Sc

KEY STAGE
3

TIER
5–7

2008

Science test

Paper 1

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.

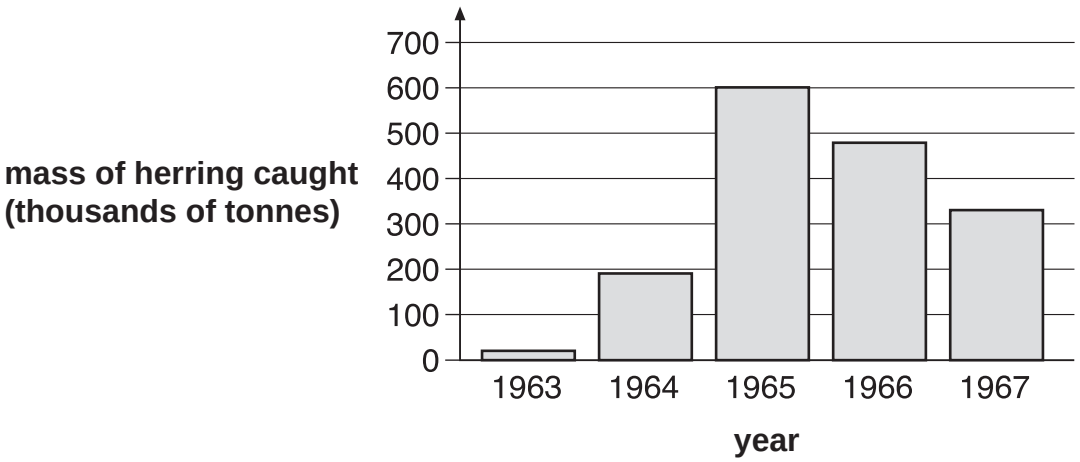
For marker's use only

TOTAL MARKS	

1. The table below shows the number of boats used for catching herring fish in the Norwegian Sea between 1963 and 1967.

year	number of fishing boats
1963	16
1965	284
1967	326

The bar chart below shows the total mass of herring caught in the Norwegian Sea between 1963 and 1967.



Use the information above to help you answer parts (a) (i), (ii) and (iii).

(a) (i) Why did the mass of herring caught increase between 1963 and 1965?

1ai

1 mark

(ii) Suggest why the mass of herring caught decreased between 1965 and 1967.

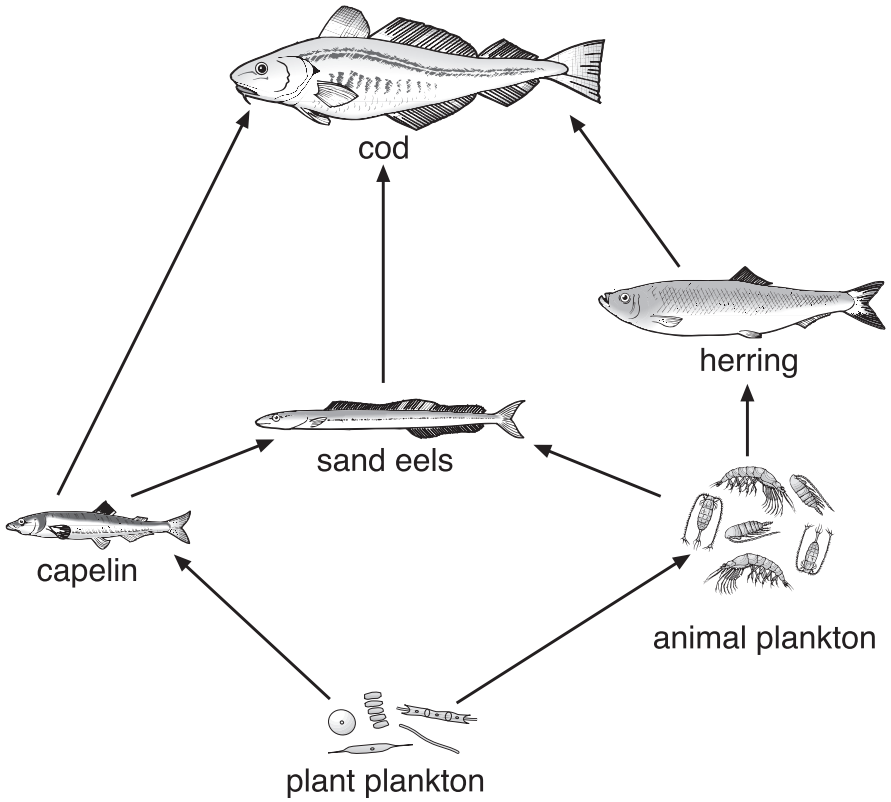
1aii

1 mark

(iii) Herring **cannot** breed until they are four years old.
Fishing for herring was banned in the Norwegian Sea from 1972 to 1976.
Suggest **one** reason why fishing for herring was banned **for this period**.

1aiii
1 mark

(b) The diagram below shows a food web in the Norwegian Sea.



not to scale

(i) How could a decrease in the number of herring cause a **decrease** in the number of sand eels?

1bi
1 mark

(ii) How could a decrease in the number of herring cause an **increase** in the number of sand eels?

1bii
1 mark

maximum 5 marks

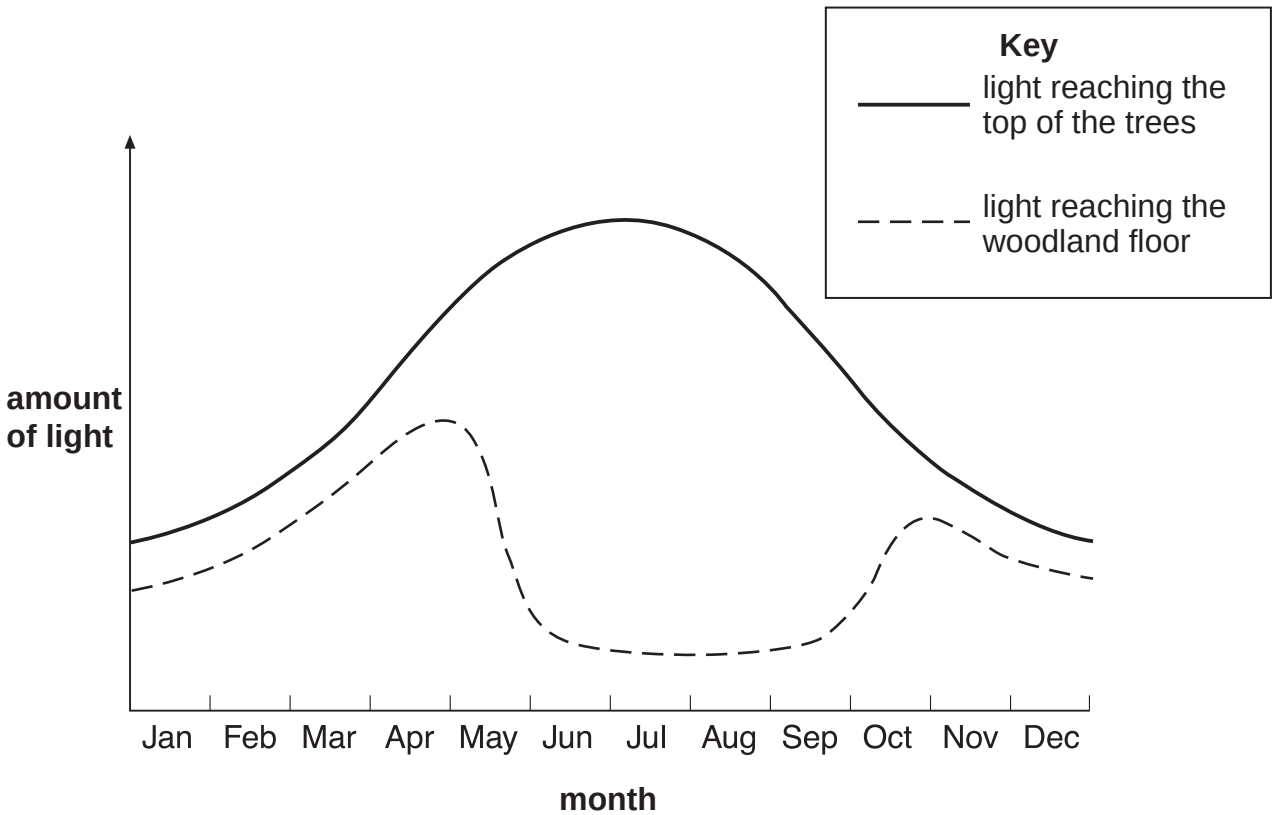
Total
5

2. The drawings below show the trees in a woodland area at the beginning of May and at the end of May.

beginning of May

end of May

The graph below shows the amount of light reaching the top of the trees and the woodland floor over one year.



(a) Why does the amount of light reaching the woodland floor decrease during May?

_____

_____

2a

1 mark

(b) Plants grow on the woodland floor.

Explain why these plants grow bigger **and** faster when there is plenty of light.

_____

_____

_____

_____

2b

1 mark

2b

1 mark

(c) **Respiration** takes place in the cells of all plants.

Complete the word equation for **respiration**.

oxygen + _____ ⟶ carbon dioxide + _____

2c

1 mark

2c

1 mark

maximum 5 marks

Total

5

3. (a) The average life span of a lion in a zoo is 22 years.
The average life span of a lion in the wild is 17 years.

Suggest **two** reasons why lions live longer in a zoo than in the wild.

1. _____

2. _____

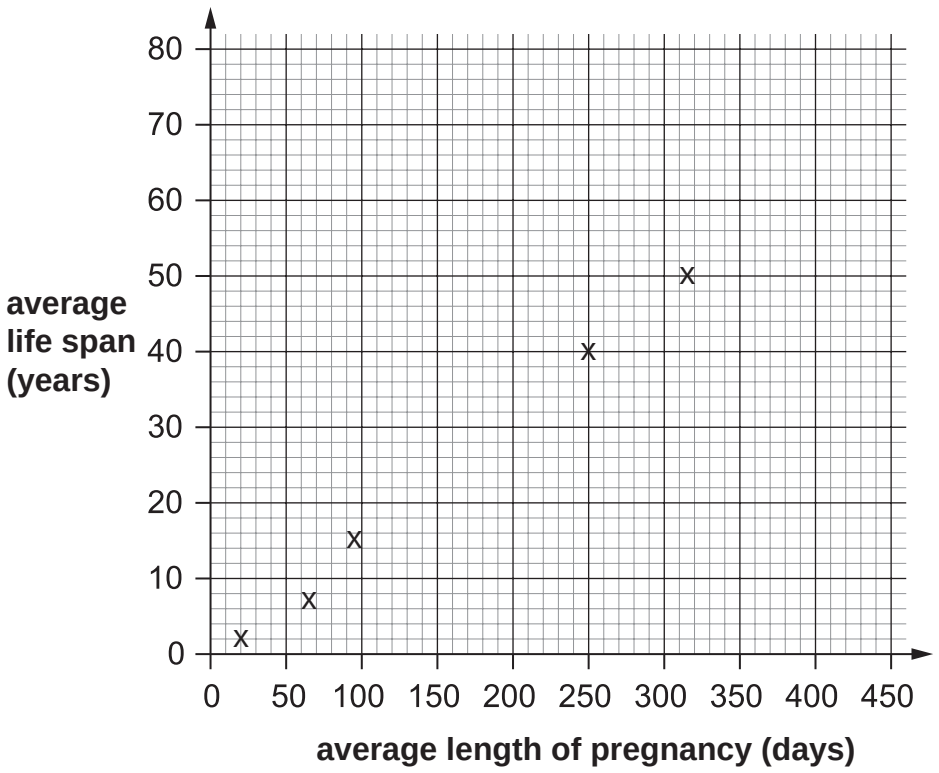
3a

1 mark

(b) John found the following data about five mammals.

mammal	average length of pregnancy (days)	average life span (years)
mouse	20	2
guinea pig	65	7
leopard	96	15
chimpanzee	250	40
whale	315	50

He plotted points using data from the table.



(i) Using the points John plotted, draw a line of best fit.

3bi
1 mark

(ii) From the graph, describe the relationship between the average length of pregnancy and the average life span.

3bii
1 mark

(c) John found data about three other mammals.

mammal	average length of pregnancy (days)	average life span (years)
human	266	72
horse	340	25
giraffe	440	17

3ci
1 mark

(i) Plot these **three** points on the graph on the opposite page.

3ci
1 mark

(ii) Do these points fit the relationship you described in part (b) (ii)? Tick the correct box.

yes ☐ no ☐

Use the graph to give a reason for your answer.

3cii
1 mark

maximum 6 marks

Total
6

4. (a) The table below shows the melting points and boiling points of four elements.

element	melting point (°C)	boiling point (°C)
aluminium	660	2520
iron	1540	2760
magnesium	650	1100
mercury	–39	357

When answering the questions below, you may give the name of an element more than once.

Which element in the table is:

(i) a liquid at 0°C?

_____

4ai

1 mark

(ii) a solid at 1500°C?

_____

4aii

1 mark

(iii) a gas at 500°C?

_____

4aiii

1 mark

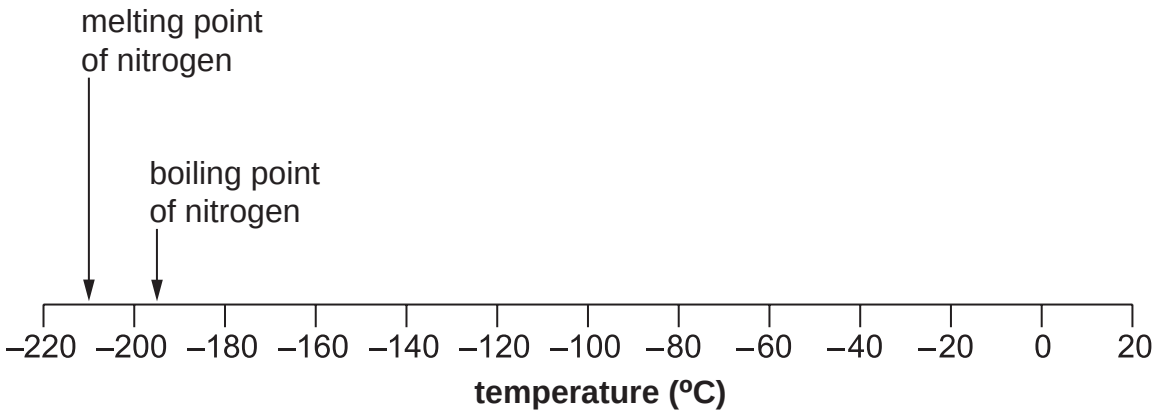
(iv) a liquid over the biggest temperature range?

_____

4aiv

1 mark

(b) The melting point and boiling point of nitrogen are marked on the scale below.



(i) **Draw an arrow** on the scale above to show the temperature at which water freezes.

4bi

1 mark

(ii) When water is a liquid, what is the physical state of nitrogen?
Tick the correct box.

solid ☐ liquid ☐ gas ☐

4bii

1 mark

(iii) What is the physical state of nitrogen at –200°C?
Tick the correct box.

solid ☐ liquid ☐ gas ☐

4biii

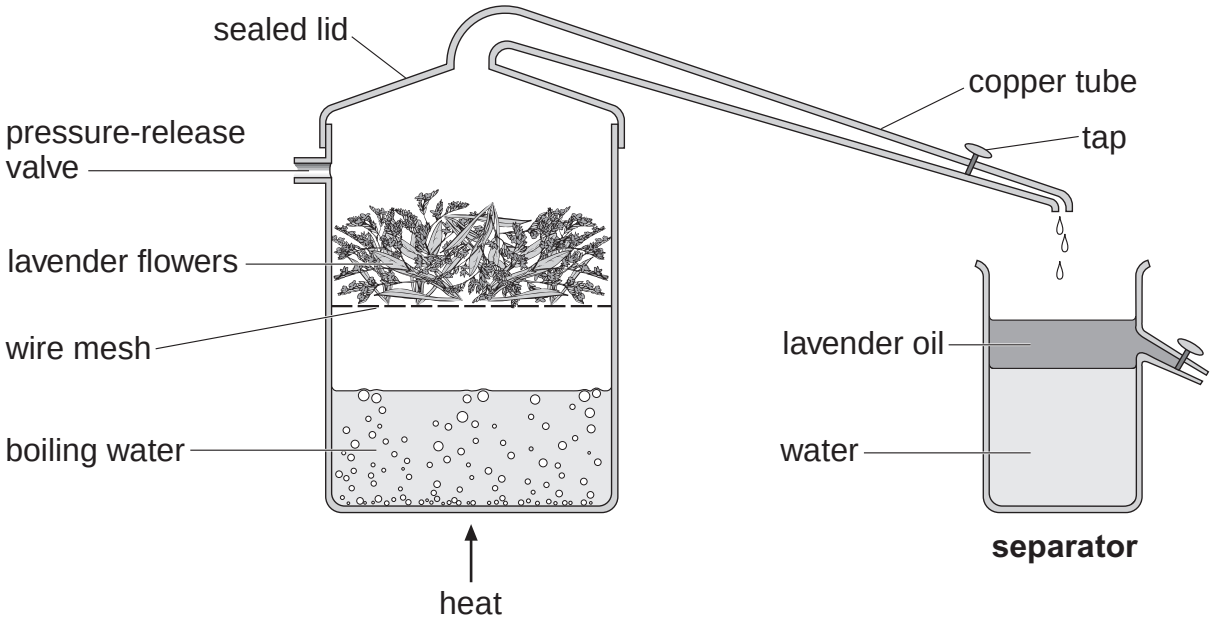
1 mark

maximum 7 marks

Total

7

5. Lavender oil is a perfume obtained from lavender flowers.
Steam at 100°C is passed through the flowers in the apparatus below.



not to scale

Water vapour and lavender oil vapour pass down a copper tube towards a separator.

(a) (i) The lavender flowers are heated in a container with a sealed lid.

Why must the lid be sealed?

_____

_____

5ai

1 mark

(ii) What would happen if the container did **not** have a pressure-release valve?

_____

_____

5aii

1 mark

(b) Lavender oil vapour and water vapour cool as they pass down the copper tube.
A mixture of lavender oil and water collects in the separator.

(i) What is the change in the physical state of both lavender oil vapour and water vapour as they cool?

from _____ to _____

5bi
1 mark

(ii) Look at the separator.

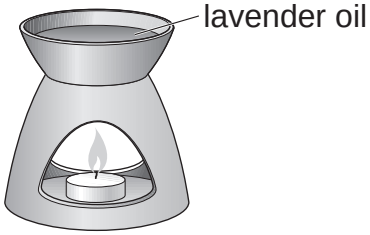
How does this show that the water is denser than lavender oil?

_____

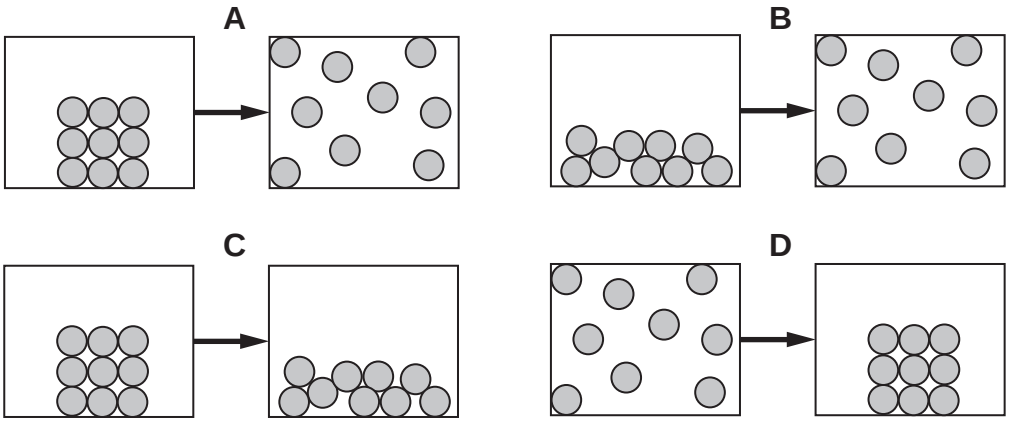
_____

5bii
1 mark

(c) Rosie poured some lavender oil into an oil burner.
She heated it with a candle.



The oil changed state.



Which diagram represents this change of state?
Write the letter.

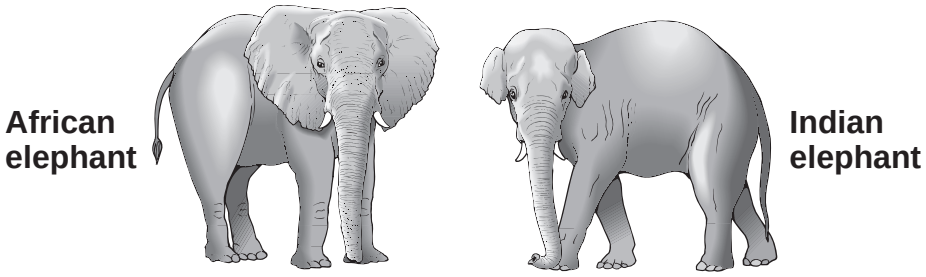
_____

5c
1 mark

maximum 5 marks

Total
5

6. (a) Elephants keep cool by losing heat from their ears.



Predict which elephant can lose more heat from its ears.

_____ elephant

Give the reason for your answer.

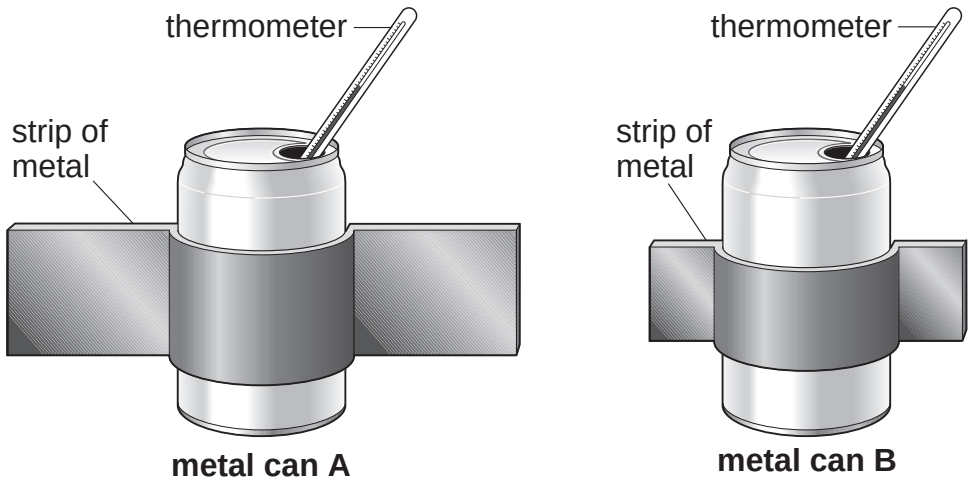
_____

_____

6a

1 mark

(b) Ben filled two identical cans with 250 cm^3 of hot water.
He wrapped strips of metal around them to model the elephants' ears.



He recorded the temperature of the water in each can every 5 minutes.
The table shows his results.

time (minutes)	temperature (°C)	
	can A	can B
0	60	60
5	54	57
10	50	54
15	46	52
20	43	50

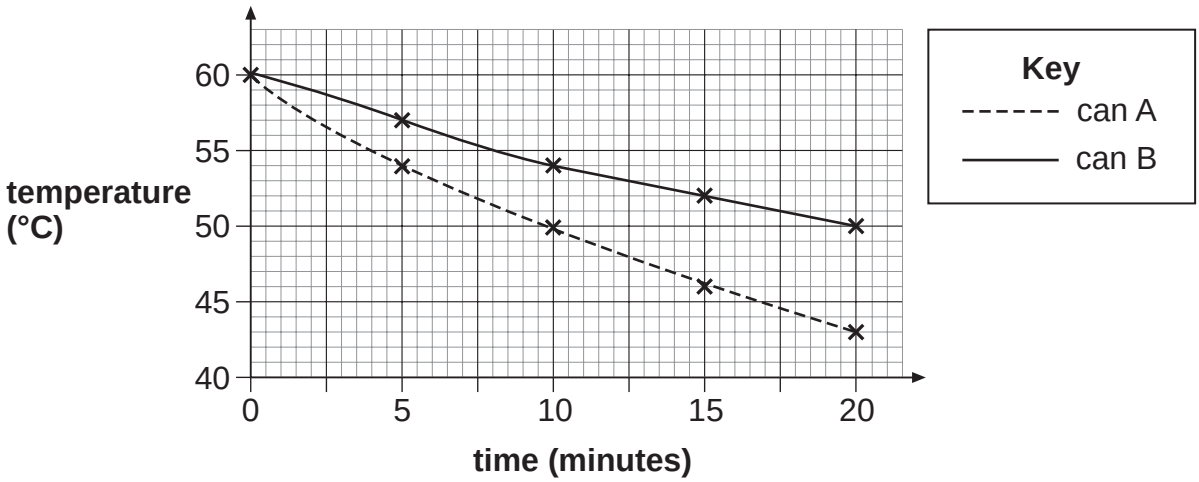
(i) Ben started with water at the same temperature in both cans.
Give **one** other way he made his test fair.

_____

_____

6bi
1 mark

(ii) He plotted the results for **can A** and **can B** and drew lines of best fit.



Why is it more useful to present these results in a graph rather than a table?

_____

_____

6bii
1 mark

(iii) The water in **can A** cooled more quickly than the water in **can B**.
Does this support your prediction in part (a)?
Tick the correct box.

yes ☐ no ☐

Explain your answer.

_____

_____

6biii
1 mark

(c) Ben repeated the investigation. Instead of a thermometer he used a temperature sensor and a data logger.
Give **one** advantage of this.

_____

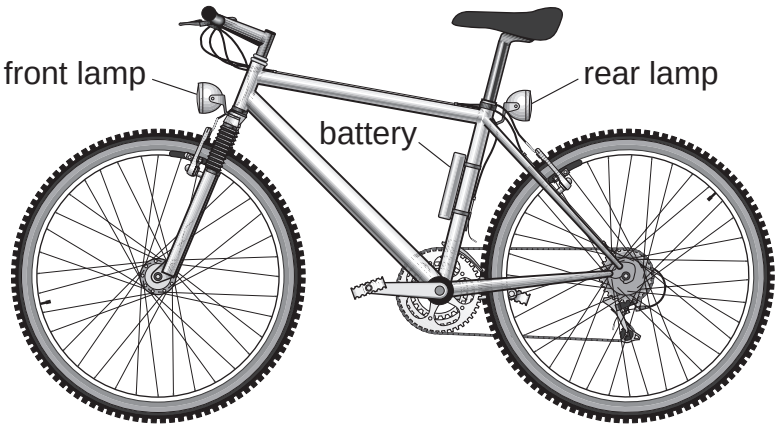
_____

6c
1 mark

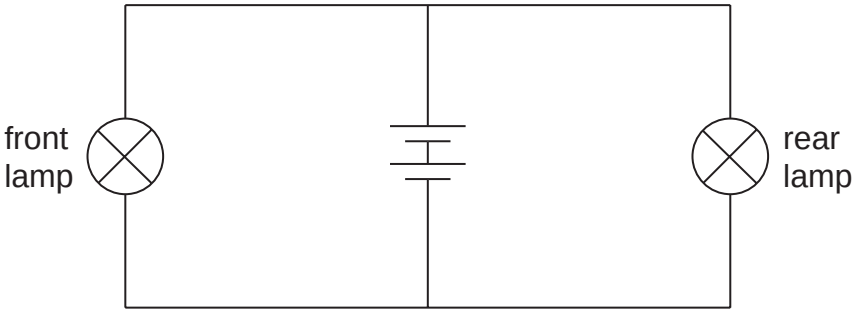
maximum 5 marks

Total
5

7. Nina's bicycle has a front lamp and a rear lamp.
Both lamps are connected to the same battery.



(a) The circuit diagram for the lamps is drawn below.



7ai

1 mark

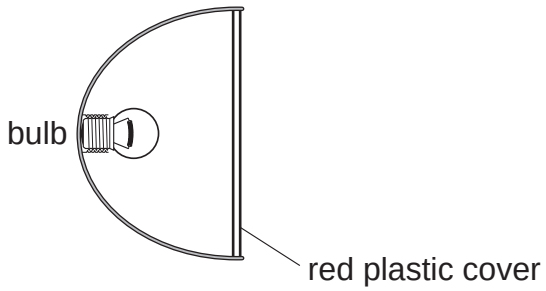
(i) **On the circuit diagram above**, place a letter **A** to show the position of a switch to turn **only** the front lamp on and off.

7aii

1 mark

(ii) **On the circuit diagram above**, place a letter **B** to show the position of a switch to turn **both** lamps on and off at the same time.

(b) The bulb in the rear lamp gives out white light.
White light is a mixture of all the colours of light.



The plastic cover acts as a red filter.
Red light passes through the filter.

What happens to the other colours that do **not** pass through?

_____ 7b

1 mark

(c) Nina replaces the battery with a generator called a dynamo.
When Nina pedals her bicycle, the back wheel turns the generator.

Complete the sentences below using words from the box.

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

As Nina pedals, _____ energy in her muscles is changed to kinetic energy. 7c

1 mark

When the generator turns, kinetic energy is changed to useful _____ energy in the wires. This energy in the wires is changed to useful _____ energy in the bulb. 7c

1 mark

When the lamps are on, some of the energy in the bulb is wasted as _____ energy. 7c

1 mark

7c

1 mark

maximum 7 marks

Total

7

8. The table shows information about three planets in our solar system.

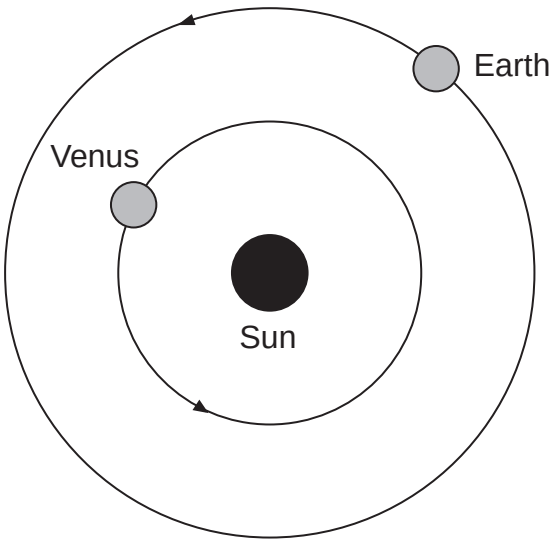
planet	time taken to orbit the Sun (Earth-years)
Mars	2.0
Venus	0.6
Earth	1.0

(a) Give **one** reason why Venus takes less time than Earth to orbit the Sun.

8a

1 mark

(b) The diagram below shows the orbits of Venus and Earth.
The Sun is a source of light. Venus does **not** produce its own light.



not to scale

8b

1 mark

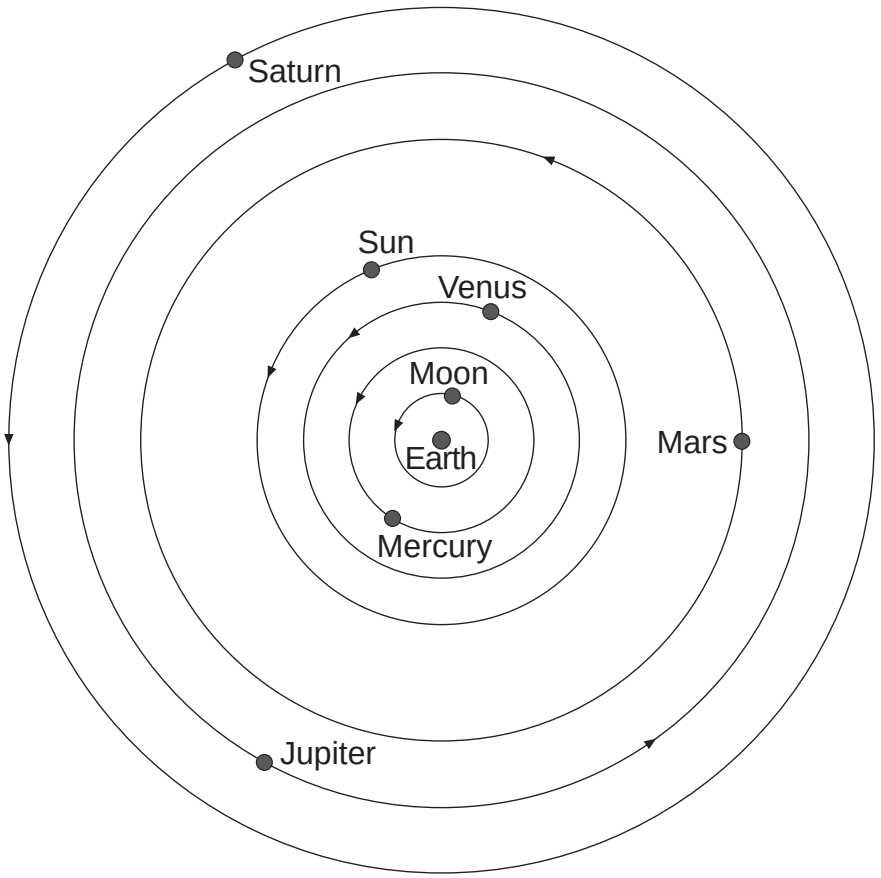
On the diagram above, draw rays of light to show how Venus can be seen from Earth. Use a ruler.

8b

1 mark

Draw an arrow **on each** ray to show the direction of light.

(c) The diagram below shows how the astronomer Ptolemy drew the solar system 2000 years ago.



not to scale

(i) The planets Uranus and Neptune are missing from his diagram.

Suggest why Ptolemy did **not** include these planets in his diagram.

_____

_____

8ci

1 mark

(ii) Today, we know the correct arrangement of the planets in our solar system.

Give **one** way the diagram above is incorrect.
Complete the sentence below.

In the correct arrangement _____

_____

8cii

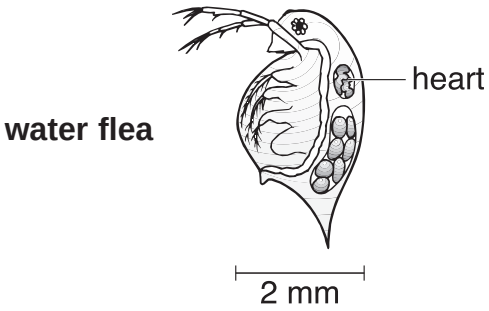
1 mark

maximum 5 marks

Total

5

9. Kava is a drug. It dissolves in alcohol but **not** in water.
A scientist tested kava to see if it can reduce the human heart rate.
Before testing the drug on humans, she tested it on water fleas.



(a) She gave two groups of water fleas a different treatment.

group	number of water fleas	treatment
1	20	one drop of kava dissolved in alcohol
2	20	one drop of alcohol

- She placed the water fleas in a dish of water under a microscope.
- She measured the heart rate of each water flea before the treatment.
- She waited 30 seconds after the treatment was given and measured the heart rate again.
- She calculated the average heart rate for each group.

(i) Why did the scientist measure the heart rate of the water fleas before the treatment?

9ai

1 mark

(ii) After giving the treatment, why did she wait for 30 seconds before measuring the heart rate?

9aii

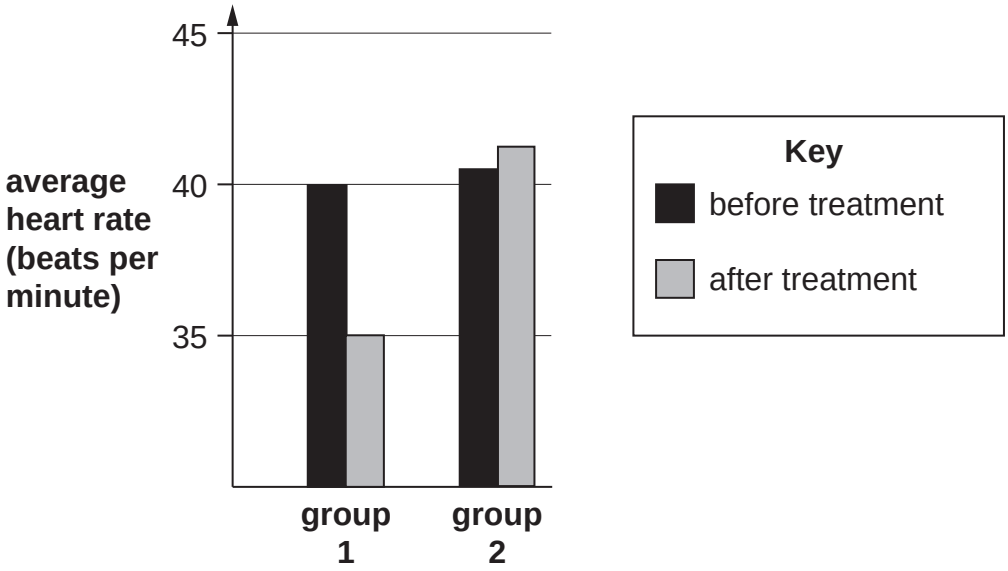
1 mark

(iii) How could the scientist increase the reliability of the investigation?

9aiii

1 mark

(b) The results of the experiment are shown below.



(i) How will the results from group 2 help in the experiment?

9bi

1 mark

(ii) How can the scientist use the results above to work out the effect of kava **alone** on the average heart rate of water fleas?

9bii

1 mark

(c) From this experiment, why could she **not** be certain how kava will affect humans?

9c

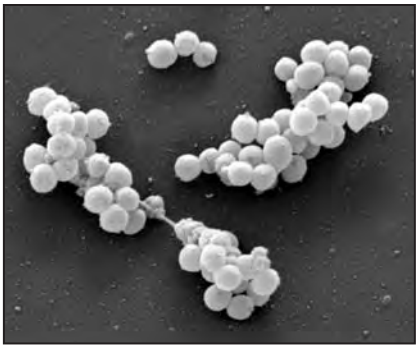
1 mark

maximum 6 marks

Total

6

10. The photograph below shows bacteria that have developed resistance to antibiotics. They are called MRSA bacteria.



(a) When MRSA bacteria reproduce, they pass on their resistance to antibiotics to the next generation.

What part of a cell passes on information?

_____

10a

1 mark

(b) MRSA bacteria can cause serious infections in people who are ill in hospital. The bacteria can live on a healthy person's **skin** or in their **lungs** without causing any harm.

Use this information to fill in the table below.
Suggest **two** ways MRSA bacteria can be spread from person to person.
Suggest how the spread of the bacteria can be prevented for each method.

	method of spread	**method of prevention**
1		
2		

10b

1 mark

10b

1 mark

(c) People can be vaccinated against some diseases caused by bacteria or viruses.

Describe how vaccination prevents a person getting a disease.

10c
1 mark

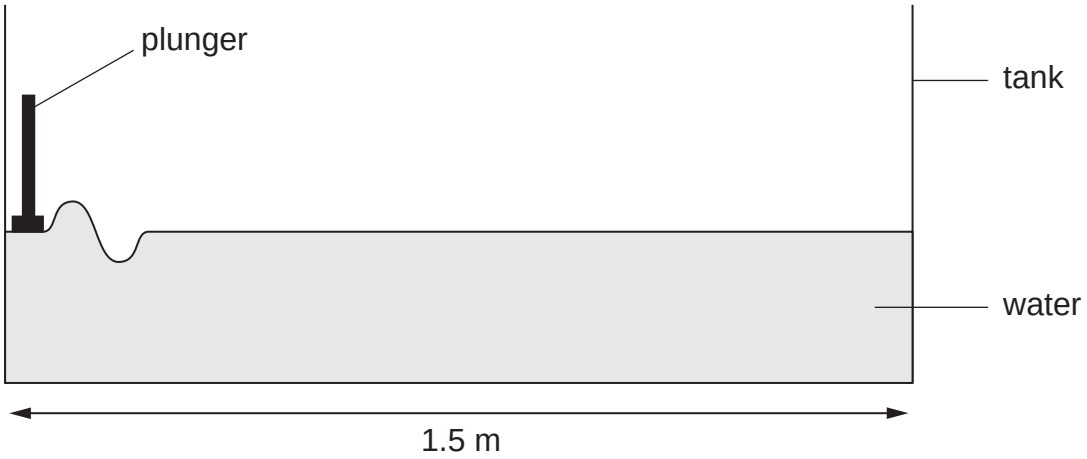
10c
1 mark

10c
1 mark

maximum 6 marks

Total
6

11. (a) Satish poured some water into a long tank in the school laboratory.
He used a plunger at one end to make a wave.



not to scale

(i) The wave travelled to the other end of the tank.
The speed of the wave was 2 m/s.

How long did the wave take to travel to the other end?

_____

_____ s

11ai
1 mark

(ii) Satish investigated how the depth of water in his tank affected the speed of the waves.
Write a plan to show how he could do this.

_____

_____

_____

_____

_____

11aii
1 mark

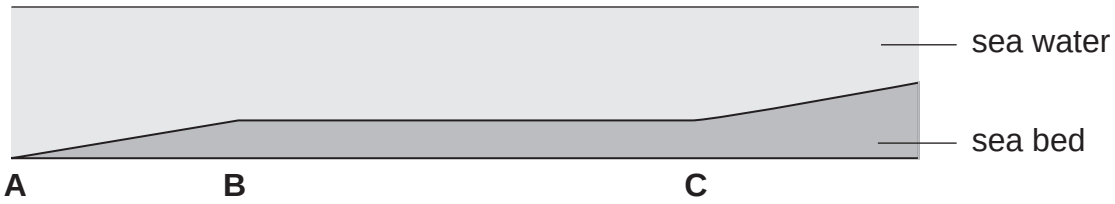
11aii
1 mark

11aii
1 mark

(b) Satish found the following information about waves in the sea.

depth of sea water (m)	speed of wave (m/s)
10	9.9
20	14.0
30	17.2
40	19.8

The diagram below shows how the depth of sea water changes.



Use the information in the table above to help you describe the speed of a wave as it travels from **A to B** and from **B to C**.

A to B _____ 11b 1 mark

B to C _____ 11b 1 mark

maximum 6 marks

Total 6

12. (a) The chemical formula for hydrochloric acid is HCl.
The chemical formula for sodium hydroxide is NaOH.

When they react together, two products are formed.
The chemical formula for one product is NaCl.

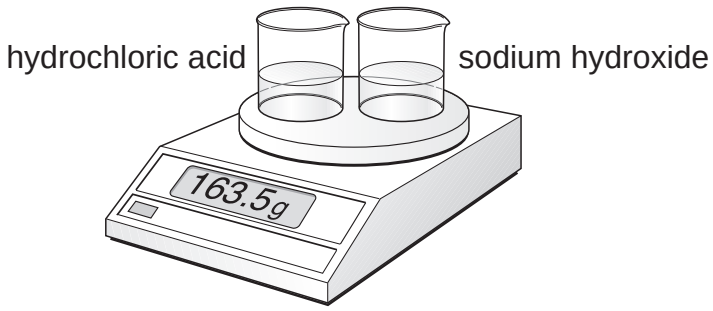
12ai 1 mark (i) Complete the word equation below with the **names** of both products.

12ai 1 mark (ii) **On the dotted line**, give the chemical formula of the other product.

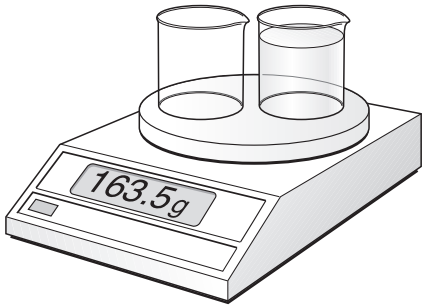
12aii 1 mark

sodium hydroxide NaOH	+	hydrochloric acid HCl	→	_____ NaCl	+	_____ _ _ _ _ _ _

(b) In experiment 1, Molly put two beakers on a balance.
One contained 20 cm^3 of hydrochloric acid.
The other contained 20 cm^3 of sodium hydroxide solution.
The total mass was 163.5 g.



She poured the acid onto the sodium hydroxide. They reacted.



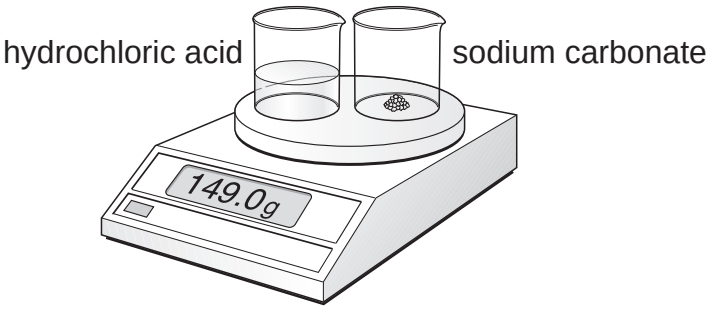
Why did the reading on the balance **not** change?

12b 1 mark

_____

_____

(c) In experiment 2, Molly put two beakers on a balance.
One contained 20 cm^3 of hydrochloric acid.
The other contained 5 g of sodium carbonate.



She poured the acid onto the sodium carbonate. They reacted.
Two of the products are the same as in experiment 1.

(i) Complete the word equation with the names of the **three** products.

sodium carbonate + hydrochloric acid → _____ + _____ + _____

12ci
1 mark

(ii) The total mass at the start was 149.0 g.
When the reaction stopped, the reading on the balance was 147.0 g.

Why was there a loss of mass in this reaction?

_____

_____

12cii
1 mark

maximum 6 marks

Total
6

13. Oliver clamped a wooden plank to a desk. There was a 40 cm overhang as shown in diagram 1.

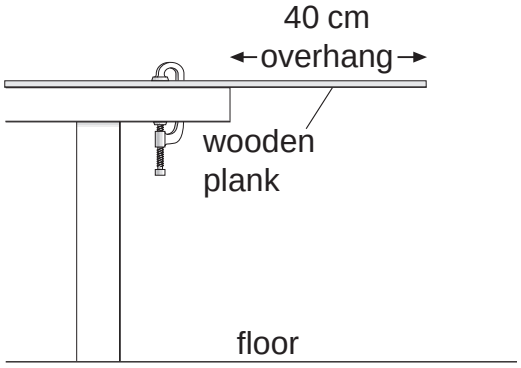


diagram 1

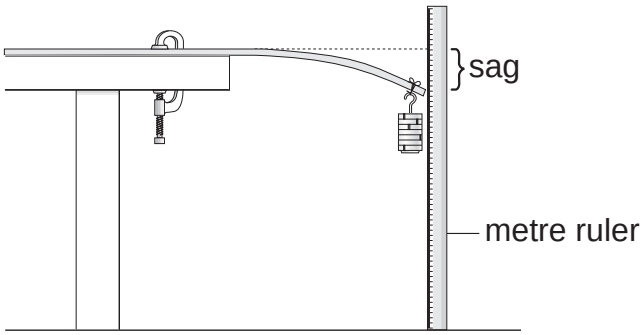
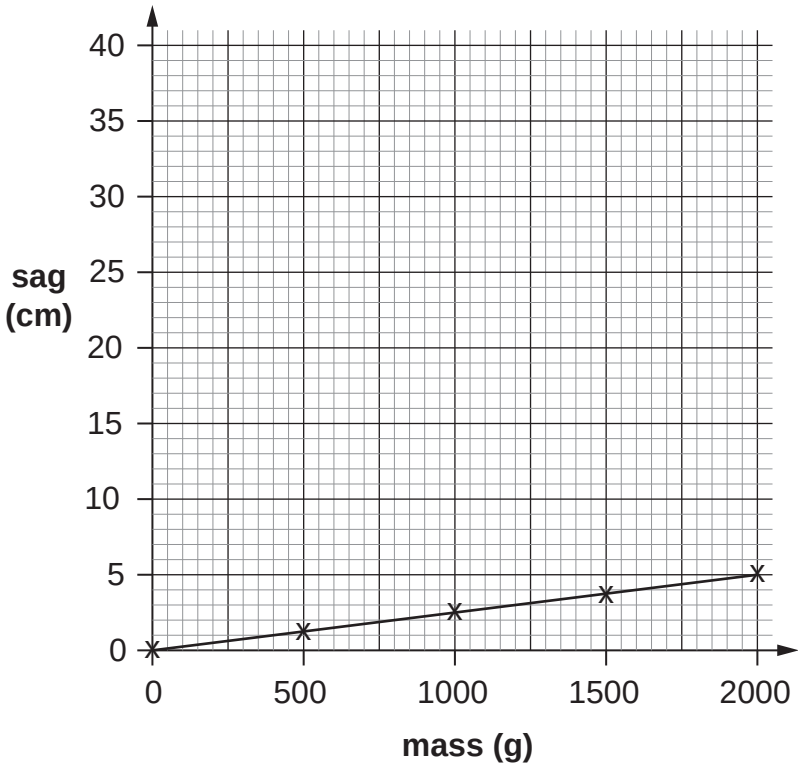


diagram 2

Oliver added masses to the end of the wooden plank as shown in diagram 2.
He measured the sag.
The graph below shows his results.



(a) What measurements would Oliver need to take to work out the sag?

_____

_____

13a

1 mark

(b) Oliver repeated his test with a new plank with an 80 cm overhang.
His results are shown below.

mass (g)	sag (cm)
0	1.0
500	15.0
1000	25.0
1500	31.0
2000	35.0

(i) Plot the results from Oliver's second test on the grid opposite.
Use the points to draw a line of best fit.

13bi
1 mark

(ii) In the second test the plank sagged with **no** mass added to it.
Explain what caused this sag.

13bi
1 mark

_____

13bii
1 mark

(c) Compare the results of Oliver's two tests.

(i) How are the results **similar** for each test?

_____

_____

13ci
1 mark

(ii) How are the results **different** in the second test?

_____

_____

13cii
1 mark

END OF TEST

maximum 6 marks

Total
6

QCA/08/3301 (Pupil pack)
QCA/08/3298 (Mark scheme pack)
282664