AQA

Surname

Other Names

Centre Number

Candidate Number

Candidate Signature

I declare this is my own work.

GCSE BIOLOGY

F

Foundation Tier Paper 1F

8461/1F

Tuesday 12 May 2020   **Afternoon**

Time allowed: 1 hour 45 minutes

At the top of the page, write your surname and other names, your centre number, your candidate number and add your signature.

[Turn over]

For this paper you must have:
- **a ruler**
- **a pencil**
- **a scientific calculator.**

INSTRUCTIONS

- **Use black ink or black ball-point pen.**

- **Pencil should only be used for drawing.**

- **Answer ALL questions in the spaces provided.**

- **If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).**

- **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 100.**

- **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.**

DO NOT TURN OVER UNTIL TOLD TO DO SO

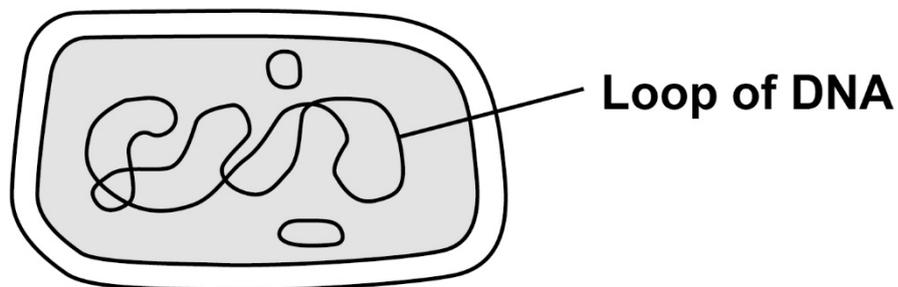**Answer ALL questions in the spaces provided.**

0 1   **This question is about cells.**

0 1 . 1   **FIGURE 1 shows a cell.**

FIGURE 1

Loop of DNA

What type of cell is shown in FIGURE 1?
[1 mark]

Tick (✓) ONE box.

☐   **Animal**

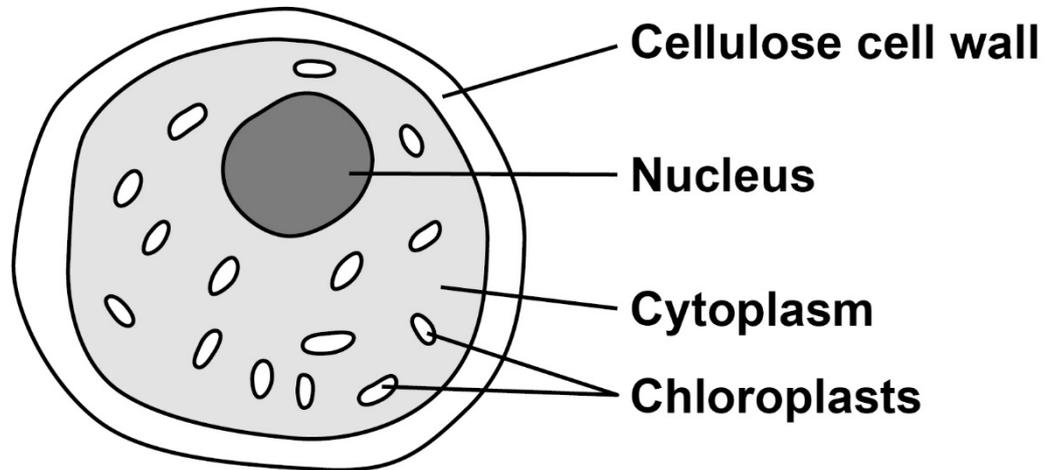☐   **Bacterium**

☐   **Plant**

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[Turn over]

FIGURE 2 shows an algal cell.

FIGURE 2

0 1 . 2 What is the function of the cell wall? [1 mark]

Tick (✓) ONE box.

☐ To contain the genetic material

☐ To stop the chloroplasts leaking out

☐ To strengthen the cell

0 1 . 3 **The algal cell is green.**

Which part of the algal cell makes it green in colour? **[1 mark]**

Tick (✓) ONE box.

☐ **Cellulose**

☐ **Chloroplast**

☐ **Cytoplasm**

☐ **Nucleus**

[Turn over]

0 1 . 4   **Cells contain sub-cellular structures.**

Draw ONE line from each structure to its function. [3 marks]

STRUCTURE

FUNCTION

Controls transport of substances into the cell

Cell membrane

Where energy is released

Mitochondria

Where glucose is made

Ribosomes

Where photosynthesis takes place

Where proteins are made
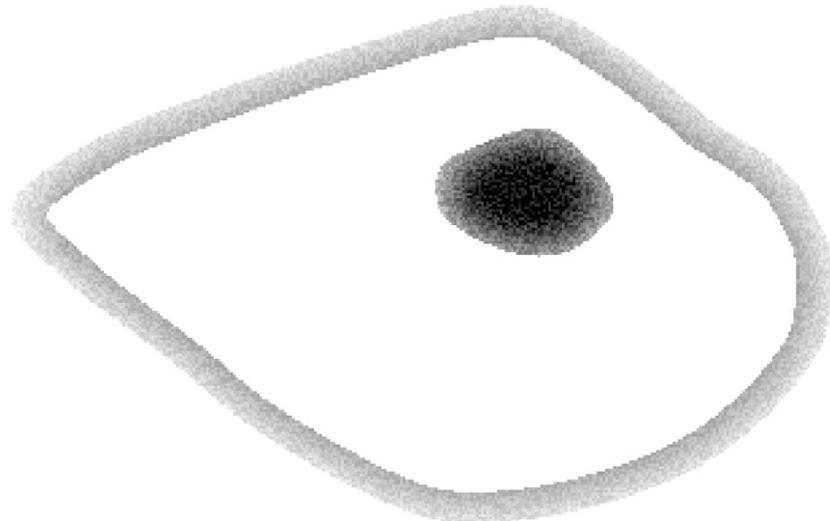
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[Turn over]

A student prepared a microscope slide of cheek cells.

The student looked at one cell using a microscope.

FIGURE 3 shows the image the student saw.

FIGURE 3

0 1 . 5 **What should the student do to get a clear image? [1 mark]**

Tick (✓) ONE box.

☐ **Adjust the focus knob**

☐ **Make the light dimmer**
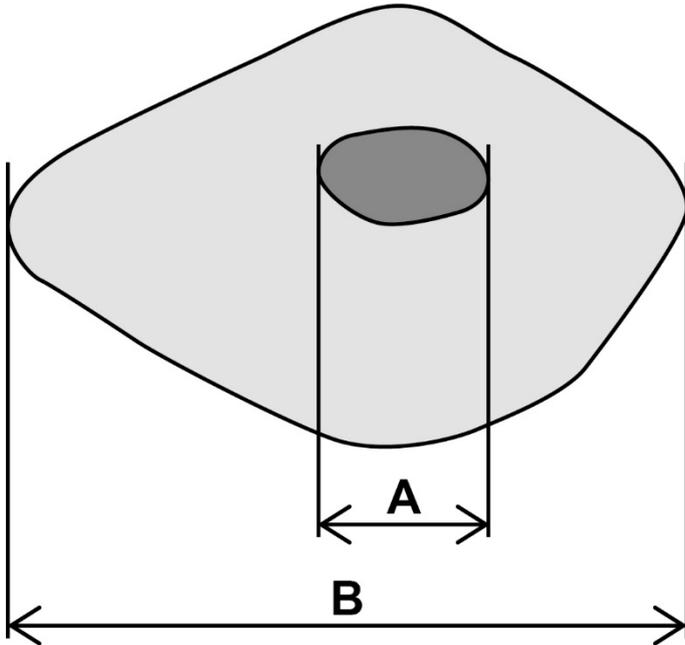
☐ **Put water on the slide**

[Turn over]

The student then obtained a clear image.

FIGURE 4 shows the clear image.

FIGURE 4

| 0 | 1 | . | 6 | Measure the length of the nucleus (A) and the length of the cell (B) in millimetres (mm).
[2 marks]

A = _____ mm

B = _____ mm

0 1 . 7 **How many times longer is the cell (B) than the nucleus (A)? [1 mark]**

_____

_____

Number of times longer = _____

0 1 . 8 **The student looked at another cell.**

The image width of the cell was 40 mm

The real width of the cell was 0.1 mm

Calculate the magnification of the cell. [2 marks]

Use the equation:

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

_____

_____

_____

Magnification = × _____

1 3

0 2 This question is about cell division.

0 2 . **1** Which process makes two identical new body cells for growth and repair? [1 mark]

Tick (✓) ONE box.

☐ **Differentiation**
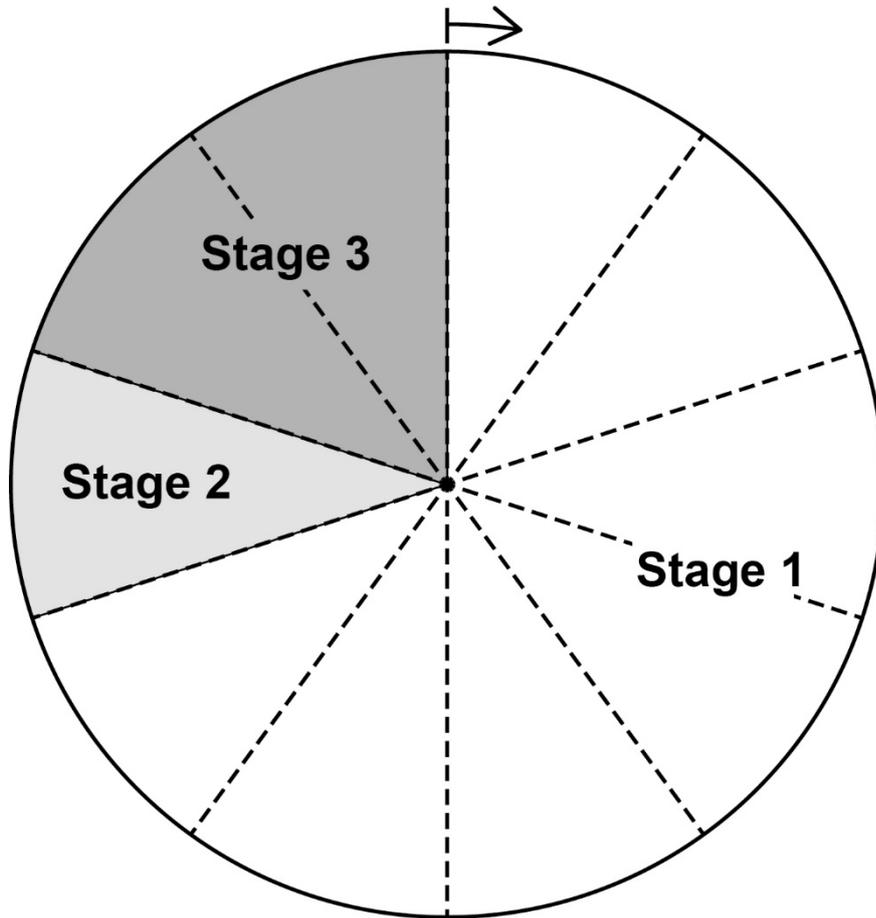
☐ **Fertilisation**

☐ **Mitosis**

BLANK PAGE

[Turn over]

FIGURE 5 shows the three stages of a cell cycle.

FIGURE 5

0 2 . 2 **Draw ONE line from each stage of the cell cycle to what happens during that stage.**
[2 marks]

Stage of cell cycle

What happens during that stage

| **Stage 1** |

| **One set of chromosomes is pulled to each end of the cell** |

| **Stage 2** |

| **The cytoplasm and cell membrane divide to form two new cells** |

| **Stage 3** |

| **The cell grows and the chromosomes replicate** |

[Turn over]

0 2 . 3 **What percentage of the total time for the cell cycle is taken by stage 1? [2 marks]**

_____

_____

_____

_____

Percentage = _____ **%**

| 0 2 | . | 4 | A cell divides to form two new cells every 24 hours.

How many days will it take for the original cell to divide into 8 cells? [1 mark]

Tick (✓) ONE box.

☐ 1

☐ 3

☐ 6

☐ 8

| 0 2 | . | 5 | The chromosomes contain the genetic material.

Name the chemical which the genetic material is made from. [1 mark]

_____

[Turn over]

0 2 . 6 **The genetic material is made of many small sections.**

Each section codes for a specific protein.

What is one section of genetic material on a chromosome called? [1 mark]

Tick (✓) ONE box.

☐ **A gamete**

☐ **A gene**

☐ **A nucleus**

0 2 . 7 **Stem cells are cells which have NOT yet been specialised to carry out a particular job.**

Bone marrow cells are one example of stem cells.

Explain how a transplant of bone marrow cells can help to treat medical conditions. [2 marks]

_____

_____

_____

_____

_____

[Turn over]

10

0 3 The human body can defend itself against microorganisms that cause disease.

Viruses are one type of microorganism that cause disease.

0 3 . 1 Name ONE type of microorganism that causes disease in humans.

Do NOT refer to viruses in your answer.
[1 mark]

_____

0 3 . 2 **Which TWO defence systems prevent microorganisms infecting the human body?**
[2 marks]

Tick (✓) TWO boxes.

☐ **Air is warmed as it is breathed into the lungs.**

☐ **Hairs on the skin trap microorganisms.**

☐ **Hydrochloric acid is produced by the stomach.**

☐ **Teeth in the mouth crush and kill microorganisms.**

☐ **The skin is a barrier covering the whole body.**

[Turn over]

0 3 . 3 If microorganisms enter the human body the immune system can destroy the microorganisms.

How does the immune system destroy microorganisms? **[1 mark]**

Tick (✓) ONE box.

	Platelets kill the microorganisms.
	Red blood cells stick to the microorganisms.
	White blood cells engulf the microorganisms.

0 3 . 4 Vaccinations prevent people becoming ill with diseases such as measles.

Complete the sentences, on the opposite page. **[2 marks]**

Choose answers from the list.

- active
- fast
- resistant
- slow
- weakened

In a vaccine the measles virus is

_____ .

If the measles virus enters the body after

vaccination the immune system reaction

will be _____ .

0 3 . 5   How is the measles virus spread from one person to another? [1 mark]

_____

_____

_____

[Turn over]

Doctors investigated the spread of the virus that causes chickenpox.

The first symptom of chickenpox after exposure to the virus is spots on the body.

23 children were playing together at a party.

On the day of the party one of the children developed chickenpox spots.

Every two days after the party, the doctors recorded when the other 22 children first showed chickenpox spots.

TABLE 1, on the opposite page, shows the results.

TABLE 1

Day when chickenpox spots first showed	Number of children
2	0
4	0
6	0
8	0
10	1
12	1
14	6
16	4
18	2
20	0
Total	14

0 3 . 6 **What was the range for the days on which children first showed chickenpox spots?**

Use TABLE 1. [1 mark]

From day _____ to day _____

[Turn over]

REPEAT OF TABLE 1

Day when chickenpox spots first showed	Number of children
2	0
4	0
6	0
8	0
10	1
12	1
14	6
16	4
18	2
20	0
Total	14

0 3 . 7 Incubation time is the usual time from exposure to a pathogen until the first symptoms appear.

Suggest the most likely incubation time for chickenpox. [1 mark]

Incubation time = _____ days

0 3 . 8 Suggest ONE reason why some of the children did NOT develop chickenpox.
[1 mark]

_____

_____

_____

0 3 . 9 One mother gave antibiotics to her child who had chickenpox.

Suggest why this child did NOT recover more quickly than the other children who had chickenpox. [1 mark]

_____

_____

_____

0 4 A 45-year-old man exercised on a rowing machine for six minutes.

A fitness monitor recorded his heart rate and breathing rate every minute.

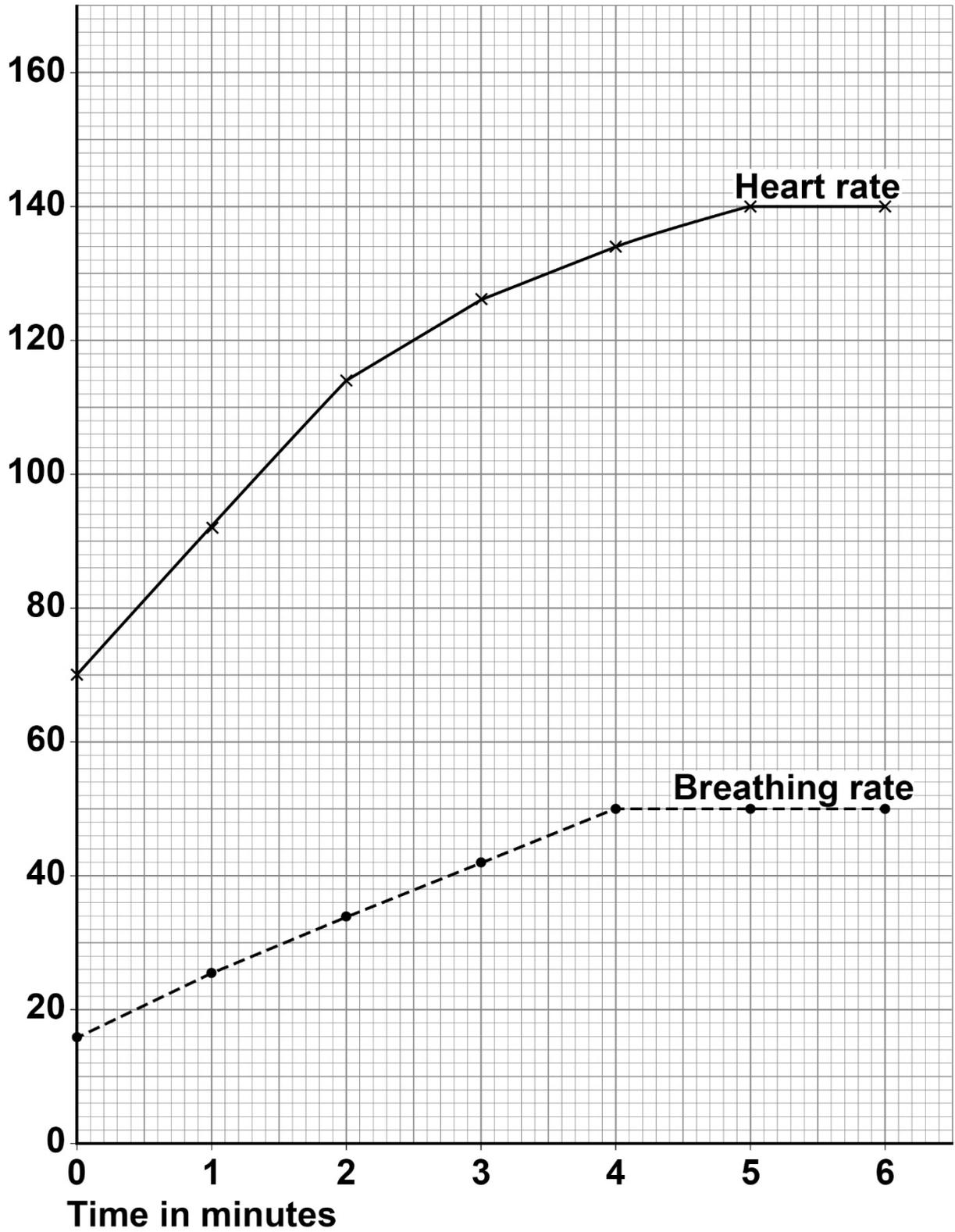FIGURE 6, on the opposite page, shows the results.

0 4 . 1 Describe the trend for breathing rate shown in FIGURE 6.
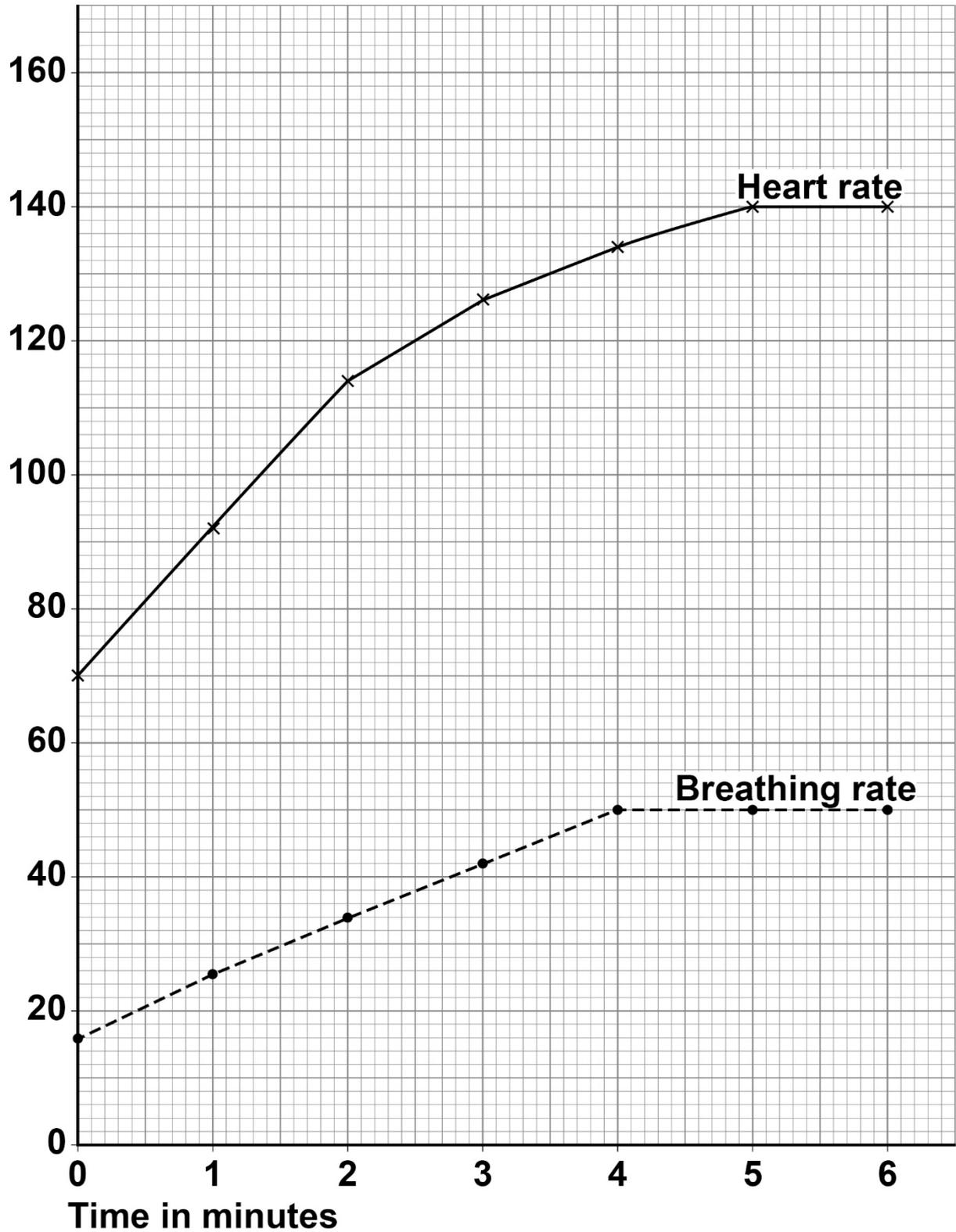
Use data from FIGURE 6 in your answer.
[3 marks]

_____

_____

_____

_____

_____

_____

_____

FIGURE 6

Figure 6: Graph of Rate per minute against Time in minutes, showing Heart rate and Breathing rate.

[Turn over]

REPEAT OF FIGURE 6

0 4 . 2 **The safe maximum heart rate for a person exercising can be calculated using the equation:**

safe maximum heart rate = 220 – age in years

Calculate the safe maximum heart rate for the man. [1 mark]

Safe maximum heart rate =

_____ **beats per minute**

0 4 . 3 **What is the man's maximum heart rate?**

Use FIGURE 6 on the opposite page. [1 mark]

Man's maximum heart rate =

_____ **beats per minute**

[Turn over]

BLANK PAGE

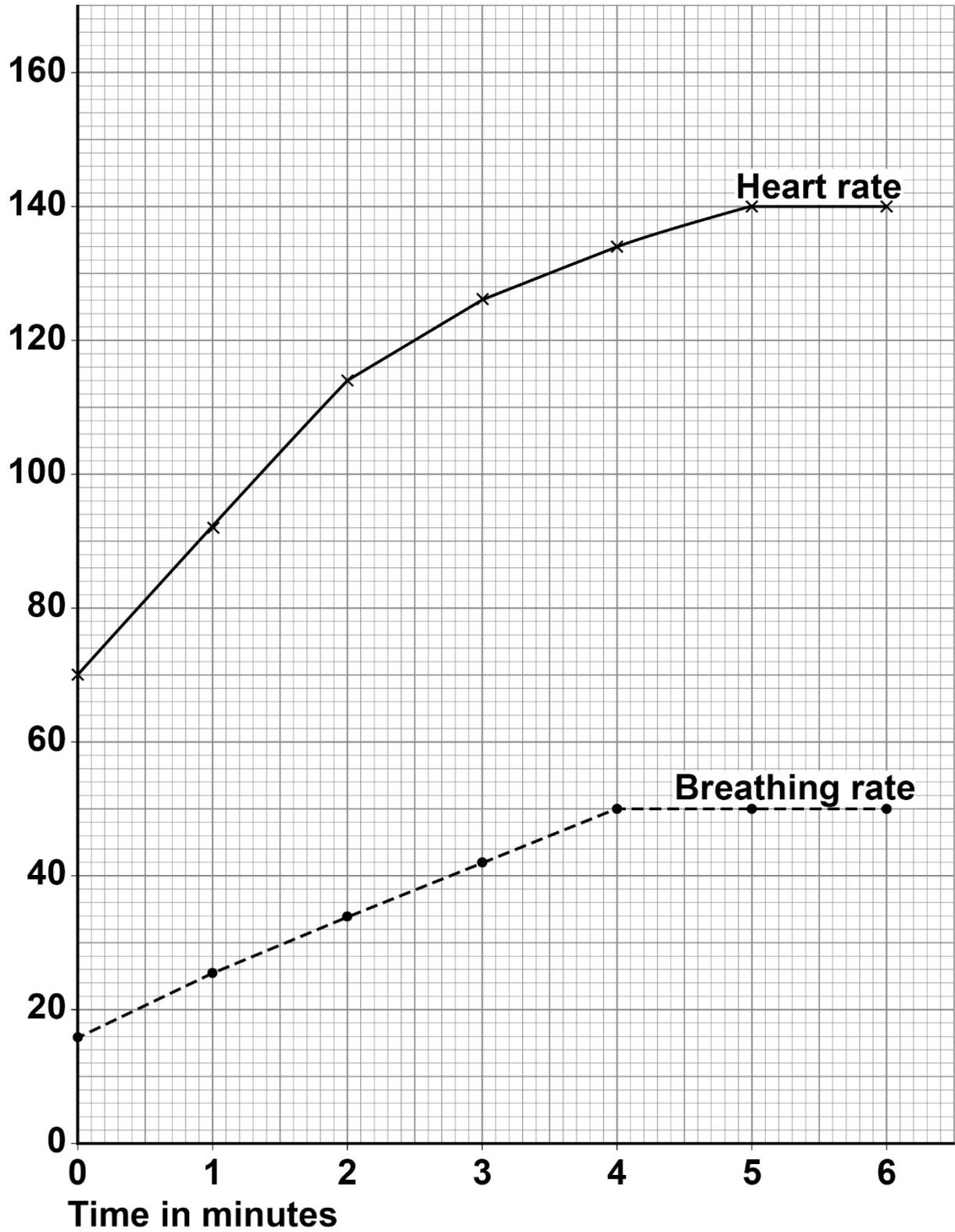0 4 . 4 **The man concluded that he was exercising at a safe heart rate.**

Give the reason for his conclusion.

Use your answers from Question 04.2 and Question 04.3 [1 mark]

_____

_____

_____

[Turn over]

REPEAT OF FIGURE 6

0 4 . 5 **Explain the ways the man's body has responded to the exercise.**

Use information from FIGURE 6 on the opposite page. [6 marks]

_____

_____

_____

_____

_____

_____

_____

_____

_____

[Turn over]

12

BLANK PAGE

[Turn over]

0 5 FIGURE 7 shows part of a deadly nightshade plant.

FIGURE 7

Leaf
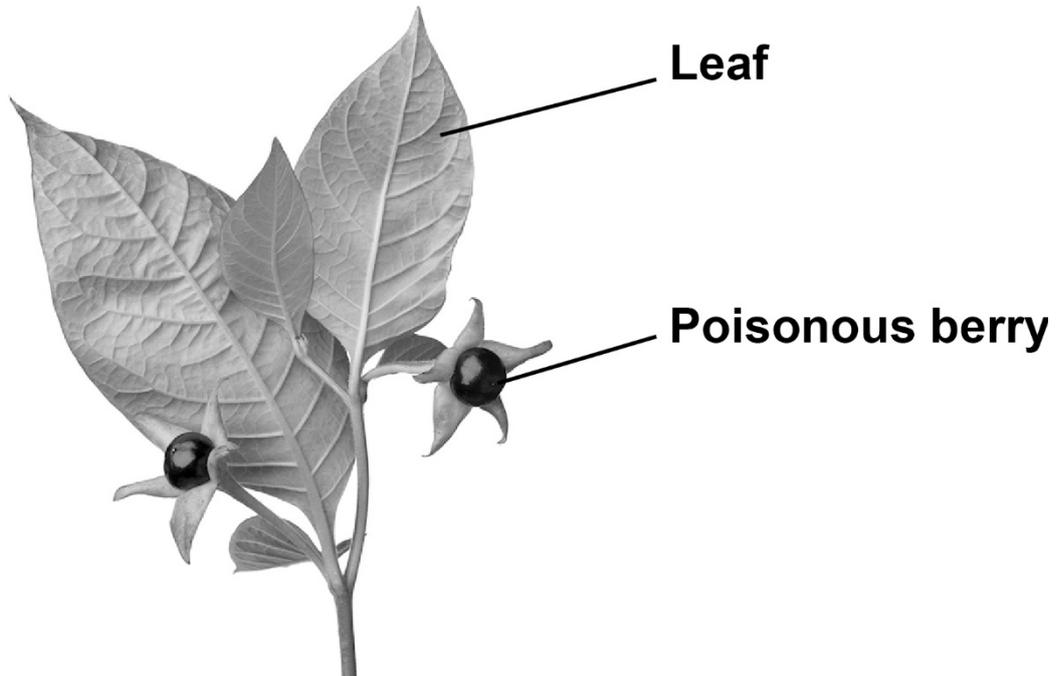
Poisonous berry

0 5 . 1 How will the poisonous berries help the deadly nightshade plant to survive? [1 mark]

_____

_____

_____

0 5 . 2 **Which type of defence mechanism are the berries? [1 mark]**

Tick (✓) ONE box.

☐ **Chemical**

☐ **Mechanical**

☐ **Physical**

[Turn over]

FIGURE 8 shows part of a gorse plant.

FIGURE 8

| 0 | 5 |. | 3 | **Suggest how the gorse plant is adapted to defend itself. [1 mark]**

_____

_____

_____

0 5 . 4 **The green leaves of the gorse plant make glucose for the plant to use.**

What are TWO uses of glucose in the gorse plant? [2 marks]

Tick (✓) TWO boxes.

☐ **For defence**

☐ **For respiration**

☐ **To absorb water**

☐ **To release minerals**

☐ **To store as starch**

[Turn over]

0 5 . 5 **A student wanted to show that the leaves of a gorse plant contain glucose.**

The student crushed the leaves to extract the liquid from the cells.

Describe the method the student could use to test the liquid from the cells for glucose.

Include the result if glucose is present.
[3 marks]

_____

_____

_____

_____

_____

_____

_____

_____

0 5 . 6   **The roots of the gorse plant have bacteria that turn nitrogen gas into nitrate ions.**

Explain why nitrate ions are needed by the gorse plant. [2 marks]

_____

_____

_____

_____

_____

0 5 . 7   **The roots of gorse plants can be infected by honey fungus.**

The honey fungus produces tiny spores underground.

Suggest how the honey fungus spores travel from the roots of an infected gorse plant to the roots of a healthy gorse plant. [1 mark]

_____

_____

_____

[Turn over]

A drug can be extracted from gorse seeds.

Doctors want to trial the drug from gorse seeds to see if it can treat diarrhoea.

0 5 . 8 Which TWO factors must the doctors test the drug for in the trial? [2 marks]

Tick (✓) TWO boxes.

☐ Appearance

☐ Dosage

☐ Solubility

☐ Taste

☐ Toxicity

| 0 | 5 | . | 9 | In the trial some patients will take tablets made from gorse seeds and some patients will take tablets made from sugar.

What are the tablets made from sugar called? **[1 mark]**

Tick (✓) ONE box.

☐ **Antibiotics**

☐ **Antibodies**

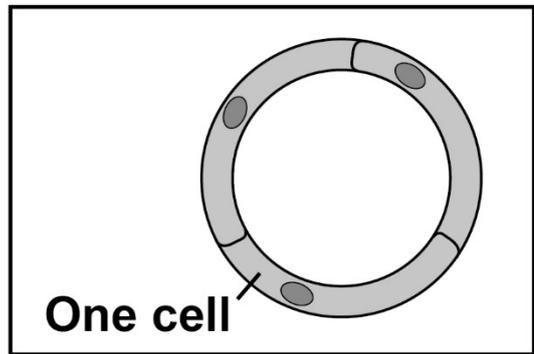☐ **Painkillers**

☐ **Placebos**

[Turn over]

14

06   **Blood is transported around the body in blood vessels.**

06 . 1   **Draw ONE line from each type of blood vessel to the structure of the blood vessel.**
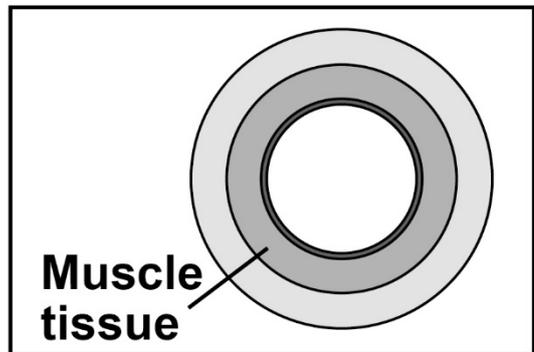**[2 marks]**

Type of blood vessel
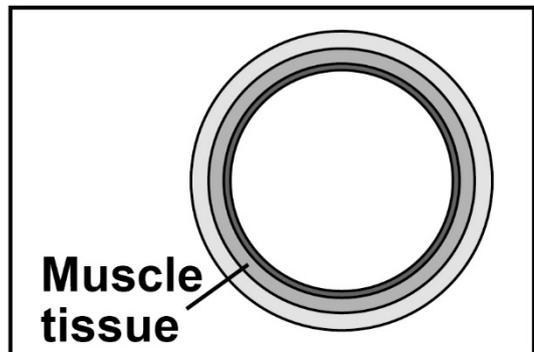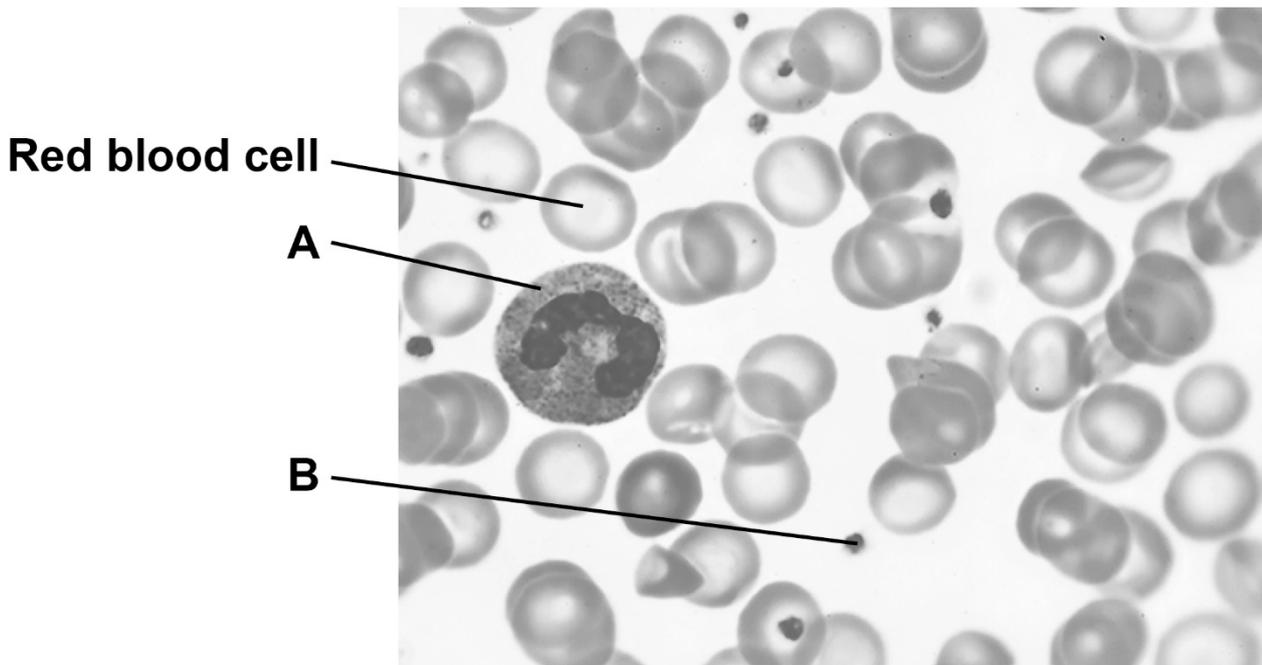
Structure of blood vessel

Artery

Capillary

Vein

One cell

Muscle tissue

Muscle tissue

0 6 . 2 **Explain how the structure of an artery is related to its function. [2 marks]**

_____

_____

_____

_____

_____

_____

[Turn over]

FIGURE 9 shows blood viewed through a microscope.

FIGURE 9

Red blood cell

A

B

0 6 . 3 **Name A and B in FIGURE 9. [2 marks]**

A _____

B _____

0 6 . 4 **A red blood cell:**

- **has no nucleus**

- **contains a red pigment called haemoglobin.**

Suggest how these adaptations help the red blood cell carry out its function. [2 marks]

No nucleus _____

_____

_____

Haemoglobin _____

_____

_____

[Turn over]

0 6 . 5 **The blood components are carried around the body in the liquid part of the blood.**

What is the liquid part of the blood called?
[1 mark]

Tick (✓) ONE box.

☐ **Cell sap**

☐ **Plasma**

☐ **Saliva**

☐ **Urine**

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[Turn over]

TABLE 2 shows the results of a man's blood test.

TABLE 2

Blood component	Patient results	Normal range
Red blood cells	4.8	4.5 to 6.5
Lymphocytes	2.6	1.0 to 4.0
Neutrophils	5.1	1.8 to 7.5
Platelets	50	140 to 400

0 6 . 6 Which component of the man's blood is NOT within the normal range? [1 mark]

_____

0 6 . 7 Suggest a symptom the man might show. [1 mark]

_____

_____

_____

11

0 7   This question is about photosynthesis.

0 7 . 1 Complete the word equation for photosynthesis. [2 marks]

_____ **+** _____ ⟶

_____ **+ oxygen**

0 7 . 2 Describe how energy for the photosynthesis reaction is gained by plants. [2 marks]

_____

_____

_____

_____

_____

[Turn over]

Students investigated the effect of temperature on the rate of photosynthesis.

The students shone light from a lamp onto pondweed and measured the volume of oxygen produced per hour.

TABLE 3 shows the results.

TABLE 3

Temperature in °C	Rate of photosynthesis in cm^3/hour			
	Test 1	Test 2	Test 3	Mean
20	18.5	19.3	19.5	X
25	32.6	34.1	32.9	33.2
30	41.9	45.2	44.9	44.0
35	38.6	39.8	44.0	40.8
40	23.1	20.5	22.4	22.0
45	1.9	14.2	2.2	2.1

0 7 . 3 **Calculate mean value X. [2 marks]**

_____

_____

_____

_____

_____

X = _____ **cm³/hour**

The students identified one anomalous result in TABLE 3.

0 7 . 4 **Draw a ring around the anomalous result in TABLE 3, on the opposite page. [1 mark]**

0 7 . 5 **Suggest one possible cause of the anomalous result. [1 mark]**

_____

_____

_____

[Turn over]

REPEAT OF TABLE 3

Temperature in °C	Rate of photosynthesis in cm^3/hour			
	Test 1	Test 2	Test 3	Mean
20	18.5	19.3	19.5	X
25	32.6	34.1	32.9	33.2
30	41.9	45.2	44.9	44.0
35	38.6	39.8	44.0	40.8
40	23.1	20.5	22.4	22.0
45	1.9	14.2	2.2	2.1

0 7 . 6 **How did the students deal with the anomalous result? [1 mark]**

_____

_____

_____

0 7 . 7 **Give ONE factor the students should have kept constant in this investigation. [1 mark]**

_____

_____

_____

0 7 . 8 **Why did the rate of photosynthesis decrease from 35 °C to 45 °C? [1 mark]**

_____

_____

_____

[Turn over]

REPEAT OF TABLE 3

Temperature in °C	Rate of photosynthesis in cm^3/hour			
	Test 1	Test 2	Test 3	Mean
20	18.5	19.3	19.5	X
25	32.6	34.1	32.9	33.2
30	41.9	45.2	44.9	44.0
35	38.6	39.8	44.0	40.8
40	23.1	20.5	22.4	22.0
45	1.9	14.2	2.2	2.1

0 7 . 9 **Complete FIGURE 10, on the opposite page, using data from TABLE 3.**

You should:

- **label the y-axis**
- **use a suitable scale for the y-axis**
- **plot the mean data from TABLE 3 for temperatures from 25 °C to 45 °C**
- **draw a line of best fit.**

[5 marks]

FIGURE 10

Temperature in °C

16
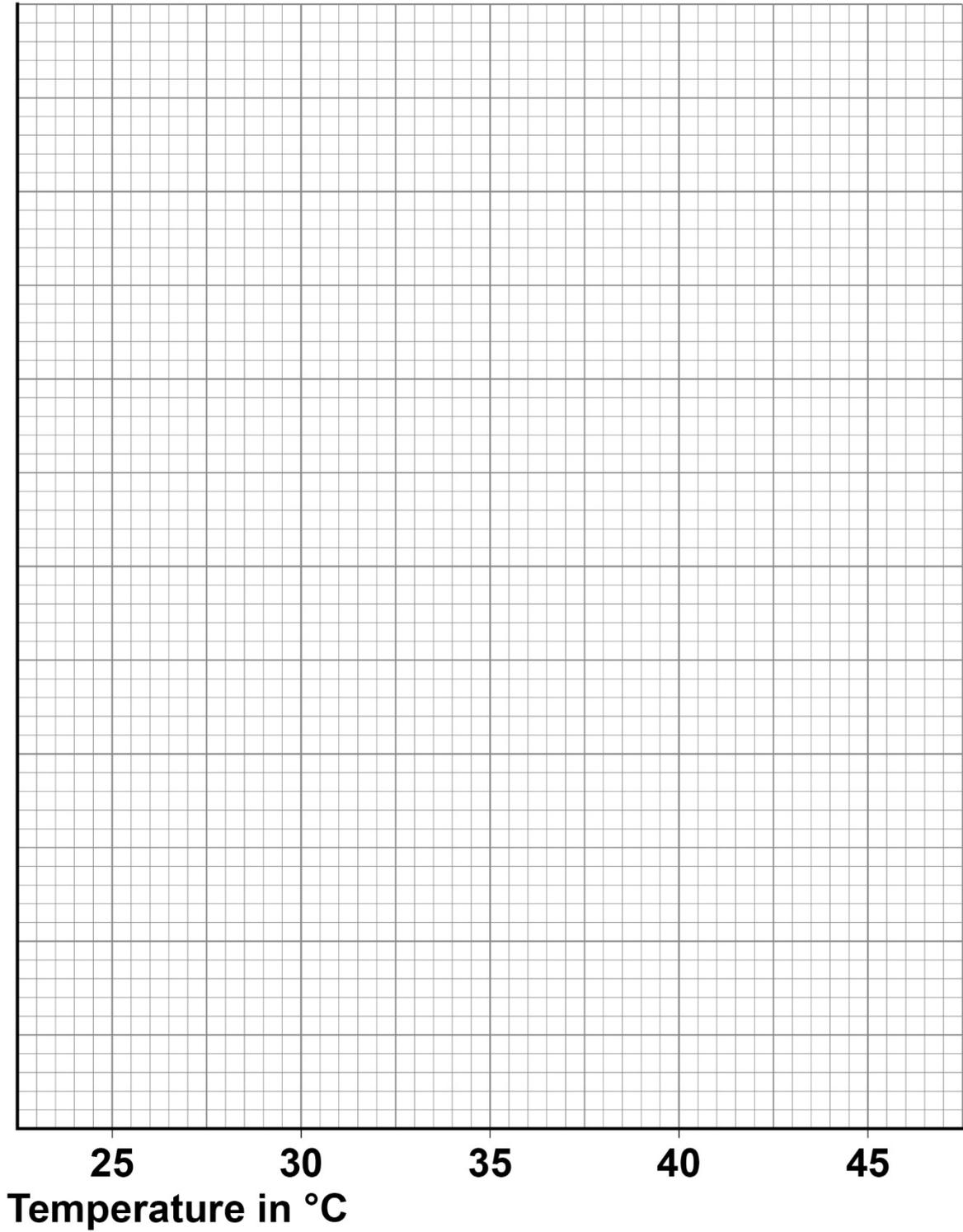
0 8   **Diffusion is an important process in animals and plants.**

0 8 . 1   **What is meant by the term diffusion?**
      [2 marks]
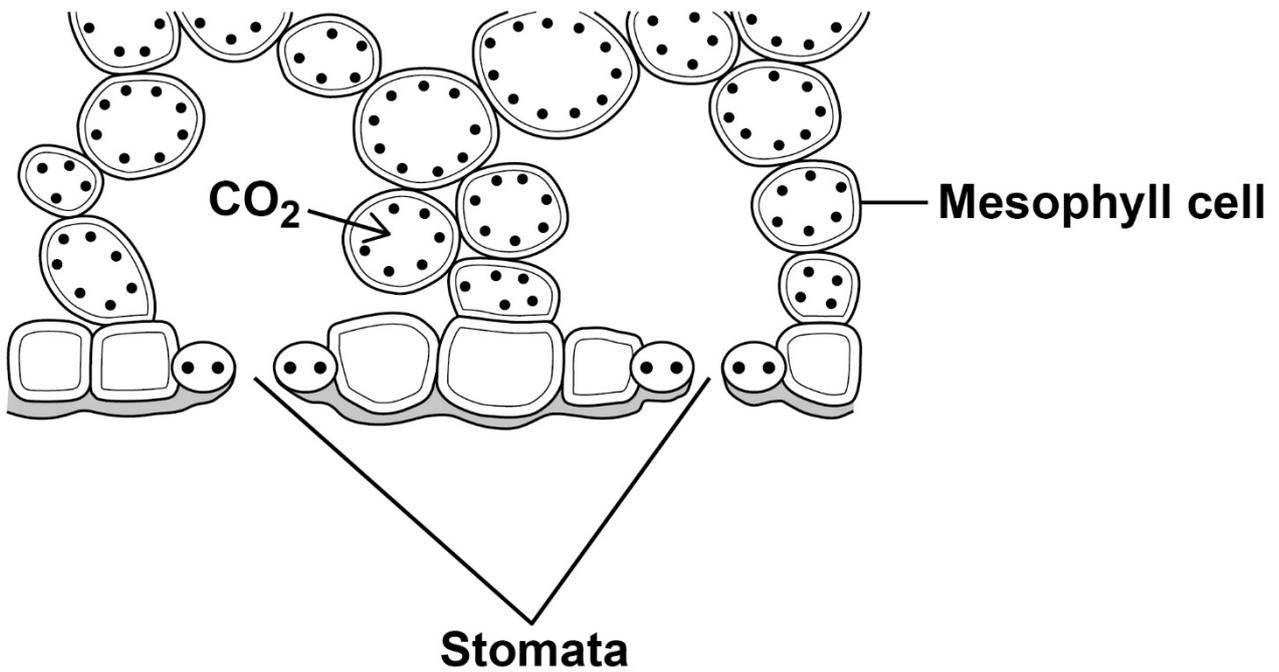
_____

_____

_____

_____

_____

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[Turn over]

0 8 . 2 FIGURE 11 shows part of a leaf.

FIGURE 11

Molecules of carbon dioxide diffuse from the air into the mesophyll cells.

Which TWO changes will increase the rate at which carbon dioxide diffuses into the mesophyll cells? [2 marks]

Tick (✓) TWO boxes.

☐ Decreased number of chloroplasts in the cells

☐ Decreased surface area of cells in contact with the air

☐ Increased carbon dioxide concentration in the air

☐ Increased number of stomata that are open

☐ Increased oxygen concentration in the air

[Turn over]

0 8 . 3 **Diffusion also happens in the human lungs.**
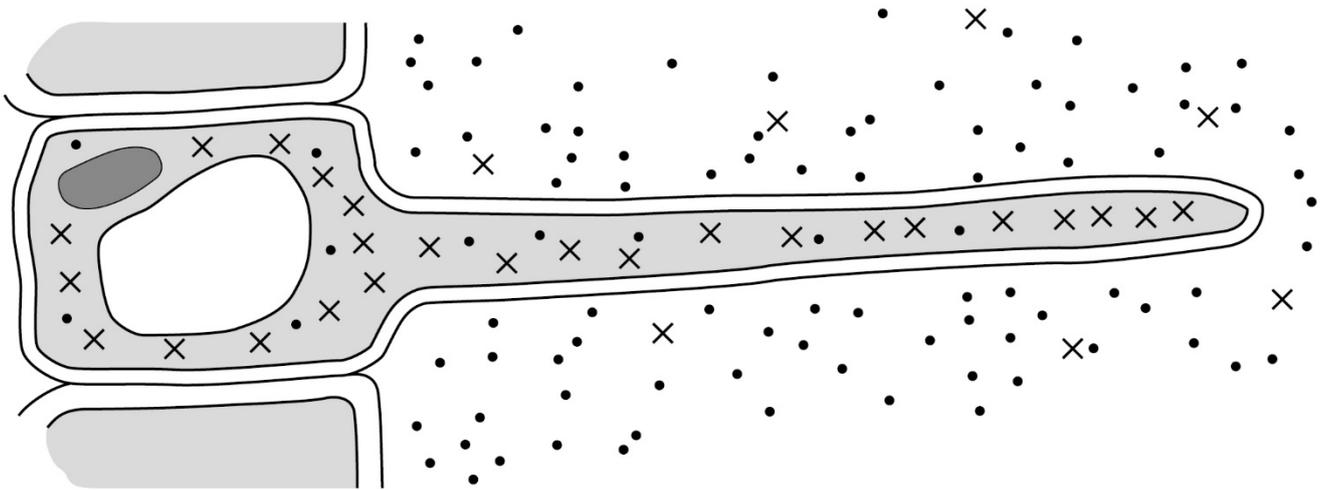
FIGURE 12 shows the human breathing system.

FIGURE 12
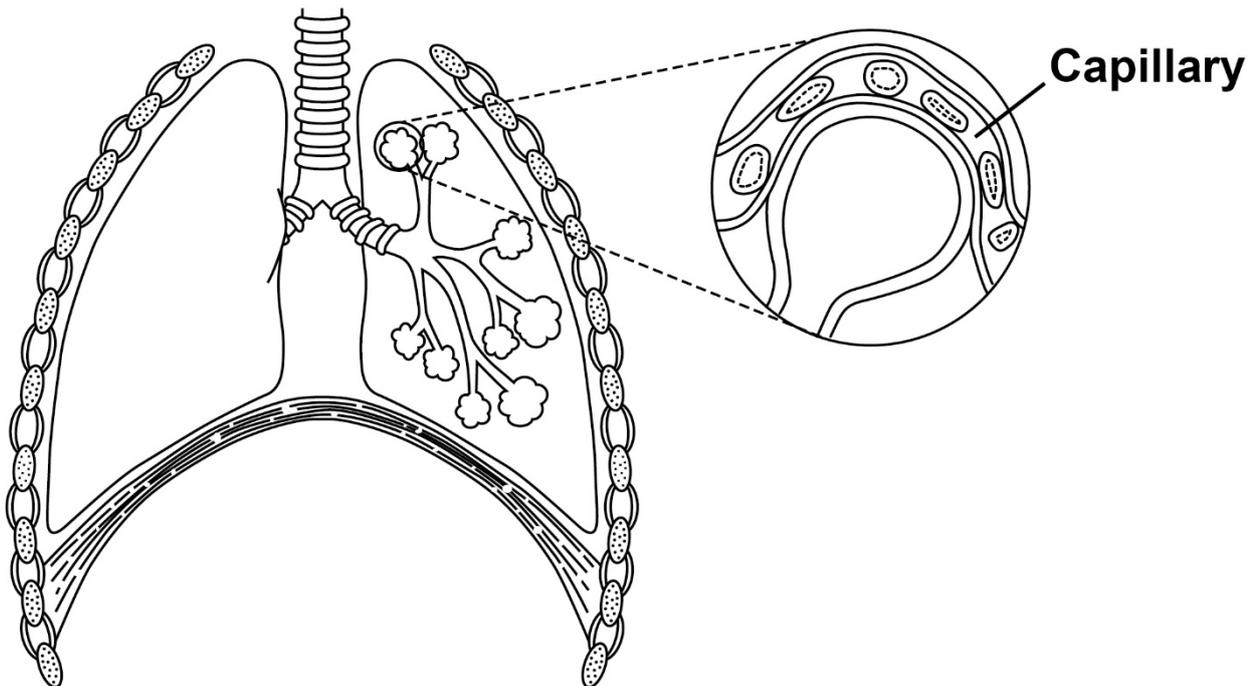
Explain how the human lungs are adapted for efficient exchange of gases by diffusion.
[6 marks]

_____

_____

_____

_____

FIGURE 13 shows a root hair cell.

FIGURE 13

KEY

∴ **Water molecules**

×× **Nitrate ions**

0 8 . 4 **Name the process by which water molecules enter the root hair cell. [1 mark]**

_____

0 8 . 5 **Nitrate ions need a different method of transport into the root hair cell.**

Explain how the nitrate ions in FIGURE 13, on the opposite page, are transported into the root hair cell.

Use information from FIGURE 13 in your answer. [3 marks]

Name of process _____

Explanation _____

_____

_____

_____

_____

_____

END OF QUESTIONS

14

Additional page, if required.
Write the question numbers in the left-hand margin.

Additional page, if required.
Write the question numbers in the left-hand margin.

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