AQA

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.

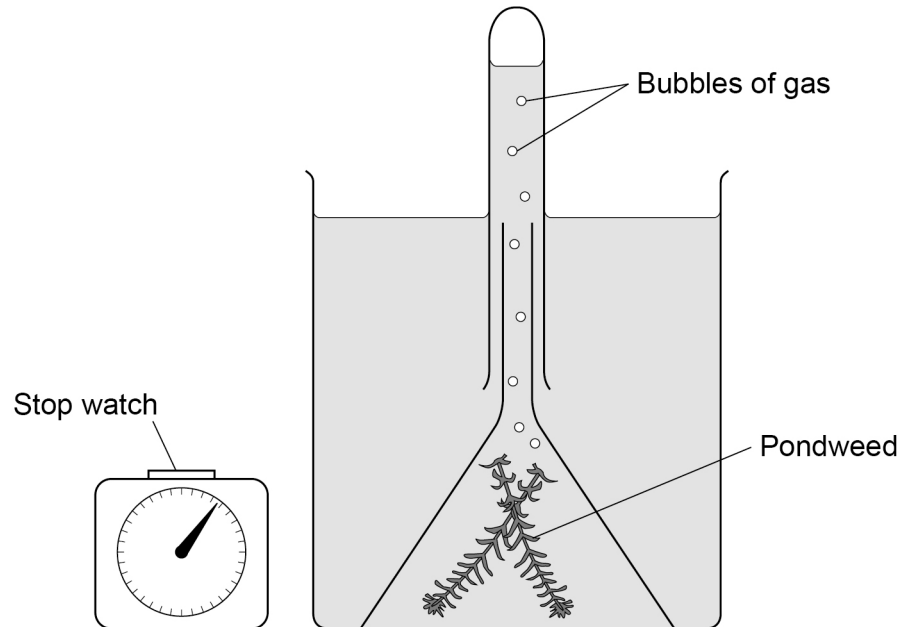| For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
TOTAL	

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]

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

Turn over ▶

Figure 2 shows the student's results.

Figure 2

Rate of photosynthesis in arbitrary units

Light intensity in lumens
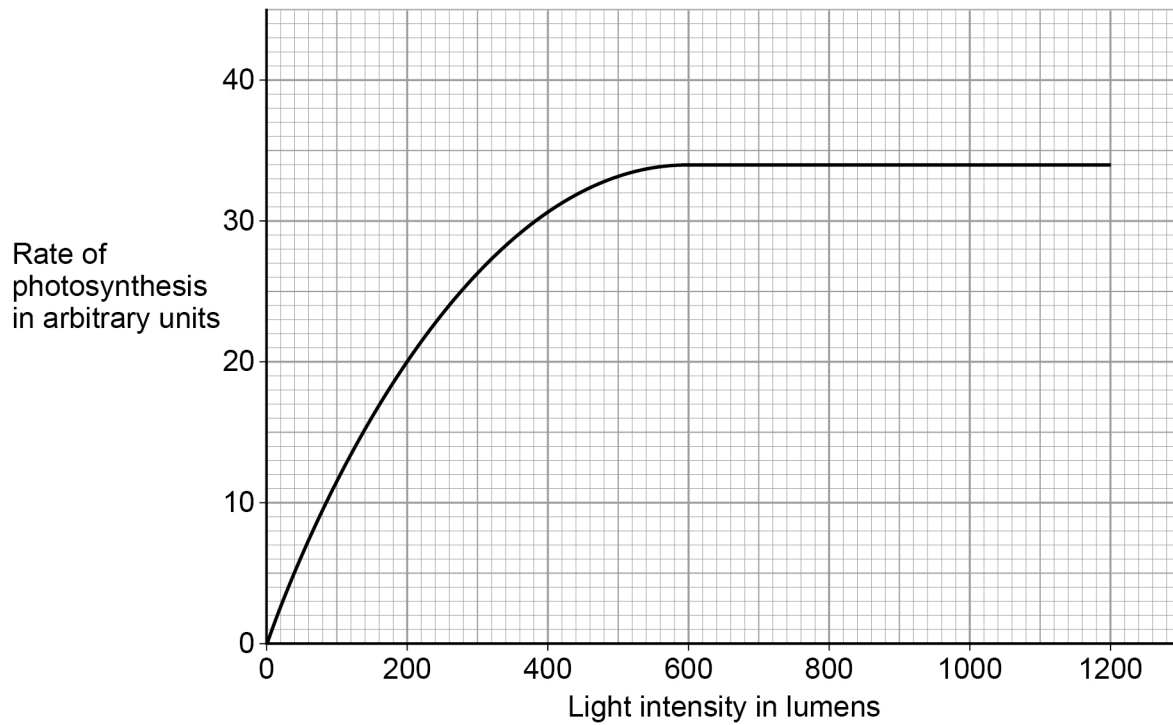
| 0 | 1 |.| 4 | What was the maximum rate of photosynthesis?

[1 mark]

Maximum rate = _____ 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]

_____

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]
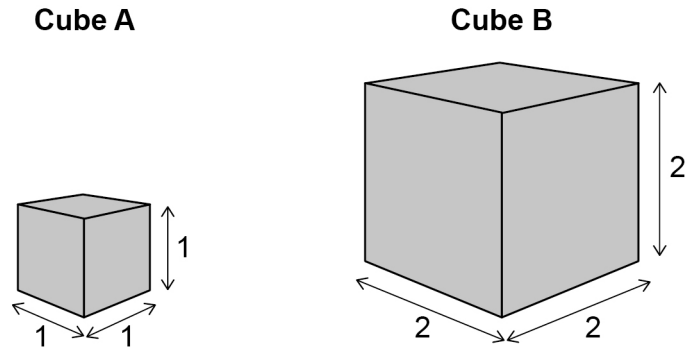
Tick (✓) **one** box.

Active transport ☐

Diffusion ☐

Osmosis ☐

Figure 3 shows two cubes.

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

Figure 3

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 = _____
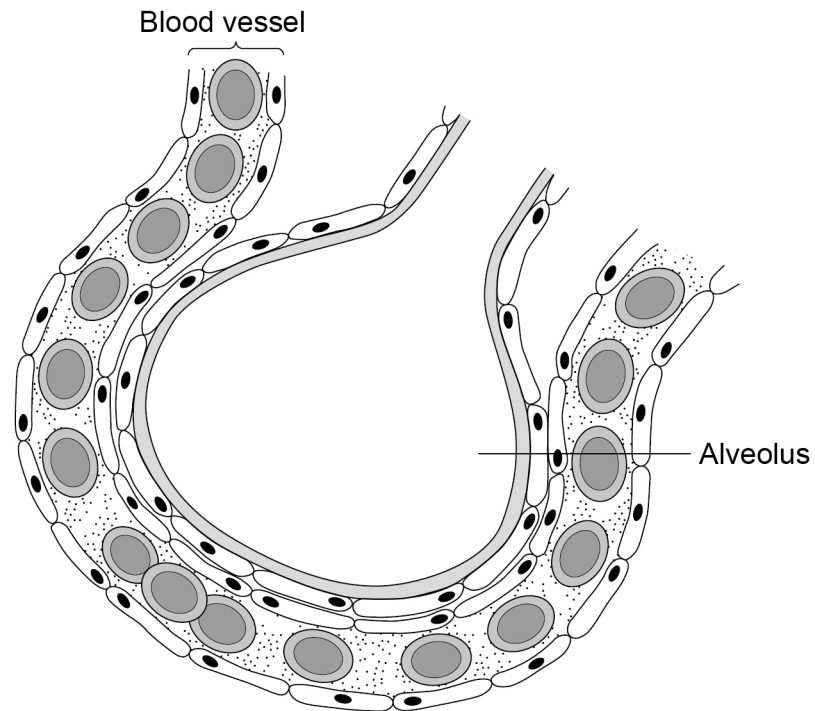
Surface area to volume ratio = _____ **:** _____

Turn over ▶

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]

_____

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

Turn over ▶

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 ☐

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.
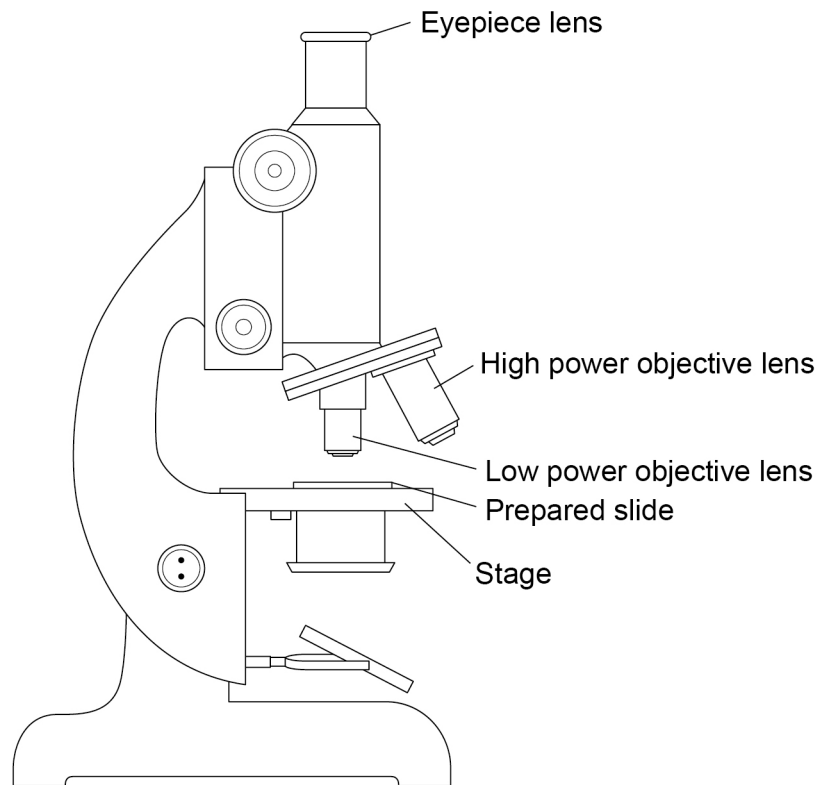
[2 marks]

_____

_____

_____

_____

Question 3 continues on the next page

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]

_____

_____

| 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]

_____

_____

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

Turn over ▶

0 4 Water is lost from the leaves of a plant through stomata.

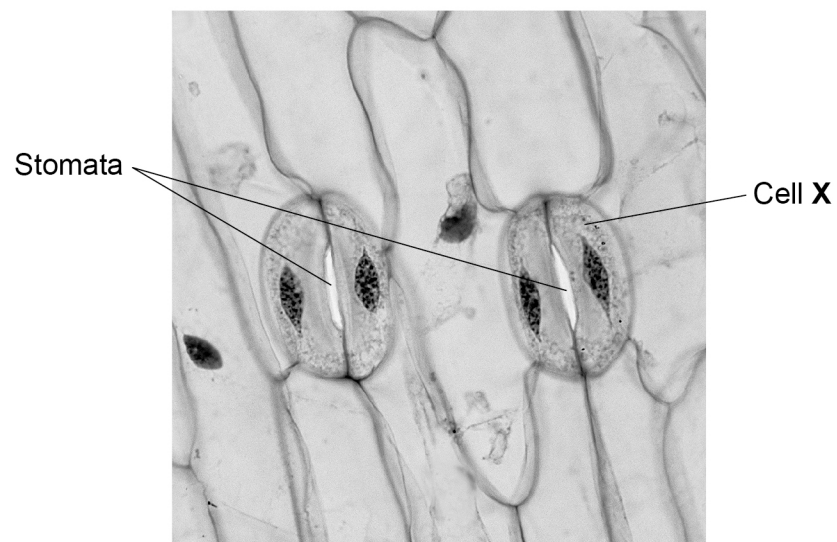**0 4 . 1** What is the process by which water is lost from the leaves of a plant?

[1 mark]

Tick (✓) **one** box.

Osmosis ☐

Photosynthesis ☐

Transpiration ☐

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

Figure 7

Stomata

Cell **X**

| 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

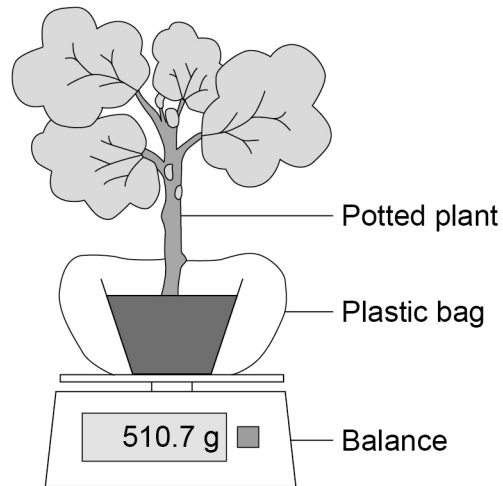**Question 4 continues on the next page**

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]

_____

_____

_____

Question 4 continues on the next page

Turn over ▶

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

Turn over for the next question

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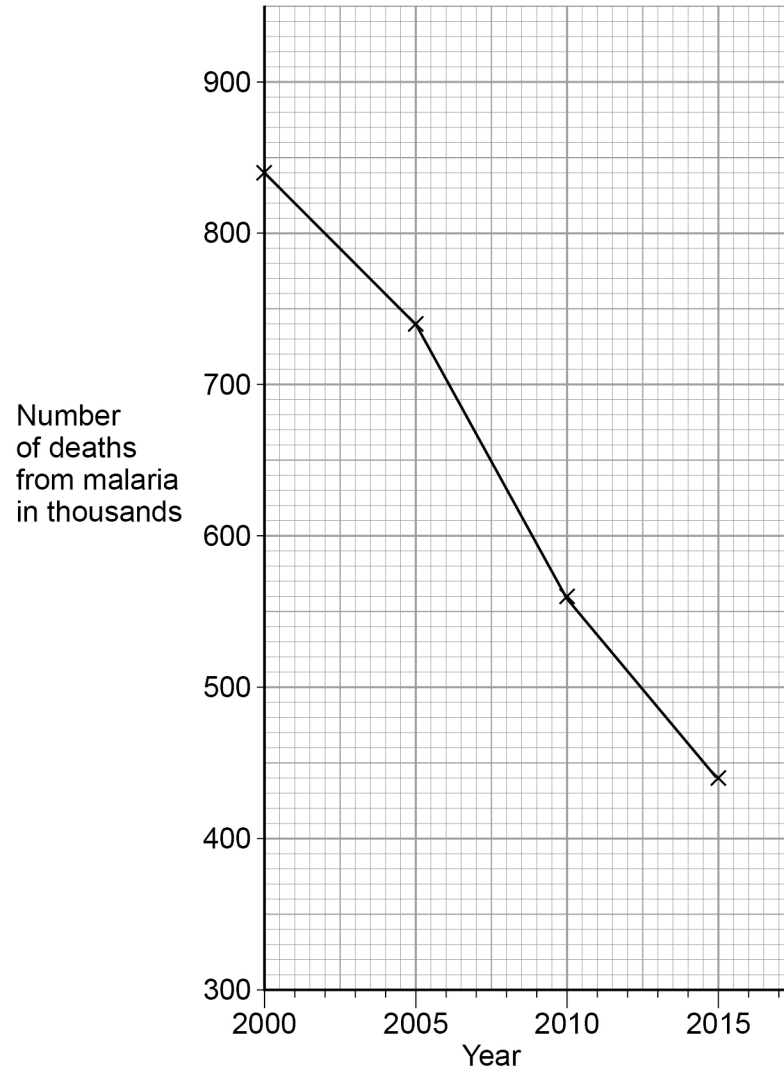**ANSWER IN THE SPACES PROVIDED**

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]

_____

_____

Decrease in number of deaths = _____

| 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

Turn over ▶

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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Turn over for the next question

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ANSWER IN THE SPACES PROVIDED**

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

Figure 10
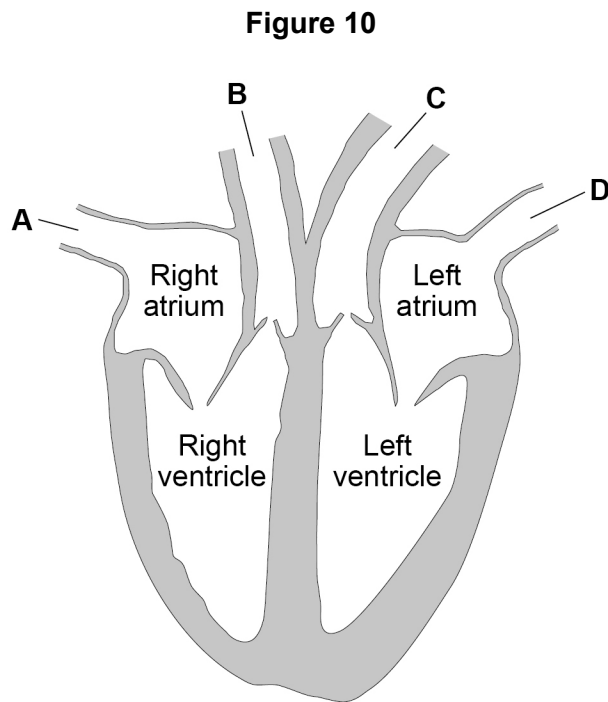
0 6 . 1 Which blood vessel carries deoxygenated blood away from the heart to the lungs?

[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 ☐

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^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

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]

_____

_____

_____

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12

Turn over for the next question

Turn over ▶

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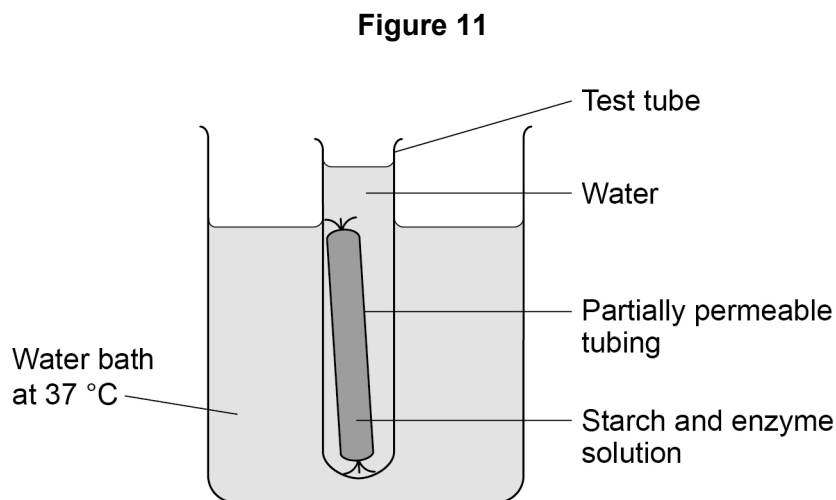
0 7 This question is about digestion.

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 _____

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 _____

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]

_____

_____

_____

_____

_____

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

[2 marks]

_____

_____

_____

_____

_____

_____

10

END OF QUESTIONS

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