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Sc

KEY STAGE 3

TIER 3–6

2003

Science test

Paper 2

Please read this page, but do not open the booklet until your teacher tells you to start. Write your name and the name of your school in the spaces below.

First name _____

Last name _____

School _____

Remember

- The test is 1 hour long.
- You will need: pen, pencil, rubber, ruler, protractor and calculator.
- The test starts with easier questions.
- Try to answer all of the questions.
- Write all your answers on the test paper – do not use any rough paper.
- Check your work carefully.
- Ask your teacher if you are not sure what to do.

For marker's use only

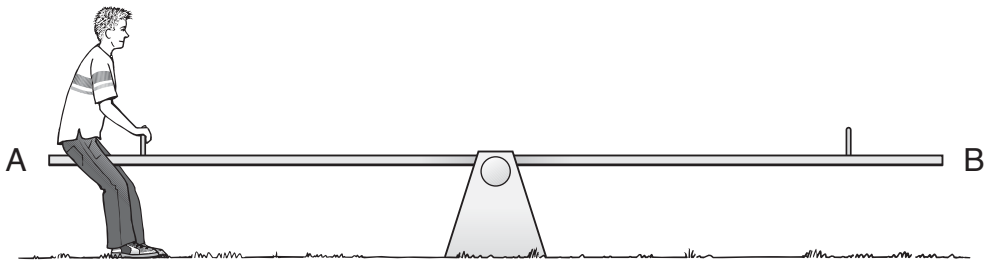
Total marks	
Borderline check	

QCA/03/1002

1. Five people take it in turns to sit on a see-saw. The table gives the weight of each person.

person	weight, in N
Jack	510
Ellie	540
Rosie	490
Maggy	540
Andy	560

(a) Andy sits at one end, but there is nobody on the other end.



Andy sits on the see-saw.
In which direction does his end of the see-saw move?

1 mark

_____

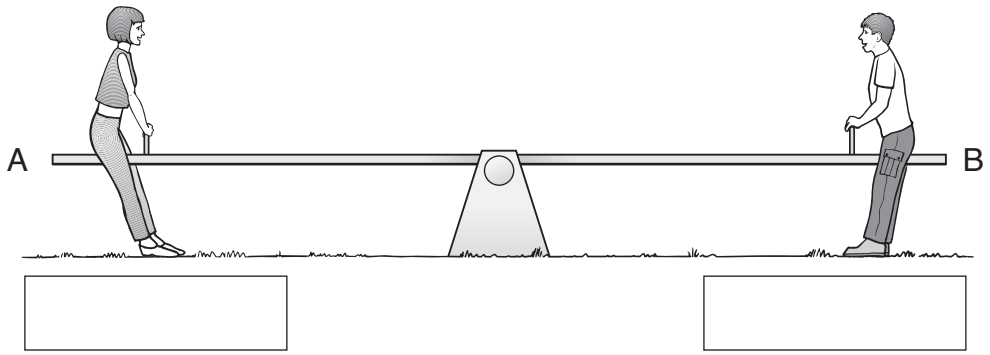
(b) Which **two** people in the table above could make the see-saw balance?

1 mark

_____ and _____

Use information in the table to help you answer parts (c) and (d).

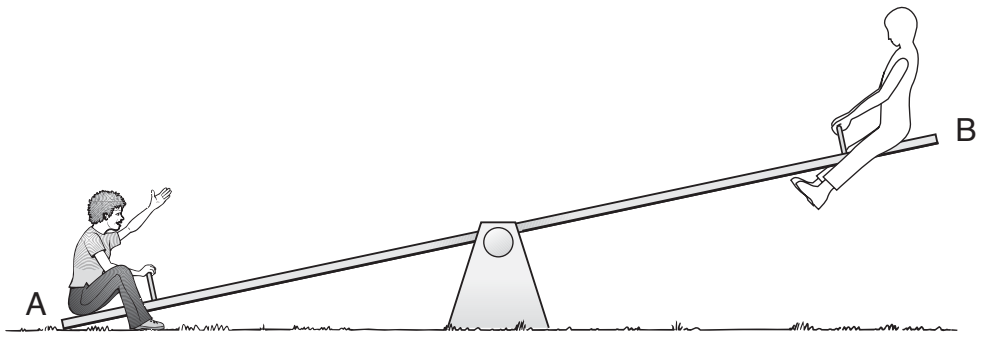
(c) Rosie sits on end A, and Jack sits on end B.



They lift their feet.
What happens to each end of the see-saw?
Write **up** or **down** in the boxes under Rosie and Jack.

1 mark

(d) Ellie sits on end A, and another of the group sits on end B.
Ellie's end stays down.



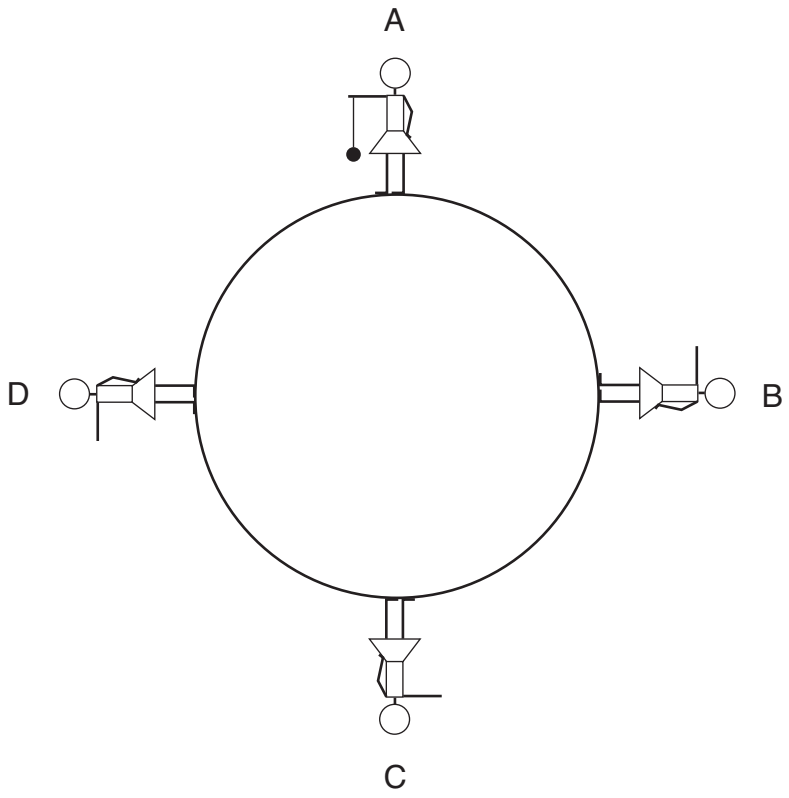
Who could be on end B?

1 mark

_____

maximum 4 marks

2. Lisa drew a picture of herself standing at four different positions on the Earth, A, B, C and D.



not to scale

(a) (i) Draw an arrow at **each** of the four positions to show the direction of the force of gravity on Lisa.

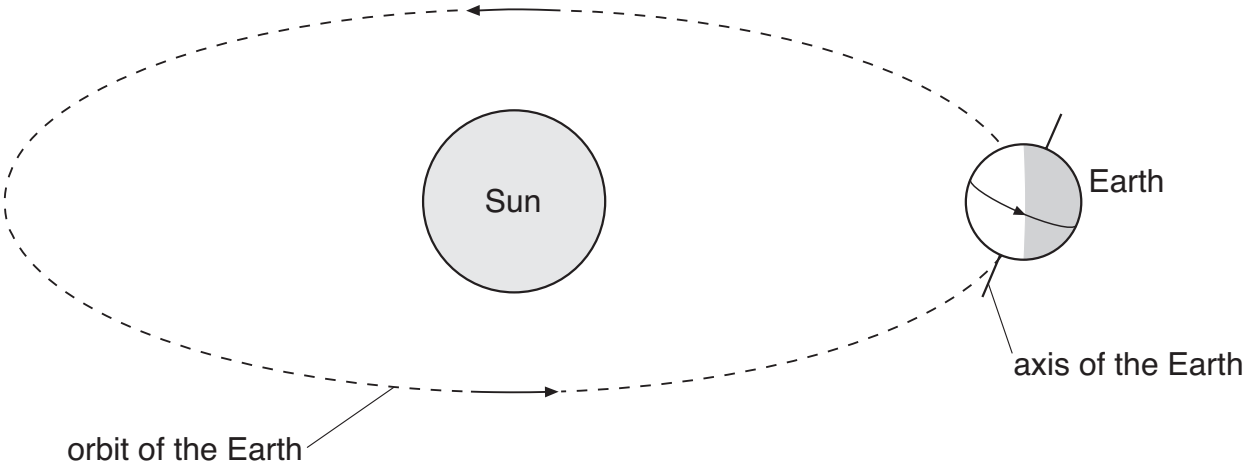
1 mark

(ii) The drawing at position A shows Lisa holding a ball on a string. Draw the ball and string in positions B, C and D.

1 mark

(b) The drawing below shows:

- that the Earth goes round the Sun;
- that the Earth rotates on its axis.



not to scale

Choose from the list below to answer parts (i) and (ii).

60 seconds **60 minutes** **24 hours** **7 days** **28 days** **365 days**

(i) How long does it take for the Earth to go round the Sun once?

1 mark

_____

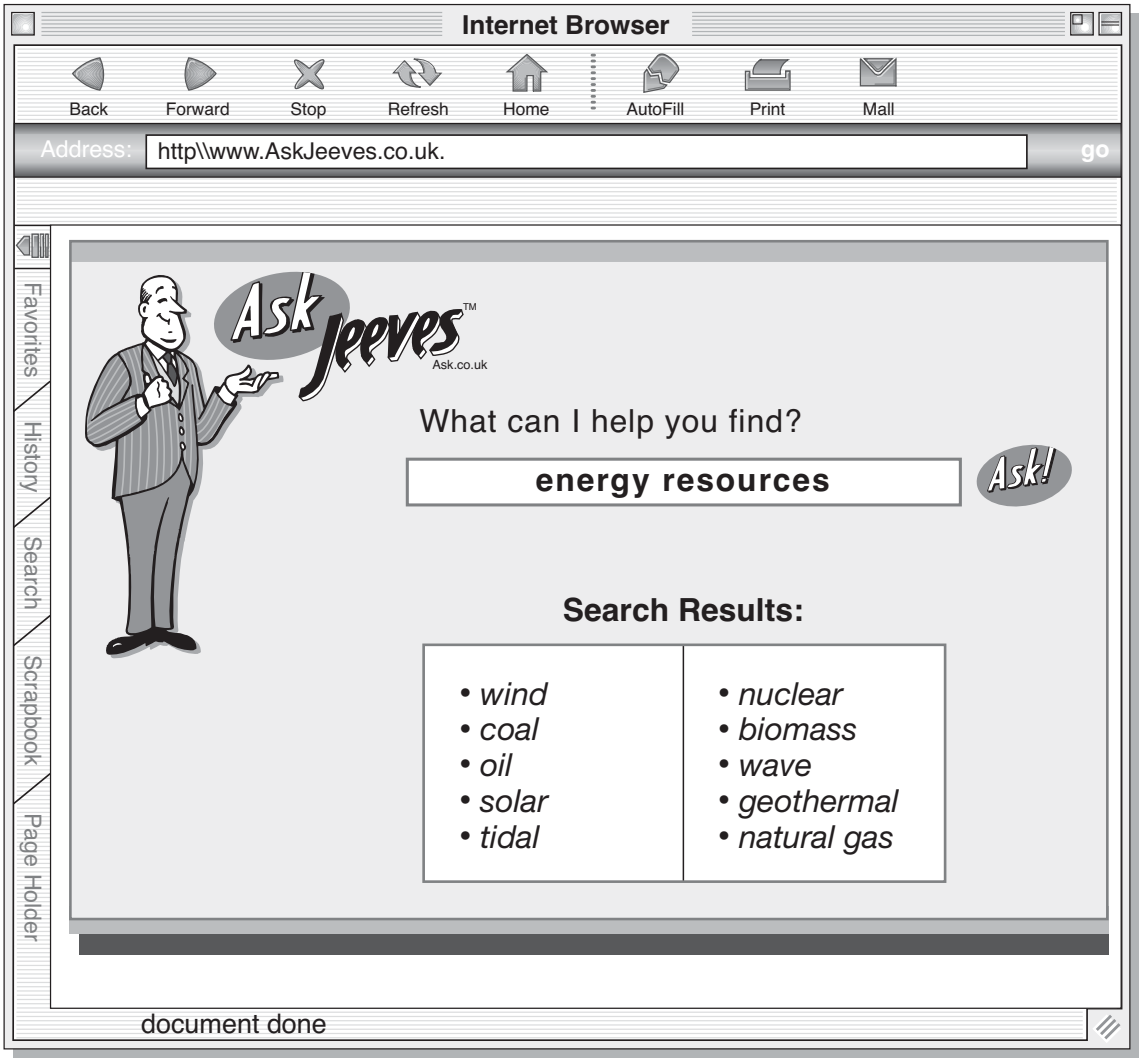
(ii) How long does it take for the Earth to rotate on its axis once?

1 mark

_____

maximum 4 marks

3. Meera used the Internet to find out about energy resources. The drawing below shows what Meera saw on her computer screen.



(a) Coal is a fossil fuel.
Give the names of **two** other fossil fuels in the list on the screen.

2 marks

_____ and _____

(b) (i) Wave energy is an example of a renewable energy resource.

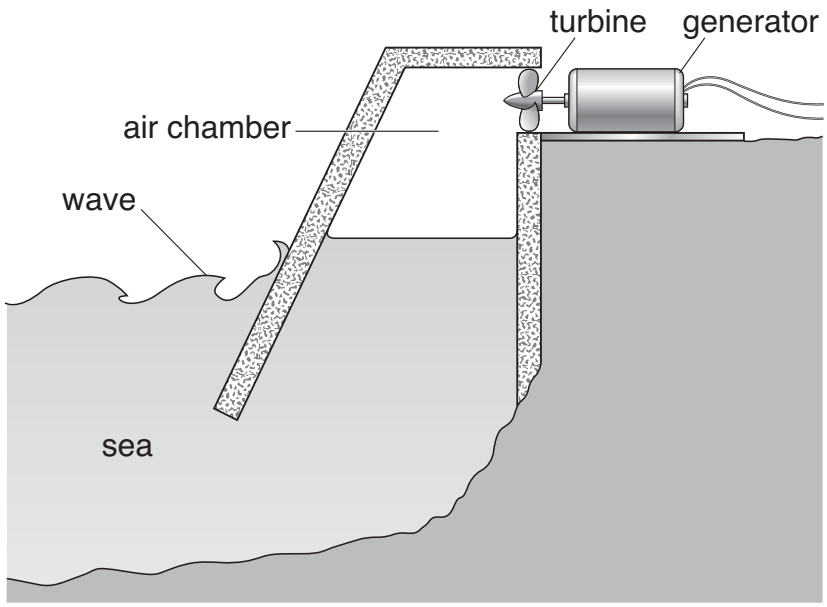
From the list on the screen above choose **two** other renewable energy resources.

2 marks

_____ and _____

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(ii) Meera found out how wave energy can be used to generate electricity. She saw the diagram below on the Internet.



Each box below shows a stage in generating electricity.

A	The air turns the turbine.
B	The turbine turns the generator.
C	The waves move up the chamber.
D	The generator produces electricity.
E	The waves push the air up the chamber.

On the lines below write the letters of the stages in the correct order. Two have been done for you.

2 marks

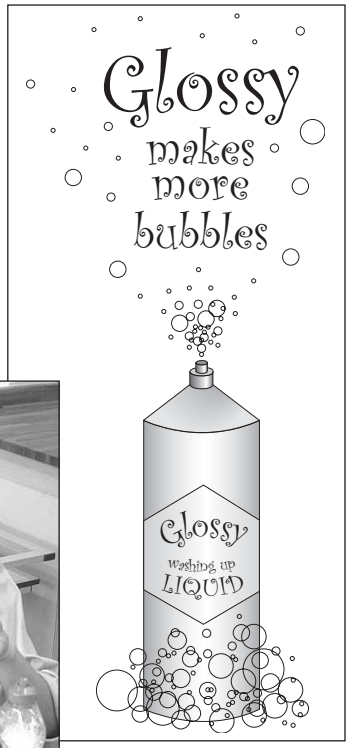
C _____ A _____ _____

maximum 6 marks

4. Alan and Aysha saw a poster claiming that Glossy washing-up liquid makes more bubbles than other washing-up liquids.

They investigated the amount of bubbles three different washing-up liquids made.

They added each type of washing-up liquid to water in a test-tube and shook it.





(a) What would they see if the results of their test supported the claim made on the poster?

1 mark

(b) Why should they use the same volume of washing-up liquid in each test-tube?

1 mark

(c) The first time they tried this investigation **all** the washing-up liquids made bubbles which went to the tops of the test-tubes.

Why was this a problem?

1 mark

(d) Jane tried the investigation again using less washing-up liquid in each test-tube.

She made a prediction about Shine washing-up liquid.

The photograph shows her results.



Glossy **Shine** **Fresh**

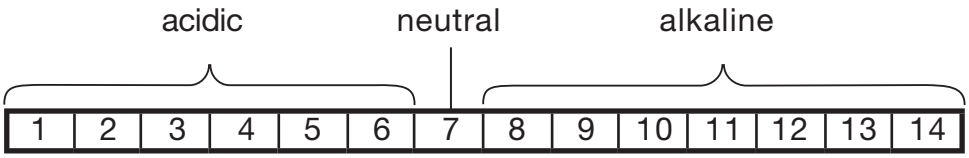
Jane's results support her prediction about Shine.

What was Jane's prediction?

1 mark

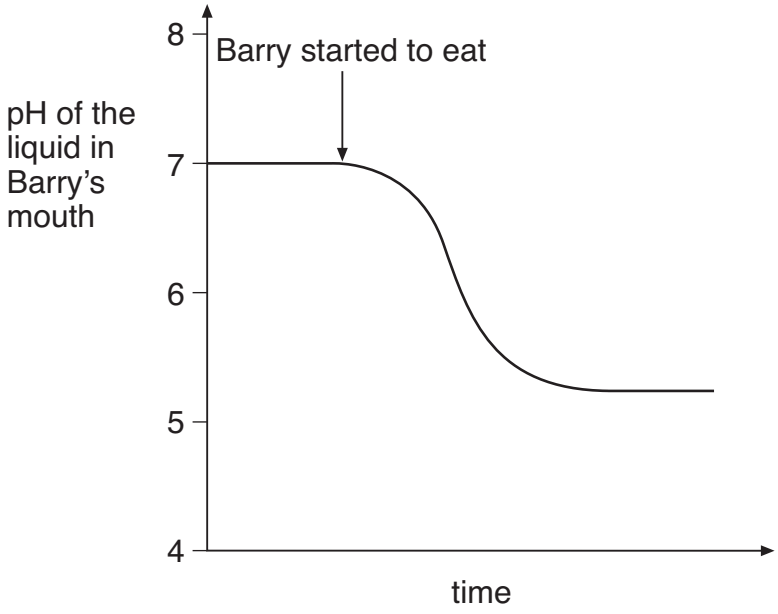
maximum 4 marks

5. The pH scale shown below is used to measure how acidic or alkaline a solution is.



pH scale

The graph below shows how the pH of the liquid in Barry's mouth changed as he ate a meal.



(a) (i) Use the **graph** to give the pH of the liquid in Barry's mouth before he started to eat.

1 mark

pH _____

(ii) What does this pH tell you about the liquid in Barry's mouth before he started to eat?

Use the **pH scale** at the top of the page to help you.
Tick the correct box.

1 mark

It was acidic.	It was alkaline.	It was colourless.	It was neutral.
☐	☐	☐	☐

(b) Look at the **graph** opposite.
What happened to the pH of the liquid in Barry's mouth as he ate the meal?

1 mark

(c) Barry chews special chewing gum after each meal. The chewing gum neutralises the liquid in his mouth.

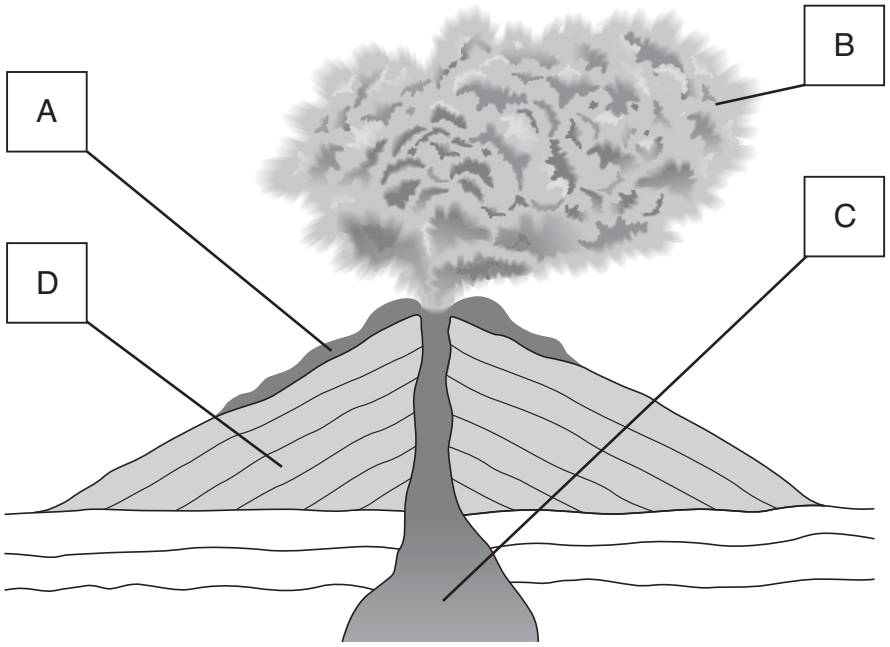
What type of substance neutralises an acid?
Tick the correct box.

1 mark

an acid	☐	an alkali	☐
an indicator	☐	a solid	☐

maximum 4 marks

6. The diagram shows a volcano erupting.



not to scale

(a) Look at the diagram. Give the letter which labels:

(i) magma

1 mark

_____

(ii) liquid lava

1 mark

_____

(iii) old solid rock

1 mark

_____

(b) When magma and lava cool, they form a hard crystalline rock.
What is the name of this type of rock?
Tick the correct box.

1 mark

igneous rock	☐
metamorphic rock	☐
sedimentary rock	☐

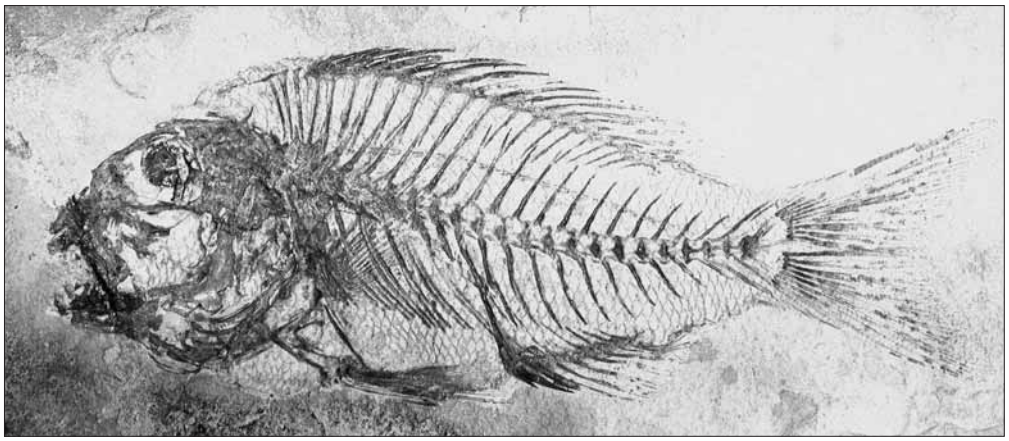
(c) The changes listed below take place when a volcano erupts.
Which **one** of these changes could be reversed?
Tick the correct box.

1 mark

Old rock is heated to form a different rock.	☐
Sulphur burns to form sulphur dioxide.	☐
Water is heated to form water vapour.	☐

(d) Ash from a volcano dropped into a lake. All the fish in the lake were killed and buried under the ash in the mud at the bottom of the lake.

The photograph below shows the remains of a fish millions of years later.



(i) The photograph shows the body parts which supported the fish.
Give the name of these body parts.

1 mark

_____

(ii) Give the name for animal **and** plant remains that are found in a rock after millions of years.

1 mark

_____

maximum 7 marks

7. The table shows the mass of water, fat, fibre and vitamin C in 100 g of potato cooked in three different ways.

	water, in g	**fat, in g**	**fibre, in g**	**vitamin C, in mg**
100 g of chips	57	7	2	9
100 g of boiled, peeled potato	80	hardly any	1	6
100 g of potato baked in its skin	63	hardly any	3	14

(a) Use information from the table to help you fill the gaps in the following sentences.

(i) Chips are crisper than boiled potatoes because chips contain **less** _____. *1 mark*

(ii) Most of the fibre in a baked potato is in the _____ of the potato. *1 mark*

(b) Use the information in the table to work out how much vitamin C there is in: *1 mark*

200 g of chips _____ mg;

200 g of potato baked in its skin _____ mg.

(c) People do **not** always eat a balanced diet.

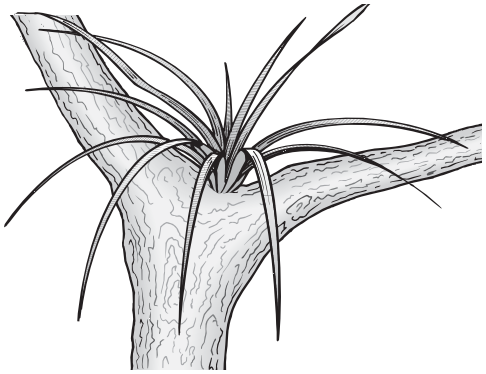
Draw **one** line from each fact about a person's diet to the organ it harms.
Draw only **three** lines.

3 marks

fact about the diet	**organ harmed**
	heart
not enough calcium	
	intestine
not enough fibre	
	lung
too much fat	
	bones

maximum 6 marks

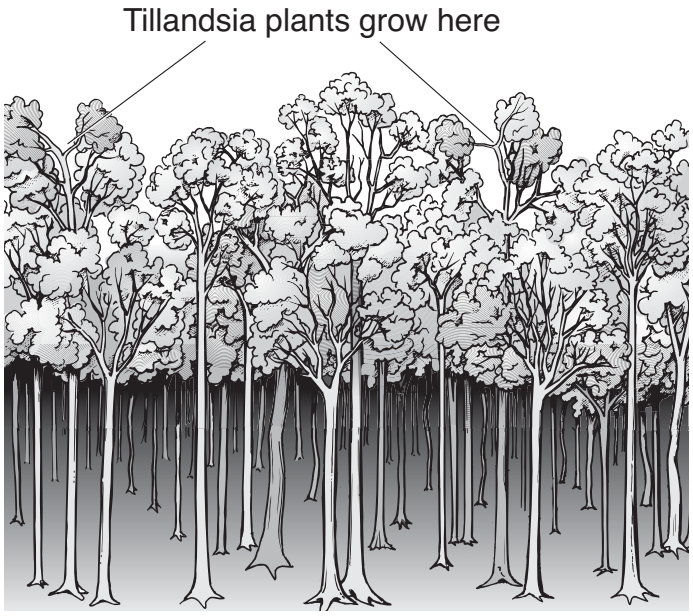
8. The drawing shows a plant called Tillandsia.



(a) (i) The leaves of this plant absorb light.
Why do plants need light?

1 mark

(ii) Tillandsia plants grow on the high branches of trees in rainforests.



not to scale

These plants **cannot** grow well on the lowest branches.
Explain why.

1 mark

(b) Tillandsia plants do **not** have root hairs on their roots.

What **two** substances do most plants absorb through their root hairs?

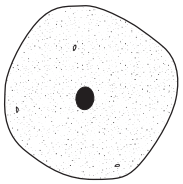
2 marks

1. _____

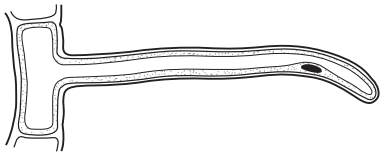
2. _____

(c) Which diagram below shows a root hair?
Tick the correct box.

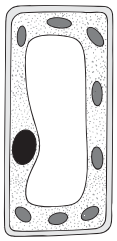
1 mark



A ☐



B ☐



C ☐



D ☐

not to scale

maximum 5 marks

9. The drawing shows a food chain including plants called tree ferns, and two dinosaurs.
They lived on Earth millions of years ago.



tree ferns Triceratops Tyrannosaurus rex

(a) The list below shows words which describe living things in a food chain.

herbivore **predator** **prey** **producer**

(i) Which word in the list above describes the tree fern?

1 mark

_____

(ii) From the list above, give **one** word that can describe Tyrannosaurus rex.

1 mark

_____

(iii) From the list above, give **one** word that can describe Triceratops.

1 mark

_____

(b) Some scientists think that a large rock from space hit the Earth about 65 million years ago.
A thick layer of dust stayed in the air for a long time and blocked out the sunlight.

This would cause a decrease in the number of tree ferns.
Give **one** way the decrease in tree ferns would affect the Triceratops.

1 mark

(c) Tyrannosaurus rex had thick scales covering its body.
Which group did it belong to?
Tick the correct box.

1 mark

amphibians	☐	fish	☐
reptiles	☐	mammals	☐

maximum 5 marks

10. Nadia is on her bicycle, waiting to pull out from a road junction.
Michael is driving his car round the bend. A row of houses stops Nadia from seeing Michael's car.



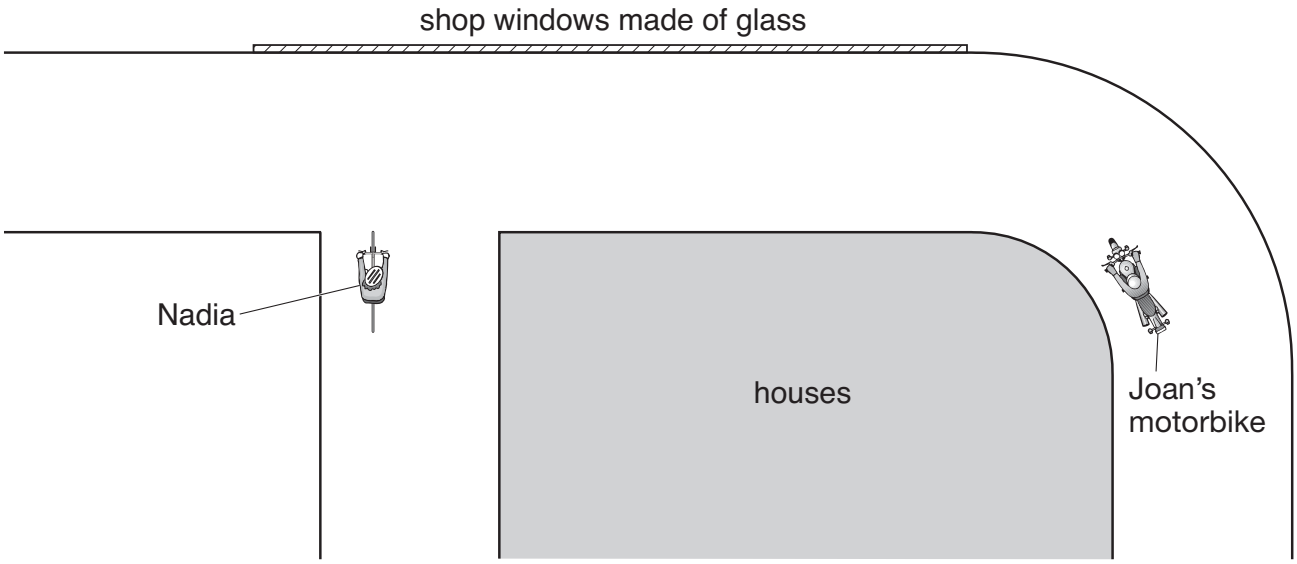
not to scale

(a) At what position will Michael's car be when Nadia first sees it?
Tick the correct box.

1 mark

A ☐ B ☐ C ☐ D ☐

(b) A row of shops was built opposite the junction. The shops have glass windows which act as a mirror.



not to scale

Nadia could see Joan's motorbike reflected in the glass window.

(i) **On the diagram above**, draw a ray of light to show how Nadia can see Joan's motorbike reflected in the glass window.
Add arrows to the ray. Use a ruler. *3 marks*

(ii) How does the glass window help to reduce the number of accidents?

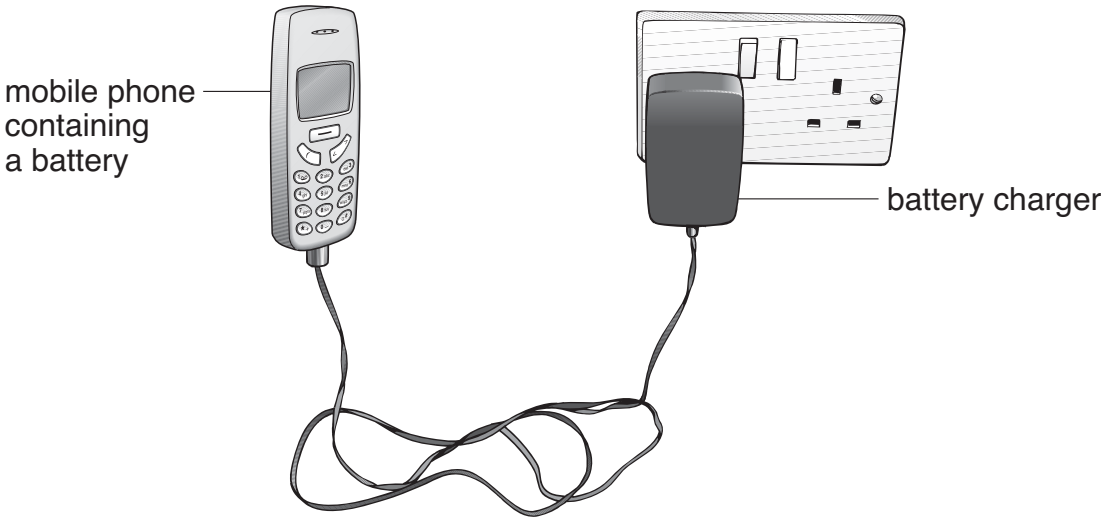
1 mark

_____

_____

maximum 5 marks

11. (a) Jacquie has a mobile phone. Energy is stored in the battery of the phone. The drawing shows the battery being charged.



(i) Which energy transfer takes place in the battery as it is being charged? Tick the correct box.

1 mark

chemical to sound	☐	sound to thermal	☐
electrical to chemical	☐	thermal to electrical	☐

(ii) When the battery is fully charged, Jacquie unplugs the phone.

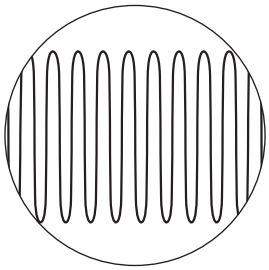
Which energy transfers take place when the mobile phone rings? Tick the correct box.

1 mark

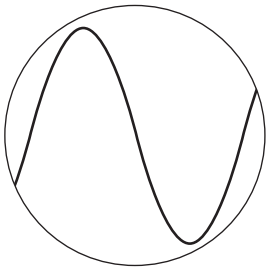


chemical to electrical to sound	☐
electrical to chemical to sound	☐
kinetic to electrical to sound	☐
thermal to electrical to sound	☐

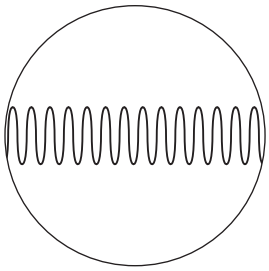
(b) Jacquie can change the ring-tone of her phone.
The diagrams below show the patterns made by four sound waves on an oscilloscope screen.
They are all drawn to the same scale.



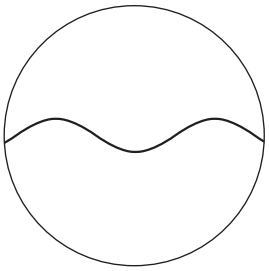
P



Q



R



S

Write the letter of the sound wave that matches each of the descriptions below.

3 marks

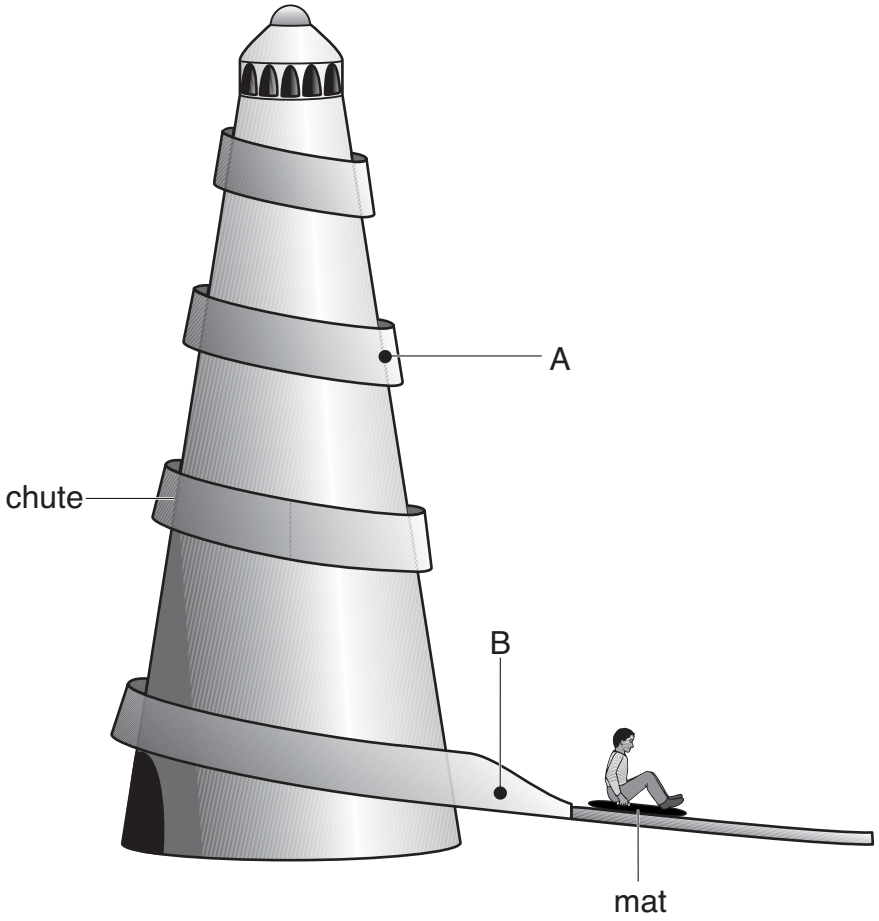
(i) a loud sound with a low pitch _____

(ii) a quiet sound with a high pitch _____

(iii) a loud sound with a high pitch _____

maximum 5 marks

12. Anil sits on a mat at the top of a helter-skelter and then slides down a chute around the outside.



(a) (i) Name **two** of the forces acting on Anil as he slides from point A to point B.

2 marks

1. _____

2. _____

(ii) As Anil slides from point A to point B, the forces acting on him are balanced.

Describe Anil's speed when the forces acting on him are balanced.

1 mark

_____

(b) Anil goes back for a second go. This time he sits on a smooth cushion instead of a mat.

He goes much faster on the cushion. Give the reason for this.

1 mark

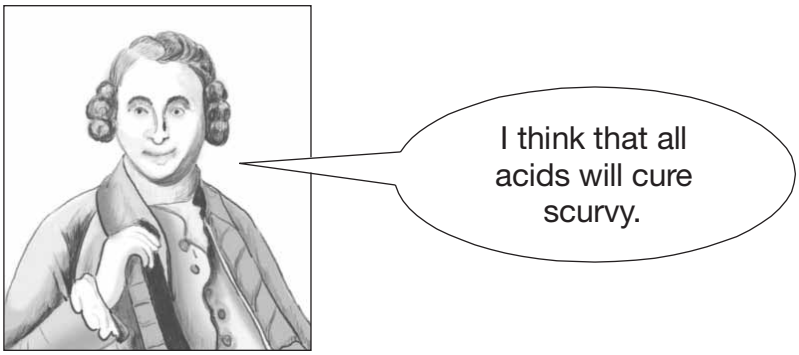
(c) On his third go Anil lies back on the cushion with his arms by his side.

What happens to his speed? Give the reason for your answer.

2 marks

maximum 6 marks

13. Sailors used to suffer from an illness called scurvy caused by a poor diet on long journeys.
James Lind was a doctor who tested treatments for scurvy. He predicted that **all acids cure scurvy**.



He gave 6 pairs of sailors with scurvy exactly the same meals but he also gave each pair a different addition to their diet.

pair of sailors	addition to their diet	effect after one week
1	some apple cider	beginning to recover
2	25 drops of very dilute sulphuric acid to gargle with*	still had scurvy
3	2 teaspoons of vinegar	still had scurvy
4	half a pint of sea water*	still had scurvy
5	2 oranges and 1 lemon	recovered
6	herbs and spices and acidified barley water	still had scurvy

(a) Does the evidence in the table support the prediction that all acids cure scurvy?
Tick the correct box.

☐ yes ☐ no

Use the table to explain your answer.

1 mark

_____

_____

***DANGER! DO NOT TRY THIS.**

(b) (i) Give the **one** factor James Lind **changed** in this experiment.
(This is called the independent variable.)

1 mark

(ii) Give the factor James Lind **examined** in this experiment.
(This is called the dependent variable.)

1 mark

(c) James Lind's evidence suggested that oranges and lemons cured scurvy.

At a later time, other scientists did the following:

- They separated citric acid from the fruit.
- They predicted that citric acid would cure scurvy.
- They tested their prediction by giving pure citric acid as an addition to the diet of sailors with scurvy.
- They found it did **not** cure scurvy.

The scientists had to make a different prediction.

Suggest a new prediction about a cure for scurvy that is consistent with the evidence collected.

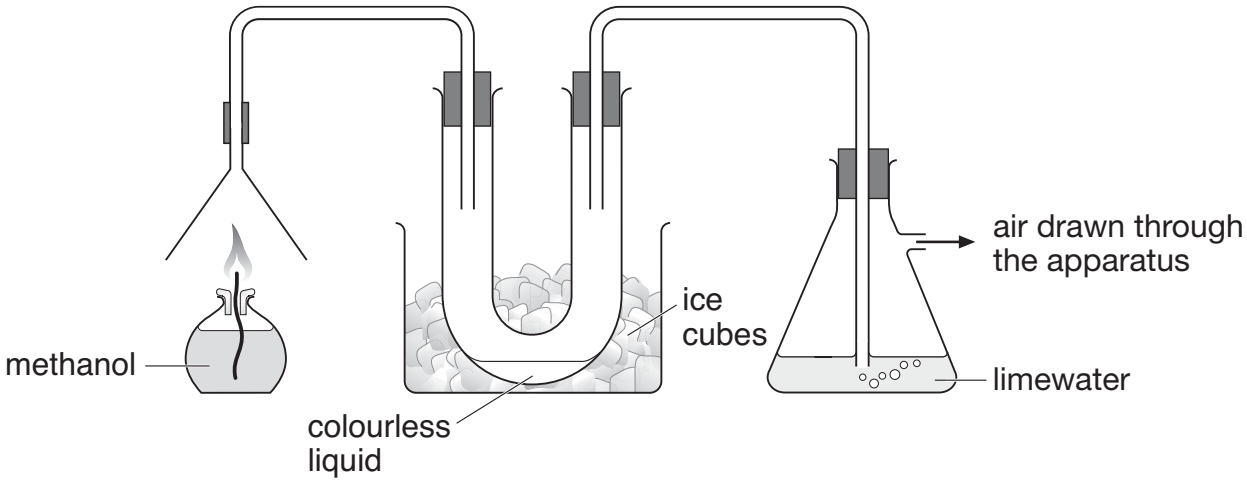
1 mark

(d) Explain why it is necessary to investigate the effects of changes in diet over a period of more than one week.

1 mark

maximum 5 marks

14. (a) George used the apparatus below to find out what substances are produced when methanol burns.



As the methanol burned, two different gases were produced.

(i) One of these gases condensed in the U-tube to give a colourless liquid. Give the name of this liquid.

1 mark

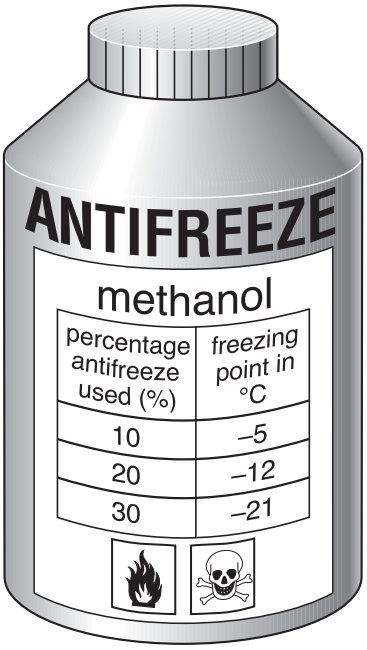
_____

(ii) The other gas turned the limewater cloudy. Give the name of this gas.

1 mark

_____

(b) Methanol is sometimes used in antifreeze. It can be added to water in car windscreen wash-bottles to prevent the water from freezing in cold conditions.



(i) The label on the bottle of antifreeze has two hazard warning symbols. What **two** precautions would you need to take when using this antifreeze?

1. _____

_____

2. _____

_____

1 mark

(ii) Water freezes at 0°C. The label on the bottle shows how the freezing point changes when different amounts of antifreeze are added to water.

Terry put a mixture containing 10% antifreeze into the wash-bottle of his car. During the night the temperature dropped to –14°C.
The wash-bottle burst.
Explain why the wash-bottle burst.

2 marks

_____

_____

_____

_____

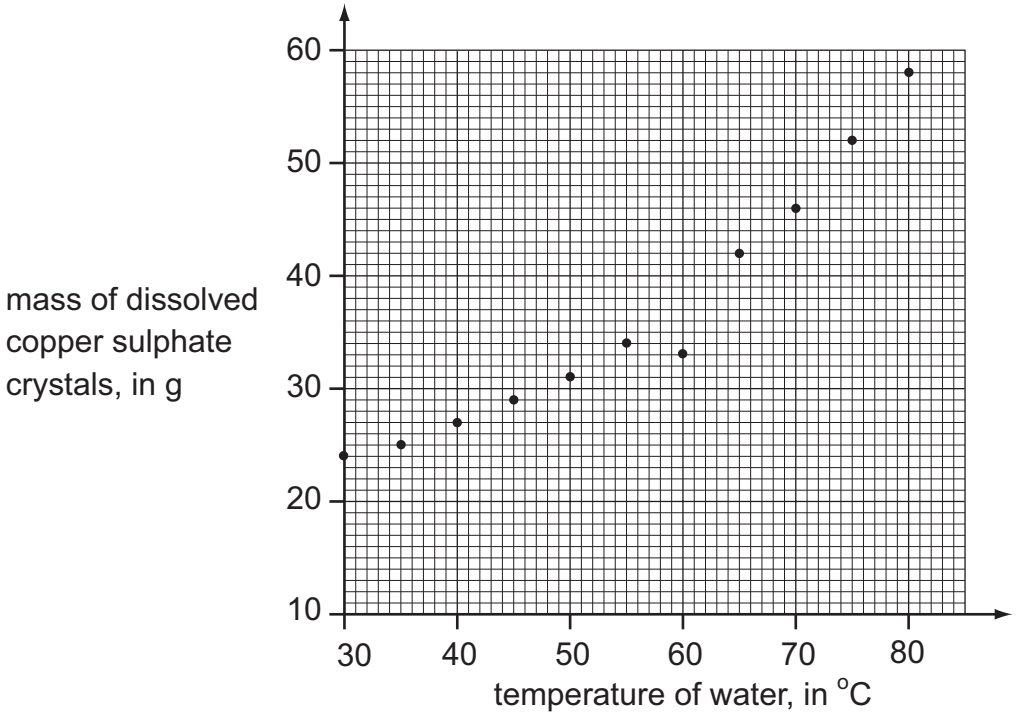
maximum 5 marks

15. Sarah and Jim investigated the effect of temperature on the solubility of copper sulphate.

They dissolved copper sulphate crystals in the same volume of water until **no** more would dissolve. This means the solution was saturated.
They measured the mass of copper sulphate needed to make a saturated solution using water at different temperatures.



They plotted their results on a grid.



(a) (i) One of the mass readings appears to be wrong (anomalous).

Circle the anomalous result on the graph.

1 mark

(ii) Draw a smooth curve of best fit on the graph.

1 mark

(iii) Use the graph to predict a more likely measurement of mass for the anomalous result.

1 mark

_____ g

(b) Suggest **one** mistake Sarah and Jim might have made to produce this anomalous result.

1 mark

_____

_____

maximum 4 marks

16. Diagram 1 below shows the lungs and the trachea, the airway leading to the lungs. One of the lungs is drawn in section.

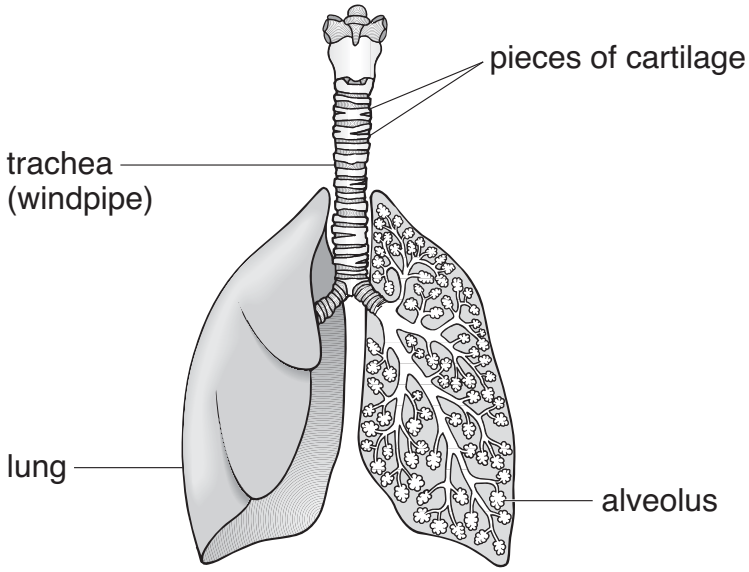


diagram 1

(a) In the wall of the trachea, there are pieces of a stiff material called cartilage.

Why is this stiff material necessary in the wall of the trachea?

1 mark

_____

_____

(b) Diagram 2 below shows one alveolus and its blood supply.

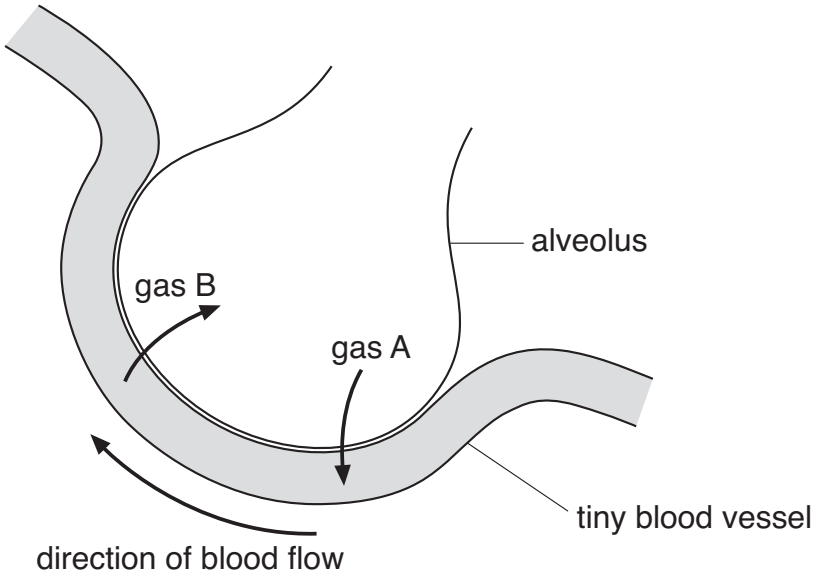


diagram 2

(i) Look at diagram 2, opposite.
Gas A **enters** the blood from the alveolus.
Gas B **leaves** the blood and enters the alveolus.
What are the names of gases A and B?

1 mark

gas A _____

gas B _____

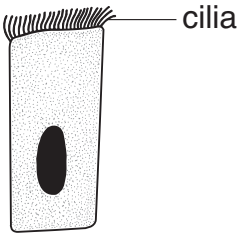
(ii) Give **one** reason why it is easy for gases to pass across the wall of an alveolus.

1 mark

_____

_____

(c) The diagram below shows a ciliated cell from the lining of the airway.



(i) What is the function of this cell in the airway?

1 mark

_____

_____

(ii) This cell is affected by substances in cigarette smoke.
What effect does cigarette smoke have on the cilia?

1 mark

_____

_____

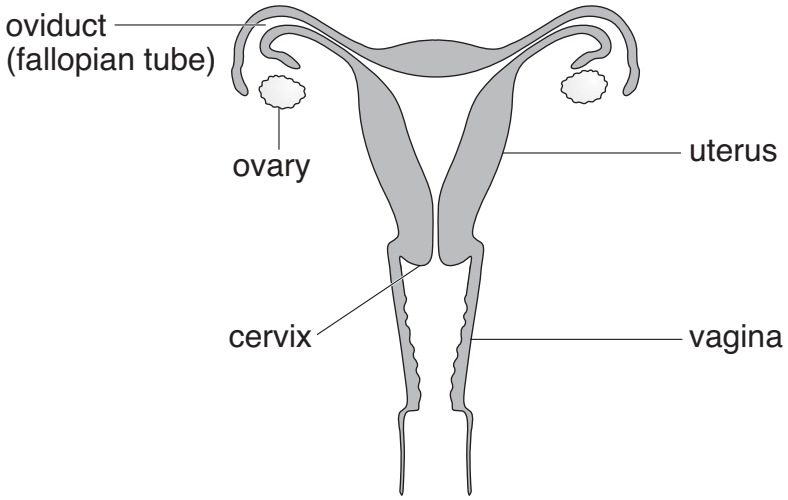
(iii) Give the name of the substance, in cigarette smoke, which causes addiction to smoking.

1 mark

_____

maximum 6 marks

17. The diagram shows a section through the female reproductive system.



(a) (i) What happens at fertilisation?

1 mark

_____

_____

(ii) In which labelled part of the female reproductive system does fertilisation normally take place?

1 mark

_____

(iii) In which labelled part of the female reproductive system does the foetus develop?

1 mark

_____

(b) Some women have blocked oviducts.
How do blocked oviducts prevent fertilisation taking place?

1 mark

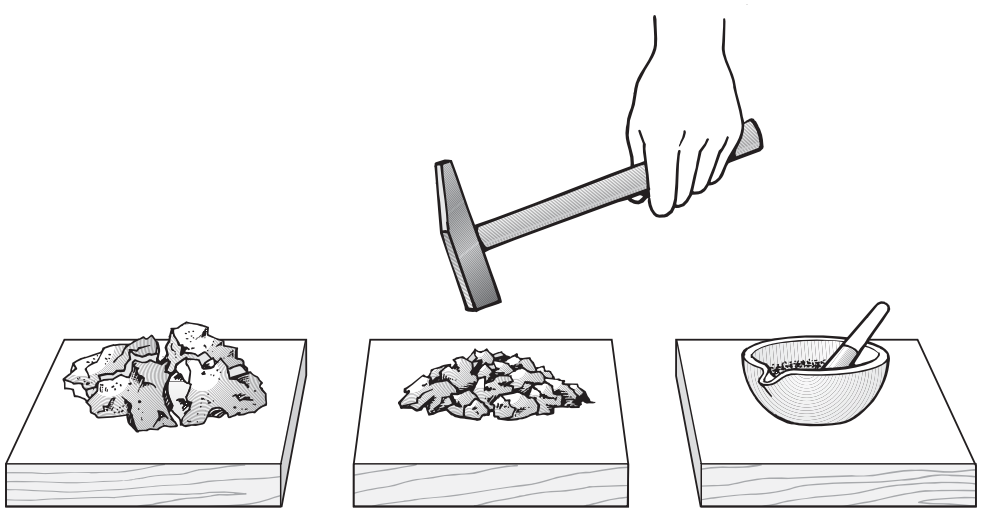
(c) When a baby is born it is pushed out of the mother's body.
Describe what happens in the wall of the uterus to push the baby out.

1 mark

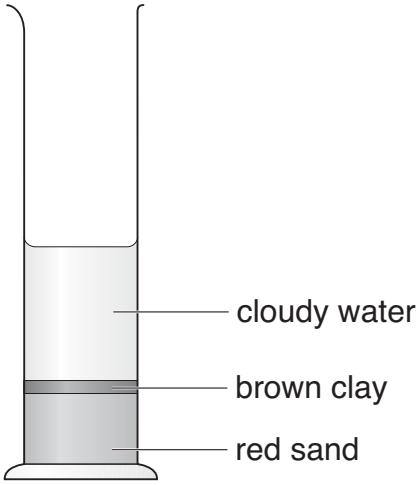
maximum 5 marks

18. Linda had a piece of red sandstone.

She hammered it into pieces and then ground them into a powder using a pestle and mortar.



She put the powder into a measuring cylinder with water and shook the mixture. The contents settled.

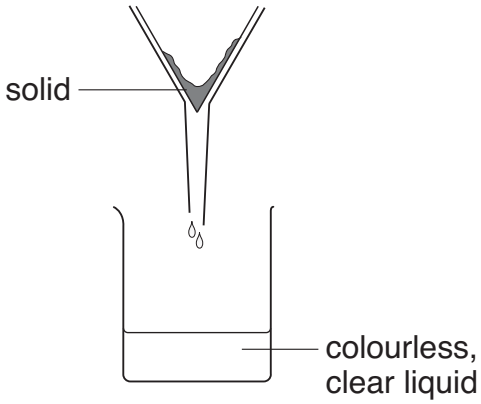


(a) Linda said her results showed that sandstone is a mixture of two substances.

How could she tell, from the results, that sandstone is a mixture of substances?

1 mark

(b) Linda then poured the cloudy water from the measuring cylinder through filter paper in a filter funnel.



She said there might be salts dissolved in the colourless, clear liquid that came through the filter.

(i) What could Linda do to find out if there were salts dissolved in the colourless, clear liquid?

1 mark

_____

_____

(ii) What would she see if there had been salts dissolved in the colourless, clear liquid?

1 mark

_____

_____

(c) Sandstone is a sedimentary rock.
Four stages in the formation of sedimentary rock are listed below.
They are **not** in the correct order.

compacted **deposited** **weathered** **transported**

Put these stages in the correct order. One has been done for you.

1 mark

stage 1 **weathered**

stage 2 _____

stage 3 _____

stage 4 _____

maximum 4 marks

END OF TEST

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