Sc

KEY STAGE
3

TIER
5–7

Year 9 science test

Paper 2

First name _____

Last name _____

Class _____

Date _____

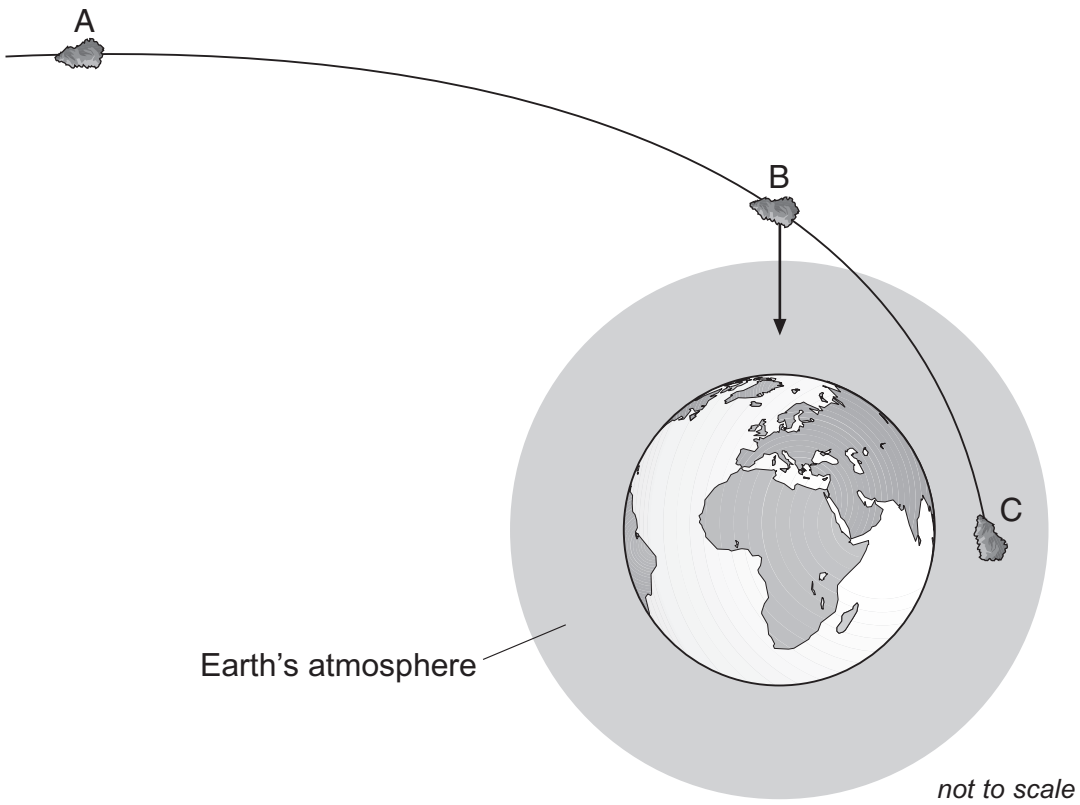
Please read this page, but do not open your booklet until your teacher tells you to start. Write your name, your class and the date in the spaces above.

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. 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.

1ai
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.

1aii
1 mark

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

_____

1aiii
1 mark

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

_____

1b

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.

_____

1c

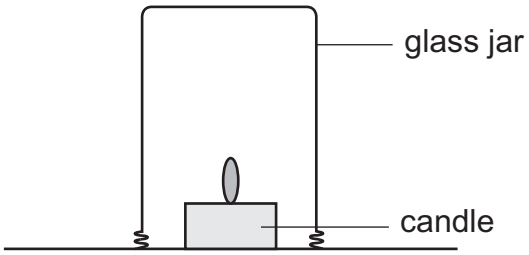
1 mark

maximum 5 marks

Total

5

2. 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?

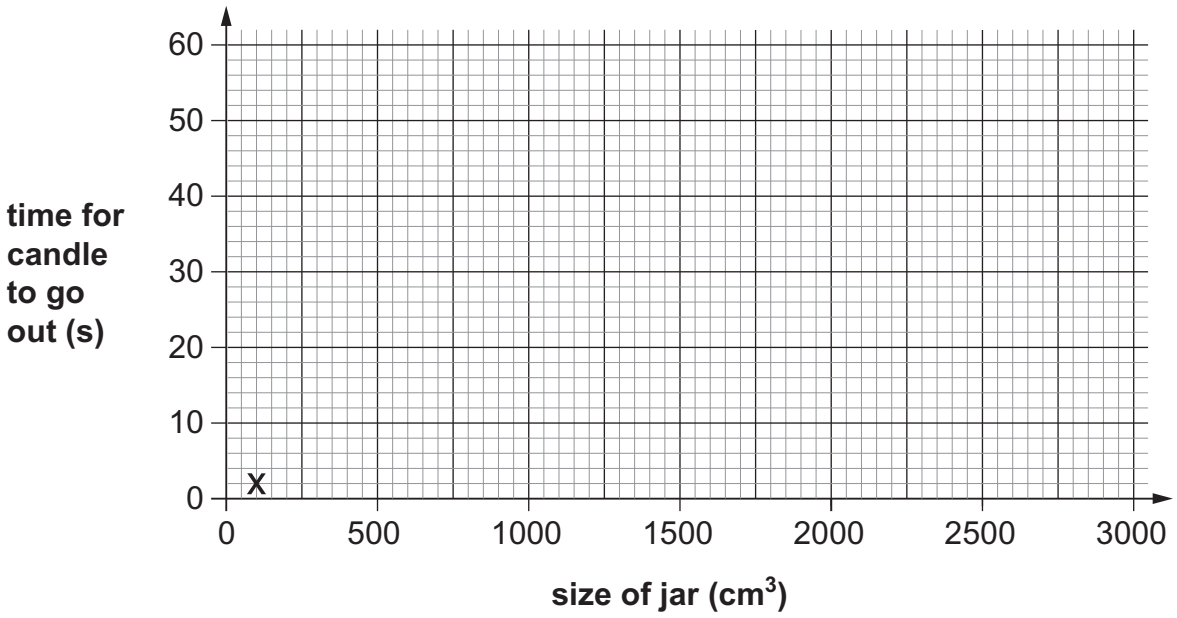
2a
1 mark

(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**.



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

_____

_____

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

_____

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

_____

maximum 6 marks

2bi
1 mark

2bii
1 mark

2biii
1 mark

2c
1 mark

2d
1 mark

Total
6

3. (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 _____

3ai
1 mark

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

_____

3aii
1 mark

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

Cr ☐ Cu ☐ C ☐ Co ☐ Ca ☐

3b
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		

3c
1 mark

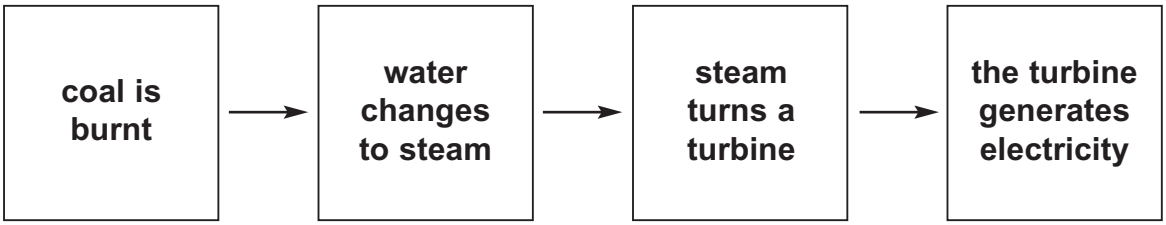
3c
1 mark

maximum 5 marks

Total
5

4. 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**

4ai
1 mark

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

_____ energy is transferred to _____ energy

4ai
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.

_____

4aii
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

4b
1 mark

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

_____

_____

4c
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?

_____

4di
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.

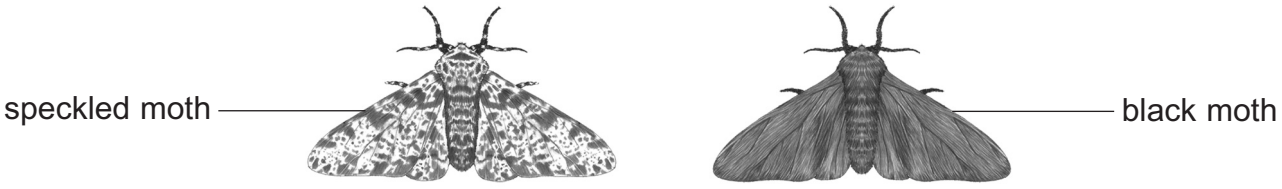
_____

4dii
1 mark

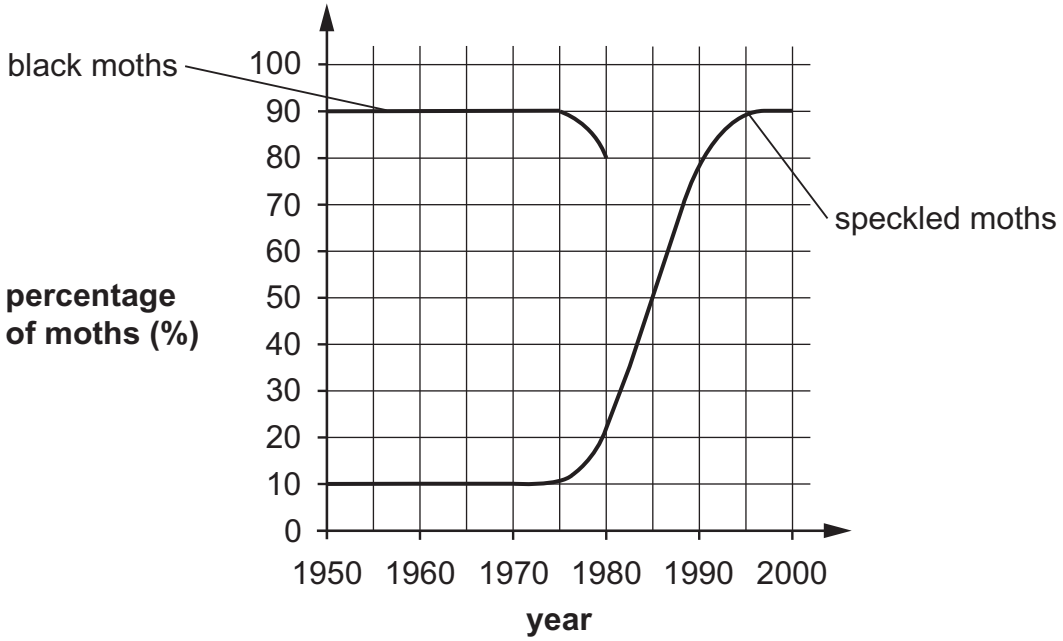
maximum 7 marks

Total
7

5. 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

5ai
1 mark

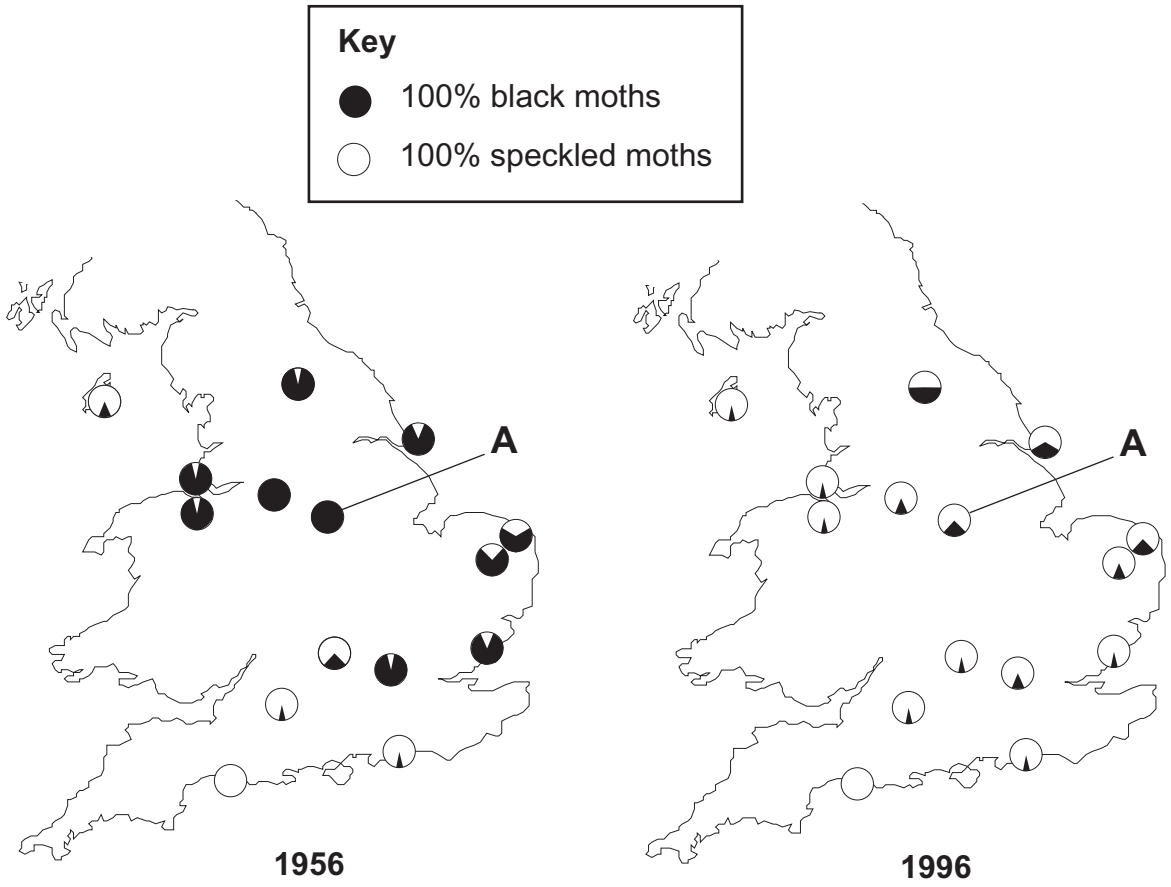
5ai
1 mark

(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.

5aii
1 mark

5aii
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?

_____

5b

1 mark

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

_____

_____

5ci

1 mark

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

_____

_____

5cii

1 mark

maximum 7 marks

Total

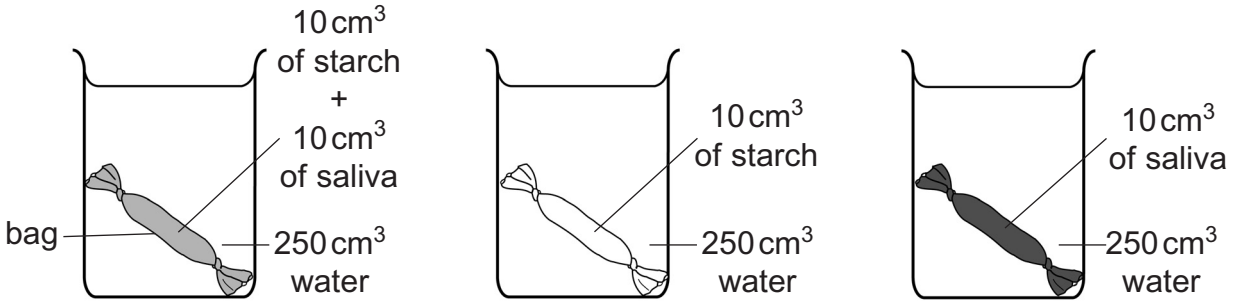
7

6. 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.

6a

1 mark

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

6bi

1 mark

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

6bii

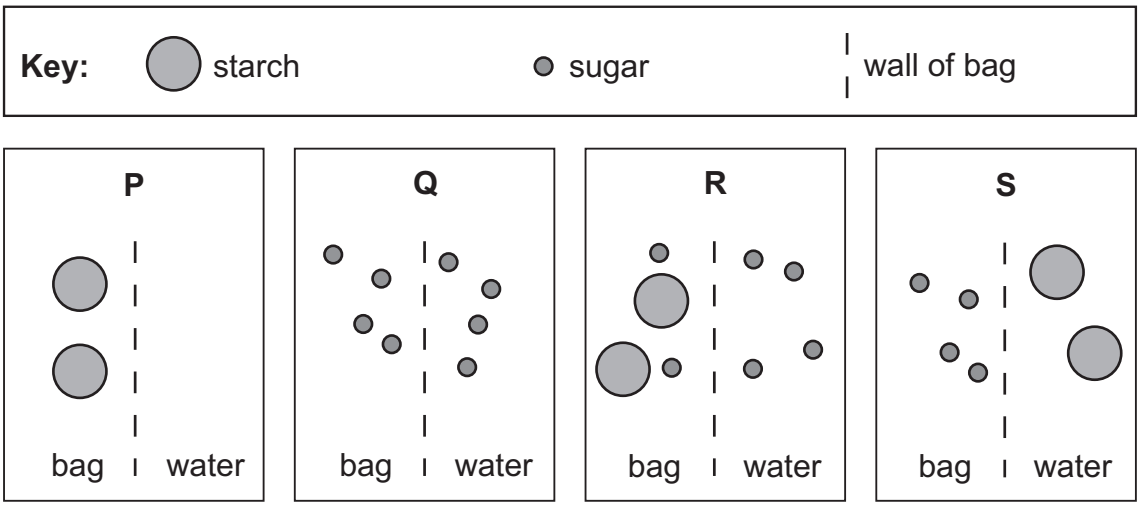
1 mark

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

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

☐ 6c
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.

_____

☐ 6di
1 mark

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

_____

☐ 6dii
1 mark

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

_____

☐ 6e
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.

_____

maximum 8 marks

☐ 6f
1 mark

Total
☐
8

7. 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

7a
1 mark

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

7a
1 mark

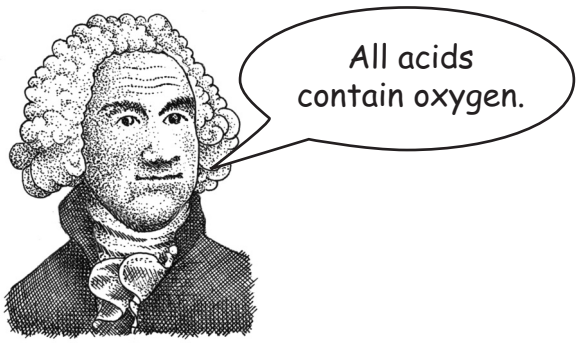
1. _____

7a
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?

7bi
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.

_____

_____

7bii

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.

_____

_____

7ci

1 mark

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

iron + hydrochloric acid ⟶ _____ + _____

7cii

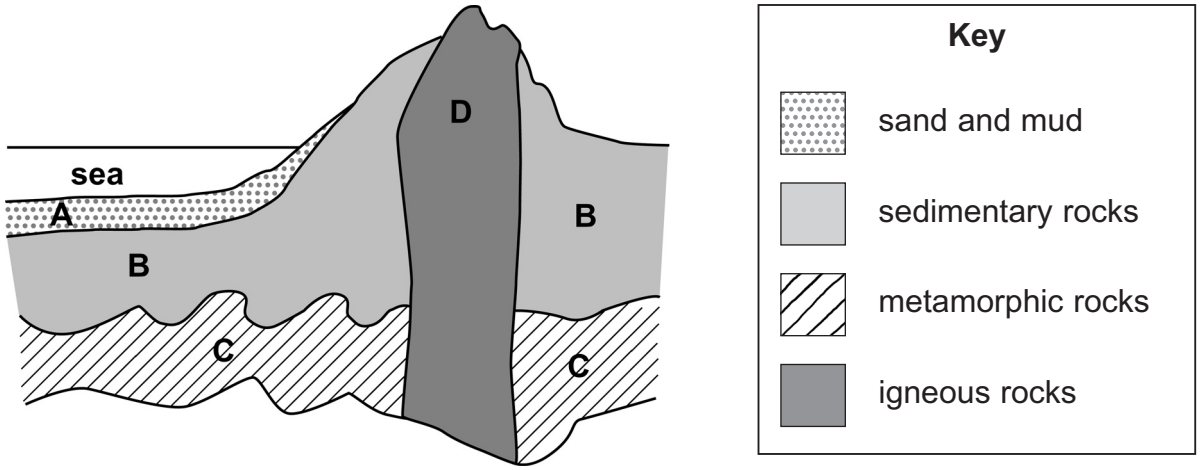
1 mark

maximum 7 marks

Total

7

8. The diagram shows rocks in a mountain range.



(a) Choose the correct letter from the diagram to best match the descriptions below. You may write each letter more than once.

(i) rock changed by heat and pressure

_____

(ii) rock formed by magma cooling and solidifying

_____

(iii) the oldest rock shown in the diagram

_____

(iv) region where eroded materials are deposited

_____

(v) region not being affected by erosion

_____

8a 1 mark

8a 1 mark

8a 1 mark

(b) Rainwater can damage rocks by physical and chemical weathering.

(i) Give one way rainwater causes **physical** weathering.
Give the name and describe the process in the table below.

(ii) Give one way rainwater causes **chemical** weathering.
Give the name and describe the process in the table below.

	name	**description of process**
physical weathering		
chemical weathering		

8bi
1 mark

8bi
1 mark

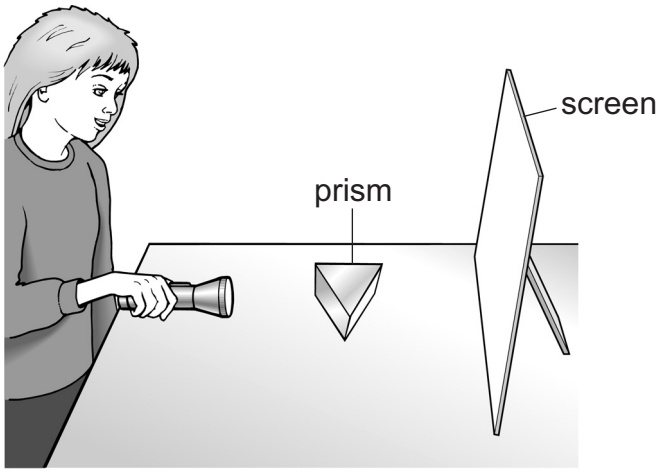
8bii
1 mark

8bii
1 mark

maximum 7 marks

Total
7

9. Ann shines a ray of white light at a glass prism.



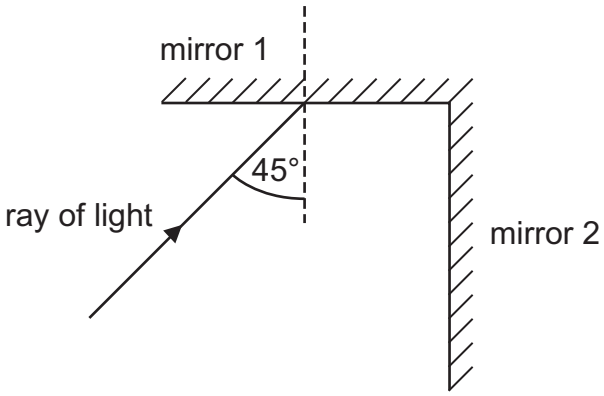
(a) Tick one box in each row to show if each sentence is **true** or **false**.

	true	**false**
The light refracts as it enters the prism.	☐	☐
The light refracts as it travels through the prism.	☐	☐
The light disperses as it leaves the prism.	☐	☐
The light forms a spectrum of colours on the screen.	☐	☐

☐ 9a
1 mark

☐ 9a
1 mark

(b) Ann places two mirrors at 90° and shines a ray of light at mirror 1.



☐ 9bi
1 mark

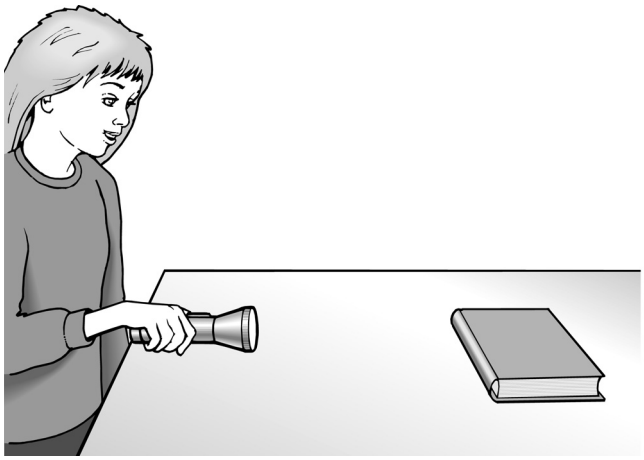
☐ 9bi
1 mark

(i) **On the diagram above** continue the ray of light to show how it is reflected by both mirrors. Use a ruler.

☐ 9bii
1 mark

(ii) **On the diagram above** label the incident ray (i) and the reflected ray (r) for the light striking **mirror 2**.

(c) Ann shines the torch at a red book.



Explain why the object looks red in white light.

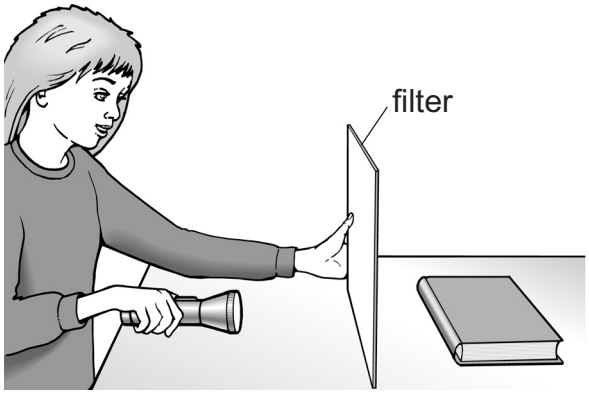
_____

_____

9c
1 mark

9c
1 mark

(d) In a dark room, Ann puts different coloured filters in front of the torch.
She records the colour the book appears.



Complete the table below to show the colour that the book would appear.
Tick **one** box in each row. The first one has been done for you.

colour of filter	**What colour does the red book appear?**		
	red	**green**	**black**
no filter	✓		
red filter			
green filter			

9d
1 mark

maximum 8 marks

Total
8

10. Solder is a mixture of lead and tin.
The melting point of solder depends on the amount of tin in the mixture.

(a) Look at the table below.

amount of tin in solder (%)	melting point of solder (°C)
0	327
30	255
40	235
50	212
60	188
70	192
80	205
90	220
100	232

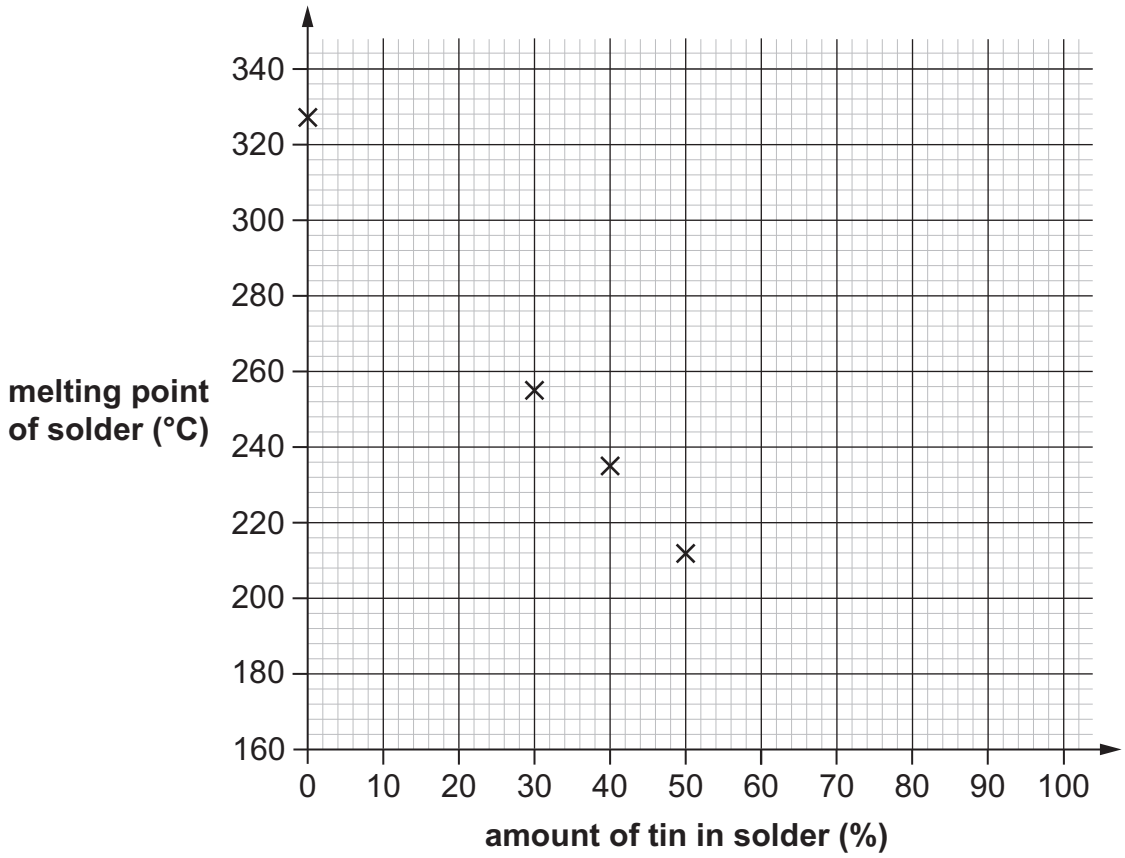
(i) The melting point of pure tin is 232°C.
What is the melting point of pure lead?

_____ °C

10ai
1 mark

(ii) Use the data in the table to plot the points on the grid below.
Four of the points are plotted for you.

Draw an appropriate line of best fit.



10aii
1 mark

10aii
1 mark

10aii
1 mark

(b) Use your graph to estimate the amount of tin needed to make solder with the **lowest** melting point.

_____ %

10b
1 mark

(c) Describe how the melting point of solder changes with the amount of tin in the solder.

_____

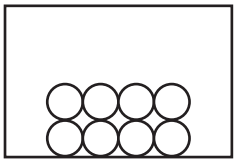
_____

_____

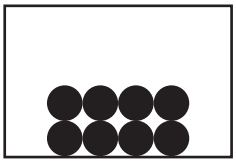
10c
1 mark

10c
1 mark

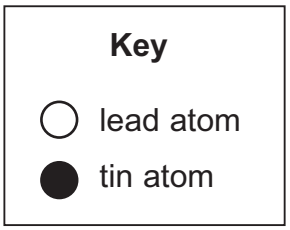
(d) The diagrams below show the arrangement of atoms in solid samples of pure lead and pure tin.



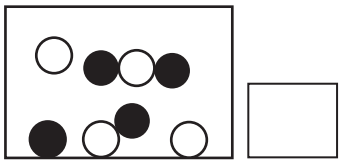
pure lead

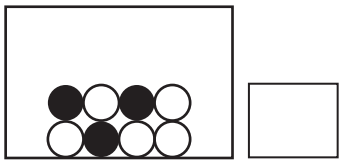


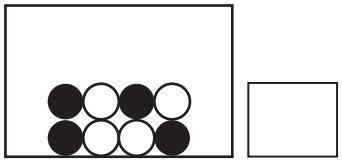
pure tin

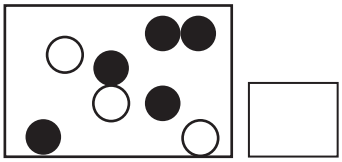


Which box shows the correct arrangement of the lead atoms and tin atoms in a sample of solder that has a melting point of 212°C at room temperature?
Use the table on the opposite page.
Tick the correct box.









10d
1 mark

maximum 8 marks

Total
8

11. A garden centre has two types of the same plant for sale.

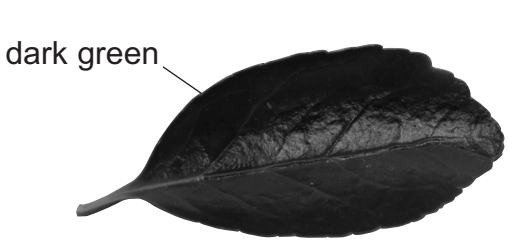
normal type



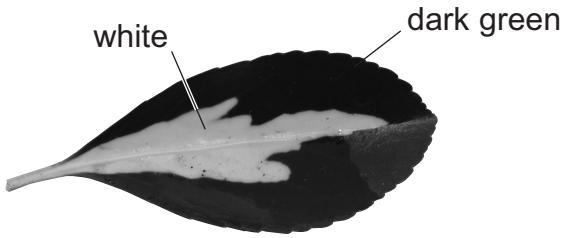
variegated type



normal leaf



variegated leaf



Chlorophyll makes a plant leaf green.

(a) At the end of the summer, the normal plants had grown more than those with variegated leaves. All the plants had been grown in the same conditions.

(i) Explain why plants with normal leaves grow more than plants with variegated leaves.

_____

_____

_____

11ai

1 mark

11ai

1 mark

(ii) Describe an investigation you could do to show how much more a normal plant grows **compared** with a variegated plant over a six-week period.

In your answer, you must clearly identify:

- the independent variable (IV)
- the dependent variable (DV)
- the variables to control (CV)
- how you will calculate the end result.

_____

_____

_____

_____

_____

_____

_____

_____

11aii
1 mark

11aii
1 mark

11aii
1 mark

11aii
1 mark

(b) What process do plants carry out in the light and in the dark to release energy? Tick the correct box.

photosynthesis	☐	respiration	☐
absorption	☐	dispersal	☐

11b
1 mark

END OF TEST

maximum 7 marks

Total
7

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QCDA/10/4350 (Pupil pack)
QCDA/10/4346 (Teacher pack)

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