Sc

KEY STAGE 3

TIER 3–6

2006

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.
- If you are asked to plan an investigation, there will be space for you to write down your thoughts and ideas.
- Do not use any rough paper.
- Check your work carefully.
- Ask your teacher if you are not sure what to do.

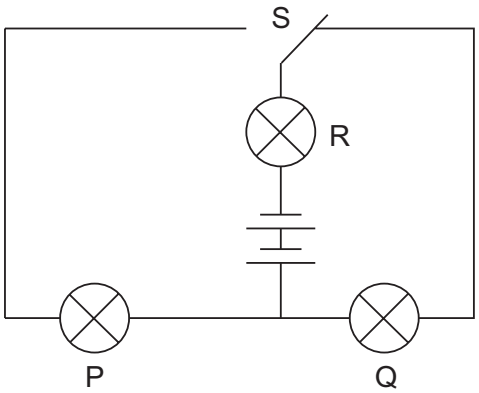
For marker's use only

Total marks	
Borderline check	

QCA/06/1937

1. (a) The diagram below shows a circuit with a two-way switch, S.

Rosie puts the switch in the position shown below.



Complete the table below to show if the bulbs are on **or** off.
Write **on** or **off** for each bulb.

bulb	on or off
P	
Q	
R	

1a

1 mark

(b) Give the name of the part that provides energy for the circuit.

_____

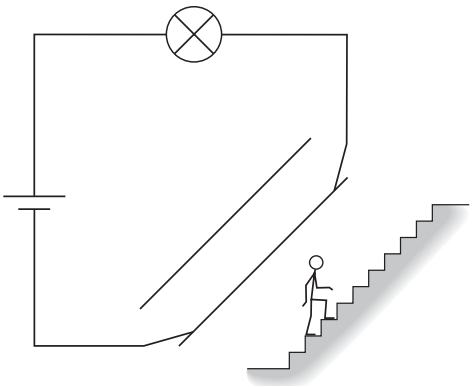
1b

1 mark

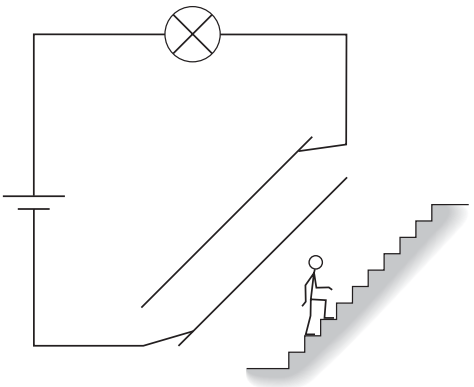
(c) The diagrams below show a light-bulb over a staircase of a model house.

There is a two-way switch at the bottom of the stairs and another two-way switch at the top.

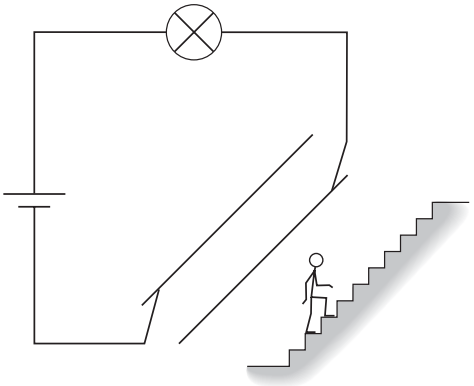
Under each diagram, tick **one** box to show if the bulb is **on** or **off**. The first one has been done for you.



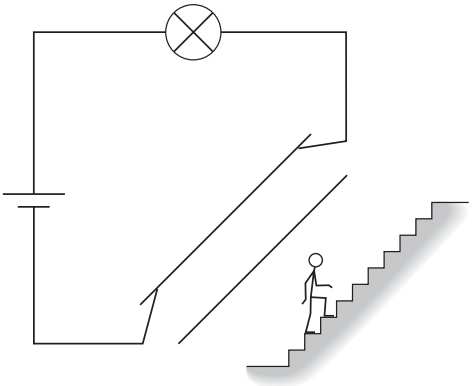
on	✓
off	



on	
off	



on	
off	



on	
off	

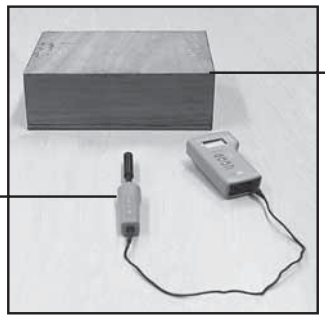
1c
1 mark

1c
1 mark

maximum 4 marks

Total
4

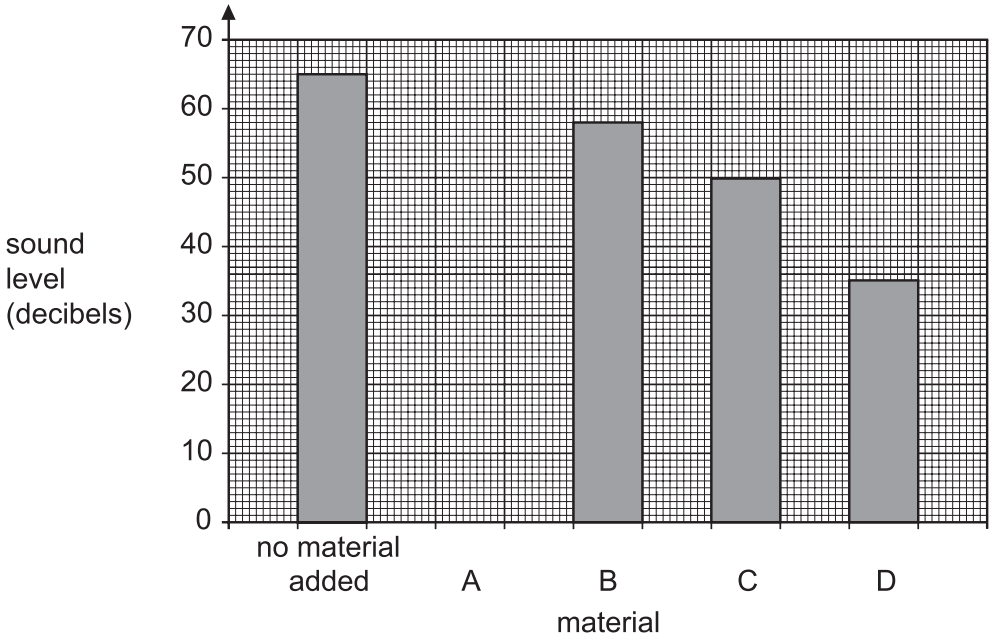
2. John investigated which material would be best for sound-proofing.
He put a bell inside a box.
He covered the bell with each material in turn.
He put a sound sensor outside the box to record the sound level.



He tested different materials and got the following results.

material	sound level (decibels)
no material added	65
A	40
B	58
C	50
D	35

(a) On the chart below, draw the bar for **material A**.



2a
1 mark

(b) How many types of material did John test?

_____

2b
1 mark

(c) Which material was best at stopping the sound going through?
Give the correct letter.

_____

2c
1 mark

(d) Which **two** things should John have done to make his test fair?
Tick the **two** correct boxes.

Use the same box each time.	☐
Make sure a different person recorded the results each time.	☐
Use the same material each time.	☐
Keep the distance between the sound sensor and the bell the same each time.	☐
Test each material in a different room.	☐

2d
1 mark

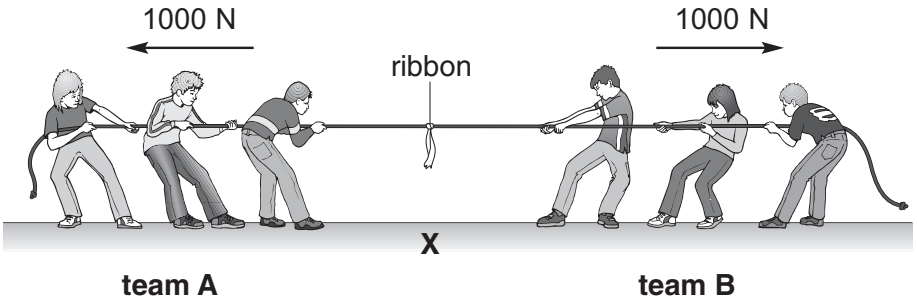
2d
1 mark

maximum 5 marks

Total
5

3. The drawings in parts (a), (b) and (c) show two teams of pupils in a tug-of-war. There is a ribbon tied to the middle of the rope.

(a) The sizes and directions of the forces of each team are shown.

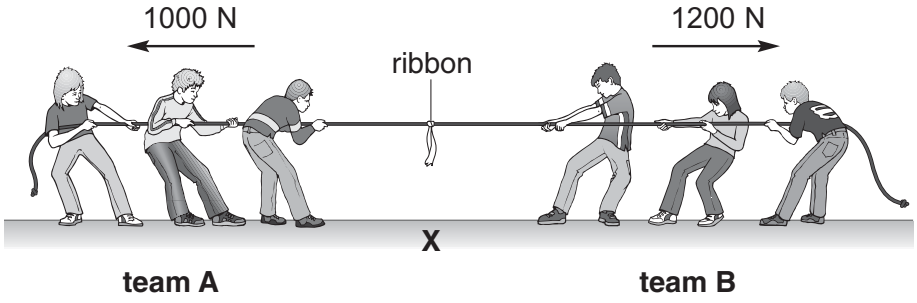


The ribbon stays above point X on the ground.
Give the reason for this.

3a

1 mark

(b) The teams then pull with the forces shown below.

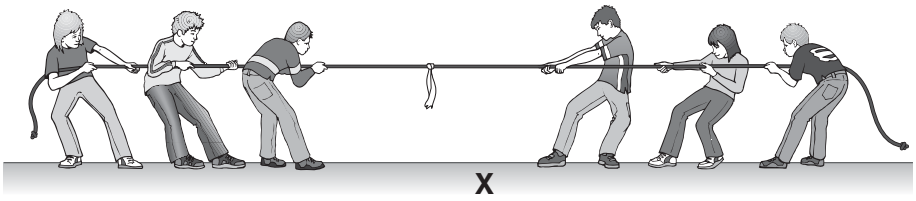


Draw an arrow on the rope to show the direction in which the ribbon will move.

3b

1 mark

(c) Later, the ribbon was to the left of point X as shown below.



Why did the ribbon move towards the left?

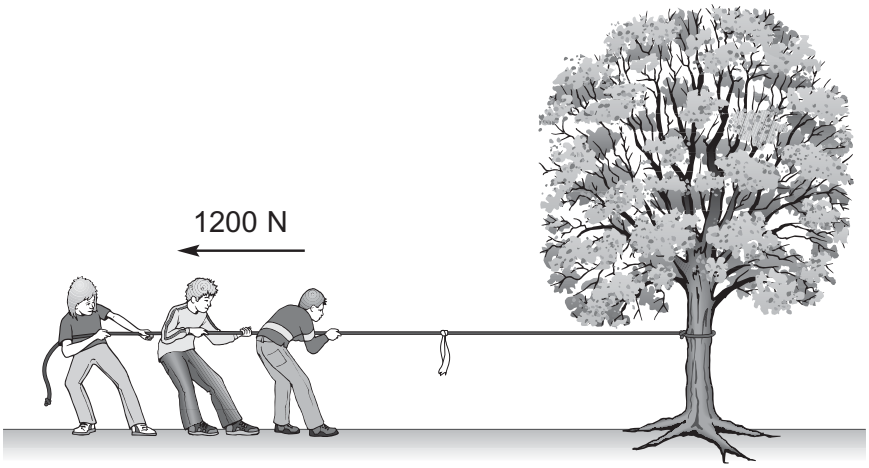
_____

_____

3c

1 mark

(d) Team A practises by pulling a rope tied to a tree.



The team pulls with a force of 1200 N but the tree does **not** move.

What is the force of the tree on the rope?
Tick the correct box.

zero	☐	less than 1200 N	☐	1200 N	☐	more than 1200 N	☐

3d

1 mark

(e) The pupils do **not** slip because there is a force between their shoes and the ground. What is the name of this force?

_____

3e

1 mark

maximum 5 marks

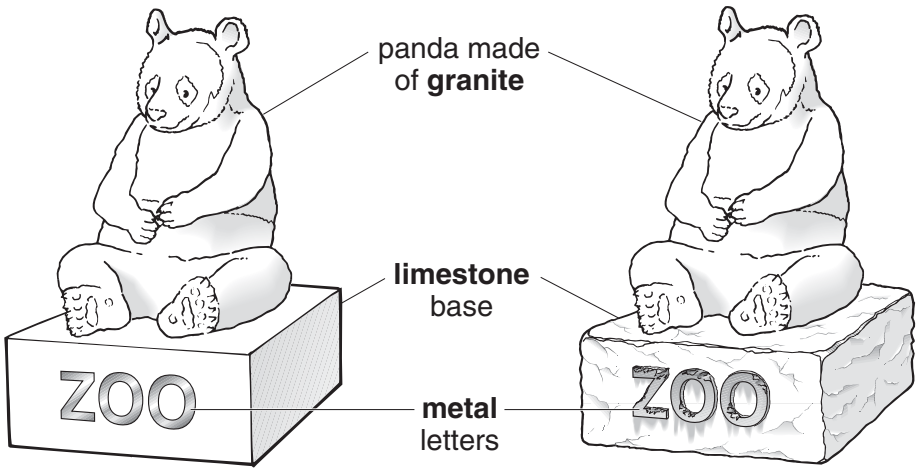
Total

5

4. A statue outside a zoo was made from two types of rock.

The panda was made of granite.
The base was made of limestone.

The drawings show the statue as it was in 1936 and in 2006.



statue in 1936 statue in 2006

(a) The surface of the limestone base has changed over the years.

(i) Which process caused this change?
Tick the correct box.

evaporating	☐	melting	☐
reflecting	☐	weathering	☐

☐ 4ai
1 mark

(ii) The surface of the panda made of granite has **not** changed.

Suggest why granite does **not** change in the same way as limestone.

_____

_____

☐ 4aii
1 mark

(b) Acid rain can be formed when fossil fuels burn.

(i) Give the name of **one** fossil fuel.

_____

4bi

1 mark

(ii) What is true about all fossil fuels?
Tick the correct box.

All fossil fuels are a source of energy.	☐	All fossil fuels are black.	☐
All fossil fuels are liquid.	☐	All fossil fuels take less than 50 years to form.	☐

4bii

1 mark

(iii) Acid rain has changed the surface of the metal letters on the statue.

Which word describes the effect of acid rain on a metal?
Tick the correct box.

corrosion	☐	friction	☐
magnetism	☐	vibration	☐

4biii

1 mark

(iv) What could the zoo owner put on the metal letters to protect them from acid rain?

_____

4biv

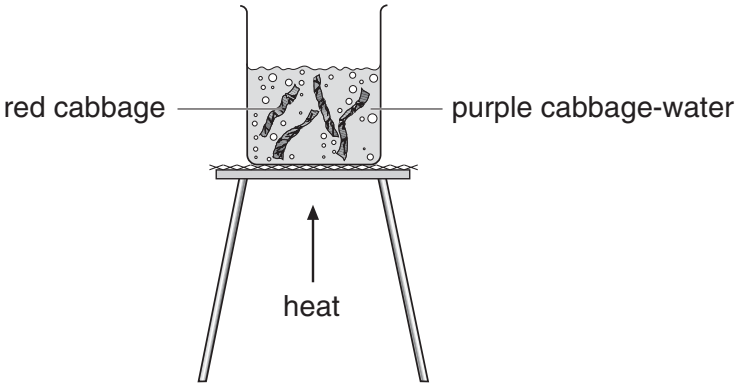
1 mark

maximum 6 marks

Total

6

5. Sharna boiled some red cabbage in water. The cabbage-water turned purple.



(a) (i) Sharna separated pieces of cabbage from the cabbage-water.

Which method did she use?
Tick the correct box.

chromatography	☐	filtration	☐
condensation	☐	freezing	☐

☐ 5ai
1 mark

(ii) Sharna wanted to find out if the purple cabbage-water contained more than one **coloured** substance.

Which method did she use?
Tick the correct box.

chromatography	☐	filtration	☐
condensation	☐	freezing	☐

☐ 5aii
1 mark

(b) Sharna mixed the purple cabbage-water with some other liquids.
She wrote the colours of the mixtures in a table as shown below.

	colour of cabbage-water mixed with liquid	Is the liquid acidic, alkaline or neutral?
liquid 1	red	acidic
liquid 2	blue	alkaline
liquid 3	purple	neutral

Use the information in the table to answer parts (i) and (ii) below.

(i) Sharna mixed cabbage-water with colourless washing-up liquid.
The mixture turned **blue**.

What does this tell you about the washing-up liquid?

_____

5bi
1 mark

(ii) Sharna then mixed cabbage-water with lemon juice.
Lemon juice is **acidic**.

What colour was the mixture?

_____

5bii
1 mark

(c) What is the name of a chemical which changes colour when it is mixed with acids or alkalis?
Tick the correct box.

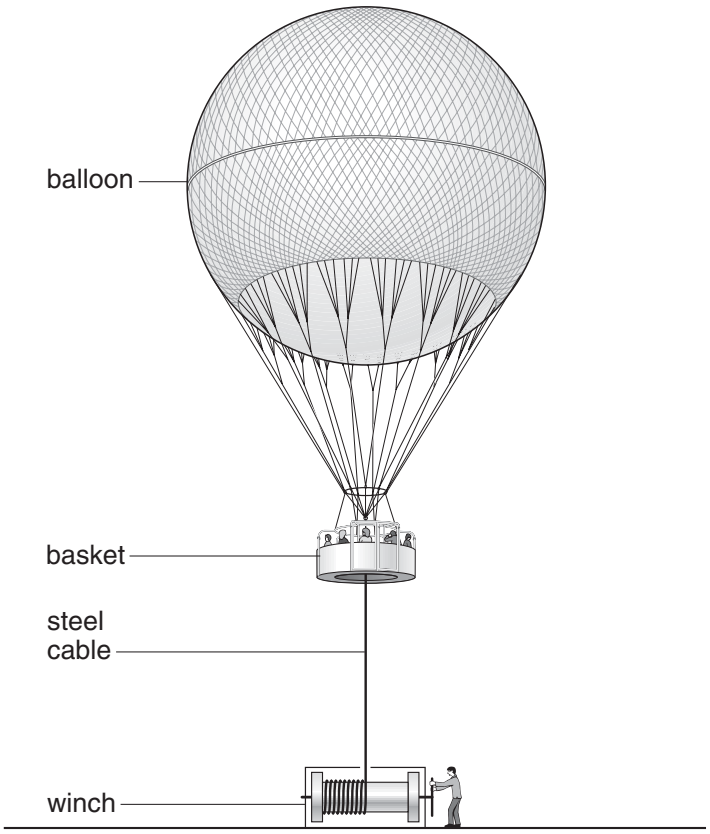
filtrate	☐	indicator	☐
non-metal	☐	solution	☐

5c
1 mark

maximum 5 marks

Total
5

6. The drawing shows some people in a balloon ride.
The basket of the balloon is fixed to the end of a steel cable.



(a) A man brings the balloon down by winding the steel cable around a winch.
Six properties of steel are given below.

(i) Which **two** properties of steel make it suitable for the **cable**?
Tick the **two** correct boxes.

It conducts electricity.	☐	It conducts heat.	☐
It is flexible.	☐	It is magnetic.	☐
It becomes rusty.	☐	It is strong.	☐

☐ 6ai
1 mark

☐ 6ai
1 mark

(ii) From these six properties of steel, give **one** property that is **never** useful.

_____

☐ 6aii
1 mark

(b) The table below shows the mass of 1 m^3 of five different gases at 20°C.

gas	mass of 1 m^3 of gas (kg)
hydrogen	0.1
helium	0.2
air	1.2
oxygen	1.3
carbon dioxide	1.8

(i) Many years ago hydrogen was used in balloons that carried people. Hydrogen is **no** longer used because it is dangerous.

Why is it dangerous to use hydrogen?

_____

6bi

1 mark

(ii) Which other gas in the table can be used in a balloon so that it can go up in the air?

_____

6bii

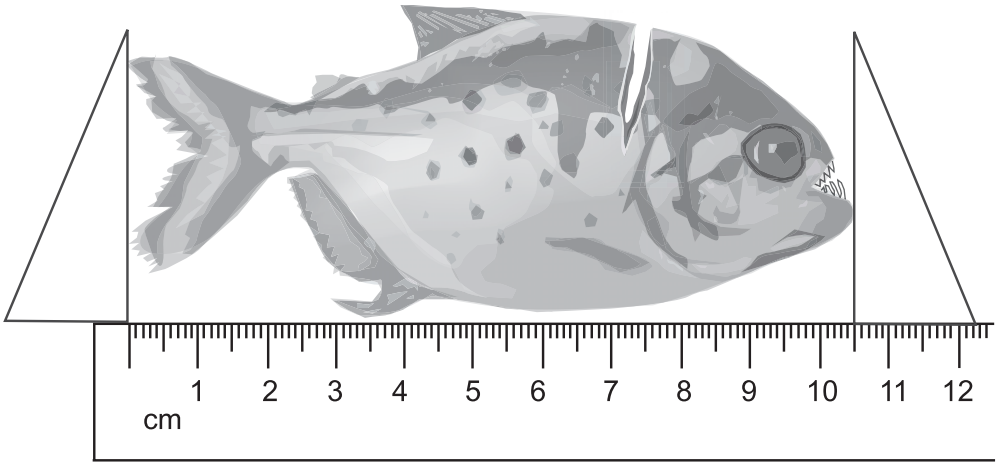
1 mark

maximum 5 marks

Total

5

7. In 2004, a man fishing on the River Thames in London told scientists that a strange fish had dropped from the sky onto his boat.



(a) What is the length of this fish?

_____ cm

7a

1 mark

(b) A scientist looked at the fish and wrote the notes shown below.

Scientist's notes

- Its shape and teeth suggest it is a piranha.
- It is fresh, so it died recently.
- It might have been a pet that was put in the river by its owner.
- Maybe a bird picked it out of the river.
  The cut on its body could have been made by a bird's beak.

Read the scientist's notes.

What **two** features of the fish made the scientist think it was a piranha?

7b

1 mark

1. _____

7b

1 mark

2. _____

(c) What made the scientist think a bird had picked it out of the river?

_____

_____

7c

1 mark

(d) How could you find out the name of a fish you had **not** seen before?

_____

_____

7d

1 mark

(e) Four of the scientist's ideas are listed in the table below.

By each idea put **one** tick to show whether the idea is supported by evidence or **not** supported by evidence.

idea	supported by evidence	not supported by evidence
It is a piranha.		
It died recently.		
It was put in the river by its owner.		
It was picked up by a bird.		

7e

1 mark

7e

1 mark

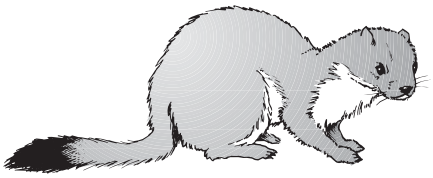
maximum 7 marks

Total

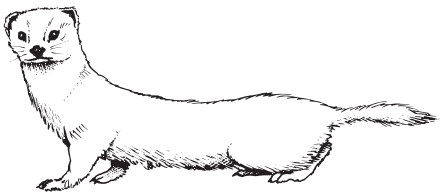
7

8. The drawings below show a stoat, a weasel and an American mink.

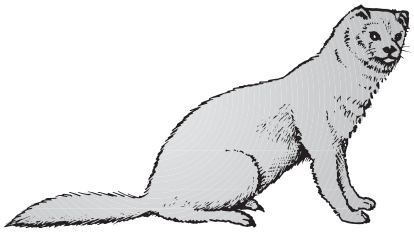
The stoat and weasel are British wild animals.
Mink are from America.



stoat



weasel



American mink

(a) They all hunt and eat rabbits.

1 000 American mink were set free into the British countryside in 1998.

(i) What happened to the numbers of rabbits in the countryside?

8ai

1 mark

_____

Give a reason for your answer.

8ai

1 mark

_____

_____

(ii) How did this affect the stoats and weasels that lived in the countryside?

8aii

1 mark

_____

_____

(b) Stoats, weasels and American mink all hunt and eat rabbits.
Complete the sentence below.

The stoats, weasels and American mink are all **predators** and the

rabbits are their _____.

8b
1 mark

(c) (i) Give the name of **one** other wild animal in Britain that hunts for small animals such as rabbits.

_____

8ci
1 mark

(ii) The American mink were **not** hunted by other animals in the British countryside, but many of the mink died.

Suggest **two** different reasons why the mink died.

1. _____

2. _____

8cii
1 mark

8cii
1 mark

(d) Stoats, weasels and mink are all mammals.

Give **one** way you tell from the drawings that they are mammals.

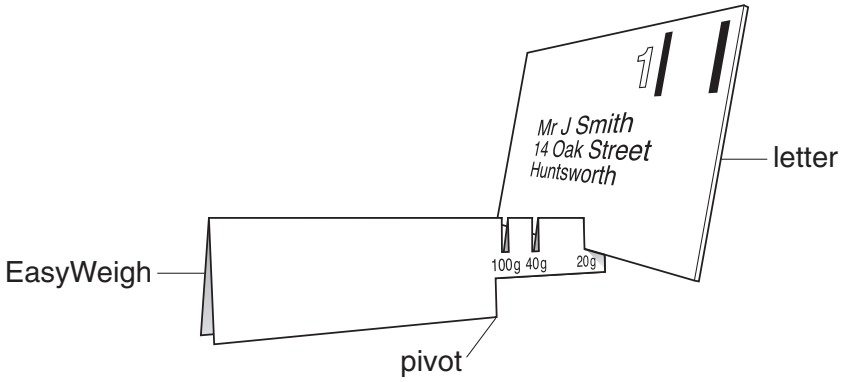
_____

8d
1 mark

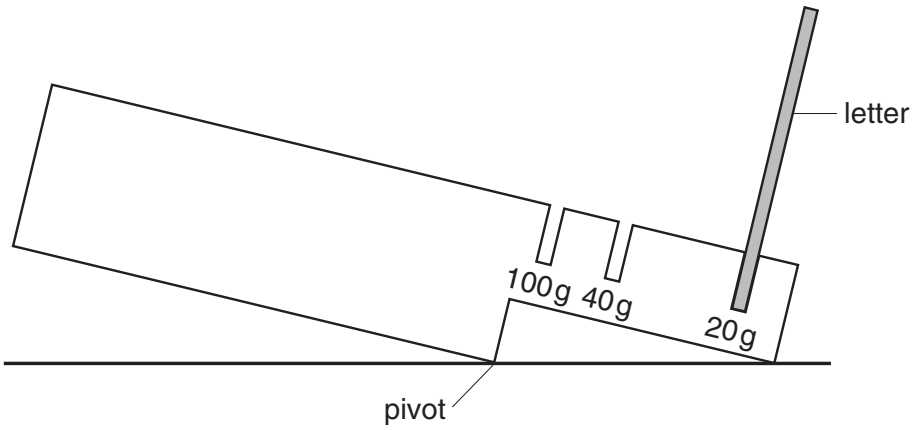
maximum 8 marks

Total
8

9. The drawing below shows a cardboard scale called an EasyWeigh.
It can be used to estimate the mass of letters.



(a) Clare put a letter in the 20 g slot. The scale tipped as shown below.



She then put the same letter in the 40 g slot. The scale did **not** tip.

(i) What do these results tell you about the mass of Clare's letter?

9ai

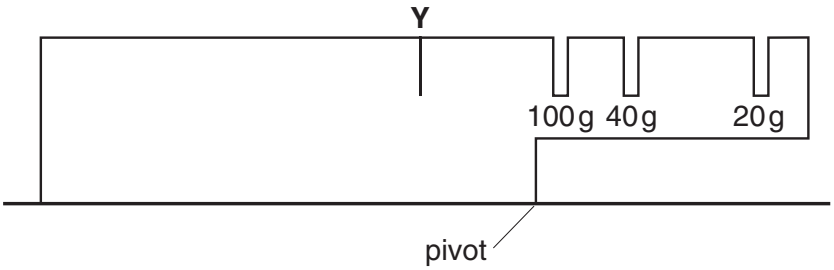
1 mark

(ii) What could Clare do to this cardboard scale to weigh her letter more accurately?

9aii

1 mark

(b) (i) Clare drew a short line to show where she thought she should cut a slot to weigh a 150 g letter. She labelled the slot Y.



Why could Clare **not** use a slot at Y to weigh a 150 g letter?

_____

_____

9bi

1 mark

(ii) Clare wanted to cut a slot to weigh a 70 g letter.

On the diagram above, draw a short line to show where the slot should be cut.

9bii

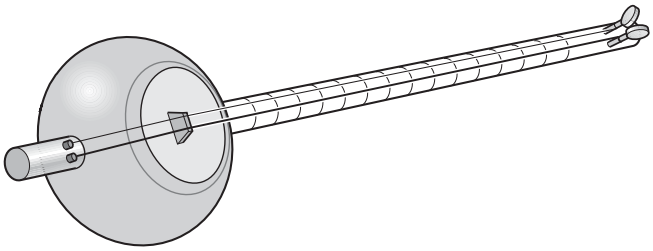
1 mark

maximum 4 marks

Total

4

10. The dotar is a musical instrument with two strings.



(a) Aftal plays the dotar very quietly.

What must he do to the strings to make a louder sound?

_____

_____

10a

1 mark

(b) Aftal makes the strings tighter so they vibrate more quickly.

How does this affect the sound produced by the strings?
Tick the correct box.

The sound has a lower pitch.	☐
The sound is louder.	☐
The sound has a higher pitch.	☐
The sound is quieter.	☐

10b

1 mark

(c) One of the strings is thicker than the other, so it vibrates more slowly.

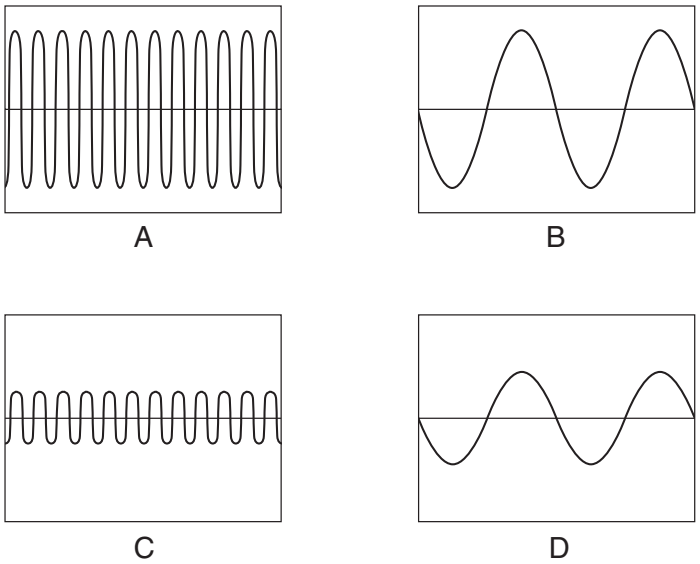
In what way is the sound made by the thicker string different from the sound made by the thinner string?

_____

10c

1 mark

(d) Aftal played the dotar near a microphone connected to an oscilloscope. The diagrams below show the patterns made by four sounds.



(i) How does the sound shown in trace A differ from the sound in trace B?

_____

_____

10di

1 mark

(ii) How does the sound shown in trace A differ from the sound in trace C?

_____

_____

10dii

1 mark

maximum 5 marks

Total

5

11. Russell investigated the relationship between mass and weight.
He weighed five different masses using a force meter.

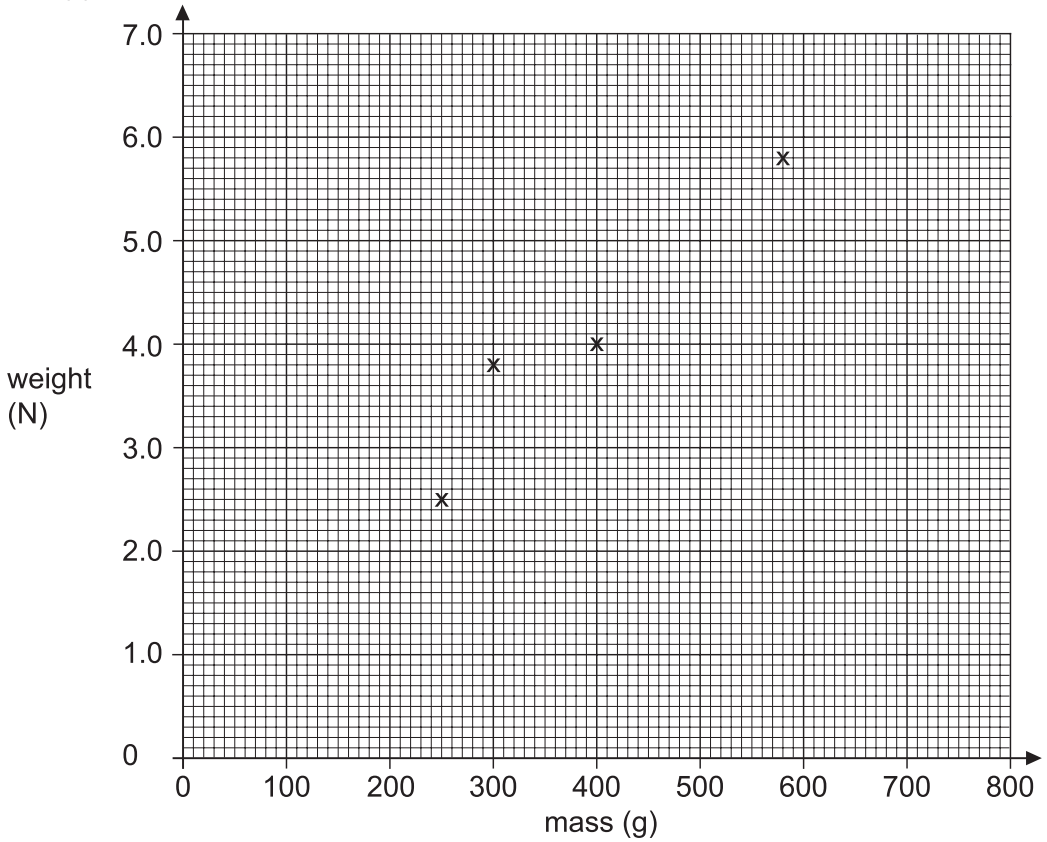
His results are shown in the table.

mass (g)	weight (N)
150	1.5
250	2.5
300	3.8
400	4.0
580	5.8

(a) He plotted four of his results on a grid as shown below.

(i) Plot the point for the 150 g mass on the graph.

(ii) Draw a line of best fit.



11ai
1 mark

11aii
1 mark

(b) One of the points Russell plotted does **not** fit the pattern.

Circle this point on the graph.

11b

1 mark

(c) Use your graph to predict:

(i) the mass of an object weighing 6.5 N;

_____ g

11ci

1 mark

(ii) the weight of an object of mass 50 g.

_____ N

11cii

1 mark

(d) Give **one** reason why it is more useful to present the results as a line graph rather than a table.

_____

_____

11d

1 mark

maximum 6 marks

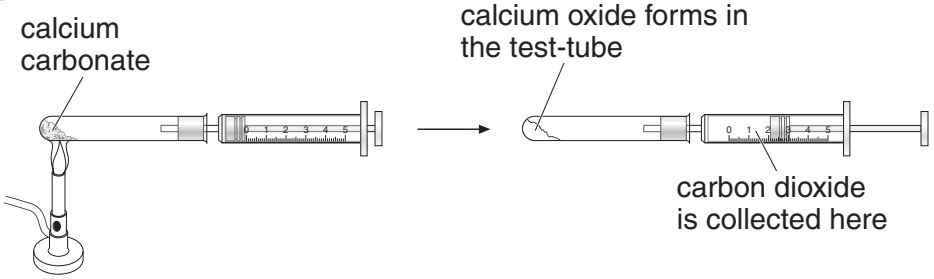
Total

6

12. A science teacher showed her class three experiments, A, B and C.
The experiments and the word equations for the reactions that took place are shown below.
All the experiments were done in a fume cupboard.

experiment A

calcium carbonate is heated



word equation calcium carbonate → calcium oxide + carbon dioxide

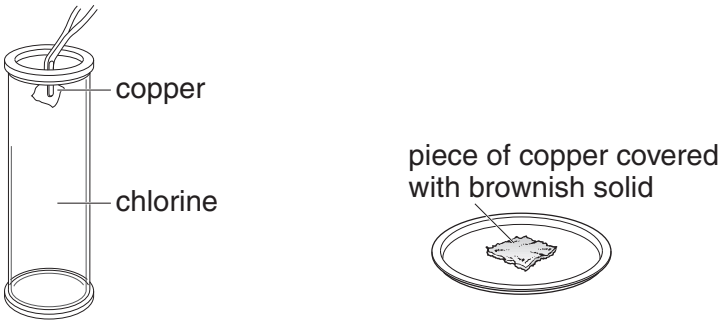
experiment B

iron filings and sulphur are heated together

word equation iron + sulphur → iron sulphide

experiment C

hot copper is added to chlorine



word equation copper + chlorine → _____

(a) From the substances in experiments A, B and C, opposite, give the name of:

(i) **one** metallic element;

_____

12ai

1 mark

(ii) **one** non-metallic element;

_____

12aii

1 mark

(iii) **two** compounds.

_____ and _____

12aiii

1 mark

(b) In experiment B, the iron filings weighed 2.0 g at the beginning of the experiment and the iron sulphide produced weighed 2.8 g.

Explain this increase in mass.

_____

_____

12b

1 mark

(c) Complete the word equation for the chemical reaction in experiment C.

copper + chlorine → _____

12c

1 mark

maximum 5 marks

Total

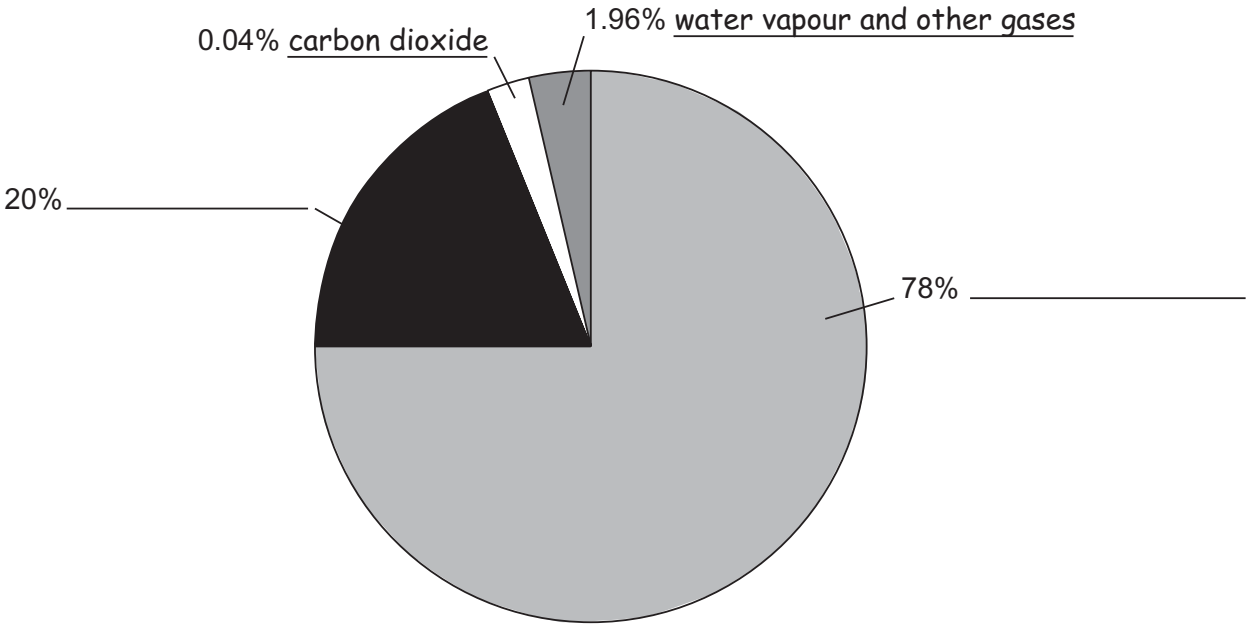
5

13. (a) Air is a mixture of gases. The pie chart represents the percentages of different gases in air.

On the line by each section of the pie chart, write the name of the correct gas.
Two have been done for you.

13a
1 mark

13a
1 mark



not to scale

(b) On a cold day, droplets of water form on a cold window.

Explain how these droplets form.

13b
1 mark

13b
1 mark

(c) The word equation below represents a process taking place in the cells of the human body.

glucose + oxygen → carbon dioxide + water

(i) What process does this word equation represent?

_____

13ci

1 mark

(ii) As a result of this process, the proportions of oxygen and carbon dioxide in air breathed in and air breathed out change.

Which **one** of the statements below is true?
Tick the correct box.

Air breathed out has less carbon dioxide and more oxygen than air breathed in. ☐

Air breathed out has less carbon dioxide and less oxygen than air breathed in. ☐

Air breathed out has more carbon dioxide and less oxygen than air breathed in. ☐

Air breathed out has more carbon dioxide and more oxygen than air breathed in. ☐

13cii

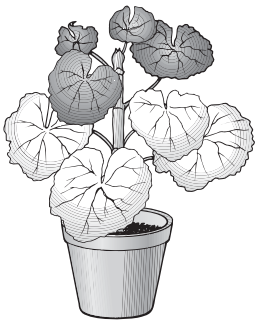
1 mark

maximum 6 marks

Total

6

14. Joe bought a potted plant. He kept it well watered but some of the leaves turned yellow.



Joe thought that the plant did **not** have enough light for photosynthesis.
He moved the plant closer to the window but more leaves turned yellow.

(a) He then thought that the plant did **not** have enough minerals.

The table below gives information about minerals.

mineral	**why the mineral is needed**
magnesium	to make chlorophyll
nitrogen	to make protein
phosphorus	to grow and transfer energy
potassium	to make fruit

(i) Joe's plant did **not** have enough of one of the minerals in the table.
Use the information in the table to suggest which mineral this was.

14ai

1 mark

_____

(ii) A plant growing in a pot is more likely to be affected by a shortage of minerals than a plant growing in a garden.
Give the reason for this.

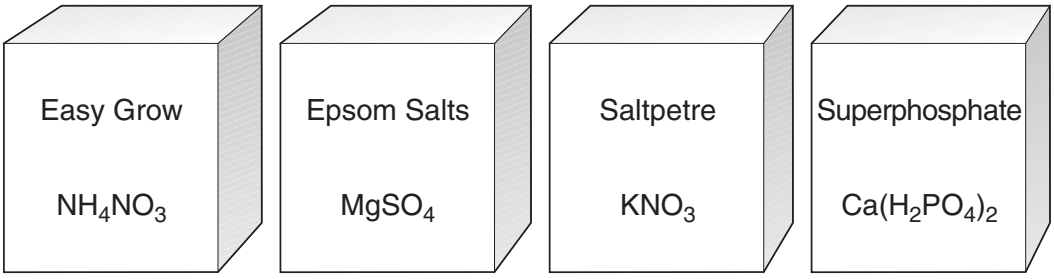
14aii

1 mark

_____

_____

(b) Joe bought some fertiliser for his plant.
The names and formulae of four different fertilisers are shown below.



A **B** **C** **D**

(i) Give the letter of **one** box of fertiliser, A, B, C or D, that would provide each of the minerals in the table below.
Write the letters in the table.

mineral	**letter of fertiliser**
magnesium	
nitrogen	
phosphorus	
potassium	

14bi 1 mark

14bi 1 mark

14bi 1 mark

(ii) Easy Grow is ammonium nitrate, NH_4NO_3.

How many different elements are present in ammonium nitrate?

_____

14bii 1 mark

(iii) How many atoms are present in the formula of ammonium nitrate?

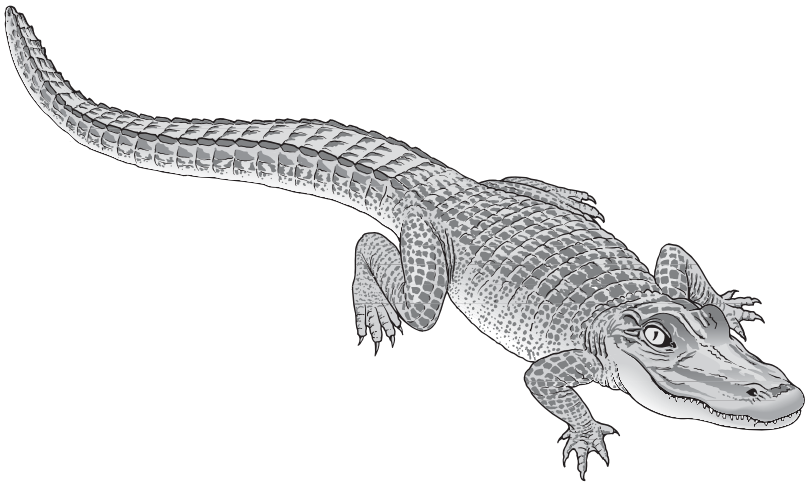
_____

14biii 1 mark

maximum 7 marks

Total 7

15. The drawing below shows an alligator.



(a) Alligators are carnivores.
What does the word carnivore mean?

15a

1 mark

(b) Alligators lay eggs in nests made from plant material.
The eggs have tough shells containing calcium carbonate.

(i) How does the eggshell help the developing alligator to survive before it hatches?

15bi

1 mark

(ii) Rotting plant material in the nest is acidic.
When the acid comes into contact with calcium carbonate in the eggshell it makes the shell weaker.

Why does the acid weaken the eggshell?

15bii

1 mark

(iii) Suggest **one** reason why it is helpful to the developing alligator in the egg if the eggshell becomes weaker.

15biii

1 mark

(c) The table below shows the percentage of female and male alligators that hatch from the eggs when the eggs are kept at different temperatures.

temperature (°C)	% eggs hatching as females	% eggs hatching as males
26	100	0
28	100	0
30	100	0
32	86	14
34	0	100
36	0	100

(i) Use the table to suggest how a zookeeper could make sure only females hatch from the eggs.

_____

_____

15ci

1 mark

(ii) Between which **two** temperatures are 50% of the eggs likely to hatch as females?
Tick the correct box.

between 26°C and 30°C ☐

between 30°C and 32°C ☐

between 32°C and 34°C ☐

between 34°C and 36°C ☐

15cii

1 mark

maximum 6 marks

Total

6

16. Jack compared the reaction times of ten different pupils in his class.
He dropped a metre ruler between each pupil's finger and thumb.
As soon as they saw the ruler begin to move, they had to catch it as quickly as possible.

(a) Jack did **not** measure time to compare pupils' reactions.
What did Jack measure to compare pupils' reaction times?

_____

_____

16a

1 mark

(b) Why was it more accurate to use the ruler rather than a stopwatch in this investigation?

_____

_____

16b

1 mark

(c) What factor did Jack change as he carried out his investigation (the independent variable)?

_____

16c
1 mark

(d) Give **two** factors he should have kept the same to make his test fair.

1. _____

2. _____

16d
1 mark

16d
1 mark

(e) What could he do to make his results more reliable?

_____

_____

16e
1 mark

maximum 6 marks

Total
6

END OF TEST

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