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Sc

KEY STAGE 3

TIER 3–6

2004

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

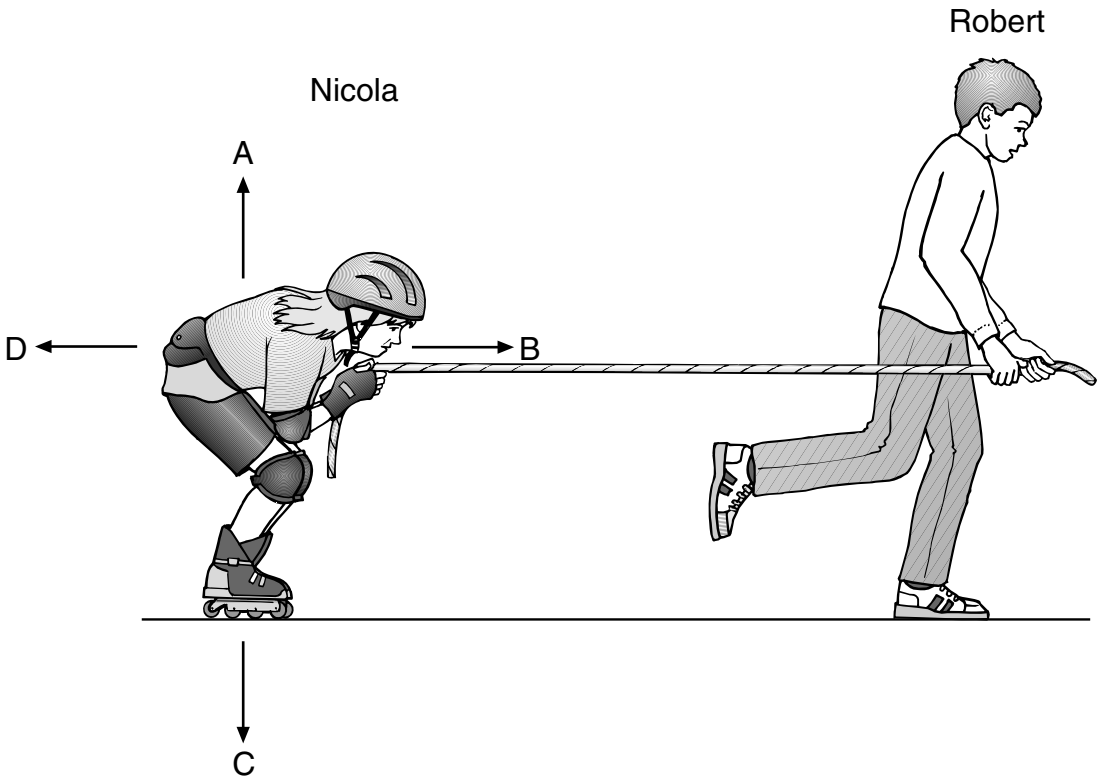
- The test is 1 hour long.
- You will need: pen, pencil, rubber, ruler, protractor and calculator.
- The test starts with easier questions.
- Try to answer all of the questions.
- The number of marks available for each question is given below the mark boxes in the margin. You should not write in this margin.
- 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/04/1209

1. (a) Nicola is trying out her new roller blades. Robert is pulling her along with a rope.
Arrows A, B, C and D show the directions of four forces acting on Nicola.



(i) Which arrow shows the direction of the force of **gravity** on Nicola?
Give the letter.

_____

1ai
1 mark

(ii) Which arrow shows the direction of the force of the **rope** on Nicola?
Give the letter.

_____

1aii
1 mark

(b) Robert pulls Nicola at a steady speed of 2 metres per second.
How far will Nicola travel in 10 seconds?

_____ metres

1b
1 mark

(c) Nicola lets go of the rope and she slows down. Gravity still acts on Nicola.

Give the name of **one** other force still acting on Nicola after she lets go of the rope.

_____

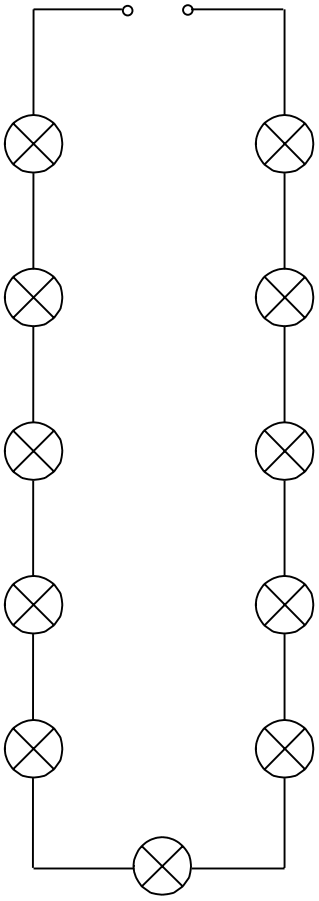
1c
1 mark

maximum 4 marks

Total
4

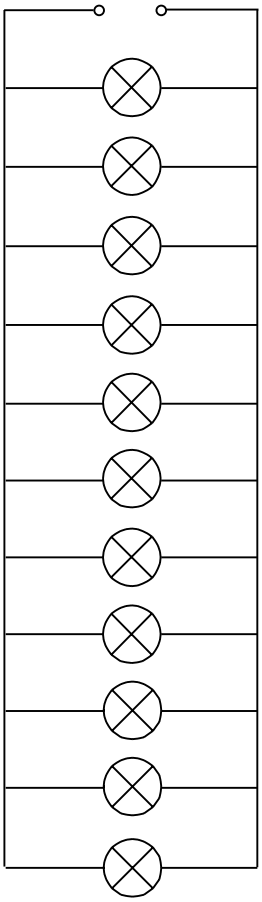
2. (a) Ahmed bought two sets of lights to put on a tree in his garden.
Circuit diagrams for the two sets of lights are shown below.

to mains plug



circuit A

to mains plug



circuit B

Choose words from the list below to fill the gaps in the sentences.

all **none** **some** **parallel** **series** **short**

(i) **Circuit A** is a _____ circuit.

If one of the bulbs breaks in **circuit A** _____ of the other bulbs will go out.

2ai
1 mark

(ii) **Circuit B** is a _____ circuit.

If one of the bulbs breaks in **circuit B** _____ of the other bulbs will go out.

2aii
1 mark

(b) Light rays from the bulbs hit the mirror of Ahmed's car.

What happened to the light rays when they hit the mirror?

_____

2b
1 mark

(c) The tree has root hairs.
What are the functions of root hairs?
Tick the **two** correct boxes.

They absorb water from the soil.	☐	They absorb sunlight.	☐
They produce seeds.	☐	They absorb minerals from the soil.	☐
They attract bees for pollination.	☐		

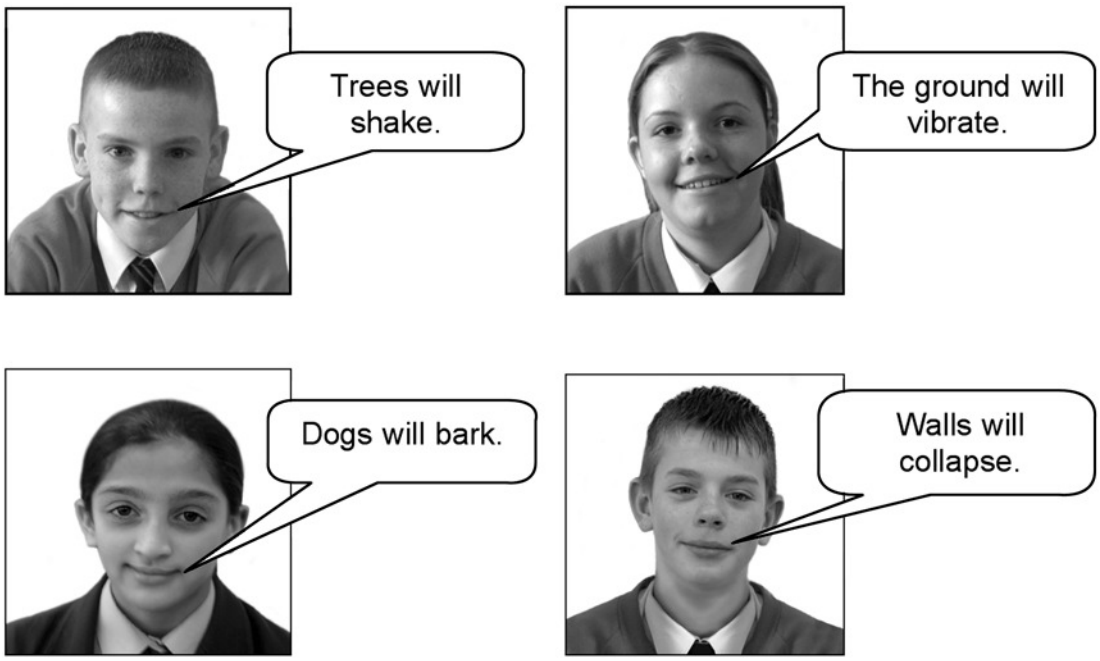
2c
1 mark

2c
1 mark

maximum 5 marks

Total
5

3. On 7th September 2001, at 11.00 am, over a million pupils took part in a national investigation.
They all jumped up and down at exactly the same time.
Sensors were used to measure the vibrations caused by the jump.
Before they jumped, four pupils described some effects they might notice.



(a) What type of statement did the pupils make?

conclusions	☐	methods	☐
observations	☐	predictions	☐

☐ 3a
1 mark

(b) Sensors at different places recorded the vibrations of the ground.

Why was it important that all the pupils jumped together?

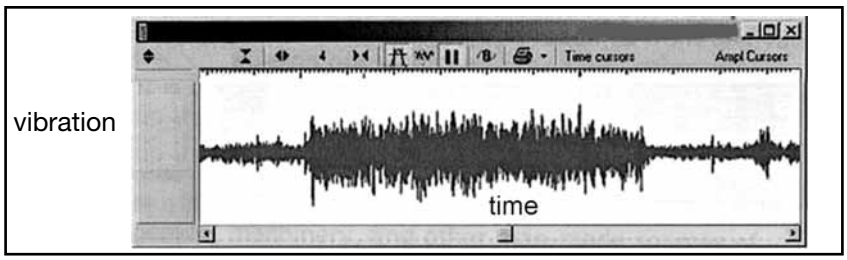
_____

_____

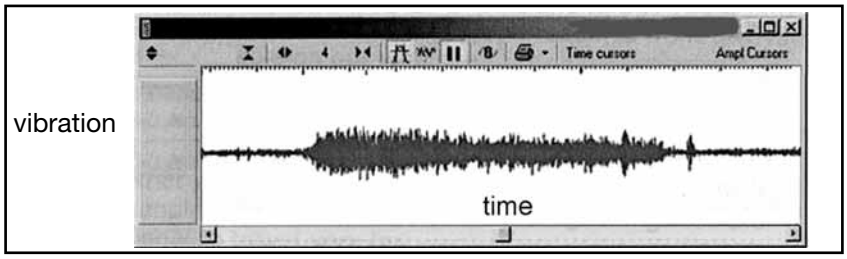
☐ 3b
1 mark

(c) The sensor recordings below show the amount of vibration of the ground at three different places during the jump.

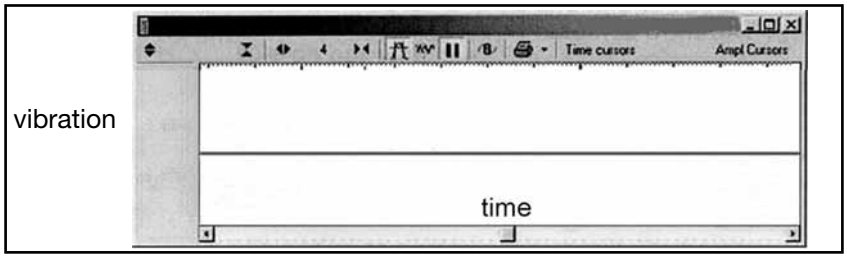
Sensor A was **near** where pupils jumped



Sensor B was at another place **near** where pupils jumped



Sensor C was at a place **far away** from where pupils jumped



Carol said, 'When pupils jump, only the ground nearby will vibrate'.

(i) Describe how the evidence in the recordings supports Carol's idea.

3ci

1 mark

(ii) Suggest **one** reason for the difference between the readings of sensor **A** and sensor **B**.

3cii

1 mark

maximum 4 marks

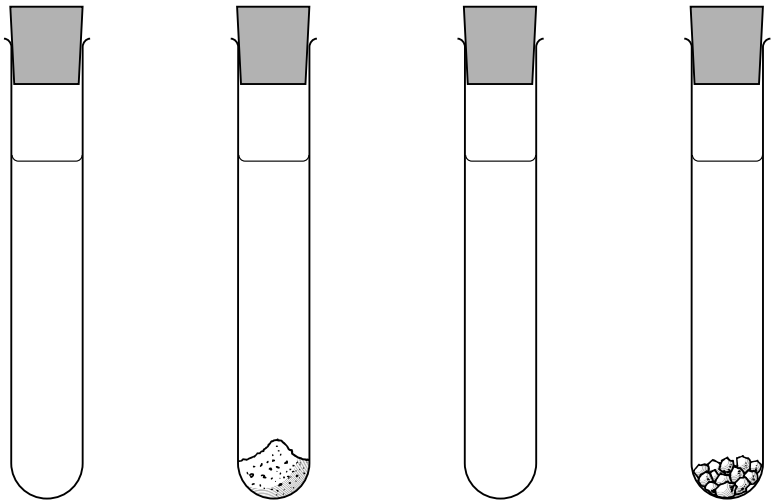
Total

4

4. (a) Reshma had a mixture of iron filings and sand.
What could she use to separate the iron filings from the mixture?

4a
1 mark

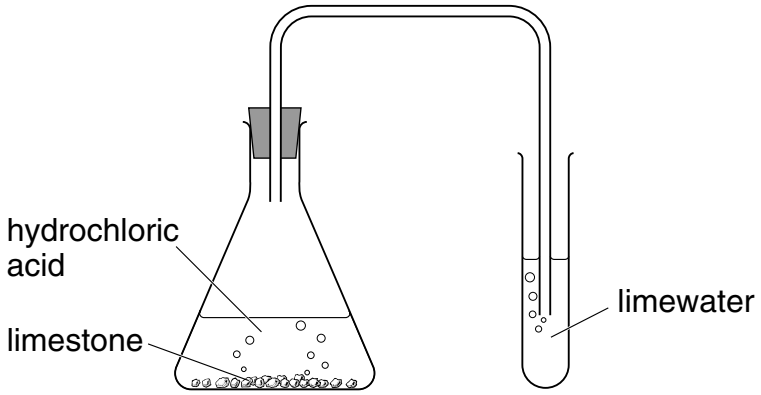
(b) Reshma put 10 cm^3 of water and 2 g of a different solid into each of four test-tubes. She shook each test-tube.
The drawings show the test-tubes after 10 minutes.



Why can the salt and sugar **no** longer be seen in test-tubes A and C?

4b
1 mark

(c) Reshma added hydrochloric acid to some pieces of limestone as shown below.



(i) Look at the diagram above.
How can you tell that a gas is given off in this experiment?

_____

_____

4ci
1 mark

(ii) Reshma passed the gas through limewater. This showed that the gas was carbon dioxide.

What happened to the limewater?
Tick the correct box.

It stayed clear. ☐

It turned blue. ☐

It turned cloudy. ☐

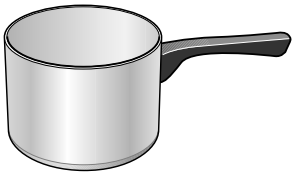
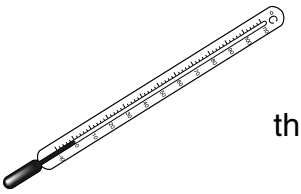
It turned red. ☐

4cii
1 mark

maximum 4 marks

Total
4

5. (a) The drawings below show that different elements are used for different objects.
Draw a line from each element to the reason for using that element.
Draw only **four** lines.

element used	**reason for using the element**
 **copper** for the base of a saucepan	It is lighter than air.
 **gold** for a ring	It is a good conductor of heat.
 **helium** in a balloon	It is a good conductor of electricity.
 **mercury** in a thermometer	It stays shiny because it does **not** react with oxygen.
	It is a liquid at room temperature.

5a
1 mark

5a
1 mark

5a
1 mark

5a
1 mark

not to scale

(b) Which of the four elements is **not** a metal?
Tick the correct box.

copper ☐

gold ☐

helium ☐

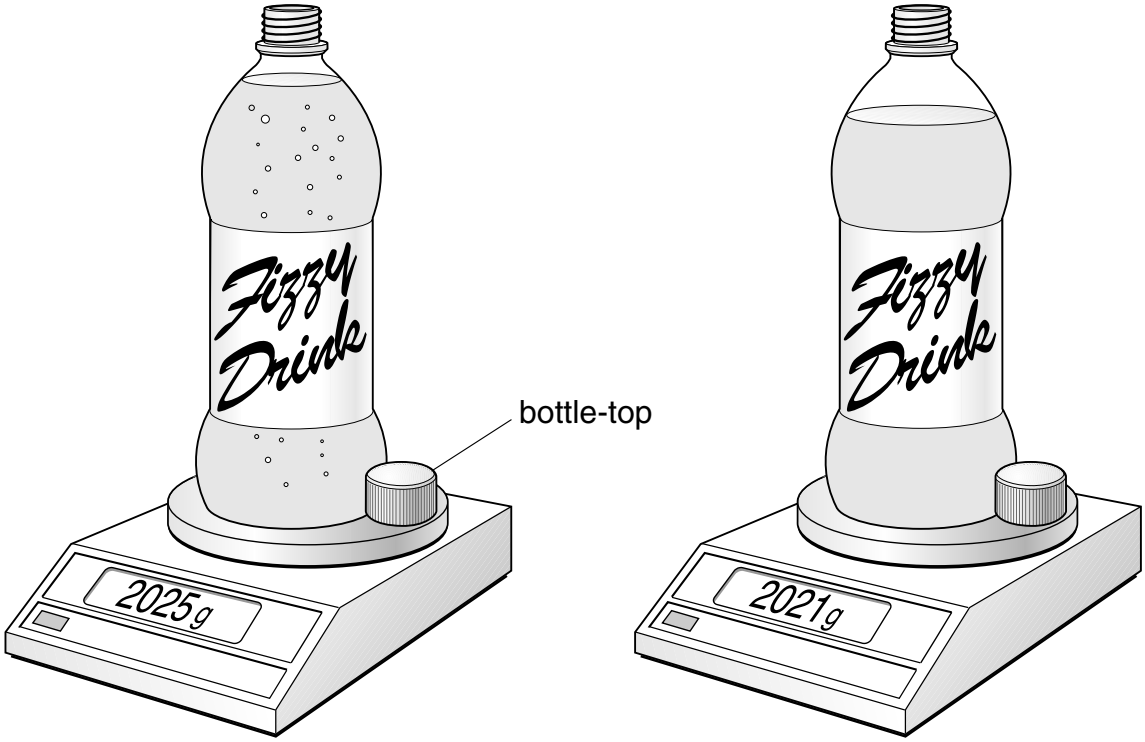
mercury ☐

☐ 5b
1 mark

maximum 5 marks

Total
☐
5

6. (a) Jenny put a bottle of fizzy drink on a balance.
She removed the bottle-top, and the drink began to fizz.
She left the open bottle of drink and the bottle-top on the balance for five days in a warm room.



at the start **five days later**

Five days later the drink was no longer fizzy. Its mass had decreased and the level of the liquid had gone down.

(i) Look at the drawings of the balance.
Work out the decrease in **mass** after five days.

_____ g

6ai
1 mark

(ii) The fizzy drink contained sugar, colouring, a gas and water.
The mass decreased because two of these substances were lost into the air.

Which **two** substances were lost into the air?

1. _____

2. _____

6aii
1 mark

6aii
1 mark

(b) The sugar, colouring and the gas were all dissolved in the water.
Which word describes the **water**?
Tick the correct box.

alkali	☐	indicator	☐
solute	☐	solvent	☐

6b
1 mark

maximum 4 marks

Total
4

7. Some pupils carried out an investigation to find out whether more sugar or more salt dissolved in water at 60°C.

Here are some of the steps in their investigation.
They are **not** in the correct order.

A



They added salt to one beaker of water at 60°C and sugar to the other beaker of water at 60°C.

B



They stirred the mixtures.

C



They recorded their results.

D



They put 20 cm^3 of water at 60°C into two beakers.

E



They collected this equipment.

(a) Put the letters **A**, **B**, **C**, **D** and **E** in the boxes below to show the correct order of the steps in their investigation.

1st ☐ 2nd ☐ 3rd ☐ 4th ☐ 5th ☐

☐ 7a
1 mark

(b) Why did they use a measuring cylinder?

_____

☐ 7b
1 mark

(c) They used water at 60°C in both beakers.

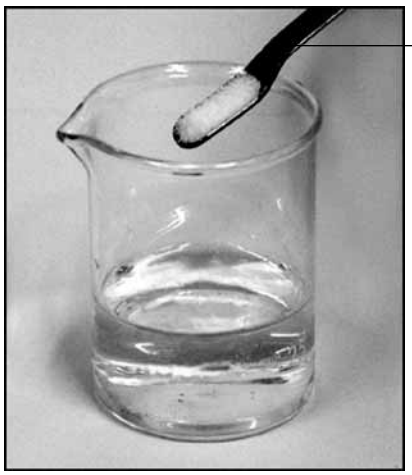
What else did they do to make their investigation fair?

_____

_____

7c
1 mark

(d) They counted the number of spatulas of sugar or salt added to the water until **no** more would dissolve.



(i) Why was this **not** an accurate method of measuring how much sugar or salt they added?

_____

_____

7di
1 mark

(ii) Suggest a more accurate method of measuring how much sugar or salt they added.

_____

_____

7dii
1 mark

(e) Jane predicted that more sugar than salt would dissolve.

Complete the table to show a result which would support Jane's prediction.

	sugar	**salt**
number of spatulas	32	

7e
1 mark

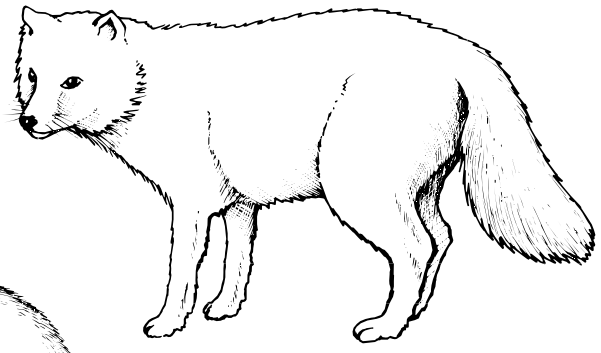
maximum 6 marks

Total
6

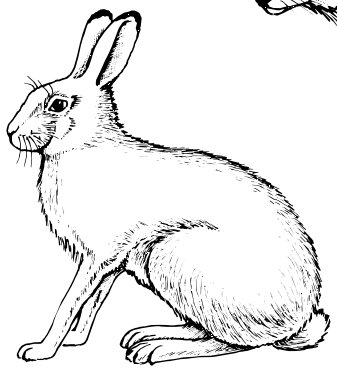
8. The drawings show five different mammals. They are **not** drawn to scale.



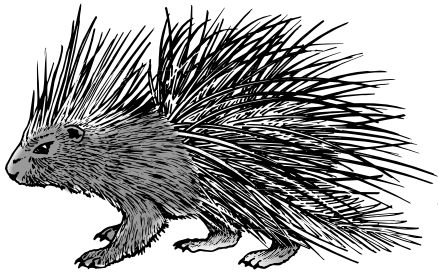
bat



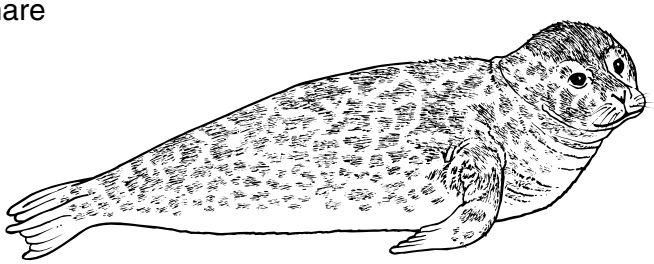
Arctic fox



Arctic hare



porcupine



seal

(a) Which fact is only true about mammals but **not** true about other animals?
Tick the correct box.

They can swim.	☐	They have four legs.	☐
They lay eggs.	☐	They produce milk to feed their young.	☐

☐ 8a
1 mark

(b) Look at the drawing of the bat.
In what way are bats unusual mammals?

_____

_____

☐ 8b
1 mark

(c) Give **one** way the seal is suited for moving through water.

8c
1 mark

(d) The porcupine has spines.
How do the spines help a porcupine to survive?

8d
1 mark

(e) In winter, the fur of the Arctic hare and the Arctic fox becomes thicker and turns white.

(i) How does **thick** fur help an Arctic hare and an Arctic fox to survive during the winter?

8ei
1 mark

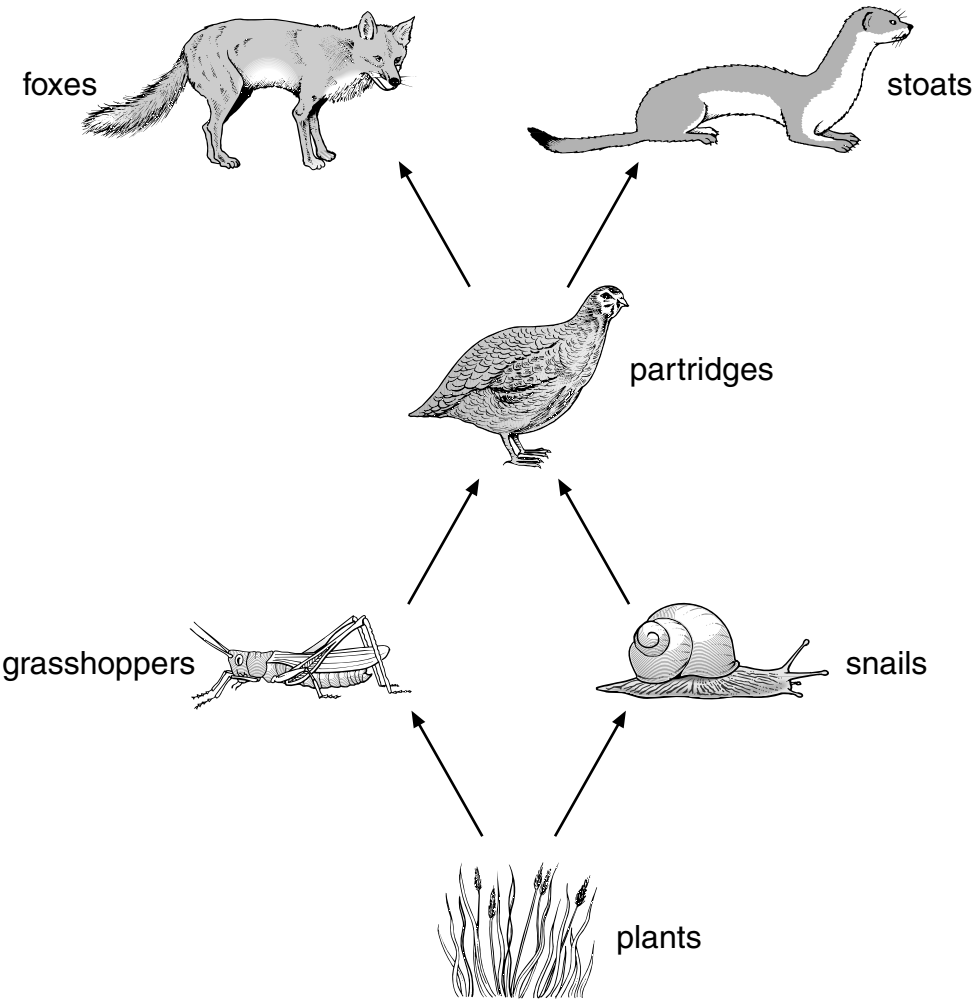
(ii) The Arctic fox hunts and eats Arctic hares.
How does **white** fur help Arctic hares to survive in the snow?

8eii
1 mark

maximum 6 marks

Total
6

9. The drawing below shows part of a farmland food web.



not to scale

(a) (i) Which living thing in the food web is an insect?

_____

9ai
1 mark

(ii) Farmers spray their plants with insecticide to kill insects.
Suggest how insecticide on the plants gets into the insects.

_____

_____

9aii
1 mark

(b) From the food web above, give the names of **one** predator and its prey.

predator _____

prey of this predator _____

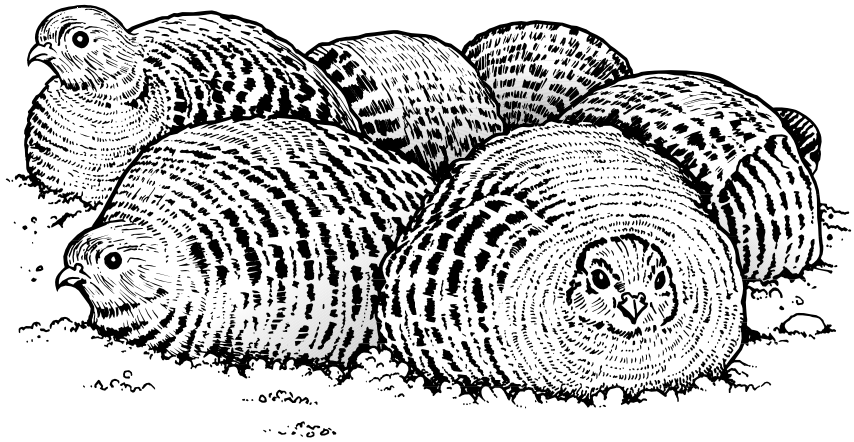
9b
1 mark

(c) Why are the plants in the food web called producers?
Tick the correct box.

They lose their leaves in the autumn.	☐	They make food by photosynthesis.	☐
They have very long roots.	☐	They have very small flowers.	☐

9c
1 mark

(d) The drawing below shows how partridges sit close together and all face outwards.



Give **one** reason why sitting close together like this helps the partridges to survive.

_____

_____

9d
1 mark

(e) Partridges lay their eggs in nests on the ground.

(i) The eggs are the same colour as the ground.
Why can this help partridges to survive?

_____

_____

9ei
1 mark

(ii) Why could laying eggs on the ground result in fewer partridge chicks?

_____

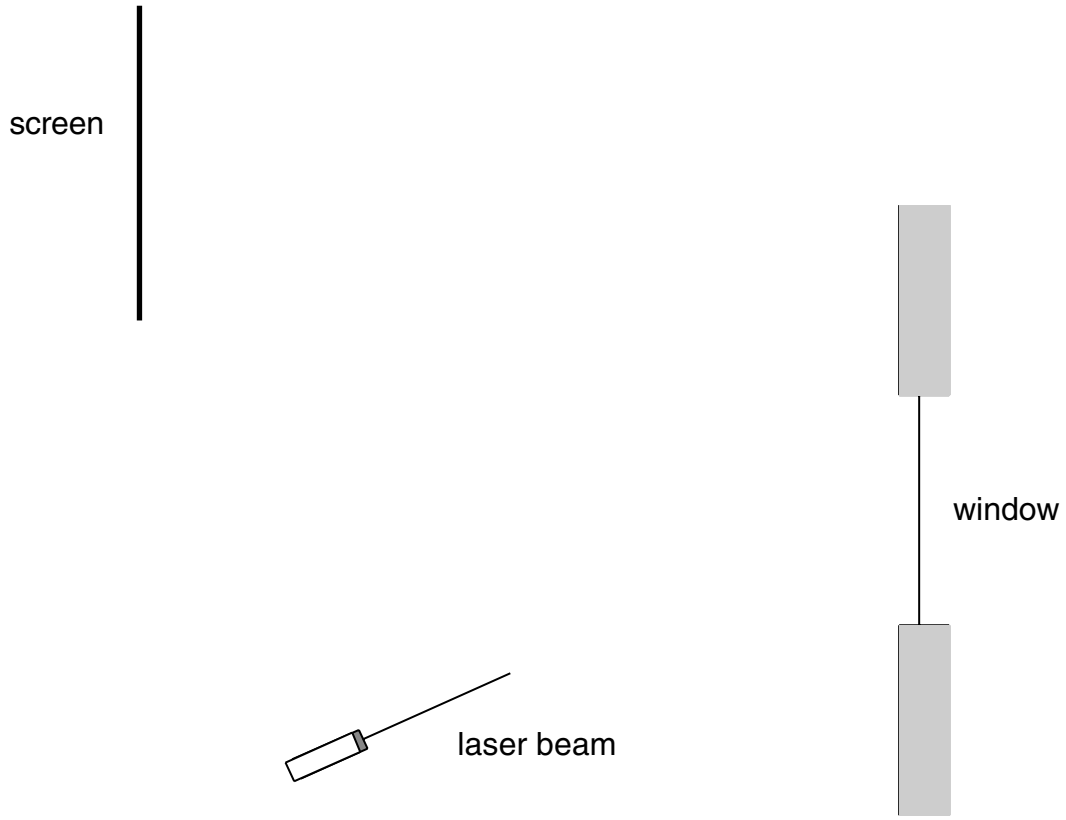
_____

9eii
1 mark

maximum 7 marks

Total
7

10. (a) A teacher shines a laser beam onto a classroom window. It reflects off the window and onto a screen.



10a
1 mark

On the diagram above, continue the laser beam to show its path as it reflects off the window and onto the screen. Use a ruler.
Add arrows to show the direction of the laser beam.

10a
1 mark

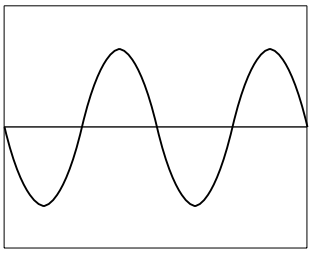
(b) (i) When a pupil plays her flute in the classroom the window vibrates. Give the reason for this.

10bi
1 mark

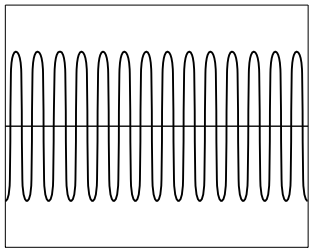
(ii) When the window vibrates, what happens to the laser beam that is reflected off the window?

10bii
1 mark

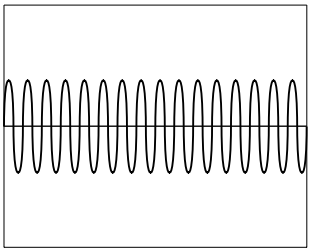
(c) The teacher places a microphone near the pupil as she plays her flute.
The diagram below shows the pattern on an oscilloscope screen.



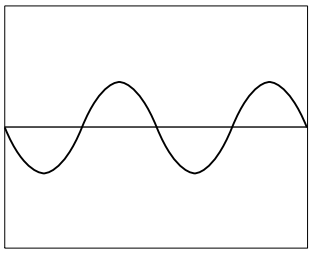
The pupil then plays her flute at a **higher pitch** and **more quietly**.
Which diagram below shows the pattern that would be seen on the oscilloscope?
Tick the correct box.



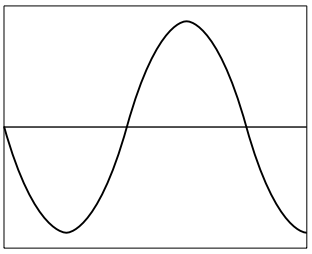
A ☐



B ☐



C ☐



D ☐

☐ 10c
1 mark

maximum 5 marks

Total
☐
5

11. (a) Debbie put a paper cup into a glass beaker.
She glued a magnet in the bottom of the paper cup.
She glued another magnet in the bottom of the beaker.
The magnets repelled.

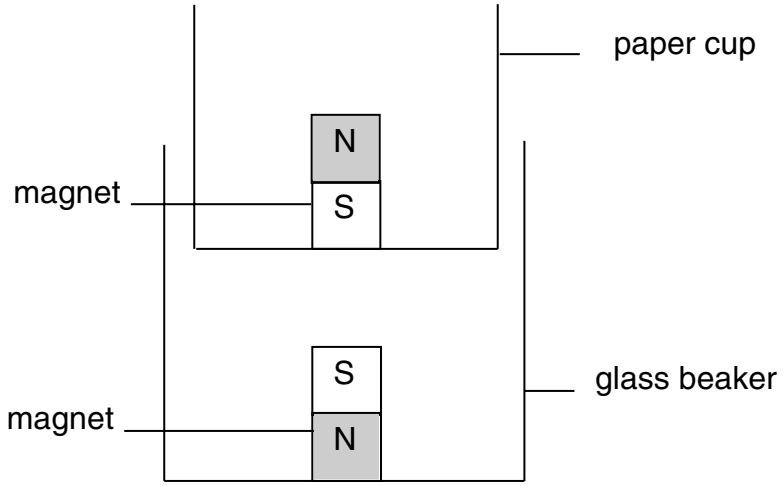


diagram A

not to scale

What **two** forces act on the paper cup and its contents to keep it in this position?

11a
1 mark

1. _____

11a
1 mark

2. _____

(b) Debbie put 5 g of aluminium rivets into the paper cup.
It moved down a little as shown in diagram B.

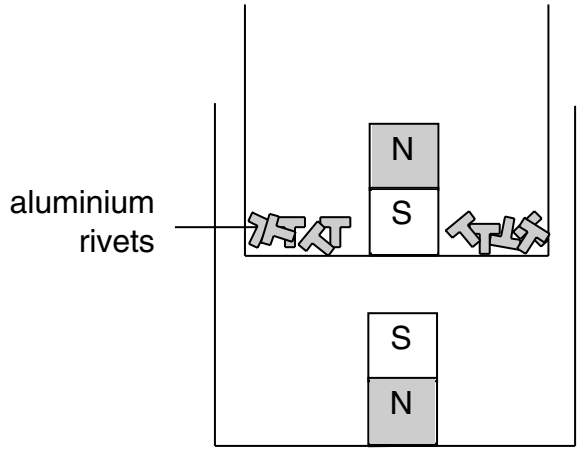
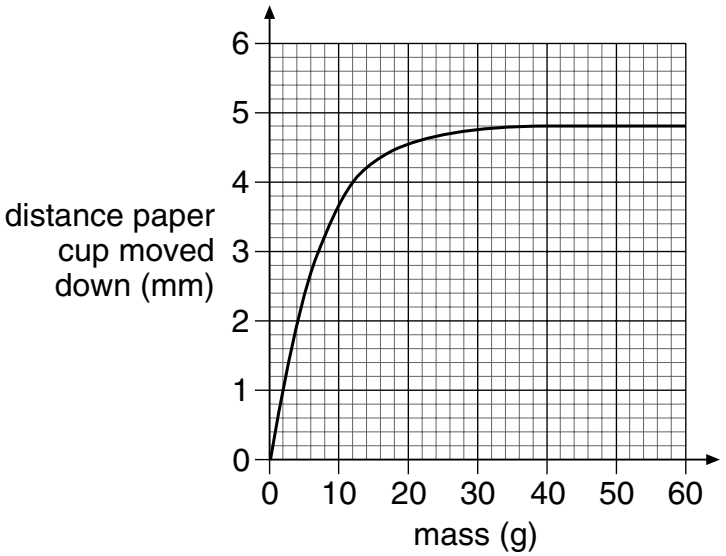


diagram B

not to scale

Debbie plotted a graph to show how the mass of aluminium rivets affected the distance the cup moved down.



(i) Use the graph to find the mass that made the cup move down 4 mm.

_____ g

11bi
1 mark

(ii) Why did the graph stay flat with masses greater than 40 g?

_____

11bii
1 mark

(c) Debbie removed the 5 g of aluminium rivets and put 5 g of iron nails into the cup.

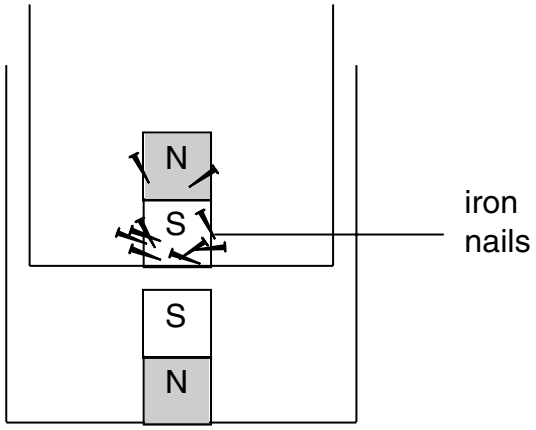


diagram C

not to scale

The paper cup moved down more with 5 g of iron nails than with 5 g of aluminium rivets as shown in diagram C.
Give the reason for this.

_____

_____

11c
1 mark

maximum 5 marks

Total
5

12. Some pupils predicted that water will evaporate faster if the surrounding air temperature is higher.

To investigate their prediction they placed some water in containers in two different rooms.

(a) Give **two** factors they should keep the same to make their investigation fair.

12a
1 mark

1. _____

12a
1 mark

2. _____

(b) They recorded the mass of the water and the container in room 1 and room 2 every day for 5 days.

The table below shows their results.

time (days)	mass of water and container (g)	
	room 1	room 2
0	100	100
1	92	85
2	80	72
3	72	54
4	60	45
5	46	30

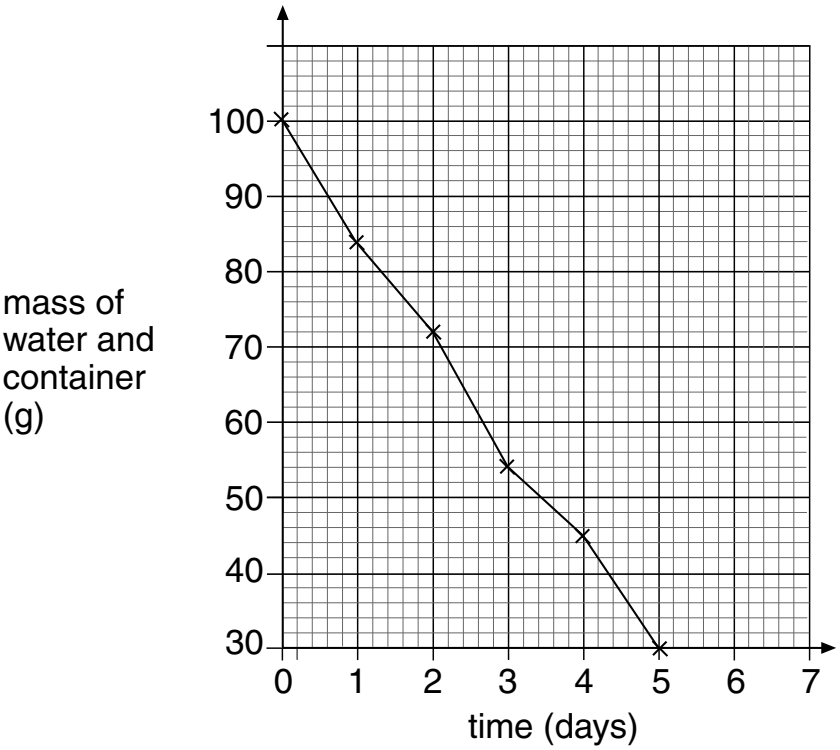
The data shown in their table is **not** sufficient to test their prediction. Explain why.

12b
1 mark

_____

_____

They plotted their data for room 2 and attempted to draw a line of best fit.



(c) Describe the mistake they made in drawing the line of best fit.

_____

_____

12c
1 mark

(d) Using the data in the table plot the points for room 1.

12d
1 mark

(e) Draw a line of best fit of the points you have drawn.

12e
1 mark

(f) In which room did the water evaporate more quickly?
Tick **one** box.

room 1 ☐ room 2 ☐

Use their data to explain your answer.

_____

_____

12f
1 mark

maximum 7 marks

Total
7

13. Hydrochloric acid is a strong acid.

(a) Winston used universal indicator solution to find the pH of some hydrochloric acid.

(i) Suggest the **colour** of the mixture of universal indicator solution and the hydrochloric acid.

13ai
1 mark

_____

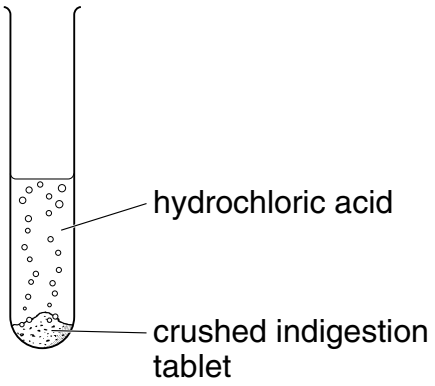
(ii) Suggest the **pH** of the hydrochloric acid.

13aii
1 mark

_____

(b) Indigestion can be caused when too much hydrochloric acid is produced in the stomach.
Magnesium carbonate can be used to treat indigestion.

Winston crushed some indigestion tablets containing magnesium carbonate. He added them to hydrochloric acid in a test-tube. The mixture fizzed.



The word equation for the reaction is shown below.

magnesium carbonate + hydrochloric acid → magnesium chloride + carbon dioxide + water

(i) Use the word equation to explain why the mixture fizzed when the reaction took place.

13bi
1 mark

_____

_____

(ii) Winston continued to add crushed tablets to the acid until the mixture stopped fizzing.
Why did the fizzing stop?

_____

_____

13bii
1 mark

(c) When magnesium carbonate reacts with hydrochloric acid, magnesium chloride is formed.

Which **two** words describe magnesium chloride?
Tick the **two** correct boxes.

a compound	☐	a mixture	☐
an element	☐	a salt	☐
a metal	☐	a solvent	☐

13c
1 mark

13c
1 mark

(d) It is important that the hydrochloric acid in the stomach is **not** completely neutralised by indigestion tablets.

Why is hydrochloric acid needed in the stomach?

_____

_____

13d
1 mark

maximum 7 marks

Total
7

14. (a) The animals drawn below all have backbones.



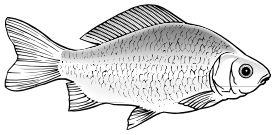
amphibian



bird



mammal



fish

not to scale

(i) What word describes animals with a backbone?

_____

14ai

1 mark

(ii) There are five groups of animals with a backbone. Only four groups are shown above.
Give the name of the missing group.

_____

14aii

1 mark

(b) The drawing below shows the human backbone. It is made up of a number of small bones.



Why is it an advantage that the backbone is made of a number of small bones rather than one long bone?

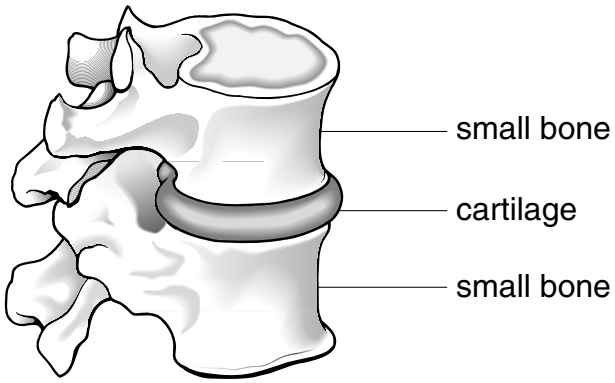
_____

_____

14b

1 mark

(c) The drawing below shows two small bones from the backbone.



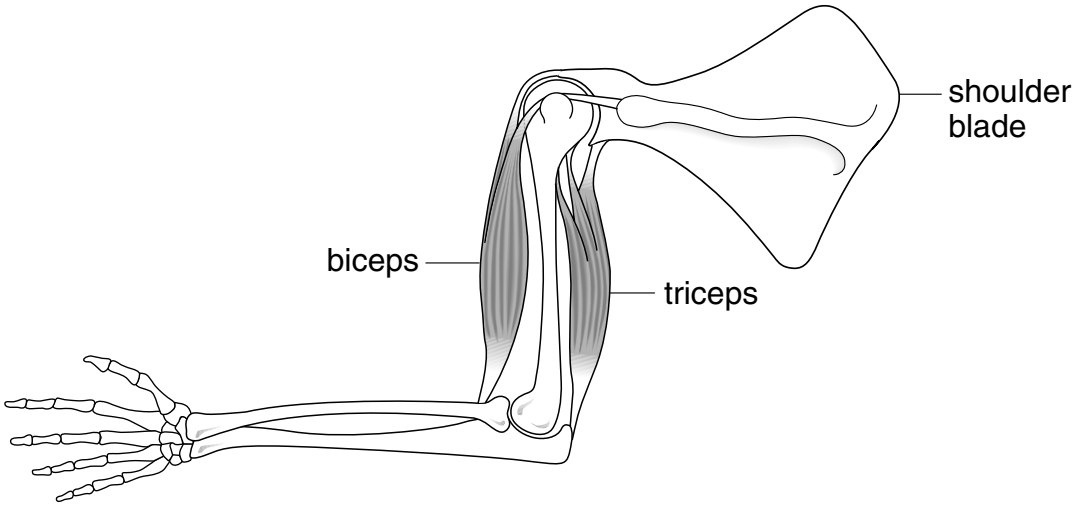
Between the small bones there is a material called cartilage.
Cartilage is softer than bone.
Give **one** advantage of having a softer material between the bones.

_____

_____

14c
1 mark

(d) The diagram below shows the bones and two muscles of an arm.



The biceps and triceps are muscles which raise and lower the forearm.
What happens to the biceps and triceps to **raise** the forearm?

the biceps _____

the triceps _____

14d
1 mark

maximum 5 marks

Total
5

BLANK PAGE

15. In January 2002, thousands of pupils recorded the numbers of different birds seen in their gardens in one hour. They sent their results to the Royal Society for the Protection of Birds who have kept data for many years.

(a) Why are the results from this survey more reliable than one person's observation?

_____

_____

15a
1 mark

(b) Pupils observed birds in their gardens for one hour during the last week in January.

Give **two** factors which are being controlled in this survey.

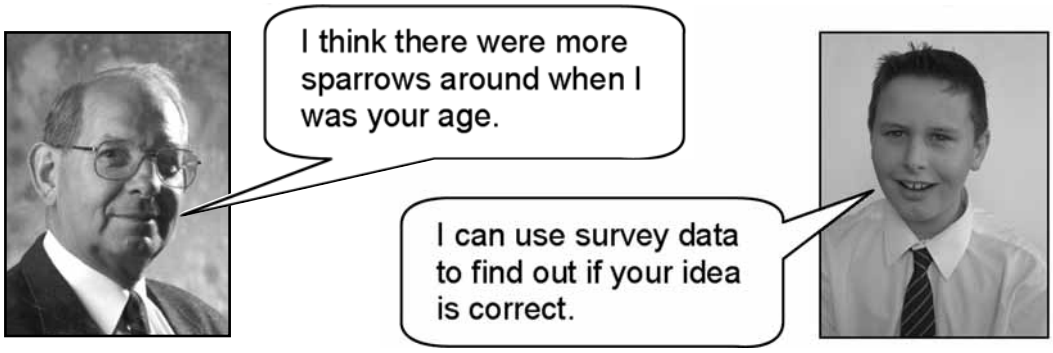
1. _____

2. _____

15b
1 mark

15b
1 mark

(c) Jack's grandad says: Jack says:



Jack thinks that the results collected in 2002 **cannot** test his grandad's idea that sparrows are less common than they used to be.

(i) What additional survey data would Jack need to test his grandad's idea?

_____

_____

15ci
1 mark

(ii) What pattern in the survey results would give Jack the evidence that his grandad was correct?

_____

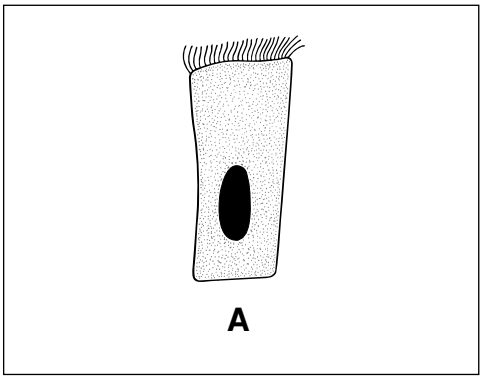
_____

15cii
1 mark

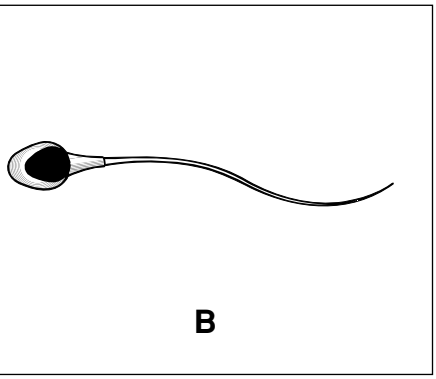
maximum 5 marks

Total
5

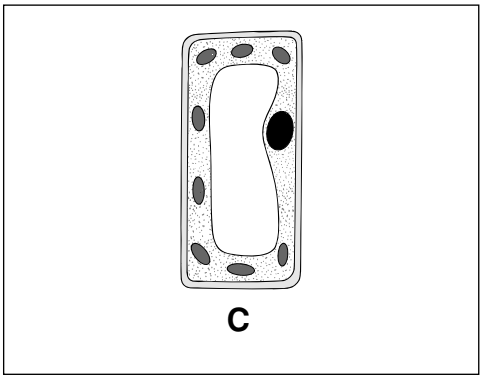
16. The diagrams below show six cells.



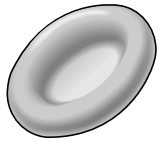
A



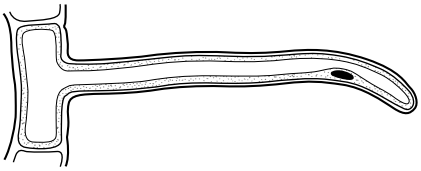
B



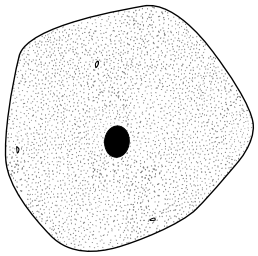
C



D



E



F

(a) (i) Give the letters of the **two** plant cells in the diagrams opposite.

_____ and _____

16ai
1 mark

(ii) Which **one** of these plant cells contains chloroplasts?
Give the letter.

_____

16aii
1 mark

(iii) Give the function of chloroplasts.

_____

_____

16aiii
1 mark

(b) (i) Give the letter of the ciliated cell.

_____

16bi
1 mark

(ii) In which part of the body are ciliated cells found?

_____

16bii
1 mark

(iii) What is the function of ciliated cells in this part of the body?

_____

_____

16biii
1 mark

(c) Give the letter of the cell which transfers genetic information from father to offspring.

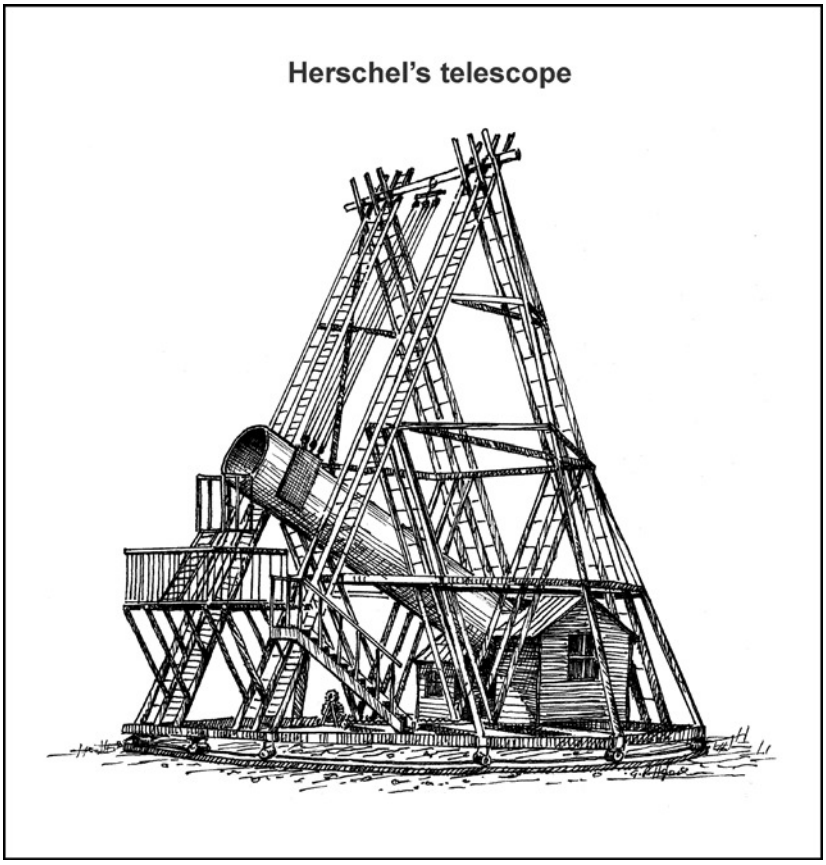
_____

16c
1 mark

maximum 7 marks

Total
7

17. Until 1781 scientists thought there were only six planets in the solar system. Then a scientist called Herschel looked through a very large telescope that could turn to follow objects in space.
He watched a bright object in the night sky for a few months and made drawings of what he saw. He concluded it was a planet.



(a) What method did Herschel use to discover the new planet?
Tick the correct box.

He carried out practical tests in the laboratory.	☐	He asked scientists' opinions.	☐
He observed the environment.	☐	He gathered data from books.	☐

☐ 17a
1 mark

(b) Scientists today use satellites as well as telescopes to observe the universe.

Suggest **one** way that developments in equipment have changed the information scientists collect about planets.

17b
1 mark

(c) Before 1781, scientists believed there were 6 planets in our solar system. Now scientists believe there are 10 planets.

What do these ideas suggest about our knowledge of our solar system?

17c
1 mark

(d) What causes scientists to reject an idea and replace it with a new one?

17d
1 mark

maximum 4 marks

Total
4

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END OF TEST

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