

Sc

KEY STAGE
3

TIER
5–7

2001

Science test

Paper 2

Please read this page, but do not open the booklet until your teacher tells you to start. Write your name and the name of your school in the spaces below. If you have been given a pupil number, write that also.

First name _____

Last name _____

School _____

Pupil number

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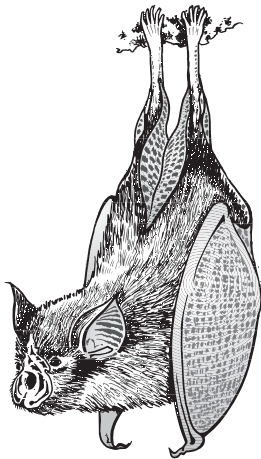
Remember

- 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.
- Write all your answers on the test paper – do not use any rough paper.
- Check your work carefully.
- Ask your teacher if you are not sure what to do.

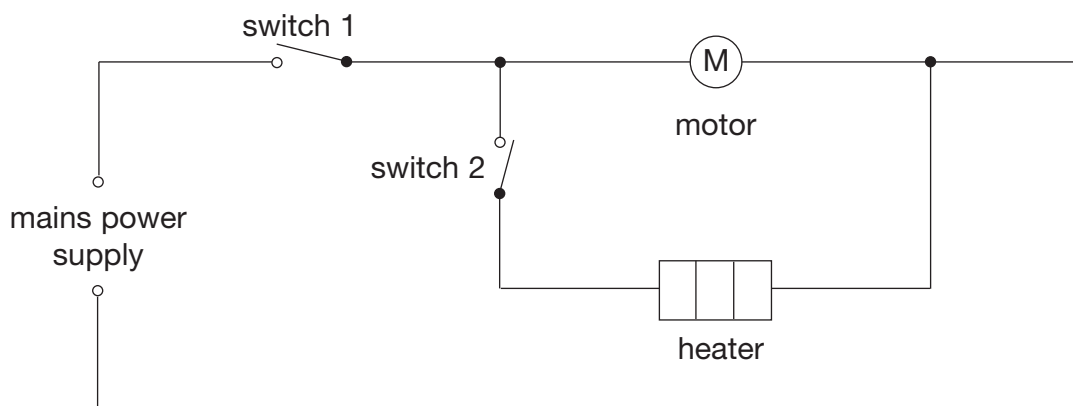
For marker's
use only

Total marks	
Borderline check	

1. The drawing shows a hairdryer.



Ben drew the diagram below to show the circuit of the hairdryer.



(a) Which of the switches must be closed for the heater to work?
Tick the correct box.

1 mark

switch
1 only

switch
2 only

switches
1 and 2

neither switch
1 nor 2

-
- (b) With this circuit, is it possible to have the heater on when the motor is switched off?

1 mark

Explain your answer.

- (c) The motor and the heater are both on. The motor blows air through the hairdryer. If the motor breaks, what would happen to the temperature of the hairdryer?

1 mark

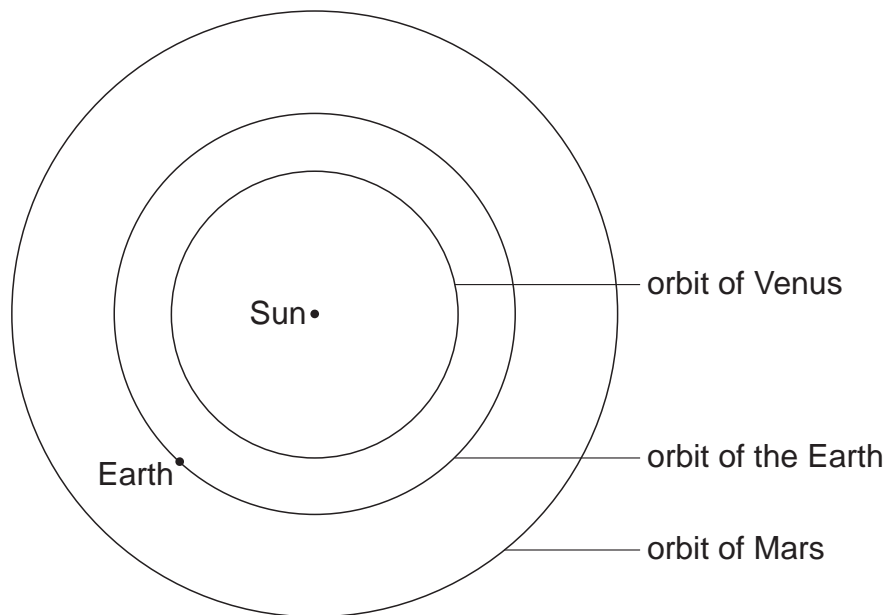
- (d) The motor and the heater are both on. Suddenly the wire in the heater breaks. What effect, if any, will this have on the motor?

1 mark

maximum 4 marks



-
2. The diagram shows the orbits of the Earth, Mars and Venus. The position of the Earth is shown.



not to scale

A person on the Earth observes Mars and Venus.

- (a) (i) On the diagram above, draw **two** more dots to show the positions of Mars and Venus when they are closest to the Earth. Label the dot for Mars with a letter M and the dot for Venus with a letter V.

1 mark

- (ii) Why is it easiest to see Mars when it is closest to the Earth?

1 mark

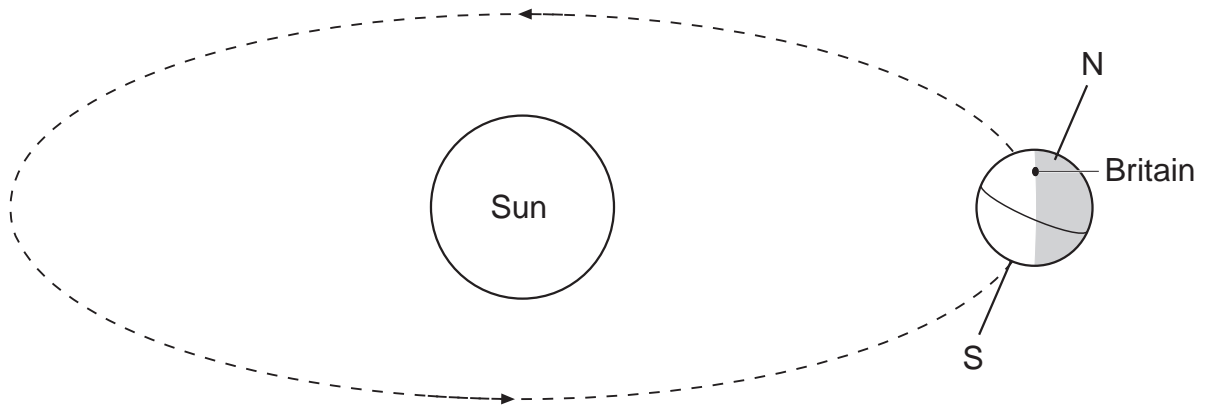
- (b) What force keeps the Earth in its orbit and stops it flying off into space?

1 mark

- (c) From the Earth, the Moon always looks approximately the same size. What can you conclude from this about the orbit of the Moon around the Earth?

1 mark

(d) The diagram shows the Earth in its orbit around the Sun.



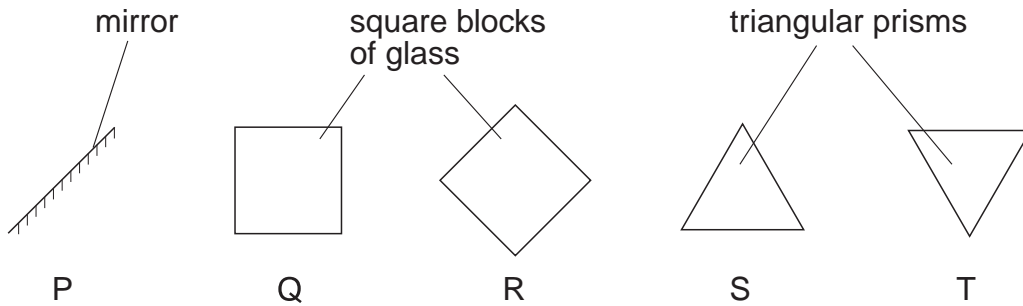
not to scale

What season is it in Britain? Explain your answer.

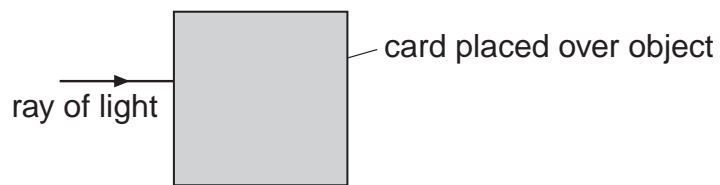
2 marks

maximum 6 marks

3. The diagram below shows the shapes and positions of five glass objects.



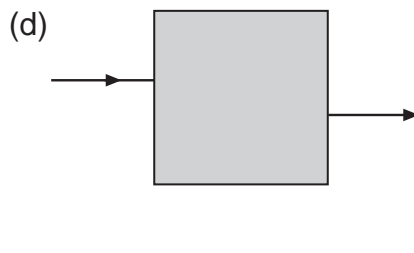
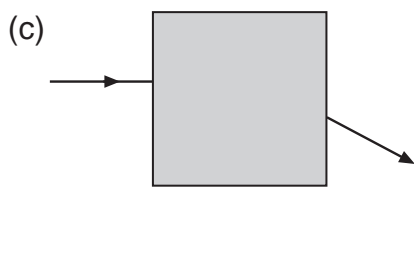
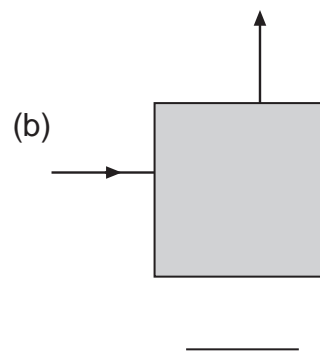
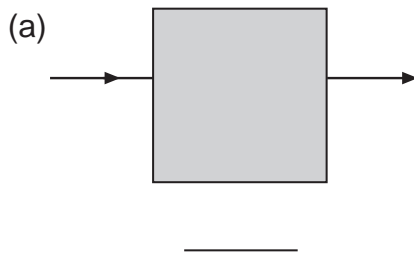
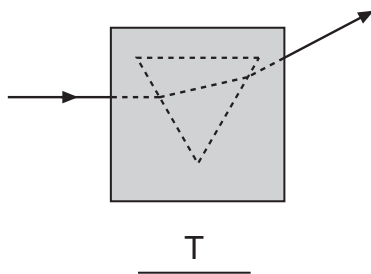
Harriet put a square of black card on top of each glass object. She shone a ray of red light onto each object.



The diagrams below show the rays of light going under the cards and coming out again.

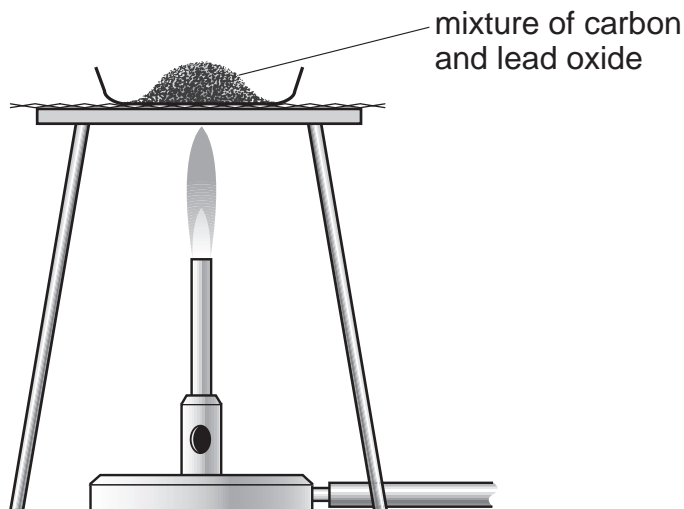
Which object is under each card? Write the correct letter below each diagram. One has been done for you.

4 marks



maximum 4 marks

4. Marie mixed 5 g of carbon with 5 g of lead oxide.
She heated the mixture strongly for 15 minutes in a fume cupboard.



After 15 minutes, Marie found some shiny beads in the mixture.

- (a) (i) Marie collected all the shiny beads from this experiment.
How could she test them to show they were metal?

1 mark

- (ii) Marie's test showed that the tiny beads were metal.
What metal were the beads likely to be?

1 mark

- (b) Marie also expected carbon dioxide to be formed in this experiment.

- (i) In carbon dioxide, what element is combined with carbon?

1 mark

- (ii) Where, apart from the air, did this element come from in this experiment?

1 mark

- (c) Give **one** safety precaution Marie should take during this experiment.

1 mark

maximum 5 marks



5. (a) The table gives some of the properties of three substances: water, paraffin wax and naphthalene.

substance	melting point in °C	density (mass of 1 cm ³ in g)
water	0	1.0
paraffin wax	60	0.8
naphthalene	80	1.2

Use the information in the table to help you answer parts (i) and (ii) below.

- (i) Arif placed a ball of naphthalene in a beaker containing water kept at 70°C. On diagram 1, draw the **shape** and **position** of the naphthalene ten minutes later.

2 marks

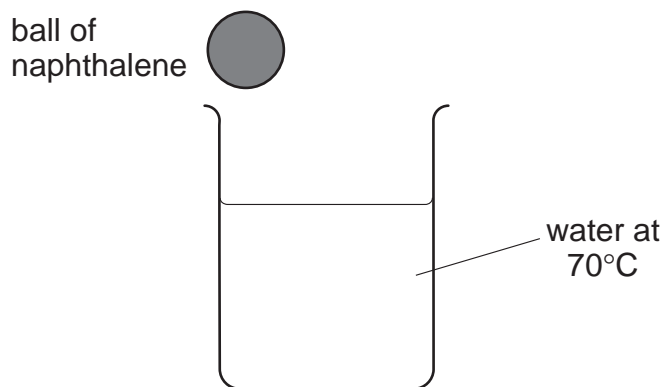


diagram 1

- (ii) Arif repeated the experiment with a similar sized ball of paraffin wax. On diagram 2, draw the **shape** and **position** of the paraffin wax ten minutes later.

2 marks

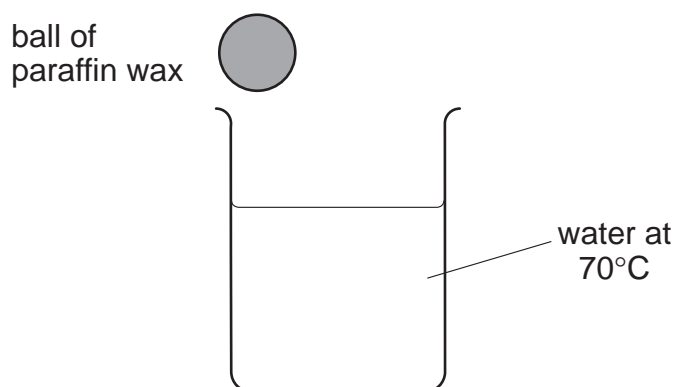


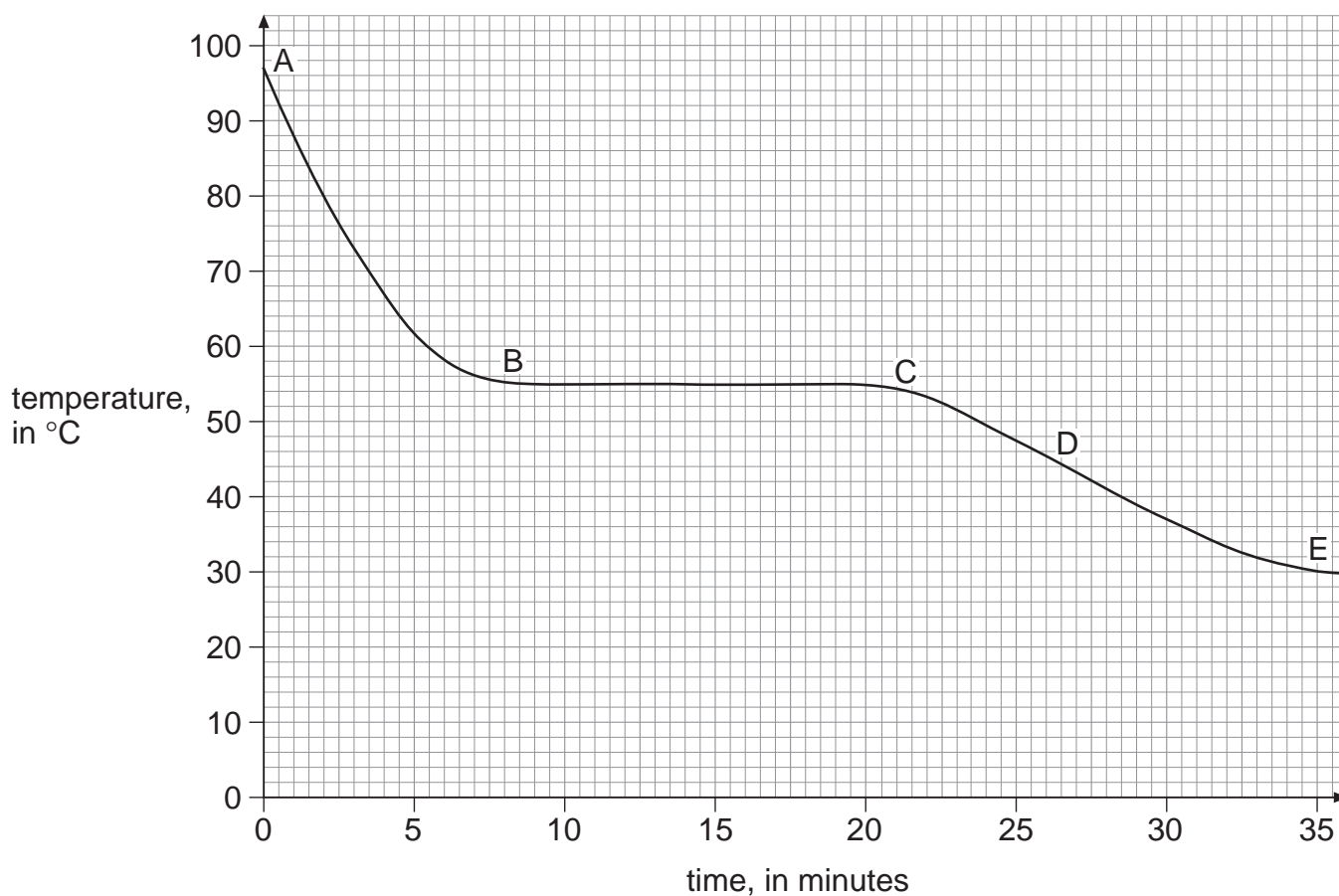
diagram 2

- (b) Arif then melted some crystals of stearic acid in a beaker. He placed a temperature probe in the stearic acid and left the stearic acid to cool. As the stearic acid cooled down its state changed. What was the change in the state of the stearic acid as it cooled?

1 mark

from _____ to _____

- (c) Arif plotted the following graph.



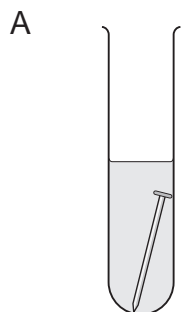
Which letter on the graph shows when the stearic acid **started** to change state?

1 mark

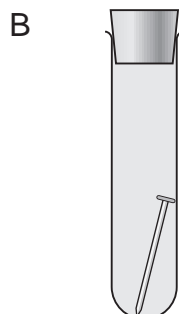
maximum 6 marks



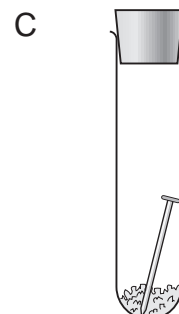
6. Jessica was investigating the rusting of iron. She set up five experiments as shown below, and left the test-tubes for three days.



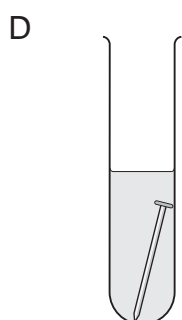
iron nail in distilled water



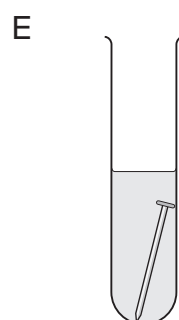
iron nail in tap water
which has been boiled to
remove dissolved gases



iron nail and a chemical
to absorb water vapour



iron nail in sea water



iron nail in vinegar

Jessica wrote the following results in her book.

test-tube	observation
A	nail slightly rusty
B	nail still shiny
C	nail still shiny
D	nail very rusty
E	nail slightly rusty, bubbles of gas seen

(a) Explain why the nails had **not** rusted in test-tubes B and C.

2 marks

in test-tube B _____

in test-tube C _____

(b) In test-tube E the iron nail reacted with the vinegar.

(i) Is vinegar **acidic**, **alkaline** or **neutral**?

1 mark

(ii) When the iron reacted with the vinegar, bubbles of gas were formed.
What gas was formed?

1 mark

(c) Before putting the iron nail in test-tube D, Jessica weighed the nail.
After three days she dried and weighed the nail **and** the rust which
had formed.

(i) How did the total mass of the nail and rust compare to the mass of
the nail at the beginning?

1 mark

(ii) Give the reason for your answer.

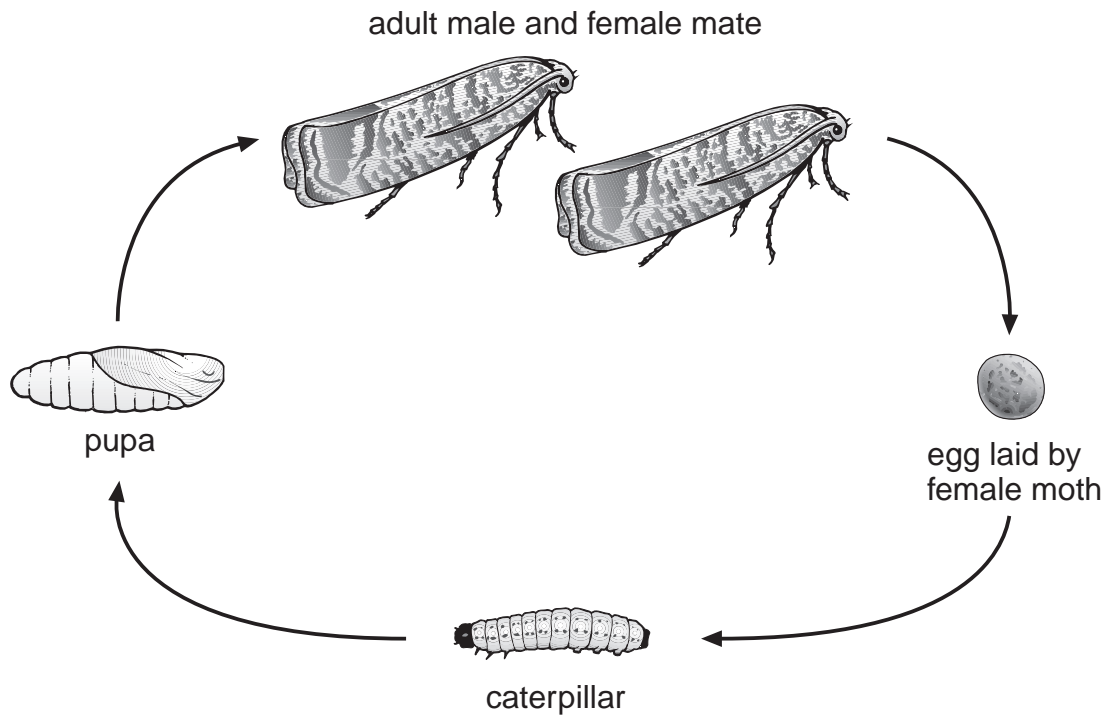
1 mark

(d) Jessica concluded that the presence of salt in the water made the nail
rust more quickly.
Explain why she drew that conclusion from her experiments.

1 mark

maximum 7 marks

7. Codling moths lay eggs on apple trees. The caterpillars of the codling moth feed on apples. The diagram below shows the life cycle of codling moths.



not to scale

Apple growers use special traps to catch male codling moths. The traps contain a chemical which female moths produce to attract male moths.

- (a) (i) Explain why trapping male moths may result in fewer caterpillars the next year.

1 mark

- (ii) Some apple growers spray their trees with insecticide to kill moths. Other apple growers disagree with this method of control. Suggest **two** reasons for **not** using insecticides.

2 marks

1. _____

2. _____

-
- (b) The female moth lays large numbers of eggs.
Suggest why this is necessary.

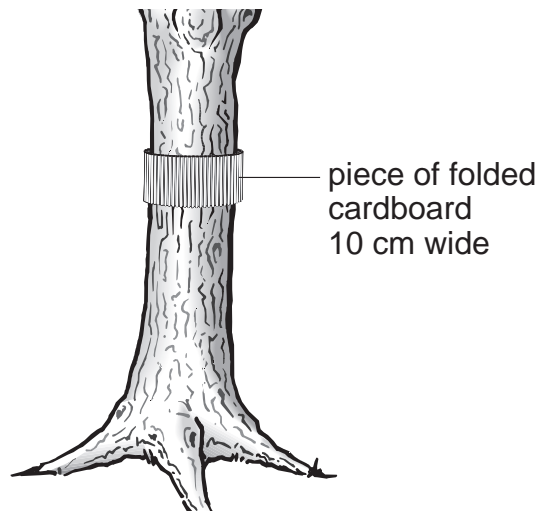
1 mark

- (c) When the caterpillars are fully grown, they crawl into tiny spaces under the bark of the trees. The caterpillars stay under the bark during the winter and then change into pupae.

- (i) Suggest why more caterpillars and pupae survive when they are under the bark.

1 mark

- (ii) Some apple growers wrap bands of folded cardboard around the trunks of apple trees, as shown below. Caterpillars crawl into the folds. The cardboard is removed during the winter and destroyed.

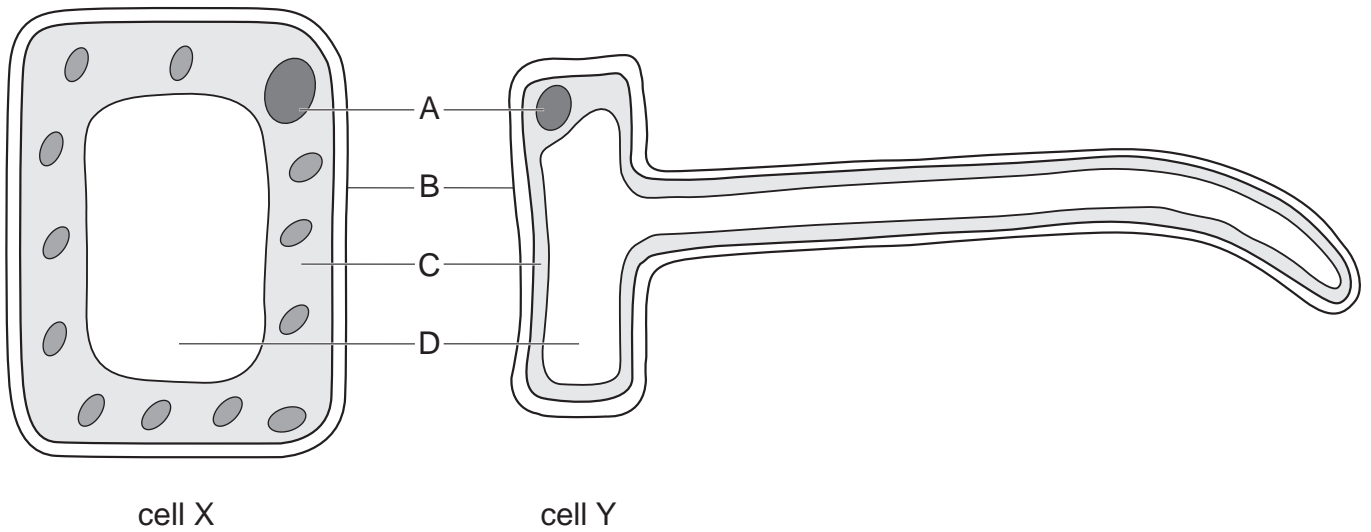


Suggest **one** way in which this helps to protect the next year's apples from damage by caterpillars of codling moths.

1 mark

maximum 6 marks

8. The diagrams show two plant cells.



- (a) In which part of a plant would these cells be found? *not to scale*
- cell X _____ *1 mark*
- cell Y _____ *1 mark*
- (b) Give the name of part B. *1 mark*
- _____
- (c) (i) Give the letter which labels the nucleus. *1 mark*
- _____
- (ii) What is the function of the nucleus? *1 mark*
- _____
- _____

-
- (d) (i) How can you tell from the diagram that photosynthesis **cannot** take place in cell Y?

1 mark

- (ii) Which process takes place in **both** cell X and cell Y?
Tick the correct box.

1 mark

egestion

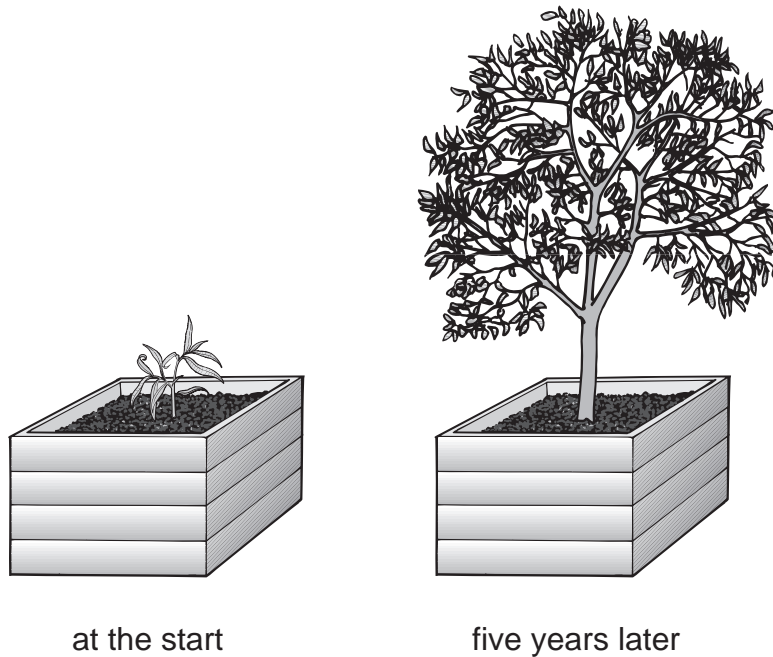
fertilisation

pollination

respiration

maximum 7 marks

9. In the seventeenth century a Belgian scientist, Van Helmont, planted a young willow tree in a tub of dry soil. During the next five years he watered the plant with rain water but he did **not** add anything else to the tub.



not to scale

After five years Van Helmont removed the willow tree from the tub and weighed the tree. He also dried and weighed the soil. Results from Van Helmont's experiment are shown in the table.

	mass of willow tree, in kg	mass of dried soil, in kg
at the start	2.3	90.6
five years later	76.7	90.5

- (a) Van Helmont concluded that the increase in the mass of the willow tree was due only to a gain in water.
- (i) What **two** pieces of evidence did Van Helmont use to reach his conclusion?

2 marks

(ii) We now know that Van Helmont's conclusion is **not** correct.
Explain why the mass of the willow tree increased by such a large amount.

2 marks

(b) Van Helmont believed that a plant would always grow faster if it was given more water. We now know that this is **not** true.
Give **two** environmental conditions which can slow down the growth of a plant, even when it has plenty of water.

2 marks

1.

2.

(c) The fresh mass of a plant includes water. To measure plant growth accurately, scientists calculate the increase in the dry mass rather than the increase in the fresh mass of a plant.

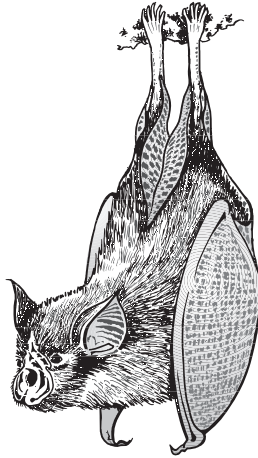
Why is finding the increase in fresh mass **not** a reliable way to measure plant growth?

1 mark

maximum 7 marks

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-
10. Bats hibernate during the winter. While they are hibernating, their hearts beat more slowly and they go into a deep sleep.



- (a) Towards the end of the summer, bats build up a store of fat in a layer beneath the skin.
Give **one** reason why fat is a useful storage substance.

1 mark

- (b) While bats are hibernating their body temperature falls.
What is the advantage of having a low body temperature during the winter?

1 mark

- (c) Suggest **one** disadvantage of hibernating.

1 mark

- (d) Sometimes bats wake up too early from hibernation. These bats are unlikely to survive the cold weather.
Give **one** reason for their low survival rate as a result of waking too early.

1 mark

maximum 4 marks

-
11. (a) In an iron rod the particles vibrate. If one end of an iron rod is heated, the vibrating particles transfer energy to neighbouring particles which are **not** vibrating so violently.
What is this process called?

1 mark

- (b) An electric immersion heater is put at the bottom of a large tank of water. The water next to the heater becomes warm.

- (i) What will happen to the warmed water next to the heater?
Give a reason for your answer.

2 marks

- (ii) Why can heat **not** be transferred in this way in an iron rod?

1 mark

- (c) In a liquid, some of the particles have enough kinetic energy to escape from the surface. This process happens even when the liquid is well below its boiling point.

1 mark

- (i) What is this process called? _____

- (ii) How will this affect the temperature of the liquid left in the container?

1 mark

maximum 6 marks



12. (a) The table gives the names of three different rocks and how they are classified.

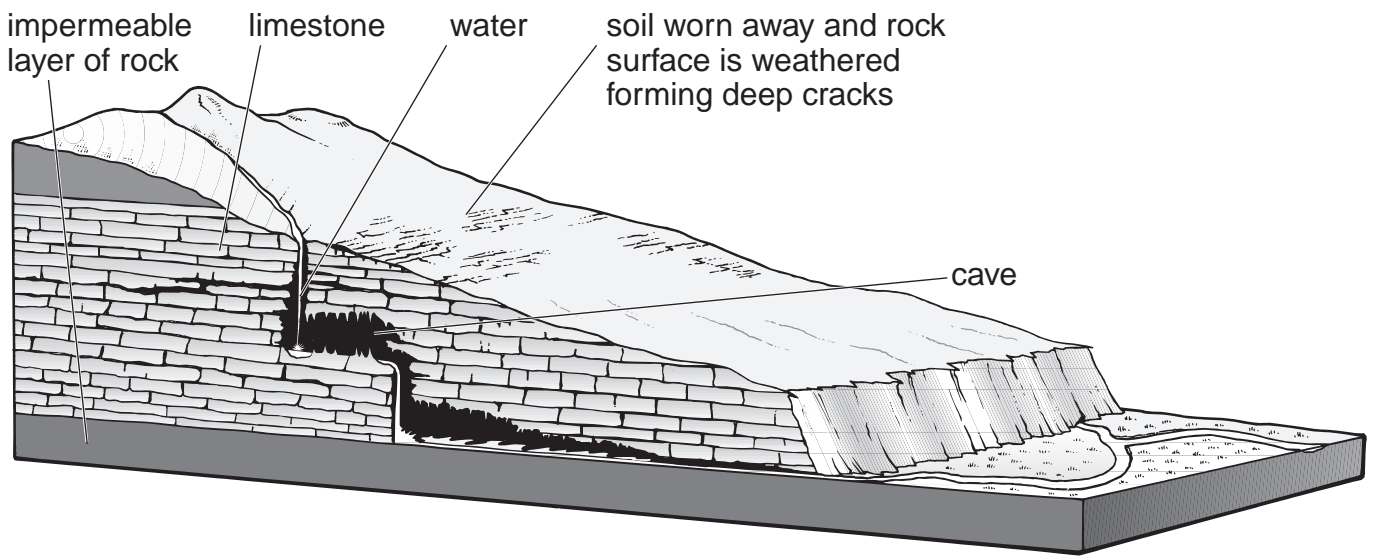
name of rock	class of rock
granite	igneous
marble	metamorphic
shale	sedimentary

In the table below, draw lines to connect the name of each rock to the description of how the rock was formed and then to the correct description of features of the rock.

3 marks

how the rock was formed	name of rock	features of the rock
layers of mud and tiny dead animals compressed and turned into rock	granite	large, interlocking crystals
magma cooling slowly underground in the Earth's crust	marble	crumbly, layered, containing fossils
limestone changed by heat and pressure	shale	hard, shiny, white with veins of colour, fizzes with acid

(b) The diagram shows a section through a limestone cliff.



Adapted from *Chemistry* by Jones, Jones and Acaster, published 1993 by Cambridge University Press

- (i) There are caves in the limestone.
Explain how **chemical** weathering causes caves to form in limestone.

2 marks

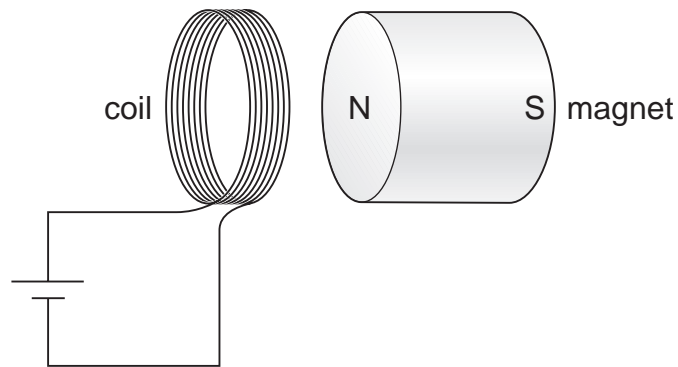
- (ii) Limestone is a porous rock. Water can enter the spaces in limestone.
Describe how this causes **physical** weathering of the limestone.

2 marks

maximum 7 marks



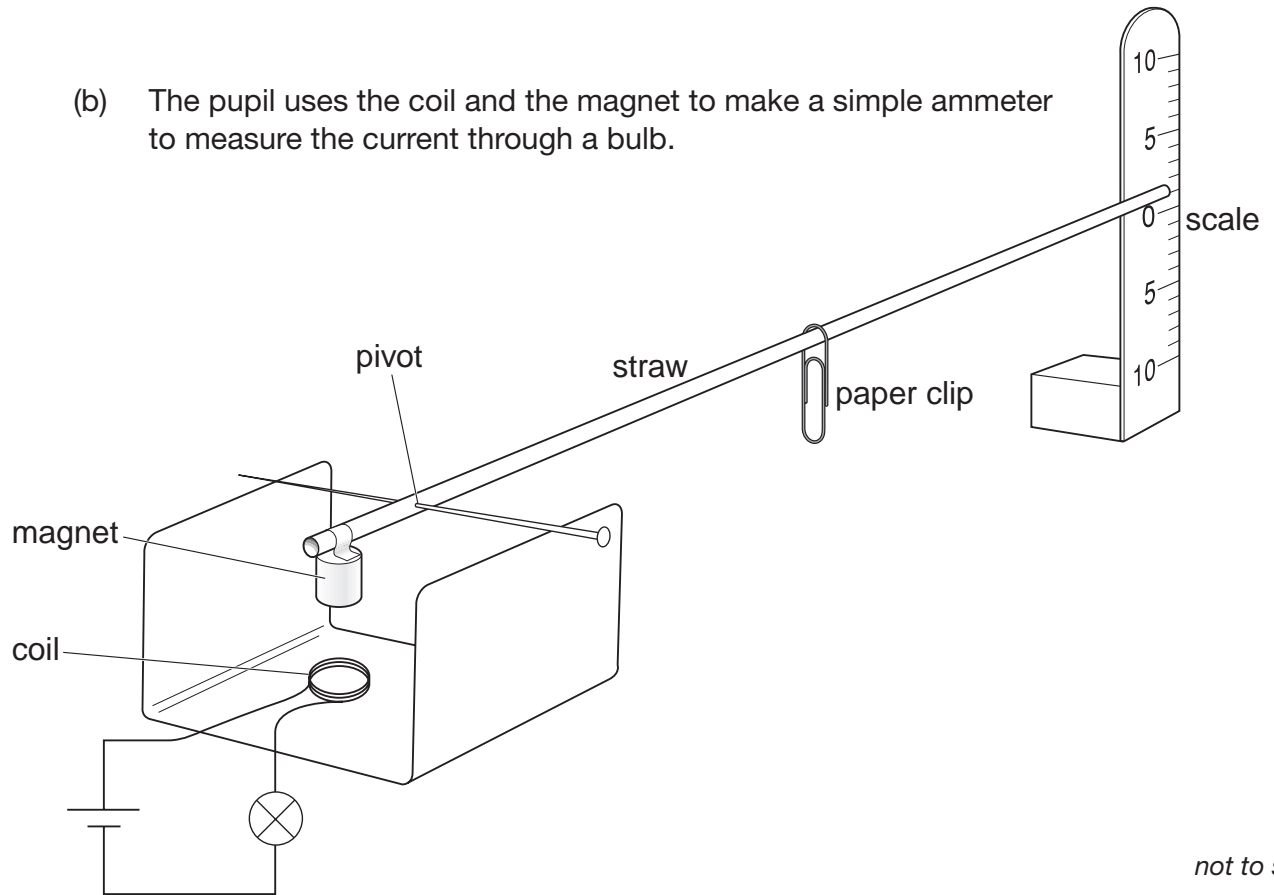
-
13. (a) A pupil makes a small coil of copper wire and passes an electric current through it. The pupil places a small magnet near the coil.



The magnet is attracted towards the coil. The pupil turns the magnet around so that the South pole is nearest the coil. What effect, if any, will this have?

1 mark

- (b) The pupil uses the coil and the magnet to make a simple ammeter to measure the current through a bulb.



- (i) The paper clip is used to balance the weight of the magnet. Why is the paper clip further away from the pivot than the magnet is?

1 mark

- (ii) Explain how a current in the coil makes the straw pointer move.

2 marks

- (iii) The pupil places a piece of soft iron in the middle of the coil. Describe and explain how this will affect the reading on the scale when the same current flows through the coil.

2 marks

maximum 6 marks



