

Sc

KEY STAGE

3

TIER

3–6

Science test

Paper 1

First name _____

Last name _____

School _____

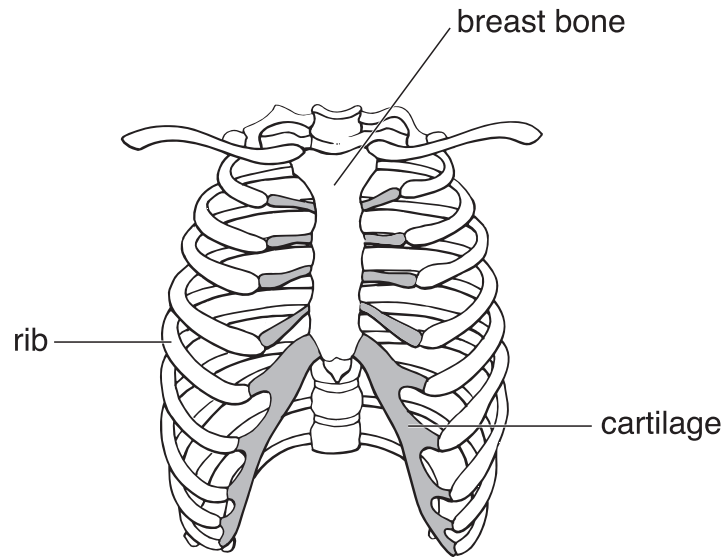
Remember

- 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	
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1. The drawing below shows the human rib cage.



- (a) The rib cage protects organs in the chest.

Give the names of **two** organs in the chest.

1. _____

2. _____

- (b) The ribs are attached to the breast bone by cartilage which bends easily. This lets the space in the chest get bigger.

Why is it important that the space can get bigger?

1a
1 mark

1a
1 mark

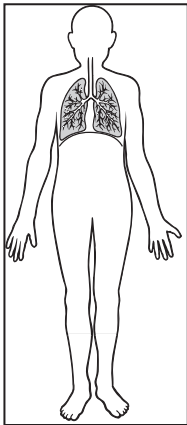
1b
1 mark

(c) The drawings below show parts of three different organ systems.

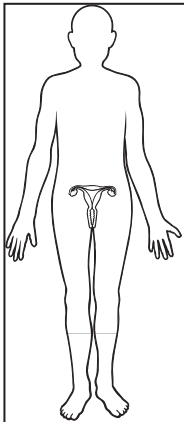
Draw a line from each organ system to its function.
Draw only **three** lines.

organ system

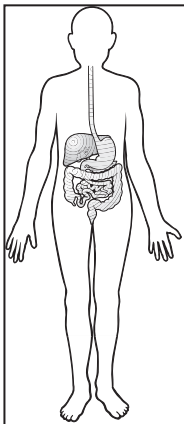
function



digestion of food



reproduction



taking in oxygen from the air

movement of the body

1c

1 mark

1c

1 mark

1c

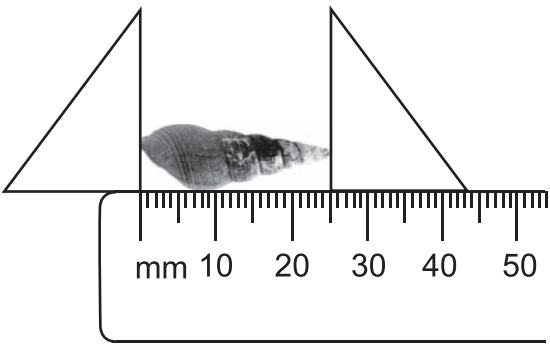
1 mark

maximum 6 marks

Total

6

2. Jay collected pond snails from the school pond.
He measured the lengths of all their shells.



2a
1 mark

- (a) What is the length of the shell above?

_____ mm

- (b) Jay made a tally chart of the lengths of **all** the shells he found.

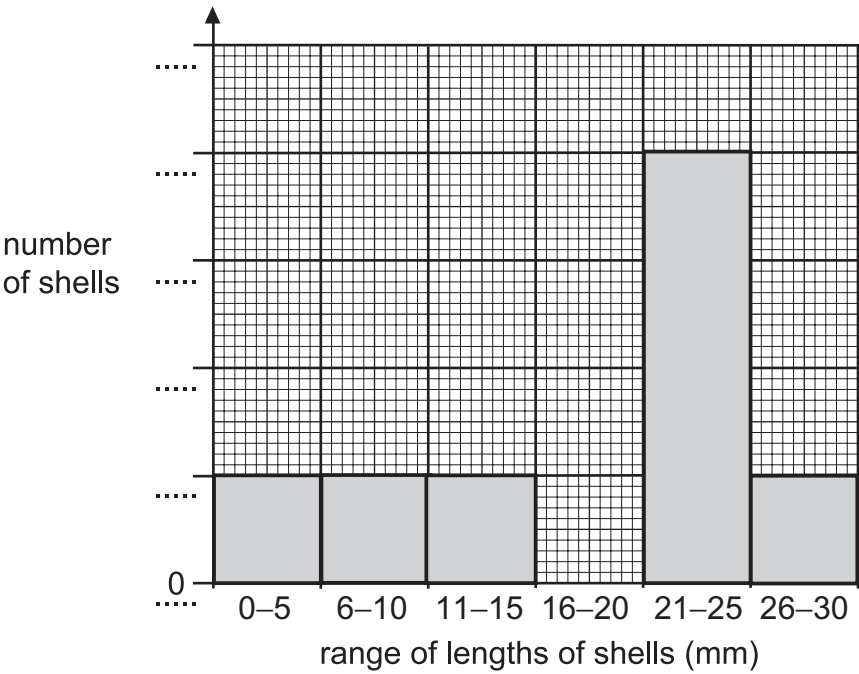
range of lengths of shells (mm)	0-5	6-10	11-15	16-20	21-25	26-30
number of shells	I	I	I	III	IIII	I

2b
1 mark

What was the most common **range** of lengths of shells Jay collected?

_____ mm

(c) Jay recorded his results in a bar chart.



(i) Add the missing numbers to the side of the bar chart labelled 'number of shells'.

1 mark

2ci

(ii) **On the chart above**, draw the bar for the number of shells measuring 16–20 mm.

1 mark

2cii

(d) Look at Jay’s results and decide if each conclusion below is **true** or **false** or if you **cannot tell**.
Tick the correct box for each conclusion.

conclusions	true	false	cannot tell
The oldest snails have the darkest shells.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
He did not find any shells longer than 30 mm.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
He found a total of eight snails.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
All the snails he found are the same type.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

1 mark

2d

1 mark

2d

maximum 6 marks

Total

6

3. The drawings show the amounts of different substances in 100 g of full-cream milk and 100 g of skimmed milk.

FULL-CREAM MILK	
water	87 g
fat	4 g
protein	3 g
sugar	5 g
calcium	120 mg
vitamin C	1 mg

SKIMMED MILK	
water	91 g
fat	0.1 g
protein	3 g
sugar	5 g
calcium	120 mg
vitamin C	1 mg

- (a) Use the information in the drawings to complete the sentence.

When skimmed milk is made from full-cream milk, most of the _____ is taken out.



3a

1 mark

- (b) (i) Look at the drawings.
Which substance in milk do we need for strong bones and teeth?



3bi

1 mark

- (ii) How are substances carried around the body?



3bii

1 mark

- (c) (i) Which animals produce milk to feed their young?
Tick the correct box.

amphibians	<input type="checkbox"/>	birds	<input type="checkbox"/>
mammals	<input type="checkbox"/>	reptiles	<input type="checkbox"/>

☐ 3ci
1 mark

- (ii) A baby fed on its mother's milk gets fewer infections.
What is the reason for this?
Tick the correct box.

The milk contains antibodies.	<input type="checkbox"/>
The milk contains water.	<input type="checkbox"/>
The milk is at body temperature.	<input type="checkbox"/>
The milk is a liquid.	<input type="checkbox"/>

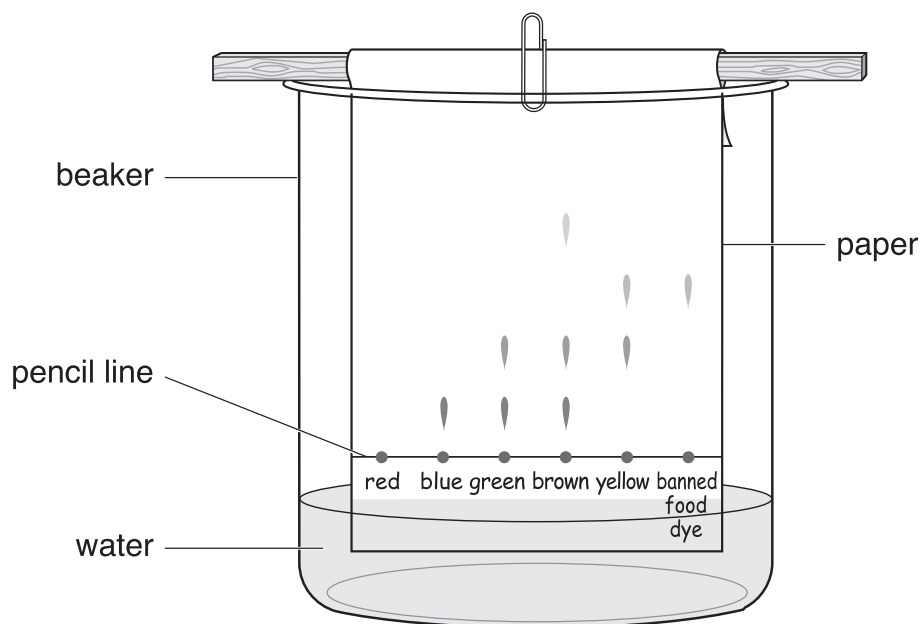
☐ 3cii
1 mark

maximum 5 marks

4. Gary wanted to find out if some food colourings contained a banned food dye.

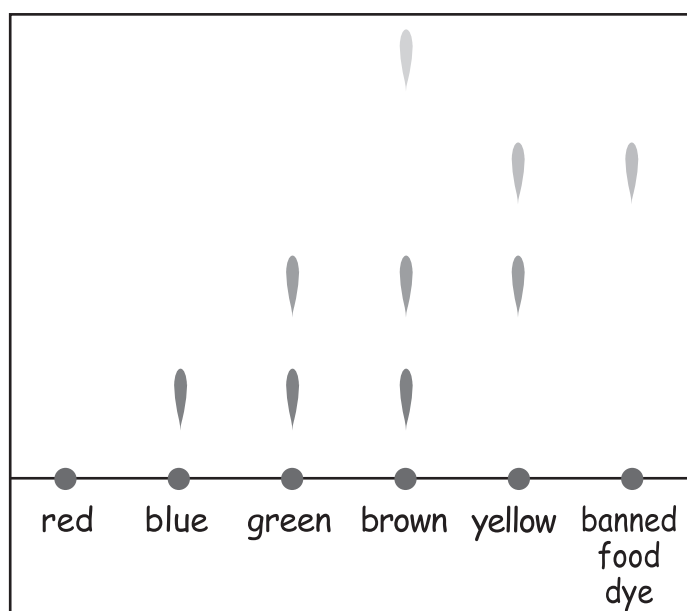
He put a drop of each food colouring and the banned food dye onto some special paper.

He hung the paper in a beaker of water.



After 10 minutes, the banned food dye and some of the dyes from the food colourings had moved up the paper.

Gary's results are shown below.



- (a) Gary wrote the labels on the paper in pencil.
Why should he **not** write them in ink?

4a
1 mark

- (b) Look at Gary's results.
The different dyes in some of the food colourings had moved up the paper.

- (i) Which food colouring contained the banned food dye?

4bi
1 mark

- (ii) Which food colouring contained the most dyes?

4bii
1 mark

- (c) Which food colouring did **not** dissolve in the water?

4c
1 mark

- (d) Which method did Gary use to separate the dyes?
Tick the correct box.

chromatography

☐

distillation

☐

evaporation

☐

filtration

☐

4d
1 mark

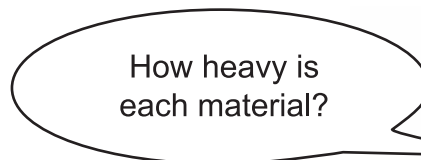
maximum 5 marks

5. Some pupils investigated different materials used to make rucksacks. Here are some of the questions they asked.



Aysha

How strong is each material?



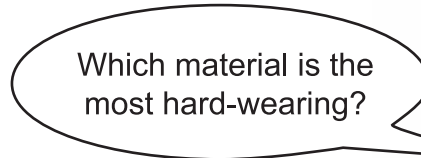
Phillip

How heavy is each material?



Zoe

Which material is the best?



Shaun

Which material is the most hard-wearing?

- (a) Which pupil asked a question that cannot be investigated?
Tick the correct box.

☐

5a

1 mark

Aysha

☐

Phillip

☐

Zoe

☐

Shaun

☐

Give a reason for your answer.

☐

5a

1 mark

- (b) Zara took four different rucksack materials and investigated how waterproof they were.

She poured 100 cm³ of water through each material in turn.
She measured the volume of water passing through each material in 30 minutes.



- (i) Give **one** way of making Zara's test fair.

☐ 5bi
1 mark

- (ii) Look at the photograph of the investigation.

Name **one** measuring instrument Zara used.

☐ 5bii
1 mark

- (c) The table below shows Zara's results.

material	volume of water passing through each material (cm ³)
A	11
B	5
C	20
D	15

Which material was the most waterproof?

Tick the correct box.

A ☐ B ☐ C ☐ D ☐

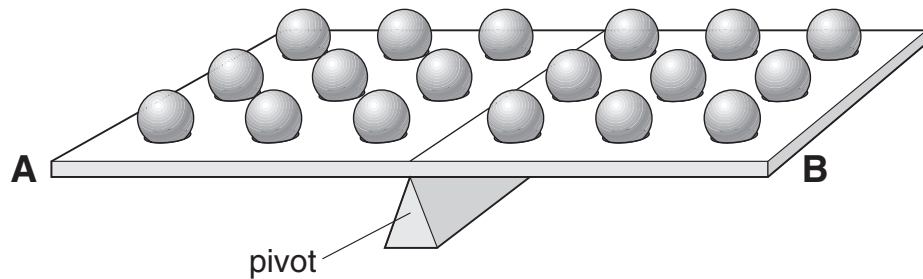
☐ 5c
1 mark

Explain your answer.

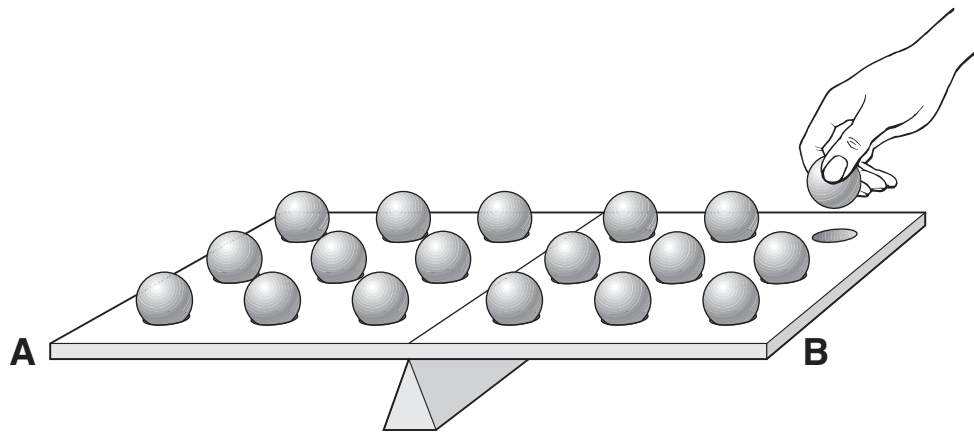
☐ 5c
1 mark

maximum 6 marks

6. Fran has a balancing game.
On each side of the pivot there are nine steel balls. The tray is balanced.



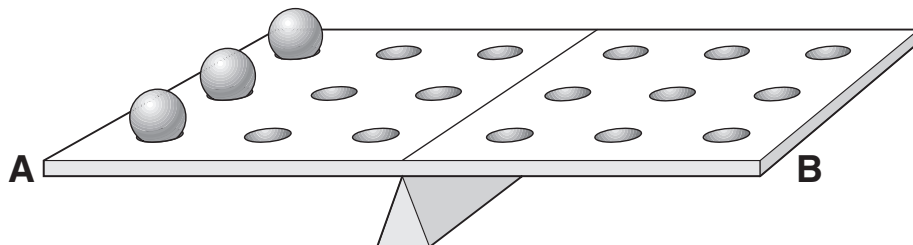
- (a) Fran removes one of the steel balls as shown below.



What will happen to end A?

- (b) There are three balls on side A as shown below.

Draw **three** other balls in the correct positions to balance the tray.



6a

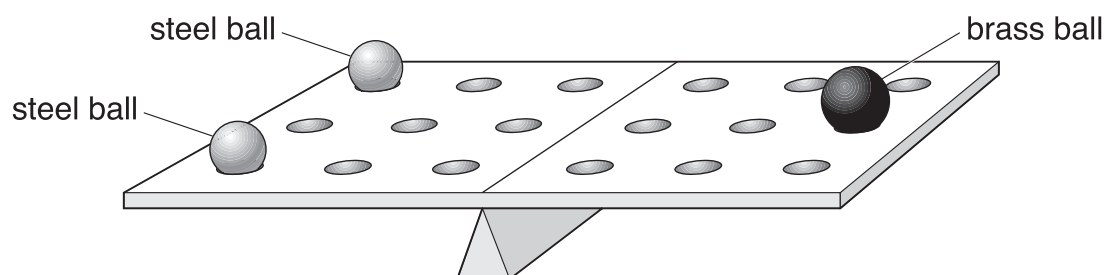
1 mark



6b

1 mark

- (c) Fran puts two steel balls on one side and one brass ball on the other side. The tray is balanced.



The mass of each steel ball is 50 g.

What is the mass of the brass ball?

_____ g

6c
1 mark

- (d) The table below gives information about the brass and steel balls.

	Is it attracted to a magnet?	elements in the ball
brass	no	copper and zinc
steel	yes	iron and carbon

- (i) Which element is **not** a metal?
Tick the correct box.

carbon	<input type="checkbox"/>	copper	<input type="checkbox"/>
iron	<input type="checkbox"/>	zinc	<input type="checkbox"/>

6di
1 mark

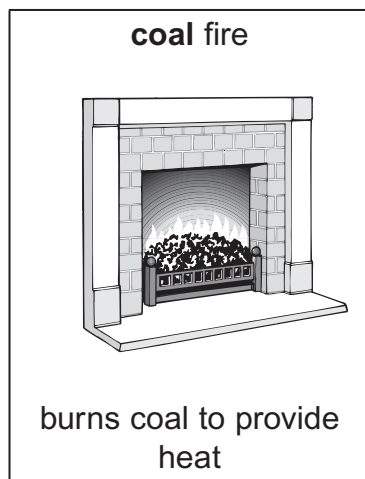
- (ii) Look at the elements in the brass ball and the steel ball.

Why is steel attracted to a magnet but brass is **not**?

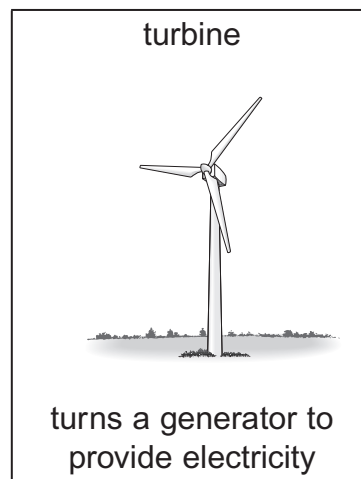
maximum 5 marks

6dii
1 mark

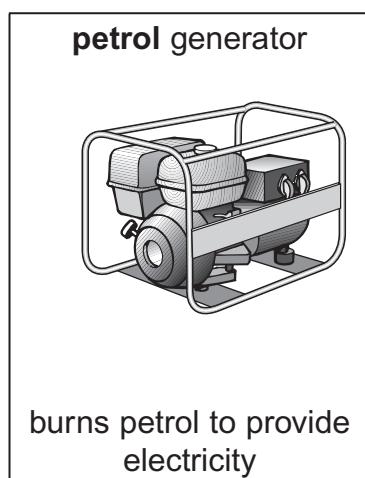
7. The drawings below show six ways of providing energy.



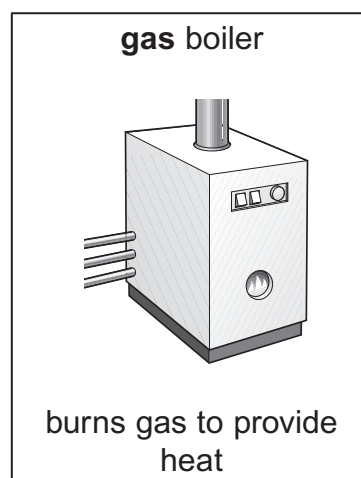
A



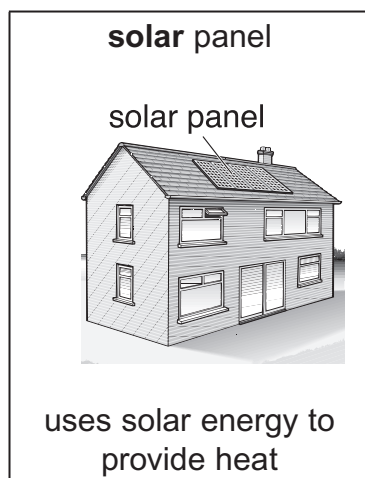
B



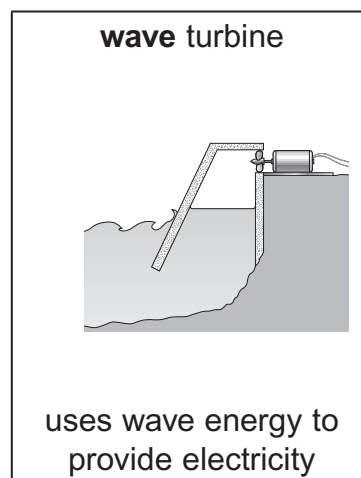
C



D



E



F

(a) From the opposite page, give the names of **two** fossil fuels.

1. _____

2. _____

(b) (i) What is the source of energy for a solar panel?

(ii) Why can the solar panel **not** work at night?

(c) What makes the blades of the turbine in drawing B go round?

(d) Renewable energy resources will **not** run out.

From the opposite page, give **one** energy source that will **not** run out.

☐ 7a
1 mark

☐ 7a
1 mark

☐ 7bi
1 mark

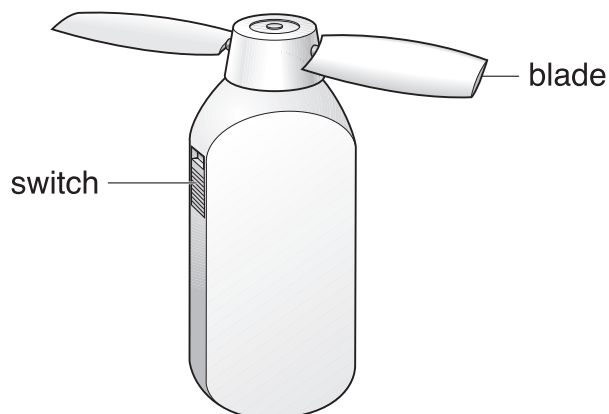
☐ 7bii
1 mark

☐ 7c
1 mark

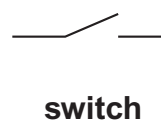
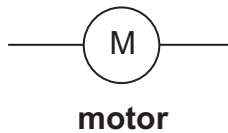
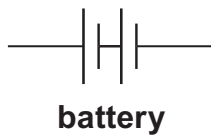
☐ 7d
1 mark

maximum 6 marks

8. Susan has a small fan to keep herself cool.
When she switches it on, a motor turns the blades to blow air.



- (a) The diagrams below show the symbols for a battery, a motor and a switch.



In the space below, draw a series circuit diagram for the fan using these symbols.



8a

1 mark

- (b) (i) Which part provides energy for the circuit?

- (ii) Some of this energy is used to turn the blades.
The rest of the energy is wasted.

Complete the sentence below. Choose words from the list.

chemical heat light sound

When the blades are turning, energy is wasted as

_____ energy and _____ energy.

- (c) Susan built a circuit using a battery, a motor and a switch.
She closed the switch to turn the motor on.

- (i) Susan added a bulb to the circuit.
The current in the circuit **decreased**.

How did this affect the motor?

- (ii) Susan removed the motor from the circuit.
The current in the circuit **increased**.

How did this affect the bulb?



8bi

1 mark



8bii

1 mark



8bii

1 mark



8ci

1 mark



8cii

1 mark

maximum 6 marks

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

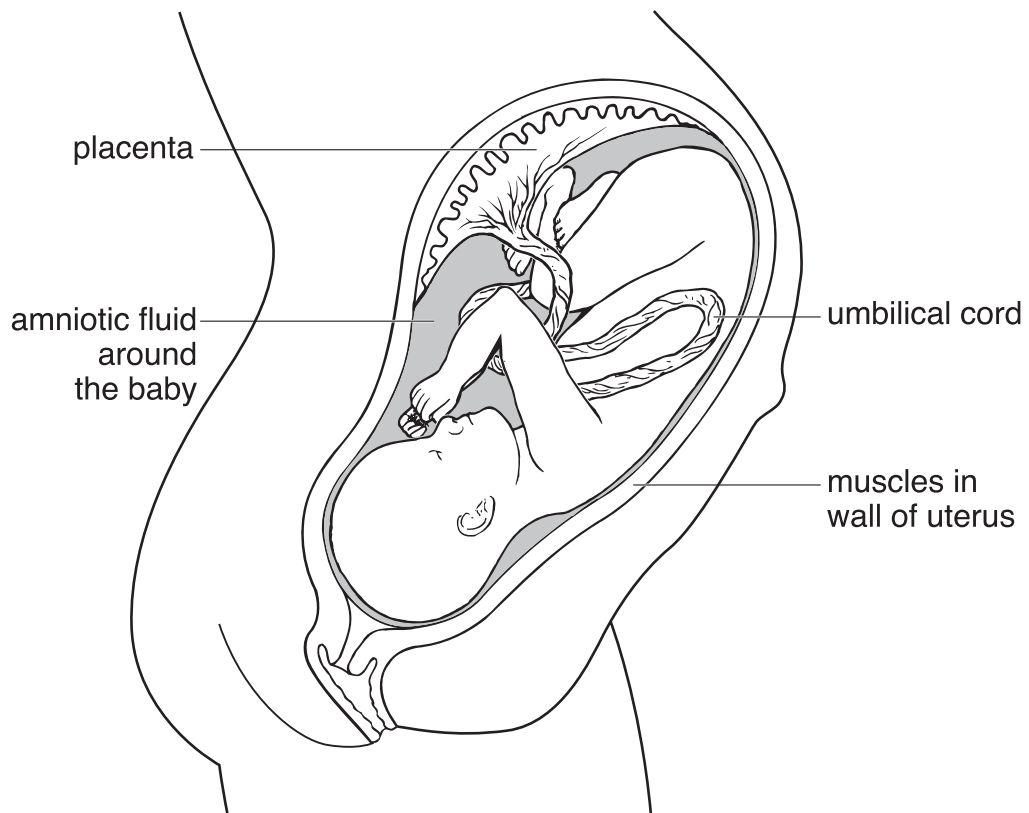


diagram 1

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

_____ months

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

- (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?

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

9c
1 mark

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

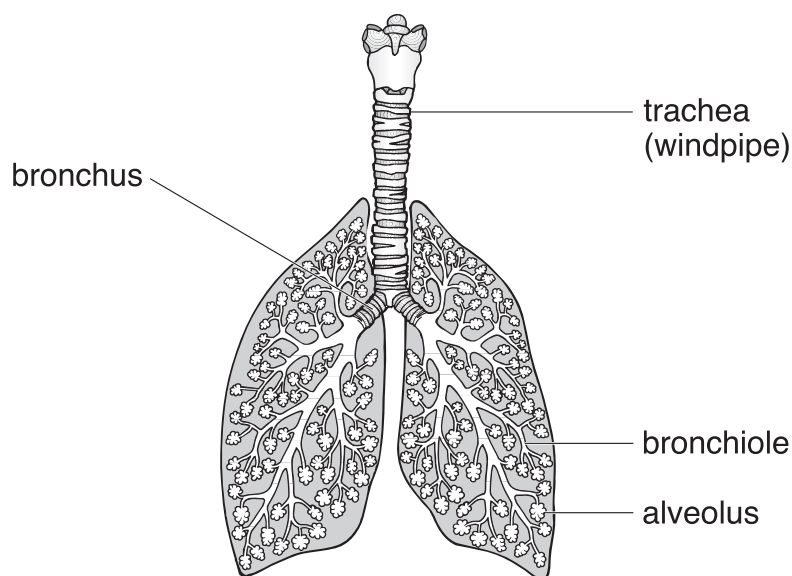


diagram 2

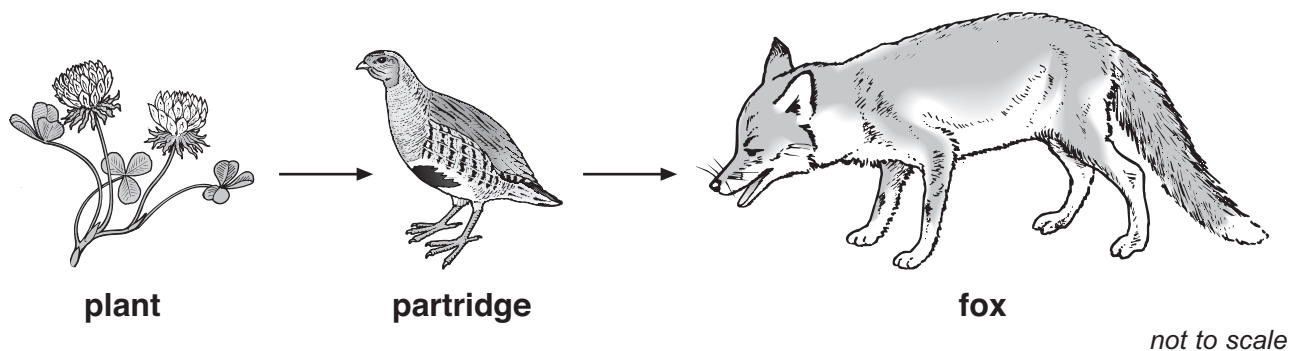
Look at **diagram 2**.

From which labelled part is oxygen absorbed into the blood?

9d
1 mark

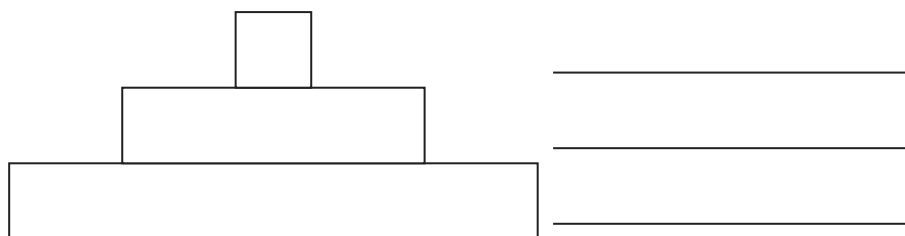
maximum 5 marks

10. 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.



10a
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.

10b
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.

	10c
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.

	10d
1 mark	

	10d
1 mark	

maximum 5 marks

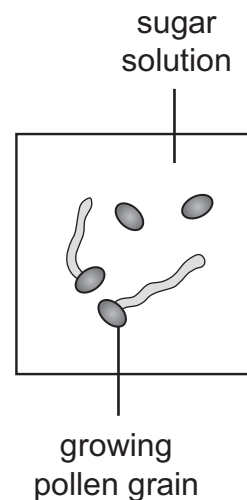
11. Amy and Tom investigated how sugar affects the growth of pollen grains. They looked at pollen grains under a microscope.

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.



11a

1 mark

11a

1 mark

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

1. _____

2. _____

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

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

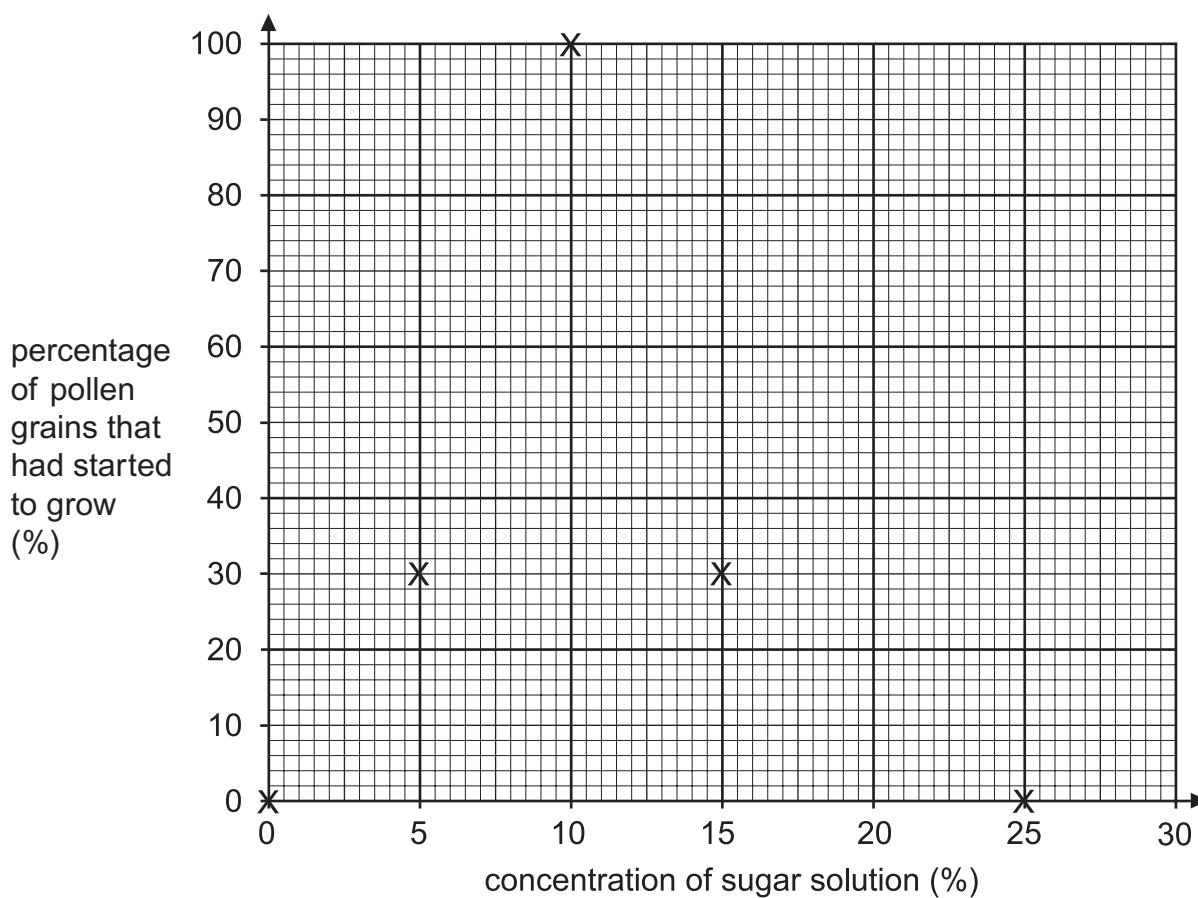
concentration of sugar solution (%)	percentage of pollen grains that had started to grow (%)
0	0
5	30
10	100
15	30
20	10
25	0

11b

1 mark

He plotted five of his results on graph paper.

Plot the result for 20% sugar solution.



- (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.

☐

11c

1 mark

☐

11d

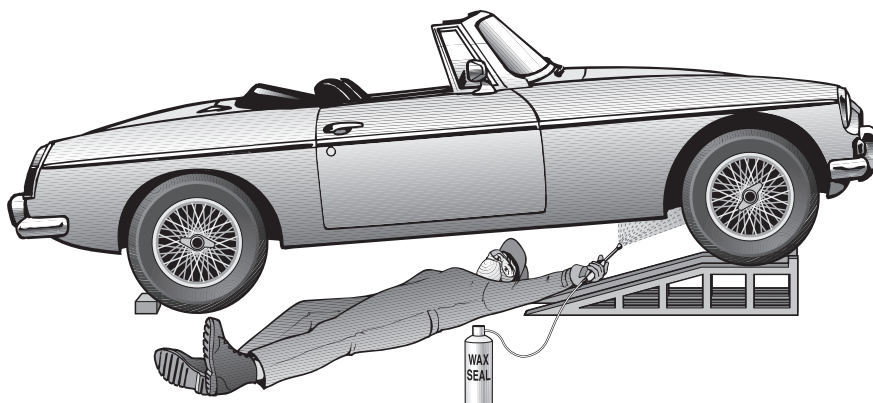
1 mark

maximum 5 marks

12. 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.

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

1. _____

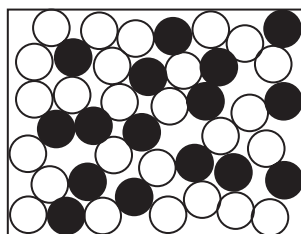
2. _____

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

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

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

- (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**

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



particles in a **solid**



12ci

1 mark



12cii

1 mark

maximum 7 marks

13. (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**.

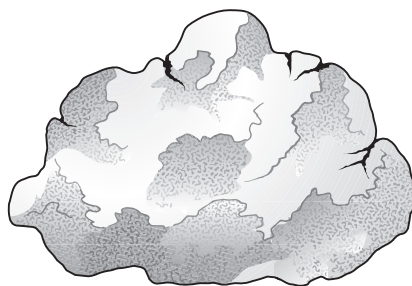
What evidence is there in the table that sandstone is porous, but granite and marble are **not** porous?



13a

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?



13bi

1 mark



13bii

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.

13c
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

13di
1 mark

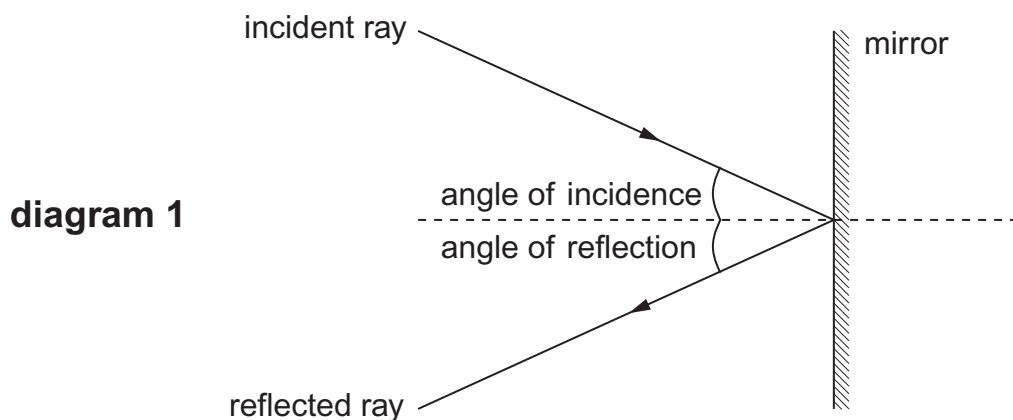
13di
1 mark

13dii
1 mark

13dii
1 mark

maximum 8 marks

14. 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.

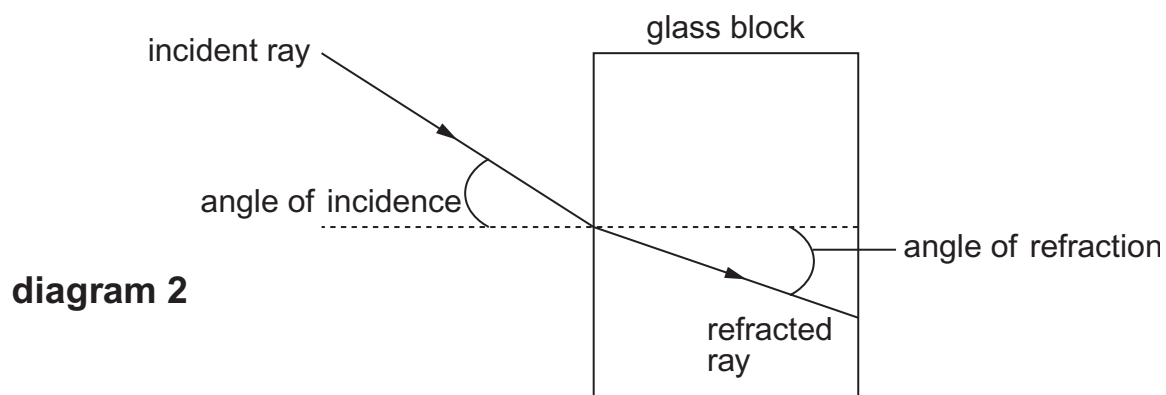
angle of incidence ($^{\circ}$)	30	40	50	60	70
angle of reflection ($^{\circ}$)	30	40	50	65	70

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

_____ $^{\circ}$

How can you tell this from the table?

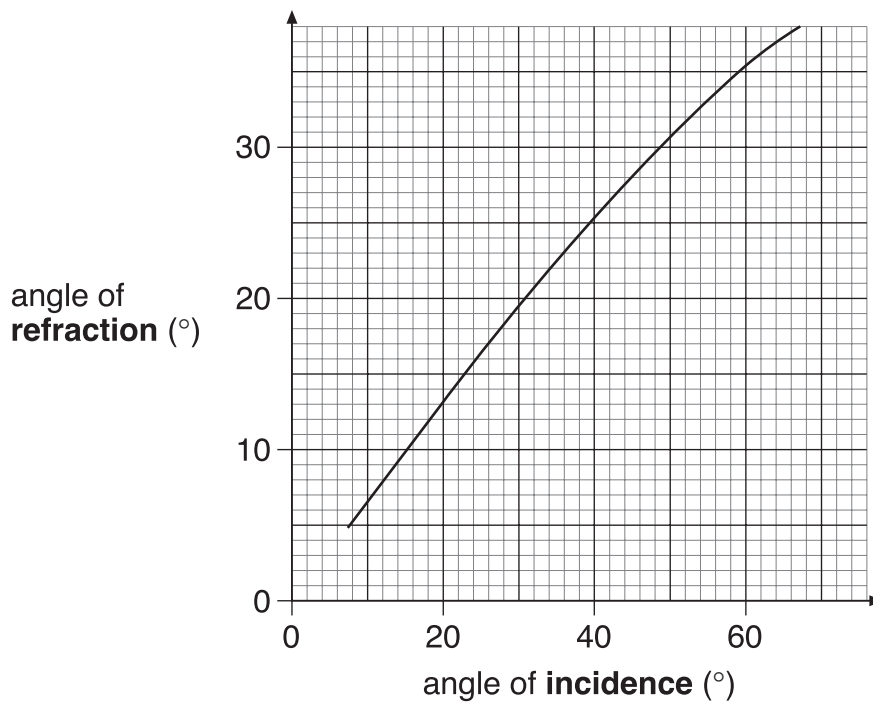
(b) James set up a different experiment as shown below.



14a

1 mark

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**?

_____°

- (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**.

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

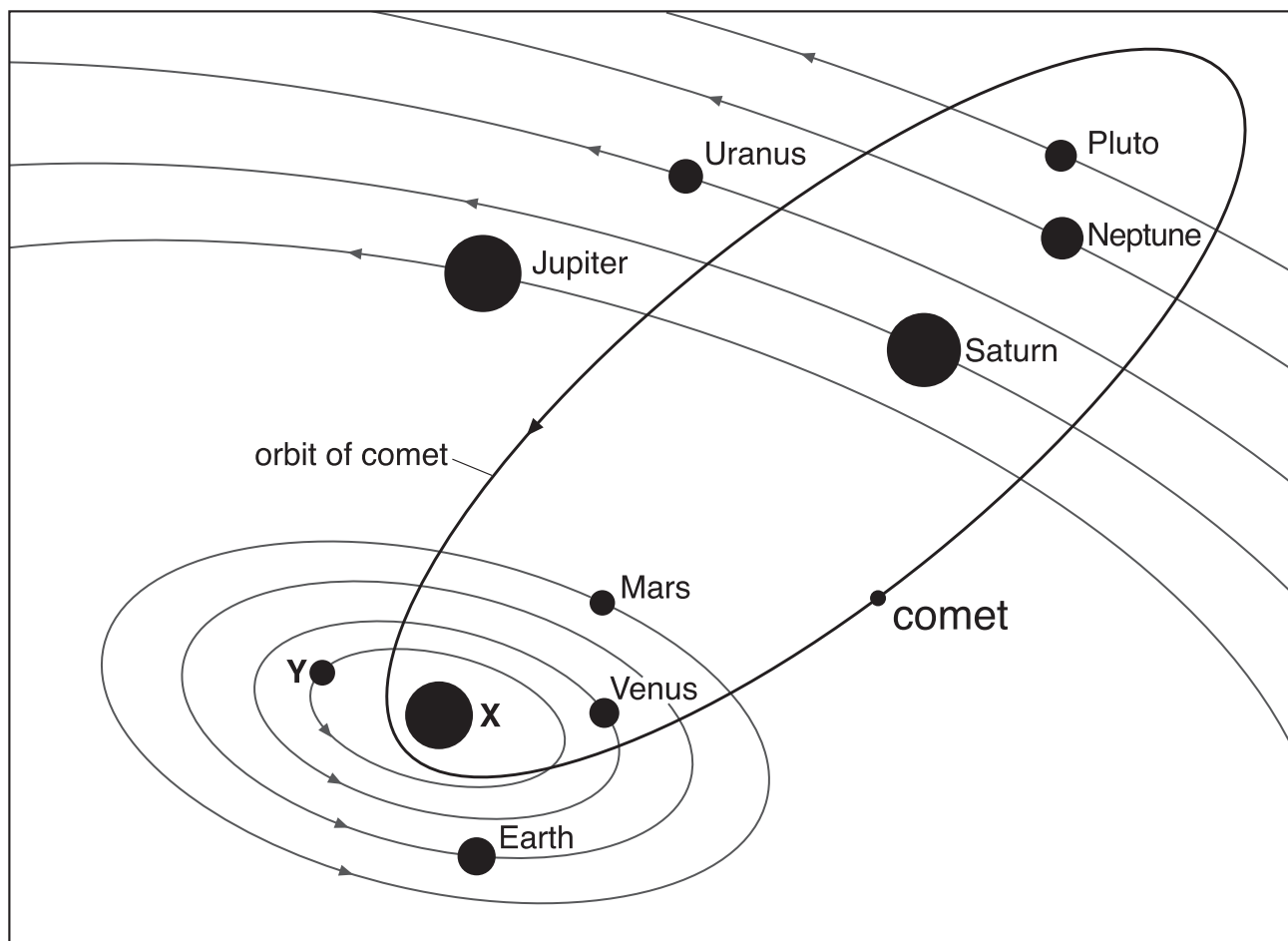
1 mark 14bi

1 mark 14bii

1 mark 14c

maximum 4 marks

15. 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. _____

- (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.

15ci
1 mark

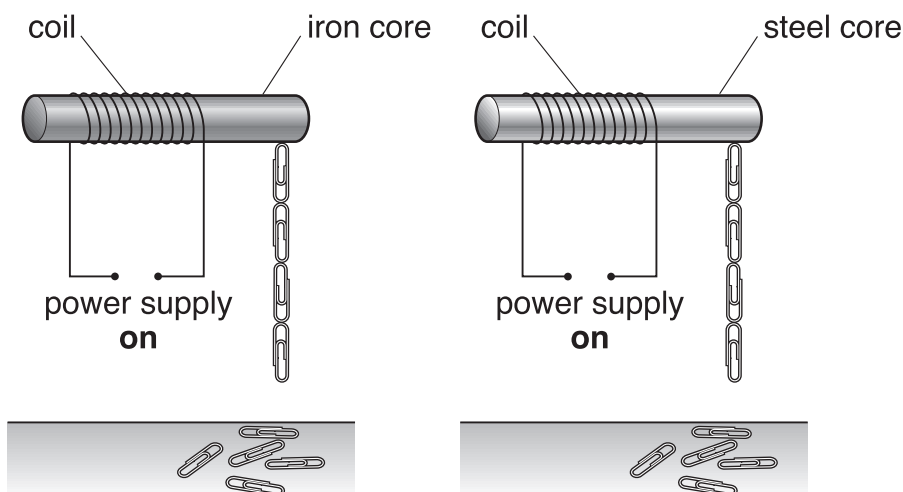
- (ii) The comet was last seen in 1986.

Predict when it will be seen next.

15cii
1 mark

maximum 6 marks

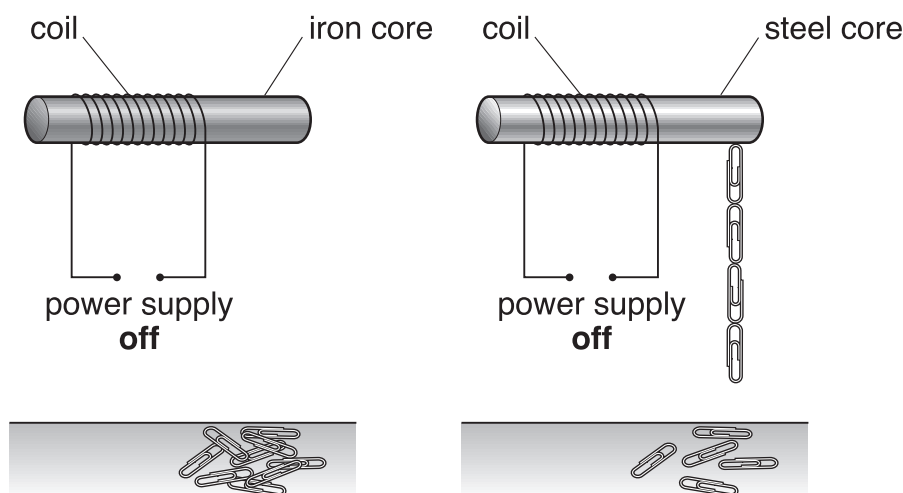
16. David made two electromagnets as shown below.
He used paper-clips to test the strength of each electromagnet.
He switched on the power supply in both circuits.



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

16a
1 mark

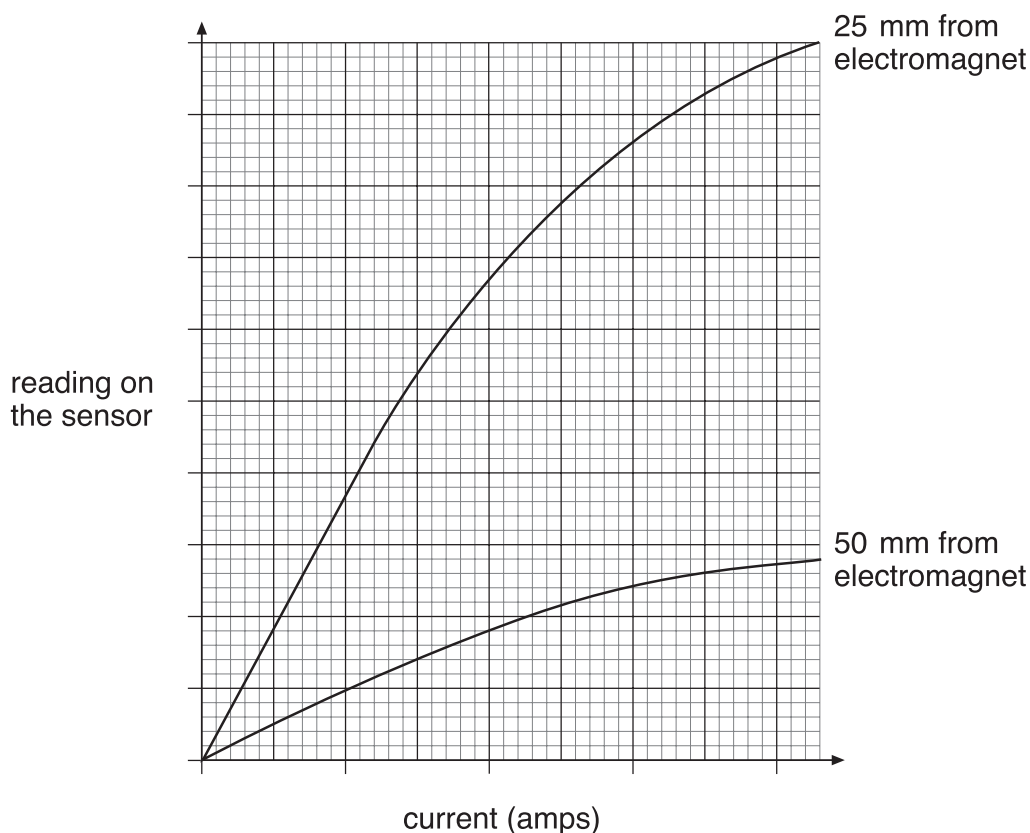
- (b) David switched off the power supply in both circuits.
The paper-clips fell off the iron core, but **not** off the steel core.



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

16b
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?

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

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

maximum 5 marks

END OF TEST

