OCR
Oxford Cambridge and RSA

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Tuesday 17 May 2022 – Morning

GCSE (9–1) Combined Science (Biology) A (Gateway Science)

J250/01 Paper 1 (Foundation Tier)

Time allowed: 1 hour 10 minutes

8993948563

You must have:
- a ruler (cm/mm)

You can use:
- a scientific or graphical calculator
- an HB pencil

J250001

Please write clearly in black ink. **Do not write in the barcodes.**

Centre number | | | | | | Candidate number | | | | |

First name(s) _____

Last name _____

INSTRUCTIONS
- Use black ink. You can use an HB pencil, but only for graphs and diagrams.
- Write your answer to each question in the space provided. If you need extra space use the lined pages at the end of this booklet. The question numbers must be clearly shown.
- Answer **all** the questions.
- Where appropriate, your answer should be supported with working. Marks might be given for using a correct method, even if your answer is wrong.

INFORMATION
- The total mark for this paper is **60**.
- The marks for each question are shown in brackets **[ ]**.
- Quality of extended response will be assessed in questions marked with an asterisk (*).
- This document has **20** pages.

ADVICE
- Read each question carefully before you start your answer.

SECTION A

Answer **all** the questions.

You should spend a maximum of 20 minutes on this section.

Write your answer to each question in the box provided.

1 Which part of the cell provides a selective barrier to molecules entering the cell?

A Cell membrane

B Cell wall

C Cytoplasm

D Plasmid

Your answer ☐ **[1]**

2 A microscope has a ×10 eyepiece lens and a ×40 objective lens.

What is its magnification?

A ×10

B ×40

C ×50

D ×400

Your answer ☐ **[1]**

3 Which two terms describe the structure of DNA?

A Monomer and double helix

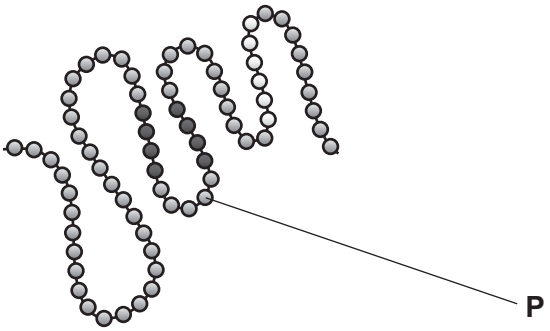
B Monomer and triple helix

C Polymer and double helix

D Polymer and triple helix

Your answer ☐ **[1]**

4 The diagram shows a model of a protein molecule.



Which substance is labelled **P** in the diagram?

A Amino acid

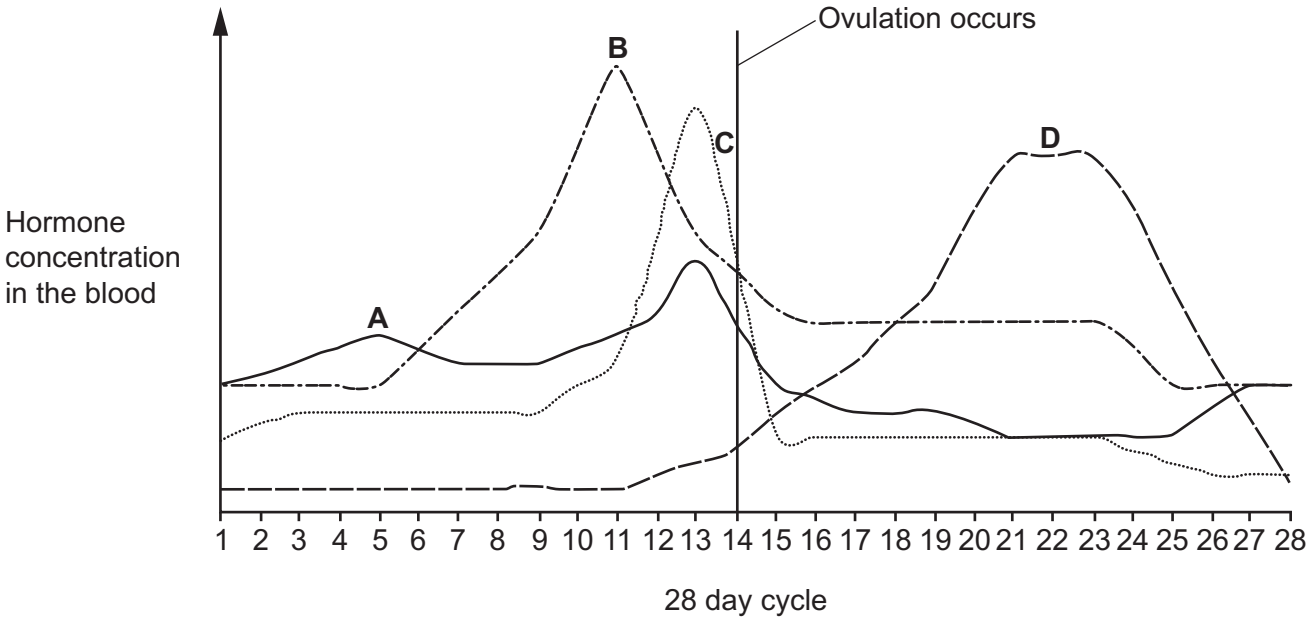
B Fatty acid

C Glucose

D Glycerol

Your answer ☐ **[1]**

5 The diagram shows the changes in female hormones during the menstrual cycle.



Which line, **A**, **B**, **C** or **D**, represents FSH?

Your answer ☐ **[1]**

6 Which statement describes a substance being transported **into** the human body from the outside?

A Carbon dioxide diffuses into the blood from the cells.

B Food molecules diffuse into the liver from the blood.

C Oxygen diffuses into the blood from the air.

D Urea diffuses into the blood from the liver.

Your answer ☐ **[1]**

7 Why do root hair cells require large numbers of mitochondria?

A For the uptake of minerals by active transport.

B For the uptake of water by active transport.

C For the uptake of minerals by osmosis.

D For the uptake of water by osmosis.

Your answer ☐ **[1]**

8 Which statement is **true** for type 1 diabetes and **false** for type 2 diabetes?

A The body stops responding to insulin, insulin injections are needed.

B The body stops responding to insulin, insulin injections are not needed.

C The pancreas stops making insulin, insulin injections are needed.

D The pancreas stops making insulin, insulin injections are not needed.

Your answer ☐ **[1]**

9 Which statement is true of **both** adult and embryonic stem cells?

A They are in all adult and embryonic tissues.

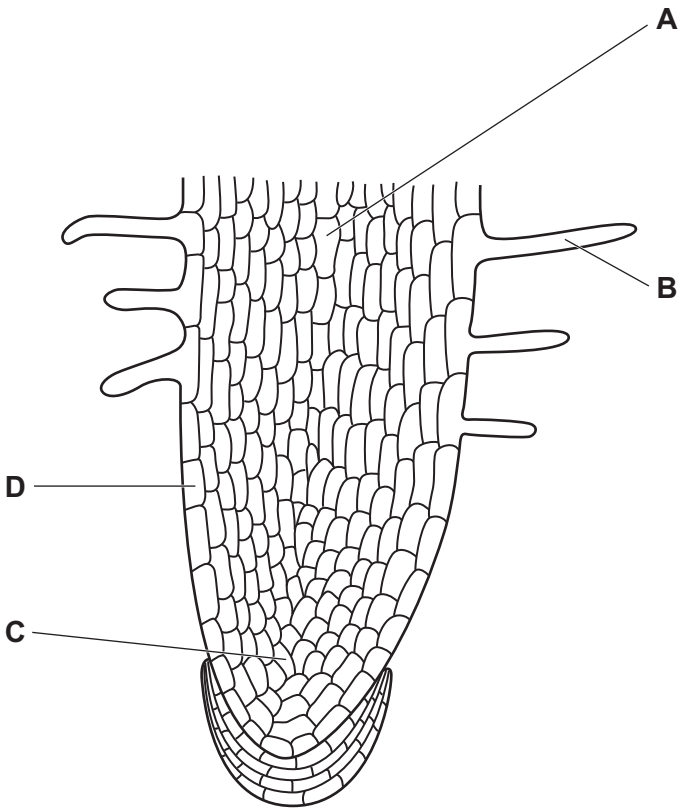
B They are only used to make blood cells.

C They can divide by mitosis.

D They cannot differentiate.

Your answer ☐ **[1]**

10 The diagram shows the root tip of a plant.



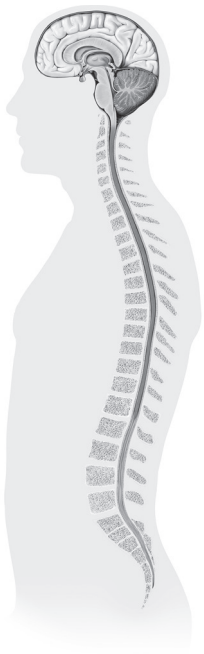
Which label, **A**, **B**, **C** or **D**, identifies the position of stem cells in the root tip?

Your answer ☐ **[1]**

SECTION B

Answer **all** the questions.

11 **(a)** The diagram shows the central nervous system (CNS).



Complete the sentence to describe the structure of the CNS. Use the diagram.

The CNS is made up of the ..... and the ..... cord.

[2]

(b) **(i)** Hot objects can burn your skin. Removing your hand from a hot object is a reflex action. The response is a reflex action because it is controlled by a reflex arc.

Suggest two **other** reasons why the response is a reflex action.

1 .....

2 .....

[2]

(ii) Draw lines to connect each **part** of the reflex arc to its correct **function** when responding to a hot object.

Part	Function
muscles	detects the hot object
motor neurone	move the hand away
receptor in skin	carries electrical impulses to the CNS
sensory neurone	carries electrical impulses to the muscles

[3]

(c) A student uses a computer program to measure the reaction times of their friends.

The table shows their results.

Friend	Sex of friend	Age of friend	Time spent each week playing computer games (hours)	Reaction time (s)
A	male	14	5	0.34
B	male	14	7	0.29
C	female	15	6	0.26
D	female	14	15	0.24
E	male	15	3	0.27

(i) Identify the **median** reaction time for the five friends.

Median reaction time = ... s **[1]**

(ii) Calculate the **mean** reaction time for the five friends.

Mean reaction time = ... s **[2]**

(iii) Use the data in the table to suggest **one** reason why friend **D** has the fastest reaction time.

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..... **[1]**

(d) Adrenaline is a hormone that speeds up reaction times.

Describe the typical features of hormonal coordination such as adrenaline in the body.

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..... **[2]**

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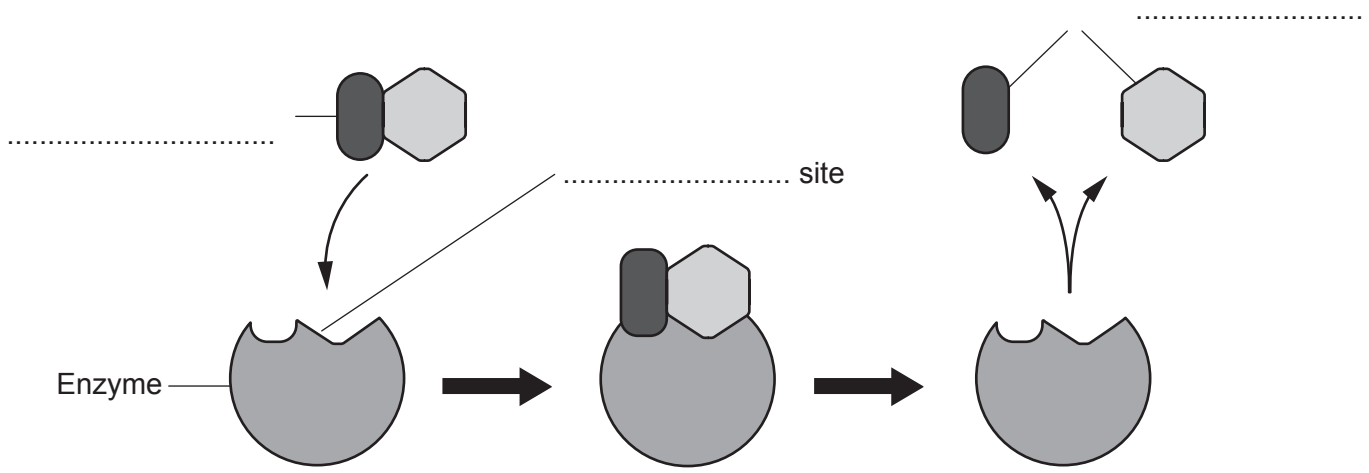
12 (a) **Fig. 12.1** shows a model of the lock and key hypothesis for enzymes.

Label **Fig. 12.1**. Use words in the list.

active	**catalyst**	**helix**	**products**
specific	**substrate**	**yields**	

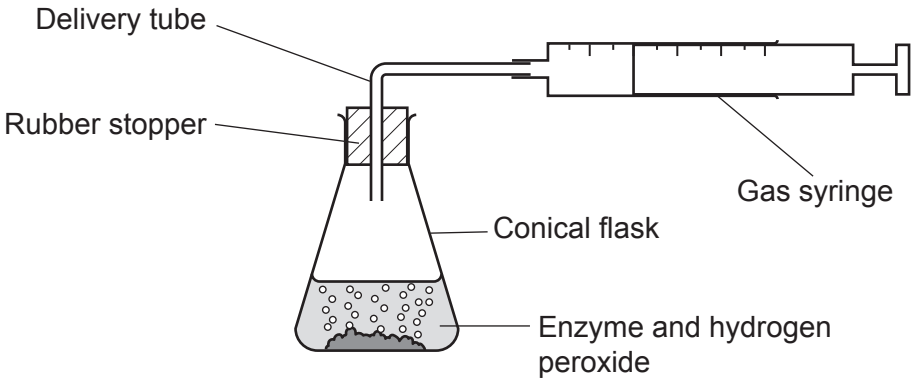
Fig. 12.1



[3]

(b) **Fig. 12.2** shows apparatus that could be used to investigate an enzyme-controlled reaction.

Fig. 12.2



The enzyme breaks down hydrogen peroxide to produce oxygen.

Complete these sentences to describe how to use the apparatus.

Put the enzyme and hydrogen peroxide into the ..... .

Measure the volume of oxygen that collects in the ..... after 5 minutes.

[2]

(c) A student uses the apparatus in **Fig. 12.2** to find the pH at which the enzyme works best (optimum pH).

The table shows the results.

pH	Volume of gas (cm^3)
1	2
6	20
14	1

***(i)** Describe and explain the pattern in the results.

Use ideas about the lock and key hypothesis in your answer.

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..... **[6]**

(ii) Describe how the student could improve their investigation to find a more **accurate** optimum pH for the enzyme.

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..... **[2]**

13 **(a)** Plants are important for life on Earth as they photosynthesise and provide oxygen.

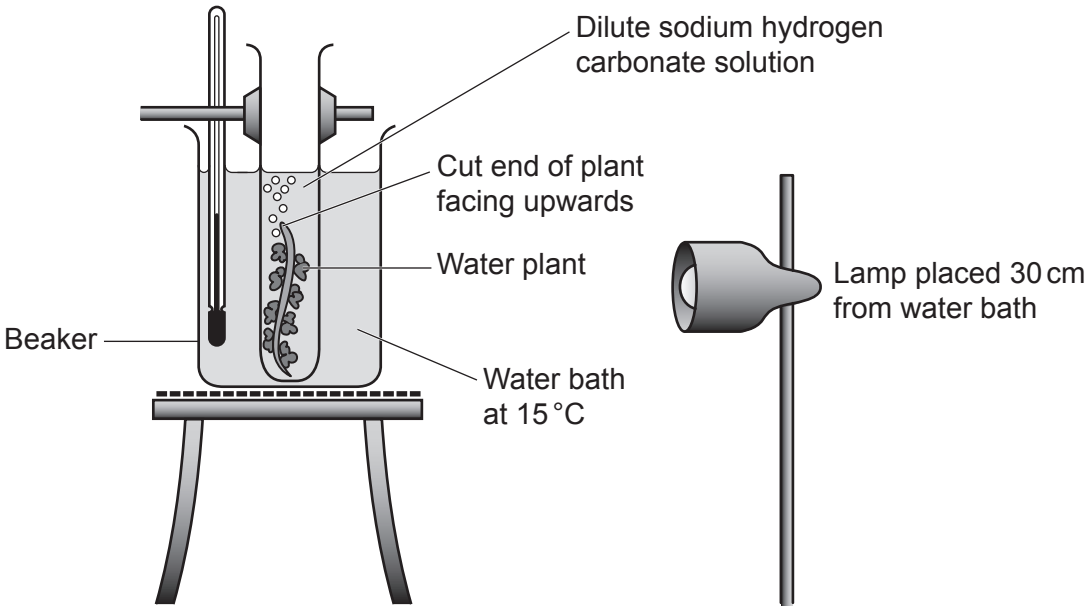
Describe **one other** reason why plants are important to life on Earth.

.....

..... **[1]**

(b) A scientist investigates the effect of temperature on the rate of photosynthesis.

The diagram shows the apparatus they use.



The scientist counts the number of bubbles released by the water plant in 10 minutes.

They repeat this method with different temperatures of water.

The table shows their results.

Temperature (°C)	Number of bubbles
15	22
20	8
25	36
30	26
35	22
40	2

(i) The scientist decides to repeat the investigation for 20 °C.
Suggest why.

.....

..... **[1]**

(ii) When the scientist repeats the investigation at 20 °C the result is 26 bubbles.

Use this result and the results in the table to describe the effect of temperature on the **rate** of photosynthesis.

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..... **[2]**

(c) The scientist decides to use the apparatus to investigate the effect of light intensity on photosynthesis.

Describe how they could use the apparatus to change light intensity.

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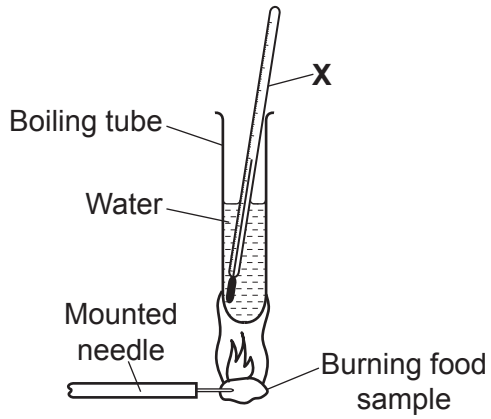
..... **[2]**

14 Respiration releases energy from food. The energy content of food can be measured by burning the food. A student measures the energy content of some different foods.

(a) The diagram shows the apparatus they use.



(i) The student finds the energy content by measuring the change in temperature of the water.

Identify the piece of apparatus labelled **X** in the diagram.

..... **[1]**

(ii) The table shows the change in temperature for one type of food.

Temperature at the start (°C)	**Temperature at the end (°C)**
20	65

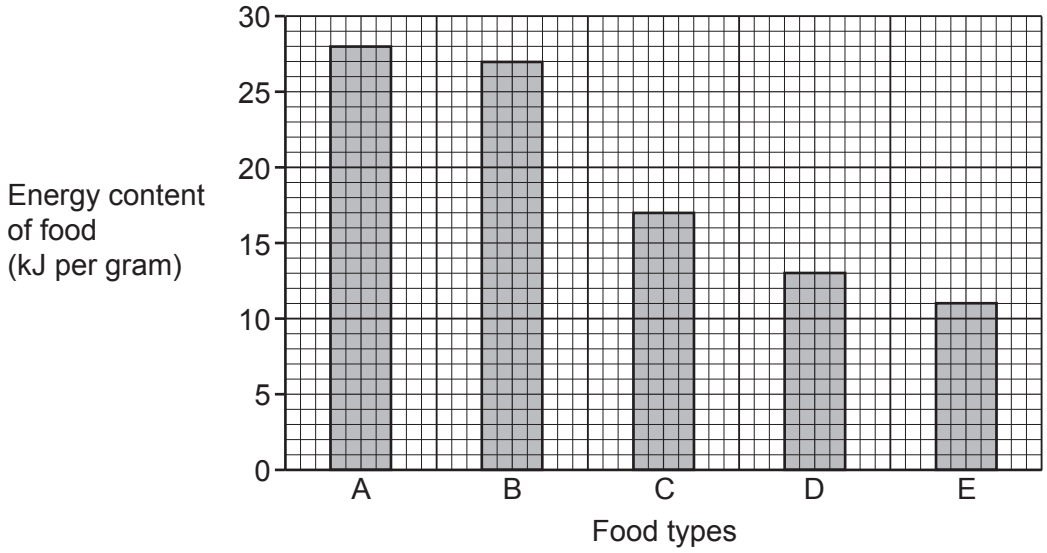
Calculate the energy content of the food using this formula.

Energy content = 20 × 4.2 × change in temperature

Energy content = ... J **[2]**

(b) The student converted all their results to find the energy content in kJ per gram of food.

The graph shows the results.



(i) What is the energy content of food type **D**? ..... kJ per gram **[1]**

(ii) Eating food type **B** provides the body with **more** ATP molecules than eating the same mass of food type **E**.

Use your knowledge of cellular respiration to explain why.

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..... **[2]**

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15 Plants and animals both have transport systems.

(a) **Fig. 15.1** shows cells found in the transport system of animals.

Fig. 15.1

(i) Identify the type of cell shown in **Fig. 15.1**.

..... **[1]**

(ii) The transport system in animals is the circulatory system.

Describe the relationship between the circulatory system and the gas exchange system in the human body.

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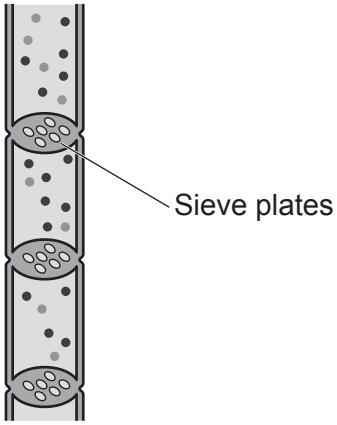
..... **[3]**

(b) Phloem is part of the transport system in plants. **Fig. 15.2** is a diagram of phloem sieve tubes.

Fig. 15.2



Explain how phloem sieve tubes are adapted to their function. Use **Fig. 15.2**.

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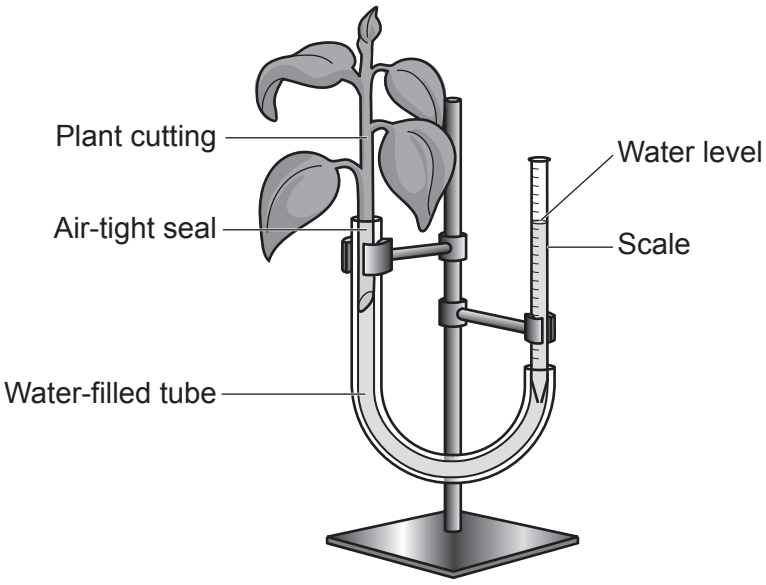
..... **[2]**

(c) **Fig. 15.3** shows apparatus used to investigate the rate of water uptake in plants.

Fig. 15.3



(i) Name the apparatus shown in **Fig. 15.3**.

..... **[1]**

(ii) The air-tight seal stops air getting into the water-filled tube.

Suggest why it is important to stop air getting into the tube.

.....

..... **[1]**

(iii) The apparatus is set up and left for 10 minutes. The water level moved 8 mm.

Calculate the rate of water uptake in **mm per second**.

Give your answer to **2** significant figures.

Rate of water uptake = ... **mm per second [3]**

(iv) The investigation is repeated with an electric fan switched on next to the apparatus.

Predict what would happen to the rate of water uptake by putting a (ring) around the correct choice to complete the sentence. Explain your answer.

The rate of water uptake would **increase / decrease / stay the same**.

Reason: .....

..... **[1]**

END OF QUESTION PAPER

ADDITIONAL ANSWER SPACE

If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margin(s).