

Unit 7C — Environment & Feeding Relationships

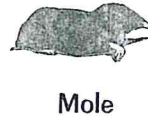
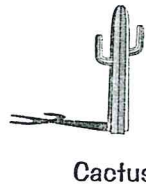
Environmental Influences on Habitats

Q1 Copy out the sentences below choosing words from the box.
You need to use one word twice.

adapted	environment	habitat
---------	-------------	---------

- The place where a living thing lives is called its
- The conditions there make up its
- Animals and plants have special features to help them survive where they live.
You say they are to their environment.
- A polar bear is well to its chilly environment.

Q2 Copy out the words below and draw lines to match each animal or plant to its habitat.






underground
tunnels

desert

open sea

on rocks
by the sea

Q3 The diagram below is all jumbled up. Write out the name of each organism followed by where it lives and why it lives there.

<u>LIVING THING:</u>	<u>FOUND WHERE:</u>	<u>WHY:</u>
 Polar bear	In a cave during the day	Because it is adapted to hot, dry conditions
 Bat	In the desert	It is hunting for prey (e.g. seals and fish)
 Cactus	Swimming in icy cold water	It is resting

Q4 Write down three features that are adaptations to help a badger to feed at night in woodland. Choose from the list below.

- | | |
|--------------------------------------|---|
| A Large flat leaves | D A long pointed nose for sucking up ants |
| B Large claws for rooting around | E Dark coloration, mainly for camouflage |
| C Ability to flap wings very quickly | F Very sensitive hearing |

Changing Environments

Q1 For each living thing, write down the feature that helps it survive in a changing environment:

Living thing:

A Swallow

B Butterfly

C Tortoise

D Squirrel

E Grizzly Bear

Feature that helps it to survive:

1. hibernates to survive over the winter

2. stores nuts underground

3. spends the winter as a pupa

4. grows a thick coat & stores extra fat for the winter

5. migrates to warmer places for the winter

Q2 For each instrument below, write down the environmental factor that it measures.

Measuring Instrument:

A Thermometer

B Light Probe

C Rain Gauge

D Meter measuring in decibels

What does it measure?

1. Noise levels

2. Rainfall levels

3. Light intensity

4. Temperature

Q3 Complete the sentences below about daily changes in plants and animals using these words:

night	nocturnal	petals	predators	salty
-------	-----------	--------	-----------	-------

a) Most flowers open up their to allow pollination.

b) Most flowers close up their petals at for protection.

c) Animals that are active at night are said to be

d) Some animals are active at night to avoid being 'got' by

e) If you are a shrimp living in an estuary (where a river meets the sea) then you will have daily changes in how the water is.

Q4 There are four yearly changes that organisms have to adapt to. Work out what they are, and write them out in full.

1. t.....rat.....e 2. s.....nli.....t 3. availability of w..... 4. availability of ...oo...

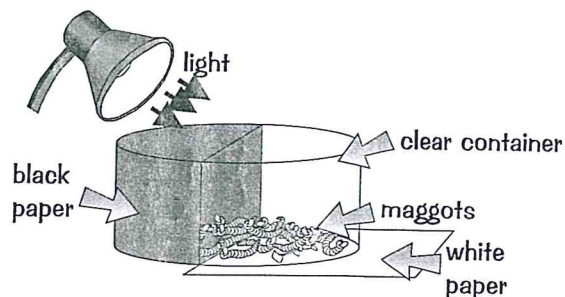
Changing Environments

- Q1 The table below describes what is happening over a period of 24 hours. Copy and complete the table using the words in this box.

Bats wake up and fly out of their roosts	Dark	First light
It is still light	Nocturnal animals active	Plants photosynthesising fastest

Time	Light Level	What's happening?
Midnight		It's 12 hours after noon.
4 am	dark	
7 am		Nocturnal animals are now hidden away.
12 noon	bright light	
4 pm		Plant photosynthesis is slowing down.
8 pm	light fading	

- Q2 James is conducting an experiment to see if maggots prefer light or dark. He puts twenty maggots in a clear round box which has been completely covered with black paper around one side and is stood on white paper on the other side and has a lamp shining on it.



Time (minutes)	Number on the dark side	Number on the light side
Start (maggots dropped in box)	9	11
0.5	12	8
1	17	3
1.5	10	10
2	11	9
2.5	15	5
3	17	3
3.5	15	5
4	18	2
4.5	17	3
5	19	1

- Is a sample of twenty maggots large enough for an investigation?
- What do maggots prefer — light or dark?
- When in the experiment do you think they started to show a clear choice between light and dark?
- Why would a further experiment with three different batches of twenty maggots give more reliable results?
- What else might affect maggot behaviour in this experiment?
- Why do you think maggots prefer what they do? (Hint: think about predators)

Maggot experiments — that James is a bit weird if you ask me...

All environments change on a daily basis. Plants and animals need to adapt to these changes. Animals come out at different times of day when they have the best chance of finding food without being eaten. And plants do clever things like closing their petals at night — well it's clever for a plant.

Feeding Relationships

Q1 Write down each sentence and say if it describes a **predator** or **prey**.

- A an animal that hunts and kills for its food
 B an animal that is hunted and killed as food for another animal

Q2 Copy the table and for each animal, tick the column it's most likely to belong to.

Animal	Predator	Prey
Lion		
Rabbit		
Earthworm		
Eagle		

Q3 Copy the table and decide whether each feature belongs to a predator or prey. Put a tick in the appropriate column. (Some features will apply to both.)

Feature	Predator	Prey
Sharp claws		
Eyes on the side of the head for all round vision		
Excellent hearing and sense of smell		
Excellent camouflage		
Eyes forward		

Q4 Copy and complete these sentences using words from the box. You need to use one word twice.

carnivore herbivore omnivore producer vegetarian
--

- a) A living thing that manufactures its own food is called a
- b) A living thing that eats only plant material is a
- c) A living thing that eats only other animals is a
- d) A living thing that eats both plants and animals is an
- e) A person who never eats meat is both a and a

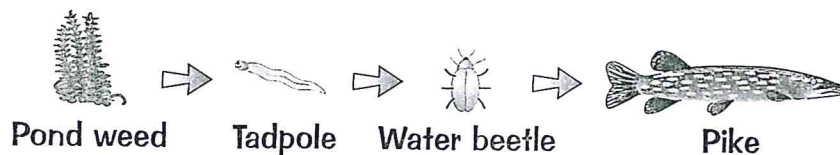
Q5 Copy each sentence below and say if it describes a **food chain** or a **food web**.

- A A diagram of a single set of living things showing what is eaten by what.
 B A more complex diagram showing how living things may be interlinked by the many different living things they eat.

Food Chains

- Q1 Each food chain is jumbled up. Write each one out in the correct order.
- Fiona (the vegetarian) → lettuce
 - Phil (a human) → grass → Daisy the cow
 - Seeds → Oscar the Siamese cat → small bird
 - Chicken → corn → Sylvia (a human)
 - Jean (a nice Frenchman) → French lettuce → large juicy French snails
 - Pond snail → pond plant → fish → Fred the fisherman
 - Whale → tiny plankton → squid
 - Large top carnivore bird → oak leaves → robin → juicy caterpillar
 - Hawk → leaves → ladybirds → greenfly → blue-tits
 - Animal plankton → plant plankton → whale → krill (little Arctic shrimp-type creatures)

- Q2 Use this food chain to answer the questions below.



- What does the arrow between each living thing mean?
- What actually passes down the food chain — **energy** or **Emma B**?
- What usually happens to the numbers of living things as you go down the chain?
- What usually happens to the size of the living things as you go down the chain?
- Name the producer in this food chain.
- Name the primary consumer in this food chain.
- Name the secondary consumer in this food chain.
- Name the tertiary consumer in this food chain.
- Name the herbivore in this food chain.
- Name two carnivores in this food chain.
- Name the top carnivore in this food chain.
- Name two predators in this food chain
- Name two living things in the food chain that are prey to predators.

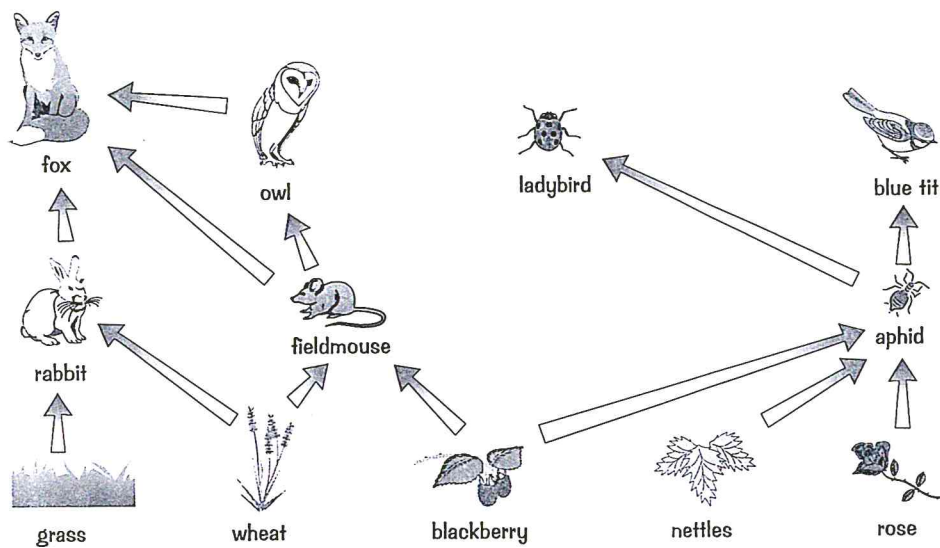


Food Webs

Q1 For each of the observations A, B and C, pick a possible conclusion from the second column. Write your answers as e.g. "D=6".

Evidence from observations (what you see)	Possible Conclusion (what you decide)
A Greenfly found on Rosebush	1. Spiders do not eat woodlice
B Woodlice found under a decaying log	2. Spiders trap and eat houseflies
C Housefly trapped in a spider's web	3. Greenfly feed on roses
	4. Woodlice feed on rotting wood
	5. Woodlice are eaten by spiders

Q2 The diagram below shows a food web.



- Name all of the producers.
- What type of living things are all of the producers?
- Name all of the primary consumers.
- Name all of the secondary consumers.
- How many tertiary consumers are shown?

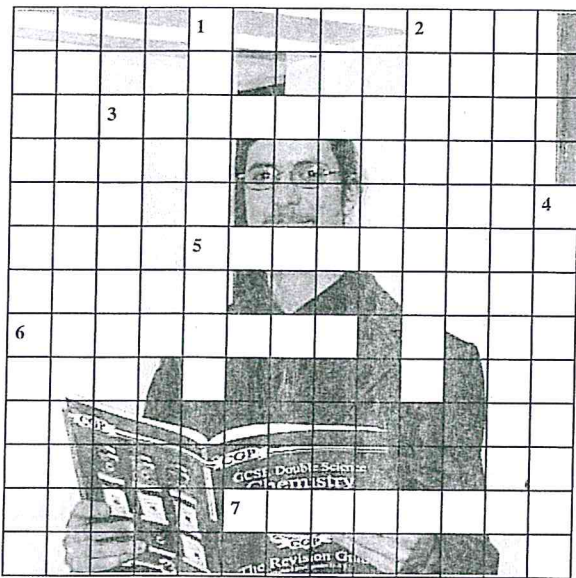
What would happen if.....

- All the blue tits suddenly died?
- All of the ladybirds vanished?
- All of the rabbits were killed by a nasty disease called myxomatosis?
- All the baby owls failed to hatch this year?

Food Webs

- Q1 Are the following statements about food webs "true" or "false"?
- Food webs try to show more information about what eats what than food chains.
 - What passes through the web in the direction of the arrows is energy.
 - Energy flows in the web from secondary consumer to primary consumer to producer.
 - At the opposite end of the chain to the producers we find animals called top carnivores.

Q2 Try this fantastic 'Food Webs Crossword'. Write the answers in your book.



Clues Across

- It uses the sun's energy to produce food containing chemical energy (8)
- An animal which eats only plants, such as a rabbit (9)
- This animal is the type of consumer that eats secondary consumers (8)
- Plants are producers but each animal is a (8)

Clues Down

- A simple diagram to show what eats what and in what sequence (4,5)
- An animal that eats only animals, never plants (9)
- This type of consumer eats producers (7)
- This type of consumer eats primary consumers (9)

Q3 Look at the 'Food Webs Wordsearch' below. See how quickly you can find the key words in the grid. Draw your own 15 x 11 grid to put your answers in.

Carnivore	Herbivore
Consumer	Omnivore
Energy	Primary
Food chain	Secondary
Food web	Tertiary

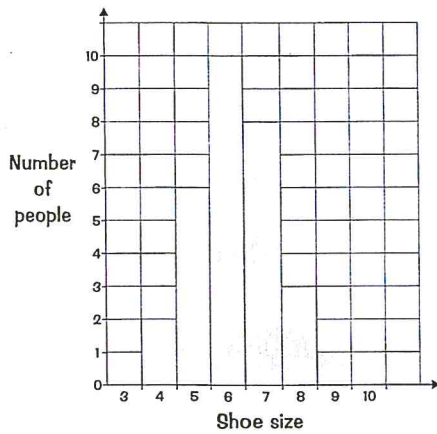
S	E	C	O	N	D	A	R	Y	H	M	U	B	S	A
F	R	R	B	I	Z	P	E	H	L	U	J	V	D	Y
O	O	V	O	T	Q	D	C	O	N	S	U	M	E	R
O	V	O	X	V	M	W	U	C	Y	X	O	T	R	A
D	I	M	D	F	I	D	K	Q	G	N	Q	L	M	
W	N	N	R	C	A	B	O	Q	R	I	R	L	I	I
E	R	I	R	K	H	Y	R	A	I	T	R	E	T	R
B	A	V	U	P	A	A	P	E	H	O	Y	P	N	P
J	C	O	N	A	Z	Z	I	B	H	G	Y	J	Y	E
V	R	R	M	I	H	Z	R	N	Y	I	B	Y	I	K
D	W	E	U	L	A	F	I	U	C	Q	V	A	I	H

Wow, what a really SPECIAL page...

Do you recognise the man hiding in the crossword and wordsearch? That's right, it's Jumbo Wilson. That's why this page is so special. Take a moment to savour the beauty of this page before moving on.

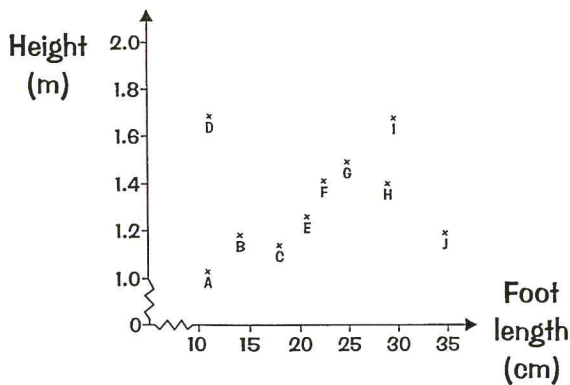
Differences in Species

Q1 Sarah records the shoe size of every person in her class on the bar chart below.



- What is the smallest shoe size in the class?
- What is the most common shoe size?
- How many people are in her class?
- How many people are there in the class whose feet are size 6 or over?

Q2 Joel says "the tallest people have the longest feet." To test his theory he measures 10 members of his class (labelled A to J) and produces the scatter graph below.

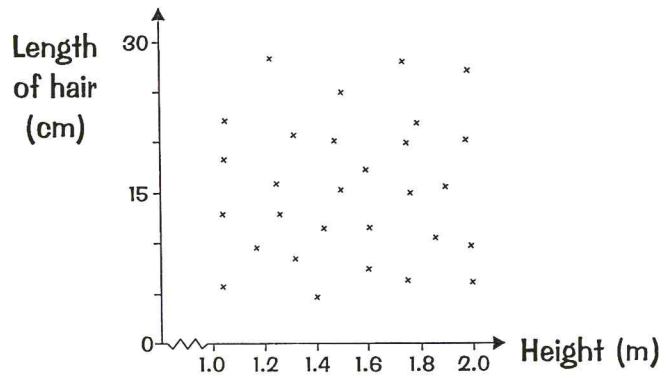


- Is there a pattern in the data? What is it?
- How strongly does the data support Joel's theory?
- Which members of the class do not fit the pattern? Describe them.
- What should Joel do to be more confident in his conclusion?

Q3 Peter suggests that "the tallest people have the longest hair."

He tests the whole class and plots the scatter graph opposite.

Does the data collected support Peter's idea?



Q4 Beth thinks that longer holly leaves have more prickles. She collects data from 10 holly leaves and puts them in a table.

Holly leaf	1	2	3	4	5	6	7	8	9	10
Length (cm)	6	10	7	8	8	9	5	4	10	7
Prickles	5	9	6	9	11	8	5	4	10	7

- Plot a scatter graph of length against number of prickles.
- Does the data support Beth's idea?

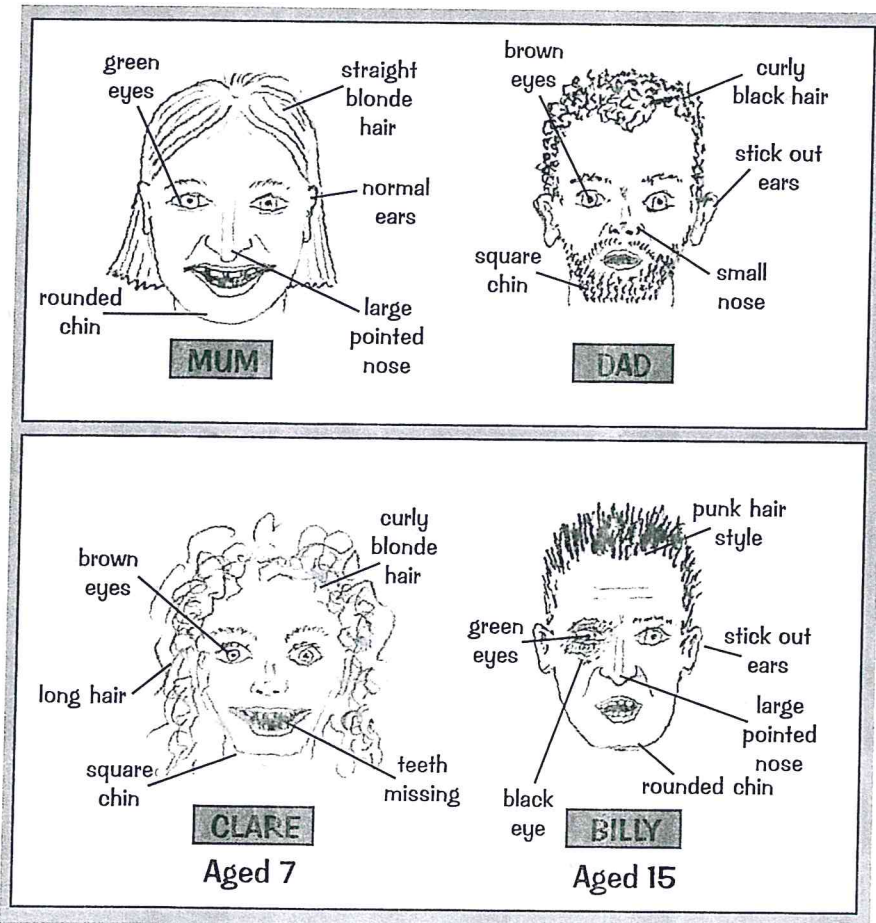
The Causes of Variation

Q1 Copy and complete the paragraph below. Use the words from the grey box.

ENVIRONMENTAL HEIGHT DIFFERENT
 INHERIT LIGHT WATER COLOUR OF PETALS

Individuals of the same species are all slightly
 Variation in characteristics can be caused by genes that we
 from our parents. Variation can also be caused by factors.
 An example of an inherited characteristic for a rose could be
 Variation in a characteristic such as could be caused by
 lack of or

Q2 A family is shown below.



- a) List the features that Billy has inherited from
 - i) his mother
 - ii) his father
- b) List the features that Clare has inherited from
 - i) her mother
 - ii) her father
- c) List the children's features which are due to environmental factors.
- d) Will Billy inherit his father's beard?
 Explain your answer.



Don't blame me, I didn't draw them...

Thanks to inherited features and environmental factors we're all different.
 That's just as well, imagine if we were all the same — variety is the spice of life.

Describing Living Things

Read the descriptions of these imaginary animals carefully, then answer the questions.

Animal A

This animal is about 2m long and covered in thick fur. Once it finds a mate it stays with the same partner for life. It gives birth to live young and feeds its offspring milk for their first year. It has long horns and four legs. When it moves it tends to bounce on its hind legs. It has large eyes but usually relies on its excellent sense of hearing to warn of danger. It eats most plants and has large rear teeth for chewing. In the winter it hibernates in its cave having stored a lot of energy as fat.

Animal B

This animal lives and breathes in water and lays eggs as it swims. When the eggs hatch the young find their own food. It has 6 legs, a hard shell and scales. It has very small eyes and it is almost completely blind but has an acute sense of hearing. Animal B feeds all year round, often camouflaging itself while lying in wait for passing small fish. It also regularly eats seaweed. Animal B will mate with a different partner each year. It has large sharp teeth.

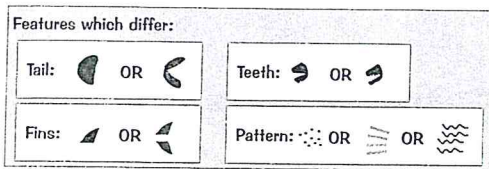
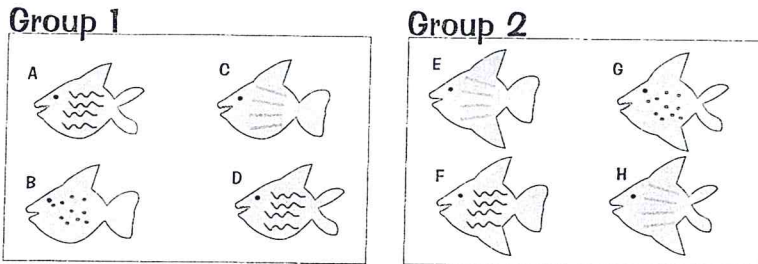
Animal C

This animal has wings, two legs and is covered in feathers. It hunts from the air, feeding only on small rodents and birds. It relies on its speed and excellent eyesight to catch its prey. It hasn't got any teeth but uses its sharp beak to tear apart its prey. It lays eggs in a nest, incubating them until they are hatched. Once hatched the offspring are fed meat by their parents until they are able to fly. The parents will remain together for life. Animal C has to hunt throughout the year.

- Q1 Pick out four things that are different about the appearances (e.g. teeth) of the three animals. Draw a table to summarise the differences.
- Q2 Pick out four things that are different about the behaviour (e.g. feeding) of the three animals. Draw a table to summarise the differences.

Sorting Things into Groups

Q1 Below are shown a number of fish. They have been sorted into two groups.

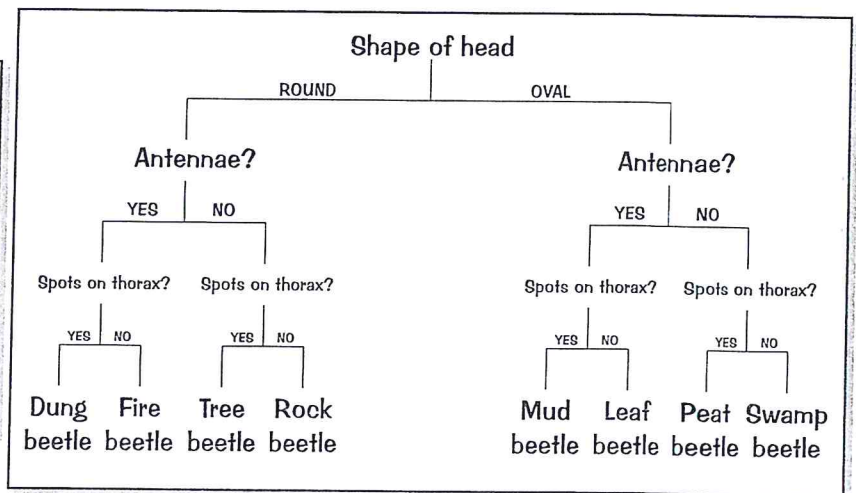
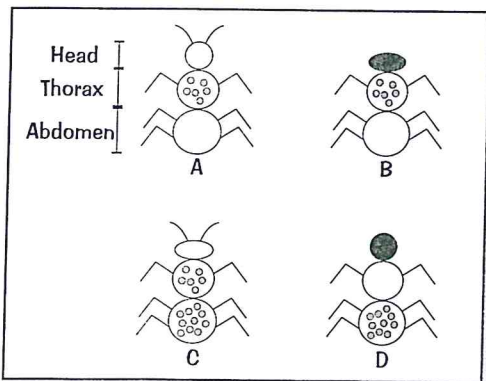


- What characteristic separates the fish into the groups above?
- How many characteristics differ among these fish?
- Put the fish into two groups according to their tail shape.

d) Abdul puts C, E and H into a group.

- What characteristic has Abdul used to create this group?
- How might you separate the remainder into further groups?

Q2 Four different insects are shown along with a key for identifying them.



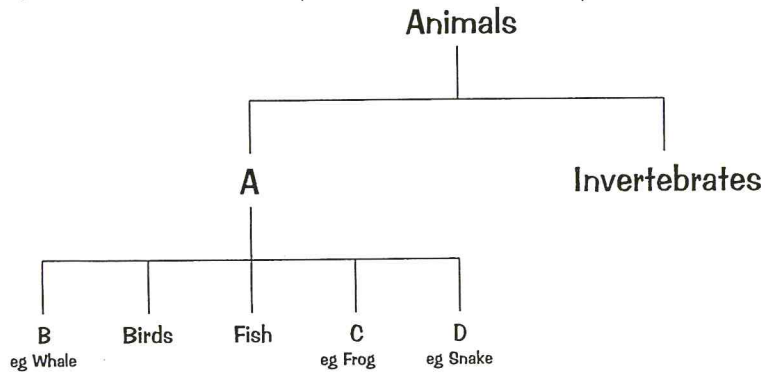
- Use the key to find the names of the insects.
- What other features could be used to identify the insects?

That's groupings explained then — sorted...

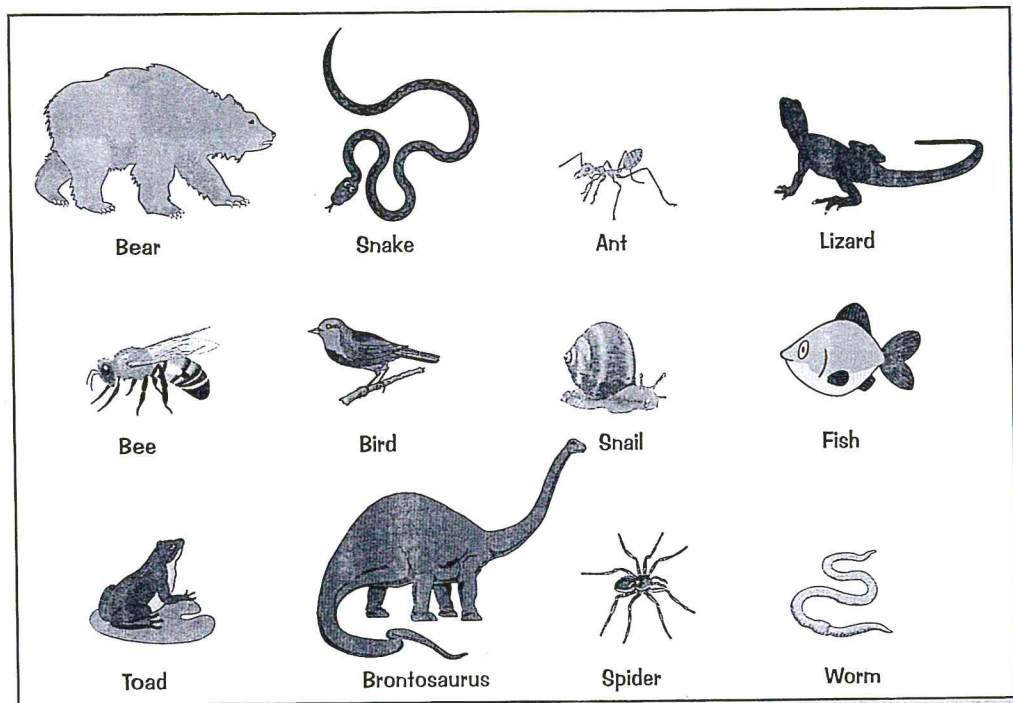
Biologists look for differences in animals in order to split them up into groups. They use these differences to make keys. Keys are just a list of questions which identify an animal (like in Q2).

How Scientists Classify Living Things

- Q1 Copy and complete the diagram below showing how part of the animal kingdom is classified by filling in the missing labels A, B, C and D.



- Q2 A scientist has found an animal and she wishes to classify it.
What's the first thing that the scientist must investigate to decide which of the 2 main groups it belongs to?
- Q3 Look at this selection of different animals.
Then use the diagram in Q1 to answer the questions below.

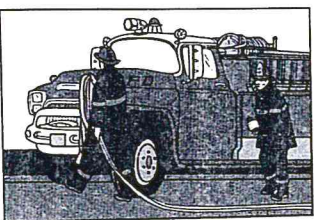


- List the vertebrates.
- List the invertebrates.
- Identify a mammal. What features make it a mammal?
- Identify an amphibian. What features make it an amphibian?
- Arthropods are invertebrates with jointed legs. List the arthropods shown above.

Some Acids and Alkalís

- Q1 **Sulfuric acid** is used to fill car batteries. It is a strong acid and can damage skin and clothing. Make a small poster about what safety measures you would take when filling a car battery with **sulfuric acid** and say what you would do in case of a spill.
- Q2 You are the science reporter for the Haztown Daily News. Rearrange the five sentences below to make a front page story about the tanker crash.

ACID TANKER OVERTURNS IN HAZTOWN TOWN CENTRE



This diluted the acid.

The fire service washed the acid away with lots of water.

A year 7 student passing by read the hazard warning on the tanker and rang the fire service.

A spokesperson for the fire service said: 'Acid is less dangerous when it is diluted with water.'

A tanker overturned in Haztown town centre today spilling its ten tonne load of strong acid.

- Q3 Spray oven cleaner contains a strong alkali called **sodium hydroxide**. It can damage skin and is particularly dangerous to eyes and lungs.
- Write a set of **instructions** explaining how to use the cleaner safely, including advice on what to do if some gets on your skin.

Acids and Alkalís — don't take sides, it's best to stay neutral...

As well as melting the Joker's face and making a great Batman film possible, acids have loads of more down to earth uses in batteries, cleaners and in lots of foods. And like Batman has Robin, acid has its faithful partner in crime, alkali. Hmm, how many superhero analogies can one tip hold?

Some Acids and Alkalis

Q1 Copy and complete the writing using the words from the grey box.

BLACKCURRANT COLOUR INDICATORS ACIDS

Some dyes change when you mix them with or alkalis.

We call these dyes Some examples of indicators are litmus,
..... juice and red cabbage solution.

Q2 Red cabbage indicator is **red** in acid and **turquoise** or **yellow** in alkali. Copy the table and fill in the empty column to show whether each substance is an **acid** or an **alkali**.

Substance	Colour in red cabbage indicator	Acid or alkali?
Lemon juice	Red	
Soapy bathwater	Turquoise	
Vinegar	Red	
Drain cleaner	Yellow	
Washing up liquid	Turquoise	
Lemonade	Red	

Q3 Copy the names of the substances. Next to each one, write down the colour you would see if you mixed it with litmus. Litmus indicator is **red** in acid and **blue** in alkali.

- | | |
|---------------------------------|-----------------------------------|
| a) hydrochloric acid | d) sulfuric acid |
| b) nitric acid | e) ammonium hydroxide (an alkali) |
| c) sodium hydroxide (an alkali) | |

Q4 Write down the first letter of each answer to spell a word:

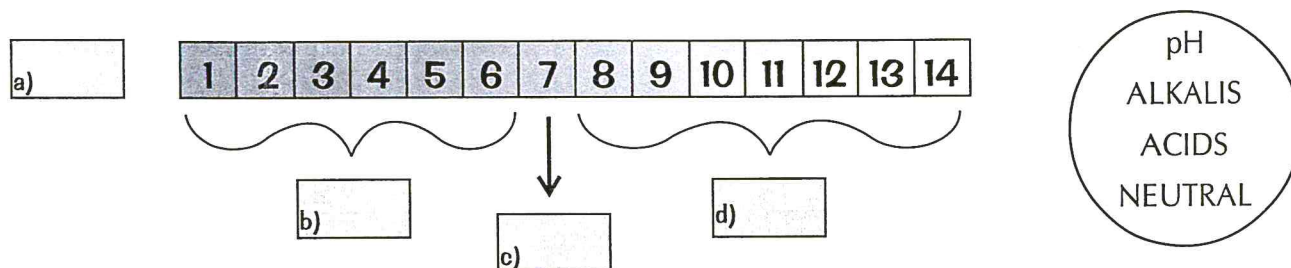
- a) These make red cabbage indicator go red.
- b) This indicator goes red in acid and blue in alkali.
- c) A baby cat.
- d) These make litmus go blue.
- e) A yellow acidic fruit.
- f) Litmus and blackcurrant juice are both

Q5 Use the information on this page to write down:

- a) Two acids you can eat or drink.
- b) Two foods you can use to make indicators.
- c) Two alkalis you can use at home.
- d) Two acids you can use in a science lesson.

The pH Scale

- Q1 Copy and complete the passage by choosing the correct word from each highlighted pair. Universal indicator is a mixture of dyes. It gives lots of different colours. A strong acid makes universal indicator go **[red / yellow]** and a strong alkali makes it go **[blue / green]**. In a neutral solution universal indicator is **[blue / green]**.
- Q2 Copy and complete the diagram by choosing the correct words from the circle.



- Q3 Choose one pH number from the list to go with each solution:
(pH numbers to choose from: pH1 pH5 pH7 pH9 pH14)
- A neutral solution.
 - A strongly alkaline solution.
 - A weakly acidic solution.
 - A weakly alkaline solution.
 - A strongly acidic solution.

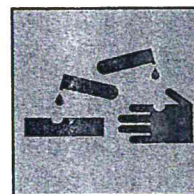
- Q4 Use the table to write down the names of:

- two** weak acids
- two** neutral liquids
- three** alkaline solutions
- two** strong acids

Solution	pH
Washing up liquid	9
Lemon juice	3
Car battery acid (sulfuric acid)	1
Water	7
Sodium hydroxide	14
Rainwater	5
Oven cleaner	12
Blood	7
Stomach acid (hydrochloric acid)	2

- Q5 Mary saw this symbol on a bottle of drain cleaner containing sodium hydroxide (pH14).

Write down **two** safety precautions she should take when she uses the drain cleaner.



Neutralising Acids and Alkalis

Q1 Copy and complete the passage by choosing the correct word from the grey box.

14 NEUTRAL NEUTRALISED ACIDIC ACID ALKALI LOWER

Sodium hydroxide is an Its pH is If you add to sodium hydroxide the pH gets lower. When the pH is 7, the solution is — the acid has the alkali. If you add more acid the pH gets even The solution is now

Q2 Write down the **five** true statements from the list below:

- Sam's hair shampoo is pH5.5. It is neutral.
- Wasp stings are alkaline. You can treat them with lemon juice (pH3).
- Acid rain can make lakes too acidic for some fish.
You can add alkali to make a lake less acidic.
- Nettle stings contain methanoic acid. You can neutralise them with vinegar (pH3).
- Cola drinks are acidic and can damage tooth enamel.
- Vinegar is acidic and is used to preserve food.
- The hydrochloric acid in your stomach can kill some bacteria.

Q3 Use the table to decide whether to add an **alkali**, an **acid** or **nothing** to the soil.

Food Crop	pH at which the crop grows best
Potatoes	4-6
Peanuts	5-6
Grapes	6-7

- The soil on Liz's field is pH8. She wants to grow potatoes. What should she add?
- The soil on Nzila's farm is pH6. He wants to grow peanuts. What should he add?
- The soil on Frank's farm is pH5. He wants to grow grapes. What should he add?

Q4 Clare does an experiment to see how the pH changes when she adds acid to an alkali. The hydrochloric acid and sodium hydroxide both have the same concentration.

Choose the correct results table and copy it out:

A

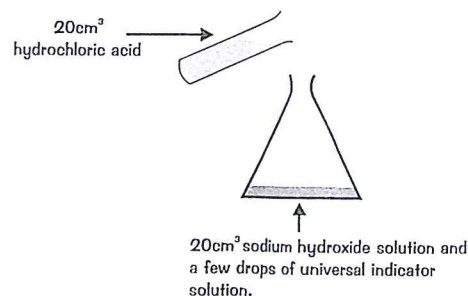
Volume of acid/cm ³	Colour of indicator	pH
0	Blue	14
20	Red	7

B

Volume of acid/cm ³	Colour of indicator	pH
0	Blue	14
20	Green	7

C

Volume of acid/cm ³	Colour of indicator	pH
0	Blue	14
20	Green	1



The Importance of Neutralisation

Q1 Copy and complete the passage by choosing the correct word from the grey box.

ALKALINE ACID HYDROCHLORIC NEUTRALISE

You may get stomach ache if you have too much acid in your stomach. Indigestion tablets dissolve in water to make solutions. These tablets some of the in your stomach and make you feel better.

Q2 You have 3 different types of indigestion tablet. From the list copy out **two** questions you could investigate to help you find out which type of tablet is the best for curing indigestion.

- Which tablet tastes the best?
- How many tablets do you need to neutralise 50cm³ of hydrochloric acid?
- If you add one tablet to 50cm³ of hydrochloric acid, what is the final pH?
- How long does it take for a tablet to react with hydrochloric acid?

Q3 Amardeep is doing an experiment to find out the pH change when she puts an indigestion tablet in 50cm³ of acid. Write out these instructions in the correct order.

- Measure out 50cm³ of hydrochloric acid in a measuring cylinder.
- Stir well.
- Crush up a tablet in a pestle and mortar and add it to the acid.
- Write down the pH of the acid.
- Pour the acid into a beaker.
- Look at the final colour of the indicator and write down the pH.
- Add 5 drops of universal indicator to the acid and look at its colour.

Q4 Junior is doing an experiment to find out what mass of tablet he needs to add to hydrochloric acid to make it change from pH1 (acidic) to pH7 (neutral). Write down **two** things he must do to make the experiment **fair**.

Q5 Grottwiggle has accidentally discovered a new powder — Maginewt. A very small mass of Maginewt neutralises a large volume of acid. Write down **two** things Grottwiggle must find out before she can sell the powder as an indigestion cure.



Who's the best — Danni my pet newt or Uncle Al? Newt-or-Al...

And on that hilarious note, you'll be pleased to know this is the last page of the section.

So remember, you need acid in your stomach, but too much can give you quite a belly ache.

Indigestion tablets make an alkaline solution to neutralise some of the acid and make you feel better.

Chemical Reactions

Q1 Solve the following anagrams.

(Each one is something that you might detect if a chemical reaction has occurred)

- a) erapmtueret sire
- b) sublbeb fo sag
- c) melsl
- d) ooclur nhaceg
- e) mealf

Q2 Chemical reactions make **new materials** — they're **irreversible changes**. Make a table to show which of the following changes are **chemical reactions**, and which are **physical changes**.

- a) Burning toast under a grill.
- b) Turning water into ice in the freezer.
- c) Boiling an egg.
- d) Igniting a Bunsen Burner.
- e) Salt disappearing as it's stirred into a beaker of water.
- f) Water droplets forming on a kitchen window near a kettle of boiling water.
- g) Green copper carbonate powder turning to black copper oxide when it's heated strongly.

Q3 Write down two differences between a **chemical reaction** and a **physical change**.

Q4 A teacher is showing his class that a gas is released when bicarbonate of soda is added to lemon juice.

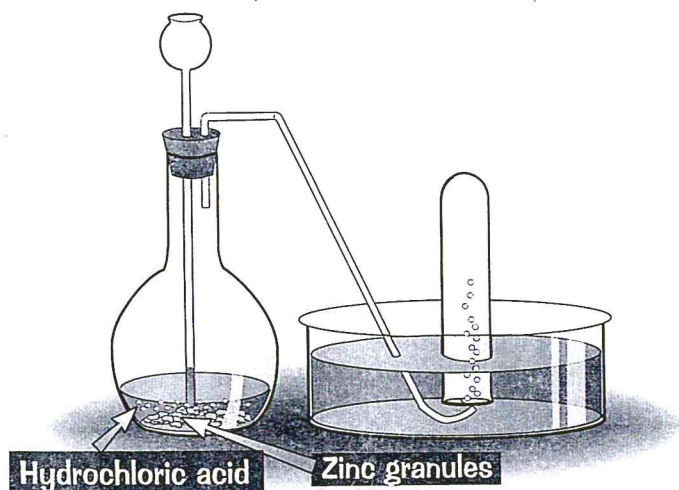
- a) How can you tell that a gas is released?
- b) Is this a physical change or a chemical change?

Chemical reactions — as easy as boiling an egg...

Remember — if it's an **irreversible** change, it's been caused by a **chemical reaction**.

Acids and Metals Reactions

Q1 Kirsty's teacher has made and collected some **hydrogen** gas as shown in the picture.



- a) Write down **two** changes that Kirsty should **see** during the reaction.
- b) Describe how Kirsty's teacher should test the gas collected to show that it is hydrogen.

Q2 Kirsty's teacher tried a second and a third experiment using two different metals. In the second experiment, no gas was produced. In the third experiment, gas was produced very quickly.

- a) Which metal might Kirsty's teacher have used in:
 - i) the second experiment?
 - ii) the third experiment?
- b) What gas was produced in the third experiment?

Q3 Copy the following paragraph, filling in the missing words. Choose words from the grey box.

When an acid is added to many metals such as the gas produced is In this type of chemical the piece of metal or becomes smaller. You can describe acids as

reaction, graphite, zinc, air, hydrogen, corrosive, disappears, appears, burns

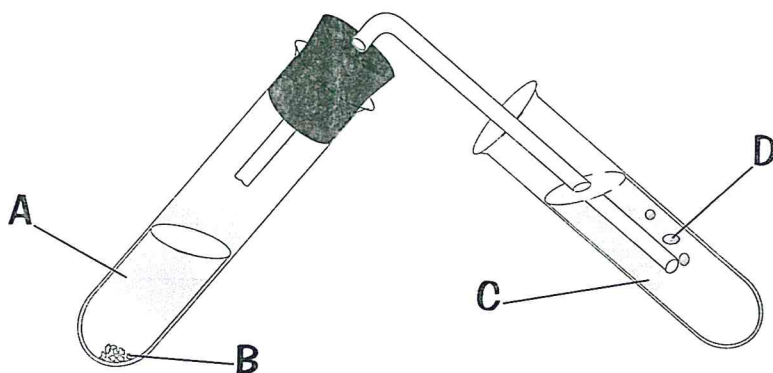
Acids and Carbonate Reactions

Q1 Which of the materials below contain mainly **carbonate** compounds?

soap copper limestone wood
 marble baking powder chalk

Q2 Lisa carried out a **chemical reaction** to show what gas is produced when an acid is added to limestone chips.

(Limestone is mostly calcium carbonate)



- Copy the diagram and name the things labelled A to D.
- What change can you see when carbon dioxide gas is bubbled through limewater?

Q3 Which of the following sentences are **true** and which are **false**?

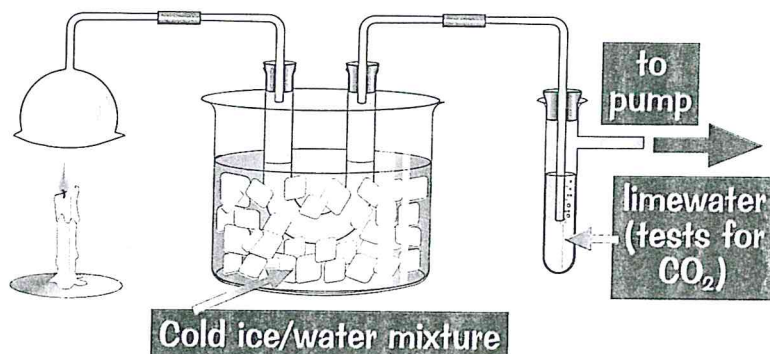
- The 'fizz' in fizzy drinks is carbon dioxide gas.
- The gas produced when an acid is added to a carbonate is hydrogen.
- Limewater is used to test for carbon dioxide gas.
- Indigestion medicines often contain carbonates.
- The only acid that will react with a carbonate is hydrochloric acid.
- A chemical reaction always means new substances being made.

Making hydrogen — it's just a gas...

Don't get your gases mixed up. If you react metals with acid, it'll be hydrogen. If you react a carbonate with acid you'll get carbon dioxide. Remember — carbonates make carbon dioxide.

Burning Reactions

Q1 David's teacher demonstrated a useful reaction involving burning a fuel.



- a) i) What product of the reaction was the teacher collecting in the U-tube?
 ii) Why did David's teacher need to cool the U-tube?
- b) i) What **product** of the reaction was being bubbled through the limewater?
 ii) What **change** would David see in the limewater when the fuel was being burned?

Q2 The statements below are **wrong**. Write them out again, replacing the word in **bold** type with a more suitable word.

- a) Ethanol, **glass** and wax are examples of fuels.
- b) Fossil fuels are rich in a substance called **tin**.
- c) **Mixing** fossil fuels releases energy.
- d) Natural gas is called **wax**.
- e) Carbon dioxide and **nitrogen** are produced when a fuel burns.

Q3 Copy and complete the word equation which shows what happens when a fuel called **methane** (natural gas) is burned.

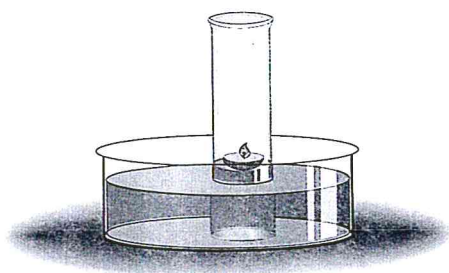
methane + o → + + energy

You Tarzan — Me Thane...

Remember — when you burn things, energy is produced. If there's a lot of energy, chemists often write it in the equation as one of the products of the reaction. But don't let that confuse you — energy's not a substance, you can't see it or touch it and it doesn't have mass. It's weird stuff.

Burning Reactions

Q1 A group of year 7 pupils set up the experiment shown in the diagram.

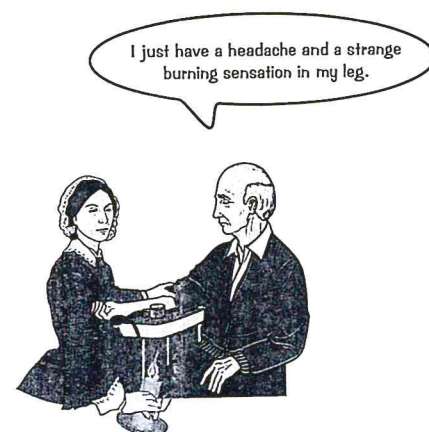
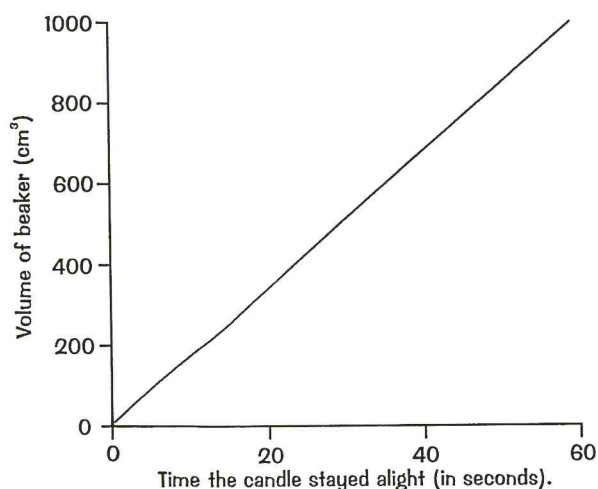


They placed a large glass container quickly over the burning candle and timed how long the candle stayed alight.

- After 29 seconds the candle went out. Why?
- Why didn't the candle go out as soon as the glass container was put over it?
- What happened to the level of water in the glass container?
- Explain your answer to c).
- Which part of the air was used up in the glass container?

Q2 Another group of pupils in the class burned a candle in a series of different-sized beakers, upside down. They timed how long the candle stayed alight in each one.

Here is a graph of their results:

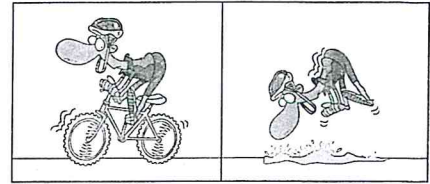


- What **relationship** does the graph show between the size of the beaker and the time the candle stayed alight?
- Explain **why** this relationship occurs.
- Estimate how long their candle would have stayed alight in a beaker of volume **2000cm³**.

Explaining Evidence from Experiments

Q1 Copy the names of the substances. Next to each one, write down whether it is a solid, liquid or gas at room temperature:

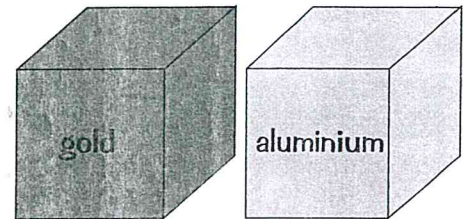
- | | | |
|-----------|------------|-------------------|
| a) gold | e) paper | h) petrol |
| b) water | f) vinegar | i) carbon dioxide |
| c) oxygen | g) diamond | j) salt |
| d) wood | | |



Liquids are useless for some things.

Q2 Both these blocks are the same size. Copy out the 2 sentences which explain why the block of gold has a greater mass than the block of aluminium.

- A gold particle has a greater mass than an aluminium particle.
- A particle of gold is lighter than a particle of aluminium.

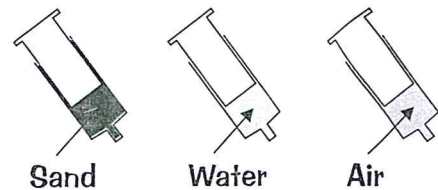


The gold particles are further apart than the aluminium particles.

The gold particles are closer together than the aluminium particles.

Q3 The ends of these syringes are sealed so that nothing can come out of them. Copy the paragraph below, choosing the correct word from each highlighted pair.

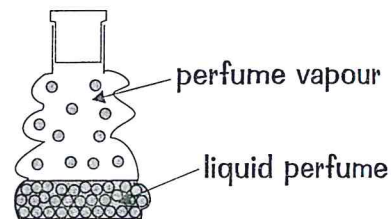
You [can't / can] push in the plungers in the sand and water syringes. This is because the particles in the sand and water are very [far apart / close together].



The particles in the air syringe are [far apart / close together] to start with. When you push in the plunger, the air particles get [further apart / closer together].

Q4 This picture shows the particles in a bottle of perfume.

- a) Draw a diagram to show what happens to the perfume vapour particles when you take the lid off the bottle.
- b) Explain why someone close to the bottle smells the perfume before someone who is further away.

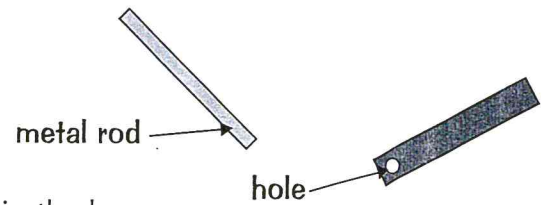


Science is just like perfume — gets right up your nose...

It doesn't matter how many times they tell you this stuff, it's still dead weird. A solid's just a load of little particles. So how does it stay together — "forces of attraction", they say. Hmmm...

Explaining Evidence from Experiments

Q1 At room temperature, the metal rod fits through the hole (just!). If you heat the rod to a high temperature, it doesn't fit through the hole.



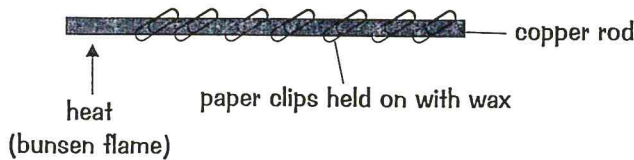
Copy the writing and fill in the gaps using the words in the box.

faster further big slowly particles

When the metal rod is cold, its particles vibrate on the spot.

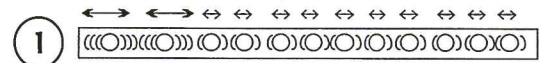
When the bar is hotter, the particles vibrate The vibrating hit each other, and get apart. This makes the end of the rod too to fit through the hole.

Q2 Marcus stuck paper clips onto one end of a copper rod using candle wax. He heated the other end of the rod. Gradually the heat travelled down the rod, the wax melted and the paper clips fell off.

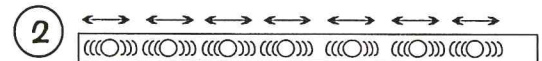


Copy sentences A, B, C and pictures 1, 2, 3. Match each sentence to the correct picture.

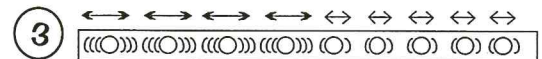
(A) The particles vibrate very fast when heated.



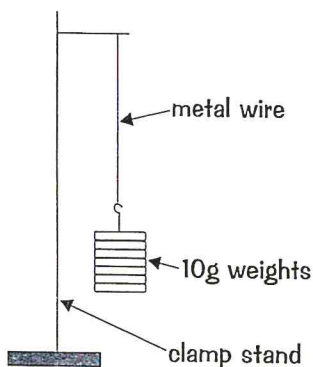
(B) They hit the particles next to them and make them vibrate faster. This part of the rod is now hot.



(C) These particles hit other particles further down the rod and make them vibrate faster too.



Q3 Samira hung 10g weights on a metal wire. It snapped when she had added 200g. Write 3 sentences to explain why the wire snapped.



For each sentence, use one phrase from each of the three columns:

10g	The particles in the middle of the wire are so far apart that the wire snaps	and the forces between the particles are slightly less strong.
200g	The particles are very close together	and the forces between these particles are now too weak to hold them together.
160g	The particles are very far apart	and the forces between the particles are very strong.

How Theories are Created

Q1 Copy this writing and fill in the gaps using words from the cloud.

Scientists collect, usually by doing experiments or making Then they think of ideas to the evidence. These ideas are called Later, scientists may do more and get some new evidence. Then they might have to their first theory.

theories explain
experiments observations
evidence change

Q2 Read the writing then answer these questions:

- a) Who entered the shop first?
Write down **four** pieces of evidence that support your theory.
- b) Write down **two** pieces of evidence that you ignored when you made your theory.

A mobile phone shop has been burgled. Police officers found 3 brothers inside the shop. A witness said that she saw a man climb a ladder and squeeze through a very small skylight in the roof before letting the other 2 brothers in through the door. You have the following evidence:

- Aidan has a broken leg that was in plaster.
- Aidan can't swim.
- Jason is very fat.
- Jason is afraid of heights.
- Jason was eating a pasty when the police arrived.
- Matthew goes to the gym often.

Q3 Here is a list of four theories. Copy the list. Next to each theory write down the letter (W, X, Y or Z) for the piece of evidence that supports the theory.

- The Theories:**
- a) Particles in liquids are closer together than particles in gases.
 - b) Gas particles spread out to fill as much space as possible.
 - c) Particles in solids get slightly further apart when you heat them.
 - d) Particles of different substances have different masses.

The Evidence:

W The smell from someone wearing too much (or too little) deodorant spreads all round the room.	X Metal rods expand when they get hot.
Y A gold ring has a greater mass than an aluminium ring of the same size.	Z You <u>can</u> push in the plunger of a sealed syringe with air in it. You <u>can't</u> push in the plunger of a sealed syringe of water.

Theories — they're just ideas with bells on...

You see — I have a theory, right. I reckon that the world's actually flat. And that people who claim they've "sailed round the world" should be burnt at the stake, frankly. That's what I reckon.

Solids, Liquids and Gases

- Q1 Solids, liquids and gases behave in different ways because they have different properties. Copy this table and use the phrases below to fill in the empty boxes.

Property	Solids	Liquids	Gases
Volume	Definite volume		
Shape		Match shape of container	
Density			Very low density
Ease of Flow	Don't flow		

Phrases to use: *definite shape, definite volume, flow easily, medium density, flow easily, high density, match shape of container, no definite volume — fill their container*

- Q2 The key below can be used to decide if something is a solid, a liquid or a gas. Copy the key and fill in the gaps.

a) Does it have a fixed volume?

YES — Go to b).

NO — Go to

b) Does it have a definite shape?

YES — Go to c).

NO — Go to d).

c) It is a

d) It is a

e) It is a gas.



Alternative method:
consult giant horned lizard.

- Q3 Copy the names of the substances. Next to each one write down whether it is a solid, liquid or gas and give a reason for your answer.

a) sand

c) tomato sauce

e) hairspray

b) chewing gum

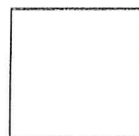
d) toothpaste

The Particle Model

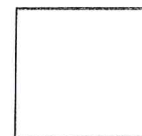
Q1 Copy the names of the substances. Next to each one, write down whether it's a solid, liquid or gas:

- a) ice b) drinking water c) steam

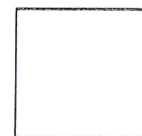
Q2 Solids, liquids and gases are made of tiny particles. Fill in the boxes to show the arrangement of particles in ice, liquid water and steam:



ice



liquid water



steam

Q3 Copy this table. Use the phrases below to fill in the empty boxes.

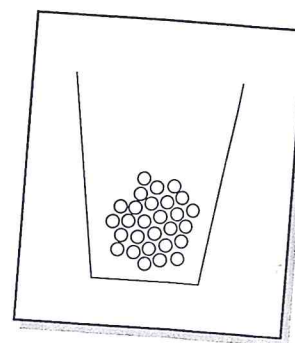
	Solids	Liquids	Gases
How close are the particles?			
How do the particles move?			

Phrases to use: *vibrate on the spot, move past each other in all directions, very close, far apart, move fast in all directions, very close*

Q4 Write out the **six** true sentences from the list below:

- *Strong forces hold the particles together in solids.*
- *Particles in liquids vibrate on the spot.*
- *Solid particles are arranged in a regular pattern.*
- *Weak forces hold the particles together in solids.*
- *Quite strong forces hold the particles together in liquids.*
- *It is difficult to compress liquids.*
- *It is difficult to compress gases.*
- *Gases expand to fill their container.*
- *Gas particles move slowly.*
- *Gas particles collide often with each other.*

Q5 Barney drew this picture to show how the particles are arranged in a glass of water. List **three** mistakes he has made.



Fixed volume — mine's stuck on loud...

If you get all these right, you've got a pretty good understanding of solids, liquids and gases.

Using the Particle Model

- Q1 Sasha lets off a stink bomb. After a few minutes Chesney can smell it at the other end of the corridor. Copy the writing and fill in the gaps to explain why.

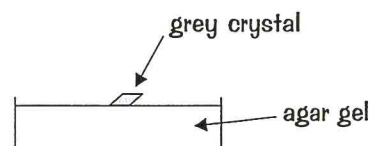
Words to use: *spread, particles, lots, few, diffusion*

To start with, there are of smell particles where the stink bomb is. Gradually, they out. The smell have moved from where there are lots of them to where there are only a of them. This process is called

- Q2 At the cinema, you can often see dust particles in the beam of light. Write down **three** sentences from the list below to explain why the dust particles are moving around.

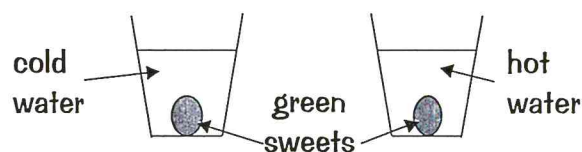
- *The light gives the dust particles energy to move.*
- *Air particles bump into dust particles.*
- *Cinemas attract especially energetic dust.*
- *When an air particle bumps into a dust particle, the dust particle moves off in a different direction.*
- *Air particles move around all the time.*
- *Dust particles vibrate in time with the pictures.*

- Q3 Edward put a grey crystal on some agar gel. After a few days, the grey colour had spread out a bit. Copy the diagram and add some grey particles to show how the colour spread.



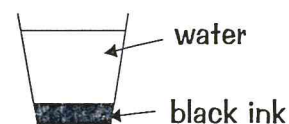
- Q4 Esmerelda puts one big green sweet in a glass of cold water and another big green sweet in a glass of hot water. Copy the writing below, choosing one word from each highlighted pair.

In both glasses, [water / air] particles bump into the sweet. Some green particles come off the sweet and mix in with the water particles.



Esmerelda can see green solutions in both glasses. Hot water particles move [slower / faster] than cold water particles, so particles come off the sweet more often in [hot / cold] water. After 20 minutes, more particles will have come off the sweet in the hot water, so the hot solution will be [lighter / darker] green.

- Q5 This glass has a layer of black ink underneath the water. After a few hours the water becomes black too. Write a few sentences to explain why the black colour spreads out — mention particles in your answer.



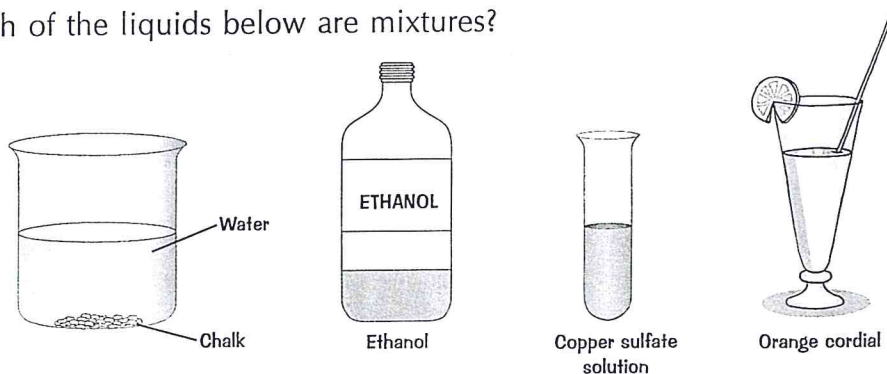
Diffusion — learn it now before it all drifts away...

It's like if you have a dancefloor full of people all jumping around and then they open another bit of dancefloor — people gradually spread out onto both dancefloors. High to low concentration, see.

Mixtures

Q1 Seawater is mainly a mixture of water, dissolved salts and sand.
Distilled water is much more like pure water.

- What does the word 'pure' mean in science?
- What does the word 'mixture' mean in science?
- Write down three examples of a mixture you might find at home.
- Which of the liquids below are mixtures?



Q2 Some solids dissolve in liquids to make a solution and some don't.

- What word is used in science to mean that something does dissolve?
- What word is used in science to mean that something does not dissolve?
- Name two everyday substances that will dissolve in water.
- Name two everyday substances that will not dissolve in water.

Q3 When solid copper sulfate dissolves in water it turns the water a blue colour.

- How do you know that the copper sulfate has dissolved and not disappeared?
- How could you separate the copper sulfate from the water to show that it has not disappeared?

Q4 Unscramble the words below to reveal four key words to do with dissolving.

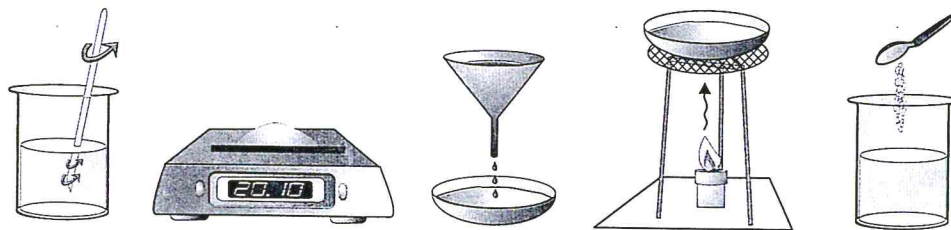
- bloules
- losbunile
- outsel
- tulsooni

Q5 How could you separate chalk from water using simple lab apparatus?

Q6 If you had a clear liquid in a beaker, how could you tell if it was a mixture or whether it was pure?

Rock Salt

You're given a 10 g sample of rock salt which contains a mixture of rock and salt. You carry out an investigation to find out how much of the rock salt was actually pure salt.



Q1 The Aim:

What is the aim of the investigation? (i.e. what are you trying to find out?)

Q2 The Apparatus:

List the apparatus you would use.

Then draw out a labelled diagram to show how the apparatus would be set up and used.

Q3 The Method:

- a) How would you check that you really have a 10 g sample of rock salt to start with?
- b) What can you do with the rock salt to dissolve the salt?
- c) How can you then separate the rock from the salty water?
- d) How can you separate the salt from the salty water?
- e) How can you find out how much salt you have at the end of the investigation?

Q4 The Results:

When the pure salt was weighed the scales read 3000 mg. How many grams is this?

Q5 The Conclusion:

- a) As a percentage (%) of the original mass how much of the rock salt was salt?
(Clue: 2 g of salt out of 10 g of rock salt would mean 20% of it was salt.)
- b) How might you improve the investigation to make it more accurate?

Finding out about salt? Do an experiment — that's the solution...

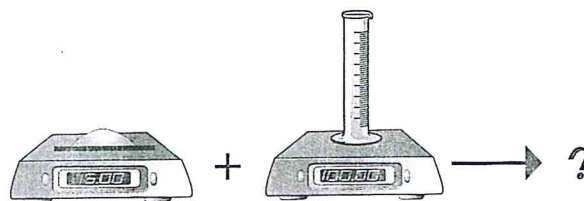
These questions cover loads about separating rock salt. They're also a top reminder of how to do and write up experiments — Aim, Apparatus, Method, Results, Conclusion. Simple.

Solutes and Solutions

Q1 Read Jack's experiment and then answer the questions.

Jack weighed out 15.00 g of table salt using a digital balance. He then carefully poured out 100 cm³ of water using a measuring cylinder.

He found that the water had a mass of 100 g. He mixed the salt and the water in a beaker then stirred the mixture to dissolve the salt and make a solution. Finally he weighed the solution.



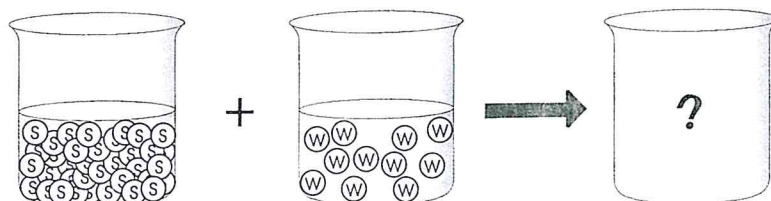
- Why did Jack use a digital balance?
- What was the mass (in grams) of the mixture of salt and water?
- Explain your answer to b).
- Jack tried to separate the salt and the water by filtering the solution. Explain why filtering could not separate the salt from the water.

Q2 Jack weighed a large evaporating basin (mass 46.32 g) and transferred the solution to it from the beaker. He left the evaporating dish in a hot sunny place near a window over the holidays. When he returned there were white crystals in the dish.

- What were the white crystals left in the dish?
- Where had the water gone?
- What name do we give to this way of separating substances?
- Jack reweighed the dish with the crystals, and found that it had a mass of 61.32g. What mass of crystals were in the dish?
- What does this show about dissolving substances?

Q3 When things mix, their particles intermingle. The diagram shows particles of salt and water before they are mixed.

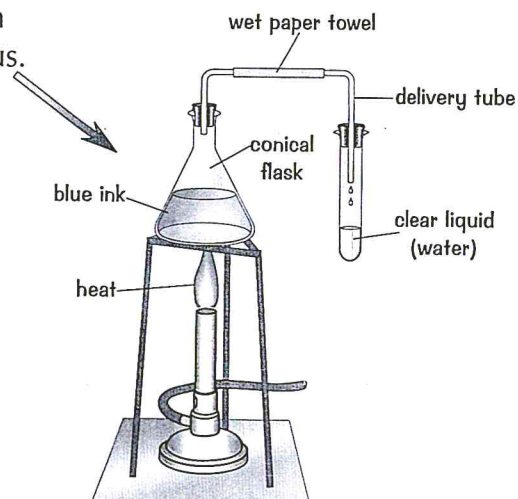
Complete the picture of the third beaker to show what you think the particles will look like if they are mixed. Clearly label the particles of salt and water.



Separating Solvents and Solutes

Q1 Blue ink is a mixture of coloured dyes and water. It can be separated into the dyes and water using this apparatus.

- Why is the ink heated?
- What do the wet paper towel and the delivery tube do?
- Why is the water clear and not blue?
- How could you check that the liquid was really pure water?

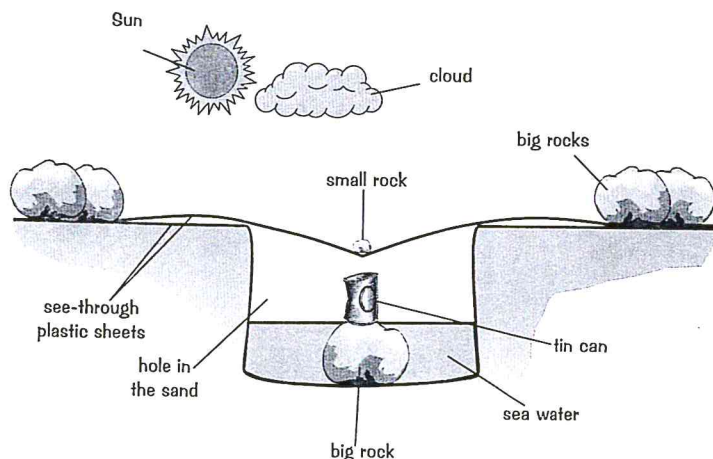


Q2 Distillation can be described using the following sentences. Write them down in the correct order to help explain the process of distillation.

- The gas turns back to a liquid.
- The liquid turns into a gas.
- The pure liquid is collected.
- The condenser cools the gas.
- The gas travels to the cool condenser.
- The liquid begins to boil.
- The liquid and the solute are heated up.

Q3 Doris has unfortunately found herself ship-wrecked on a desert island and can't find any water. She thought back to her science lessons and remembered that she had learnt that pure water can be obtained from seawater. She found a sheet of old clear plastic and a tin can, which had washed up on the beach, and set up the following.

- Explain in as much detail as possible how the water in the seawater finds its way into the can.
- Why does the water not taste of salt, like seawater?
- Most water is collected when the sun is shining brightly. Why is this?

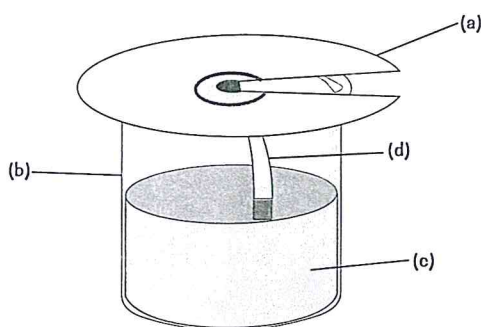


Chromatography

Q1 From the following, only copy out the correct statements about chromatography.

- a) Chromatography is a separation technique.
- b) Chromatography can be used to separate coloured inks only.
- c) Chromatography involves boiling and condensing.
- d) Chromatography can be used to separate a mixture of solutes which are soluble in the same solvent.
- e) Chromatography is used to identify unknown substances.

Q2 Copy the diagram and fill in the names for labels a) to d).



Q3 Explain how chromatography can be used to compare two substances that are found in the colouring of sugar-coated chocolate sweets, like Smarties.

Q4 Chromatography is used in forensic science.

- a) What is forensic science?
- b) Name an example where chromatography is used in forensic science.

Q5 To explain how chromatography works and the fact that certain substances travel different distances through the chromatogram, we can think of the solvent particles giving the solute particles a 'piggyback ride'. Using this idea and diagrams if you want, explain in detail how chromatography works.

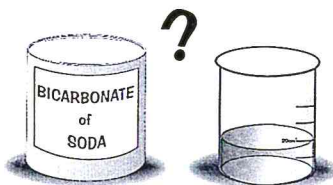
Bob only photoed birds on rugs — he was a crow-mat-ographer...

Chromatography is definately one of the more interesting separation techniques. After all, you can make loads of pretty patterns and pass it off as science.

Solubility

- Q1 From the following, copy out only the correct statements about solubility.
- a) When a soluble solid is added to an appropriate solvent, a solution is made.
 - b) When an insoluble solid is added to a solvent, a solution is made.
 - c) When a soluble solid is added to a solvent, there is a limit to how much can be dissolved.
 - d) When a soluble solid is added to a solvent, there isn't a limit to how much can be dissolved.
 - e) When a soluble solid is added to a solvent, the amount which dissolves depends on the temperature of the liquid.
 - f) When a soluble solid is added to a solvent, the amount which dissolves does not depend on the temperature of the liquid.

- Q2 Sodium hydrogen carbonate (bicarbonate of soda) is soluble in water. Describe an experiment you could do in the lab, which would find out how much of it could be dissolved in 20 cm³ of water.



- Q3 The solubility of potassium nitrate fertiliser is 21 g per 100 g of water at 10 °C.
- a) What does the above statement mean?
 - b) How many grams of potassium nitrate could be dissolved in 50 g of water?
 - c) How many grams of potassium nitrate could be dissolved in 200 g of water?
 - d) Why is it useful to know how soluble a fertiliser is?
 - e) Do you think that insoluble fertilisers would be useful or not? Explain your answer.
- Q4 Choose the correct description of a saturated solution and write it out.
- A saturated solution is...
- a) ...a very wet solution.
 - b) ...a solution with a solute lying on the container bottom.
 - c) ...a damp answer to a dry question.
 - d) ...a solution where no more solute can be added.

More about Solubility

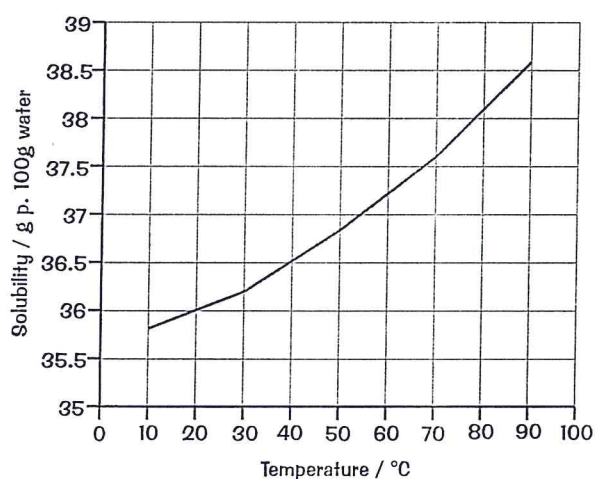
Q1 Look at the table below and answer the questions.

Table Showing Solubility at Room Temperature / g per 100g Water

Substance	Temperature / °C				
	20	30	40	50	60
A	25	30	37	46	59
B	32	33	35	38	42
C	29	31	33	35	37

- a) Which is the most soluble substance at 20 °C?
- b) Which is the least soluble substance at 20 °C?
- c) How does the solubility of A, B and C change as the temperature is increased?
- d) Why should you always quote the temperature when giving the solubility of a substance?
- e) Which substance's solubility changes the most, as the temperature is increased?

Q2 The graph below shows how the solubility of sodium chloride (common salt) changes with temperature. Look at the graph and then answer the questions below it.



- a) Describe how the solubility of sodium chloride changes as the temperature rises.
- b) Using the graph, find what mass of sodium chloride can dissolve in 100 g of water at 30 °C.
- c) What is the solubility of sodium chloride at 50 °C?
- d) Estimate the solubility of sodium chloride at 100 °C.
- e) If you had 10 g of water at 30 °C, how much salt would you add to get a saturated solution?
- f) If 100 cm³ of solution was cooled from 60 °C to 40 °C, what mass of salt would come out of the solution? (i.e. stop being dissolved and appear as salt crystals.)

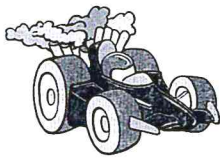
Uses of Fuels

Q1 Write down the type of fuel that would be used in each of the following:

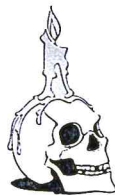
- a) a central heating system,
- b) a camping stove,
- c) a train,
- d) a barbecue.

Q2 The pictures below show 4 uses of fuels.
Copy and complete the sentences for each one.

a)



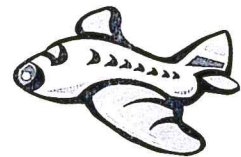
b)



c)



d)



- a) Petrol is b..... to make the car m......
- b) Candle wax is b..... to give off l......
- c) Coal is b..... to give off h......
- d) Kerosene is b..... to make the plane m......

Q3 **Movement, heat and light** are all types of what?

Q4 Copy and complete the equation below which summarises the burning of fuel:



Q5 Copy the **correct** statements from this list about **good fuels**:

- | | |
|----------------------------|------------------------------------|
| a) give out a lot of heat | f) are very flammable |
| b) give off a lot of smoke | g) burn with a smokey yellow flame |
| c) are easy to light | h) are very expensive |
| d) burn steadily | i) burn with a clean flame |
| e) give off toxic fumes | j) are easy to transport |

Uses of Fuels

Q1 Write down 3 fossil fuels from the list below:

- | | |
|----------------|---|
| a) wood | e) seal blubber (a layer of fat under the skins of seals) |
| b) camel dung | f) a battery |
| c) natural gas | g) oil |
| d) coal | |

Q2 Coal is made from dead plants. What are oil and natural gas mostly made from?

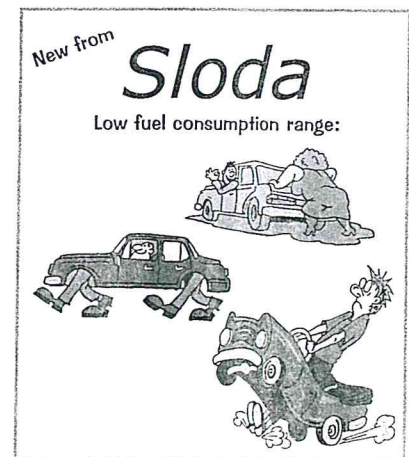
Q3 Where are oil and natural gas formed?

Q4 Write out the following statements in the correct order, to describe how a fossil fuel is made:

- Coal is made from plants that lived millions of years ago.
- Water from swamps flowed over them and covered them with sand and mud.
- As time passed the sand and mud changed to rock.
- When the plants died they fell to the ground.
- The plants couldn't rot because there was no oxygen around them.
- The dead plants were squashed into a flat layer of coal.

Q5 Why are fossil fuels described as **non-renewable**?
Use the key words below in your answer.

MILLIONS YEARS REPLACED FAST USE



Q6 Scientists predict that oil and natural gas supplies will run out by 2050.

- How old will you be in 2050?
- Give 2 ways in which life will be different if there is no oil or gas.
- What would happen to the supplies of coal if the oil and gas ran out?
- What could we do to make our energy supplies last longer? Give 2 suggestions.

If you're stuck, just burn your homework — it's a novel excuse...

The problem is, they all thought these fuels would be around for ever. D'oh.

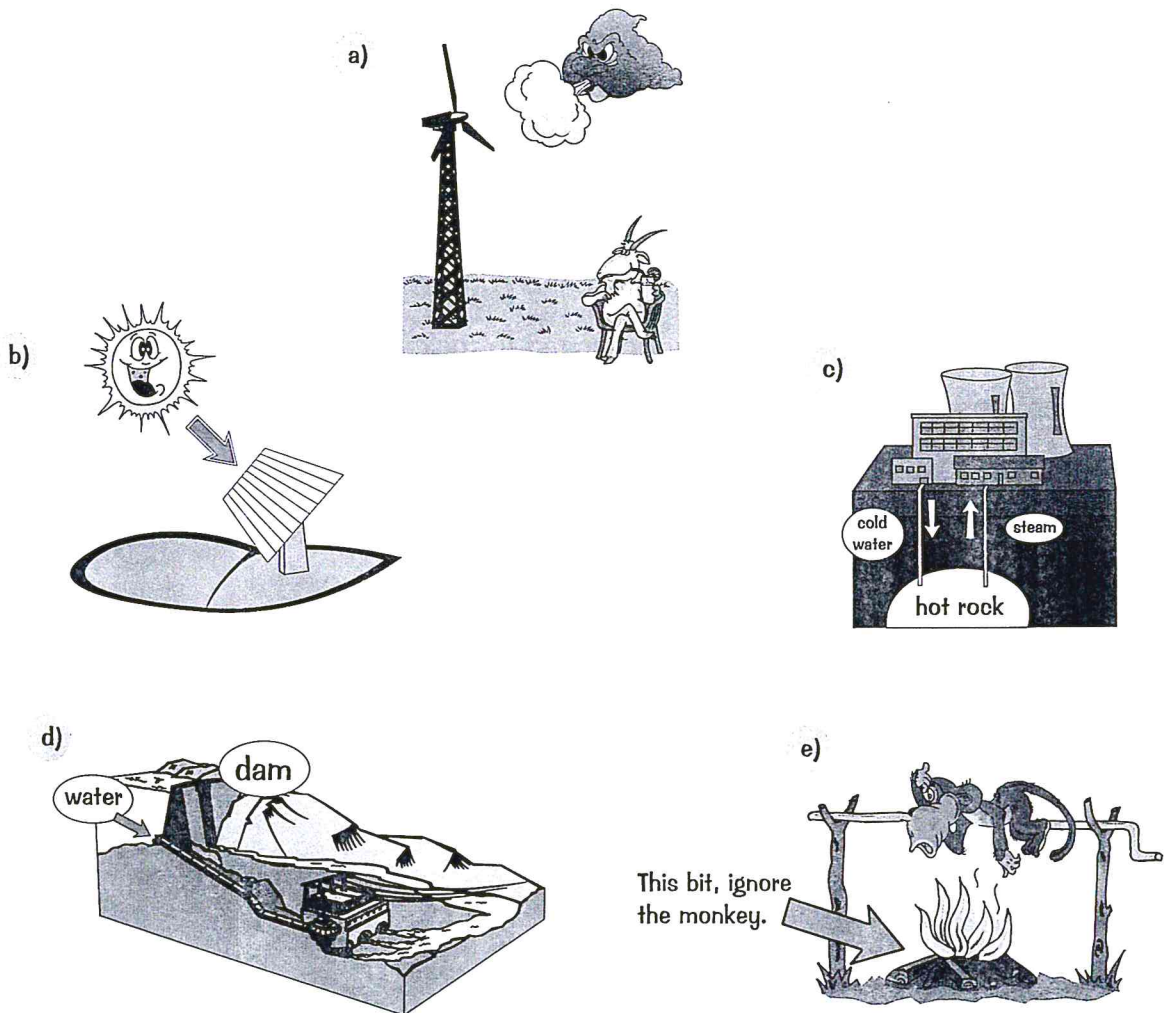
Renewable Energy Resources

Q1 Using **some** of the words below, copy and complete the sentence.

CAN FAST RENEWABLE CANNOT SLOW

A energy resource is one that
be replaced as as it is being used.

Q2 The pictures below show devices which use renewable energy resources.
Name each device and the type of renewable energy that it uses.



Q3 Name one important renewable energy resource which has not been included in Q2.

No animals were harmed in the making of this page...

This is important stuff. If we can't think of alternative ways to harness energy, we'll all end up sitting in the cold and dark through the long winter nights, without even a Playstation for company.

Renewable Energy Resources

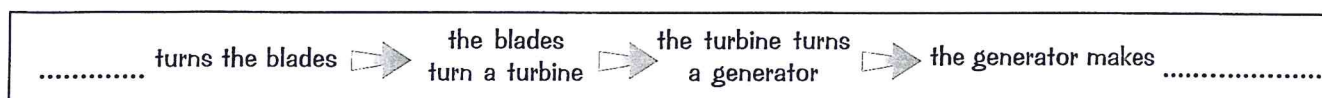
Q1 You can summarise how the devices in Q2 on p.54 work by drawing a flow diagram e.g.

SOLAR PANEL

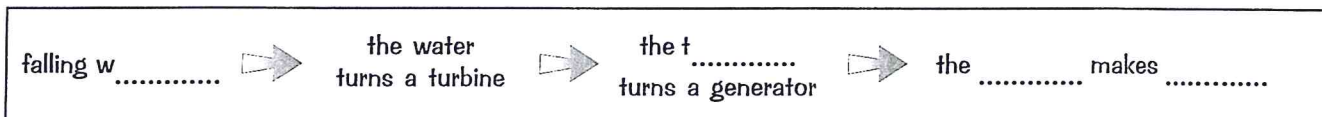


Copy and complete these summaries for the other devices.

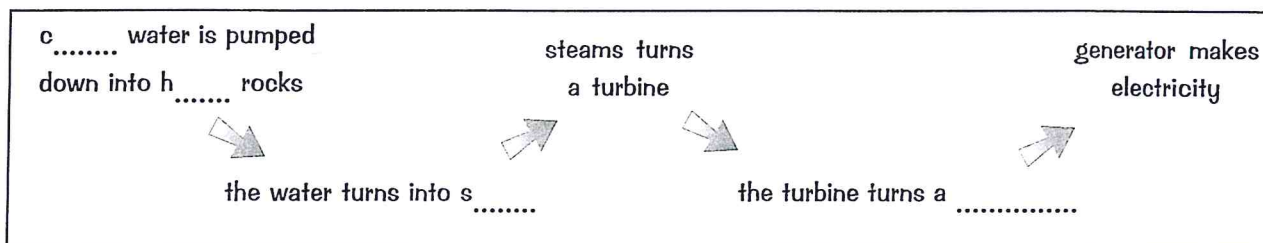
a) WIND TURBINES



b) HYDROELECTRIC POWER STATION



c) GEOTHERMAL POWER STATION



d) What do the devices a) - c) all make?

Q2 Copy and complete the table to give one advantage and one disadvantage of each renewable energy resource.

Energy Resource	Advantage	Disadvantage
Solar		
Wind		
Geothermal		
Hydroelectric		
Biomass		

Spend some of your energy answering these...

Now what would be handy would be if we could harness the energy of drizzle. Then at least something good would come out of the fact that it chucks it down every single summer...

How Living Things Use Energy

Q1 For each living thing below, give an activity that it needs energy for.

a) a bird



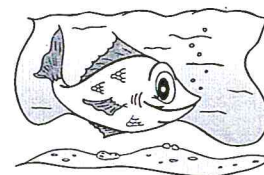
b) Joe



c) a tiger



d) a fish



Q2 Copy and complete these sentences:

All living things need e to carry out activities. They get energy from the f they eat. Food is their energy r Different foods contain different amounts of e The energy in food is measured in j

Q3 A joule is a very small amount of energy. How many joules are there in a kilojoule?

Q4 The table shows the amount of energy contained in different foods.

Food	Amount of energy kJ	Food	Amount of energy kJ	Food	Amount of energy kJ	Food	Amount of energy kJ
Cottage cheese	110	Vegetable Soup	400	Carrot	108	Grilled Chicken	840
Cheshire Cheese	890	Cream of tomato soup	565	Cabbage	80	Potatoes boiled	323
Lemonade	750	1 Slice of Bread	397	Baked beans	1450	Lettuce	20
Milk Full Cream	675	1 Banana	275	Jelly	425	Tuna fish	310
Milk Skimmed	370	1 Apple	190	Cherry cake	646	Chips	1150
Tea with Milk	200	Ice Cream	520	Fish finger	220	1 Plain Biscuit	162

a) Write down the food that contains the most energy.

b) Write the food that contains the least energy.

c) How much energy is in a banana sandwich made of 2 slices of bread, and a banana?

Q5 On average, a farmer needs 14,000kJ of energy per day and an office worker needs 10,000kJ of energy per day.

a) Explain why there is such a difference in the energy they need.

b) What might happen to the farmer if his daily intake of energy were only 10,000kJ?

c) What might happen to the office worker if his daily intake were 15,000kJ of energy?

Q6 After eating breakfast and lunch the office worker had taken in 6,000kJ of energy. Design an evening meal which would make sure that he takes in all the energy he needs for that day.

The Parts of an Electrical Circuit

Q1 Fill in the missing names and draw the missing circuit symbols.

SYMBOL	NAME
_____
.....	SWITCH
⊗ OR ⊕
Ⓥ
.....	AMMETER
 made of three

Q2 Using circuit symbols, draw the following circuits:

- A series circuit containing two cells, two bulbs and one switch.
- A parallel circuit containing two cells, two bulbs and two switches — **each switch should control one bulb only.**

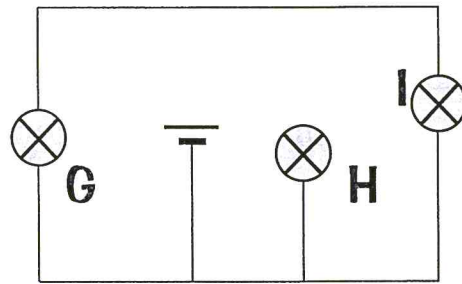
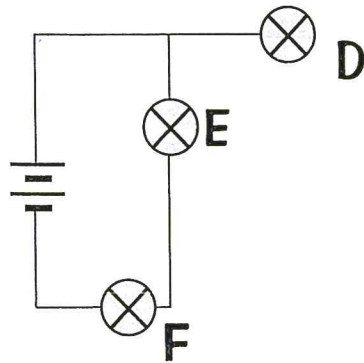
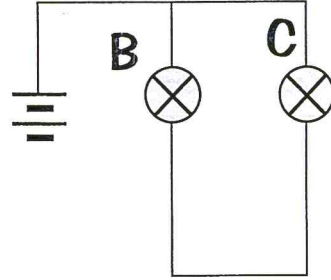
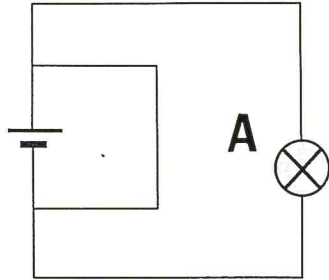
Q3 Copy and complete the following statements by selecting the correct word from the grey box.

CAN	NEGATIVE	POSITIVE	ENERGY
CAN'T	COMPLETE	OPEN	CLOSED

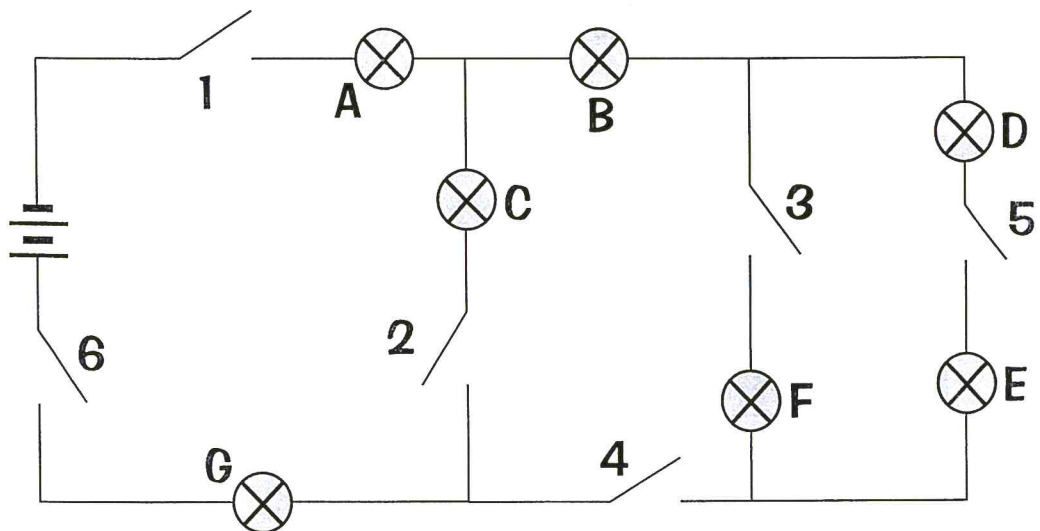
- For a current to flow there must be a circuit.
- For a current to flow switches must be
- If there is a gap in a circuit the current flow.
- For a circuit to work two cells must be connected positive to
- A battery or power pack is a source of electrical

How Electrical Circuits Work

- Q1 List the letters of the bulbs that will light in the following circuits. Then **correct** each circuit so that **all** bulbs will light



- Q2 Study the following circuit:



For each bulb (A-G) write down the switches that **MUST** be closed for the bulb to be lit.

LET THERE BE LIGHT — and there was *(once he'd found the switch)...*

If you can trace with your finger from one side of the battery through a bulb and back to the other side of the battery without any breaks then the bulb will light. Try it.

What Happens in Circuits

Q1 The circuit symbol for an ammeter is shown below.



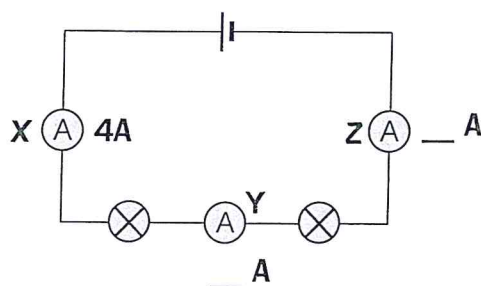
Copy the following sentences choosing the correct word from the options given.

An ammeter measures [voltage / current / energy].

Current is measured in [joules / volts / amps].

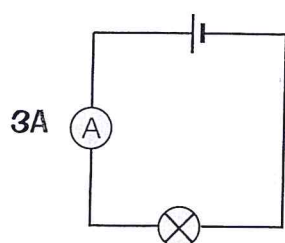
An ammeter must be connected in [series / parallel]

Q2 Two identical bulbs were connected in the following circuit. The reading on ammeter X was 4A.

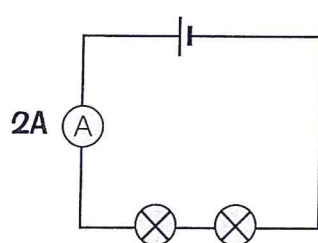


Copy the circuit and write down the readings on ammeters Y and Z.

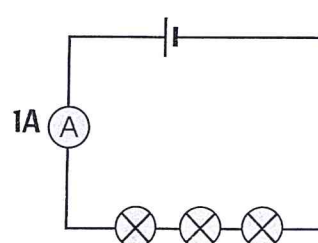
Q3 Study the three circuits below.



Circuit 1



Circuit 2



Circuit 3

For each of the following statements say whether it is true or false. If false then rewrite the sentence correctly.

- As more bulbs are added the current increases.
- As more bulbs are added the bulbs get dimmer.
- Putting more bulbs in the circuit decreases the total resistance.
- The bulbs in circuit 3 could be made brighter by adding another cell.

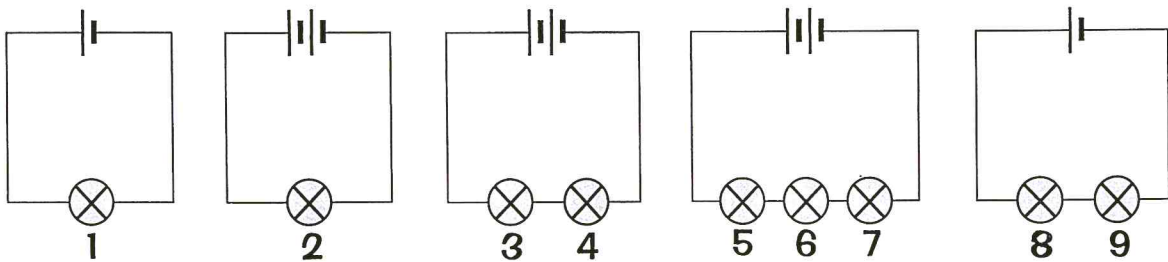
What Happens in Circuits

- Q1 Cells provide voltage. Cells added together make a battery.
Each of the cells below has a voltage of 1.5V.



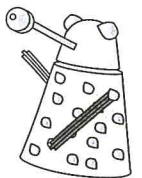
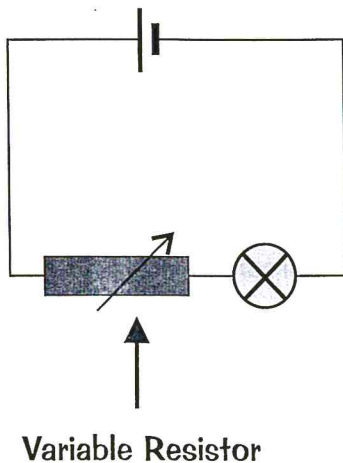
For each battery write down the total voltage.

- Q2 Study the circuits below. All bulbs and cells are identical.



- Which bulb(s) is/are the brightest?
- Which bulb(s) is/are the dimmest?
- Which two bulbs have the same brightness as bulb 3?

- Q3 The resistance of a variable resistor can be changed.



Initially the resistance of the variable resistor is low.
The bulb is bright.

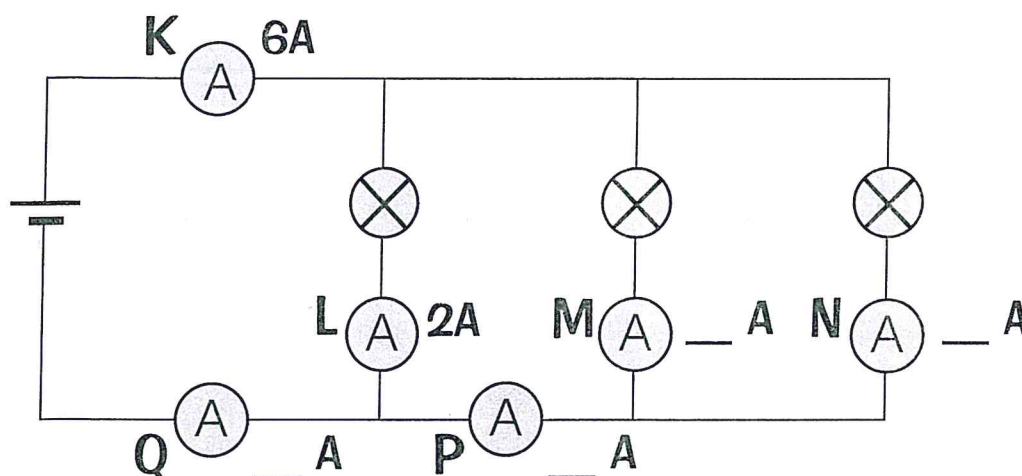
- Is the current through the bulb high or low?
- The resistance of the variable resistor is increased. Explain what happens to the bulb.

You will learn this — resistance is futile...

The larger the voltage the larger the current. The lower the resistance the larger the current.
The larger the voltage the larger the current. The lower the resistance the larger the current. Got it?

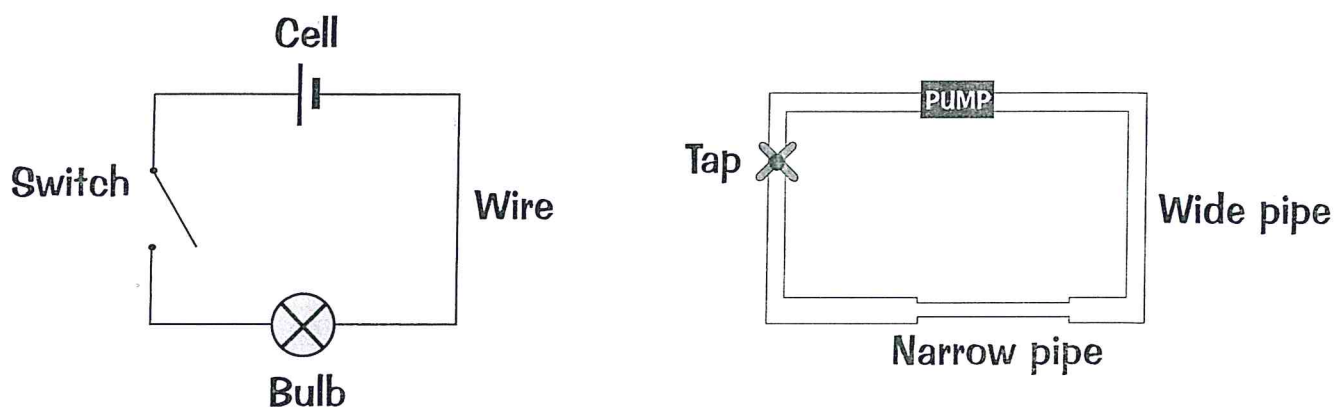
Explaining Circuits

- Q1 No current is lost at a junction. In the circuit below all the bulbs are identical. Ammeter K reads 6A and ammeter L reads 2A.



Copy the circuit and write down the readings on ammeters M, N, P and Q.

- Q2 Asif suggests that a water circuit is like an electrical circuit.



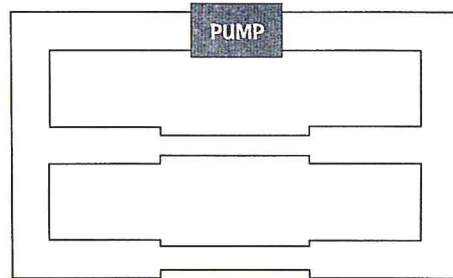
Asif says:

“The pump pushes the water around the circuit. It is easy to push the water through the wide pipes. The narrow pipe offers more resistance. Turning the tap off stops the flow of water throughout the whole circuit. To push more water you could use a higher power pump. To have less water flowing in the circuit put another narrow pipe in series.”

If the **underlined** words are changed Asif could be describing the electrical circuit. Rewrite the paragraph so that it describes the electrical circuit.

Explaining Circuits

- Q1 Jane suggests a way to increase the water flowing through the pipes. She adds another section of narrow pipe as shown below.



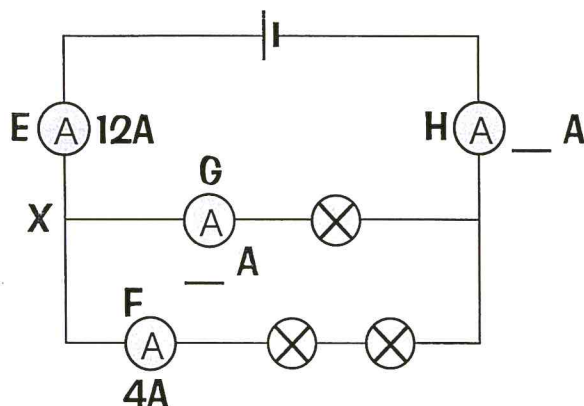
- a) Copy and complete the following paragraph choosing the words from the grey box.

SERIES RESISTANCE PARALLEL WATER MORE LESS

Jane has added another narrow pipe in with the first. There are now pathways for the water to flow. There is less in the circuit. The pump can push more around the circuit.

- b) Now draw the electrical circuit that follows Jane's idea.

- Q2 In the circuit below all bulbs are identical. The ammeter E reads 12A and ammeter F reads 4A.



- a) Copy the circuit and add the readings on ammeters G and H.
- b) When the current reaches the junction at X it splits. Why does more current go through the top branch than the bottom branch? (Hint – use the word resistance in your answer)

Water circuits and electric circuits — not to be mixed...

All the current that leaves a battery will return. All the current that enters a junction leaves it.
No matter how hard you try, no current is lost — it's like your annoying little brother.

Useful Circuits and Their Hazards

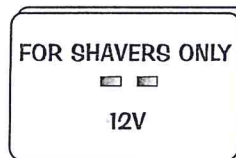
Q1 Copy and complete the paragraph choosing the correct highlighted words.

The mains electricity in your home is supplied at a voltage of [115 / 230 / 1.5]V. The voltage supplied by a torch battery is much [lower / higher]. Touching any mains wires is extremely [safe / dangerous / clever], especially if you have [dry / wet] skin. Wet skin has a lower [energy/voltage/resistance] than dry skin. This means that a [large / small] current can flow through you — a current that is likely to [amuse / kill / tickle] you.

Q2 There should be no 230V sockets in a bathroom. Explain why.

Q3 You might find a socket like the one on the right in your bathroom.

Explain why it is safe.



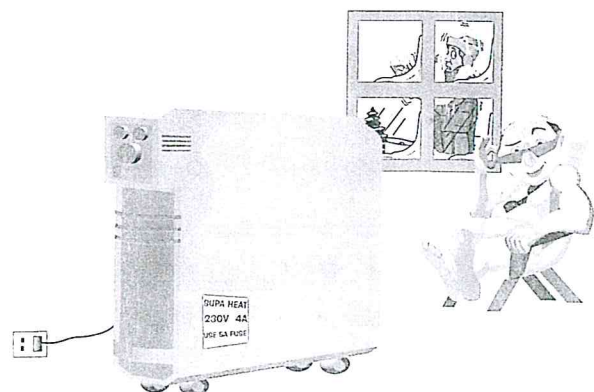
Q4 A fuse melts and breaks the circuit when the current through it is too large. The following fuses are marked with their maximum ratings.



When a current of 8A is used, which of the fuses will melt?

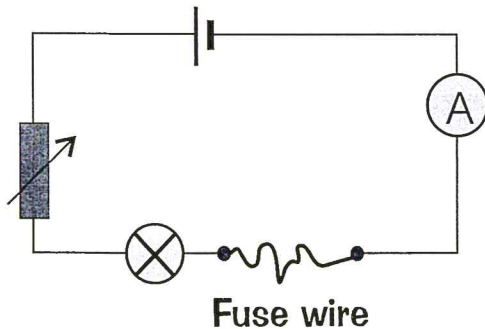
Q5 A heater normally uses 4A. The manufacturer recommends a 5A fuse.

Describe and explain what would happen if a 3A fuse was used.



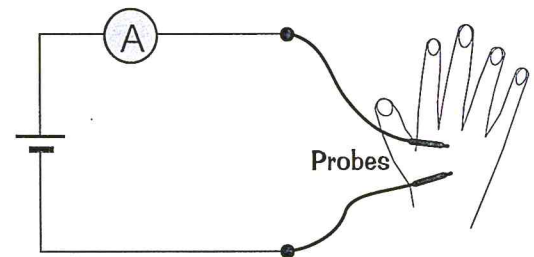
Useful Circuits and Their Hazards

- Q1 The circuit below shows a piece of fuse wire in series with a cell, a bulb, a variable resistor and an ammeter.



- a) The resistance of the variable resistor is at maximum. The bulb is dim.
 - i) Is the reading on the ammeter high or low?
 - ii) Why is the bulb dim?
- b) The resistance of the variable resistor is slowly reduced.
 - i) What happens to the reading on the ammeter?
 - ii) Suddenly the fuse wire glows and melts. Explain why this has happened?
 - iii) Describe and explain what happens to the bulb.

- Q2 If someone is not telling the truth they sweat slightly. Wet skin has a lower resistance than dry skin. The circuit for a lie detector is shown opposite. The two probes are placed on the skin.



A pupil is connected to the lie detector and asked questions.

The readings on the ammeter after two answers A and B are shown below.

A 6.3 MICROAMPS

B 0.4 MICROAMPS

Which answer is likely to be a lie? Explain your choice carefully.

If I see one more circuit question — I'll blow a fuse...

A fuse saved my Mum's life once. Well, kind of. She was cutting through the cable on an electric lamp, but the lamp was still plugged in. Big flash, then there was a hole in the scissors. Mind you, if the scissors hadn't had plastic handles, she probably would've been electrocuted anyway. So, a fuse will blow, but there might be an instant when there's a big dangerous current flowing.

Types of Force

Q1 You can't see a force, but you can see the effects that a force has on an object. Name the three ways that a force can affect an object.

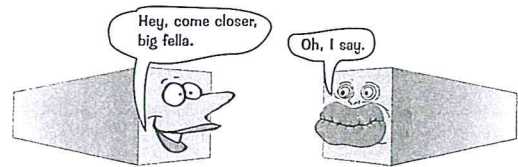
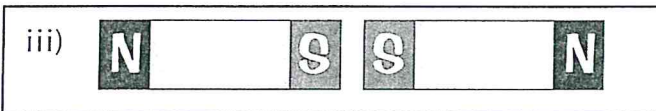
Q2 Copy and complete the sentences below.

Arrows are used in diagrams to show the and of forces.

A is an instrument used to measure forces.

This instrument measures forces in

Q3 Look at these magnets and then answer the questions below.



a) Copy out each diagram and add arrows to show the forces on the magnets.

b) For each part i) - iv), say whether the magnets are **attracted** or **repelled**.

Q4 Give a definition for each of the forces below.

- Upthrust
- Gravity
- Friction

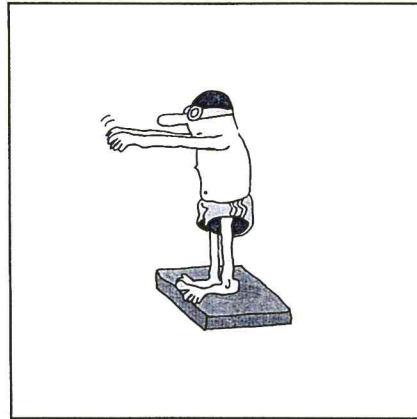
Q5 Draw labelled diagrams to show an example of each type of force from question four.

I can't stop making these terrible jokes — it's just a force of habit...

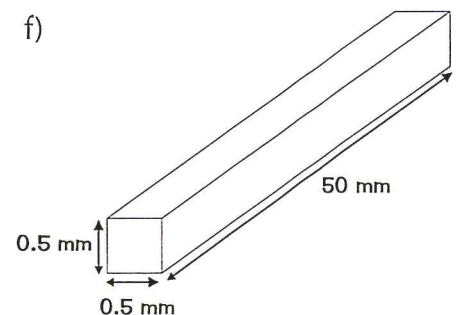
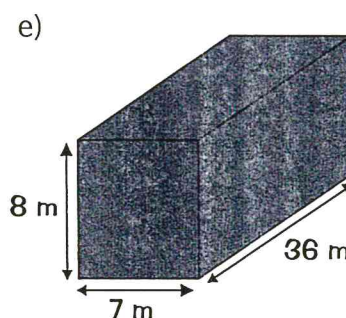
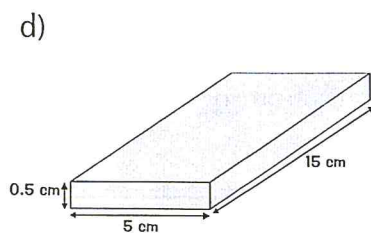
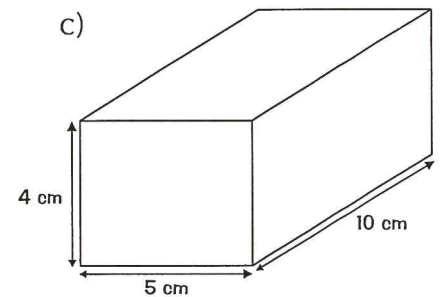
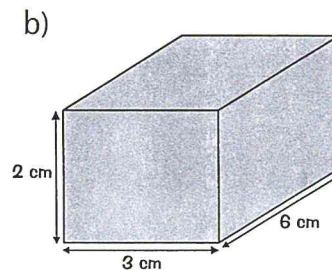
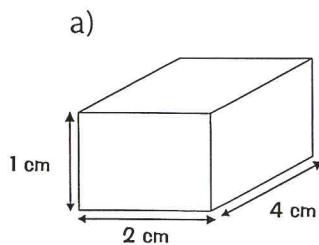
Forces are everywhere, you just can't avoid them. They keep us standing up, they keep us afloat. Gravity is a fairly important one that stops us floating into space. In fact, the force is all around us, it binds us together, but beware the dark side. Hang on, ignore that last bit, I lapsed into Star Wars.

Density and Floating

- Q1 Gravity and upthrust exist everywhere on earth, exerting a force on all objects. We know that gravity exists because we do not float off the surface of the earth. Copy the picture and draw the force arrows.



- Q2 The same boy gets in the swimming pool.
- What forces act upon him?
 - Draw a picture of him swimming at the surface with labelled arrows to show the four forces involved.
- Q3 To work out if something will float or not you have to be able to calculate its density. To calculate density you need to be able to calculate volume. Calculate the volumes of the objects below.



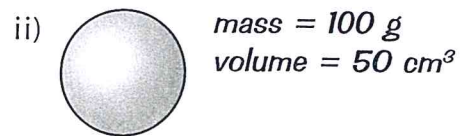
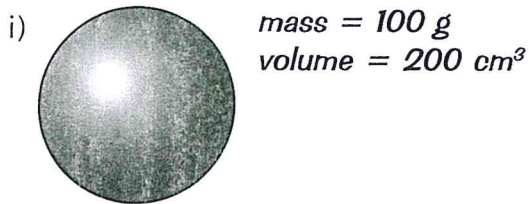
Density and Floating

- Q1 An object will float in water if its density is less than the density of water.
Use these reminder boxes to help you answer the following questions.

$$\text{Density (g/cm}^3\text{)} = \frac{\text{Mass (g)}}{\text{Volume (cm}^3\text{)}}$$

The density of water is 1 g/cm³

- a) Calculate the density of the following objects.



- b) Which of the two objects (i or ii) will float in water?

- Q2 Complete the sentence below with one of the phrases from the grey boxes.

When an object floats we can say that the forces are

unbalanced

balanced

acting in the same direction

acting upwards

acting downwards

- Q3 Complete the table.

Object	Mass (g)	Volume (cm ³)	Density (g/cm ³)	Does it float in water?
a	200	100		
b	100	150		
c	60	200		
d	20	10		

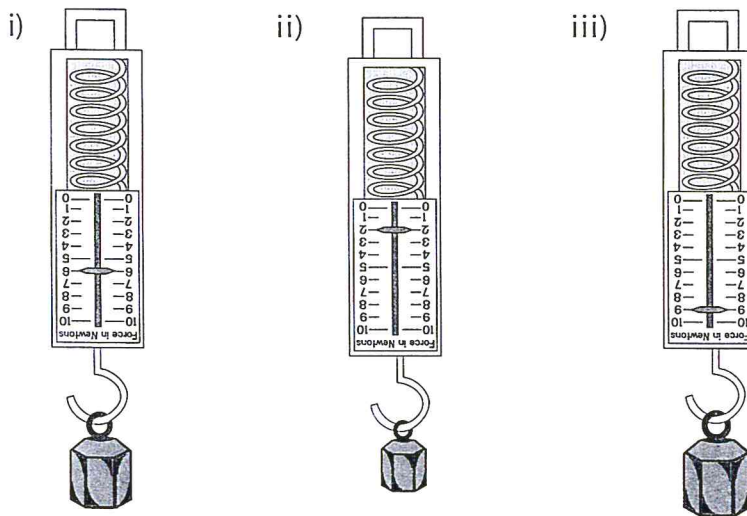
OK, try one more time Northerners – “FLOAT” No, you’re still saying flort*

It's getting a bit harder now. There's even some maths starting to appear. Gulp. Learn the formula for density and remember — an object floats if it's less dense than water (1 g/cm³).

*kidding

Force Meters and Stretching

- Q1 a) We can measure the weight of an object by using a force meter.
What are the weights of the objects below?



Weights are
measured in newtons.

- b) Two forces can be seen in action in the diagrams above — gravity and upthrust.
Are these forces balanced or unbalanced in the diagrams?

- Q2 When materials are stretched and then allowed to return to the same shape, they are said to be elastic. A force meter (newton meter) has a spring that is elastic.

Weight	Distance Stretched
0.1 N	0.5 cm
0.3 N	1.5 cm
0.5 N	2.5 cm
0.7 N	3.5 cm
0.9 N	4.5 cm

- a) Using the data above plot a graph.
- b) Draw a line of best fit on the graph.
- c) If you place a weight of 0.4 N on the force meter, what would be the distance stretched?
- d) Predict what distance would be produced by a weight of 1.5 N

Mass and Weight

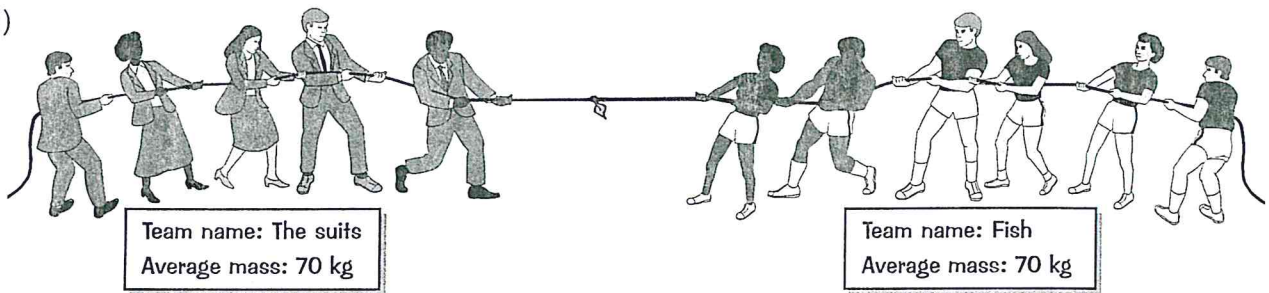
Q1 Mass is measured in kilograms (kg), weight is measured in newtons (N). Which of the following statements is correct?

- a) A chicken has a weight of 2 kg and a mass of 20 N.
 b) A chicken has a mass of 2 kg and a weight of 20 N.

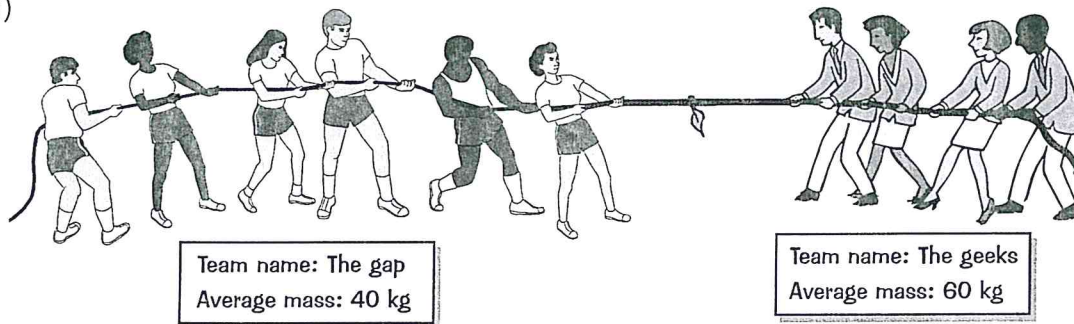
Q2 Answer these questions about mass and weight.

a) Calculate the total weight of each team.

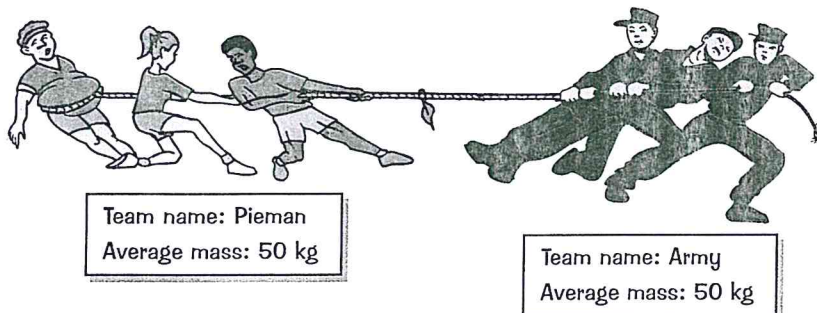
i)



ii)



iii)



b) Make a table showing details for all the teams.

Include total weight, average mass, number of people and team names.

Newton came up with this one...

Or did he... Actually Robert Hooke (1635 - 1703) studied how things are elastic which led to the creation of the newton meter. Sir Isaac Newton got all the credit, the weasel.

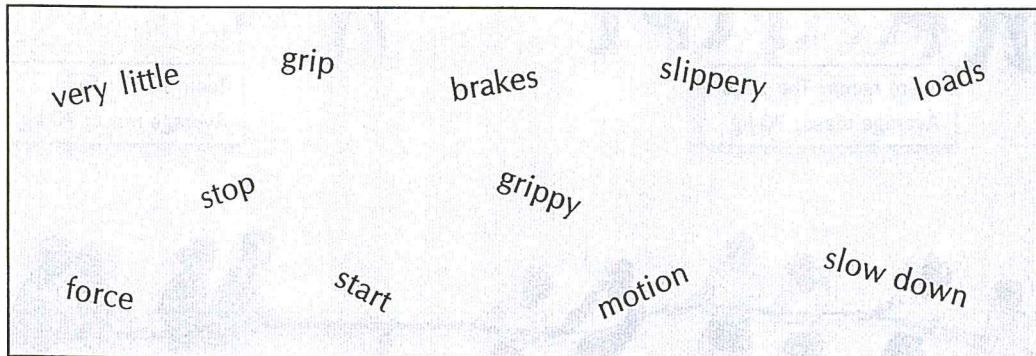
Friction

Q1 Copy out this paragraph and fill in the blanks using words from the grey box.

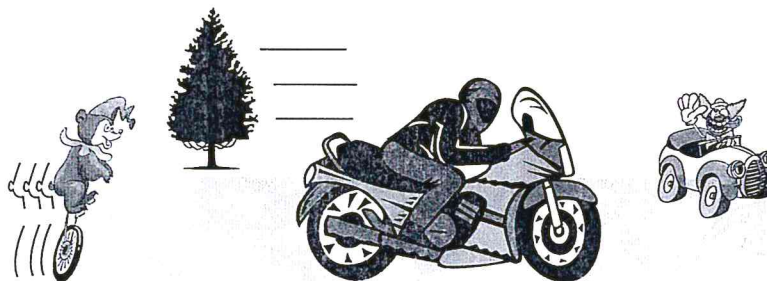
Friction is a that opposes

A surface gives of friction.

A surface gives friction. Friction allows car tyres to the road surface — without this grip the car wouldn't be able to move. use friction to the car. If the brakes supply enough friction the car will



Q2 The motorcyclist pictured below is travelling at a constant speed. Three forces — weight, friction and air resistance — act upon him.



- a) Copy the motorcyclist and draw on the force arrows.
- b) What happens to each of the following forces as he goes faster?
 - i) weight
 - ii) friction
 - iii) air resistance

Remember that forces can change direction, speed and shape.

Friction

Q1 Friction can be useful as well as unhelpful. Put the following statements into the correct part of the table.

- a) Friction between the soles of your feet and the ground.
- b) Friction in a car engine (eg. the pistons).
- c) Friction between the brakes and the wheels.
- d) Friction between a boat and the sea.

Useful	Unhelpful

Q2 Draw diagrams for a), c) and d) in question one. Include arrows and labels to show the direction of movement and friction. *[Don't do the engine. That'd be way too hard.]*

Q3 Copy out the paragraph below choosing the correct words where you have a choice.

A [lubricant / gas] is used to [reduce / increase] friction.

Lubricants are often [solids / liquids].

They are used to [dampen / smooth out] rough surfaces.

Q4 Answer these questions about friction.

- a) Why do you put oil in car engines?
- b) What would happen to the engine if you did not put oil in it?
- c) Name two types of lubricants.

Q5 Which of these would produce more friction?

- a) An ice cube sliding across a wooden table.
- b) A wooden block sliding across a wooden table

Big Brother Thought of the Day: Avoid friction or it'll lead to your eviction...

Friction, what a teaser. Sometimes you want it, sometimes you don't.
A bit like brown sauce — great on chips, rubbish on meringue. Think on.

Stopping Distance

Q1 Copy out the sentence below filling in the blank.

The a vehicle travels, the greater the stopping distance.

Q2 Using the data below plot a graph.

Speed (miles per hour)	Stopping Distance (metres)
20	12
30	22
40	35
50	51
60	70
70	92

a) What happens to the stopping distance as the speed decreases?

b) Use your graph to work out the stopping distances at the following speeds:

- i) 25 miles per hour
- ii) 65 miles per hour
- iii) 45 miles per hour

Q3 The data above is the stopping distance for a vehicle travelling on a dry road. What would happen to the stopping distances if the vehicle were travelling on a wet road?

Q4 Draw a distance/time graph for the following story.

- a) A girl leaves home at 8am, she walks 1 km to her friend's house, she arrives at 8.15am.
- b) She waits 5 mins for her friend.
- c) They both leave at 8.20am. They walk to the bus stop 0.5 km away, it takes 5 mins.
- d) They wait 5 mins for the bus.
- e) They arrive at school at 8.45am. The bus travelled 10 km.

STOPping distance — hammer time...

There's two things that affect stopping distance — friction (between tyres and the road) and speed. The faster you go, the longer the stopping distance (no surprise there). When roads are wet, there's less friction. Things like ice and oil leave virtually no friction which makes them very dangerous.

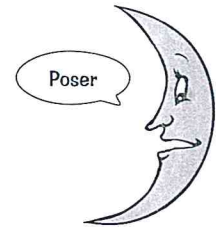
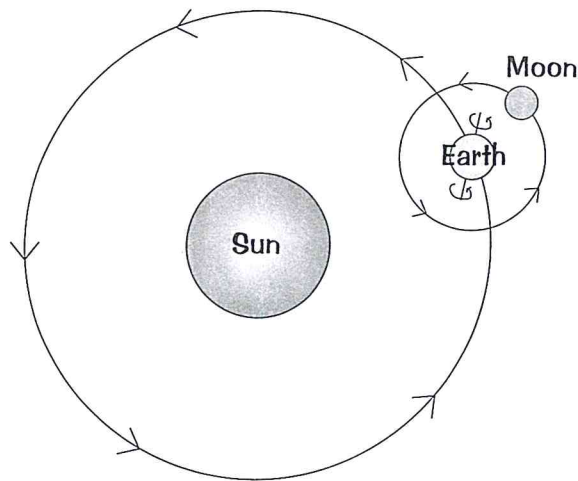
Sorry if you're too young to remember this. (But if your teacher starts wearing baggy trousers, shuffling sideways like a crab and shouting "you can't touch this", don't be scared, they just do remember it.)

Orbits and Rotation

Q1 Rewrite the paragraph, filling in the gaps with words from the box:

orbit	Earth	Moon	Sun	rotation
-------	-------	------	-----	----------

The travels in an round the One full circuit is one year. The also travels in an orbit round the Earth. It takes one month to complete this circuit. The of the Earth on its axis causes day and night.



Q2 Using the diagram above, describe how the Earth's rotation causes day and night.

Q3 Explain why the Earth is split into different time zones.
(For example, parts of Australia are twelve hours ahead of the U.K.)

Q4 Why does the Sun appear to move across the sky during the day?
Draw a sketch to help explain it.

Q5 Explain how you know that the Earth is spherical, and not flat as people used to think.

How We See the Sun and Moon

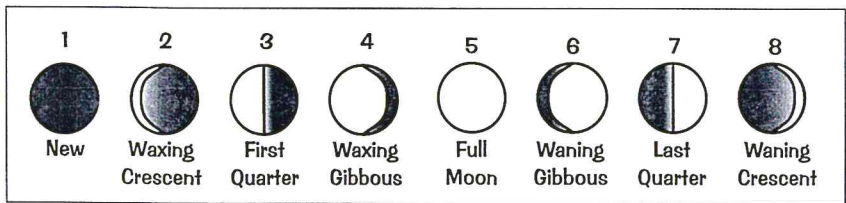
Q1 Write down the main differences between a star (e.g. the Sun) and a planet (e.g. the Earth). See if you can find four.

Q2 Copy out the sentences below choosing the correct words from the box.

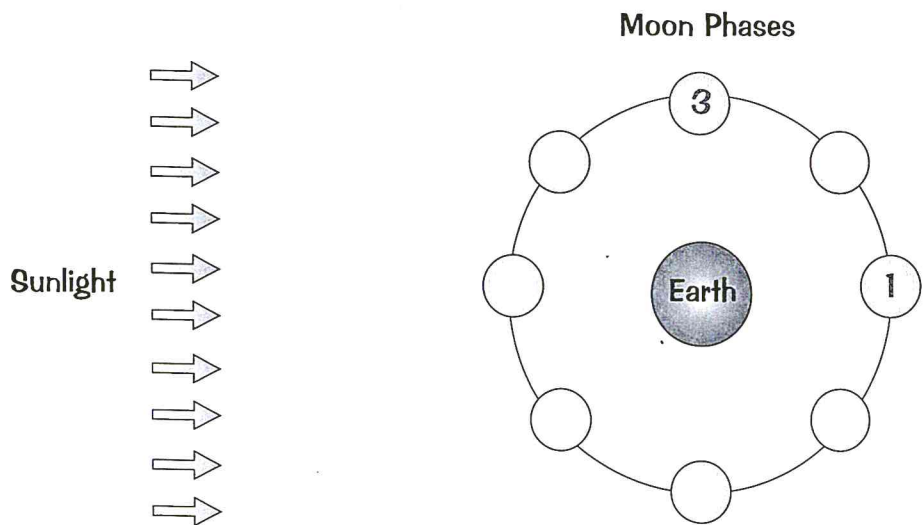
luminous Moon Sun reflected

The Moon appears to us to be This is caused by light from the being off the towards us.

Q3 The view of the Moon from the Earth shows a sequence of phases.



Copy out the diagram below and place a number in the circle to coincide with the phase at that point. I've done two for you.



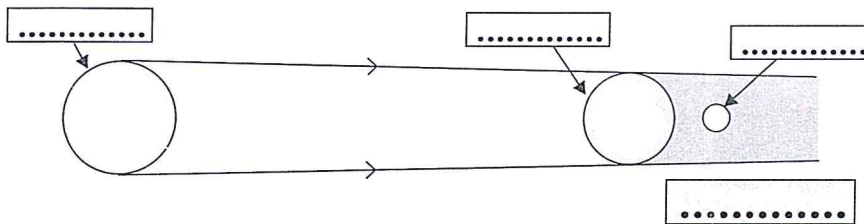
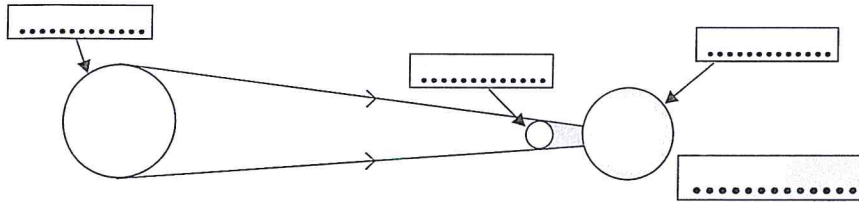
Q4 Explain the difference between a "full" Moon and a "new" Moon.

Q5 How long, to the nearest day, does it take for one orbit of the Moon round the Earth?

Eclipses of the Sun and Moon

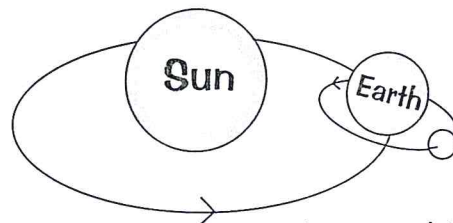
- Q1 The diagrams below show a lunar and a solar eclipse. Fill in the missing words from this list (some occur more than once).

Sun	Moon	Earth	Lunar Eclipse	Solar Eclipse
-----	------	-------	---------------	---------------



not to scale

- Q2 Describe in **simple terms** what happens during an eclipse of the Sun or Moon and explain the difference between the two.
- Q3 The Moon's orbit is inclined slightly relative to the Earth's orbit. Explain what effect this has on eclipses. (Hint: does it make them more or less common?)



(not to scale)

not to scale

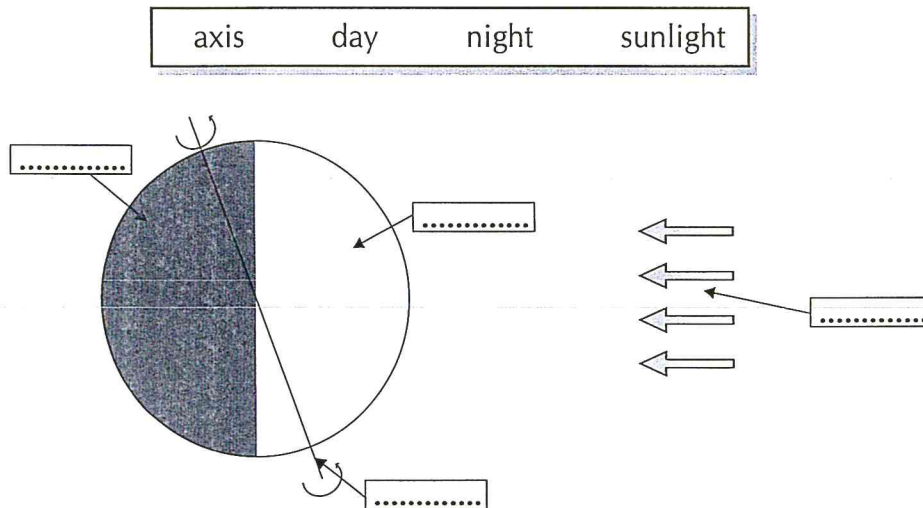
Once upon a time I was falling in love, now I'm only falling apart...

OK, I admit it — these pages probably won't make the Top 100 Easiest Pages Of All Time. If you're finding it difficult to understand, learn the answers to the questions. They're all simple facts you can find in a book. Once you know the facts, you can work backwards to understand it all.

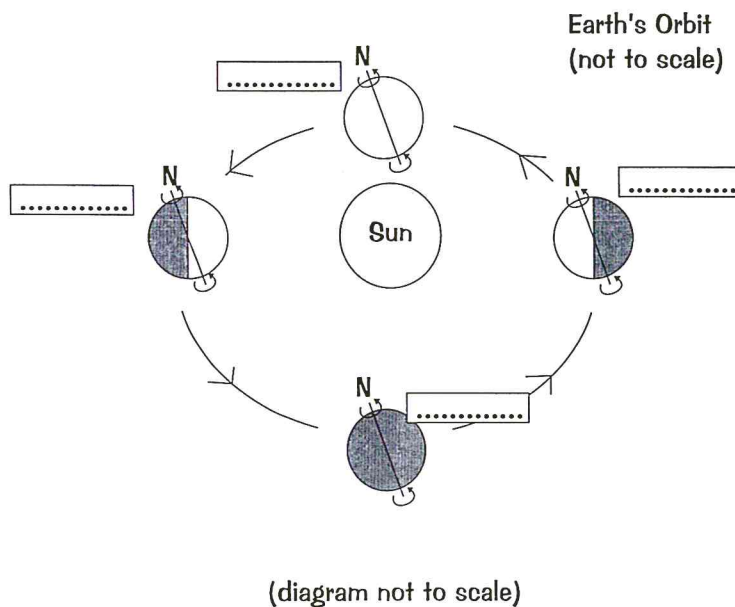
The Causes of the Seasons

Seasonal effects arise on Earth because of the tilt of the Earth's axis (23.5°) combined with its orbit around the Sun.

Q1 Copy out the diagram and use these words to complete the labels.



Q2 The Earth orbits the sun every 365 days. This is one year. During this time there are four seasons.



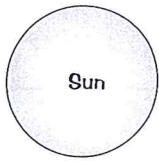
- Copy out the diagram.
- Complete the labels to show the seasons (Spring, Summer, Autumn, Winter) for the Northern Hemisphere.
- What is happening in the Southern Hemisphere at the same time?
- Explain what would happen to the seasons if the axis of the Earth were not tilted.

For further info on the Four Seasons, look up Vivaldi...

Understanding how the tilt of the Earth's axis gives us seasons, is one of the trickiest things you're going to have to get your head round in Science. It's like this: Winter for us (in the Northern hemisphere) is when the top of the earth is furthest away from the Sun (because of the tilt). In our Summer, the top half of the Earth is closer to the Sun — we get long days and the Southern hemisphere gets shorter days and has its winter. Study the diagram until it all clicks.

Planets of the Solar System

Q1 Name each of the nine planets a) - i) orbiting the Sun as shown below.



a)



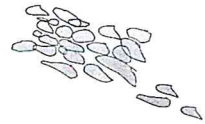
b)



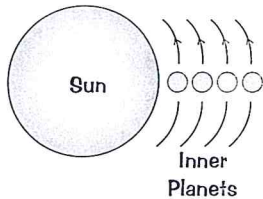
c)



d)



Asteroids



e)



f)



g)



h)



i)

Q2 Showing the location of each planet on a diagram to the **correct scale** is difficult. Suggest another way of demonstrating the distance of the planets from the Sun, and the problems involved.

Q3 Copy and complete this passage about the orbits of the different planets by choosing the correct words from the grey box.

DAY SUN YEAR SPIN DIFFERENT

All the planets in our solar system orbit the

However the time taken for one orbit is for each planet.

The planets also at different speeds.

This means that the length of a and

a are different on each planet.

Space, the final frontier...


That last tip was a monster, so I'll keep this one short. Learn the nine planets, their order and the main facts about each one — that's all you're getting, sunshine.

Planets of the Solar System

Q1 The table below gives information about the planets in our solar system.

	PLANET	RELATIVE SIZE	RELATIVE MASS (Earth Masses)	MEAN DIST. FROM SUN (millions of km)	ORBIT TIME d=day, y=year
Inner Planets	Mercury	0.4	0.05	58	88d
	Venus	0.9	0.8	108	225d
	Earth	1.0	1.0	150	365d
	Mars	0.5	0.1	228	687d
Outer Planets	Jupiter	11.0	318.0	778	12y
	Saturn	9.4	95.0	1430	29y
	Uranus	4.0	15.0	2870	84y
	Neptune	3.8	17.0	4500	165y
	Pluto	0.2	0.003	5900	248y

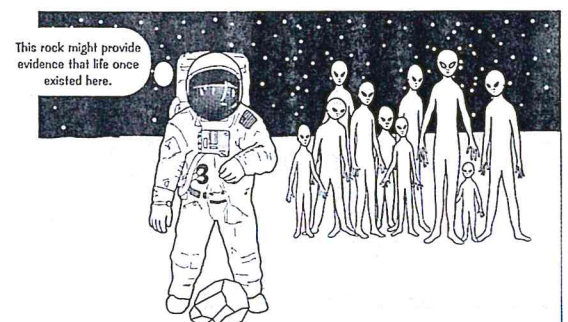
- Compare, using information from the table, the relative size and mass of the four inner planets with the outer planets of the solar system.
- Which planet is nearest to the Earth?
- How many times further from the Sun is Pluto than Mercury?
- Which planet is nearest in size to the Earth?

Q2 Imagine you are a space travel agent called Bob.  *must be Bob — that's very important.*
Write a brief introduction to Mercury and Jupiter to tell travellers what they're like.

Use as many facts about
each planet as you can.

Q3 Within our solar system **only Earth** is known to **support life**.
What conditions are necessary for life?

Q4 What evidence should we look for in searching for life on other planets?



Hint: What makes Earth a good
place for supporting life?