Sc

KEY STAGE
3

TIER
3–6

Year 9 science test

Paper 2

First name _____

Last name _____

Class _____

Date _____

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

Remember:

- The test is 1 hour long.
- You will need a pen, pencil, rubber and ruler. You may find a protractor and a calculator useful.
- 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.
- Show any rough working on this paper.
- Check your work carefully.
- Ask your teacher if you are not sure what to do.

TOTAL MARKS	

1. (a) Tom watched birds feeding in his garden.
He spotted the birds shown below.

blackbird

blue tit

bullfinch

dove

sparrow

robin

not to scale

Tom recorded what the birds in his garden ate.
His results are shown below.

bird	type of food			
	fruit	nuts	worms	seeds
blackbird	✓		✓	
blue tit		✓		✓
bullfinch				✓
dove				✓
sparrow		✓		✓
robin	✓		✓	✓

Use the information in the table to answer the following questions.

(i) Tom put some pieces of fruit in his garden.
Which **two** birds will eat this food?

_____ and _____

1ai

1 mark

(ii) How many types of bird eat nuts?

_____

1aii

1 mark

(iii) Which food from the table opposite will attract the **most types** of **bird**?

_____

1aiii
1 mark

(iv) Which bird from the table eats the most types of **food**?

_____

1aiv
1 mark

(b) What are birds covered with to keep them warm?

_____

1b
1 mark

(c) Many birds reproduce in the spring.

Suggest why birds need extra food in the spring.

_____

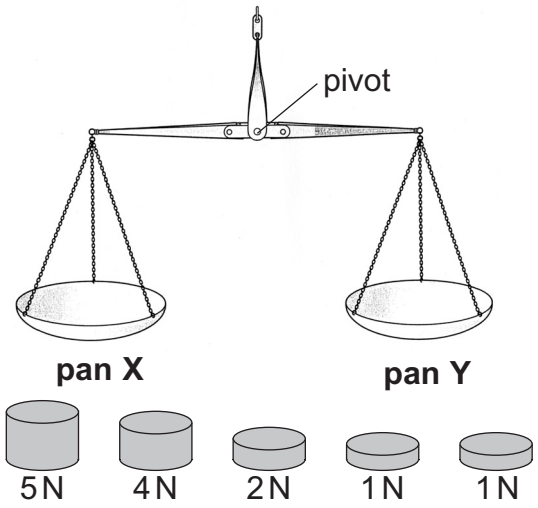
_____

1c
1 mark

maximum 6 marks

Total
6

2. Ellie has a set of scales and some weights as shown below.



Ellie puts two weights in pan X and one weight in pan Y. The scales balance.

(a) Which weights could be in pans X and Y?

pan X: _____ and _____

pan Y: _____

2a

1 mark

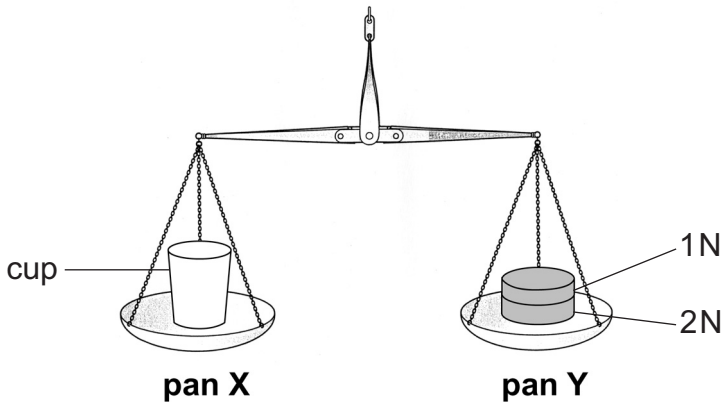
(b) Ellie removes all the weights from the scales.
She then puts a cup on pan X.
In which direction will pan Y move?

_____

2b

1 mark

(c) She puts weights into pan Y so the scales balance.

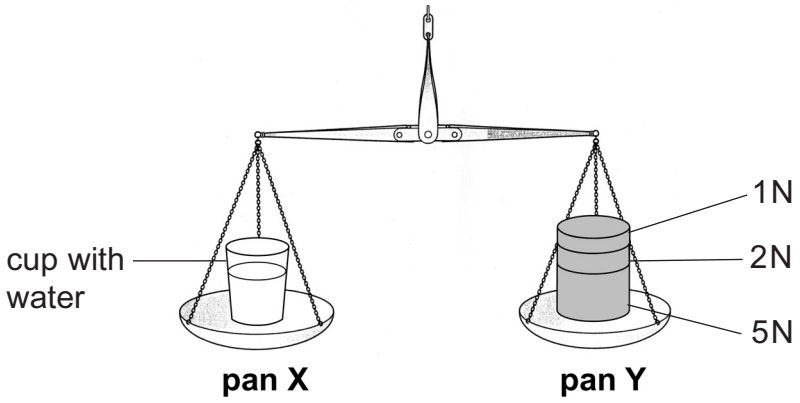


How much does the cup weigh?

_____N

2c
1 mark

(d) Ellie puts some water in the cup.
She then adds some more weights to pan Y to make the scales balance.



(i) How much do the cup **and** water weigh?

_____N

2di
1 mark

(ii) How much does the water weigh?

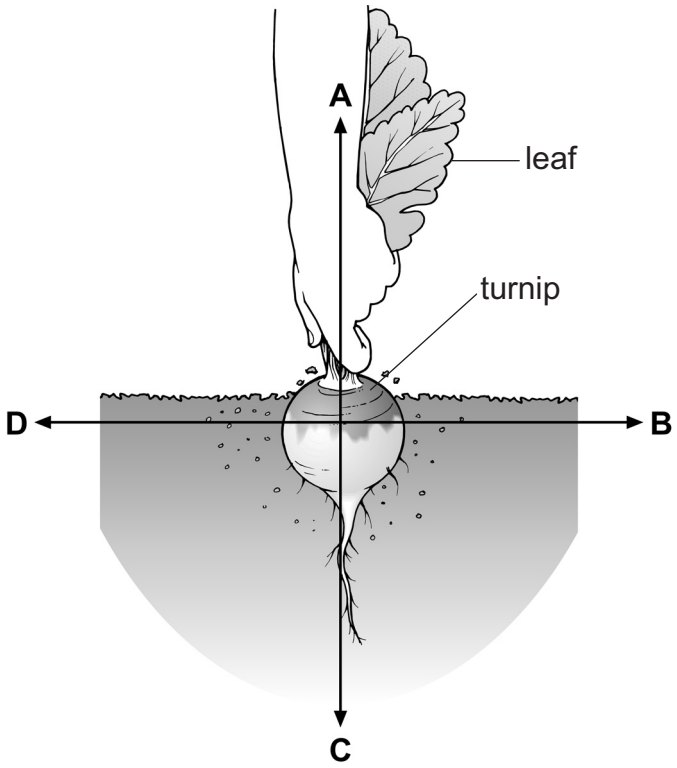
_____N

2dii
1 mark

maximum 5 marks

Total
5

3. The drawing below shows Rebekah **pulling** a turnip out of the ground.



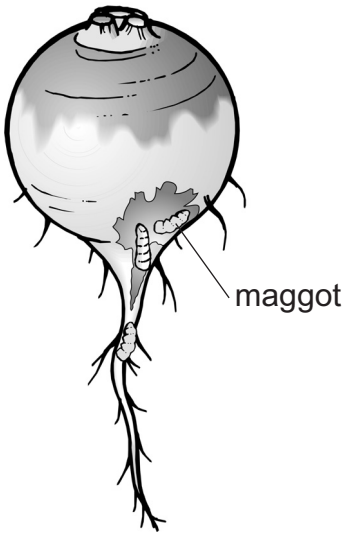
(a) Which arrow, **A**, **B**, **C** or **D**, shows the direction of force of Rebekah's hand on the turnip?

_____

3a

1 mark

(b) The drawing below shows root maggots eating a turnip.
The maggots damage the roots.



Damaged roots do **not** grow very well.

Complete the sentence below.

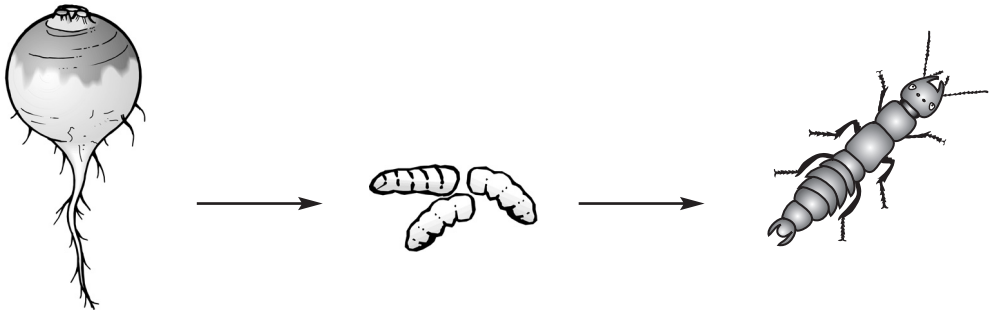
Damaged roots **cannot** take up as much _____ and

_____ from the soil.

3b
1 mark

3b
1 mark

(c) The drawing below shows a food chain including a rove beetle.



not to scale

turnip **maggots** **rove beetle**

Which word describes a rove beetle?
Tick the correct box.

herbivore	☐	predator	☐
prey	☐	producer	☐

3c
1 mark

(d) Turnip plants make food by photosynthesis.

(i) Which part of a plant makes food?

_____

3di
1 mark

(ii) What will the turnip plant use stored food for?

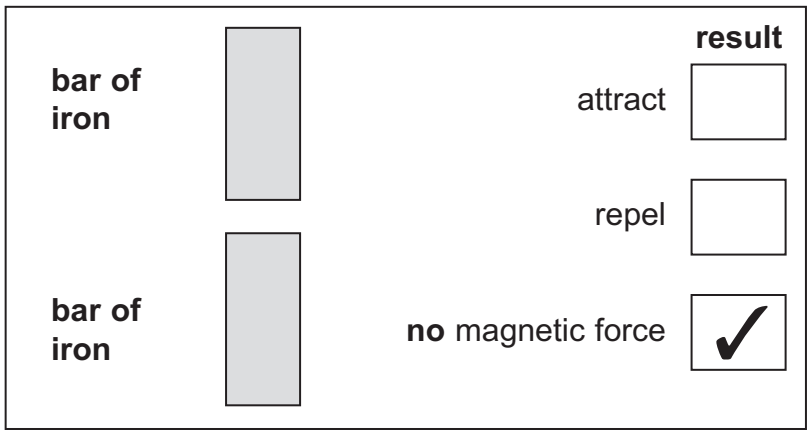
_____

3dii
1 mark

maximum 6 marks

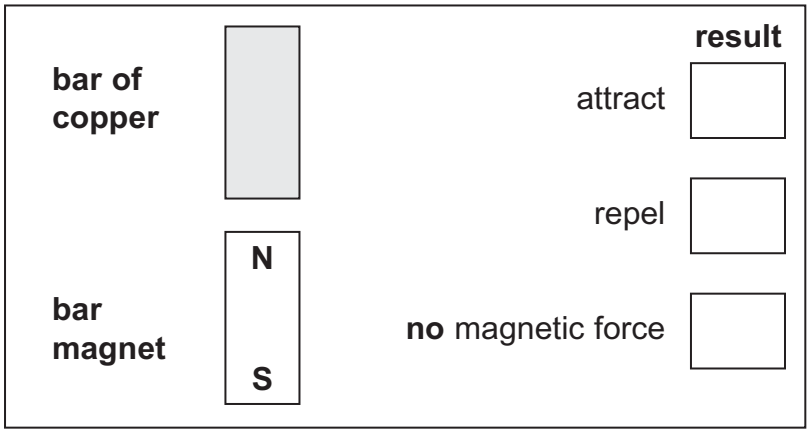
Total
6

4. David put two bars of iron close to each other.
There was **no** magnetic force between them.
David recorded the result as shown below.



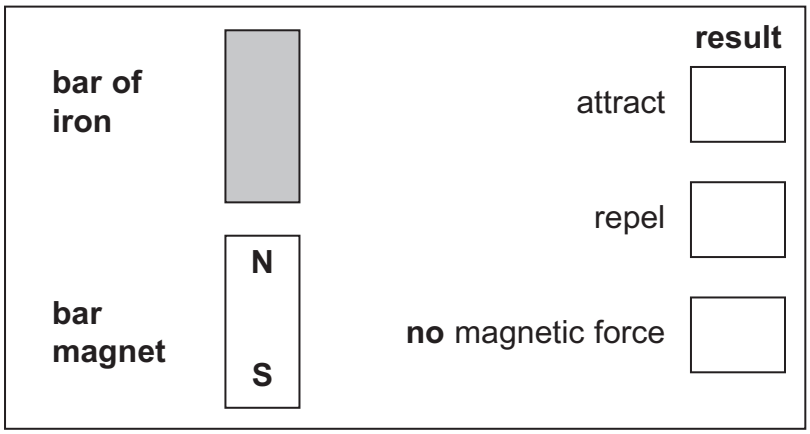
(a) David did three other tests.
Tick the correct box to show the result for each test.

(i)



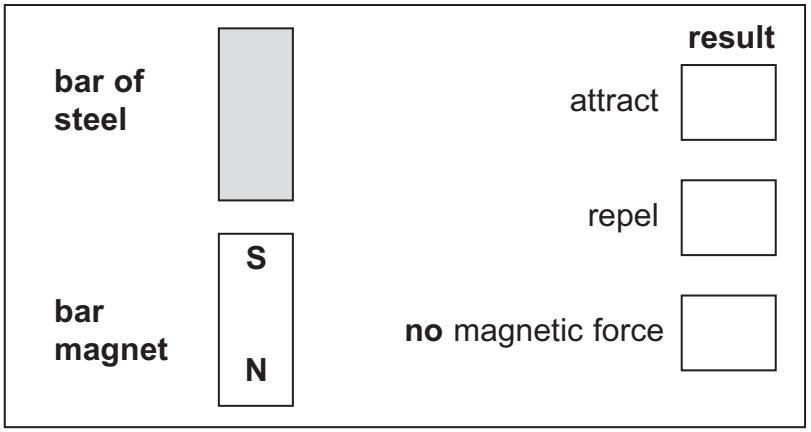
4ai
1 mark

(ii)



4aii
1 mark

(iii)



4aiii

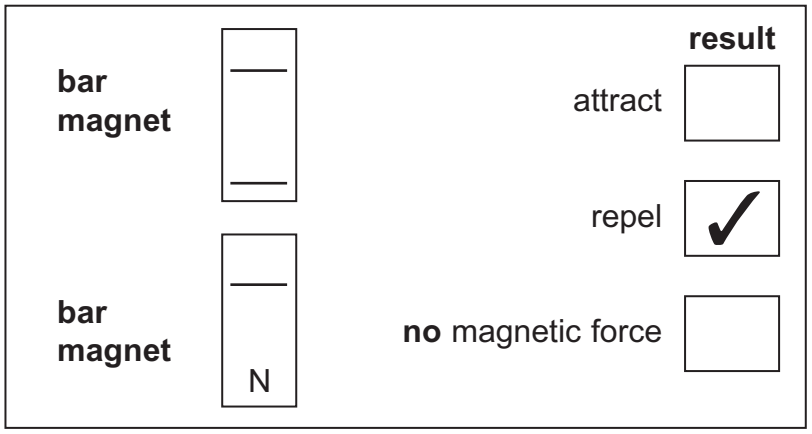
1 mark

(b) David then did two experiments with magnets.

The tick in each box shows David's results in each experiment.

Label the missing poles on **each** magnet to match David's results.

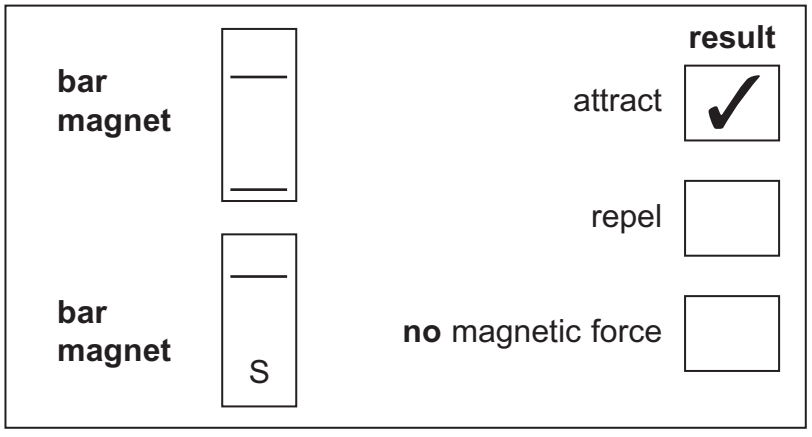
(i)



4bi

1 mark

(ii)



4bii

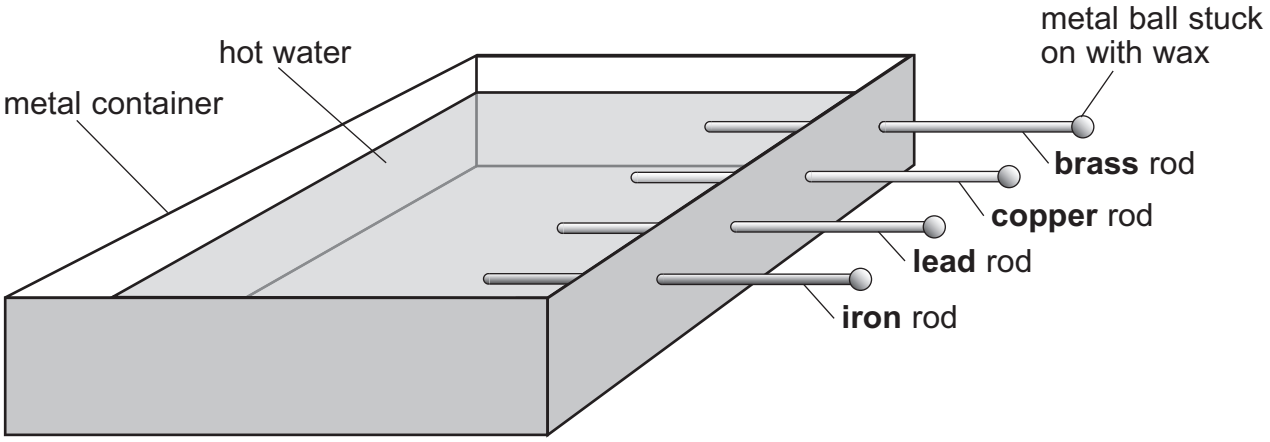
1 mark

maximum 5 marks

Total

5

5. Leanne had four rods, each made from a different metal.
She wanted to find out which metal was the best conductor of heat.
The diagram shows some of Leanne's equipment.



(a) Leanne's results are shown in the table.

metal rod	time for metal ball to drop off (seconds)
brass	36
copper	24
lead	246
iron	132

What measuring equipment did Leanne use to get her results?

_____

5a
1 mark

(b) Give **two** things Leanne must do to carry out a fair test.

1. _____

2. _____

5b
1 mark

5b
1 mark

(c) Which metal in the table was the best conductor of heat?
Tick the correct box.

brass	☐	copper	☐
iron	☐	lead	☐

☐ 5c
1 mark

(d) Leanne left the rods in the water for a week.
One of the metal rods went rusty.

Which metal rod went rusty?
Tick the correct box.

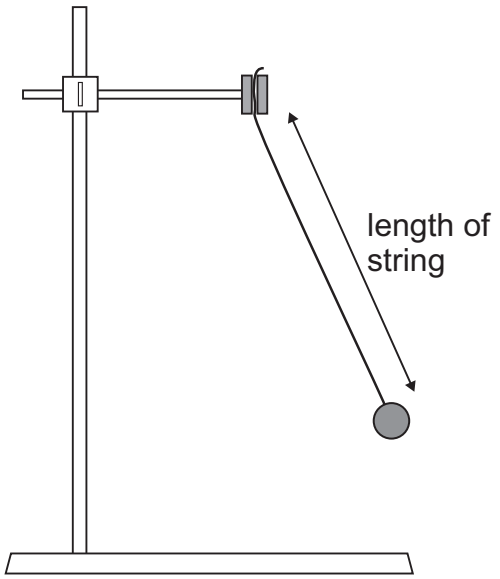
brass	☐	copper	☐
iron	☐	lead	☐

☐ 5d
1 mark

maximum 5 marks

Total
☐
5

6. Paula made a pendulum from a ball attached to a piece of string.



She counted the number of swings the ball made in 10 seconds.
She repeated the experiment with different lengths of string.

The table below shows Paula's results.

length of string (cm)	number of swings in 10 seconds
10	16
20	11
30	9
40	8
50	7

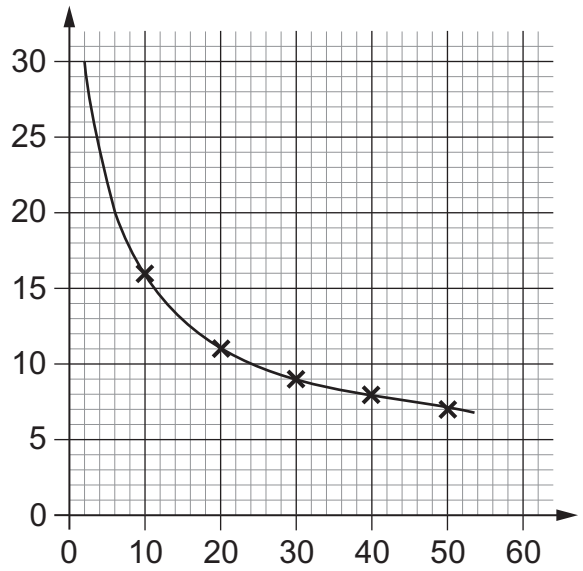
(a) What happens to the number of swings when the string gets longer?

6a

1 mark

(b) Paula drew a graph of her results.

(i) Write the labels on **both axes** of the graph below.
Use the table to help you.



_____

_____

_____

6bi
1 mark

6bi
1 mark

(ii) Paula made a pendulum from a piece of string that was 15 cm long.
How many times would this pendulum swing in 10 seconds?
Use the graph to help you.

_____

6bii
1 mark

(iii) Paula made a pendulum from a piece of string that was 60 cm long.
Estimate the number of swings the pendulum makes in 10 seconds.
Use the graph.
Tick the best answer.

18 ☐ 12 ☐ 6 ☐ 4 ☐

6biii
1 mark

(c) After some time the pendulum stops moving.
What force makes the pendulum stop moving?

_____

6c
1 mark

maximum 6 marks

Total
6

7. In 2007, a new law came in to stop people smoking in public buildings.

(a) Smoking can be very harmful.
Which three problems can be caused by smoking?

Tick the **three** correct boxes.

being out of breath easily	☐	lung cancer	☐
being overweight	☐	food poisoning	☐
heart disease	☐		

☐ 7a
1 mark

☐ 7a
1 mark

(b) Some scientists investigate 'passive smoking'. Passive smoking is when people breathe in smoke from other people's cigarettes.
They checked the health of three groups of people.

group A	group B	group C
non-smokers who spend **no** time in smoky places	**non-smokers** who spend time in smoky places	**smokers** who spend time in smoky places

(i) Which group of people breathe in the **least** cigarette smoke?
Tick the correct box.

group A ☐ group B ☐ group C ☐

☐ 7bi
1 mark

(ii) Which **two** groups will help scientists find out the effects of passive smoking?
Tick the **two** correct boxes.

group A ☐ group B ☐ group C ☐

☐ 7bii
1 mark

(c) People in **group B** are likely to have similar health problems to people in **group C.**

Explain why.

_____

_____

7c

1 mark

(d) Four scientists investigated passive smoking. The table below shows the number of people each scientist studied from each group.

scientist	group A	group B	group C
David	289	3	18
Olga	8	6	11
Peter	402	399	403
Mary	15	210	511

Which scientist is likely to get the most reliable results?
Tick the correct box.

David ☐ Olga ☐

Peter ☐ Mary ☐

7d

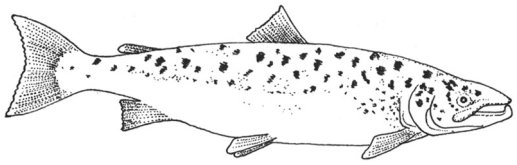
1 mark

maximum 6 marks

Total

6

8. (a) The drawing below shows a fish.



Look at the drawing of a fish.

Describe **two** ways in which a fish is suited to swimming.

1. _____

2. _____

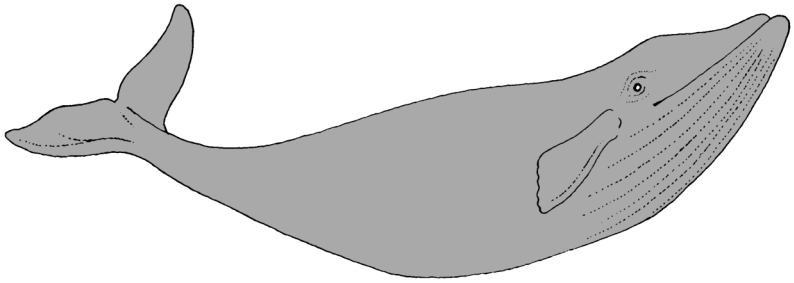
8a

1 mark

8a

1 mark

(b) The drawing below shows a blue whale.



not to scale

A long time ago people thought that the blue whale was a fish. Now we know that the blue whale is a mammal.

Give **one** way mammals are different from fish.

_____

8b

1 mark

(c) A hundred years ago there were 350 000 blue whales.
Now there are only about 10 000 blue whales.
Suggest why the blue whale population has decreased.

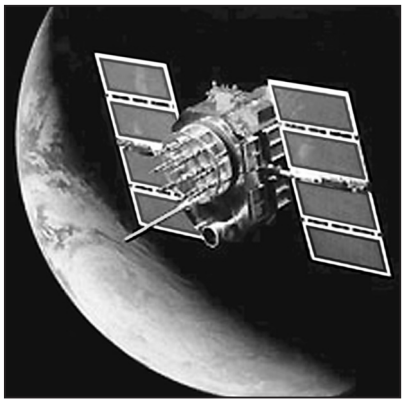
_____

_____

8c

1 mark

(d) The blue whale is now a protected species. Scientists catch and tag the whales with a transmitter. Satellites can be used to track the tagged whales.



(i) What information about whales can scientists be certain to get from a satellite tracking system?
Tick the correct box.

what food they eat	☐
how often they give birth	☐
where they travel	☐
the sex of the whale	☐

☐ 8di
1 mark

(ii) Give **one** advantage of using a satellite tracking system to track whales.

_____

_____

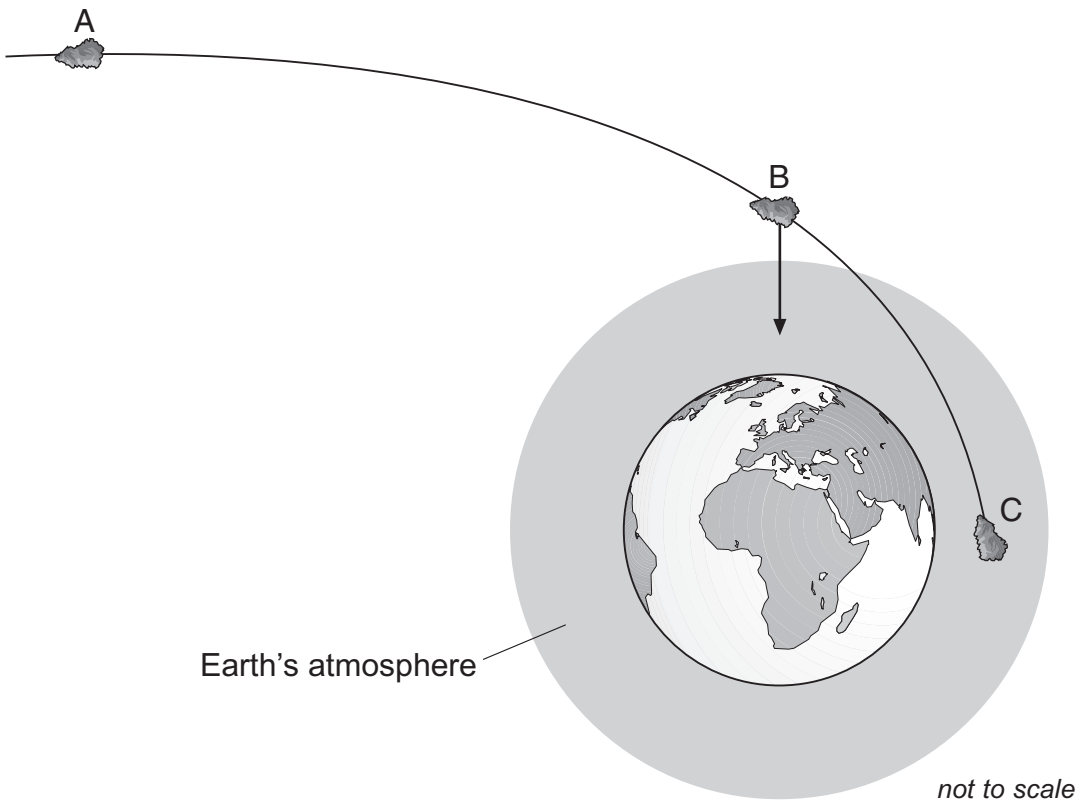
☐ 8dii
1 mark

maximum 6 marks

Photograph © www.nasa.gov

Total
☐
6

9. The diagram below shows the path of a meteor as it gets closer to the Earth. The meteor is shown in three positions: A, B and C.



(a) The path of the meteor is affected by the Earth's gravity.
The arrow shows the direction of the force due to gravity acting on the meteor at B.

(i) **On the diagram** draw an arrow to show the direction of the force of gravity on the meteor at A.
Use a ruler.

9ai
1 mark

(ii) **On the diagram** draw an arrow to show the direction of the force of gravity on the meteor at C.
Use a ruler.

9aii
1 mark

(iii) How does the force of gravity on the meteor change as it travels from A to C?

_____

9aiii
1 mark

(b) What happens to the speed of the meteor as it travels from A to B?

_____

9b

1 mark

(c) When the meteor enters the Earth's atmosphere, three forces act on the meteor. Gravity and upthrust are two of these forces.

Give the name of the **other** force.

_____

9c

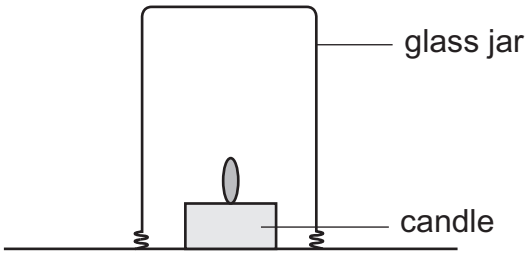
1 mark

maximum 5 marks

Total

5

10. Kiran lit a candle.
She placed a 100 cm^3 glass jar over the candle.
The candle flame went out after 2 seconds.



(a) Why did the flame go out?

10a

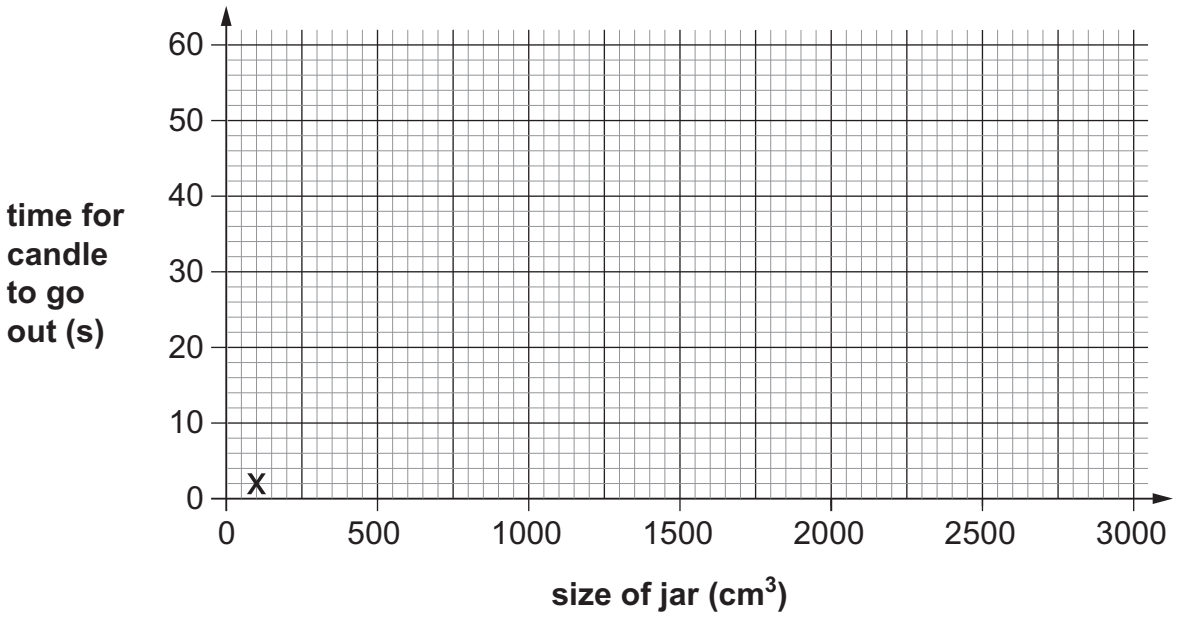
1 mark

(b) Kiran put different sized jars over a lit candle.
She measured the time it took for the flame to go out each time.
She recorded her results in a table.

size of jar (cm^3)	time for candle to go out (s)
100	2
250	5
500	9
1000	22
2000	37
3000	60

(i) **Plot Kiran's results** on the graph paper below.
The first one has been done for you.

(ii) **Draw a line of best fit**.



10bi
1 mark

10bii
1 mark

(iii) What conclusion can you make from her results?

_____

_____

10biii
1 mark

(c) What should Kiran keep the same in this experiment to make it a fair test?

_____

10c
1 mark

(d) Suggest **one** way for Kiran to make her results more reliable.

_____

10d
1 mark

maximum 6 marks

Total
6

11. (a) The table below shows information about five elements.

element	melting point (°C)	boiling point (°C)	conducts electricity	colour
A	–7	59	no	brown
B	–218	–183	no	colourless
C	1535	2750	yes	silvery
D	113	445	no	yellow
E	1083	2567	yes	orange

(i) Which **two** of these elements are likely to be metals?
Write the letters.

_____ and _____

11ai
1 mark

(ii) Which element in the table is liquid at room temperature?
Write the letter.

_____

11aii
1 mark

(b) What is the chemical symbol for copper?
Tick the correct box.

Cr ☐ Cu ☐ C ☐ Co ☐ Ca ☐

11b
1 mark

(c) How many atoms of iron and oxygen are there shown in the formulas for FeO and Fe_2O_3?

Complete the table below.

compound	number of atoms of iron	number of atoms of oxygen
FeO		
Fe_2O_3		

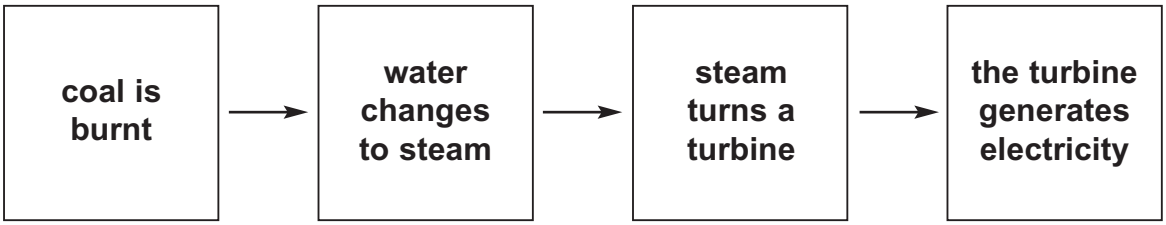
11c
1 mark

11c
1 mark

maximum 5 marks

Total
5

12. In a power station, coal can be used to generate electricity.



(a) Use words from the box to answer the questions below.

chemical	**electrical**	**gravitational potential**	
kinetic	**light**	**sound**	**thermal**

12ai

1 mark

(i) What is the useful energy transfer when coal is burnt?

_____ energy is transferred to _____ energy

12ai

1 mark

(ii) Some of the energy stored in coal is wasted when it is burnt.
Give the name of **one** type of energy released that is **not** useful.

_____

12aii

1 mark

(b) Wind turbines are also used to generate electricity. The wind turns the turbine blades and the turbine blades turn a generator.

Use words from the **box opposite**. Complete the sentence to show the useful energy transfer in a wind turbine and generator.

_____ energy is transferred to _____ energy

12b
1 mark

(c) Suggest **one** disadvantage of using wind to generate electricity.

_____

_____

12c
1 mark

(d) Sugar cane is a plant.

The sugar from the cane is used to make alcohol. Alcohol is a fuel.

(i) Which energy source do plants use to produce sugar?

_____

12di
1 mark

(ii) Is sugar cane a renewable **or** non-renewable source of energy? Tick one box.

renewable source ☐ non-renewable source ☐

Give a reason for your answer.

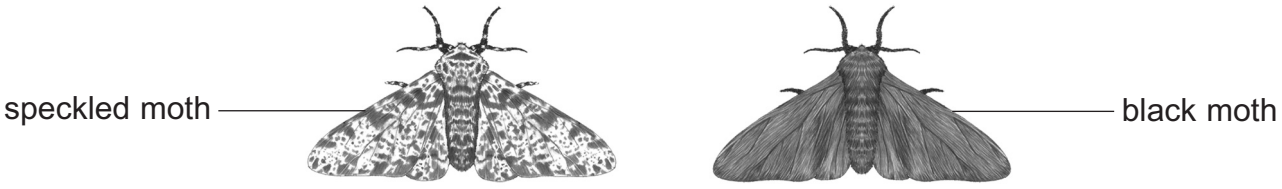
_____

12dii
1 mark

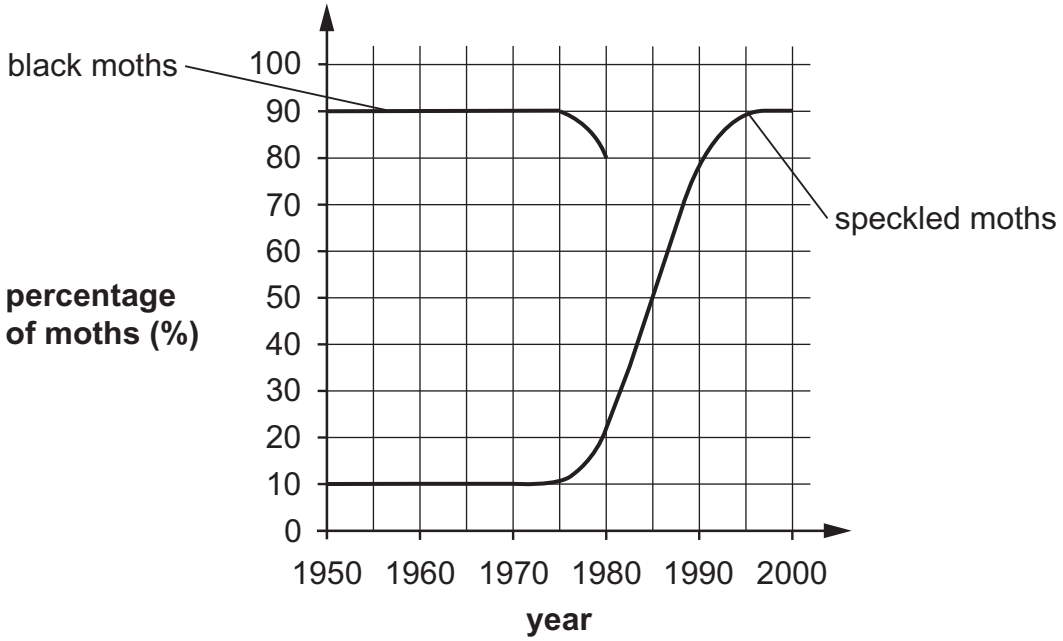
maximum 7 marks

Total
7

13. The diagram below shows the two different forms of the same moth.
All these moths are either speckled or black.



(a) The graph below shows how the percentage of **speckled** moths changed between 1950 and 2000 in one city.



(i) Complete the table below with the missing **year** and **percentage**.
Use the graph.

year	percentage of speckled moths (%)	percentage of black moths (%)	total percentage (%)
1970	10	90	100
_____	50	50	100
1990	78	_____	100

13ai 1 mark

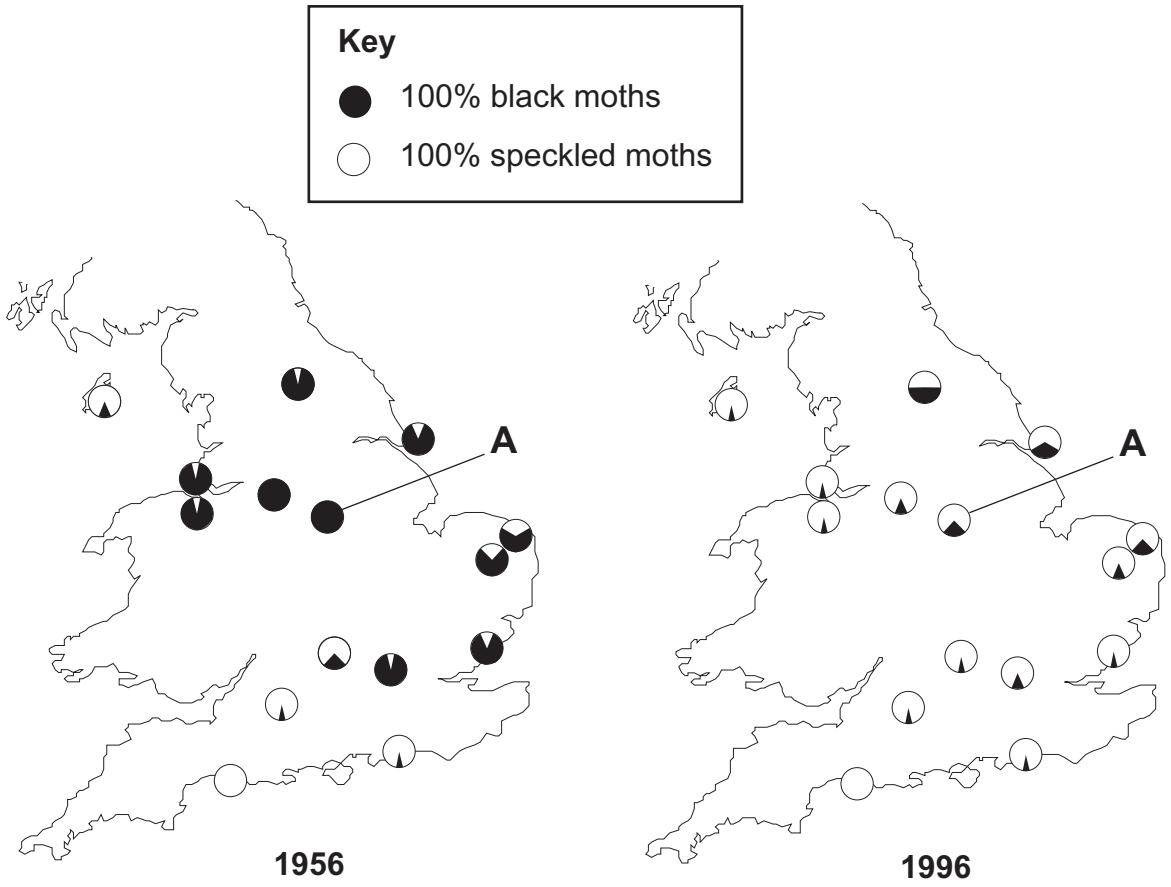
13ai 1 mark

(ii) The percentage of **black** moths from 1950 to 1980 is also shown on the graph.
Continue the line on the graph above to show how the percentage of **black** moths changed between 1980 and 2000.

13aii 1 mark

13aii 1 mark

(b) The maps below show the percentage of speckled moths and black moths at different places in Britain in 1956 and 1996.



How did the percentage of black moths change at place **A** between 1956 and 1996?

_____

13b

1 mark

(c) (i) Describe **one** way in which the data shown in the graph is better than the data shown in the maps.

_____

_____

13ci

1 mark

(ii) Describe **one** way in which the data shown in the maps is better than the data shown in the graph.

_____

_____

13cii

1 mark

maximum 7 marks

Total

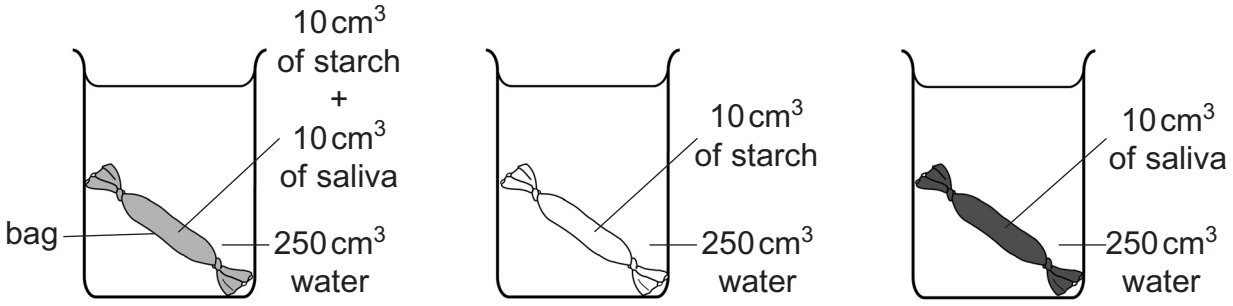
7

14. Sally investigated how the human body digests and absorbs starch.

She used saliva to digest the starch.

To model digestion she used special bags made from a semi-permeable membrane. These bags have lots of very small holes.

Sally sets up the equipment as shown below. There is one special bag in each beaker.



beaker A **beaker B** **beaker C**

She keeps the water in the beakers at 37ºC.
After 20 minutes, Sally tested the contents of each beaker and bag for starch and sugar.
The table below shows Sally's results.

	Was starch found in the bag?	Was sugar found in the bag?	Was starch found in the water?	Was sugar found in the water?
beaker A	✓	✓	✘	✓
beaker B	✓	✘	✘	✘
beaker C	✘	✘	✘	✘

(a) Suggest why Sally kept the water at 37ºC.

_____

14a
1 mark

(b) (i) Explain why sugar was found in the bag in beaker A.

_____

14bi
1 mark

(ii) Starch was **not** found in the **water** outside the bag in any beaker. Suggest why.

_____

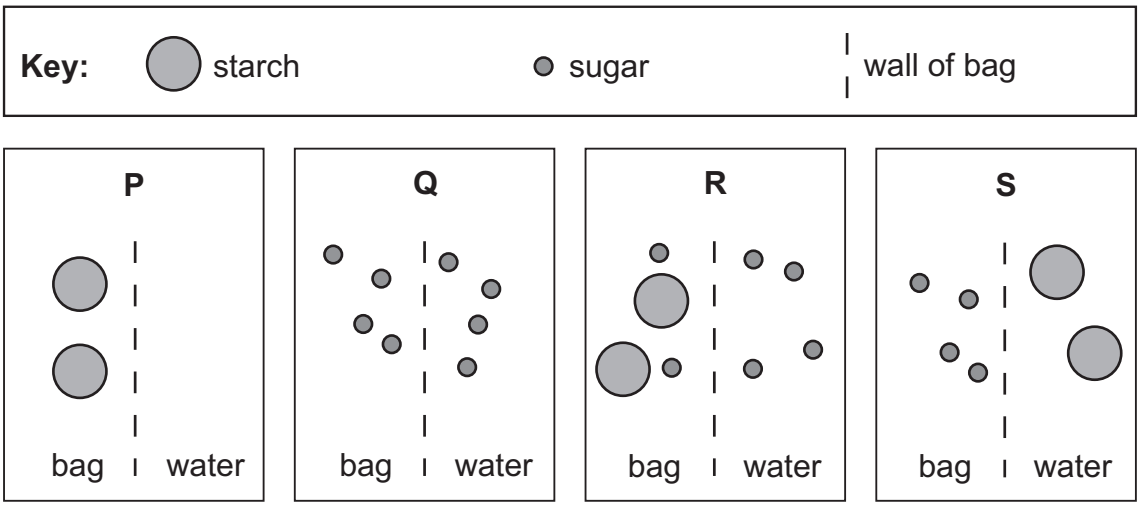
14bii
1 mark

(c) Why did Sally set up beaker C? Tick the correct box.

for a fair test	☐	for accuracy	☐
for reliability	☐	for a control	☐

☐ 14c
1 mark

(d) Sally used diagrams to show what happened in her investigation.



Use the diagrams above to answer the following questions.

(i) Which diagram shows the **results** of beaker **B**? Write the letter.

_____

☐ 14di
1 mark

(ii) Which diagram shows the **results** of beaker **A**? Write the letter.

_____

☐ 14dii
1 mark

(e) What does saliva contain that causes starch to change in beaker A?

_____

☐ 14e
1 mark

(f) Sally chewed a piece of bread for 5 minutes without swallowing.
What would she notice about the taste of the bread after chewing for 5 minutes?
Use Sally's results to help you.

_____

☐ 14f
1 mark

maximum 8 marks

Total
☐
8

15. A long time ago sulphuric acid was made by heating a substance called **blue vitriol**. The equations below show how sulphuric acid is produced by this method.

blue vitriol ⟶ copper oxide + sulphur trioxide + water

sulphur trioxide + water ⟶ sulphuric acid

15a
1 mark

(a) Name **three** elements contained in blue vitriol.

15a
1 mark

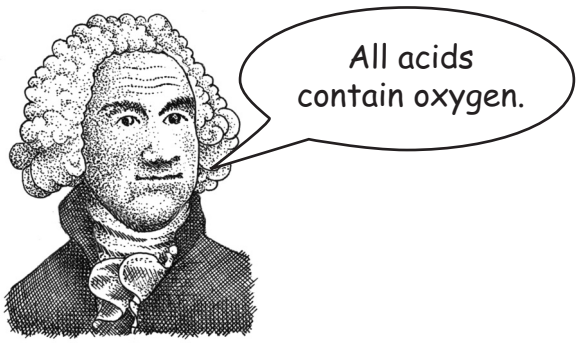
1. _____

15a
1 mark

2. _____

3. _____

(b) (i) Anton Lavoisier was a scientist. He made acids by dissolving oxides like sulphur oxide and nitric oxide in water. They formed two acids; sulphuric acid and nitric acid. From this, he concluded:



Anton Lavoisier

The formulas for these two acids are H_2SO_4 and HNO_3.

How do these formulas support Lavoisier's conclusion about acids?

15bi
1 mark

_____

_____

(ii) Some time after Lavoisier's death, hydrochloric acid was identified.
The formula for hydrochloric acid is HCl.

Explain why scientists no longer supported Lavoisier's conclusion about acids.

_____

_____

15bii

1 mark

(c) Scientists now agree that **all** acids contain hydrogen.
Look at the two word equations below.

zinc + sulphuric acid ⟶ zinc sulphate + hydrogen

magnesium + nitric acid ⟶ magnesium nitrate + hydrogen

(i) Explain how these equations support the suggestion that acids contain hydrogen.

_____

_____

15ci

1 mark

(ii) Complete the equation below for the reaction between iron and hydrochloric acid.

iron + hydrochloric acid ⟶ _____ + _____

15cii

1 mark

END OF TEST

maximum 7 marks

Total

7

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