

Sc

KEY STAGE  
3

TIER  
3–6

## 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. Nadine mixed grass seeds with sand.  
She put the mixture into three mesh bags to make three model heads.  
She soaked two of the bags in water.

(a) The drawings below show the model heads after one week.



**A**



**B**



**C**

- (i) Which **two** model heads did Nadine soak in water?  
Give the letters.

\_\_\_\_\_ and \_\_\_\_\_

How can you tell this from the drawings?

\_\_\_\_\_  
\_\_\_\_\_

- (ii) Nadine watered both of these models for two weeks.  
She watered one more often than the other.

How would the model that was watered more often look different from the other one?

\_\_\_\_\_  
\_\_\_\_\_



1ai

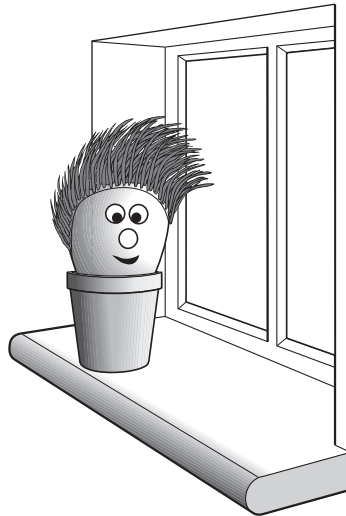
1 mark



1aii

1 mark

(b) Nadine put one of the watered models near a window.

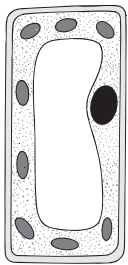


Why did the grass grow towards the window?

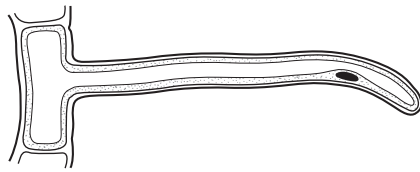
\_\_\_\_\_

1b  
1 mark

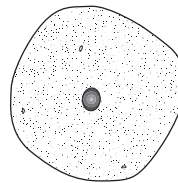
(c) (i) Grass plants have root hairs. Which diagram shows a root hair cell?  
Tick the correct box.



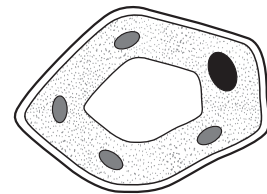
A



B



C



D

1ci  
1 mark

(ii) Fill the gaps in the sentence below.

Root hairs take in \_\_\_\_\_ and  
\_\_\_\_\_ from the soil.

1cii  
1 mark

1cii  
1 mark

*maximum 6 marks*

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2. (a) Drinking alcohol can cause changes in the body.

(i) Draw a line from each **change** to the **effect** on the body.  
Draw only **three** lines.

**change**

**effect**

more blood travels to the  
surface of the body

reactions are slower

activity of the brain  
slows down

a person loses weight

sense of pain is reduced

skin gets warmer

a person can get hurt  
without knowing it

(ii) People who drink alcohol and then drive a car are likely to  
have accidents.

From the information above, which **effect** of drinking alcohol  
causes accidents?

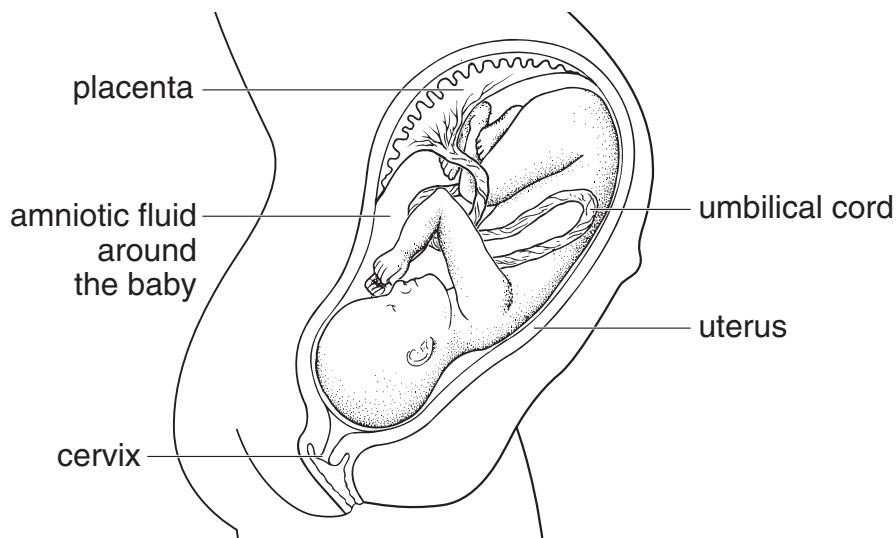
\_\_\_\_\_

2ai  
1 mark

2ai  
1 mark

2ai  
1 mark

(b) The drawing below shows a baby in its mother's uterus.



(i) Through which labelled part can alcohol pass from mother to baby?

\_\_\_\_\_

2bi  
1 mark

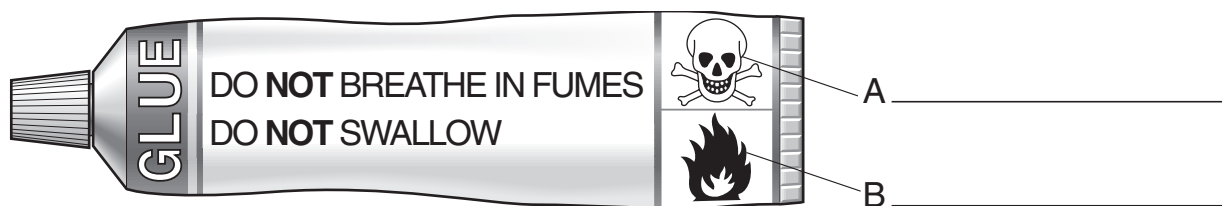
(ii) Which labelled part protects the baby from damage?

\_\_\_\_\_

2bii  
1 mark

(c) (i) What do the hazard warning symbols, **A** and **B**, on this tube of glue mean? Choose from the box below and write your answers on the lines.

**corrosive**
**explosive**
**flammable**
**toxic**
**radioactive**



2ci  
1 mark

2ci  
1 mark

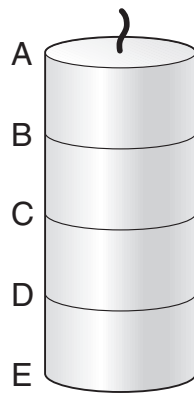
(ii) The glue contains a solvent. Why is it dangerous to breathe in the fumes from the glue?

\_\_\_\_\_  
\_\_\_\_\_

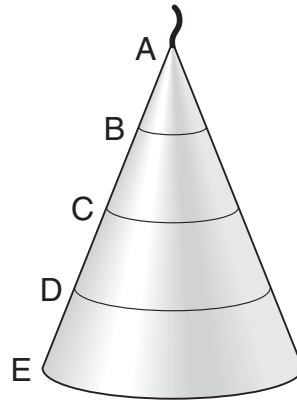
2cii  
1 mark

*maximum 8 marks*

3. Simon made two candles from the same amount of wax. He drew lines on both candles.



**candle 1**



**candle 2**

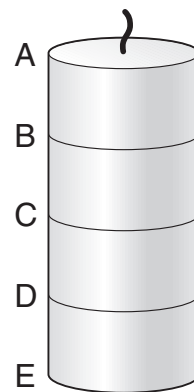
- (a) What would Simon use to measure the **distance** between the lines?

\_\_\_\_\_

- (b) He timed how long **candle 1** took to burn. His results are shown below.

- (i) How long would it take for **candle 1** to burn from C to D? Write your answer in the table.

| part that burned | time for candle 1 to burn (minutes) |
|------------------|-------------------------------------|
| A to B           | 30                                  |
| B to C           | 30                                  |
| C to D           |                                     |
| D to E           | 30                                  |



**candle 1**

3a  
1 mark

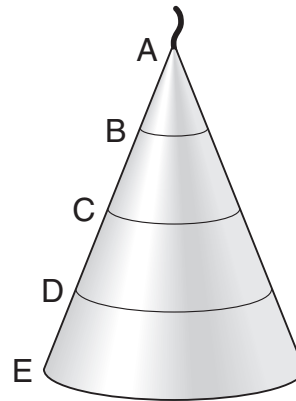
3bi  
1 mark

(ii) Simon timed how long **candle 2** took to burn.

How long would it take for **candle 2** to burn from A to B **and** from D to E?

Write your answers in the table.

| part that burned | time for candle 2 to burn (minutes) |
|------------------|-------------------------------------|
| A to B           |                                     |
| B to C           | 20                                  |
| C to D           | 40                                  |
| D to E           |                                     |

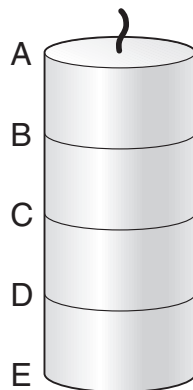


**candle 2**

3bii  
1 mark

3bii  
1 mark

(c) Simon wanted to use a candle to measure time. He made **candle 3** the same size as **candle 1**.



**candle 1**



**candle 3**

Why is **candle 3** more useful than **candle 1** for measuring time?

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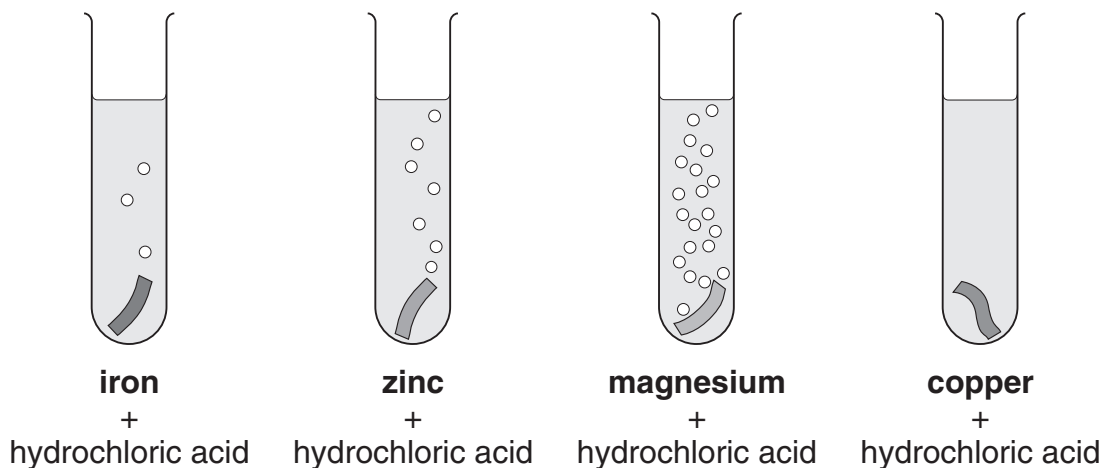
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3c  
1 mark

*maximum 5 marks*

4. (a) Ruth put a piece of a different metal in each of four test tubes.

She poured 10 cm<sup>3</sup> of hydrochloric acid onto each metal.



Look at the diagrams above.

(i) How do these show if a metal reacts with the acid?

\_\_\_\_\_

(ii) **On the lines below**, put the **four** metals in the order of how strongly they react with the acid.

**most reactive** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**least reactive** \_\_\_\_\_

4ai  
1 mark

4aii  
1 mark



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(b) Choose the name of a metal from the box below to answer each question.

|               |             |                  |             |
|---------------|-------------|------------------|-------------|
| <b>copper</b> | <b>iron</b> | <b>magnesium</b> | <b>zinc</b> |
|---------------|-------------|------------------|-------------|

(i) Which metal from the box is used for electrical wires?

\_\_\_\_\_

4bi  
1 mark

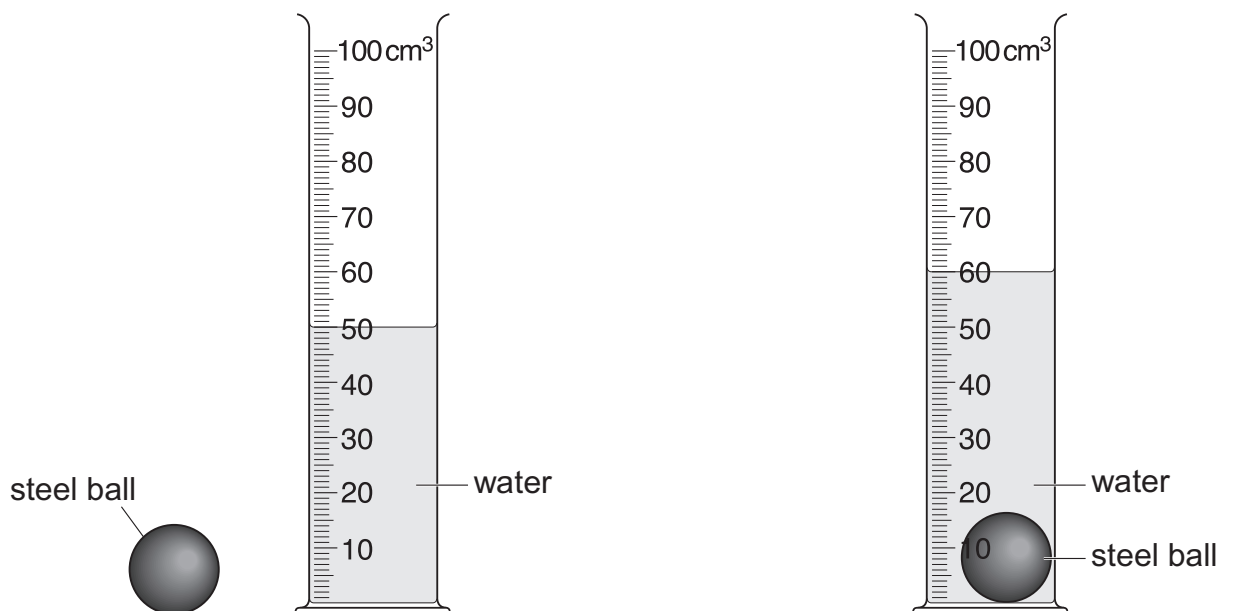
(ii) Which metal from the box goes rusty?

\_\_\_\_\_

4bii  
1 mark

*maximum 4 marks*

5. (a) Gary poured 50 cm<sup>3</sup> of water into a measuring cylinder. He then put a steel ball into the measuring cylinder.



- (i) What is the new reading on the measuring cylinder?

\_\_\_\_\_ cm<sup>3</sup>

- (ii) What is the volume of the steel ball?

\_\_\_\_\_ cm<sup>3</sup>



5ai

1 mark



5aii

1 mark

(b) The table below shows the mass and volume of four objects.

| object           | mass (g) | volume (cm <sup>3</sup> ) |
|------------------|----------|---------------------------|
| aluminium figure | 230      | 85                        |
| lead weight      | 800      | 70                        |
| steel block      | 200      | 25                        |
| wood puzzle      | 400      | 500                       |

(i) Which object is the heaviest? \_\_\_\_\_

(ii) Which object takes up the most space? \_\_\_\_\_

(c) The frame of a bike is made of aluminium.



(i) Give **one** reason why aluminium is a suitable material for the frame.

\_\_\_\_\_

\_\_\_\_\_

(ii) A force between the tyres and the road stops the bike skidding.

What is the name of this force?

\_\_\_\_\_

5bi  
1 mark

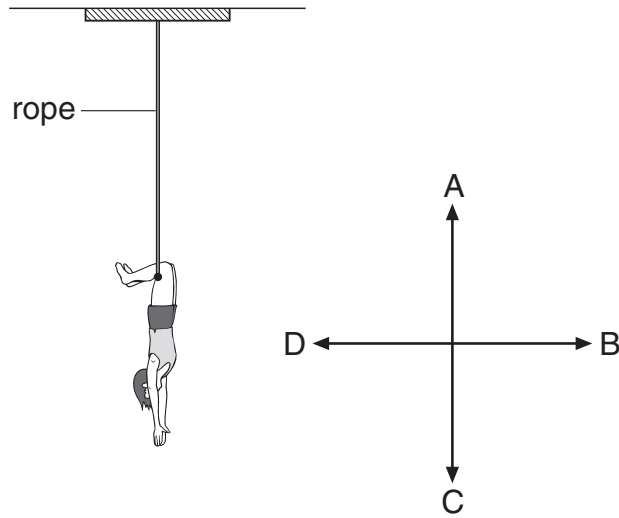
5bii  
1 mark

5ci  
1 mark

5cii  
1 mark

*maximum 6 marks*

6. The diagram below shows Jo hanging on a trapeze (swing) in a circus.



(a) (i) Which arrow, A, B, C or D, shows the direction of Jo's weight?

6ai

1 mark

\_\_\_\_\_

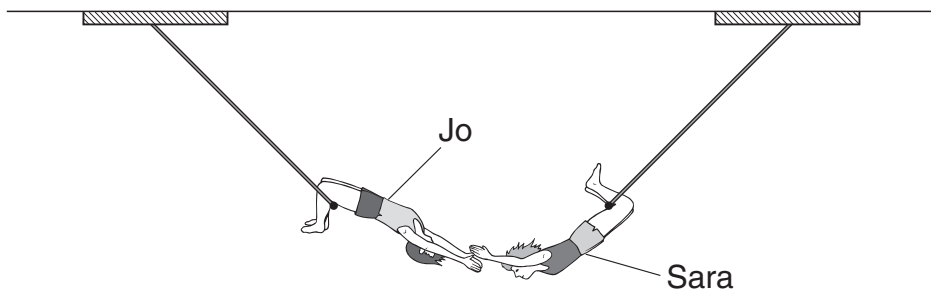
(ii) Which arrow, A, B, C or D, shows the direction of the force of the rope on Jo?

6aii

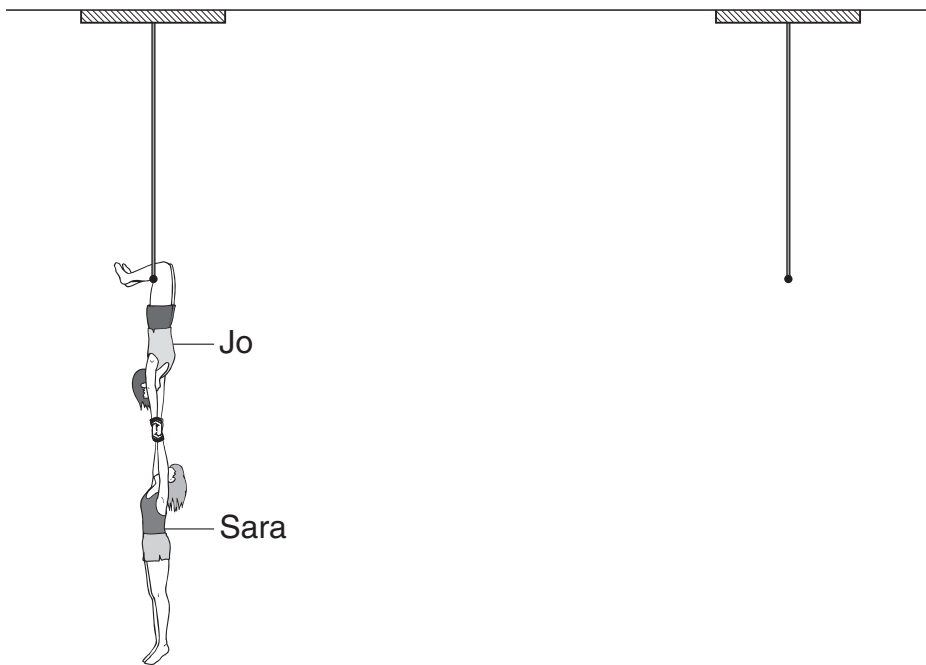
1 mark

\_\_\_\_\_

(b) Sara swings towards Jo.



Sara lets go of her trapeze and Jo catches her.



(i) What happens to the downward force on the rope of Jo's trapeze?  
Tick the correct box.

increases

decreases

stays the same

there is **no** force






6bi

1 mark

(ii) Explain your answer.

\_\_\_\_\_

6bii

1 mark

(c) Jo lets go of the trapeze and both Sara and Jo fall into a safety net below them.

What happens to the downward force on the rope when Jo lets go?

\_\_\_\_\_

6c

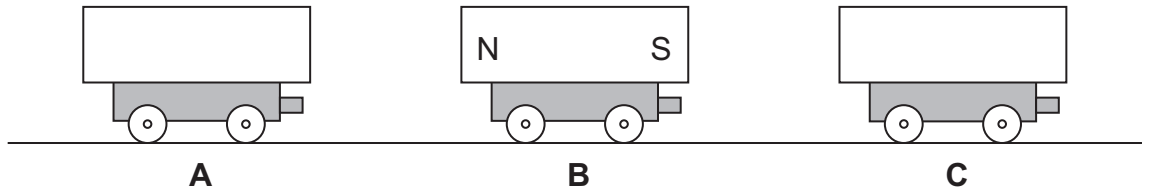
1 mark

*maximum 5 marks*

7. The diagram below shows three trolleys.  
Peter put a bar magnet on each trolley.

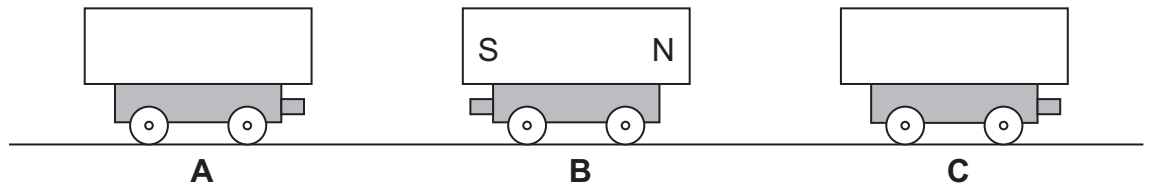
(a) He pushed trolleys A, B and C together.

- Magnet B **attracted** magnet A.
- Magnet B **repelled** magnet C.



**On the diagram above**, label the north and south poles of magnets A and C.  
Use the letters N and S.

(b) Peter turned trolley B around. Trolleys A and C were **not** turned around.



What would happen now when Peter pushed them all together?  
Use either **attract** or **repel** to complete each sentence below.

Magnet B would \_\_\_\_\_ magnet A.

Magnet B would \_\_\_\_\_ magnet C.

7a

1 mark

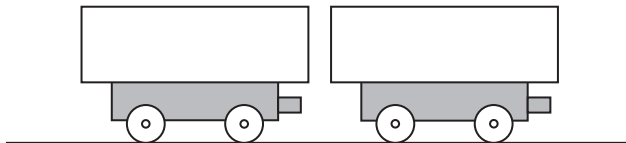
7a

1 mark

7b

1 mark

(c) Peter held two trolleys close together and then let go.



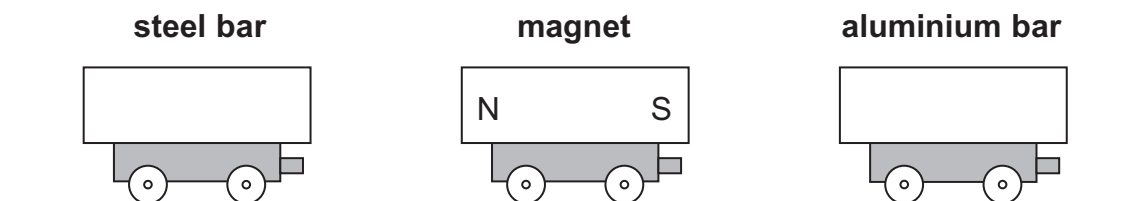
The magnets repelled each other.

**Draw an arrow** on both magnets to show which way they would move.

1 mark 7c

(d) Peter took a magnet, a steel bar and an aluminium bar.

He put them on three trolleys as shown below.



(i) What happens to the steel bar as he moves it closer to the magnet?

\_\_\_\_\_

1 mark 7di

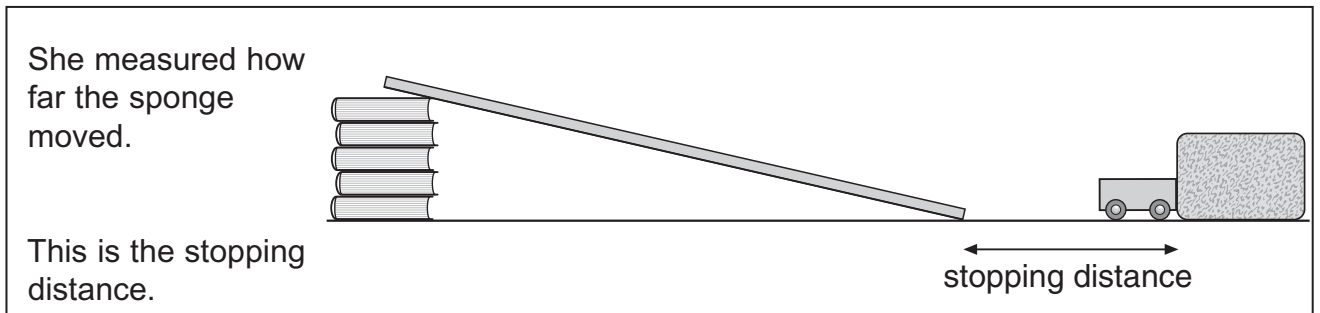
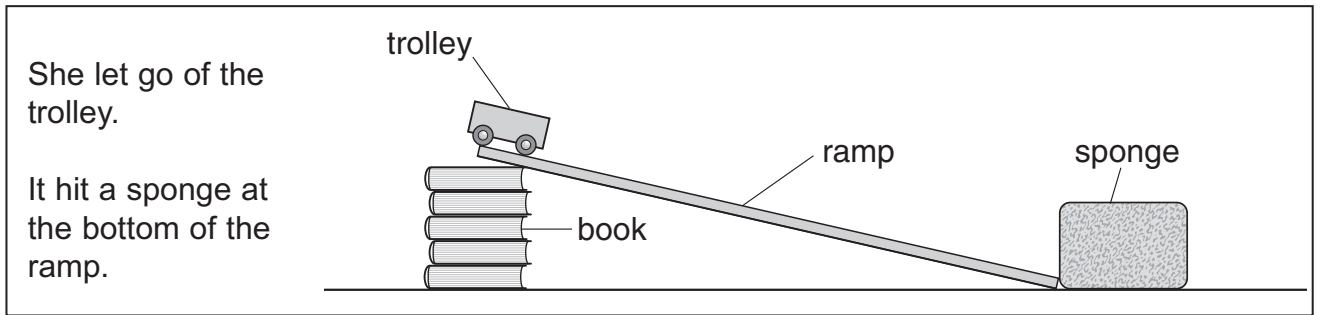
(ii) What happens to the aluminium bar as he moves it closer to the magnet?

\_\_\_\_\_

1 mark 7dii

*maximum 6 marks*

8. Yasmin investigated the stopping distance of a trolley.



(a) Yasmin did the investigation five times.  
She changed the steepness of the ramp each time.

(i) How could she make this ramp steeper?

\_\_\_\_\_

\_\_\_\_\_

(ii) Yasmin's results are shown in the table.

| steepness of ramp | stopping distance (cm) |
|-------------------|------------------------|
| A                 | 10                     |
| B                 | 16                     |
| C                 | 16                     |
| D                 | 28                     |
| E                 | 34                     |

She predicted, 'The steeper the ramp, the greater the stopping distance'.  
If Yasmin was correct, which ramp was the steepest? Write the letter.

\_\_\_\_\_

8ai

1 mark

8aii

1 mark



(iii) Yasmin looked at her results and decided she should repeat her investigation. Look at Yasmin's results.

Suggest why she decided to repeat her investigation.

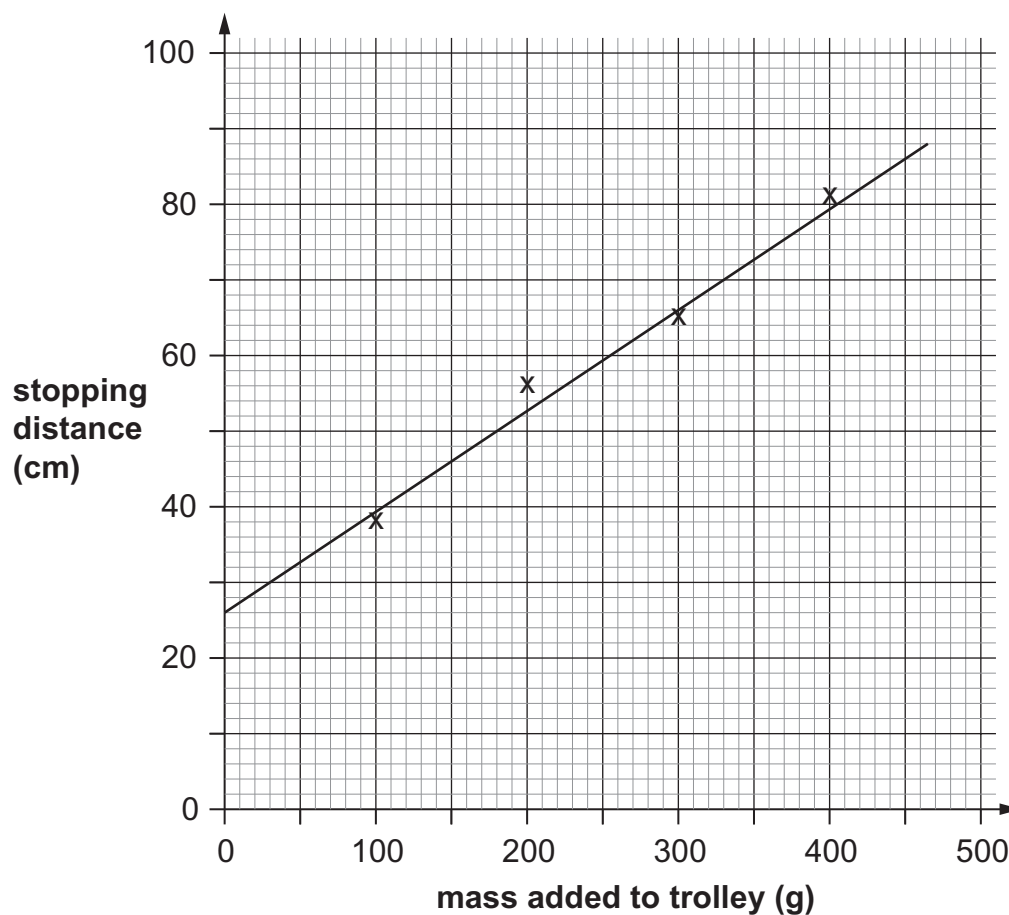
\_\_\_\_\_

8aiii

1 mark

(b) Yasmin then investigated the stopping distance of a trolley with different masses on it.

The graph shows her results.



(i) What would be the stopping distance if 0 g were on the trolley?

\_\_\_\_\_ cm

8bi

1 mark

(ii) Complete the sentence with **decreases**, **increases** or **stays the same**.

As the mass added to the trolley increases,

the stopping distance \_\_\_\_\_.

8bii

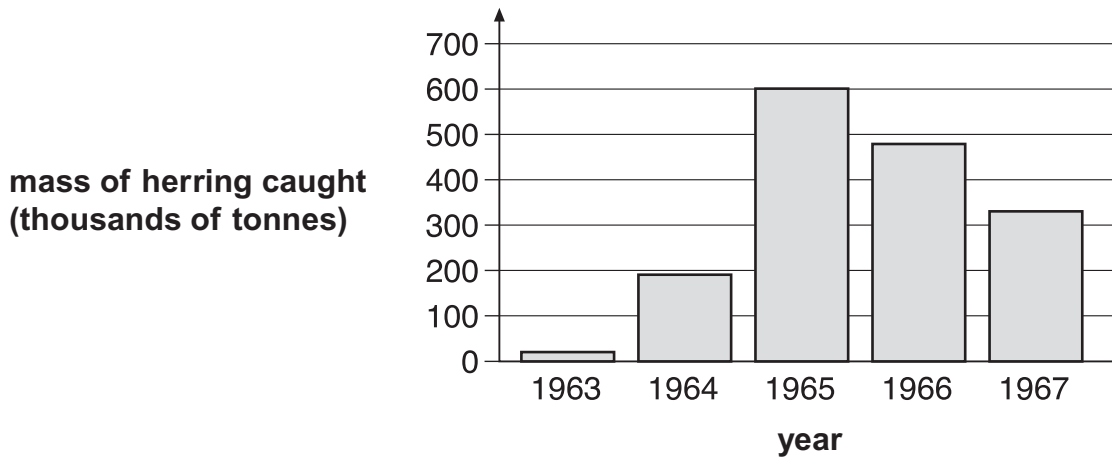
1 mark

*maximum 5 marks*

9. 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?

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

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9ai

1 mark

9aia

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**.

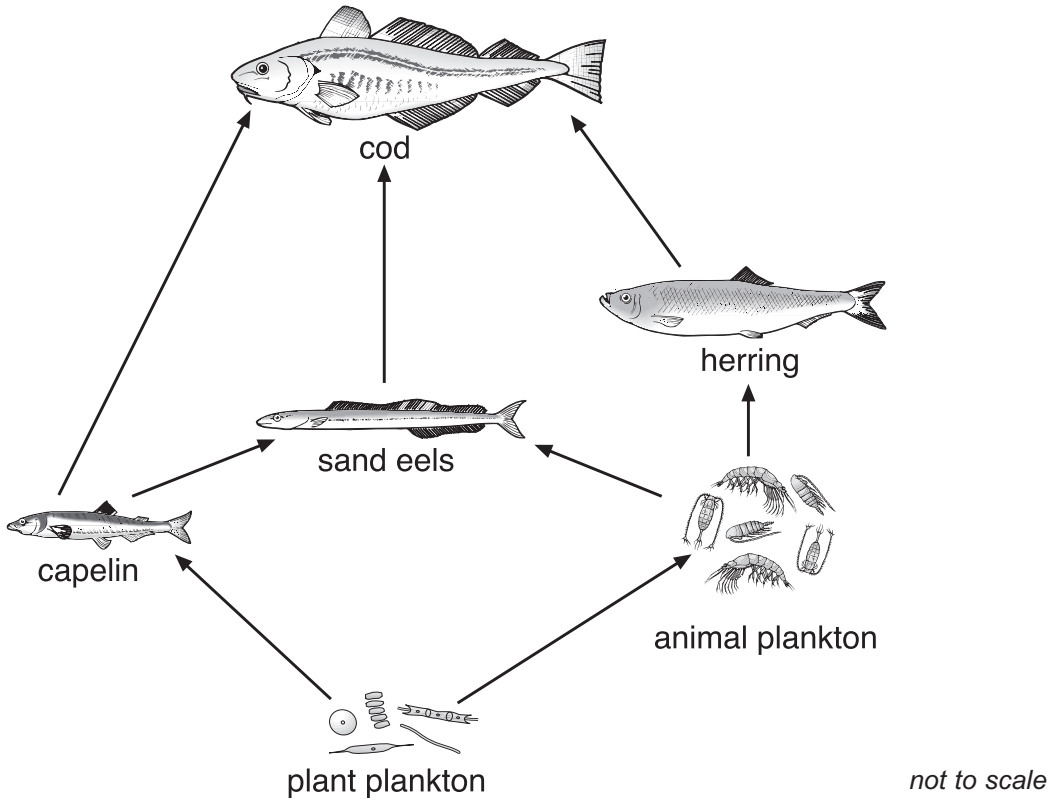
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9aiii  
 1 mark

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



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

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9bi  
 1 mark

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

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9bii  
 1 mark

*maximum 5 marks*

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

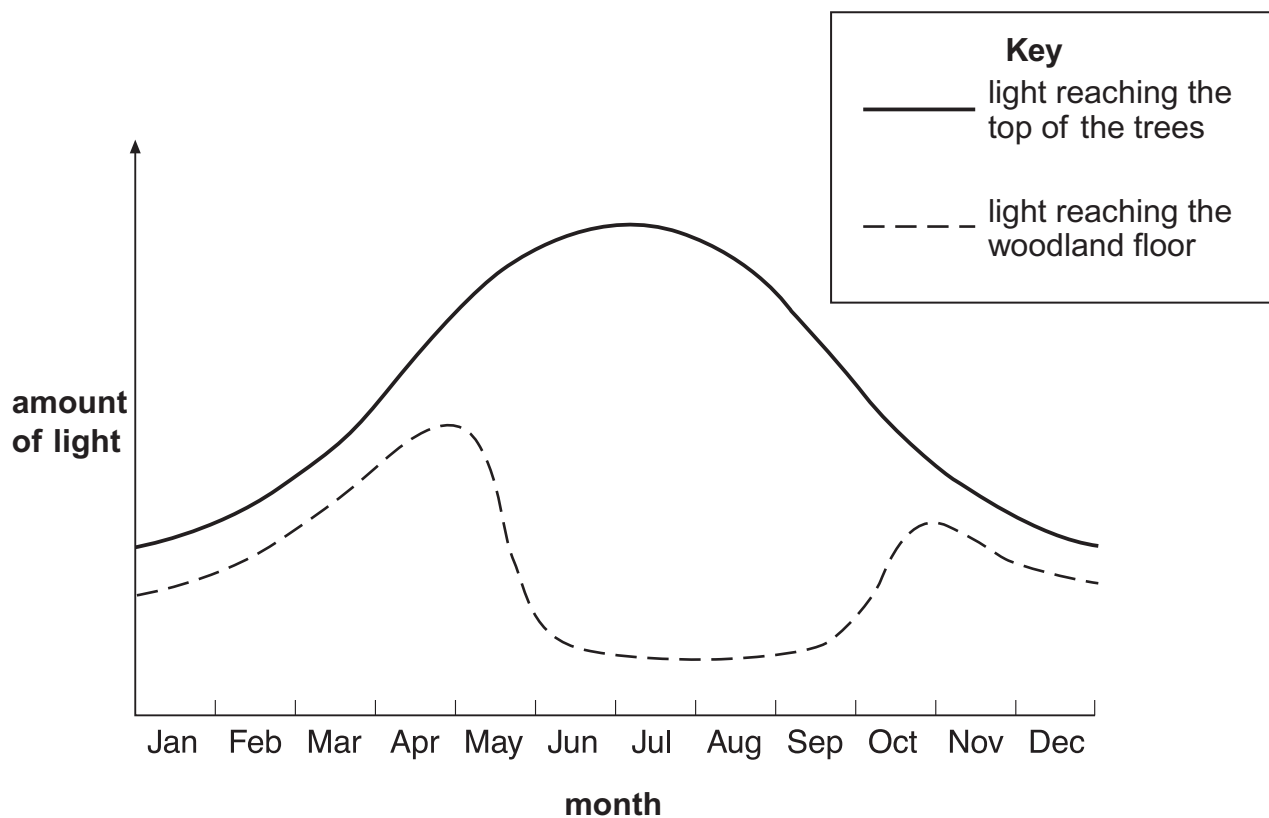


**beginning of May**



**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?

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10a

1 mark

(b) Plants grow on the woodland floor.

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

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10b

1 mark

10b

1 mark

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

Complete the word equation for **respiration**.

oxygen + \_\_\_\_\_  $\longrightarrow$  carbon dioxide + \_\_\_\_\_

10c

1 mark

10c

1 mark

*maximum 5 marks*

11. (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. \_\_\_\_\_



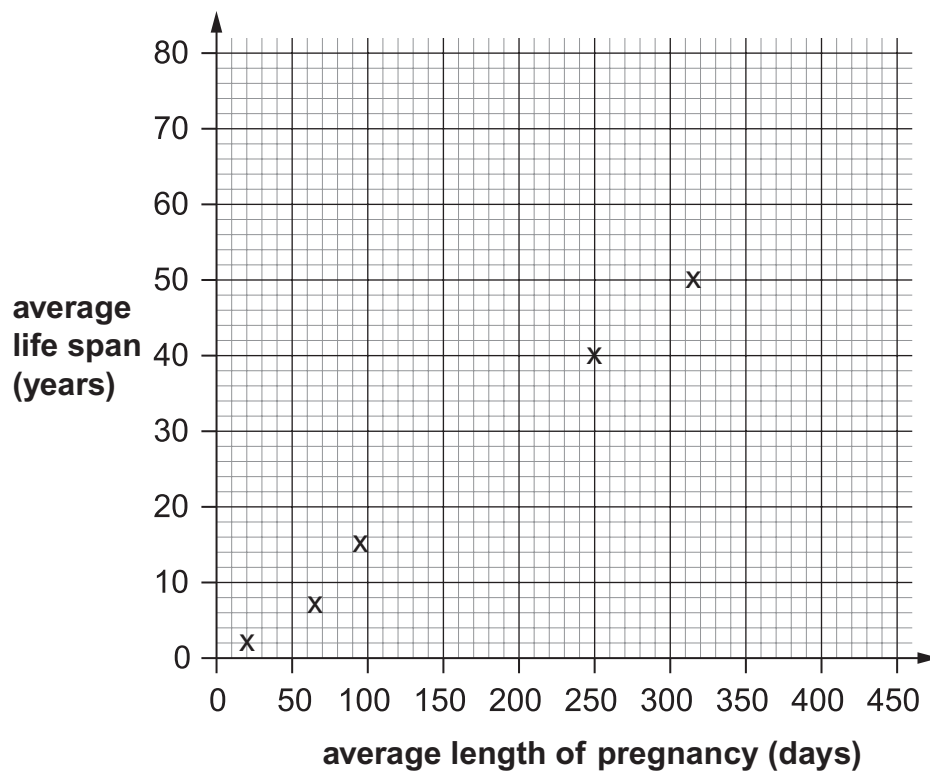
11a

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.

11bi  
1 mark

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

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11bii  
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                        |

11ci  
1 mark

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

11cii  
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.

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11cii  
1 mark

*maximum 6 marks*

12. (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?

12ai

1 mark

\_\_\_\_\_

- (ii) a solid at 1500°C?

12aii

1 mark

\_\_\_\_\_

- (iii) a gas at 500°C?

12aiii

1 mark

\_\_\_\_\_

- (iv) a liquid over the biggest temperature range?

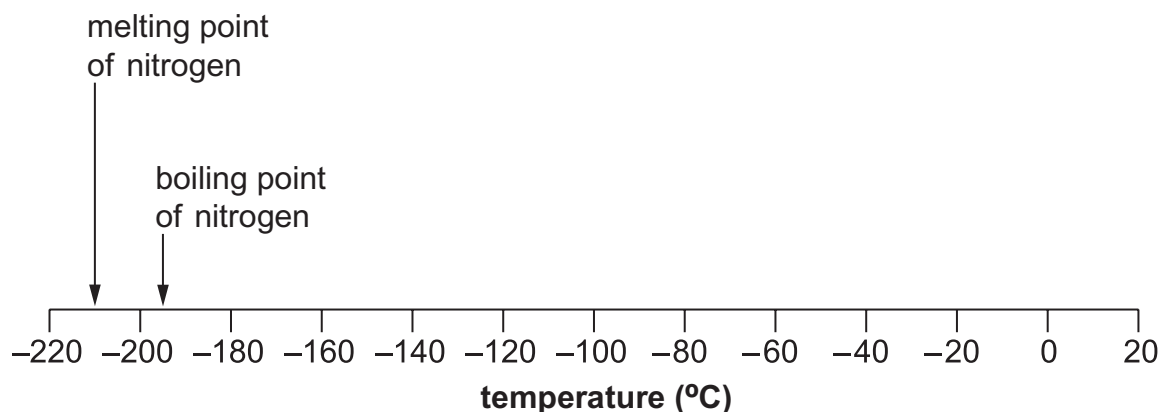
12aiv

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.

12bi  
1 mark

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

solid  liquid  gas

12bii  
1 mark

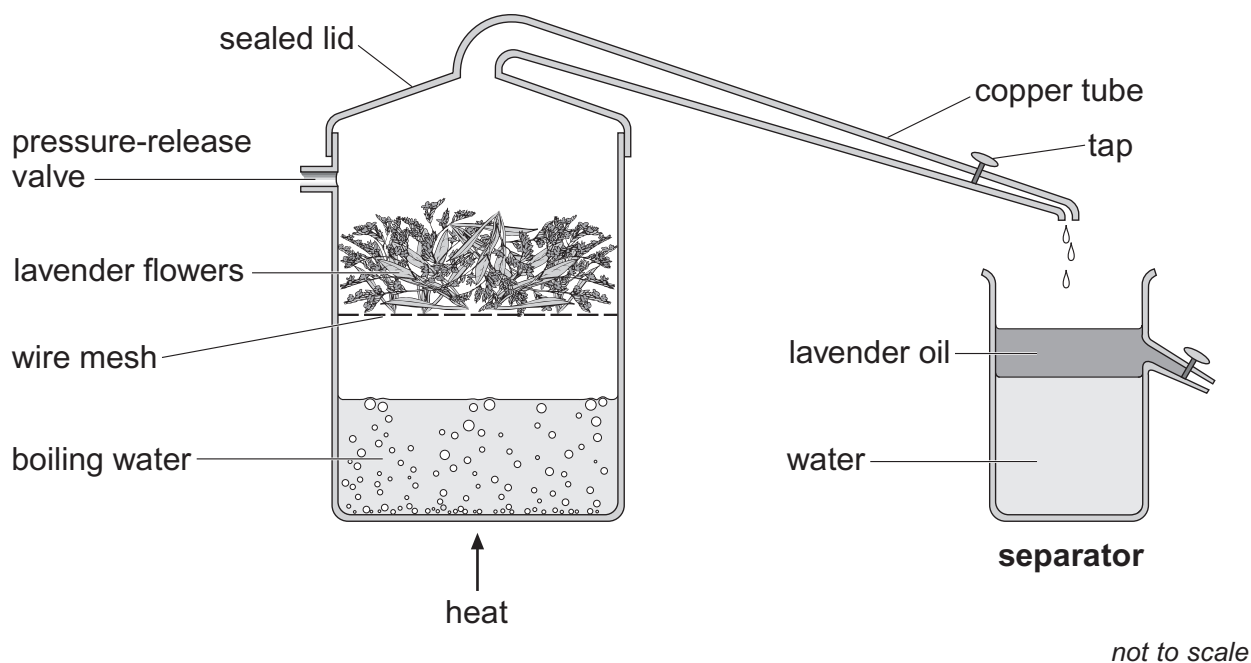
(iii) What is the physical state of nitrogen at  $-200^{\circ}\text{C}$ ?  
Tick the correct box.

solid  liquid  gas

12biii  
1 mark

*maximum 7 marks*

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



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?

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

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13ai  
1 mark

13aia  
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 \_\_\_\_\_

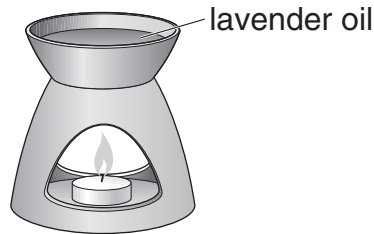
- (ii) Look at the separator.

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

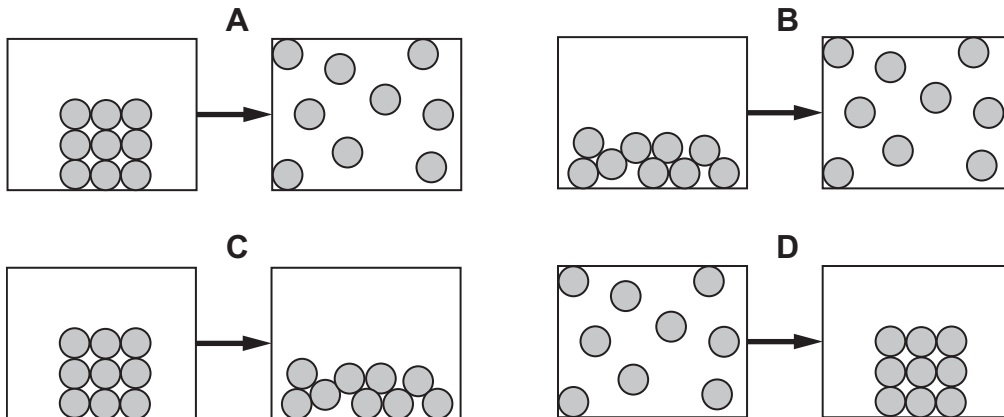
\_\_\_\_\_

\_\_\_\_\_

- (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.

\_\_\_\_\_

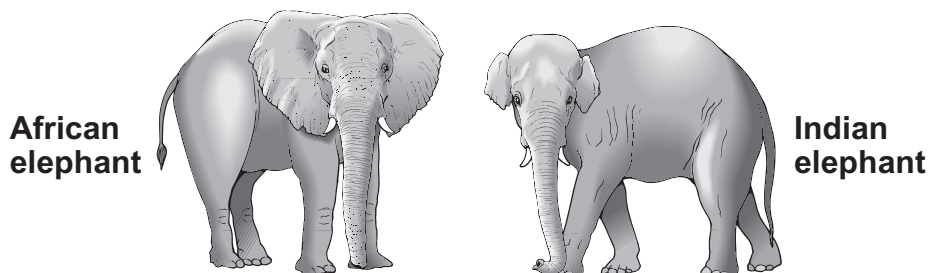
13bi  
1 mark

13bii  
1 mark

13c  
1 mark

*maximum 5 marks*

14. (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.

\_\_\_\_\_

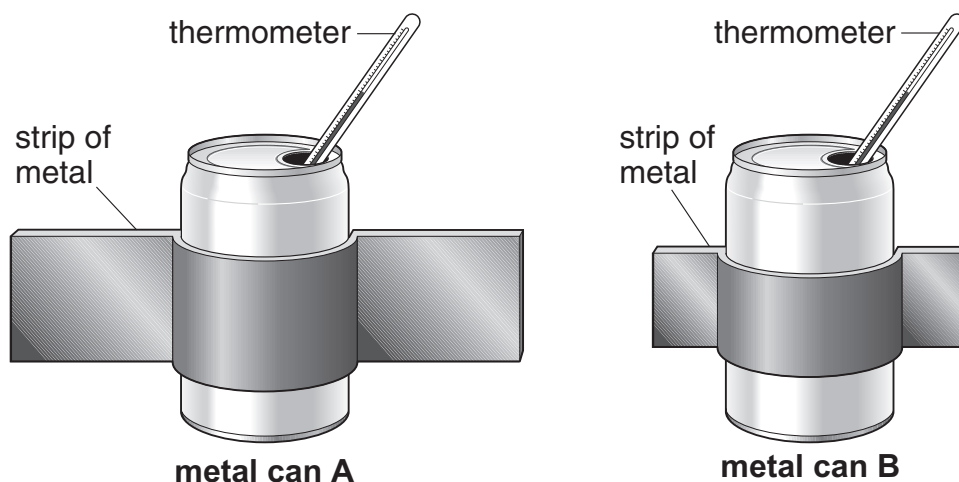
\_\_\_\_\_



14a

1 mark

(b) Ben filled two identical cans with 250 cm<sup>3</sup> 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.

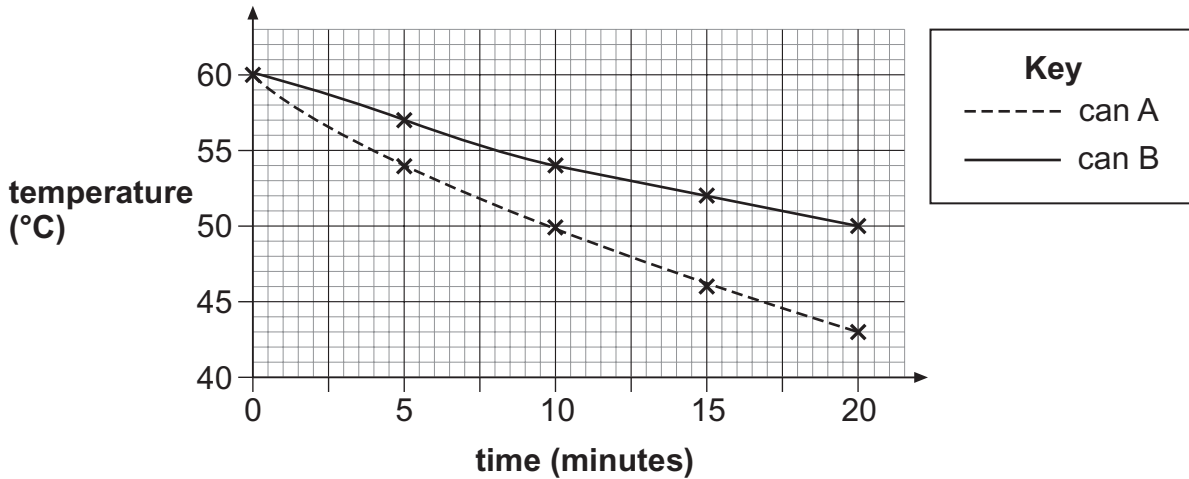
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14bi  
1 mark

- (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?

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14bii  
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.

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14biii  
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.

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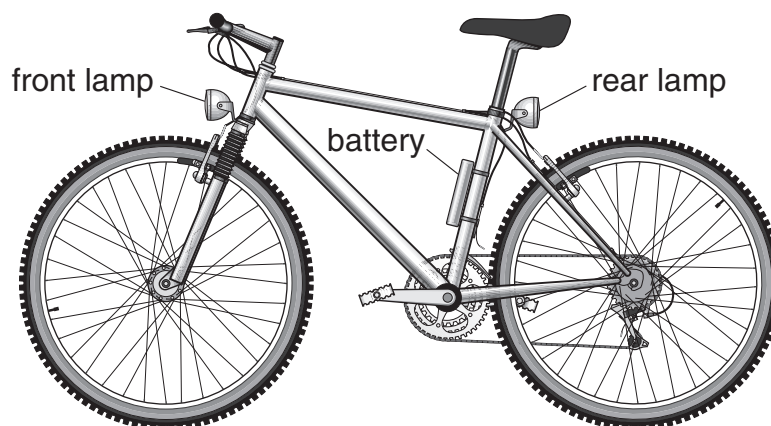


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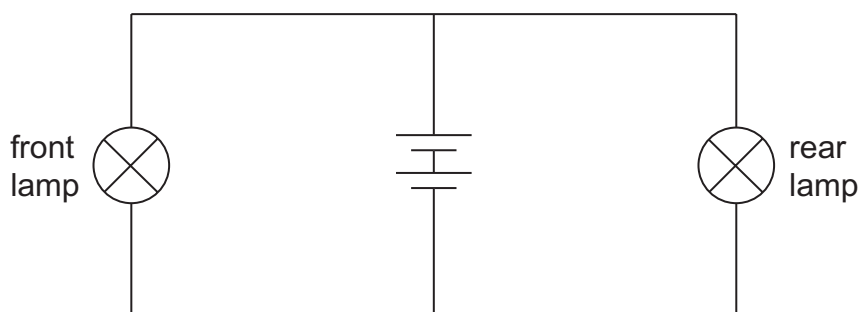
14c  
1 mark

*maximum 5 marks*

15. 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.

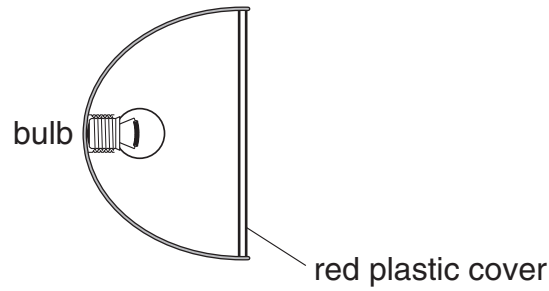


- (i) **On the circuit diagram above**, place a letter **A** to show the position of a switch to turn **only** the front lamp on and off.
- (ii) **On the circuit diagram above**, place a letter **B** to show the position of a switch to turn **both** lamps on and off at the same time.

15ai  
1 mark

15aia  
1 mark

- (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?

\_\_\_\_\_

15b  
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.

|                 |                   |                      |
|-----------------|-------------------|----------------------|
| <b>chemical</b> | <b>electrical</b> | <b>gravitational</b> |
| <b>kinetic</b>  | <b>light</b>      | <b>sound</b>         |
|                 | <b>thermal</b>    |                      |

As Nina pedals, \_\_\_\_\_ energy in her muscles is changed to kinetic energy.

15c  
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.

15c  
1 mark

15c  
1 mark

When the lamps are on, some of the energy in the bulb is wasted as \_\_\_\_\_ energy.

15c  
1 mark

*maximum 7 marks*

16. 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.

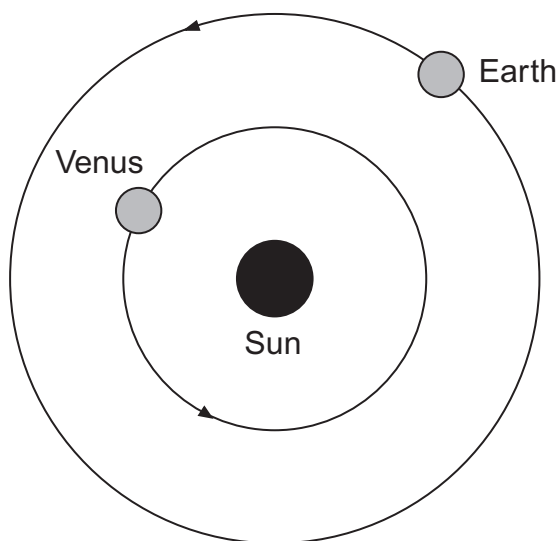
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16a

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*

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

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

16b

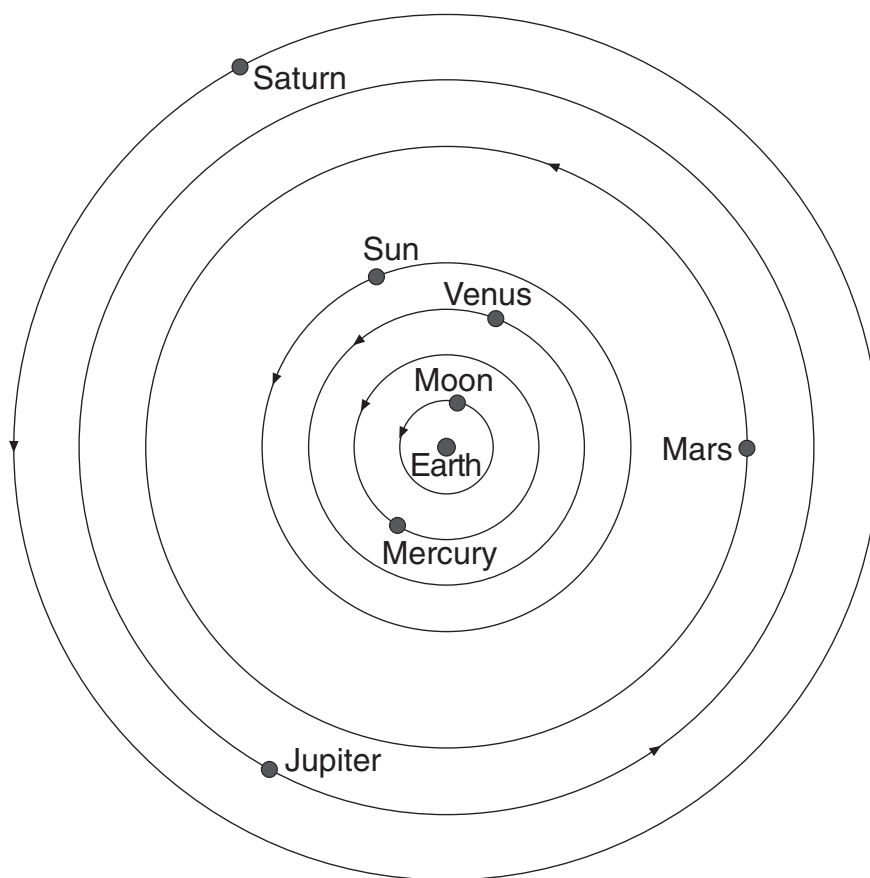
1 mark

16b

1 mark



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



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

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

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16ci  
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 \_\_\_\_\_

---

16cii  
1 mark

*maximum 5 marks*

**END OF TEST**

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