AQA

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.

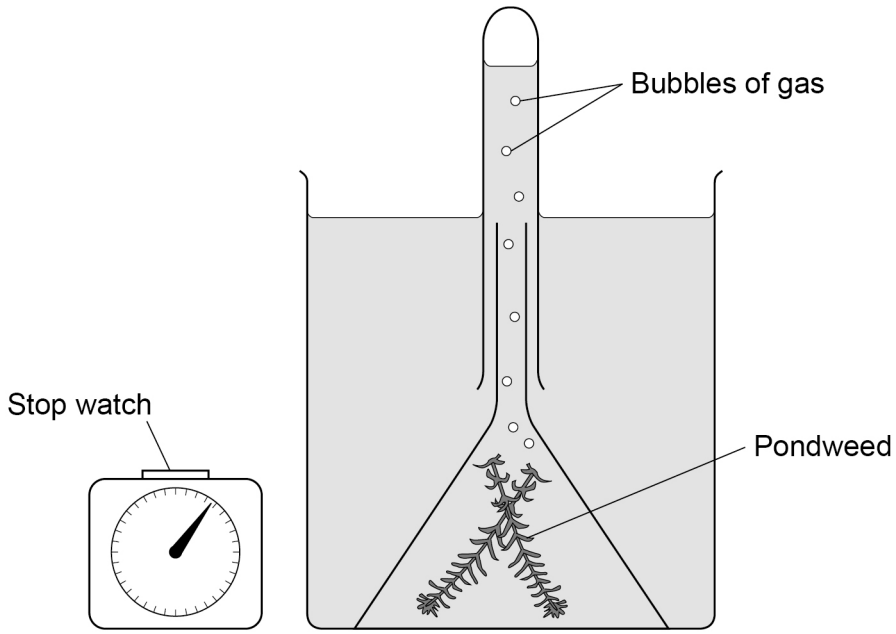
For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
TOTAL	

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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]

0 1 . 2 Describe **one** way the student could change the intensity of light reaching the pondweed.

[2 marks]

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0 1 . 3 Describe how the student could use the apparatus in **Figure 1** to measure the rate of photosynthesis.

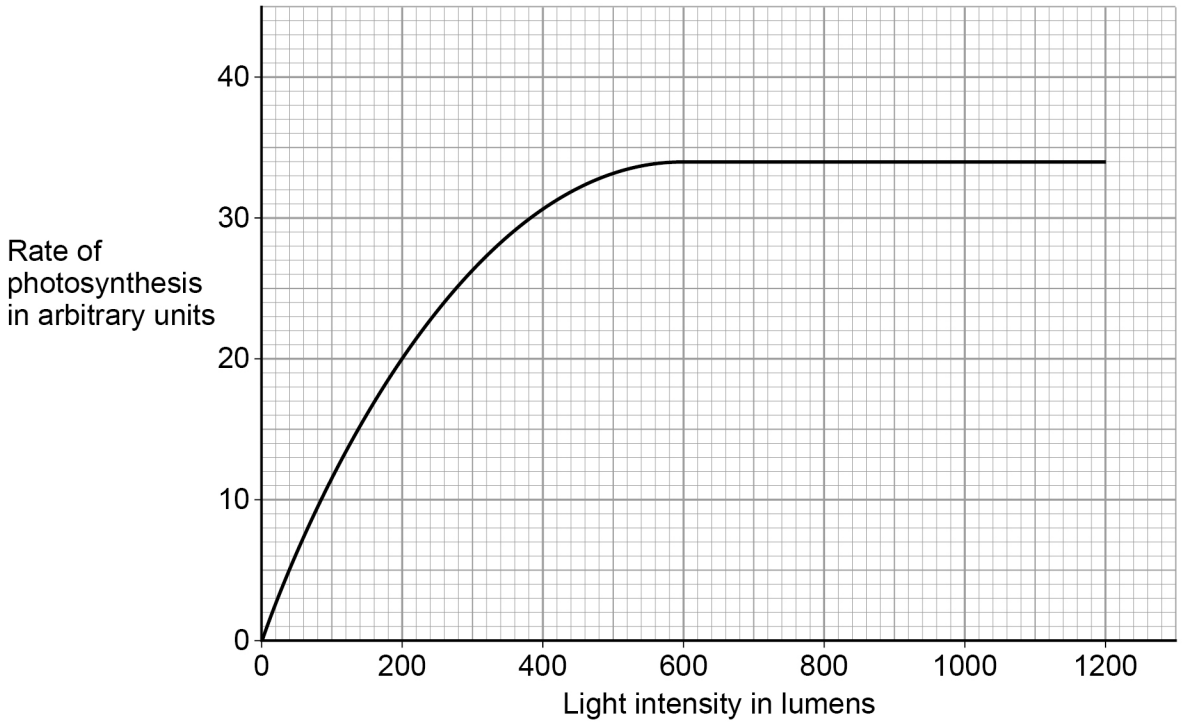
[2 marks]

Question 1 continues on the next page

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Figure 2 shows the student's results.

Figure 2



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

[1 mark]

Maximum rate = _____ arbitrary units

Do not write outside the box

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]

_____

8

Do not write outside the box

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 ☐

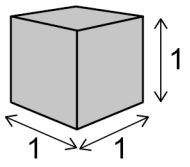
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Figure 3 shows two cubes.

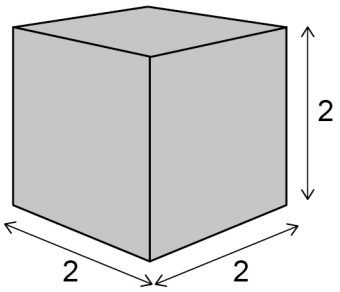
The surface area to volume ratio for cube **A** is 6:1

Figure 3

Cube A



Cube B



0 2 . 2 Calculate the surface area to volume ratio of cube **B**.

[4 marks]

Surface area of one face of cube **B** _____

_____

Surface area of one face = _____

Total surface area of cube **B** _____

_____

Total surface area = _____

Volume of cube **B** _____

_____

Volume = _____

Surface area to volume ratio = _____ : _____

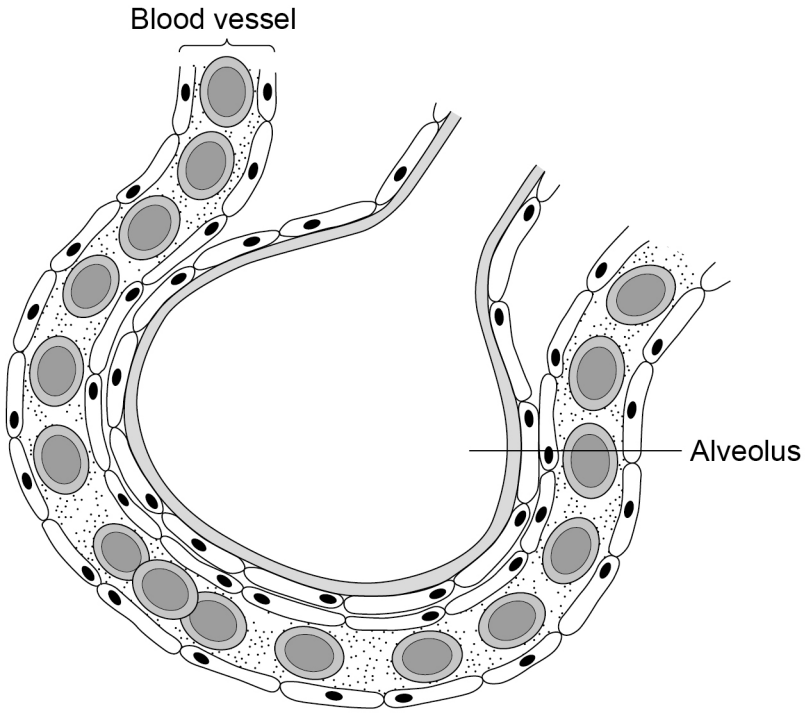
Turn over ►

Do not write outside the box

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]

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

[1 mark]

Do not write outside the box

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 _____

_____

2 _____

_____

9

Turn over for the next question

Do not write outside the box

0 3 This question is about organisation in living organisms.

0 3 . 1 Write the biological structures from the box in the correct size order.

[3 marks]

cell	**nucleus**	**organ**	**tissue**

Smallest

↓

Largest

_____

_____

_____

_____

0 3 . 2 Name **one** animal organ.

[1 mark]

_____

0 3 . 3 Which is a plant tissue?

[1 mark]

Tick (✓) **one** box.

Flower ☐

Leaf ☐

Phloem ☐

Root ☐

Do not write outside the box

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.

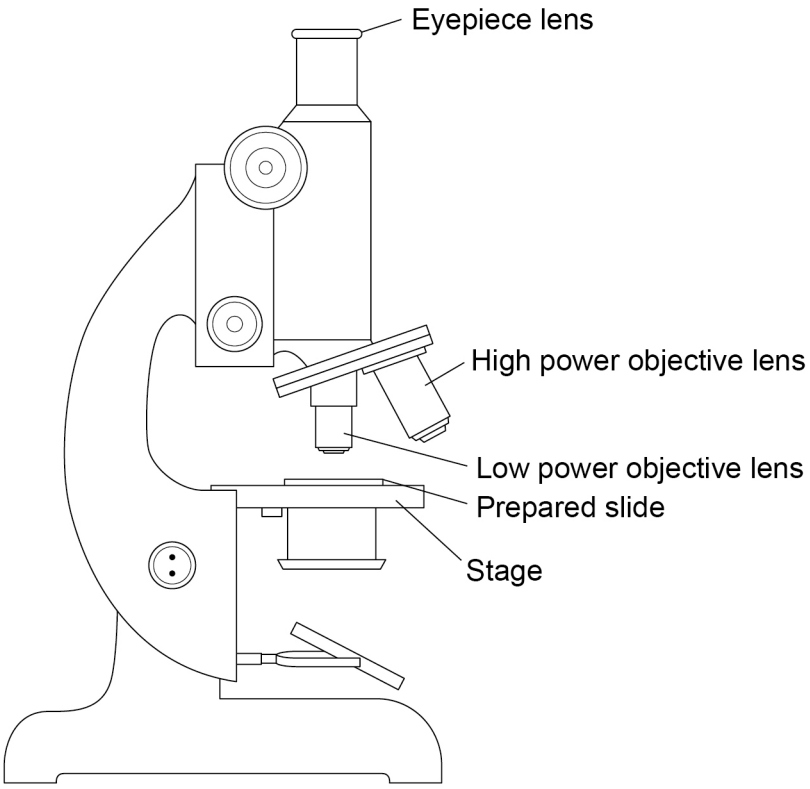
[2 marks]

Question 3 continues on the next page

Do not write outside the box

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]

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]

Do not write outside the box

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

The total magnification is ×50

What was the power of the eyepiece lens used?

[1 mark]

Power of eyepiece lens = × _____

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

Suggest **one** reason why.

[1 mark]

11

Turn over for the next question

Do not write outside the box

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.

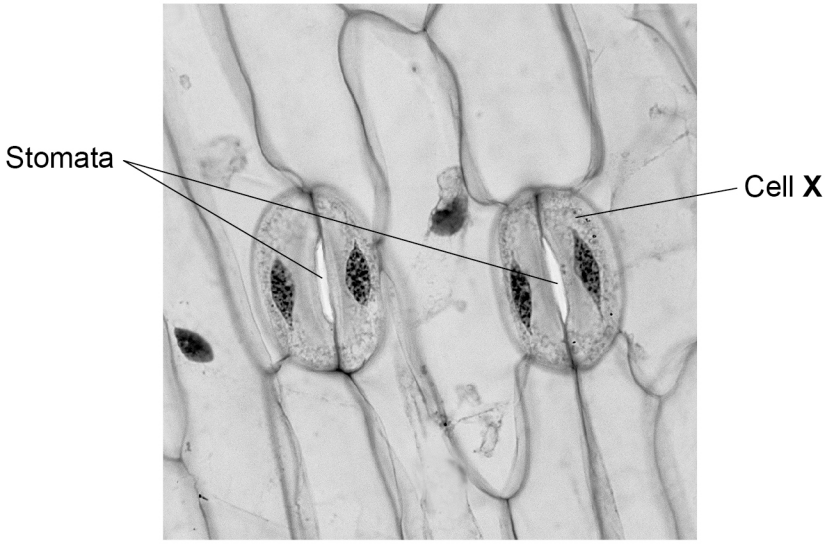
Osmosis ☐

Photosynthesis ☐

Transpiration ☐

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

Figure 7



Do not write outside the box

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 ×800

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

Give your answer in micrometres (μm).

1 mm = 1000 μm

Use the equation:

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

[3 marks]

Real length of cell **X** = _____ μm

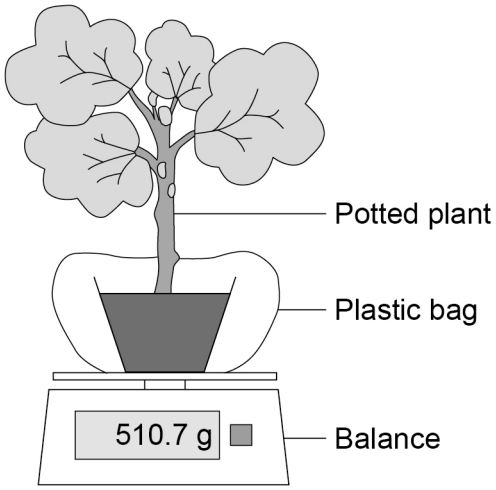
Question 4 continues on the next page

Do not write outside the box

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 ☐

Do not write outside the box

0 4 . 5 Suggest why the student sealed a plastic bag around the pot.

[1 mark]

Question 4 continues on the next page

Do not write outside the box

Table 1 shows the student's results.

Table 1

Temperature in °C	Mass at the start in g	Mass after 3 hours in g	Mass of water lost in 3 hours in g
20	510.7	508.6	2.1
25	510.4	507.1	3.3
30	**X**	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 = _____ g

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

[1 mark]

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 _____

2 _____

12

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Turn over for the next question

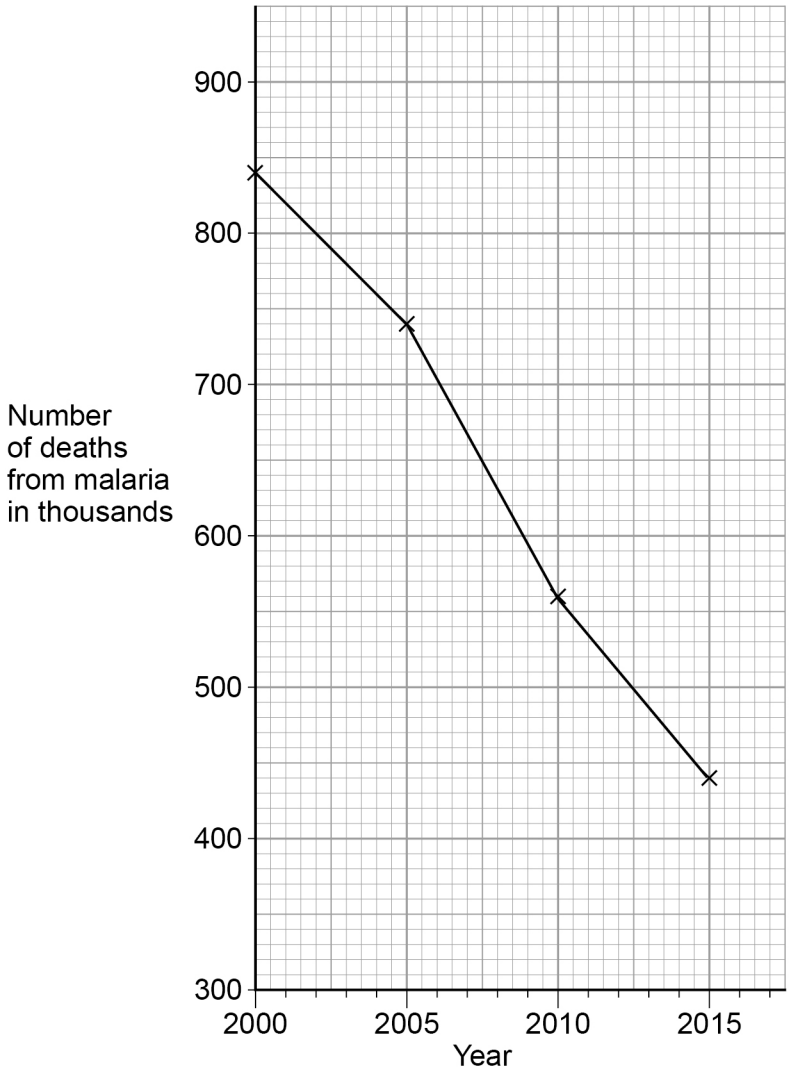
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ANSWER IN THE SPACES PROVIDED

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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]

Decrease in number of deaths = _____

Do not write outside the box

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]

_____

_____

0 5 . 4 What type of pathogen causes malaria?

[1 mark]

Tick (✓) **one** box.

Bacterium ☐

Fungus ☐

Protist ☐

Virus ☐

Do not write outside the box

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]

0 5 . 6 Give **one** way of controlling the spread of malaria.

Do **not** refer to a vaccine in your answer.

[1 mark]

8

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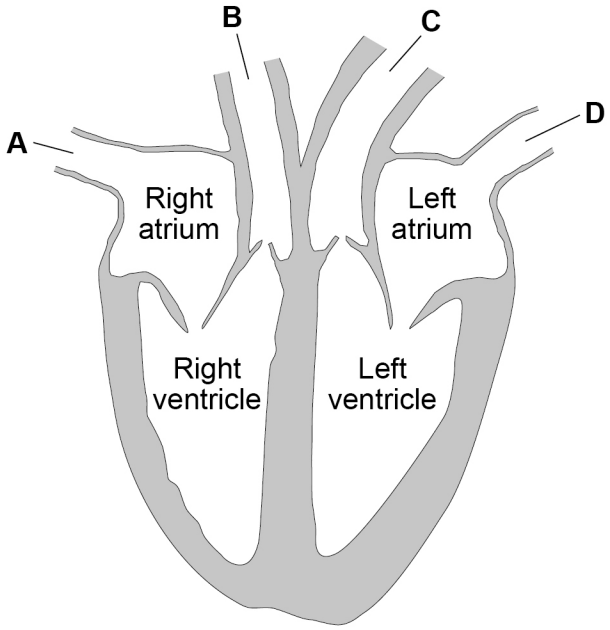
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0 6 **Figure 10** shows a human heart.

Figure 10



0 6 . 1 Which blood vessel carries deoxygenated blood away from the heart to the lungs?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

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 ☐

Do not write outside the box

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

Do not write outside the box

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^3	80	120	**X**	98
Cardiac output in cm^3 per minute	5440	18 000	2800	8624

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

Use the equation:

cardiac output = stroke volume × heart rate

Give your answer to 2 significant figures.

[3 marks]

Stroke volume **X** = _____ cm^3

Do not write outside the box

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]

12

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0 7 This question is about digestion.

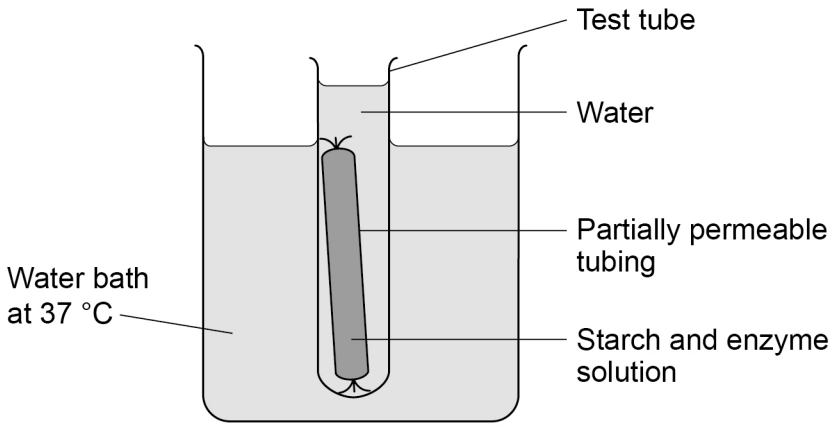
0 7 . 1 Name the enzyme that digests starch in the human digestive system.

[1 mark]

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.

0 7 . 2 Suggest which parts of the body the partially permeable tubing and the water in the test tube represent.

[2 marks]

Partially permeable tubing _____

Water in the test tube _____

Do not write outside the box

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 _____

Sugar _____

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

[1 mark]

_____

_____

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

[2 marks]

_____

_____

_____

_____

_____

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0 7 . 6 Explain the results for test **4**.

[2 marks]

10

END OF QUESTIONS

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