AQA

Please write clearly in block capitals.

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

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

GCSE BIOLOGY

F

Foundation Tier Paper 1F

Tuesday 12 May 2020 Afternoon Time allowed: 1 hour 45 minutes

Materials

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

Instructions
- Use black ink or black ball-point pen.
- Pencil should only be used for drawing.
- Fill in the boxes at the top of this page.
- 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.

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
TOTAL	

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.

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

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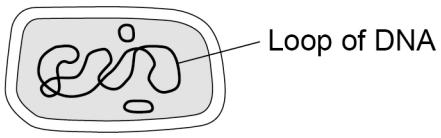
0 1 This question is about cells.

0 1 . 1 **Figure 1** shows a cell.

Figure 1



What type of cell is shown in **Figure 1**?

[1 mark]

Tick (✓) **one** box.

Animal ☐

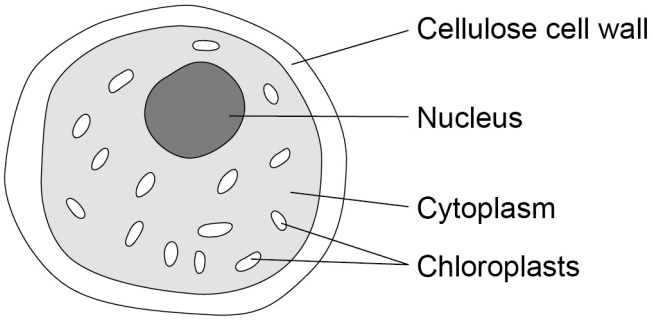
Bacterium ☑

Plant ☐

Do not write outside the box

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 ☐

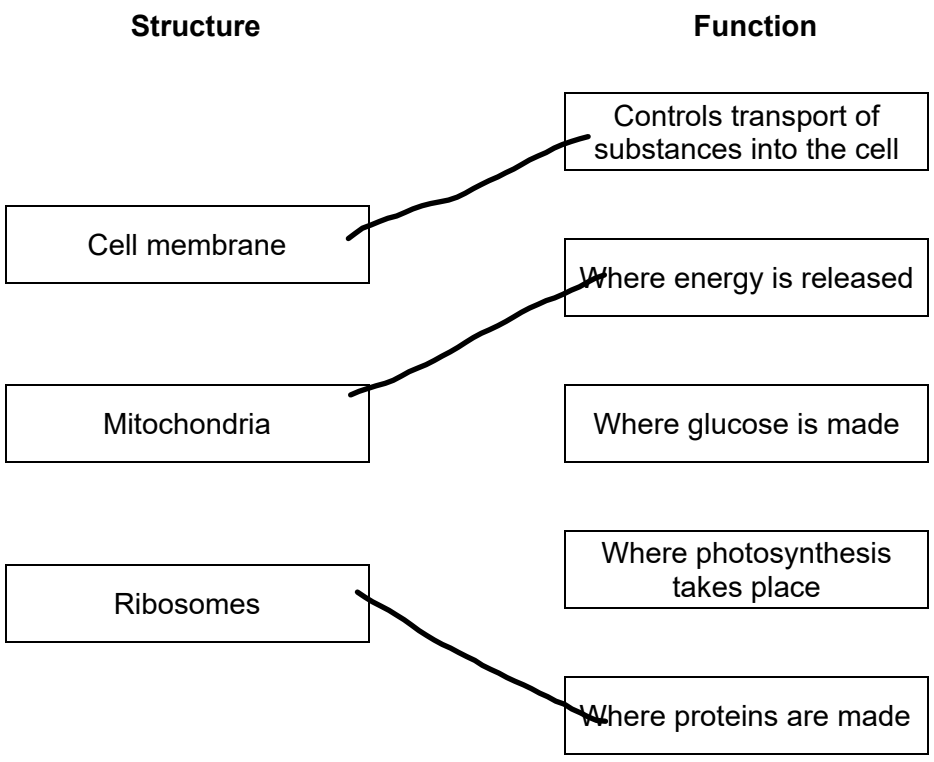
Nucleus ☐

Do not write outside the box

0 1 . 4 Cells contain sub-cellular structures.

Draw **one** line from each structure to its function.

[3 marks]



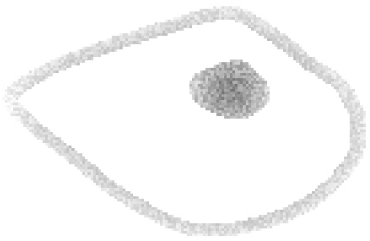
Do not write outside the box

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 ☐

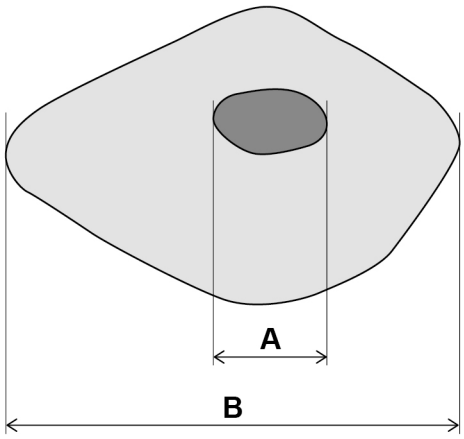
Question 1 continues on the next page

Do not write outside the box

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 = 15 mm

B = 60 mm

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

[1 mark]

60 ÷ 15

Number of times longer = 4

Do not write outside the box

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:

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

$40 \div 0.1$

Magnification = × 400

12

Turn over for the next question

Do not write outside the box

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.

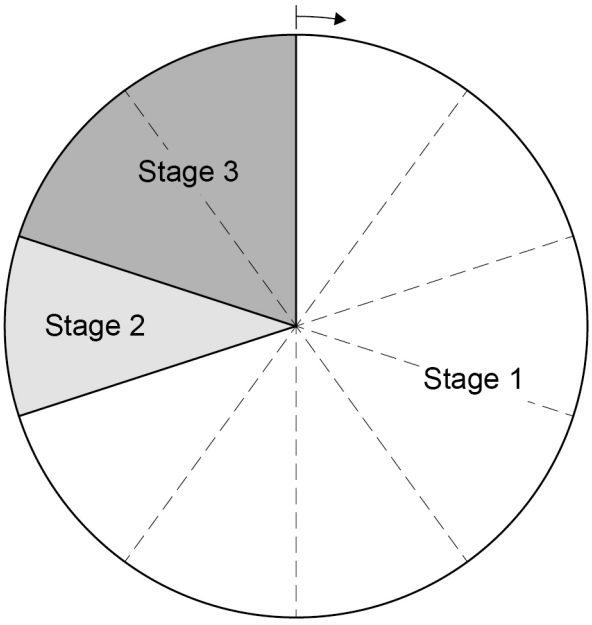
Differentiation ☐

Fertilisation ☐

Mitosis ☑

Figure 5 shows the three stages of a cell cycle.

Figure 5



Do not write outside the box

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

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

[2 marks]

$\frac{7}{10} \times 100$

Percentage = 70 %

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 ☐

Do not write outside the box

0 2 . 5 The chromosomes contain the genetic material.

Name the chemical which the genetic material is made from.

[1 mark]

DNA

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]

bone marrow cell differentiate into many types of cells
so will cure disease where new cells are

10

Do not write outside the box

Turn over for the next question

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ANSWER IN THE SPACES PROVIDED

Do not write outside the box

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]

fungi

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. ☑

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. ☑

Do not write outside the box

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

Complete the sentences.

[2 marks]

Choose answers from the box.

active	**fast**	**resistant**	**slow**	**weakened**

In a vaccine the measles virus is weakend.

If the measles virus enters the body after vaccination the immune system reaction will be fast.

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

[1 mark]

by coughs

Question 3 continues on the next page

Do not write outside the box

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 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 10 to day 18

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 = 14 days

Do not write outside the box

0 3 . 8 Suggest **one** reason why some of the children did **not** develop chickenpox.

[1 mark]

they had been vaccinated

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]

Antibiotics do not kill viruses

11

Turn over for the next question

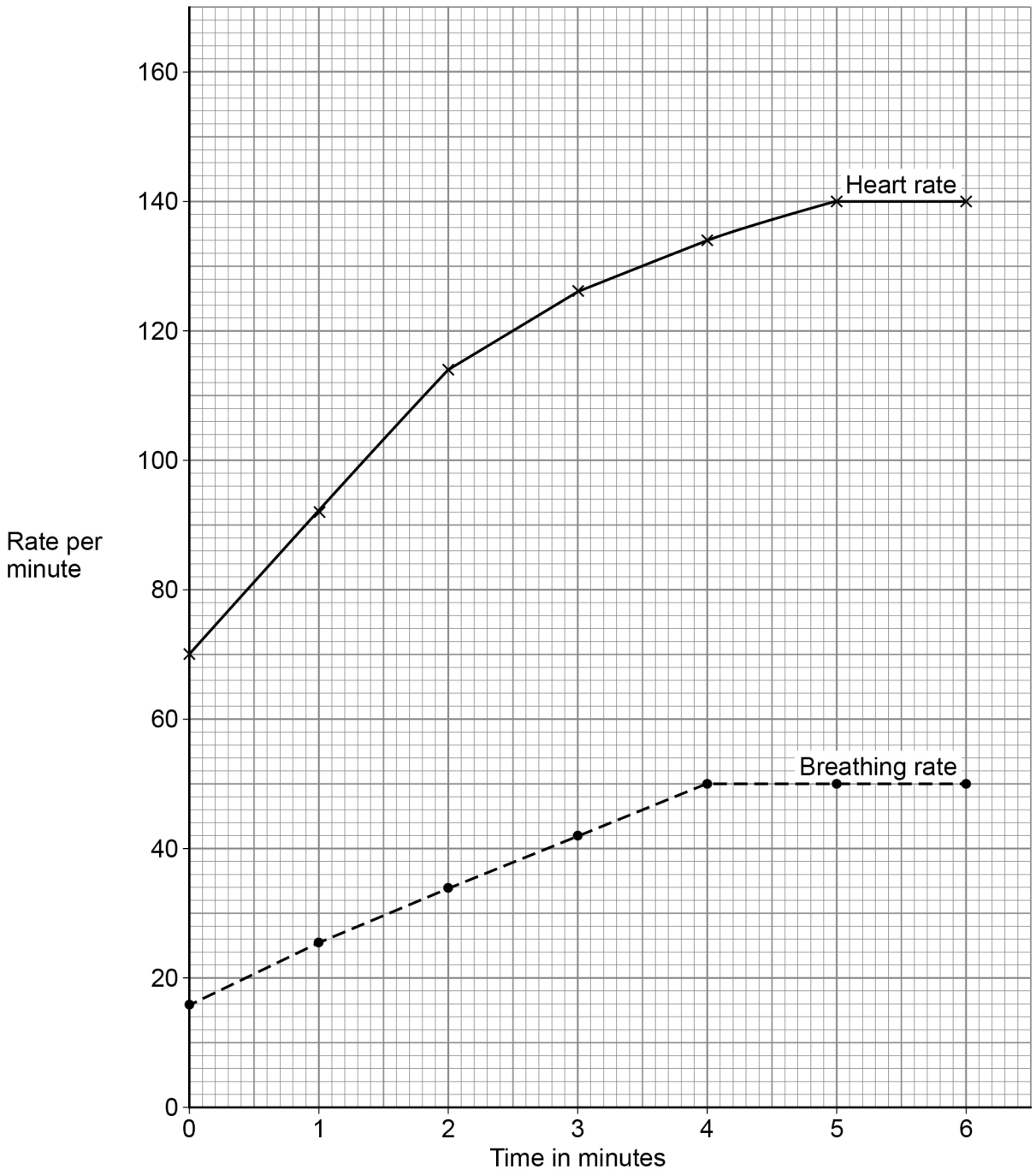
Do not write outside the box

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 shows the results.

Figure 6



Do not write outside the box

0 4 . 1 Describe the trend for breathing rate shown in **Figure 6**.

Use data from **Figure 6** in your answer.

[3 marks]

increase at first until 4 minutes stayed constant from 4 minutes

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 = 175 beats per minute

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

Use **Figure 6**.

[1 mark]

Man's maximum heart rate = 140 beats per minute

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]

because his rate is lower than the maximum safe rate

Do not write outside the box

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

Use information from **Figure 6** on page 16.

[6 marks]

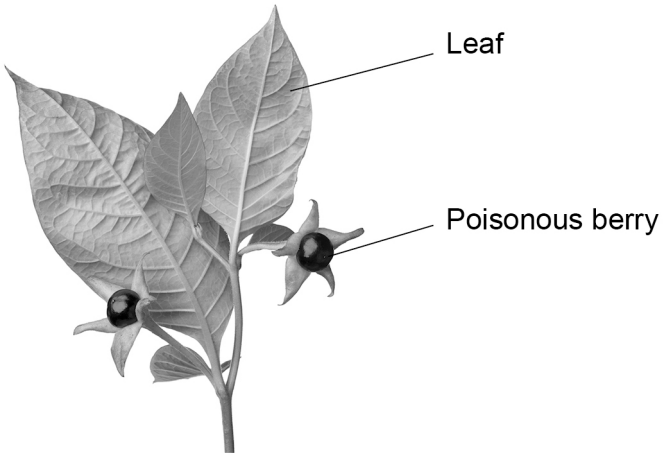
heart rate increased to increase blood flowing to muscles and to provide more oxygen and more glucos
and to remove carbon dioxide more quickly
breathing rate increased supplies more oxygen so more oxygen to blood more carbon dioxide removed

12

Do not write outside the box

0 5 **Figure 7** shows part of a deadly nightshade plant.

Figure 7



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

[1 mark]

will stop animals eating it

0 5 . 2 Which type of defence mechanism are the berries?

[1 mark]

Tick (✓) **one** box.

Chemical ☑

Mechanical ☐

Physical ☐

Do not write outside the box

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]

thorns

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 ☑

Do not write outside the box

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]

add Benedict's solution and boil i glucose is present blue colour changes to yellow

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]

nitrate ions are needed to make proteins which are needed for growth

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]

in the soil water

Do not write outside the box

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 ☑

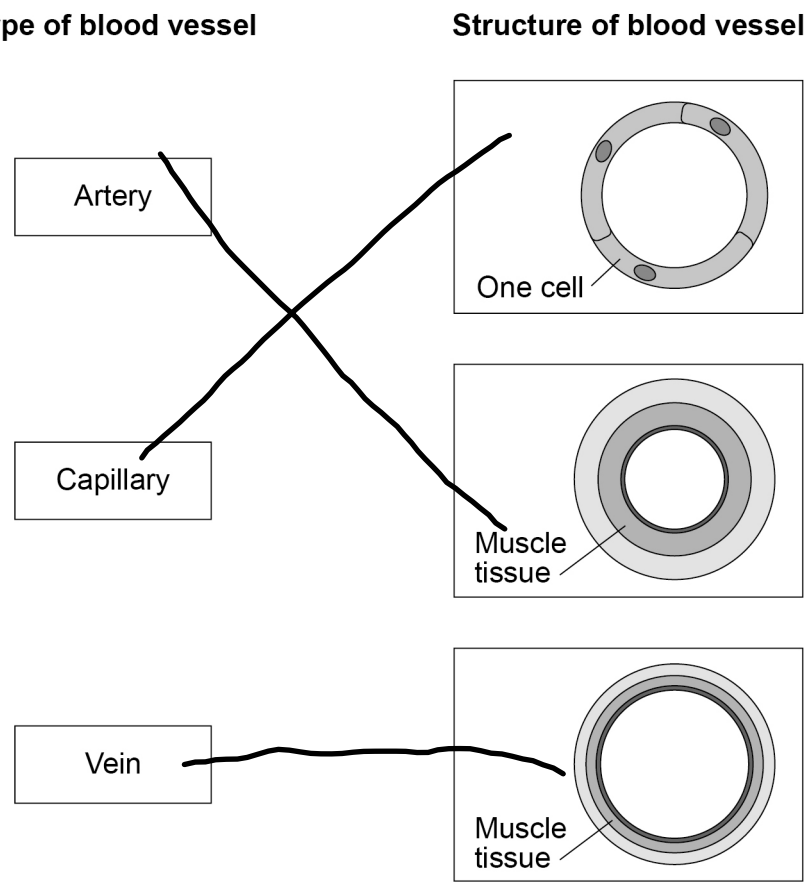
14

Do not write outside the box

0 6 Blood is transported around the body in blood vessels.

0 6 . 1 Draw **one** line from each type of blood vessel to the structure of the blood vessel.

[2 marks]



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

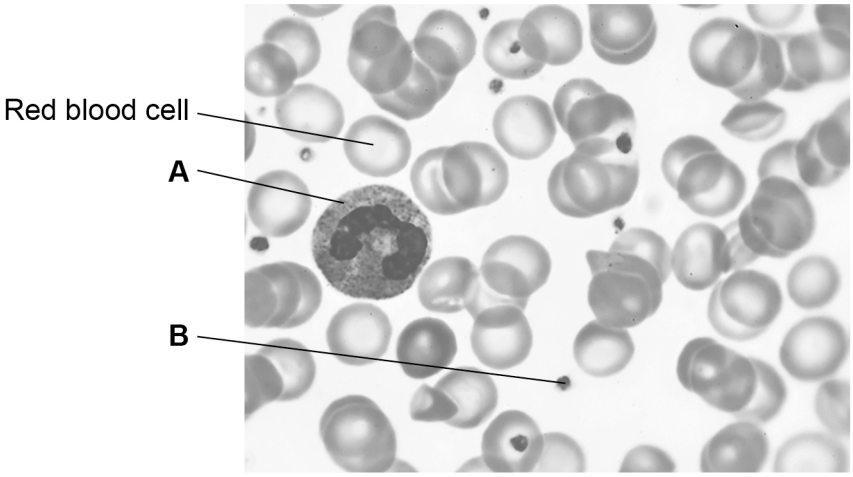
[2 marks]

thicker muscle walls to push blood around the body

Do not write outside the box

Figure 9 shows blood viewed through a microscope.

Figure 9



0 6 . 3 Name **A** and **B** in **Figure 9**.

[2 marks]

A white blood cells

B platelets

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 more space for haemoglobin

Haemoglobin to bind oxygen

Do not write outside the box

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 ☐

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]

platelets

0 6 . 7 Suggest a symptom the man might show.

[1 mark]

continued bleeding

11

Do not write outside the box

0 7 This question is about photosynthesis.

0 7 . 1 Complete the word equation for photosynthesis.

[2 marks]

carbon dioxide + water → glucose + oxygen

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

[2 marks]

light is absorbed by chlorophyll

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

Do not write outside the box

0 7 . 3 Calculate mean value **X**.

[2 marks]

$\frac{18.5+19.3+19.5}{3}$

X = 19.1 cm^3/hour

The students identified one anomalous result in **Table 3**.

0 7 . 4 Draw a ring around the anomalous result in **Table 3**.

[1 mark]

0 7 . 5 Suggest **one** possible cause of the anomalous result.

[1 mark]

scale value was misread

0 7 . 6 How did the students deal with the anomalous result?

[1 mark]

did not use it in calculations

0 7 . 7 Give **one** factor the students should have kept constant in this investigation.

[1 mark]

light intensity

Do not write outside the box

Table 3 is repeated below.

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 . 8 Why did the rate of photosynthesis decrease from 35 °C to 45 °C?

[1 mark]

enzymes lose the shape of the active site

Do not write outside the box

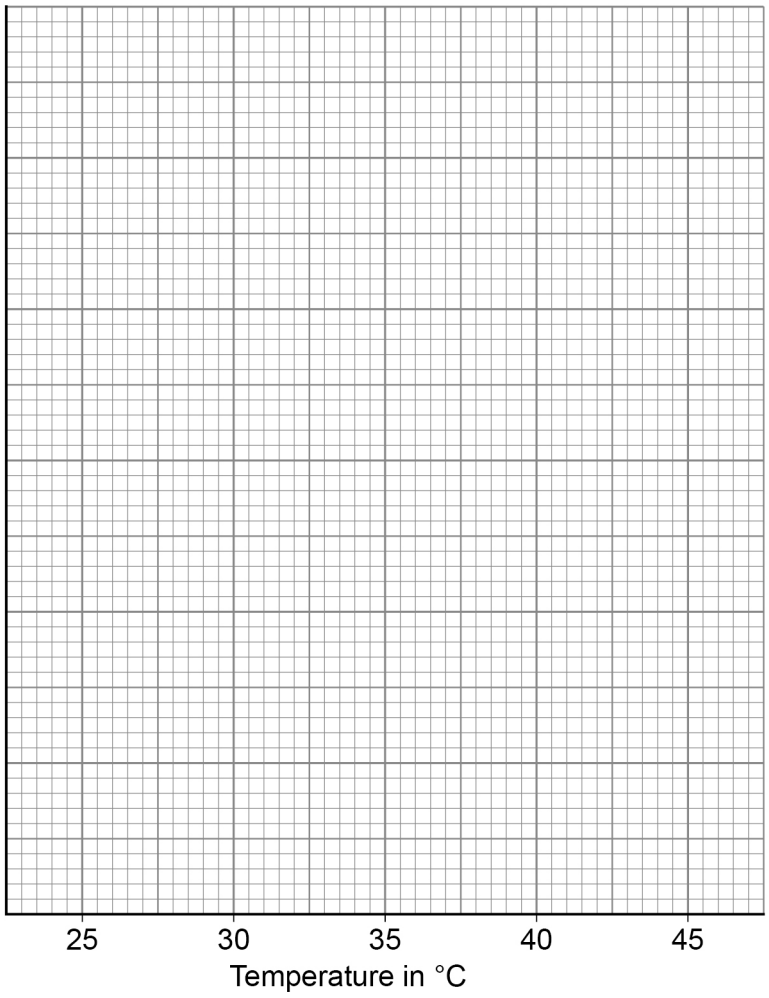
0 7 . 9 Complete **Figure 10** using data from **Table 3**.

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



16

Turn over for the next question

Do not write outside the box

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

0 8 . 1 What is meant by the term diffusion?

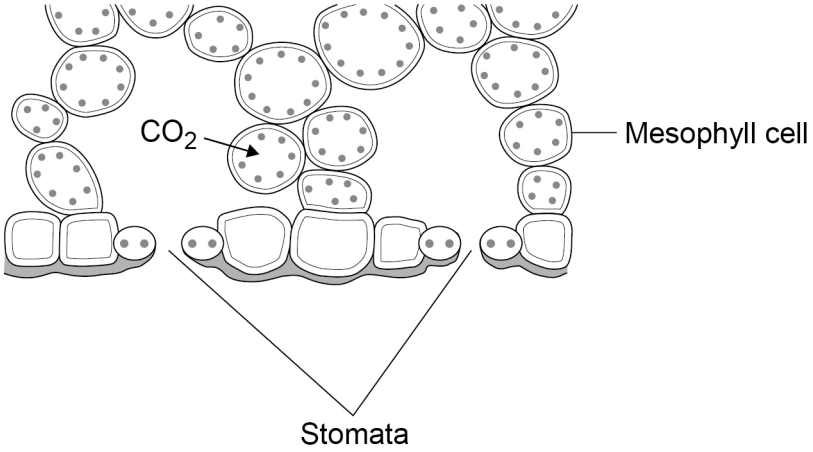
[2 marks]

diffusion is the movement of particles from and area of higher concentration t an area of lower concentration

Do not write outside the box

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 ☐

Question 8 continues on the next page

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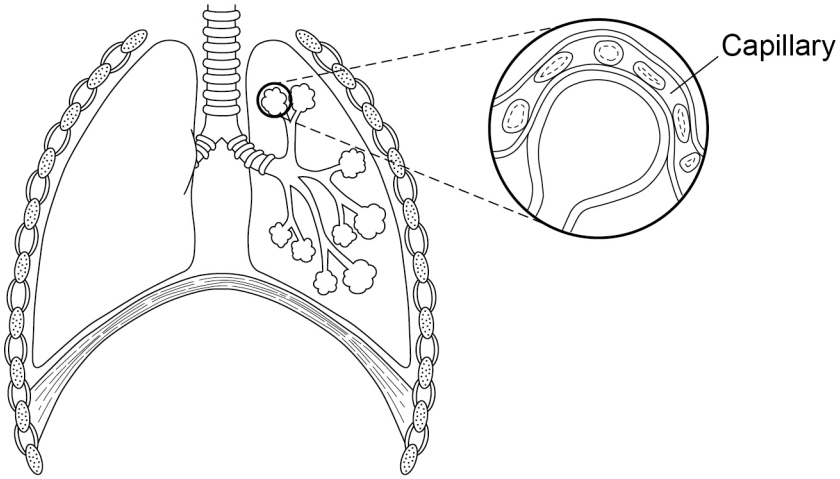
0 8 . 3 Diffusion also happens in the human lungs.

Figure 12 shows the human breathing system.

Figure 12



Explain how the human lungs are adapted for efficient exchange of gases by diffusion.

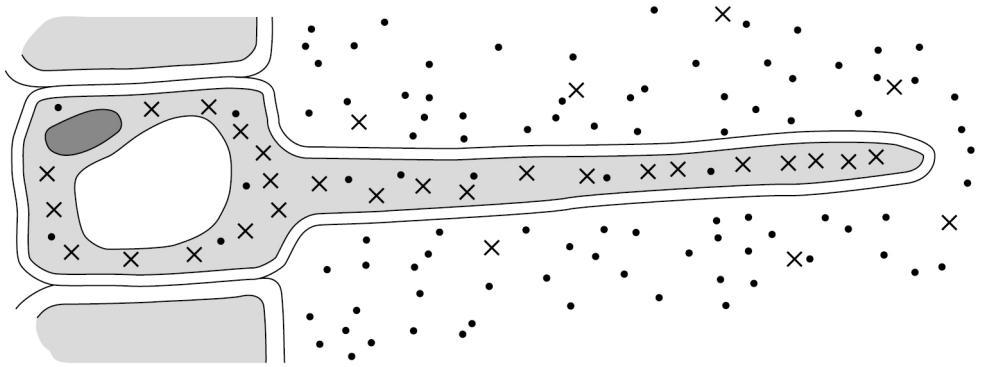
[6 marks]

many alveoli provide a large surface area
capillaries are thin which provides short diffusion plan
breathing mechanism moves air in or out to bring in fresh oxygen and to remove carbon dioxide
large capillary network to remov
oxygen quickly and to bring carbon dioxide to lungs quickly

Do not write outside the box

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]

Osmosis

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

Explain how the nitrate ions in **Figure 13** are transported into the root hair cell.

Use information from **Figure 13** in your answer.

[3 marks]

Name of process active transport

Explanation energy is needed to move nitrate ions from a lower concentration to a higher concentration

14

END OF QUESTIONS

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ANSWER IN THE SPACES PROVIDED

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

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