AQA

GCSE
BIOLOGY

F

Foundation Tier   Paper 1F

Tuesday 14 May 2019   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.
* 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 100.
* The marks for questions are shown in brackets.
* You are expected to use a calculator where appropriate.
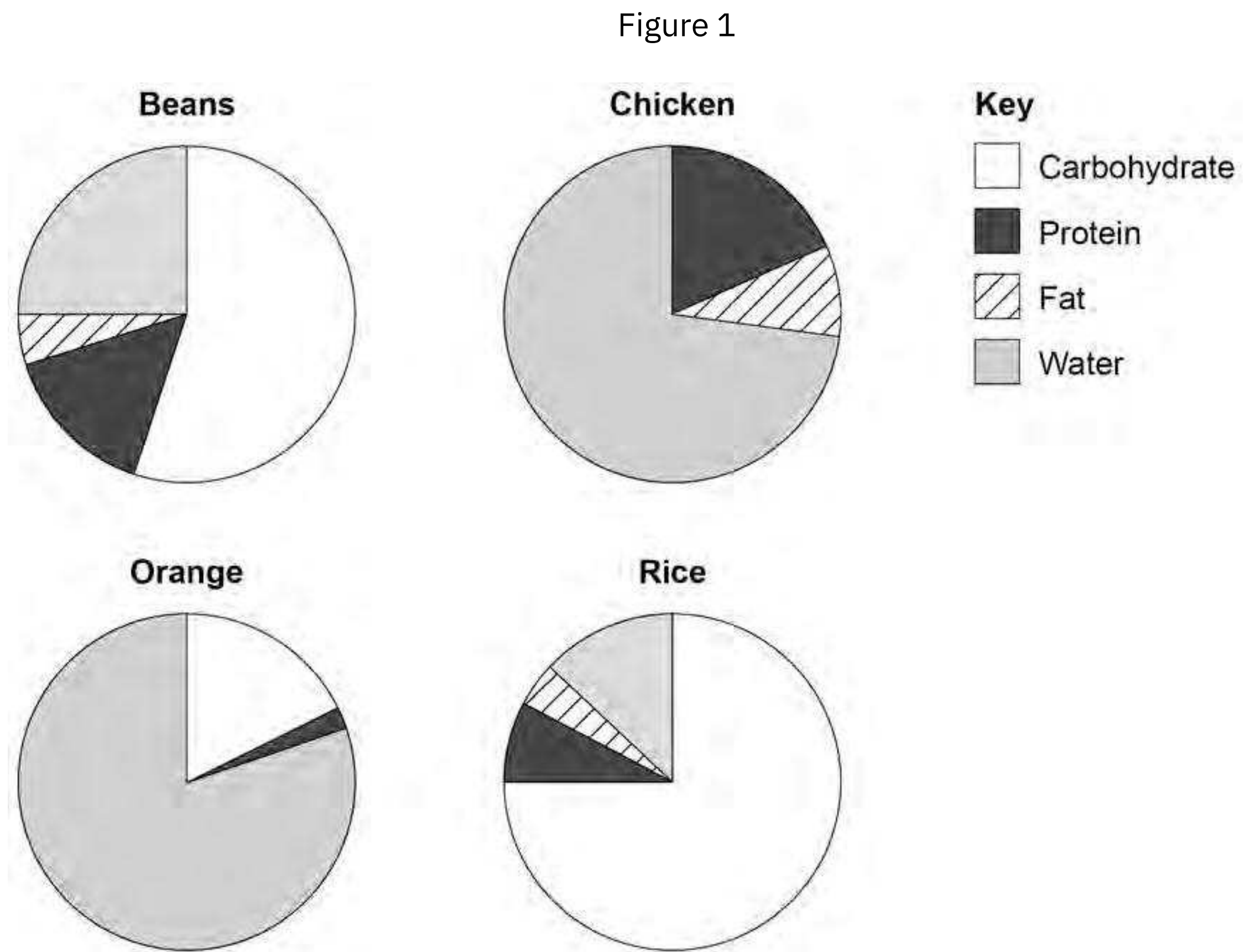* You are reminded of the need for good English and clear presentation in your answers.

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
9	
TOTAL	

Answer all questions in the spaces provided.

| 0 | 1 |

Many foods contain carbohydrates.

Figure 1 shows information about four different foods.

Figure 1

| 0 | 1 . 1 | Which food contains the highest percentage of carbohydrate?

[1 mark]

Tick (✓) one box.

Beans ☐

Chicken ☐

Orange ☐

Rice ☐

02

| 0 | 1 . 2 | Estimate the percentage of water found in beans.

[1 mark]

Percentage =

_____ %

| 0 | 1 . 3 | Look at Figure 1.

Why would eating only beans provide a more balanced diet than eating only chicken?

[1 mark]

_____

_____

| 0 | 1 . 4 | Sugars are produced when enzymes break down starch.

What is the name of the enzyme which breaks down starch to produce sugars?

[1 mark]

Tick (☐) one box.

Amylase ☐

Bile ☐

Lipase ☐

Protease ☐

| 0 | 1 . 5 | Which chemical could be used to test for glucose?

[1 mark]

Tick (☐) one box.

Benedict's reagent ☐

Biuret reagent ☐

Iodine solution ☐

Sulfuric acid ☐

Turn over ▶

0 1 . 6   What colour change would be seen in a positive test for glucose?

[1 mark]

From blue to _____ .

0 1 . 7   People with diabetes have difficulty controlling the concentration of glucose in their blood.

The blood of four people was tested.

Table 1 shows the results.

Table 1

Person	Concentration of glucose in blood in arbitrary units
A	4.2
B	6.9
C	7.1
D	5.1

Table 2 shows the information used to help decide if a person has diabetes.

Table 2

Concentration of glucose in blood in arbitrary units	Conclusion
<5.6	No diabetes
5.6 to 7.0	Mild diabetes
>7.0	Severe diabetes

Which person has severe diabetes?
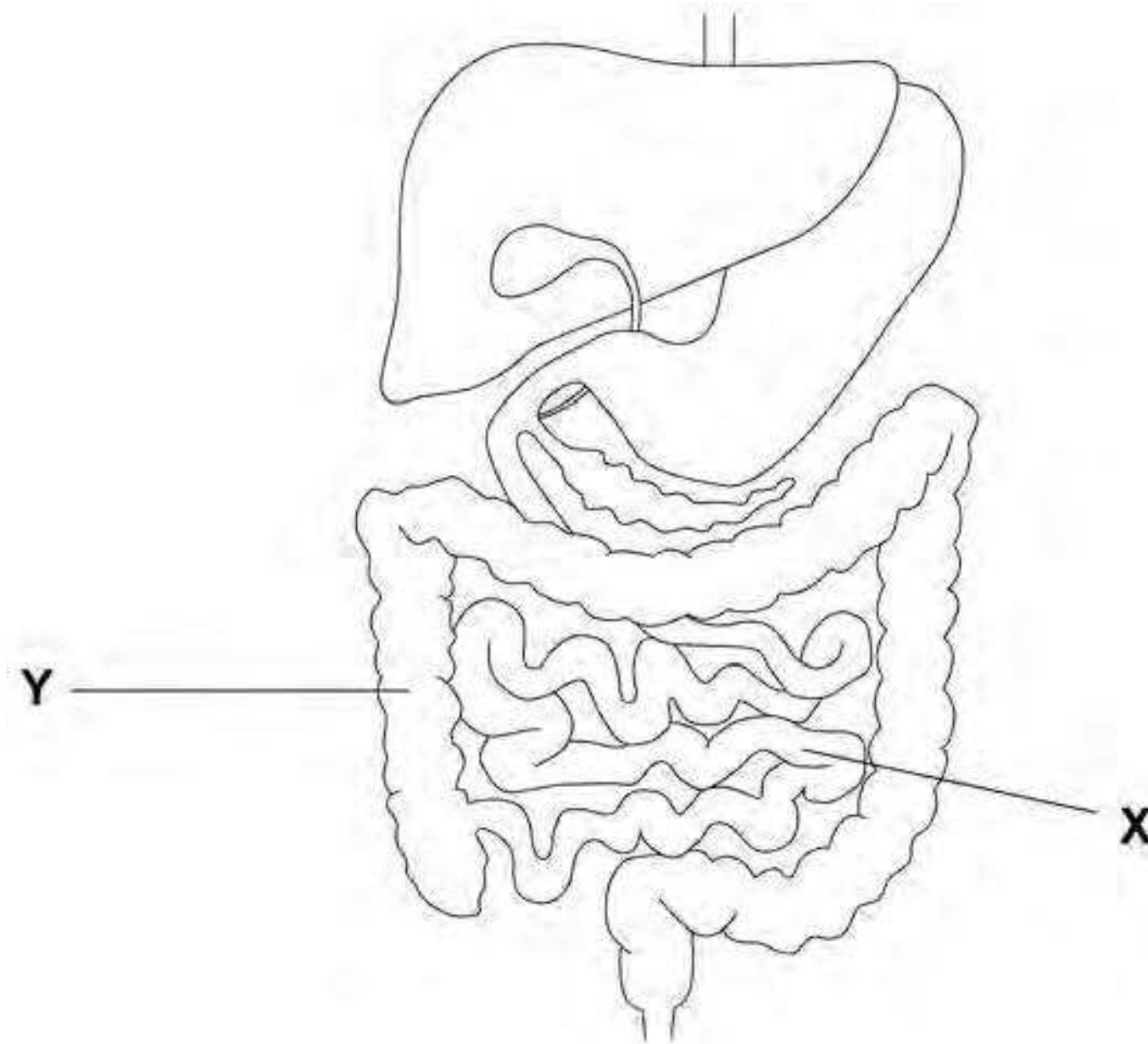
[1 mark]

Tick (☐) one box.

A ☐   B ☐   C ☐   D ☐

*

Figure 2 shows part of the human digestive system.

Figure 2

| 0 | 1 . 8 | Glucose is absorbed into the bloodstream in part X.

Name part X.

[1 mark]

_____

| 0 | 1 . 9 | Complete the sentences.

[2 marks]

Choose answers from the box.

| active transport | digestion | excretion |
| osmosis | respiration | |

Some glucose is absorbed into the bloodstream against the concentration gradient by

the process of . _____

Water moves out of part Y and into the bloodstream by
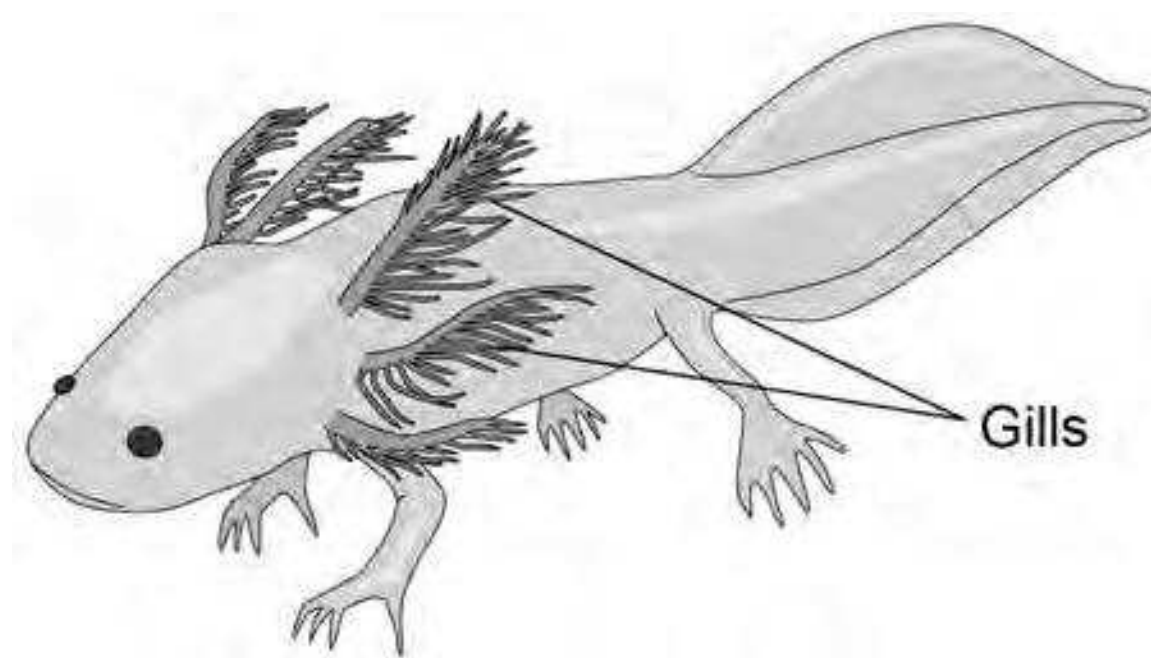
the process of . _____

Turn over ▶

0 2   An animal called an axolotl lives in water.

Figure 3 shows an axolotl.

Figure 3

Oxygen enters the axolotl's bloodstream through the gills by diffusion.

0 2 . 1   What is diffusion?

[1 mark]

Tick (☐) one box.

The movement of particles from a high concentration to a low concentration ☐

The movement of particles from a low concentration to a high concentration ☐

The movement of water from a concentrated solution to a more dilute solution ☐

0 2 . 2   Describe how one feature of the axolotl's gills increases the rate of diffusion of oxygen.

Use information from Figure 3.

[2 marks]

Feature _____

Description _____

_____

_____

If a gill of an axolotl is removed, stem cells in the damaged area will divide and a new gill will grow.

0 2 . 3 Complete the sentence.

[1 mark]

Choose the answer from the box.

adaptation	differentiation	evolution	variation

When stem cells specialise to produce gill cells, this process is

known as _____ .

0 2 . 4 Complete the sentence.

[1 mark]

Choose the answer from the box.

binary fission	mitosis	mutation

To grow a new gill the stem cells divide by _____ .

0 2 . 5 Which one of the following does not contain stem cells?

[1 mark]

Tick (✓) one box.

Bone marrow ☐

Embryos ☐

Hair ☐

Meristem tissue ☐

Turn over ▶

0 2 . 6   Axolotls are small animals. Axolotls are used in stem cell research.

What are two advantages of using axolotls in stem cell research?

[2 marks]

Tick (☐) two boxes.

Axolotls are cheap to feed.   ☐

Axolotls are easy to breed.   ☐
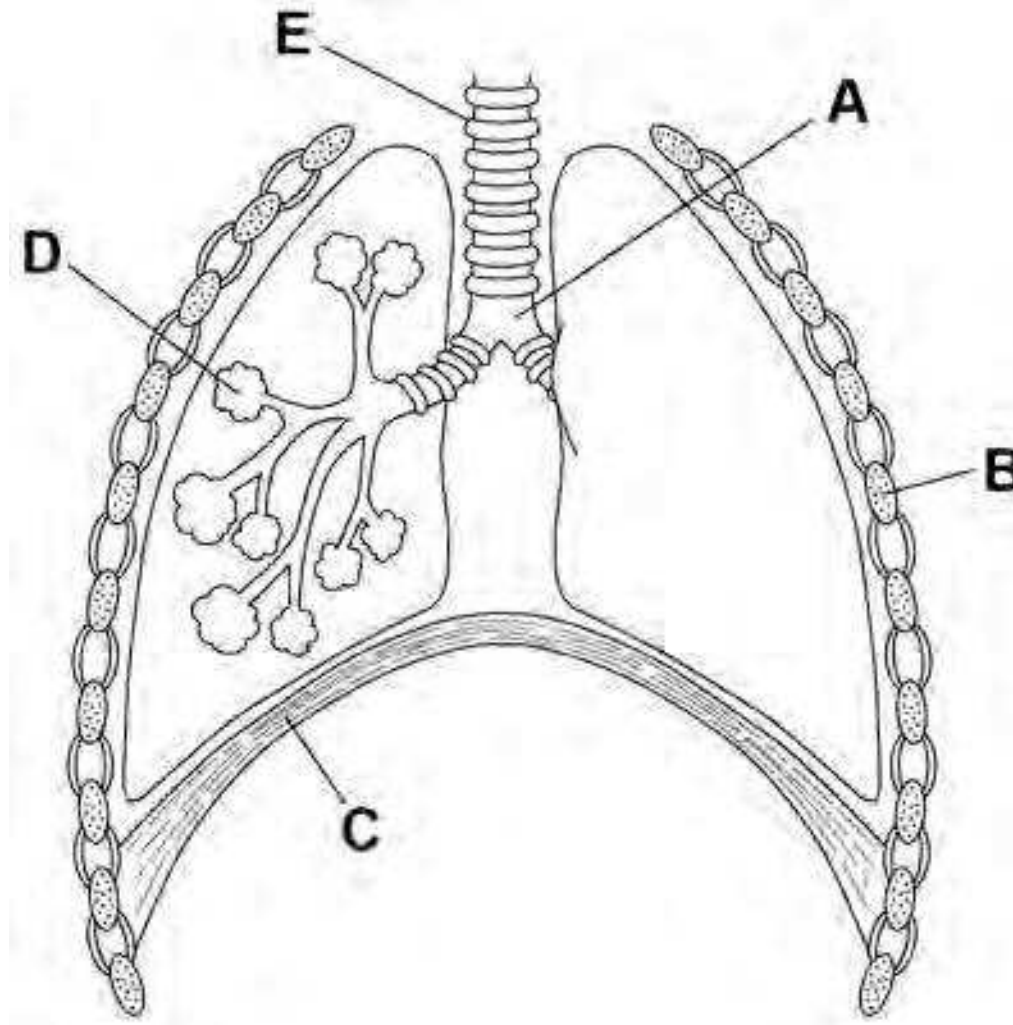
Axolotls are endangered.   ☐

Axolotls live in water.   ☐

Axolotl research is cruel.   ☐

Oxygen uptake in humans takes place in the lungs.

Figure 4 shows the human breathing system.

Figure 4

0 2 . 7 Where does oxygen enter the bloodstream?

[1 mark]

Tick (✓) one box.

A ☐   B ☐   C ☐   D ☐

0 2 . 8 Name part E on Figure 4 .

[1 mark]

0 2 . 9 Which blood vessel carries blood to the lungs?

[1 mark]

Tick (✓) one box.

Aorta ☐

Pulmonary artery ☐

Vena cava ☐

11

Turn over ▶

0 3 This question is about leaves.

0 3 . 1 Complete the sentences.

Choose answers from the box.

[3 marks]

epidermis	phloem	palisade mesophyll
waxy cuticle	xylem	

The layer of cells lining the upper surface and lower surface of a

leaf is the .

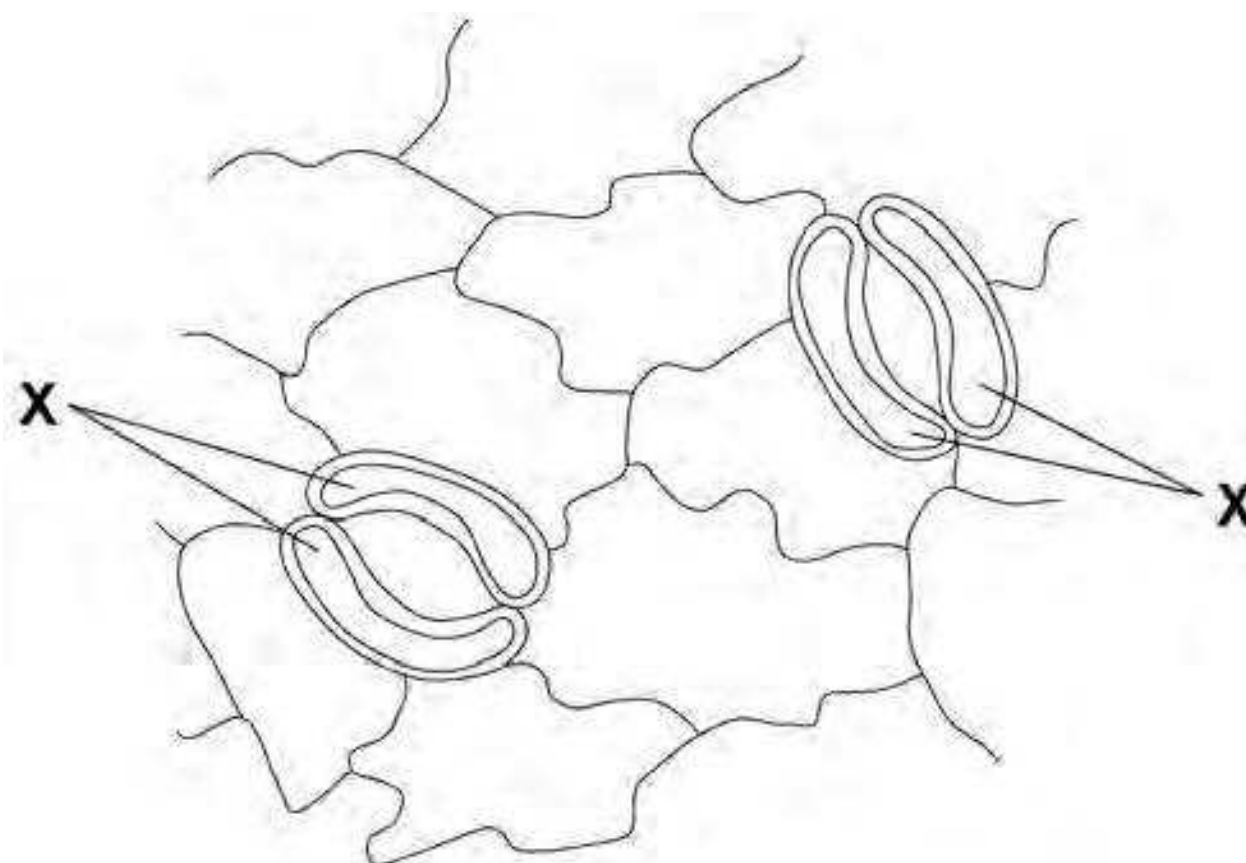The part of the leaf where most photosynthesis occurs

is the . _____

Water is transported to the leaf in the _____ .

Water is lost through small openings on the lower surface of plant leaves.

These small openings are called stomata.

Figure 5 shows two stomata on the lower surface of a leaf.

Figure 5

0 3 . 2   The cells labelled X control the width of the stomata.

What are the cells labelled X?

[1 mark]

Tick (✓) one box.

Guard cells ☐

Mesophyll cells ☐

Root hair cells ☐

Stem cells ☐

0 3 . 3   What is the function of the stomata?

[1 mark]

Tick (✓) one box.

To allow light into the leaf ☐

To let carbon dioxide into the leaf ☐

To let sugars out of the leaf ☐

To protect the leaf from pathogens ☐

0 3 . 4   How is water lost from a leaf?

[1 mark]

Tick (✓) one box.

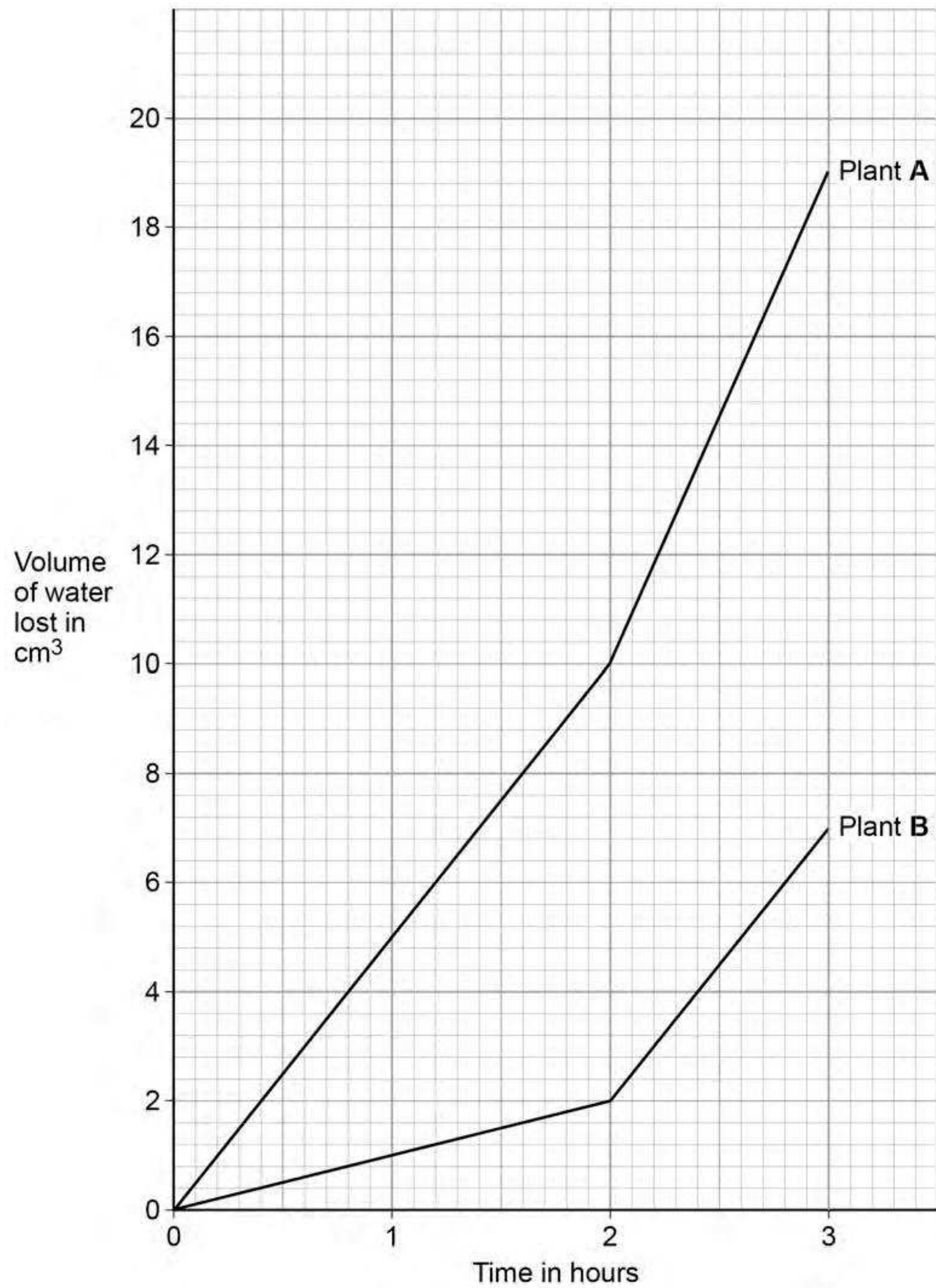By evaporation ☐

By respiration ☐

By translocation ☐

Turn over ▶

A student investigated the volume of water lost from two plants.

The plants were different species.

Figure 6 shows the student's results.

Figure 6

0 3 . 5 Calculate the difference in the volume of water lost by plant A compared to plant B in the first hour.

[2 marks]

_____

_____

Difference in volume = _____ cm3

0 3 . 6 What could cause plant A to lose water at a faster rate than plant B?

[1 mark]

Tick (☐) one box.

Plant A has fewer stomata per leaf. ☐

Plant A is smaller. ☐

Plant A has more leaves. ☐

Plant A has smaller leaves. ☐

0 3 . 7 After the first 2 hours, both plants were moved to a new room.

Suggest one reason why both plants lost water at a faster rate in the new room.

[1 mark]

_____

_____

Question 3 continues on the next page

Turn over ▶

| 0 | 3 | . | 8 |

Some plants have adaptations to stop them from being eaten by animals.

Figure 7 shows part of a holly plant.

Figure 7

Describe one way the holly plant is adapted to stop it being eaten by animals.

[1 mark]

_____

_____

11

14

Turn over for the next question

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Turn over ▶

15

0 4 A student investigated respiration in yeast.

This is the method used.

1. Add 5 cm3 of a yeast and water mixture to each measuring cylinder.

2. Add different masses of sugar to each measuring cylinder.

3. Mix the contents of each measuring cylinder gently for 5 seconds.

4. Put the measuring cylinders in a water bath at 25 °C

5. Over the next 20 minutes, record the maximum volume the foam reaches in each measuring cylinder.

Figure 8 shows the student's results.

Figure 8

Key: ▨ Mixture   ▢ Foam
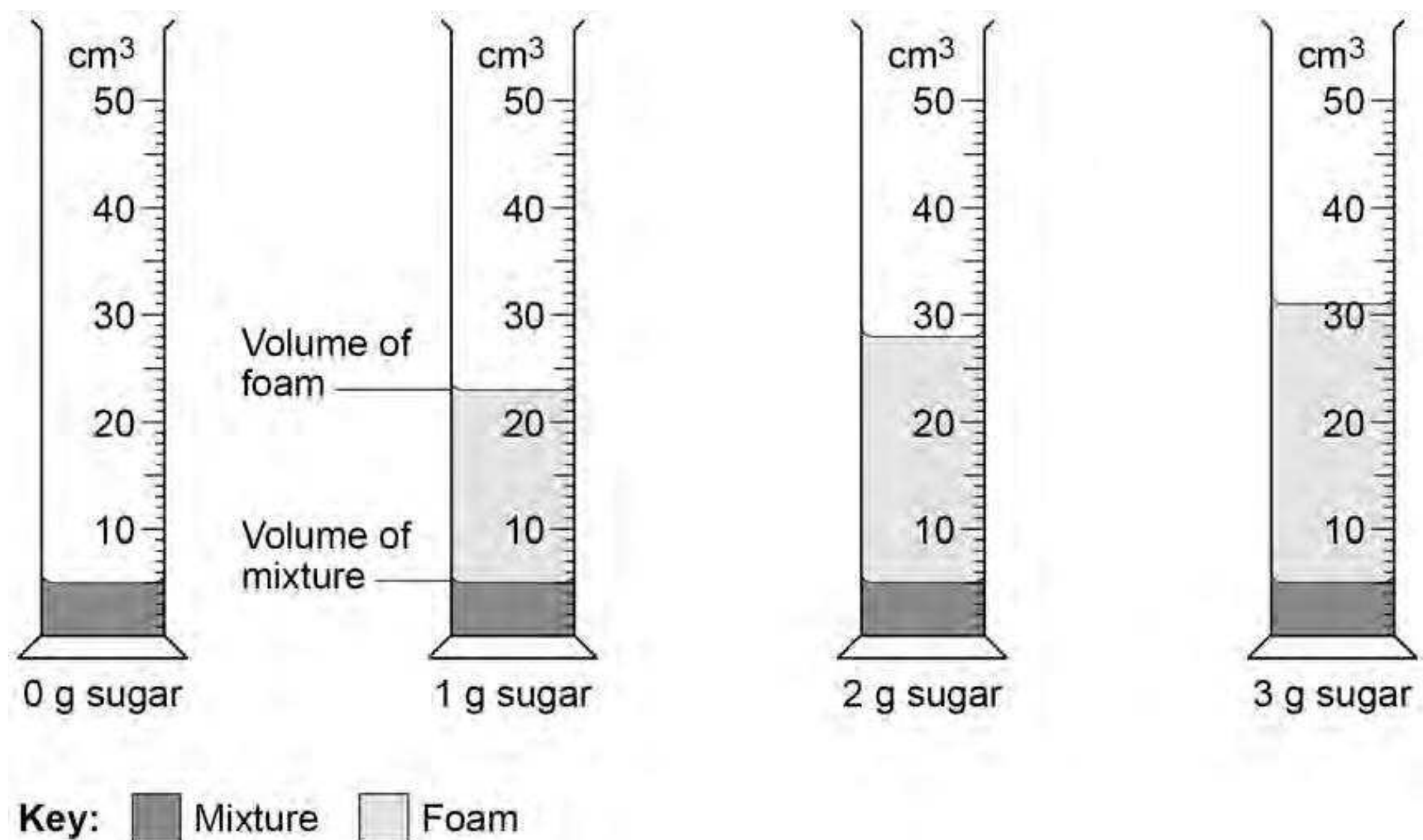
0 4 . 1 Which two variables did the student control in the method?

[2 marks]

Tick (☐) two boxes.

Mass of sugar ☐

pH of the mixture ☐

Temperature ☐

Volume of foam ☐

Volume of yeast and water ☐

Table 3 shows the results.

Table 3

Mass of sugar in g	Maximum volume in cm3
0	5
1	23
2	X
3	31

0 4 . 2 What is value X in Table 3?

Use Figure 8.

[1 mark]

X = _____ cm3

Question 4 continues on the next page

Turn over ▶

In the investigation, the yeast respires and releases a gas which causes the foam to rise.

0 4 . 3 Which gas causes the foam to rise?

[1 mark]

Tick (□) one box.

Carbon dioxide ☐

Hydrogen ☐

Nitrogen ☐

Oxygen ☐

0 4 . 4 What conclusion can you make about the relationship between the mass of sugar used and the volume of gas produced?

[1 mark]

_____

_____

_____

_____

0 4 . 5 Why was no foam produced in the mixture with 0 g of sugar?

[1 mark]

_____

_____

_____

0 4 . 6 Why was the measuring cylinder with 0 g of sugar included in the investigation?

[1 mark]

_____

_____

| 0 | 4 . 7 | The top of the mixture can be covered with a layer of oil after step 3 in the method.

Suggest why the layer of oil stops the yeast respiring aerobically.

[1 mark]

_____

_____

| 0 | 4 . 8 | What other substance is produced during anaerobic respiration in yeast?

[1 mark]

Tick (☐) one box.

Ethanol ☐

Hydrochloric acid ☐

Lactic acid ☐

Water ☐

Turn over for the next question

0 5 A man has the following symptoms:

• yellow discharge from his penis
• pain when urinating.

0 5 . 1 The man has a bacterial infection.

What is the most likely cause of the man's symptoms?

Tick (☐) one box.

[1 mark]

Gonorrhoea ☐

HIV ☐

Measles ☐

Salmonella poisoning ☐

0 5 . 2 The man took a full course of antibiotics.

The man's symptoms did not improve.

Why did the antibiotics not cure the symptoms?

Tick (☐) one box.

[1 mark]

The bacteria are immune to the antibiotics. ☐

The bacteria are resistant to the antibiotics. ☐

The man is immune to the antibiotics. ☐

The man is resistant to the antibiotics. ☐

0 5 . 3   Using a condom can stop the bacteria being passed to another person during sexual intercourse.

Suggest a different way the man could avoid passing the bacteria on to someone else.

[1 mark]

_____

_____

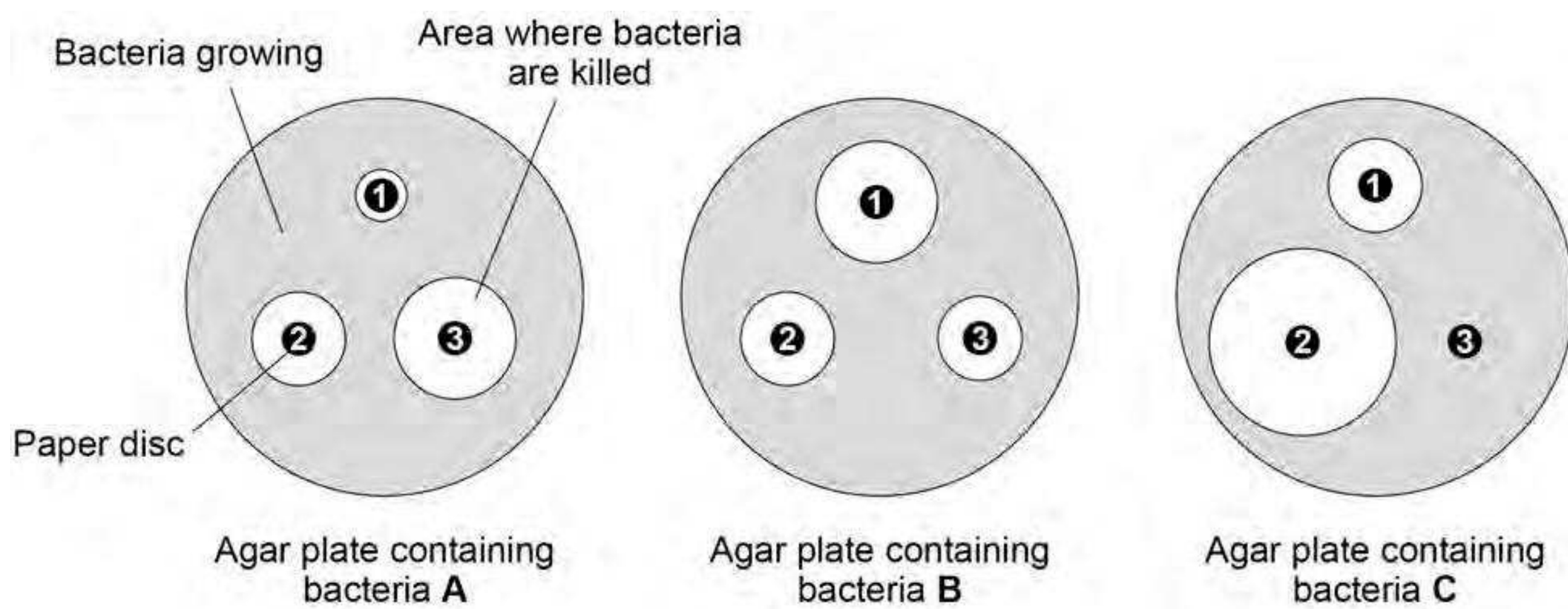Question 5 continues on the next page

Turn over ▶

21

A scientist investigated the effect of three different antibiotics on three different types of bacteria, A, B and C.

This is the method used.

1. Grow bacteria A on an agar plate.

2. Put three separate paper discs each containing one of the antibiotics
(1, 2 and 3) onto the agar plate.
3. Put the agar plate into an incubator for 48 hours.

4. Repeat steps 1–3 for bacteria B and for bacteria C.

Figure 9 shows the scientist's results.

Figure 9

Agar plate containing bacteria **A**

Agar plate containing bacteria **B**

Agar plate containing bacteria **C**

| 0 | 5 | . | 4 | Compare the effectiveness of the three antibiotics at killing the different types of bacteria.

[6 marks]

_____

_____

_____

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Question 5 continues on the next page

Turn over ▶

23

Milk contains bacteria.

A small volume of raw milk was placed in a counting chamber in a special type of microscope slide.
Figure 10 shows what the counting chamber looked like when viewed using a microscope.
Figure 10
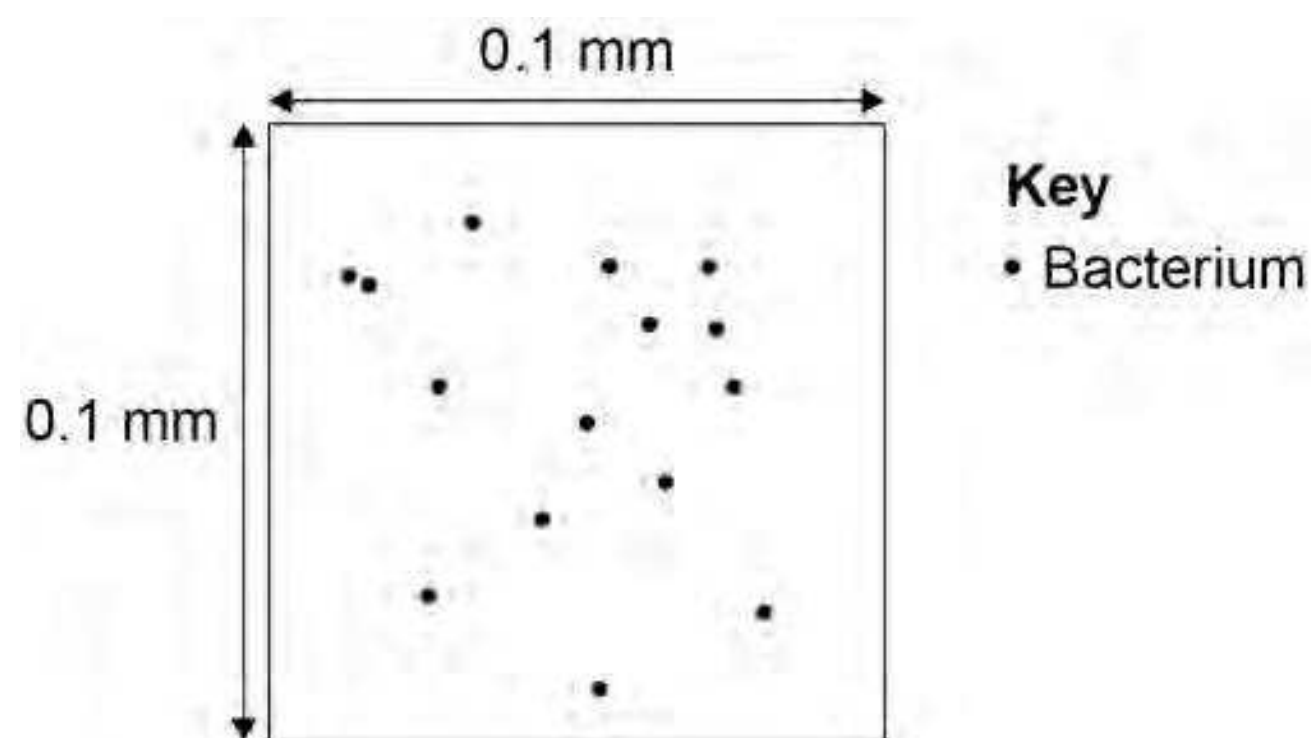
A scientist counted the number of bacteria in four samples of raw milk.

Table 4 shows the results.

Table 4

Milk sample	Number of bacteria in counting chamber
E	15
F	12
G	13
H	16

| 0 | 5 . 5 | Which milk sample is shown in Figure 10?

[1 mark]

Tick (☐) one box.

Sample E ☐

Sample F ☐

Sample G ☐

Sample H ☐

| 0 | 5 | . | 6 | Calculate the mean number of bacteria in the four samples in Table 4.

[2 marks]

_____

_____

_____

Mean number of bacteria = _____

| 0 | 5 | . | 7 | Calculate the mean number of bacteria per mm3 of milk in the samples.

Complete the following steps.

[3 marks]

Calculate the total area of the counting chamber in Figure 10.

_____

Total area of counting chamber = _____ mm2

The depth of the counting chamber is 0.01 mm

Calculate the volume of the counting chamber in Figure 10.

Use the equation:
volume $= area × depth$

_____

Volume of counting chamber = _____ mm3

Calculate the mean number of bacteria per mm3 of milk in the samples.

Use the equation:

mean number of bacteria per mm3 of milk
$= \dfrac{\text{mean number of bacteria from Question } 05.6}{\text{volume of counting chamber}}$

_____

Mean number of bacteria per mm3 of milk = _____

Turn over ▶

Milk is heated to reduce the number of bacteria it contains before it is sold for humans to drink.

Milk with more than 20 000 bacteria per cm3 cannot be sold for humans to drink.

Table 5 shows the number of bacteria per cm3 in four different samples of milk.

Table 5

Milk sample	Number of bacteria per cm3 of milk
P	1.8×10^4
Q	2.2×10^4
R	2.2×10^{-5}
S	1.8×10^3

| 0 | 5 . 8 | Which of the milk samples could not be sold for humans to drink?

[1 mark]

Tick (✓) one box.

P ☐   Q ☐   R ☐   S ☐

| 0 | 5 . 9 | Why should milk sold for humans to drink not contain large numbers of bacteria?

[1 mark]

_____

_____

_____

17

0 6 Figure 11 shows the internal structure of the human heart.

Figure 11
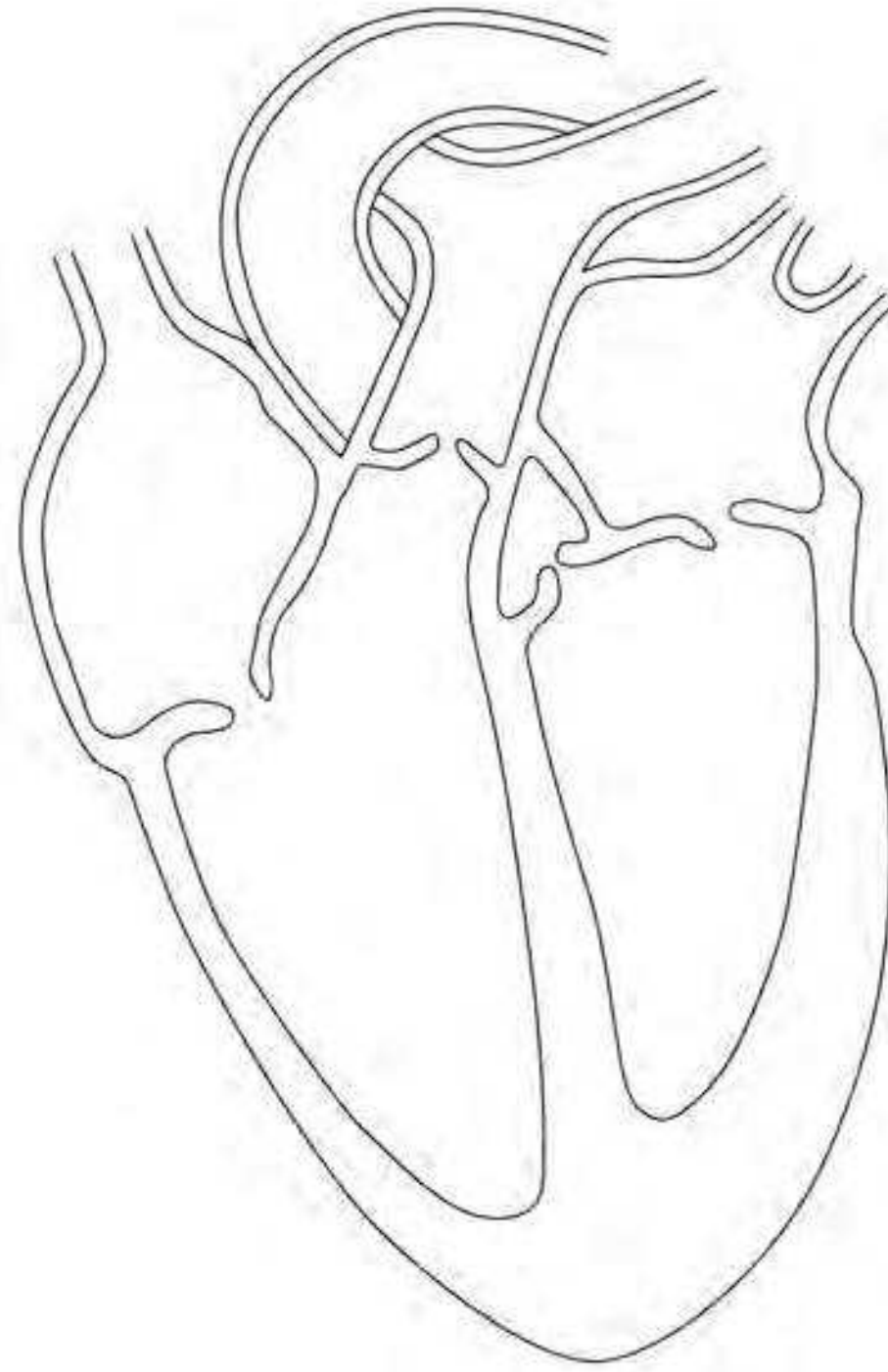
0 6 . 1 Which organ system is the heart a part of?

[1 mark]

_____

0 6 . 2 Draw a ring around one valve on Figure 11.

[1 mark]

0 6 . 3 What is the function of the valves in the heart?

[1 mark]

_____

_____

Question 6 continues on the next page

Turn over ▶

27

| 0 | 6 | . | 4 |

Valves are also found inside some blood vessels.

Which type of blood vessel contains valves?

[1 mark]

_____

Sometimes a valve in the heart can begin to leak.

A leaking heart valve may be replaced with either:

• a mechanical valve
• a biological valve from a pig.

Table 6 shows information about the replacement valves.

Table 6

Mechanical valve	Biological valve from a pig
Made of plastic or metal	Made from living tissue
Can cause the blood to clot around the valve	No risk of blood clotting around the valve
No need for another replacement valve after 5 years	Sometimes another replacement valve is needed after 5 years

| 0 | 6 | . | 5 |

Suggest two reasons why a patient may choose a mechanical valve and not a biological valve from a pig.

[2 marks]

1 _____

_____

2 _____

_____

0 6 . 6 Suggest one reason why a patient may choose a biological valve from a pig and a not mechanical valve.

[1 mark]

_____

_____

0 6 . 7 A person may develop other medical conditions.

Draw one line from each medical condition to the correct treatment.

[2 marks]

Medical condition   Treatment

Antibiotics

High blood cholesterol

Artificial pacemaker

Irregular heart rate

Insulin

Statins

Turn over for the next question

9

Turn over ▶

0 7   Figure 12 shows an animal cell viewed using a microscope.

Figure 12
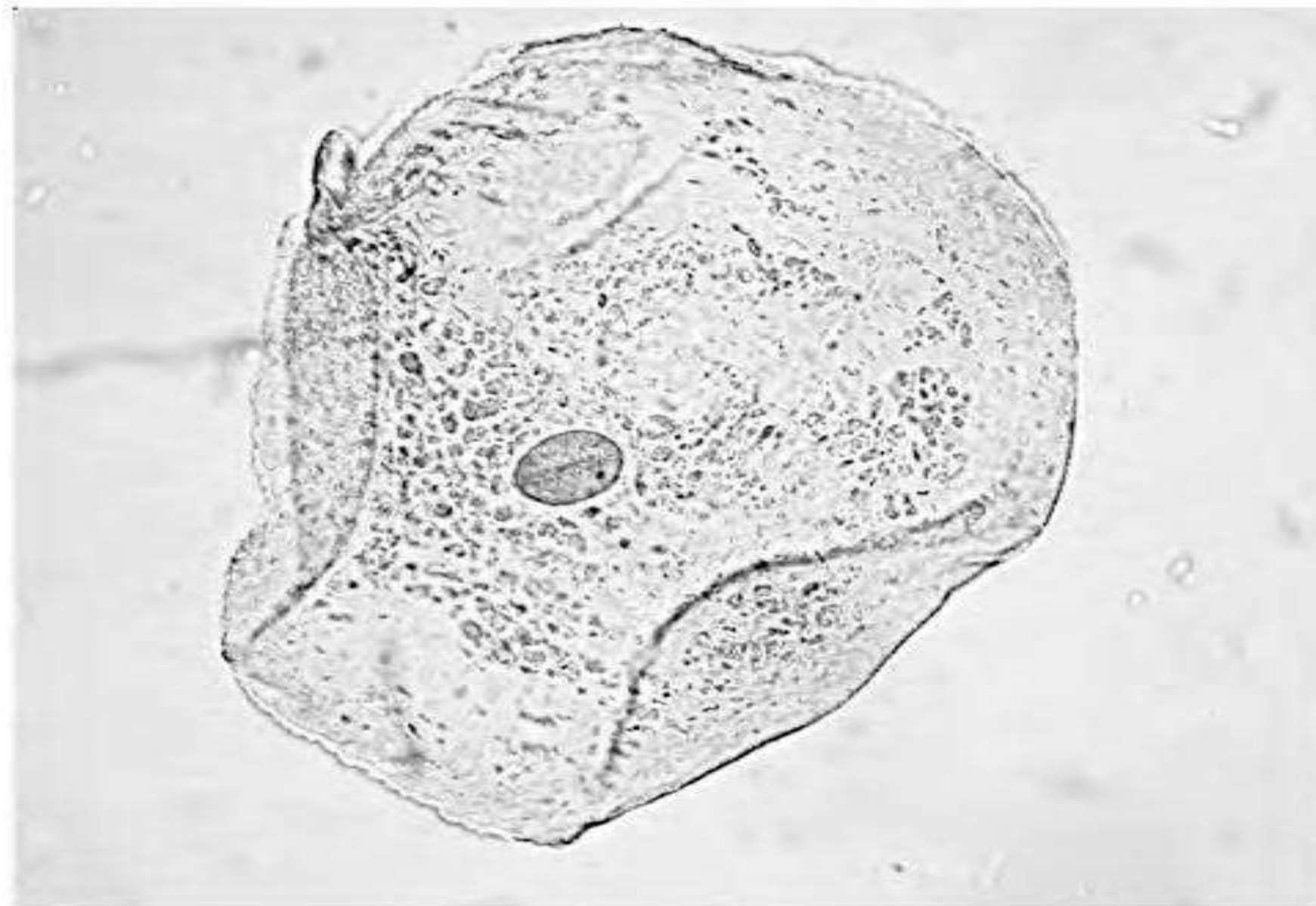
0 7 . 1   The cell contains a nucleus.

What is the function of the nucleus?

[1 mark]

0 7 . 2   Name one type of cell that does not contain a nucleus.

[1 mark]

0 7 . 3   Draw a simple diagram of the cell in Figure 12 .

     Label two parts of the cell.

[2 marks]

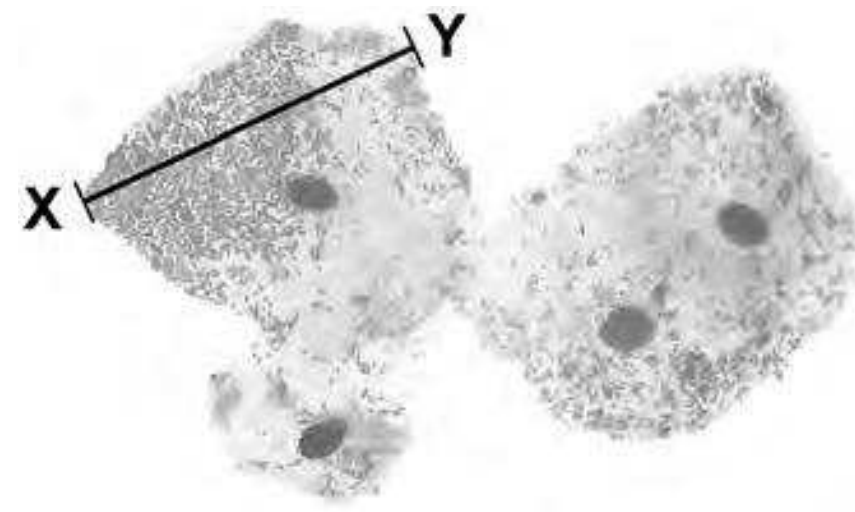0 7 . 4   Name one structure found in a plant cell but not found in an animal cell.

[1 mark]

_____

Question 7 continues on the next page

Turn over ►

31

Figure 13 shows some different cells.

Figure 13

| 0 | 7 | . | 5 | The real length from point X to point Y is 0.06 mm

Calculate the magnification.

Use the equation:

magnification = $\dfrac{\text{size of image}}{\text{realsize of object}}$

[3 marks]

_____

_____

_____

_____

_____

_____

Magnification = × _____

*3 2 *

| 0 | 7 | . | 6 |

The cells shown in Figure 13 were viewed using a light microscope.

Give two advantages of using an electron microscope instead of a light microscope.

[2 marks]

1 _____

_____

2 _____

_____

10

Turn over for the next question

0 8   Mosquitoes carry a pathogen that causes malaria.

0 8 . 1   What type of pathogen causes malaria?

[1 mark]

Tick (✓) one box.

A bacterium   ☐

A fungus   ☐

A protist   ☐

A virus   ☐

Mosquito nets can help prevent the spread of malaria.

Table 7 shows the results of a study in one area of Africa.

Table 7

Total number of people in the study	Number of people who use mosquito nets when sleeping	Percentage of people with malaria	
		Who use mosquito nets when sleeping	Who do NOT use mosquito nets when sleeping
476 426 1.2 40			

A newspaper made the following statement:

‘Study shows mosquito nets are scientifically proven to prevent malaria.’

Give one piece of evidence that supports the statement.

0 8 . 2

[1 mark]

_____

_____

_____

| 0 | 8 |.| 3 | | Suggest one reason why the statement may not be valid.

[1 mark]

_____

_____

Table 8 shows information about the number of deaths from malaria in the same area of Africa.

Table 8

Year	Number of deaths from malaria per 100 000 people

2005 161

2007 136

2009 114

2011 97

2013 94

2015 92

| 0 | 8 |.| 4 | | Predict the number of people per 100 000 who died from malaria in 2017 if the trend stayed the same.

[1 mark]

_____

_____

Number of people per 100 000 = _____

| 0 | 8 |.| 5 | | Use of mosquito nets has helped to reduce the number of deaths from malaria each year.

Suggest one other reason for the reduced number of deaths from malaria each year.

[1 mark]

_____

_____

Turn over ▶

0 8 . 6 Describe how the human body:

• prevents pathogens from entering
• defends itself against pathogens inside the body.

[6 marks]

_____

_____

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11

Turn over for the next question

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ANSWER IN THE SPACES PROVIDED

Turn over ▶

37

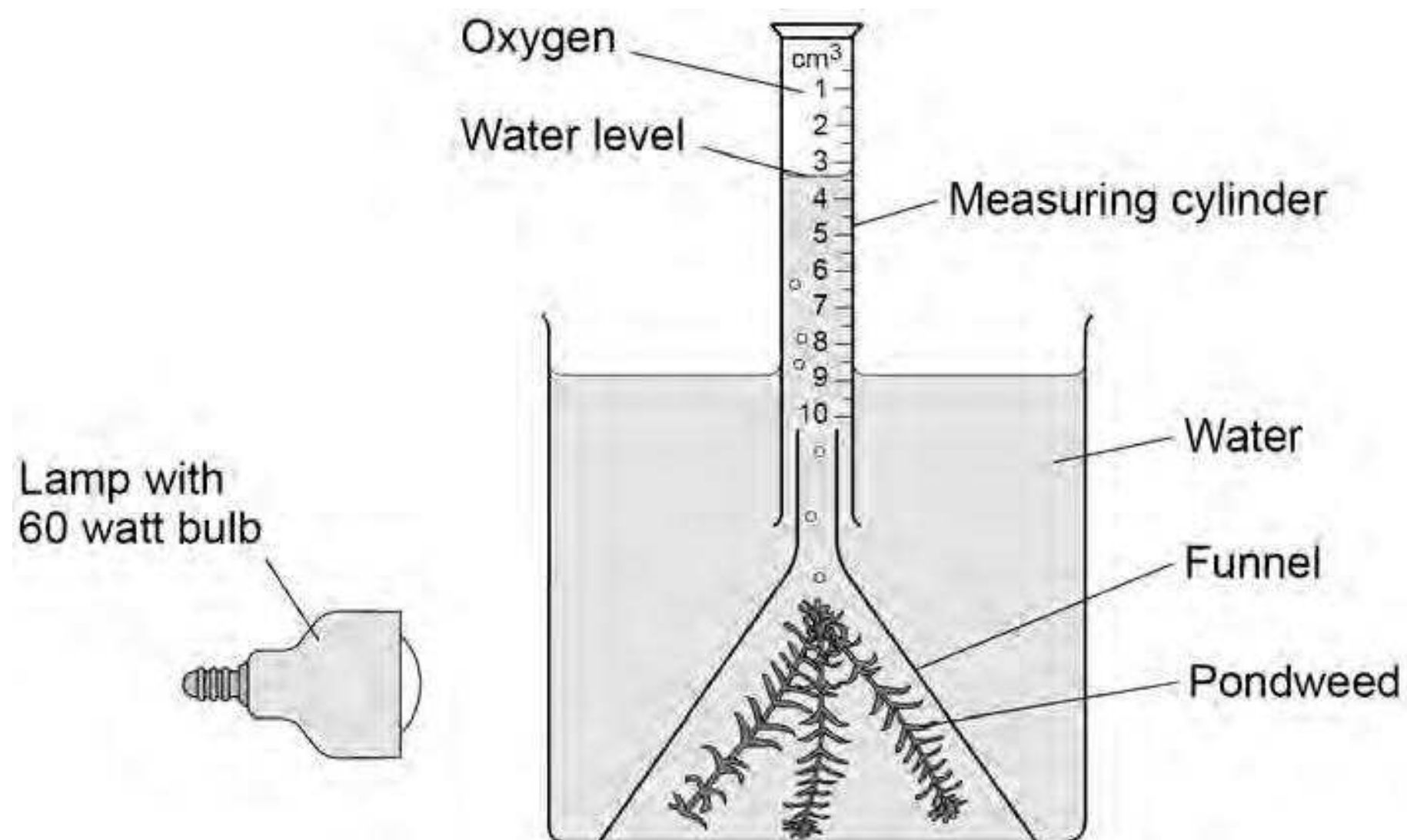**0 9** This question is about photosynthesis.

0 9 . 1 Complete the word equation for photosynthesis:

[2 marks]

_____ + _____ ⟶ _____ + oxygen

A student investigated photosynthesis using pondweed.

Figure 14 shows the apparatus the student used.

Figure 14

This is the method used.

1. Set up the apparatus as shown in Figure 14.

2. Switch on the lamp.

3. After 20 minutes, record the volume of oxygen collected in the measuring cylinder.

4. Repeat steps 1–3 using bulbs of different power output.

0 9 . 2   What was the independent variable in the investigation?

[1 mark]

Tick (☐) one box.

Power output of bulb   ☐

Rate of photosynthesis   ☐

Time to collect oxygen   ☐

Volume of oxygen collected   ☐

0 9 . 3   Suggest two ways the method could be improved so the results would be more valid.

[2 marks]

1 _____

_____

2 _____

_____

Question 9 continues on the next page

Turn over ▶

Table 9 shows the student's results.

Table 9

Power output of bulb in watts	Volume of oxygen collected in 20 minutes in cm3	Rate of photosynthesis in cm3/hour
60	0.5	1.5
100	0.8	2.4
150	1.1	X
200	1.2	3.6
250	1.2	3.6

0 9 . 4   Calculate value X in Table 9.

[1 mark]

_____

_____

X = _____ cm3/hour

0 9 . 5 Complete Figure 15 .

[4 marks]

You should:

• label the x-axis
• use a suitable scale
• plot the data from Table 9 and your answer to Question 09.4
• draw a line of best fit.

Figure 15

Rate of photosynthesis in cm³/hour
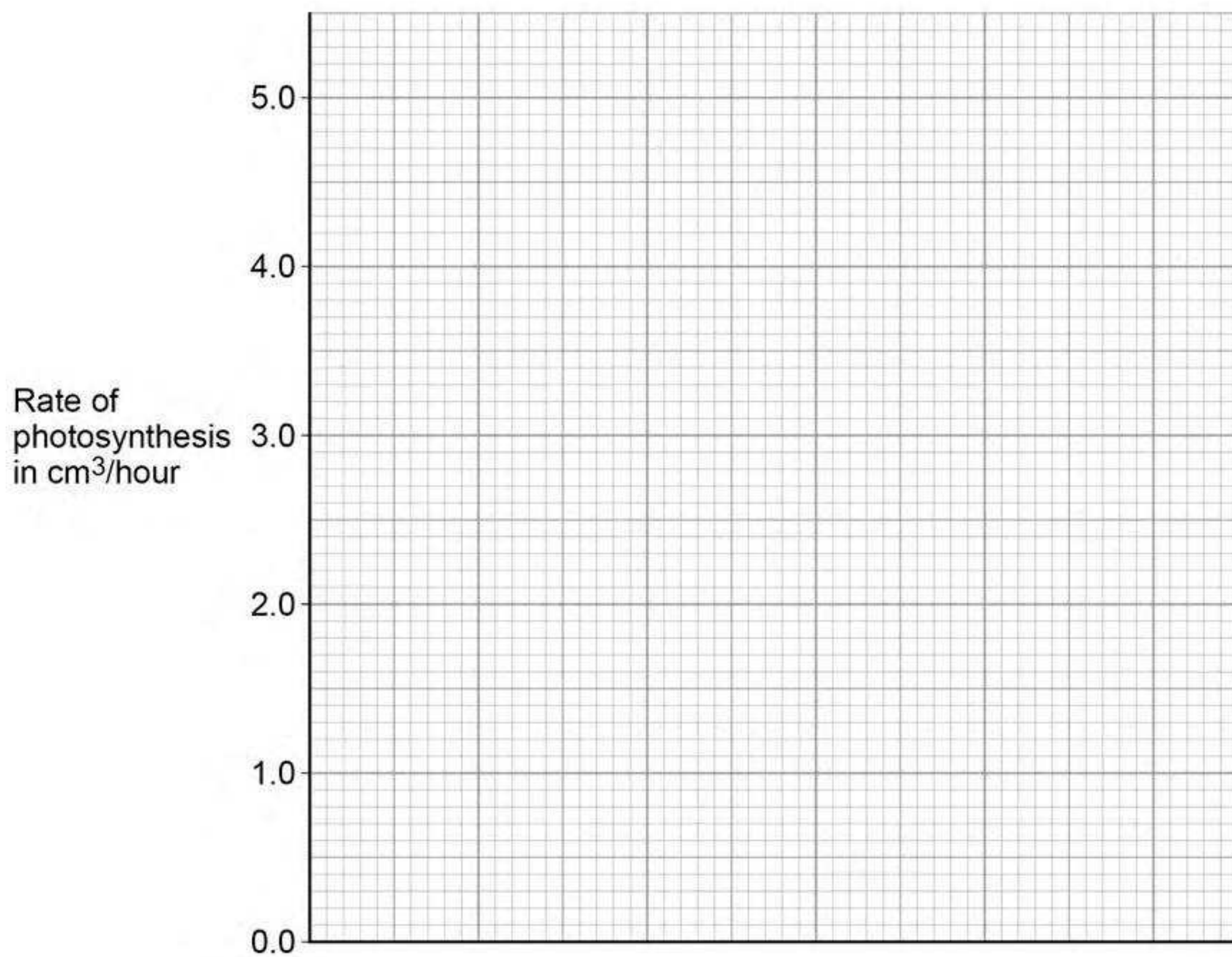
0 9 . 6 Determine the expected rate of photosynthesis with a bulb of power output 75 watts.
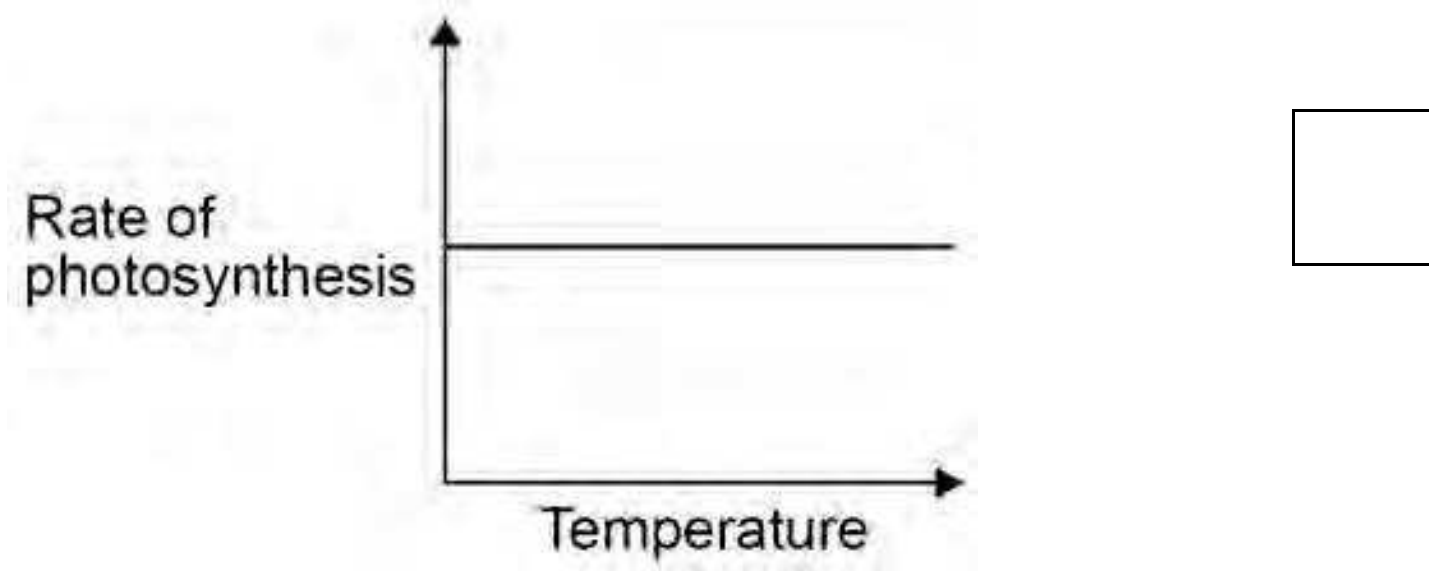
Use Figure 15.

[1 mark]

Rate of photosynthesis at 75 watts = _____ cm3/hour

Turn over ▶

0 9 . 7 Which graph shows the effect of temperature on the rate of photosynthesis?

[1 mark]

Tick (☐) one box.

Rate of photosynthesis / Temperature ☐

Rate of photosynthesis / Temperature ☐

Rate of photosynthesis / Temperature ☐

Rate of photosynthesis / Temperature ☐

12
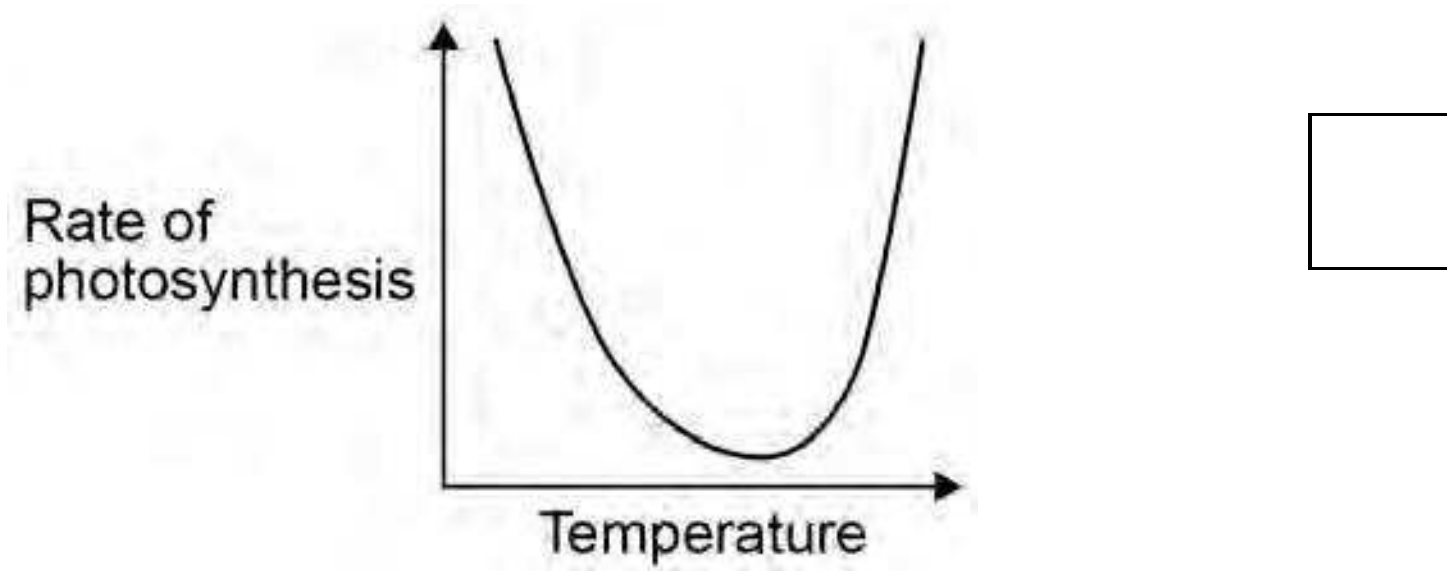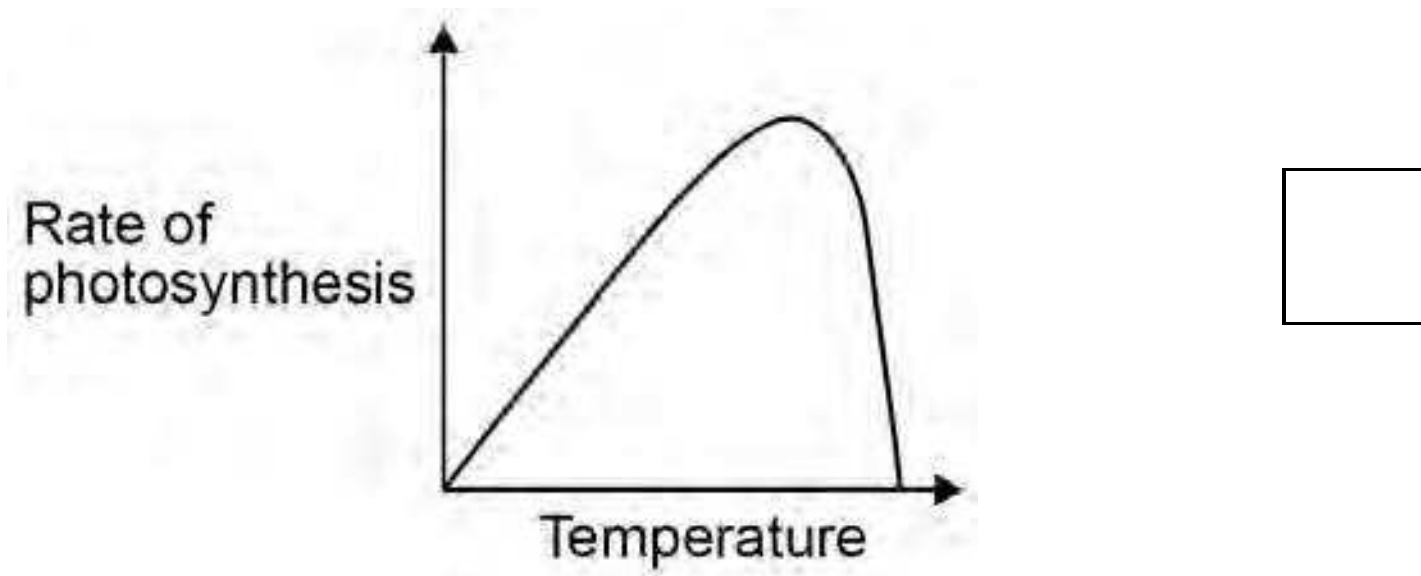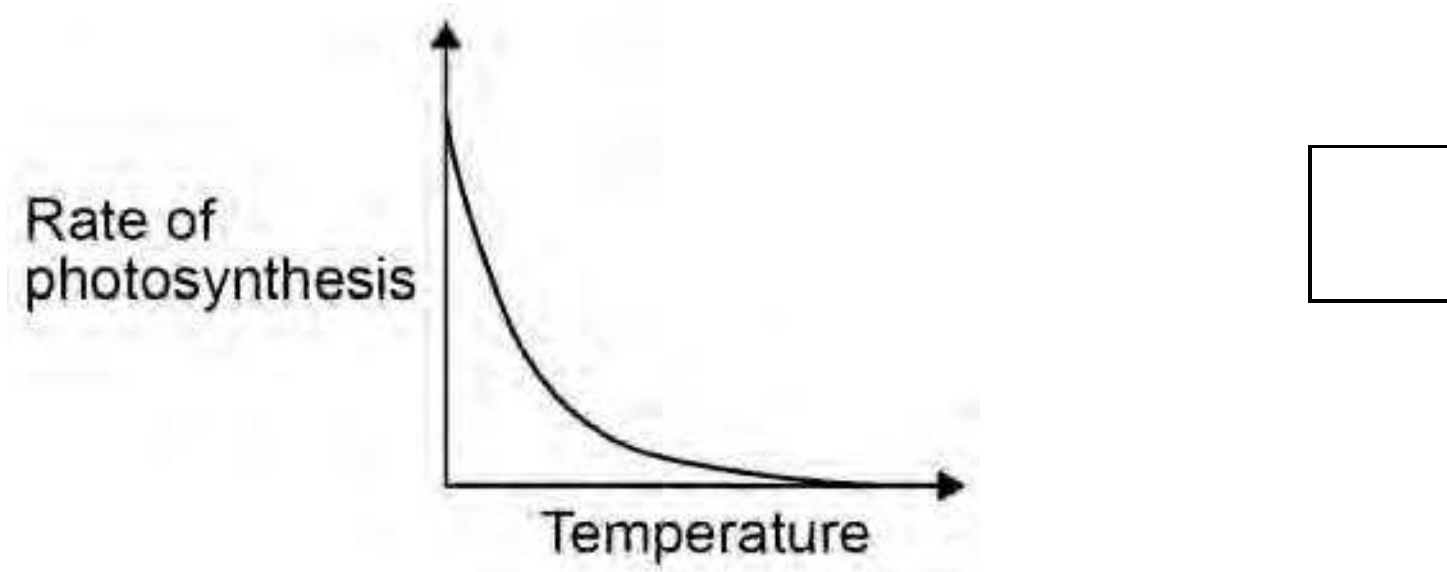
END OF QUESTIONS

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43

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