



Please write clearly in block capitals.

Centre number

|  |  |  |  |  |
|--|--|--|--|--|
|  |  |  |  |  |
|--|--|--|--|--|

Candidate number

|  |  |  |  |
|--|--|--|--|
|  |  |  |  |
|--|--|--|--|

Surname

\_\_\_\_\_

Forename(s)

\_\_\_\_\_

Candidate signature

\_\_\_\_\_

# GCSE COMBINED SCIENCE: TRILOGY

# F

Foundation Tier  
Biology Paper 1F

Tuesday 14 May 2019

Afternoon

Time allowed: 1 hour 15 minutes

## Materials

For this paper you must have:

- a ruler
- a scientific calculator.

## Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want to be marked.
- In all calculations, show clearly how you work out your answer.

## Information

- The maximum mark for this paper is 70.
- The marks for questions are shown in brackets.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

| For Examiner's Use |      |
|--------------------|------|
| Question           | Mark |
| 1                  |      |
| 2                  |      |
| 3                  |      |
| 4                  |      |
| 5                  |      |
| 6                  |      |
| 7                  |      |
| <b>TOTAL</b>       |      |



J U N 1 9 8 4 6 4 B 1 F 0 1

IB/M/Jun19/E10

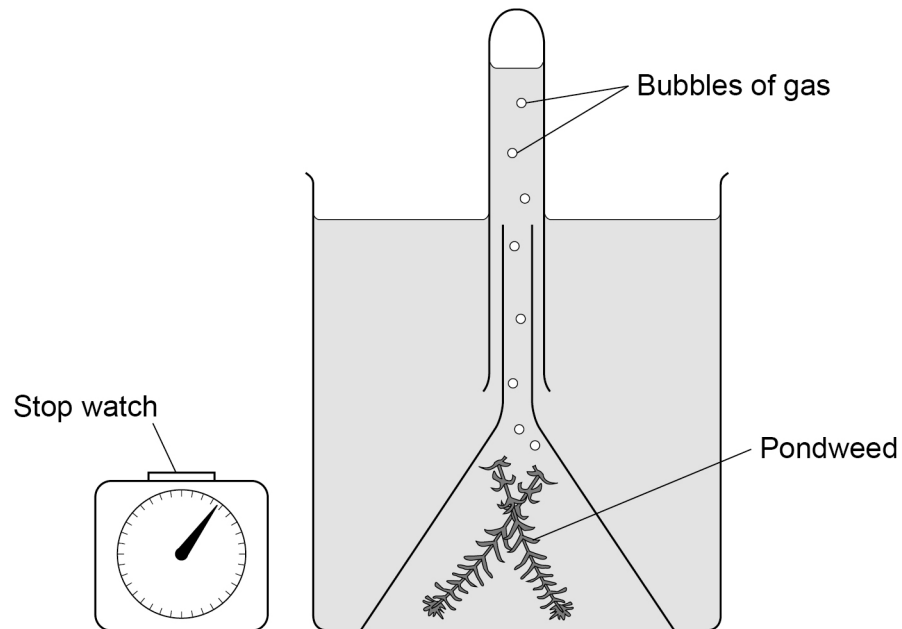
**8464/B/1F**

0 1

A student investigated the effect of light intensity on the rate of photosynthesis.

**Figure 1** shows some of the apparatus used.

**Figure 1**



0 1 . 1

Name the gas produced by the pondweed in the light.

[1 mark]

oxygen

0 1 . 2

Describe **one** way the student could change the intensity of light reaching the pondweed.

[2 marks]

use a lamp



0 1 . 3

Describe how the student could use the apparatus in **Figure 1** to measure the rate of photosynthesis.

**[2 marks]**

count the number of bubbles  
in a given time

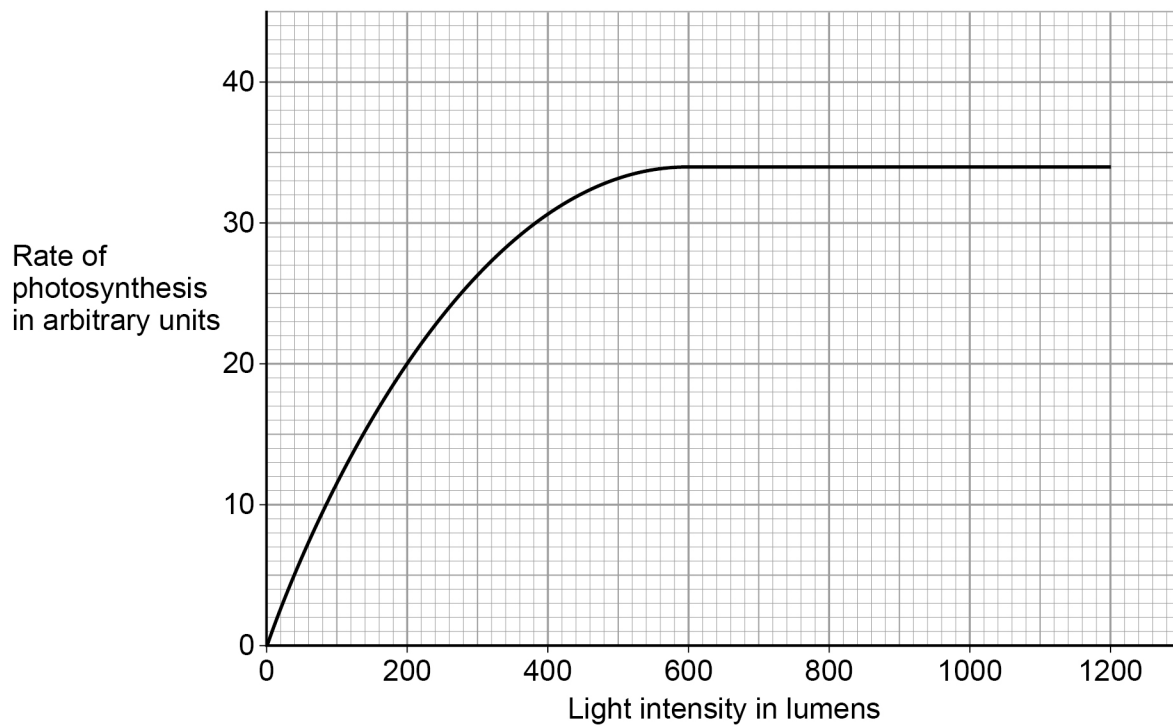
Question 1 continues on the next page

Turn over ►



Figure 2 shows the student's results.

Figure 2



0 1 . 4 What was the maximum rate of photosynthesis?

[1 mark]

Maximum rate = 34 arbitrary units



0 1 . 5

At which light intensity was light a limiting factor?

[1 mark]

Tick (✓) **one** box.

200 lumens

☒

600 lumens

☐

1200 lumens

☐

0 1 . 6

Light intensity can affect the rate of photosynthesis.

Give **one** other factor that can affect the rate of photosynthesis.

[1 mark]

temperature

8

Turn over ►



**0 2**

A single-celled organism has a large surface area to volume ratio.

**0 2 . 1**

How does oxygen enter a single-celled organism?

**[1 mark]**

Tick (✓) **one** box.

Active transport

☐

Diffusion

☒

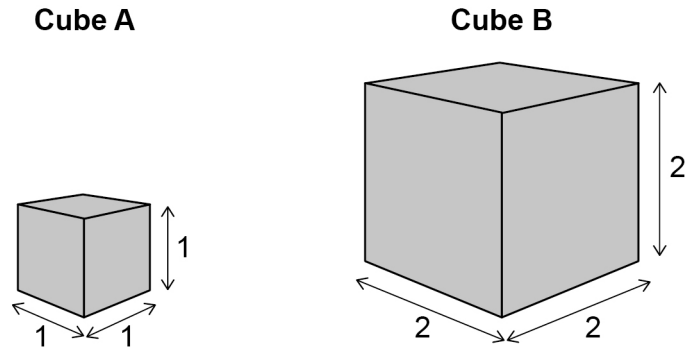
Osmosis

☐

**Figure 3** shows two cubes.

The surface area to volume ratio for cube **A** is 6:1

**Figure 3**



0 2 . 2

Calculate the surface area to volume ratio of cube **B**.

[4 marks]

Surface area of one face of cube **B**  $2 \times 2$

Surface area of one face = 4

Total surface area of cube **B**  $4 \times 6$

Total surface area = 24

Volume of cube **B**  $2 \times 2 \times 2$

Volume = 8

Surface area to volume ratio = 24 : 8

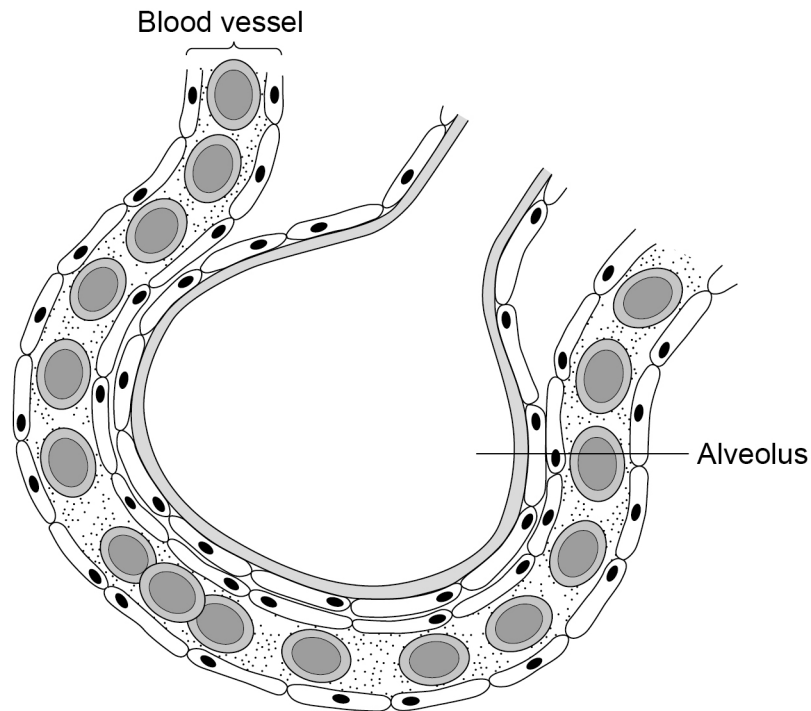
Turn over ►



Multicellular organisms have exchange surfaces to absorb substances.

**Figure 4** shows part of the exchange surface in the lungs.

**Figure 4**



**0 2 . 3** Oxygen passes from the alveolus into the blood.

Name the part of the blood that carries the most oxygen.

[1 mark]

red blood cells

**0 2 . 4** Name the gas that passes out of the blood into the alveolus.

[1 mark]

carbon dioxide



0 2 . 5

Alveoli provide a large surface area for gas exchange.

Give **two** other ways the lungs are adapted for efficient gas exchange.

[2 marks]

- 1 wall of alveolus only one cell thick
- 2 good blood supply

9

Turn over for the next question

Turn over ►



03

This question is about organisation in living organisms.

03.1

Write the biological structures from the box in the correct size order.

[3 marks]

|      |         |       |        |
|------|---------|-------|--------|
| cell | nucleus | organ | tissue |
|------|---------|-------|--------|

Smallest

↓

Largest

nucleus

cell

tissue

organ

03.2

Name **one** animal organ.

[1 mark]

kidney

03.3

Which is a plant tissue?

[1 mark]

Tick (✓) **one** box.

Flower

☐

Leaf

☐

Phloem

☒

Root

☐

**Figure 5** shows part of a root viewed using a microscope.

**Figure 5**

This image cannot be reproduced here due to third-party  
copyright restrictions

0 3 . 4

Explain how a root hair cell is specialised for its function.

[2 marks]

large surface area so it can  
absorb lot of water

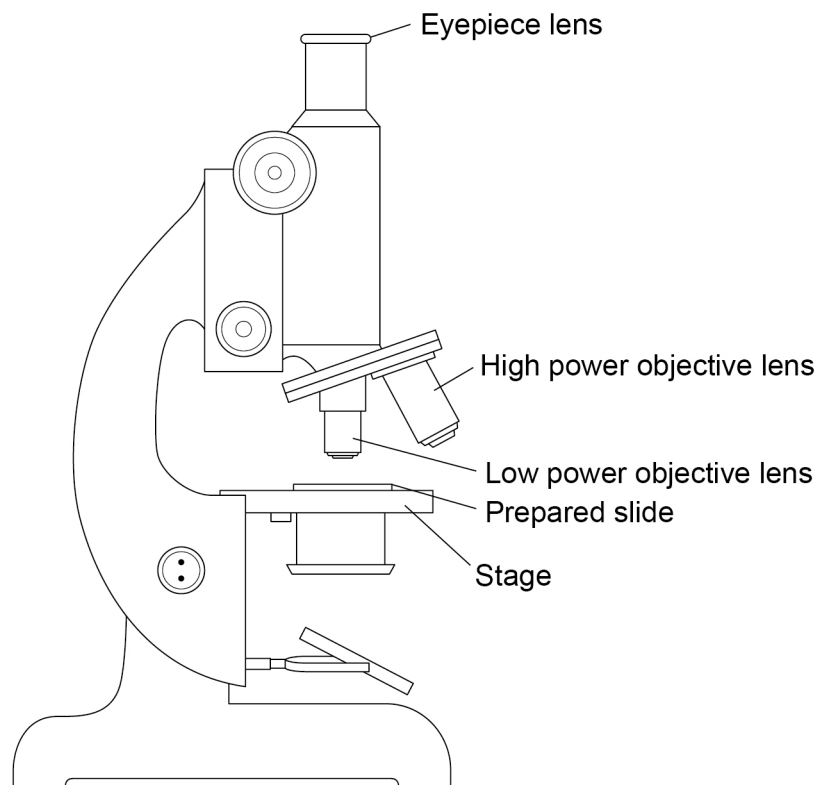
**Question 3 continues on the next page**

**Turn over ►**



**Figure 6** shows a microscope.

**Figure 6**



**0 3 . 5**

It is easier to view the cells using the low power objective lens first.

Give **one** reason why.

**[1 mark]**

**Easier to focus**

**0 3 . 6**

To focus the image the objective lens should be moved away from the stage.

Give **one** reason why the objective lens should **not** be moved towards the stage.

**[1 mark]**

**to avoid damage to  
lens**



**0 3 . 7** The image of the prepared slide in **Figure 6** is viewed with the  $\times 10$  objective lens.

The total magnification is  $\times 50$

What was the power of the eyepiece lens used?

[1 mark]

Power of eyepiece lens =  $\times$  5

**0 3 . 8** Root hair cells do **not** contain chloroplasts.

Suggest **one** reason why.

[1 mark]

root hair cells are not exposed  
to light

11

Turn over for the next question

Turn over ►



|   |   |
|---|---|
| 0 | 4 |
|---|---|

Water is lost from the leaves of a plant through stomata.

|   |   |   |   |
|---|---|---|---|
| 0 | 4 | . | 1 |
|---|---|---|---|

What is the process by which water is lost from the leaves of a plant?

[1 mark]

Tick (✓) **one** box.

Osmosis

☐

Photosynthesis

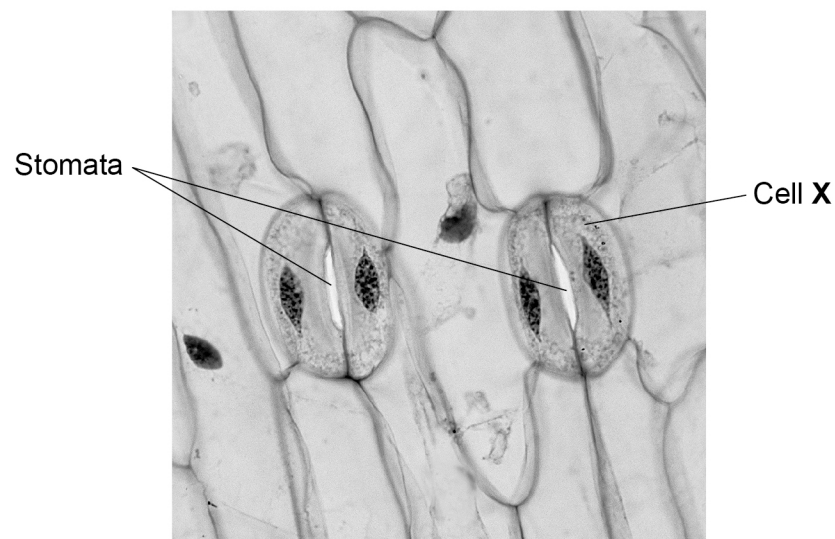
☐

Transpiration

☒

**Figure 7** shows stomata on the lower surface of a leaf.

**Figure 7**



**0 4 . 2** What is the name of cell **X**?

**[1 mark]**

Tick (✓) **one** box.

Epidermal cell

☐

Guard cell

☒

Palisade cell

☐

Xylem cell

☐

**0 4 . 3** The length of cell **X** is 25 mm when viewed at a magnification of  $\times 800$

Calculate the real length of cell **X**.

Give your answer in micrometres ( $\mu\text{m}$ ).

1 mm = 1000  $\mu\text{m}$

Use the equation:

$$\text{real length of cell} = \frac{\text{size of image}}{\text{magnification}}$$

**[3 marks]**

25

800

0.03125

Real length of cell **X** = 31.25  $\mu\text{m}$

**Question 4 continues on the next page**

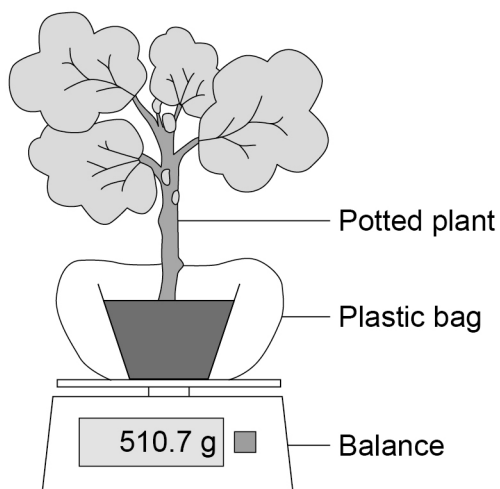
**Turn over ►**



A student measured the mass of water lost from some similar plants. The plants were at different temperatures.

**Figure 8** shows the apparatus used.

**Figure 8**



This is the method used.

1. Seal a plastic bag around the pot of a potted plant.
2. Place the potted plant with the bag on a balance in a room at 20 °C
3. Record the mass.
4. After 3 hours record the mass again.
5. Calculate the mass of water lost from the plant.
6. Repeat steps 1–5 at 25 °C and at 30 °C with other similar plants.

0 4 . 4

What was the independent variable in this investigation?

[1 mark]

Tick (✓) **one** box.

Initial mass of the plant

☐

Length of time the plant was left

☐

Mass of water lost

☐

Temperature of the room

☒

|   |   |   |   |
|---|---|---|---|
| 0 | 4 | . | 5 |
|---|---|---|---|

Suggest why the student sealed a plastic bag around the pot.

[1 mark]

Mass lost was from the  
leaves

Question 4 continues on the next page

Turn over ►



**Table 1** shows the student's results.

**Table 1**

| Temperature<br>in °C | Mass at<br>the start in g | Mass after 3 hours<br>in g | Mass of water lost<br>in 3 hours in g |
|----------------------|---------------------------|----------------------------|---------------------------------------|
| 20                   | 510.7                     | 508.6                      | 2.1                                   |
| 25                   | 510.4                     | 507.1                      | 3.3                                   |
| 30                   | <b>X</b>                  | 506.3                      | 4.9                                   |

**0 4 . 6** What is the resolution of the balance used in this investigation?

[1 mark]

Tick **one** box.

0.1 g

☒

1.0 g

☐

100 g

☐

500 g

☐

**0 4 . 7** Calculate value **X** in **Table 1**.

[1 mark]

$x = 511.2$  g

**0 4 . 8** Give **one** conclusion that can be made from the results in **Table 1**.

[1 mark]

the higher the temperature the  
more water lost

**0 4 . 9** Give **two** factors that might affect the rate of water loss from the leaves.

Do **not** refer to temperature in your answer.

[2 marks]

1 humidity  
2 light intensity



**Turn over for the next question**

*Do not write  
outside the  
box*

**DO NOT WRITE ON THIS PAGE  
ANSWER IN THE SPACES PROVIDED**

**Turn over ►**

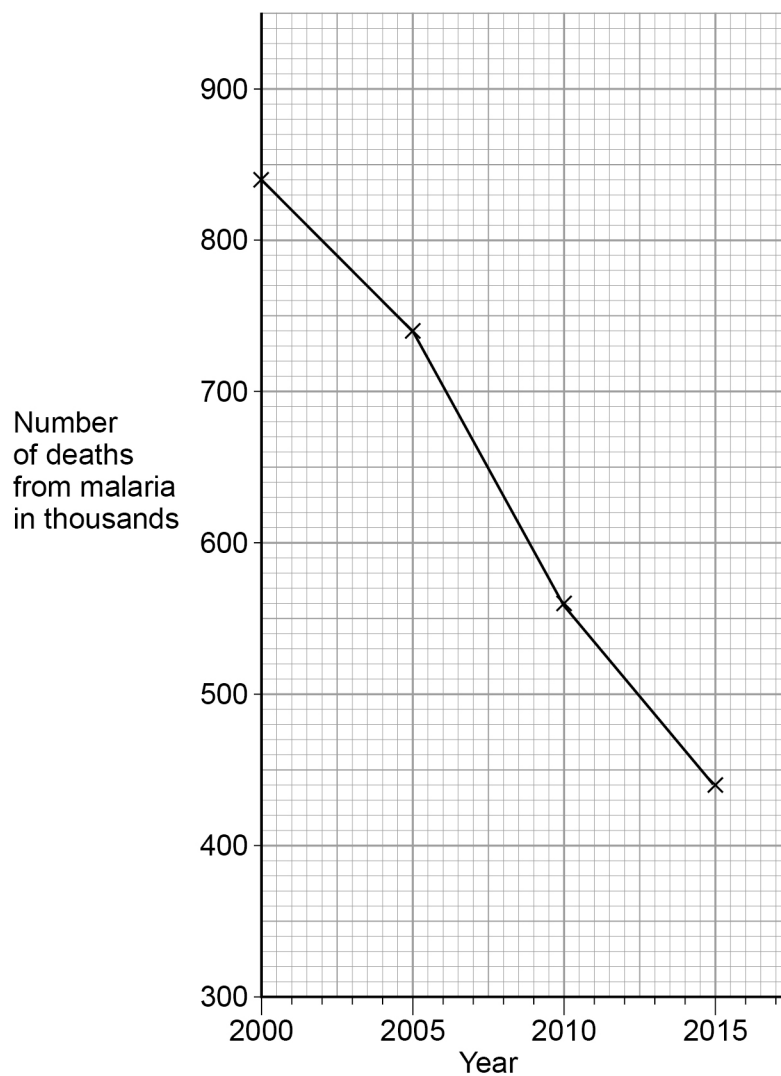


0 5

Malaria is a disease transmitted by mosquitos.

**Figure 9** shows information about the number of deaths from malaria.

**Figure 9**



0 5 . 1

Calculate the decrease in the number of deaths between 2000 and 2015.

[2 marks]

$$840,000 - 440,000$$

Decrease in number of deaths = 400,000



**0 5 . 2** Which time period shows the greatest decrease in the number of deaths?

[1 mark]

Tick (✓) **one** box.

2000 to 2005

☐

2005 to 2010

☒

2010 to 2015

☐

**0 5 . 3** A student looked at **Figure 9** and concluded that there were 800 000 deaths from malaria in 2002.

Suggest **one** reason why this conclusion might **not** be correct.

[1 mark]

**Data not collected**

**0 5 . 4** What type of pathogen causes malaria?

[1 mark]

Tick (✓) **one** box.

Bacterium

☐

Fungus

☐

Protist

☒

Virus

☐

Turn over ►



0 5 . 5

Scientists are developing a vaccine against malaria.

Suggest how a vaccine against malaria could reduce the spread of the disease.

[2 marks]

make people immune so fewer  
infected people to pass pathogens

0 5 . 6

Give **one** way of controlling the spread of malaria.Do **not** refer to a vaccine in your answer.

[1 mark]

prevent mosquitoes breeding

8



**Turn over for the next question**

*Do not write  
outside the  
box*

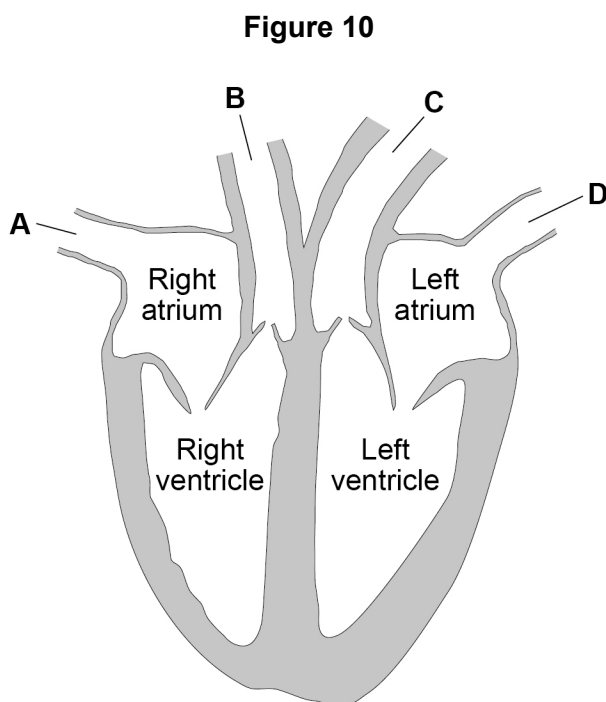
**DO NOT WRITE ON THIS PAGE  
ANSWER IN THE SPACES PROVIDED**

**Turn over ►**



0 6

Figure 10 shows a human heart.



0 6 . 1

Which blood vessel carries deoxygenated blood away from the heart to the lungs?

[1 mark]

Tick (✓) **one** box.

|   |                          |   |                                     |   |                          |   |                          |
|---|--------------------------|---|-------------------------------------|---|--------------------------|---|--------------------------|
| A | <input type="checkbox"/> | B | <input checked="" type="checkbox"/> | C | <input type="checkbox"/> | D | <input type="checkbox"/> |
|---|--------------------------|---|-------------------------------------|---|--------------------------|---|--------------------------|

0 6 . 2

The natural resting heart rate is controlled by a group of cells that act as a pacemaker.

Where in the heart are 'pacemaker cells' found?

[1 mark]

Tick (✓) **one** box.

Left atrium

☐

Left ventricle

☐

Right atrium

☒

Right ventricle

☐

Some people may be treated with a drug to slow their heart rate.

**0 6 . 3** Digitalis is a drug that slows the heart rate.

Where does the drug digitalis originate from?

**[1 mark]**

Tick (✓) **one** box.

Bacteria

☐

Foxgloves

☒

Mould

☐

Willow

☐

**Question 6 continues on the next page**

**Turn over ►**



Beta blockers are another type of drug that slows the heart rate.

**Table 2** shows information for people who do not take beta blockers and for people who do take beta blockers.

- Stroke volume is the volume of blood pumped out of the heart each time it beats.
- Cardiac output is the total volume of blood pumped out of the heart each minute.

**Table 2**

|                                              | No beta blockers taken |                 | Taking beta blockers |                 |
|----------------------------------------------|------------------------|-----------------|----------------------|-----------------|
|                                              | At rest                | During exercise | At rest              | During exercise |
| Heart rate in beats per minute               | 68                     | 150             | 52                   | 88              |
| Stroke volume in cm <sup>3</sup>             | 80                     | 120             | X                    | 98              |
| Cardiac output in cm <sup>3</sup> per minute | 5440                   | 18 000          | 2800                 | 8624            |

**0 6 . 4** Calculate stroke volume **X** in **Table 2**.

Use the equation:

$$\text{cardiac output} = \text{stroke volume} \times \text{heart rate}$$

Give your answer to 2 significant figures.

**[3 marks]**

$$X = \frac{2800}{52}$$

Stroke volume **X** = 54 cm<sup>3</sup>



0 6 . 5

Some people who take beta blockers get out of breath when they exercise.

Explain why beta blockers can have this effect during exercise.

You should refer to information given in **Table 2**.

[6 marks]

effect of exercise

during exercise body needs to

transfer more energy

energy transferred during

respiration so more oxygen us

needed

effect of beta blockers

beta blockers reduce the increase in

heart rate during exercise

effect on breathing rate

breathing rate increased to increase

rate amount of oxygen absorbed

12

Turn over for the next question

Turn over ►



**There are no questions printed on this page**

*Do not write  
outside the  
box*

**DO NOT WRITE ON THIS PAGE  
ANSWER IN THE SPACES PROVIDED**



07

This question is about digestion.

07.1

Name the enzyme that digests starch in the human digestive system.

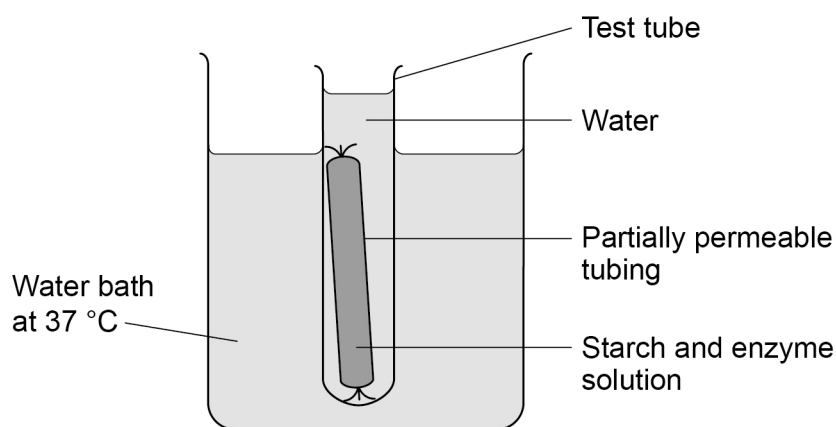
[1 mark]

amylase

A student set up a model to represent the digestion and absorption of food molecules in the digestive system.

Figure 11 shows the student's model.

Figure 11



This is the method used.

1. Fill a test tube with water at 37 °C
2. Test the water for starch and for sugar.
3. Mix together starch and enzyme solution and immediately test it for starch and for sugar.
4. Fill some partially permeable tubing with the starch and enzyme mixture.
5. Seal the tubing and place it in the test tube of water.
6. Place the test tube in a water bath at 37 °C
7. After 30 minutes, test the mixture inside the partially permeable tubing and test the water in the test tube for starch and for sugar.

07.2

Suggest which parts of the body the partially permeable tubing and the water in the test tube represent.

[2 marks]

Partially permeable tubing

small intestine

Water in the test tube

blood

Turn over ►



**Table 3** shows the results.

**Table 3**

| Test | Description of liquid                   | Result of starch test | Result of sugar test |
|------|-----------------------------------------|-----------------------|----------------------|
| 1    | Mixture inside tubing at start          | ✓                     | ✗                    |
| 2    | Water in the test tube at start         | ✗                     | ✗                    |
| 3    | Mixture inside tubing after 30 minutes  | ✓                     | ✓                    |
| 4    | Water in the test tube after 30 minutes | ✗                     | ✓                    |

**Key**

✓ = Present

✗ = Not present

**0 7 . 3** Name the reagents used to test for starch and for sugar.

**[2 marks]**

Starch iodine solution

Sugar Benedict's solution

**0 7 . 4** Why was there no sugar present in test 1?

**[1 mark]**

enzymes had not started  
to work

**0 7 . 5** Explain the results for test 3.

**[2 marks]**

starch broke down to form  
sugar  
not all starch was digested



07.6

Explain the results for test 4.

[2 marks]

sugar molecules formed  
are small enough to pass  
through tubing

10

END OF QUESTIONS



**There are no questions printed on this page**

*Do not write  
outside the  
box*

**DO NOT WRITE ON THIS PAGE  
ANSWER IN THE SPACES PROVIDED**

**Copyright information**

For confidentiality purposes, from the November 2015 examination series, acknowledgements of third-party copyright material are published in a separate booklet rather than including them on the examination paper or support materials. This booklet is published after each examination series and is available for free download from [www.aqa.org.uk](http://www.aqa.org.uk) after the live examination series.

Permission to reproduce all copyright material has been applied for. In some cases, efforts to contact copyright-holders may have been unsuccessful and AQA will be happy to rectify any omissions of acknowledgements. If you have any queries please contact the Copyright Team, AQA, Stag Hill House, Guildford, GU2 7XJ.

Copyright © 2019 AQA and its licensors. All rights reserved.



3 2



1 9 6 G 8 4 6 4 / B / 1 F

IB/M/Jun19/8464/B/1F