

Sc

KEY STAGE

3

TIER

5–7

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. **Diagram 1** shows a baby in its mother's uterus.

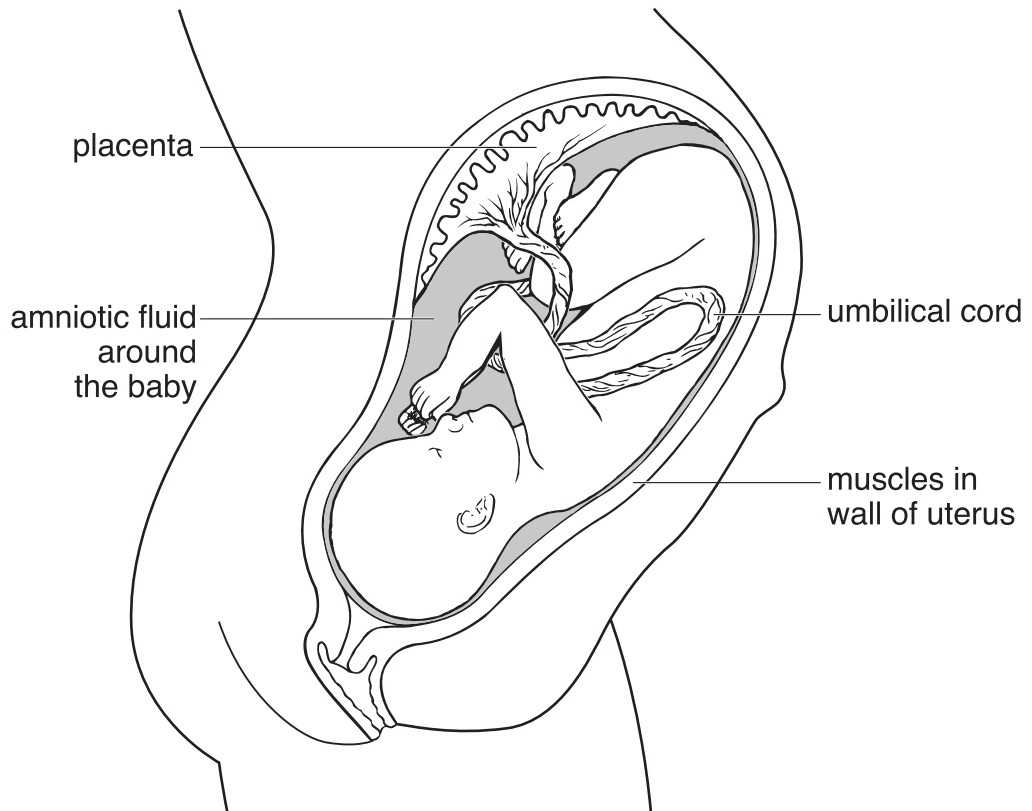


diagram 1

(a) What is the normal length of pregnancy in humans?

_____ months



1a

1 mark

(b) (i) What is the function of the amniotic fluid around the baby?



1bi

1 mark

(ii) As a baby is born, it is pushed out of the mother's body.

Look at the diagram above.

What happens in the wall of the uterus to push the baby out?



1bii

1 mark

(c) How does a baby get oxygen from its mother while it is inside its mother's uterus?

1c
1 mark

(d) **Diagram 2** shows a section through the mother's lungs.

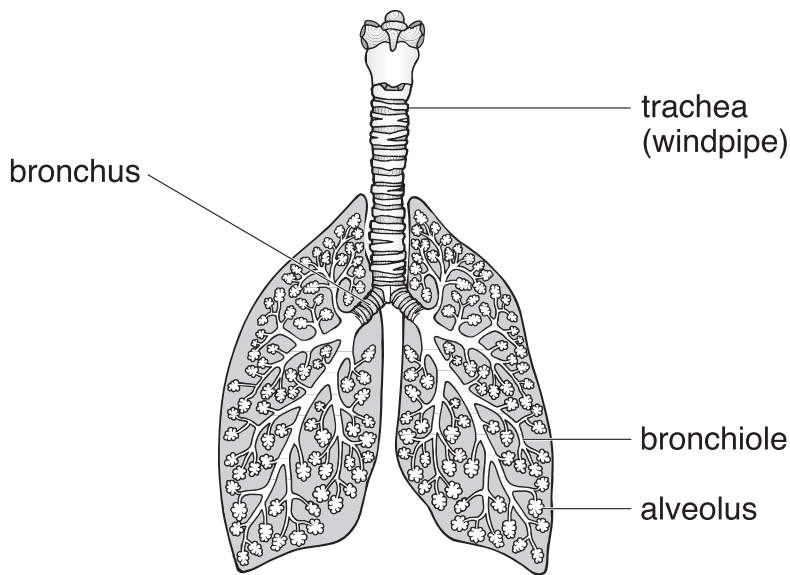


diagram 2

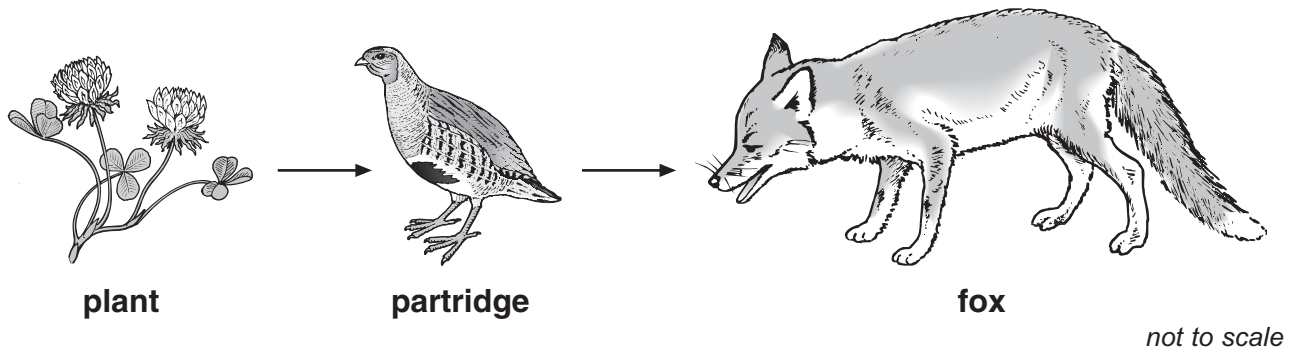
Look at **diagram 2**.

From which labelled part is oxygen absorbed into the blood?

1d
1 mark

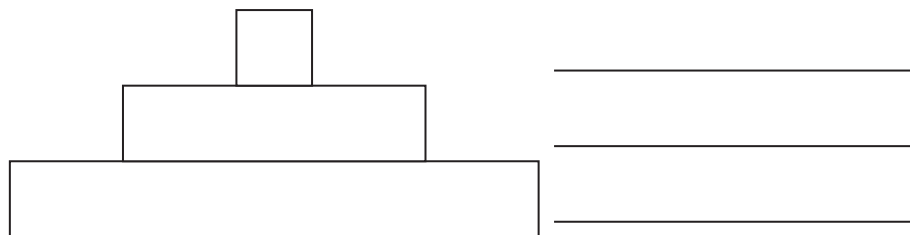
maximum 5 marks

2. The drawings show part of a farmland food chain.



(a) A pyramid of numbers represents the number of organisms at each stage in a food chain.

On each line by the pyramid of numbers below, write the name of the correct organism from the food chain above.



2a
1 mark

(b) Partridges feed mainly on insects and wild plants (weeds).

Some farmers spray their crops with chemicals to kill insects and weeds.

How would this affect the number of foxes?

Explain your answer.

2b
1 mark

-
- (c) Partridges build their nests on the ground among plants.
They lay up to 18 eggs in the nest.

Suggest why partridges need to lay so many eggs.

2c
1 mark

- (d) Some farmers leave a strip of land around the edge of each field which they do **not** spray with chemicals.

Suggest **two** reasons why this will lead to an increase in the number of partridges on these farms.

1.

2.

2d
1 mark

2d
1 mark

maximum 5 marks

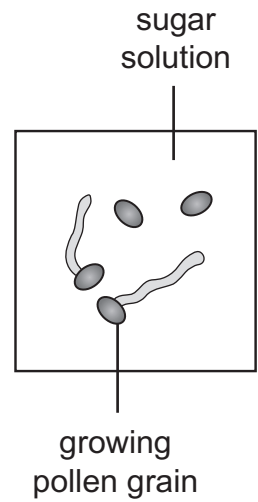
3. Amy and Tom investigated how sugar affects the growth of pollen grains. They looked at pollen grains under a microscope.

Amy's Plan

- Add some pollen grains to one drop of very concentrated sugar solution.
- Add some pollen grains to one drop of dilute sugar solution.
- Count how many pollen grains have started to grow.

Tom's Plan

- Add one drop of different concentrations (0%, 5%, 10%, 15%, 20% and 25%) of sugar solution to each slide.
- Add the same amount of pollen to each drop.
- One hour later count how many pollen grains have started to grow. Work out the percentage.



3a

1 mark

(a) Give **two** ways in which Tom's plan is better than Amy's plan.

1. _____

2. _____

3a

1 mark

(b) In Tom's investigation, what factor did he change (the independent variable)?

3b

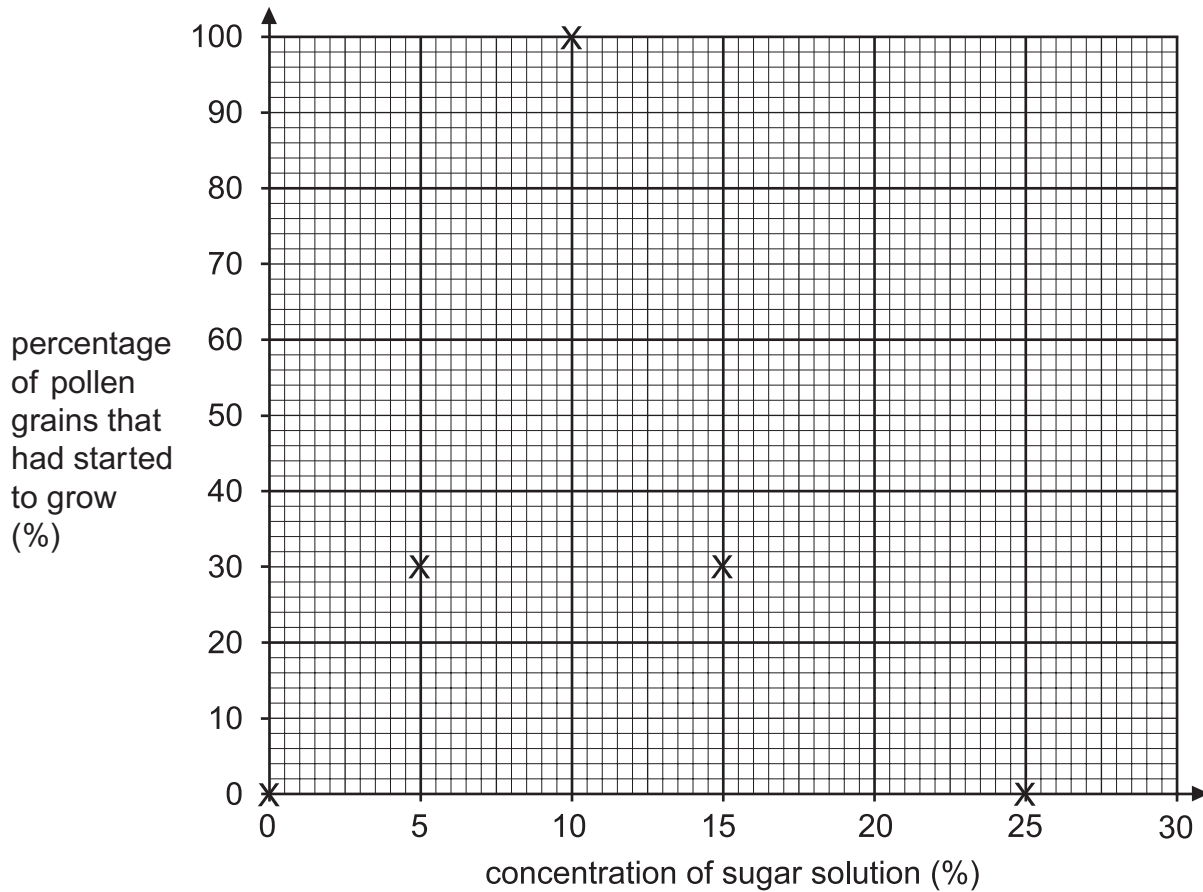
1 mark

(c) Look at Tom's results in the table below.

| concentration of sugar solution (%) | percentage of pollen grains that had started to grow (%) |
|-------------------------------------|--|
| 0 | 0 |
| 5 | 30 |
| 10 | 100 |
| 15 | 30 |
| 20 | 10 |
| 25 | 0 |

He plotted five of his results on graph paper.

Plot the result for 20% sugar solution.



3c
1 mark

- (d) Tom's conclusion was, 'The greater the concentration of sugar solution, the greater the percentage of pollen grains that had grown.'

Do his results support his conclusion?
Tick one box.

yes no

Use the results in the graph to explain your answer.

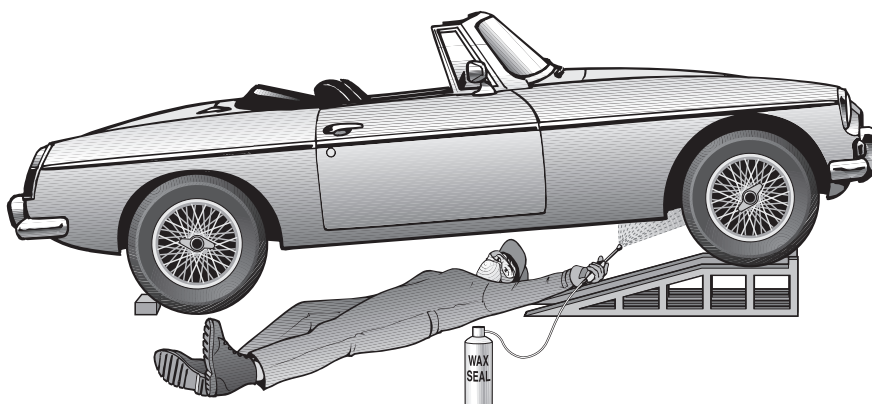
3d
1 mark

maximum 5 marks

4. Jill bought a can of Wax Seal to spray the parts underneath her car.



Wax Seal helps to prevent these parts rusting.
It is a mixture of wax and a liquid called white spirit.



(a) (i) The body of Jill's car is made from steel. Steel contains iron.

4ai

1 mark

Give **two** substances that are needed for iron to rust.

1. _____

2. _____

4ai

1 mark

(ii) How does Wax Seal help to protect the car from rusting?

4aii

1 mark

(iii) Wax Seal can also be used on the upper parts of a car.
What else protects parts such as the doors from rusting?

4aiii

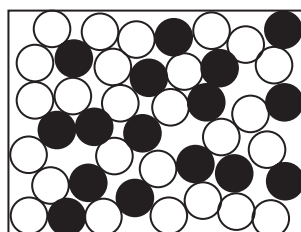
1 mark

(b) The metal parts of a car may corrode.
What type of air pollution could cause corrosion?

4b

1 mark

- (c) The diagram below shows the mixture of particles of wax and white spirit in Wax Seal.



key

- = particle of white spirit
● = particle of wax

not to scale

After Jill sprays the car, the white spirit evaporates leaving a layer of solid wax on the surface.

- (i) In the box below, draw **eight** circles, ○, to show the arrangement of particles in a gas.



particles in a **gas**

1 mark
4ci

- (ii) In the box below, draw **eight** circles, ●, to show the arrangement of particles in a solid.



particles in a **solid**

1 mark
4cii

maximum 7 marks

5. (a) Helen weighed three pieces of rock and soaked them in water. The next day, she weighed them again. Her results are shown below.

| rock | mass before soaking in water (g) | mass after soaking in water (g) |
|-----------|----------------------------------|---------------------------------|
| granite | 26.3 | 26.3 |
| marble | 20.4 | 20.4 |
| sandstone | 25.5 | 27.6 |

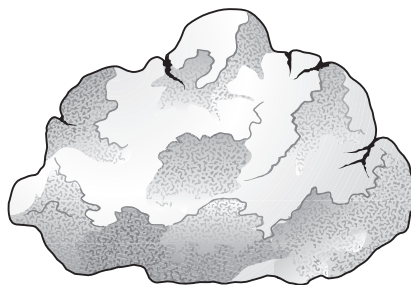
Rocks that have lots of small spaces are described as **porous**.

What evidence is there in the table that sandstone is porous, but granite and marble are **not** porous?

5a

1 mark

- (b) Helen put the soaked sandstone into a freezer for 24 hours.



Water in the spaces in the sandstone froze and expanded.

- (i) What would happen to the sandstone as the water froze and expanded?

- (ii) In the winter this process happens in rocks in the countryside. What is the name of this process?

5bi

1 mark

5bii

1 mark

- (c) Helen placed fresh pieces of granite, marble and sandstone in beakers of dilute sulphuric acid.
Only the marble reacted with the acid.

Use Helen's results to explain why granite is more suitable than marble for a statue in a city centre.

5c
1 mark

- (d) (i) Draw a line from the name of each rock below to the group of rocks it belongs to.
- (ii) Draw a line from each group of rocks below to the way the group of rocks was formed.

| name of rock | group of rocks | way the group of rocks was formed |
|--------------|----------------|--|
| granite | sedimentary | the effect of high temperature and pressure on limestone |
| marble | igneous | formed when magma cools |
| sandstone | metamorphic | particles are deposited in layers |

5di
1 mark

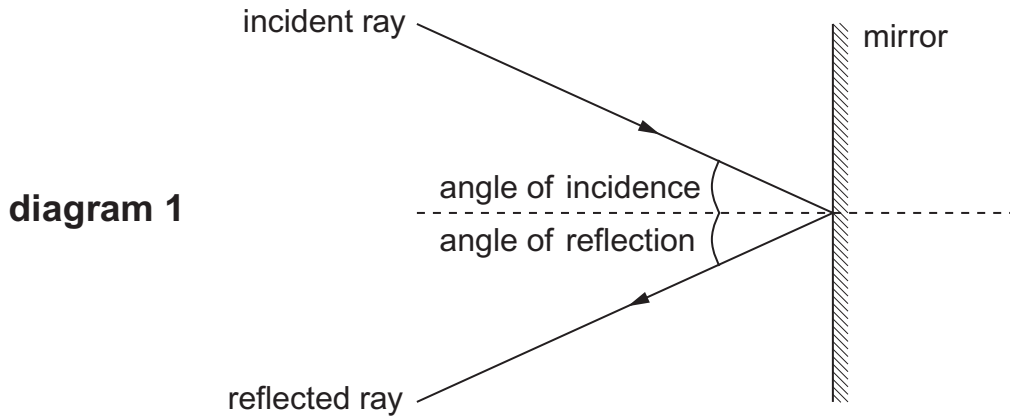
5di
1 mark

5dii
1 mark

5dii
1 mark

maximum 8 marks

6. James shone a ray of light at a mirror as shown below.



He measured the angle of **reflection** for different angles of incidence. His results are shown below.

| | | | | | |
|---|----|----|----|----|----|
| angle of incidence ($^{\circ}$) | 30 | 40 | 50 | 60 | 70 |
| angle of reflection ($^{\circ}$) | 30 | 40 | 50 | 65 | 70 |

(a) Which angle of reflection was **not** measured accurately?

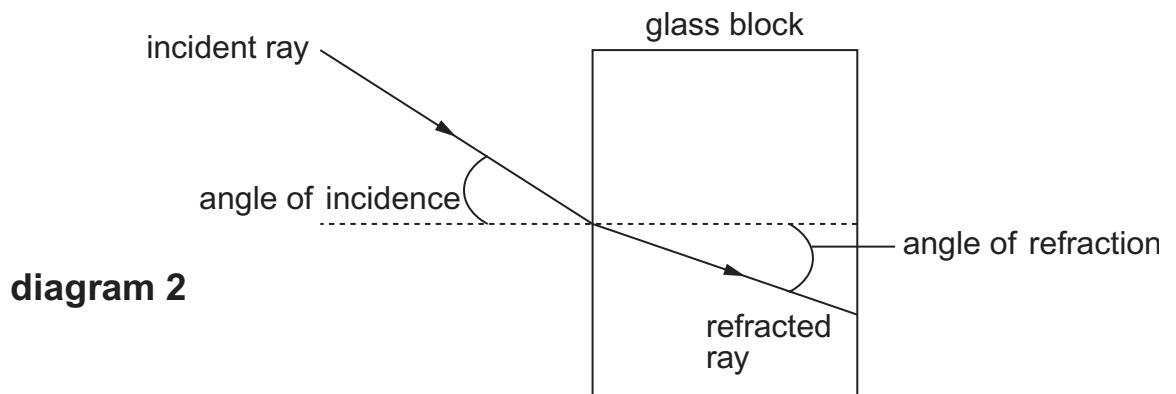
_____ $^{\circ}$

How can you tell this from the table?

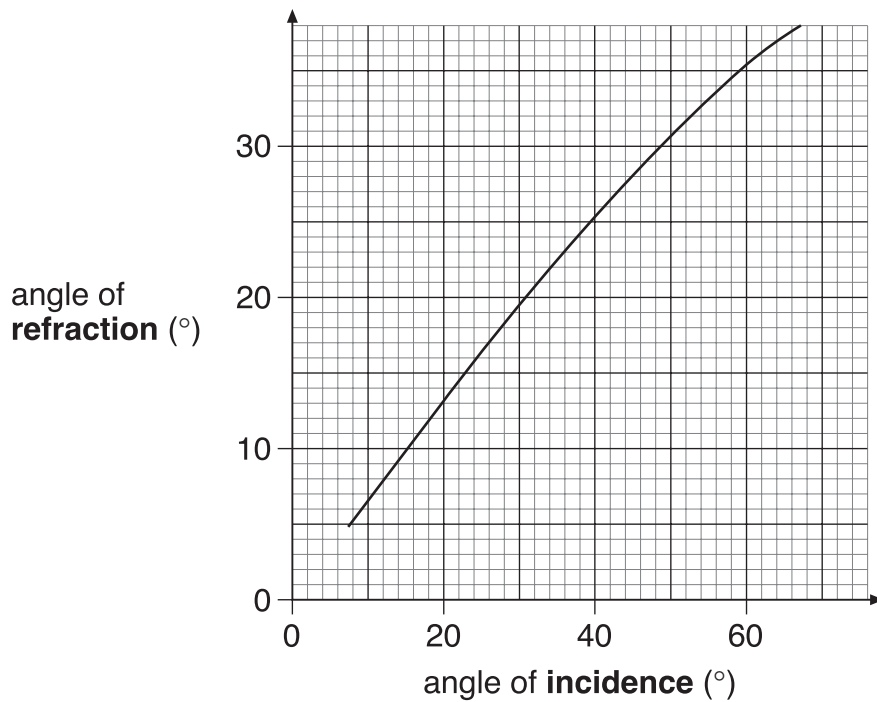
6a

1 mark

(b) James set up a different experiment as shown below.



He measured the angle of **refraction** for different angles of incidence. His results are shown in the graph.



Use the graph to answer the questions below.

- (i) When the angle of **refraction** is 20° , what is the angle of **incidence**?

_____°

6bi
1 mark

- (ii) What conclusion could James draw from his graph?
Complete the sentence below.

When light passes from air into glass, the angle of **incidence** is

always _____ the angle of **refraction**.

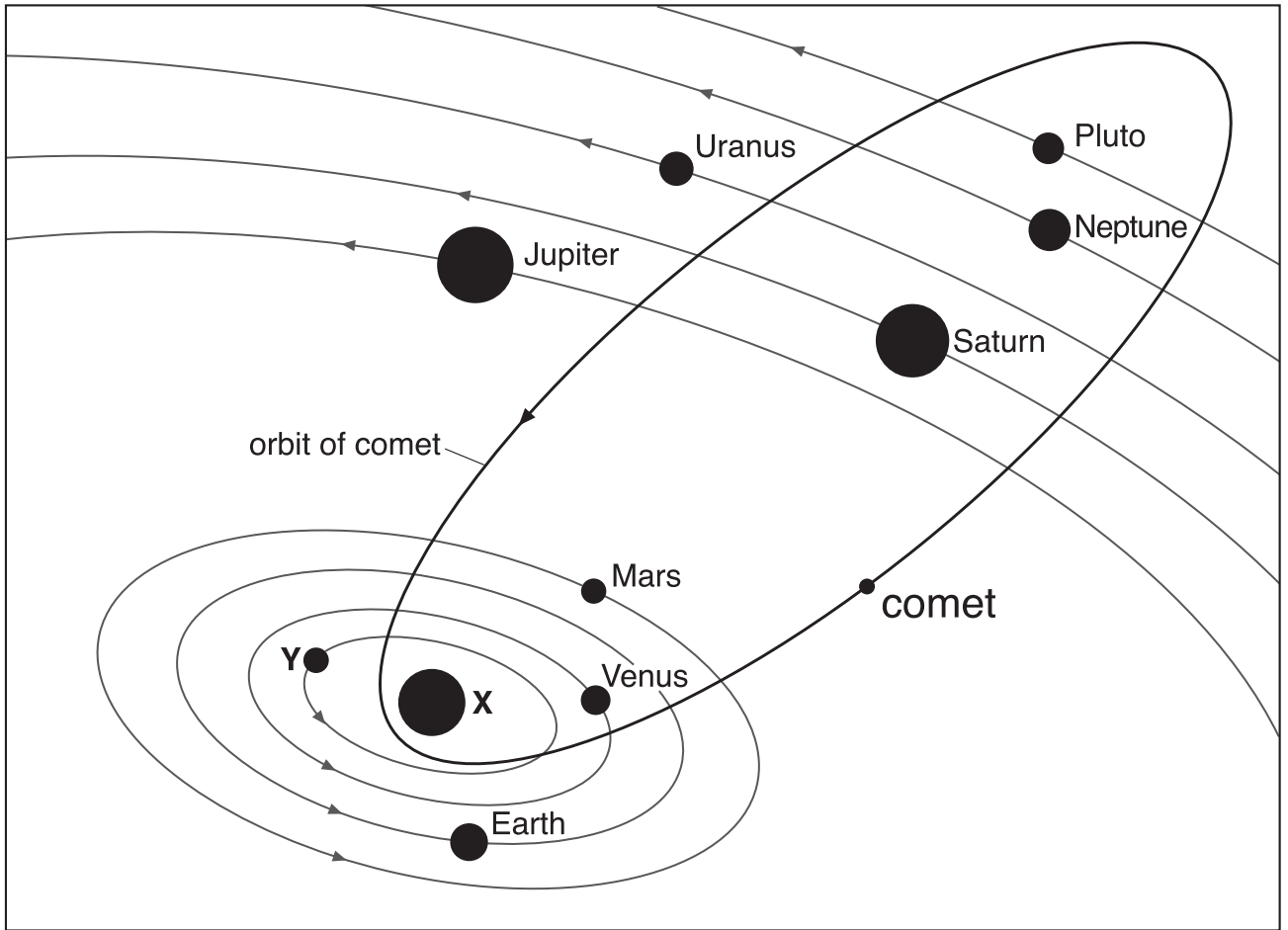
6bii
1 mark

- (c) **On diagram 2, on the opposite page**, draw a line to continue the refracted ray as it leaves the glass block.

6c
1 mark

maximum 4 marks

7. The diagram below shows part of the solar system.



not to scale

(a) Look at the diagram.
Give the names of X and Y.

X _____

Y _____

(b) It takes Jupiter much longer than Mars to complete one orbit.
Give **two** reasons for this.

1. _____

2. _____

7a

1 mark

7a

1 mark

7b

1 mark

7b

1 mark

(c) The diagram opposite also shows the orbit of a comet.

In 1531, 1607 and 1683 scientists recorded that they had seen a comet in the sky.

(i) Edmund Halley looked at these dates and suggested the scientists had all seen the same comet.

Explain how he worked out that it was the same comet each time.

7ci
1 mark

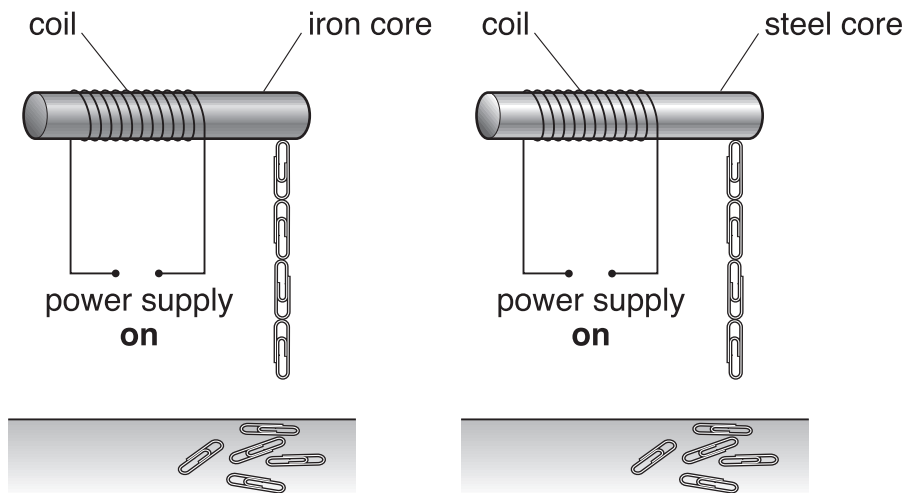
(ii) The comet was last seen in 1986.

Predict when it will be seen next.

7cii
1 mark

maximum 6 marks

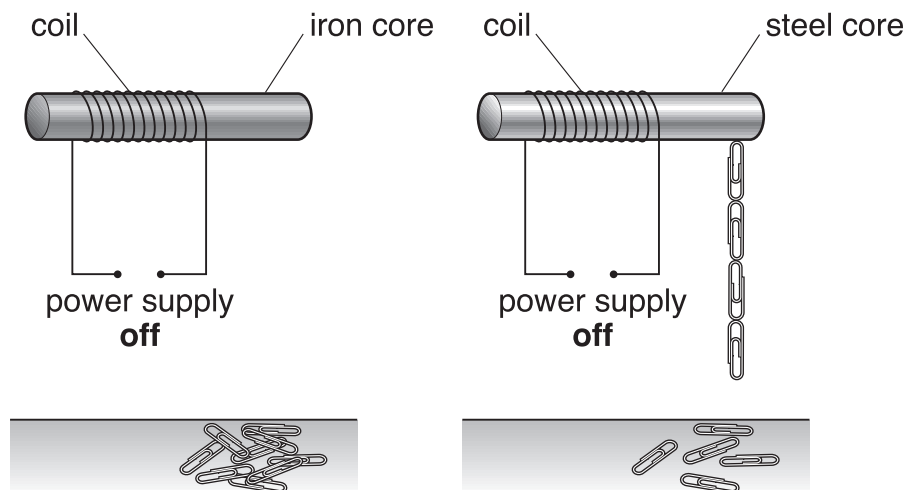
8. David made two electromagnets as shown below. He used paper-clips to test the strength of each electromagnet. He switched on the power supply in both circuits.



- (a) How can you tell that the strength of both electromagnets is the same?

8a
1 mark

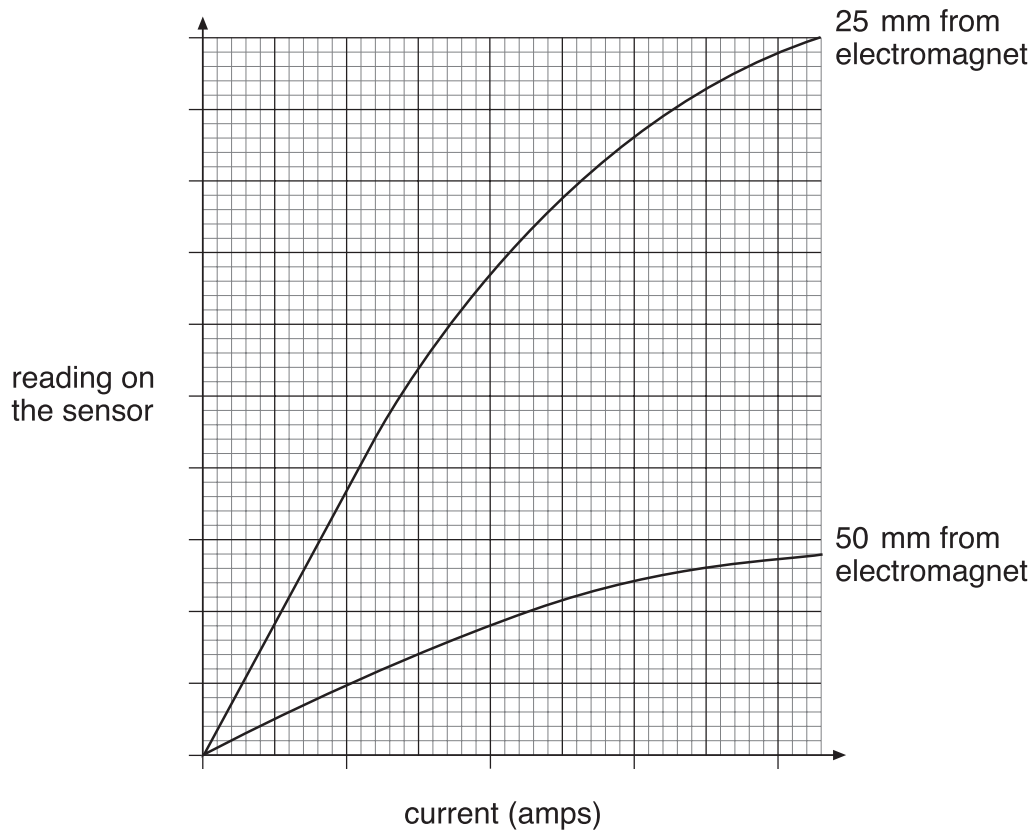
- (b) David switched off the power supply in both circuits. The paper-clips fell off the iron core, but **not** off the steel core.



Why is iron used, rather than steel, for the core of an electromagnet?
Use the diagrams above to help you.

8b
1 mark

- (c) David used a sensor to measure the strength of an electromagnet. He placed the sensor 25 mm from the electromagnet and increased the current in the coil. He repeated the experiment with the sensor 50 mm from the electromagnet. The graph below shows his results.



- (i) How did the distance of the sensor from the electromagnet affect the reading on the sensor?

8ci
1 mark

- (ii) How did the size of the current in the coil affect the strength of the electromagnet?

8cii
1 mark

- (iii) What else could David do to an electromagnet to change its strength?

8ciii
1 mark

maximum 5 marks

9. The drawings show identical twins, Sara and Helen, and their parents.



father



mother



Sara



Helen

(a) (i) Sara and Helen have blue eyes like their mother.

Describe how genetic information is passed on from a parent to a child.

9ai

1 mark

9ai

1 mark

(ii) Sara and Helen have brown hair like their father and blue eyes like their mother.

Why do children have characteristics of both parents?

9aii

1 mark

(b) Sara and Helen are identical twins.

Why do they have identical characteristics?

9b
1 mark

(c) Sara now spends a lot of her time working outdoors in a hot country. Helen now works in an office in England.

The table shows information about three human characteristics.

| characteristic | Is it identical for Sara and Helen? |
|----------------|-------------------------------------|
| eye colour | yes |
| skin colour | no |
| weight | no |

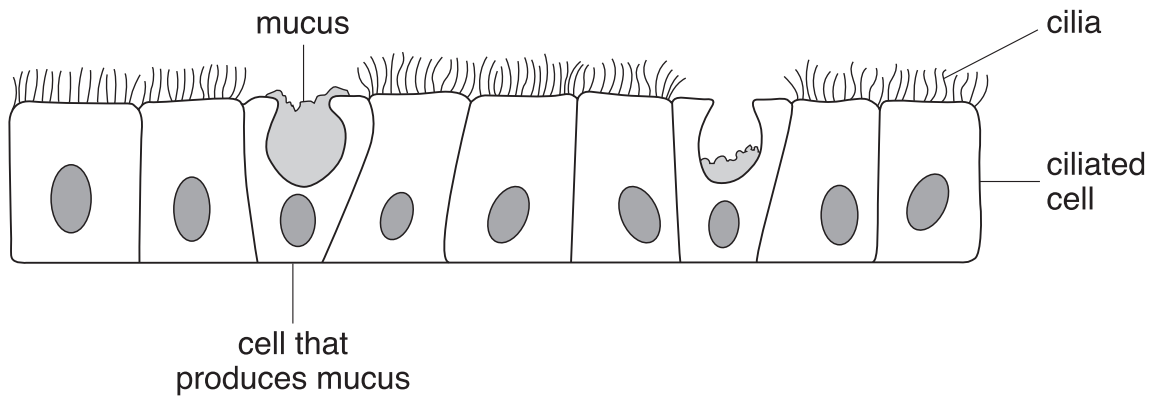
Explain why their eye colour is identical but their weight and skin colour are **not** identical.

9c
1 mark

9c
1 mark

maximum 6 marks

10. (a) The diagram shows two types of cell in the lining of the airway leading to the lungs.



When a person breathes in cigarette smoke, cilia are damaged and much more mucus is produced.
What will be the consequences of this?

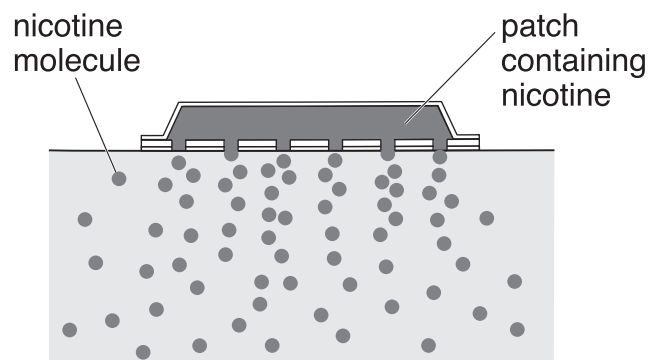
10a
1 mark

10a
1 mark

- (b) Sharna is addicted to smoking and wants to stop.
Instead of smoking she puts nicotine patches on her skin.



**nicotine patch
on Sharna's skin**



**a section through a nicotine patch
on Sharna's skin**

The table shows the mass of nicotine in different patches and the number of weeks each type of patch is used over an eight-week period.

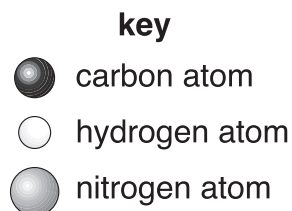
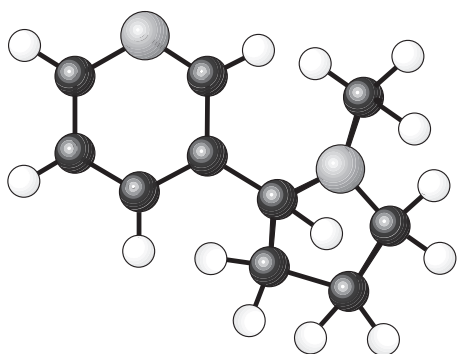
| mass of nicotine in each patch (mg) | weeks |
|-------------------------------------|-------|
| 21 | 1–4 |
| 14 | 5–6 |
| 7 | 7–8 |

Use information in the table to describe how this eight-week course of treatment should help to reduce Sharna's addiction to smoking.

10b
1 mark

10b
1 mark

- (c) The diagram below shows a nicotine molecule. It contains atoms of three elements.



- (i) Nicotine is a compound. How does the diagram show this?

10ci
1 mark

- (ii) When nicotine in a cigarette is burned in air, nitric oxide is formed from the nitrogen in the nicotine.

Look at the elements in nicotine.

Give the names of **two** other compounds formed when nicotine burns in air.

1. _____

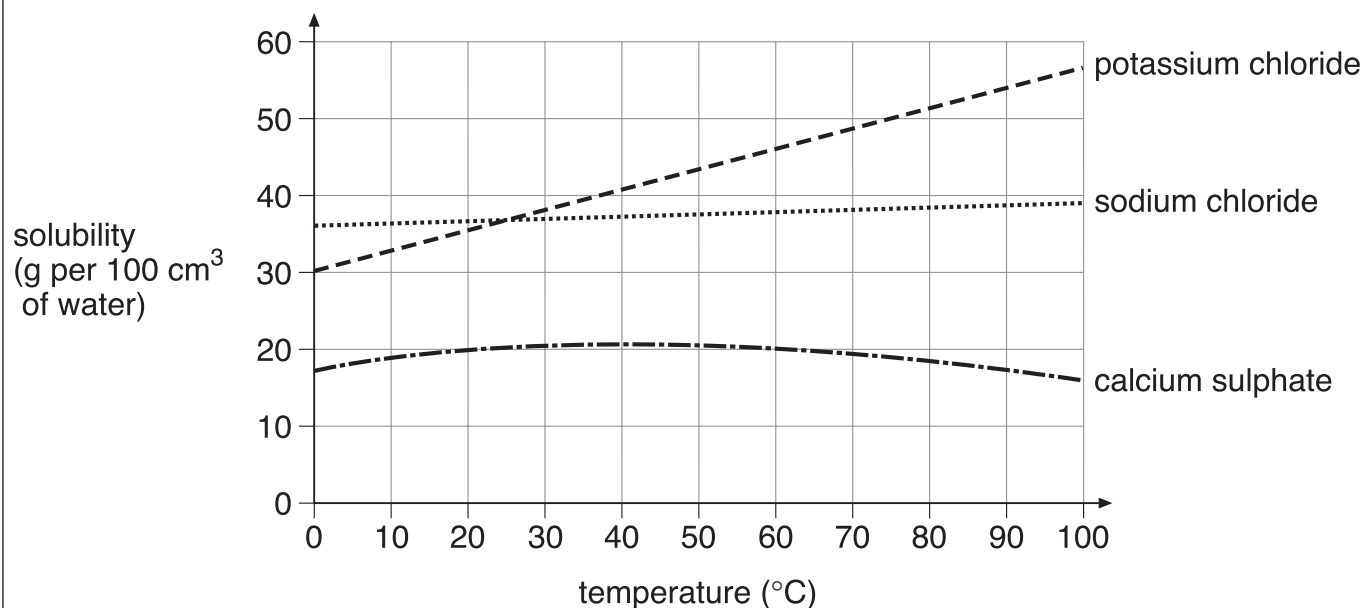
2. _____

10cii
1 mark

10cii
1 mark

maximum 7 marks

11. The graph below shows how the solubility of three salts, sodium chloride, potassium chloride and calcium sulphate, changes as the temperature changes.



(a) (i) Use the graph above to compare the solubility of sodium chloride and potassium chloride in the temperature range 10°C to 90°C.

11ai

1 mark

11ai

1 mark

(ii) Ken had a beaker containing 54 g of potassium chloride dissolved in 100 cm³ of water at 90°C. He cooled the solution to 40°C.

What would he see in the beaker as the solution cooled to 40°C? Use the graph to help you.

Explain your answer.

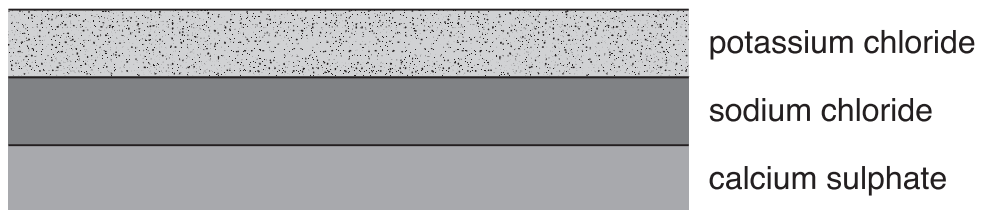
11aii

1 mark

11aii

1 mark

- (b) The water in a lake had the three salts dissolved in it. The water evaporated from the lake and the salts were deposited in layers in the order shown below.



Look at the graph on the opposite page.

- (i) What evidence is there that these three salts were deposited at a temperature above 25°C?

11bi
1 mark

- (ii) In what order would the salts be deposited at 10°C?

top _____

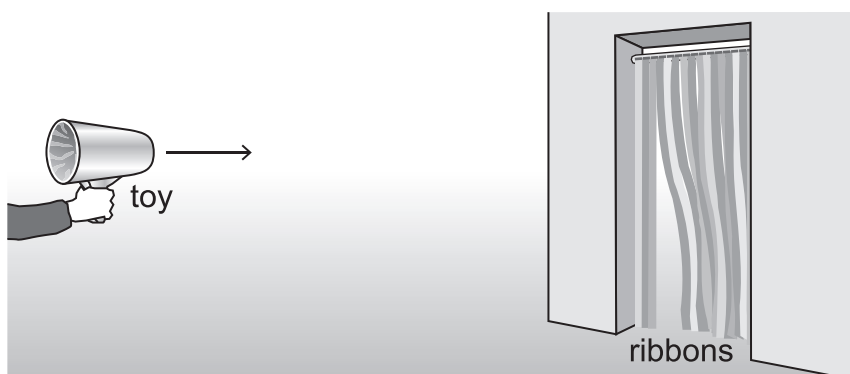
middle _____

bottom _____

11bii
1 mark

maximum 6 marks

12. John has a toy that fires a 'pulse of air'. He fires it at ribbons in a doorway. The ribbons move when the pulse of air hits them.



- (a) John's friend measured how long it took for a pulse of air to travel different distances to the ribbons.

He used a digital stopwatch to measure the time between firing the toy and the ribbons moving.

He took six measurements of time at each distance.

He recorded his results in a table.

| distance from toy to ribbons (m) | time measured (s) | | | | | | average time (s) |
|----------------------------------|-------------------|------|------|------|------|------|------------------|
| | | | | | | | |
| 6 | 0.37 | 0.45 | 0.48 | 0.33 | 0.29 | 0.42 | 0.4 |
| 10 | 0.66 | 0.77 | 0.73 | 0.72 | 0.76 | 0.70 | 0.7 |
| 14 | 1.24 | 1.31 | 1.27 | 1.67 | 1.18 | 1.19 | 1.3 |
| 18 | 2.30 | 2.27 | 2.39 | 2.15 | 2.23 | 2.34 | 2.3 |

Give **one** cause of the differences in the measurements of the time for the same distance.

- (b) John's teacher said, 'In other investigations we have usually plotted time on the x-axis and distance on the y-axis of a graph. We should do the opposite with the data in the table.'

Explain why the y-axis should be labelled with time in this investigation.

12a

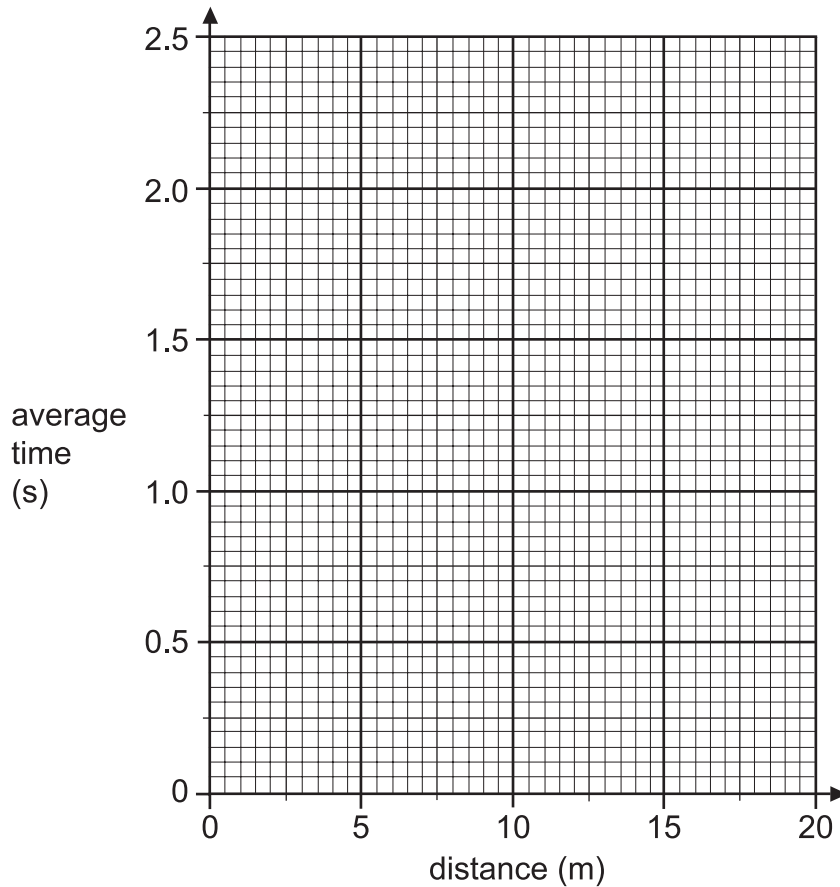
1 mark

12b

1 mark

(c) (i) Plot the average times against distance on the graph below.

12ci
1 mark



(ii) Draw a curve of best fit on the graph.

12cii
1 mark

(d) Which of the following statements is the most likely explanation of why the line on the graph is curved?

Tick one box.

The pulse of air spreads out as it travels.

The pulse of air slows down as it travels.

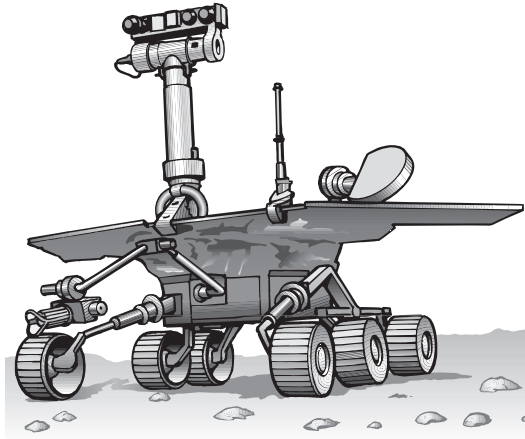
The pulse of air travels at constant speed.

The pulse of air does **not** travel in a straight line.

12d
1 mark

maximum 5 marks

13. The drawing below shows a space buggy on the surface of Mars.



(a) The distance between Earth and Mars is 192 000 000 km.

It took a spacecraft 200 days to take the buggy from Earth to Mars.

Calculate the speed at which the spacecraft travelled.
Give the unit.

13a

1 mark

13a

1 mark

(b) The weight of the buggy was 105 N on Earth and 40 N on Mars.

Why was the weight of the buggy less on Mars than on Earth?

13b

1 mark

-
- (c) The buggy uses solar panels to generate electrical energy.

The solar panels generate less electrical energy on Mars than on Earth.
Give a reason why.

13c
1 mark

- (d) The weight of the buggy was 40 N on Mars.
When the buggy landed on Mars it rested on an area of 0.025 m².

Calculate the pressure exerted by the buggy on the surface of Mars.
Give the unit.

13d
1 mark

13d
1 mark

END OF TEST

maximum 6 marks

