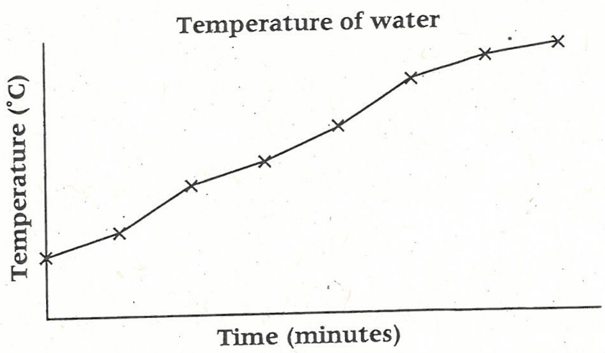
? **1** Plot the results from the spring experiment on graph paper.

Line graphs 2

Lines of best fit

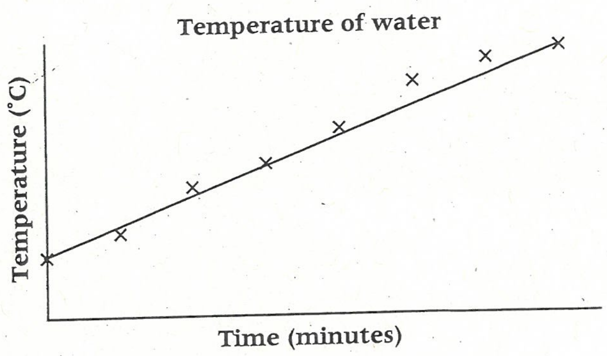
A line of best fit on a graph is the line you might get if all your measurements were perfectly accurate. It does not necessarily go through all the points.

Anita heated a beaker of water using a Bunsen burner, and measured the temperature of the water every minute. This is the graph she plotted to show her results.



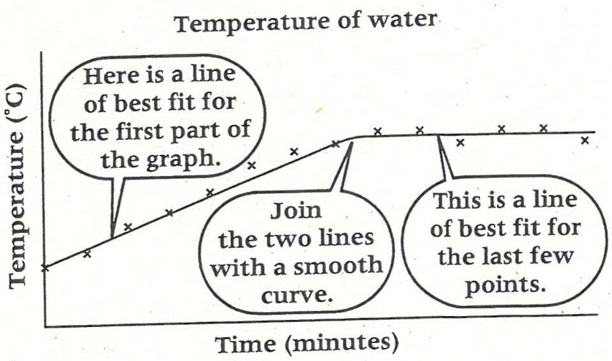
Anita did not do the experiment very accurately. She was sometimes a few seconds late taking the temperature. The thermometer could only read the temperature to the nearest 2 degrees.

If you look carefully at Anita's graph, you can see that all the points would be fairly close to a straight line.



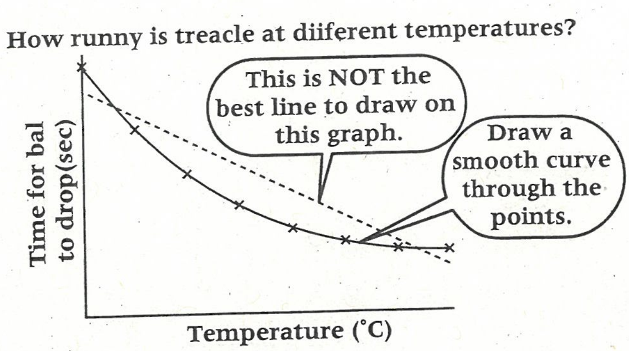
This is usually the best way of drawing a scientific graph, *but not always!*

Anita did her experiment again, but this time she carried on measuring the temperature after the water had boiled.



Not all graphs show straight lines. Samir investigated how runny treacle is at different temperatures. He dropped a ball into a long tube filled with hot treacle, and timed how long it took to fall.

This graph shows Samir's results.



SS15 Evaluating

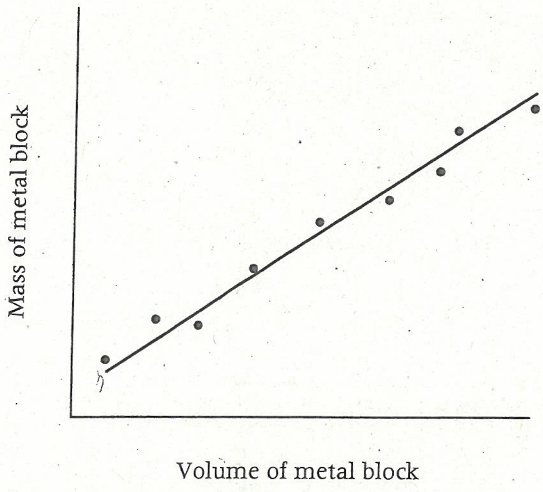
You carry out investigations to find things out – but how sure are you that your results are correct? You need to **evaluate** your investigation to decide how good your evidence is. There are different ways you can evaluate your investigation.

Evaluating a method

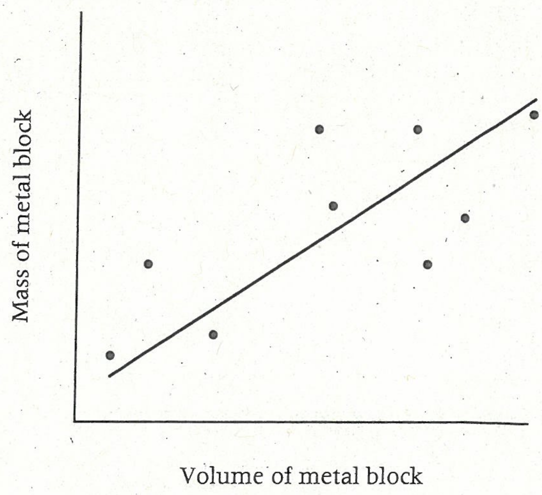
- Did you carry out a fair test?
- Were your measuring instruments accurate enough?
- Did anyone else in the class use a different method? Was their method better or worse? Why?
- Were there any factors you could not control? For instance, the Sun might have come out halfway through an experiment and made the room warmer. Could you control these things if you had a chance to do the investigation again?
- How could you improve your method if you had to do the investigation again? You need to explain *why* you would make the changes.

Evaluating a set of results

- Have you got enough results? If you have drawn a graph, you should have at least 5 different points on it.
- How reliable are your results? You can use a graph to help you to decide whether or not your results are reliable.



These results look reliable. They are all very close to the straight line drawn through them.



These results are not reliable. They do not follow a pattern closely.

- Are there any results that do not fit the pattern? If there are, can you explain them?
- Did you repeat any measurements? If your measurements were almost the same when you repeated them, your results are probably reliable. If there is a big difference between repeated results, then there was probably something wrong with your experiment.

A good way of evaluating an investigation is to work with another group. Both groups explain their methods and results, and then you all discuss the method and the reliability of the results.

S Developing skills in: evaluating

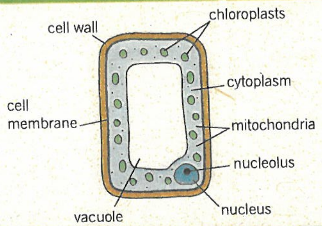
B1 Chapter 1: Cells
Knowledge organiser

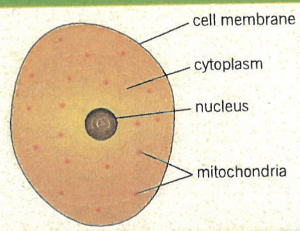
Activate
Question · Progress · Succeed

All living things (organisms), are made of **cells**. Some are only made of a single cell, for example, bacteria. A person is made up of millions of cells joined together.

Plant and animal cells

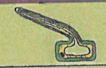
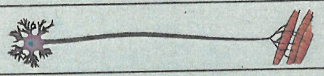
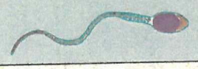
Cells have smaller structures inside them, called components, that each have an important function.





Specialised cells

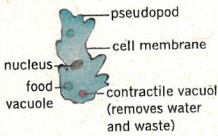
Specialised cells have special features that allow them to do a specific job or function:

	Cell type	Function	Special features	Diagram
plant cells	root hair cell	absorb water and nutrients from soil	• root hair creates a large surface area • no chloroplasts as no light underground	
	leaf cell (palisade cell)	carry out photosynthesis	• found at the top surface of leaves • packed with chloroplasts • thin with a large surface area to absorb more light	
animal cells	red blood cell	transport oxygen around the body	• contain haemoglobin which joins to oxygen • no nucleus • disc shaped to increase surface area	
	nerve cell (neurone)	carry electrical impulses around the body	• long and thin with connections at each end	
	sperm cell	carry male genetic material	• streamlined head and a long tail • lots of mitochondria to transfer energy	

Unicellular organisms

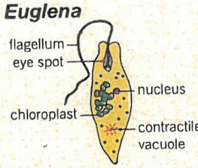
A **unicellular** organism only consists of one cell. They have no fixed shape and are adapted to carry out many different functions.

Amoeba



- nucleus controls growth and reproduction
- move by moving part of their body and the rest follows slowly in the same direction
- eat bacteria, algae, and plant cells by engulfing them
- reproduce by splitting in half (binary fission)

Euglena



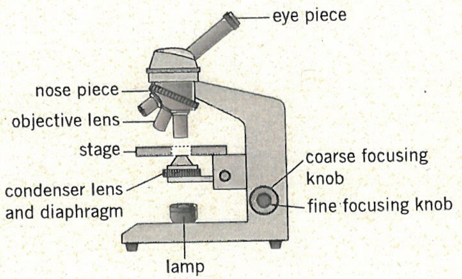
- microscopic organism found in fresh water
- contain chloroplasts and make their own food by photosynthesis
- eye spot that detects light
- flagellum allows the *Euglena* to move towards the light to make more food

Microscopes

Cells can only be seen under a microscope. A microscope magnifies an object using lenses.

Remember that:

- the specimen needs to be thin so light can pass through
- a dye can be added to make the object easier to see.



Using a microscope

1. Move the stage to its lowest position.
2. Place the slide/object on the stage.
3. Choose the objective lens with the lowest magnification.
4. Look through the eyepiece and turn the coarse-focus knob slowly until you see the object.
5. Turn the fine focus knob until it comes into focus.
6. Repeat steps 1–5 using a higher magnification lens.

Movement in and out of cells

Particles move in and out of cells by **diffusion**.

During diffusion, particles spread out from where they are in *high* **concentration** to where they are in *low* concentration.

Diffusion in water is called **osmosis**.

Glucose and oxygen move from the blood **into** cells by diffusion.

Carbon dioxide moves **out of** cells to the blood by diffusion.

Key terms

Make sure you can write definitions for these key terms.

amoeba · cell · cell membrane · cell wall · chloroplast · concentration · cytoplasm · diffusion · Euglena · flagellum · leaf cell · microscope · mitochondria · nerve cell · nucleus · red blood cell · root hair cell · specialised cell · sperm cell · unicellular · vacuole

7A Summary Sheets

Cells and their functions

All living things are made from **cells**. There are two basic types of cell:

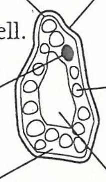
Animal cell

Cell surface membrane. This is like a very thin bag. It keeps the cell together and controls what goes into and out of the cell.

Nucleus. This is the 'control centre' of the cell. It tells the cell what to do.

Cytoplasm. This is a jelly-like substance. Many of the cell's activities take place here.

Plant cell



Cell wall. This is like a box with many large holes in it. It supports the cell and is very strong. It is made out of a substance called **cellulose**.

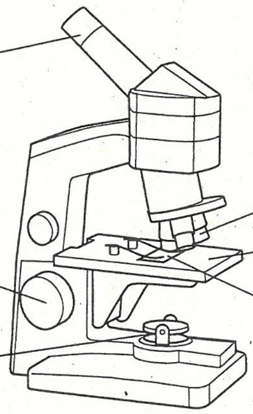
Chloroplasts. These are green discs that allow the plant to make food (by **photosynthesis**). They contain a chemical called **chlorophyll**.

Vacuole. This is a storage space filled with a liquid called **cell sap**.

Cells are very small. A **microscope** is used to see them.

To use a microscope you:

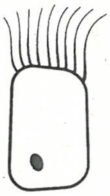
- **i** Place the smallest objective lens over the hole in the stage.
- **ii** Turn the focusing wheel to move the objective lens close to the stage.
- **iii** Place the slide on the stage.
- **iv** Adjust the light source or mirror.
- **v** Look into the eyepiece lens
- **vi** Turn the focusing wheel until what you see is clear (**in focus**).



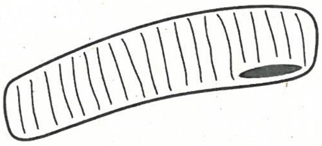
A microscope makes things appear bigger. It **magnifies** things. There are two **lenses** in a microscope. To work out the total **magnification** you multiply the magnification of the **objective lens** by the magnification of the **eyepiece lens**.

The object you want to look at using a microscope is called the **specimen**. It has to be thin to let light get through it. It is placed, with a drop of water, onto a **slide**.
A **coverslip** is put on top. The coverslip stops the specimen from drying out, holds it flat and stops it moving. A **stain** might be used to help you see parts of the cell.

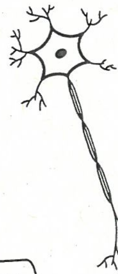
Some cells have special shapes. They are **adapted** to do certain jobs.



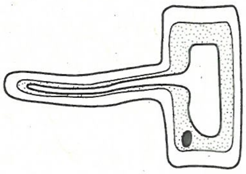
Cilated epithelial cells *are found in tubes leading to the lungs. The strands at the top* ***(cilia)*** *wave about to move dirt out of the lungs.*



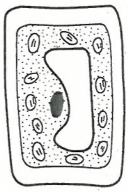
Muscle cells *are able to change length. This helps us to move.*



Nerve cells (neurones) *are long so that messages can be carried around the body quickly.*



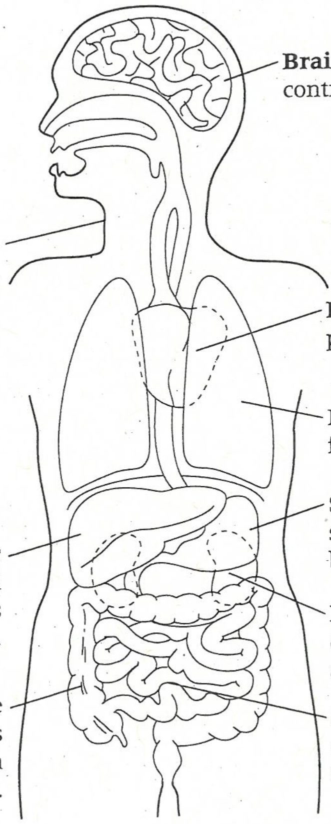
Root hair cells *in plant roots take water out of the ground quickly. The root hair gives the water more surface to get into the cell.*

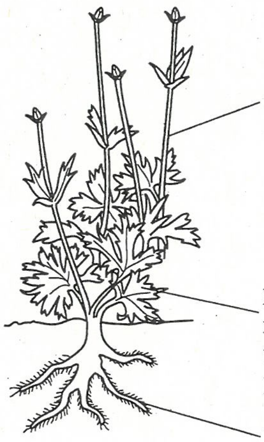


Palisade cells *in plant leaves are packed with chloroplasts to help the plant make food.*

A group of cells that are the same, all doing the same job, is called a **tissue** (e.g. muscle tissue). A group of different tissues working together to do an important job makes an **organ**. For example the **heart** is an organ and is made of muscle tissue and nerve tissue.

Organs have very important jobs:





C1 Chapter 1: Particles and their behaviour

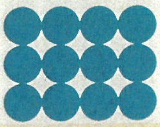
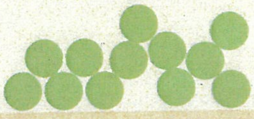
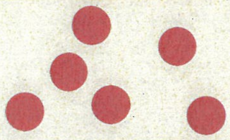
Knowledge organiser

Activate
Question · Progress · Succeed

changes of state

particles gain energy from the surroundings → particles vibrate faster → particles lose their place in the pattern — **melting** (solid → liquid)

particles gain more energy from the surroundings → particles move faster → particles pull completely away from each other — **boiling / evaporation** (liquid → gas)

	solid	liquid	gas
state of matter	solid	liquid	gas
How do the particles move?	particles do not move around, but vibrate on the spot	particles are touching but can slide over each other	particles are spread out far away from each other
arrangement of particles			
can it be compressed?	no, because there is no space between the particles	no, because the particles are touching their neighbours	yes, because there is space between the particles
can it flow?	no, because the particles can't move around	yes, because the particles can slide over each other and move around	yes, because the particles can move around

changes of state

particles lose energy to the surroundings → particles move slower → particles come close together — **condensation** (gas → liquid)

particles lose more energy to the surroundings → particles move even slower → particles take a fixed place in a pattern — **freezing** (liquid → solid)

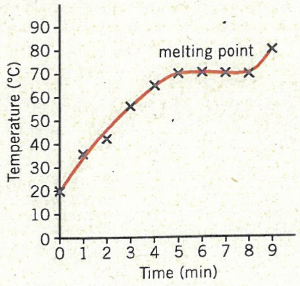
Sublimation

Some solids do not exist as liquids, but instead directly change state from solid to gas in a process called sublimation.

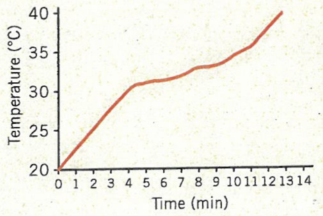
Melting and boiling points

Melting point — the temperature at which a **substance** melts
Boiling point — the temperature at which a substance boils

If you heat a **solid** and plot a graph of temperature against time:



the melting point will appear as a flat line if the substance is **pure** (has only one type of particle).



If you don't see a flat line, the substance is a mixture (has different types of particle).

Diffusion

Particles move about randomly in liquids and gases and spread out through **mixtures**. This process is called diffusion. How quickly diffusion happens depends upon three variables:

Variable	Effect on diffusion
temperature	diffusion is faster at higher temperatures *because* particles move faster when hotter
particle size	diffusion is slower with larger, heavier particles
state of matter	diffusion is: • fast in gases • slow in liquids • doesn't happen in solids

Gas pressure

Gas particles move around, colliding with the walls of a container they are in. This causes a force called pressure. It depends on three variables:

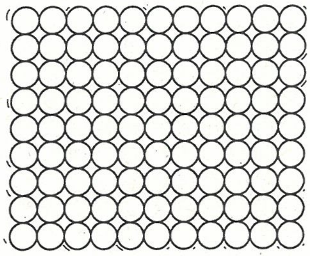
Variable	Effect on gas pressure
temperature	Pressure increases at higher temperatures *because* particles move faster and therefore collide more frequently with the container.
particle size	Pressure increases with greater numbers of particles *because* there are more particles colliding with the walls of the container.
state of container	Pressure decreases as the size of container increases *because* particles have more space to move around, so they don't collide with the walls of the container as often.

Key terms Make sure you can write a definitions for these key terms.

boiling · boiling point · change of state · condensation · diffusion · evaporation · freezing · gas · liquid · melting · mixture · particle · solid · state of matter · sublimation · substance

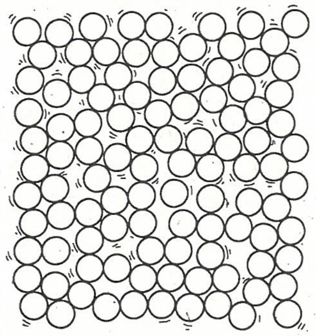
Summary Sheets

Solids, liquids and gases



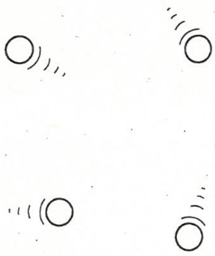
SOLID

- Solids are made up of particles that are very close together and are held tightly together by strong **bonds**.
- Solids cannot be squashed, do not flow, have a fixed shape and volume, and have a high density.



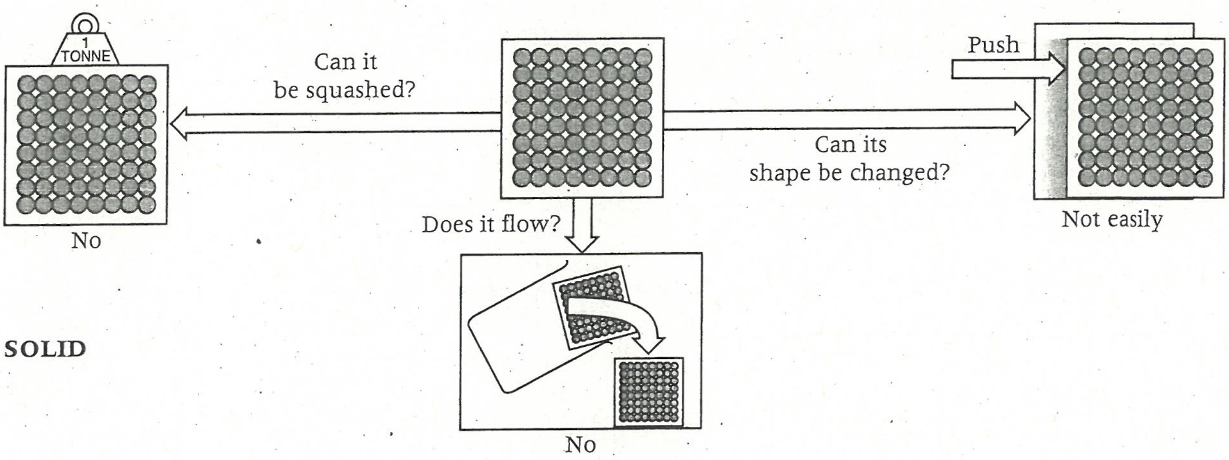
LIQUID

- Liquids are made up of particles that are fairly close together; the bonds between the particles are weaker than the bonds in solids.
- Liquids cannot be squashed, flow quite easily, and have a fixed volume but no fixed shape.
- Although they are dense, liquids usually have a lower density than solids.

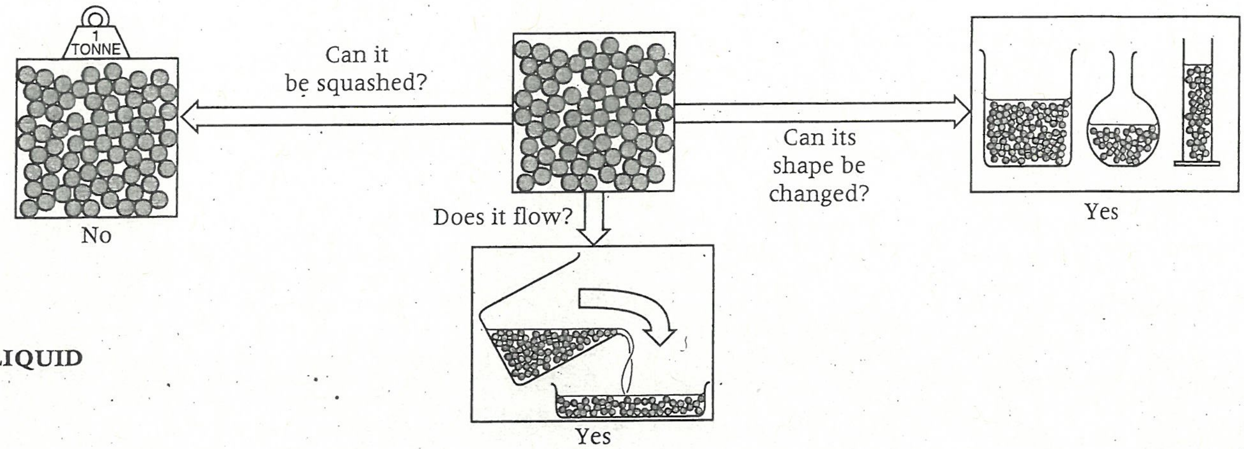


GAS

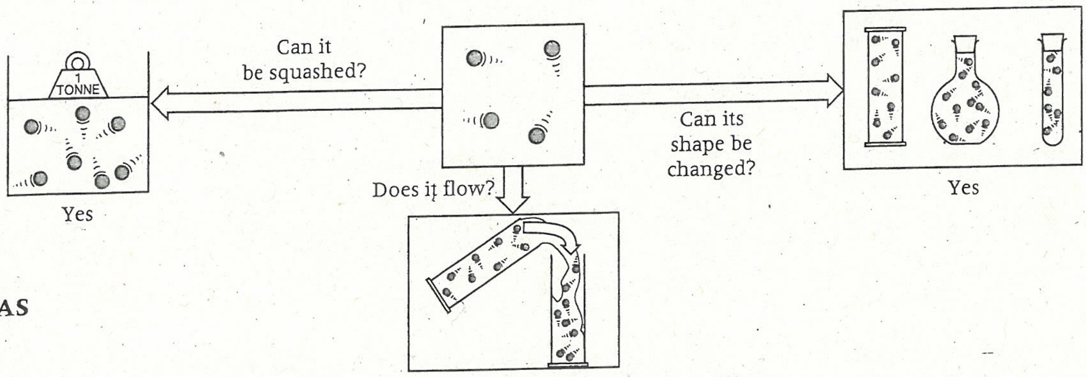
- Gases are made up of particles that are well spread out, with no bonds between them.
- Gases are quite easy to squash, flow easily, have no fixed volume and no fixed shape.
- Gases have a lower density than liquids.



SOLID



LIQUID



GAS

Diffusion

The natural mixing of substances is called **diffusion**. Diffusion occurs because particles in a substance are always **moving** around. Diffusion is fastest in **gases**, and slower in liquids. Diffusion in solids is extremely slow.

Pressure in gases

Pressure is caused by particles hitting the walls of the container they are in. If the pressure becomes too great for a fixed container to hold, it will burst.

The pressure may increase because:

- the container has been squashed, making the volume smaller; this means that the particles will be hitting the walls more often.
- the number of particles has been increased, which means there are more particles moving around to hit the walls.
- the temperature of the particles has increased, so they will move around faster and hit the walls harder and more often.

If the particles are in a container which is flexible, like a balloon or a syringe, an increase in pressure will make the volume increase.

The idea of particles is a **theory** that scientists use to explain **observations**. Scientists use theories to make **predictions**, and test the predictions to find out if they are correct. If the predictions are not correct, then the theory may have to be changed to help to explain the new evidence.