

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS**  
**GCSE (9–1)**  
**J250/01**  
**COMBINED SCIENCE (BIOLOGY) A**  
**(GATEWAY SCIENCE)**  
**Paper 1, B1–B3 and CS7 (PAGs B1–B5)**  
**(Foundation Tier)**  
**TUESDAY 15 MAY 2018: Afternoon**  
**TIME ALLOWED: 1 hour 10 minutes**  
**plus your additional time allowance**  
**MODIFIED ENLARGED 36pt**

<b>First name</b>		<b>Last name</b>	
<b>Centre number</b>			
		<b>Candidate number</b>	

**YOU MUST HAVE:**  
**a ruler (cm/mm)**

**YOU MAY USE:**  
**a scientific or graphical calculator**  
**an HB pencil**

**READ INSTRUCTIONS OVERLEAF**



# **INSTRUCTIONS**

**Use black ink. You may use an HB pencil for graphs and diagrams.**

**Complete the boxes on the front page with your name, centre number and candidate number.**

**Answer ALL the questions.**

**Write your answer to each question in the space provided. Additional paper may be used if required but you must clearly show your candidate number, centre number and question number(s).**

# **INFORMATION**

**The total mark for this paper is 60.**

**The marks for each question are shown in brackets [ ].**

**Quality of extended responses will be assessed in questions marked with an asterisk (\*).**

## **SECTION A**

**Answer ALL the questions.**

**You should spend a maximum of 20 minutes on this section.**

**1 Which substances are used in the synthesis of LIPIDS? [1]**

**A Amino acids and glucose**

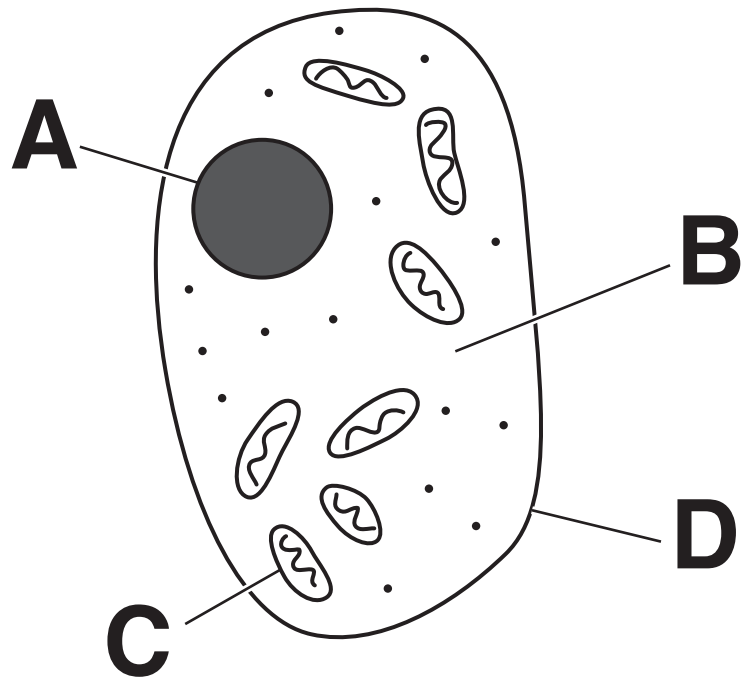
**B Amino acids and glycerol**

**C Fatty acids and glucose**

**D Fatty acids and glycerol**

**Your answer**

**2 The drawing shows some of the structures found in an animal cell.**



**Which labelled structure contains enzymes for cellular respiration? [1]**

**Your answer**

3    **Photosynthesis is a process that occurs in plants.**

	Type of reaction	Substrates	Products
A	Endothermic	Carbon dioxide and water	Oxygen and glucose
B	Exothermic	Carbon dioxide and water	Oxygen and glucose
C	Endothermic	Oxygen and glucose	Carbon dioxide and water
D	Exothermic	Oxygen and glucose	Carbon dioxide and water

**Which row describes photosynthesis? [1]**

Your answer

**4 Which substances are transported in the PHLOEM vessels? [1]**

**A Sucrose only**

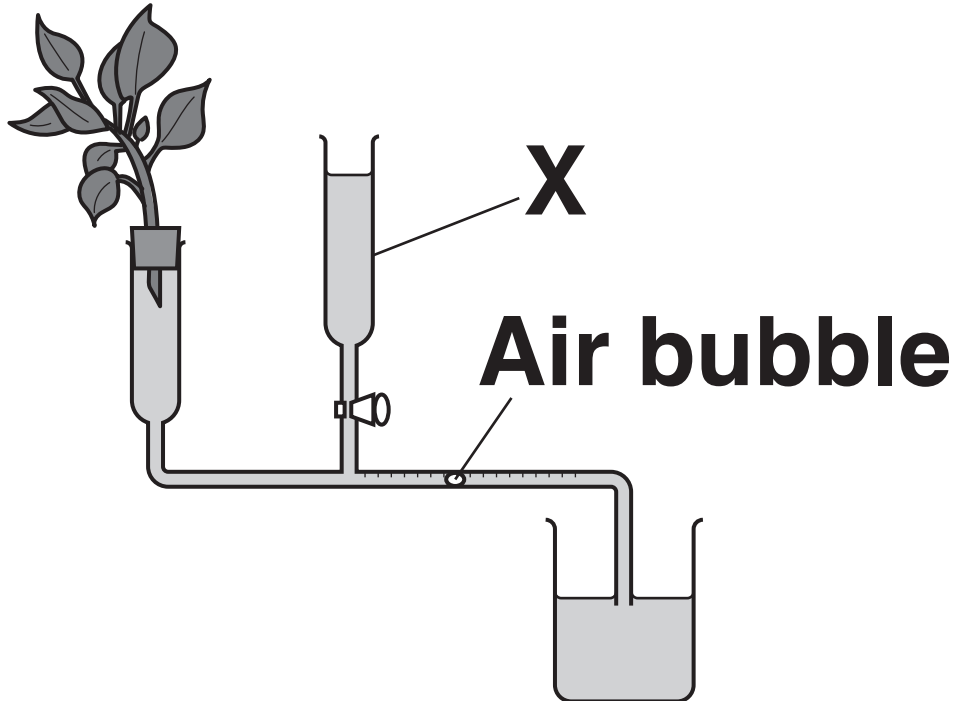
**B Water and mineral ions**

**C Water and sucrose**

**D Water only**

**Your answer**

**5 The diagram shows a potometer.**



**Why is structure X needed? [1]**

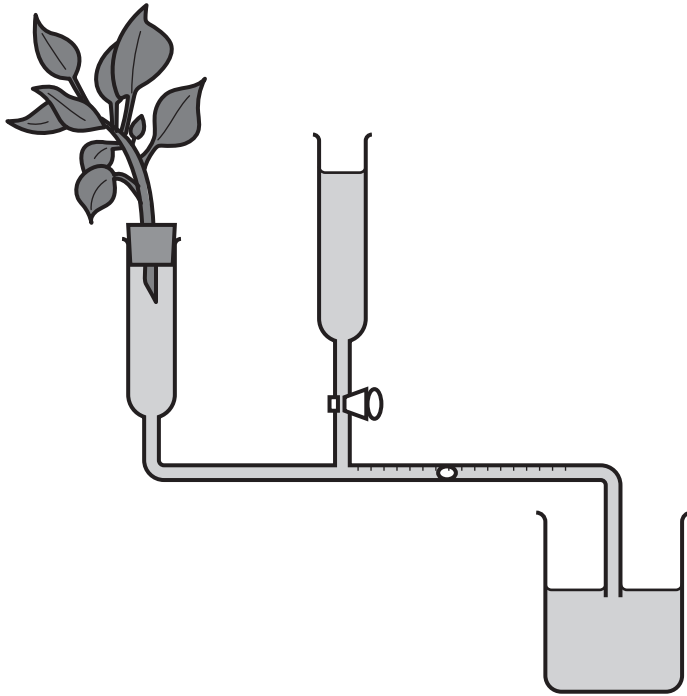
- A Maintains temperature of the apparatus**
- B Provides the plant with mineral ions**
- C Returns the air bubble to its original position**
- D Sucks water up from the beaker**

**Your answer**

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**6 Look at the diagram of a potometer.**



**How can the apparatus be changed to INCREASE the rate of water uptake? [1]**

- A Add more water to the beaker**
- B Place an electric fan next to the apparatus and switch the fan on**
- C Place a plastic bag over the plant**
- D Remove half of the leaves from the plant**

**Your answer**

**7 A student investigates osmosis. They place potato chips in different sugar solutions.**

**The table shows their results.**

<b>Sugar solution</b>	<b>Mass of potato chip (g)</b>	
	<b>At start</b>	<b>After one hour</b>
<b>X</b>	<b>2.0</b>	<b>2.2</b>
<b>Y</b>	<b>2.0</b>	<b>1.9</b>
<b>Z</b>	<b>2.0</b>	<b>1.7</b>

**What is the PERCENTAGE CHANGE in mass for the potato chip in sugar solution Z? [1]**

**A    -7**

**B    -15**

**C    -18**

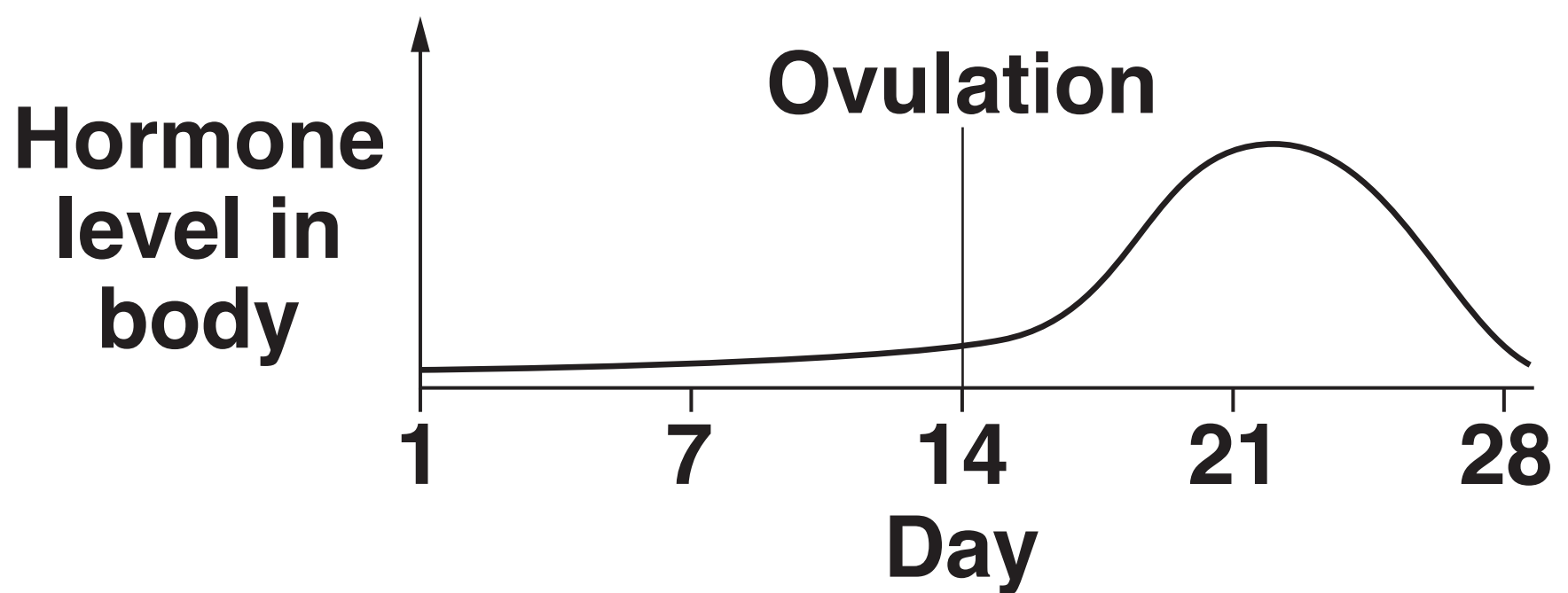
**D    -30**

**Your answer**

## 8 The level of some hormones change during the menstrual cycle.

The graph shows how the level of one hormone changes during the menstrual cycle.

Fertilisation has NOT taken place after ovulation.



**Which hormone is represented in the graph? [1]**

**A FSH**

**B Oestrogen**

**C Progesterone**

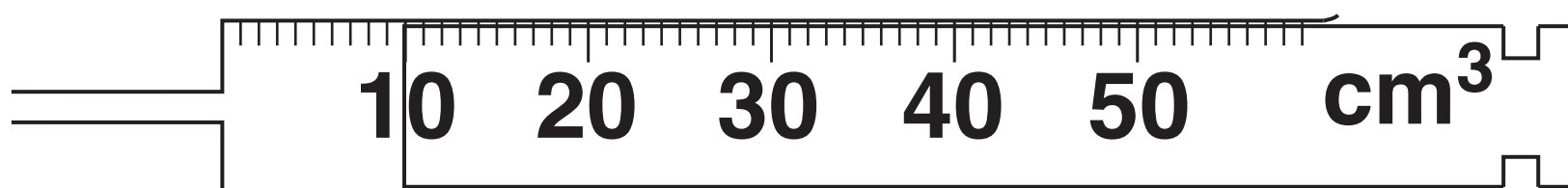
**D Testosterone**

**Your answer**

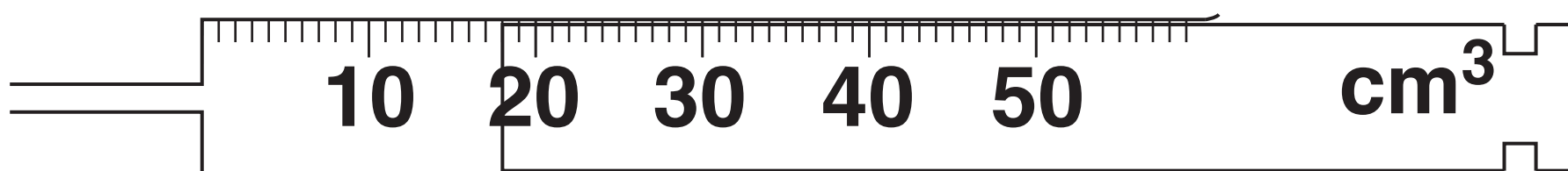
- 9 A student investigates an enzyme controlled reaction. She collects the gas produced during the reaction in a gas syringe.**

**The diagrams show the amount of gas in the gas syringe at the START and after FIVE MINUTES.**

**Volume of gas at start**



**Volume of gas after five minutes**



**What is the rate of the reaction? [1]**

**A     $0.625\text{ cm}^3/\text{min}$**

**B     $1.6\text{ cm}^3/\text{min}$**

**C     $3.6\text{ cm}^3/\text{min}$**

**D     $8\text{ cm}^3/\text{min}$**

**Your answer**

**10 Which of these carbohydrates is a POLYMER? [1]**

**A Glucose**

**B Maltose**

**C Starch**

**D Sucrose**

**Your answer**



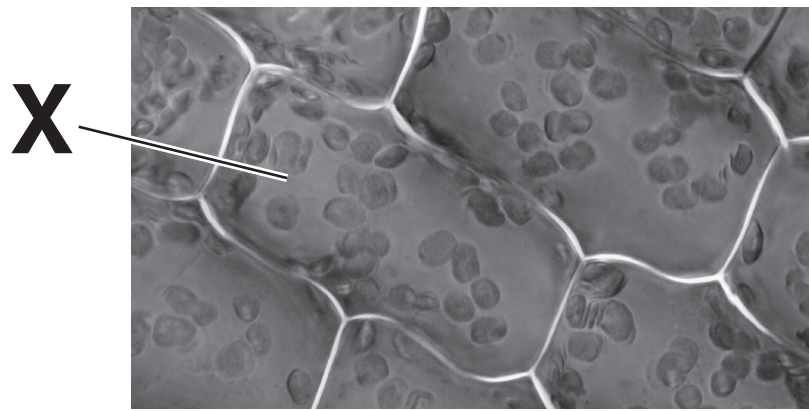
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## SECTION B

**Answer ALL the questions.**

**11 The picture shows plant cells as seen using a light microscope.**

**Fig. 11.1**



**(a) Draw a large labelled diagram of cell X. Use the space below. [3]**

**(b) The plant cells shown in Fig. 11.1 are NOT root cells.**

**Explain how you can tell this from the picture.**

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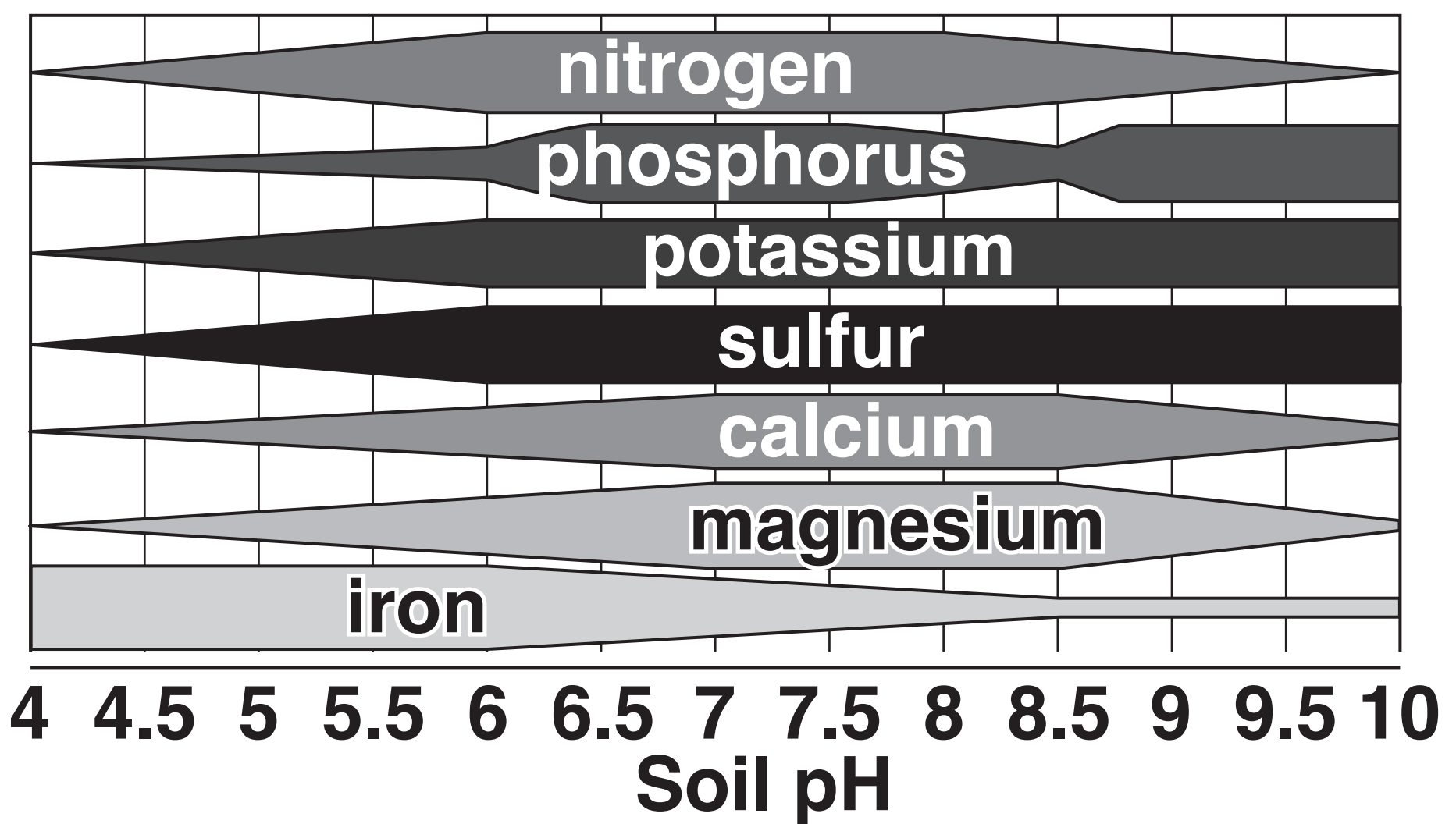
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[2]

**(c) Plants take mineral ions from the soil. The availability of mineral ions for plants growing in soil is affected by the pH of the soil.**

**The chart shows the availability of mineral ions in soils of different pH. The thicker the bar, the more available the mineral ion.**



- (i) A plant is growing in a soil of pH 4.**

**Which mineral ion will be MOST available to the plant?**

\_\_\_\_\_ **[1]**

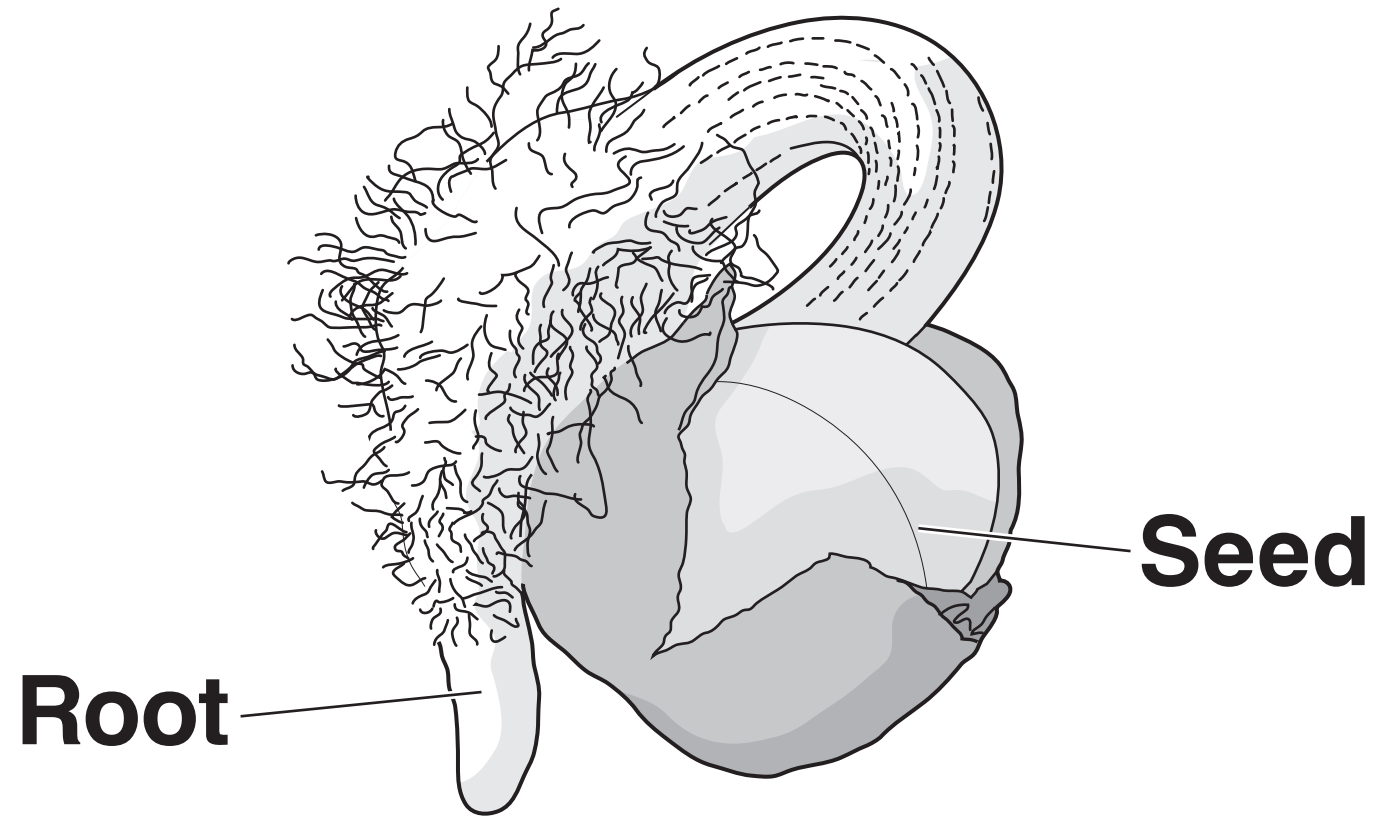
- (ii) Magnesium is required by plants for photosynthesis.**

**Growing plants in VERY alkaline soils may result in less biomass.**

**Use the chart to explain why.**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ **[2]**

- (iii) The picture shows a root growing from a seed.



**Explain how the structures seen on the root help with the uptake of minerals.**

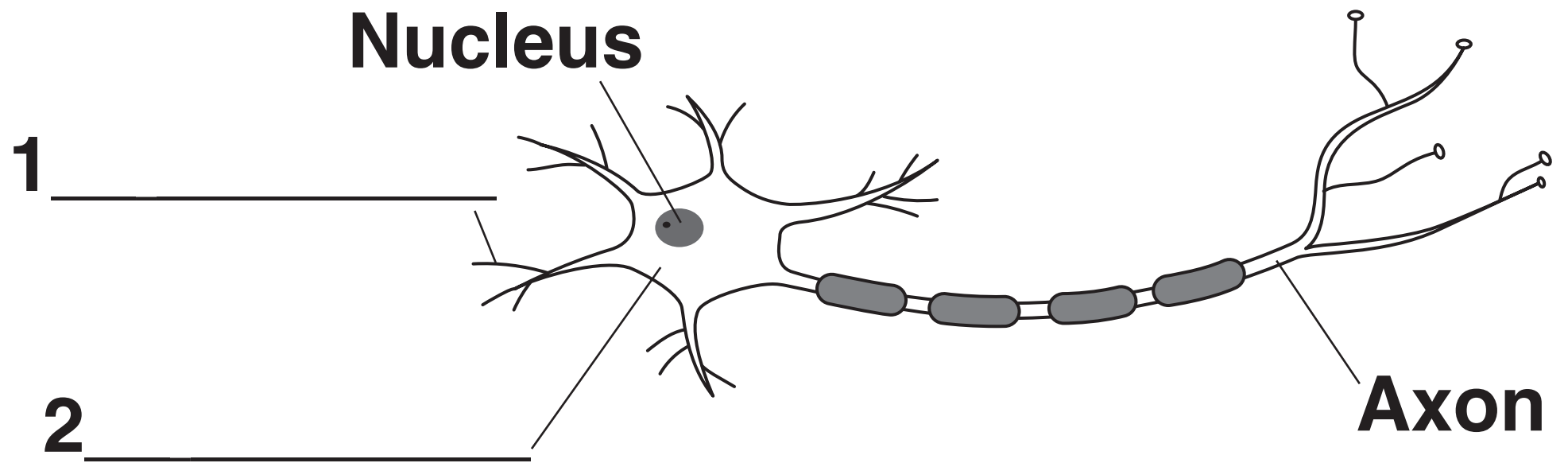
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[2]

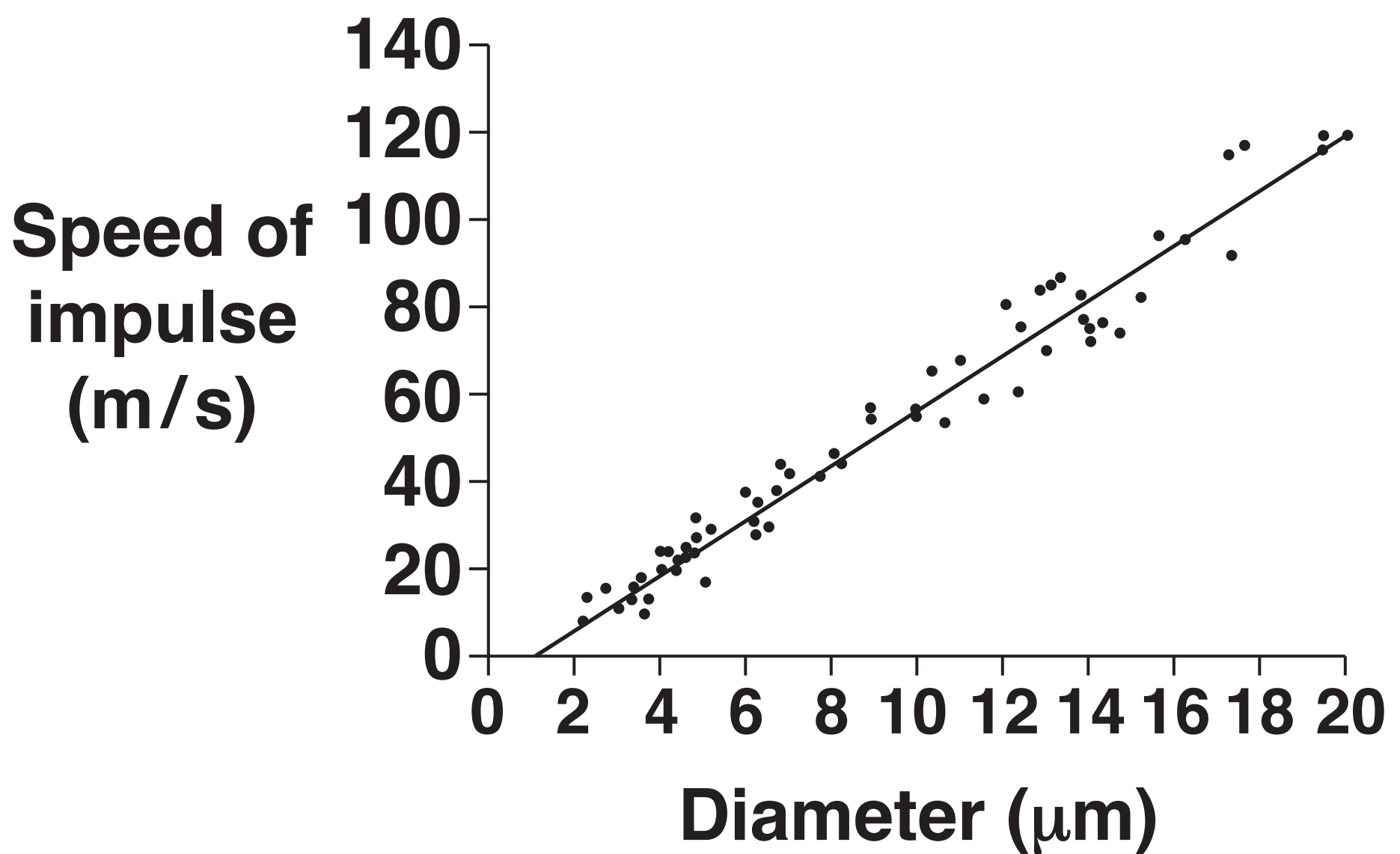
**12 (a) The diagram shows a motor neurone.**



**Label 1 and 2 on the diagram. [2]**

**(b) Nerve impulses can travel along axons at different speeds.**

**The graph shows the relationship between the speed of a nerve impulse and the diameter of the axon.**



**(i) Describe the relationship between diameter and speed of impulse.**

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**[1]**



**(ii) The data was measured as part of an investigation by a scientist. The scientist made this statement.**

**‘The data collected is mostly precise.’**

**What evidence is there in the graph to support this statement?**

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**[1]**

### 13 The table compares type 1 and type 2 diabetes.

	Type 1	Type 2
Usual age of onset		Adult
Development of symptoms	Very quick	May appear over several months
Percentage of diabetic population	About 10%	About 90%
Linked to obesity	Rare	Common
Cause	Beta cells ( $\beta$ cells) destroyed so no insulin production	Body cells may not react to insulin or not enough insulin is produced

**(a) State the usual age of onset for TYPE 1 diabetes. [1]**

**Write your answer in the table.**

**(b) Which organ in the body contains beta cells ( $\beta$  cells)?**

\_\_\_\_\_ **[1]**

**(c) Write about the different treatments for the TWO types of diabetes.**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ **[3]**

**14 Amino acids are found in the food we eat. Different diets will contain different amounts of amino acids.**

**The table shows some of the amino acids we need in our diet. It also shows the mean daily intake of one adult male and the recommended daily allowance (RDA) for the same man.**

<b>Amino acid</b>	<b>Mean intake (g/day)</b>	<b>RDA (g/day)</b>
<b>Histidine</b>	<b>1.5</b>	<b>0.9</b>
<b>Leucine</b>	<b>3.9</b>	<b>2.8</b>
<b>Lysine</b>	<b>2.2</b>	<b>2.5</b>
<b>Threonine</b>	<b>2.3</b>	<b>1.3</b>
<b>Valine</b>	<b>2.8</b>	<b>1.6</b>

**(a) Which amino acid has the LOWEST RDA?**

\_\_\_\_\_ **[1]**

- (b) (i) Calculate the mean intake as a percentage of the RDA for LYSINE.**

**Answer = \_\_\_\_\_ % [2]**

- (ii) Explain why this man's intake of LYSINE may affect his health.**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ **[2]**

# **15 Two students investigate the effect of temperature on respiration in yeast.**

**This is what they do:**

**Put some yeast and sugar solution into a boiling tube**

**Put the boiling tube into a water bath at 10 °C**

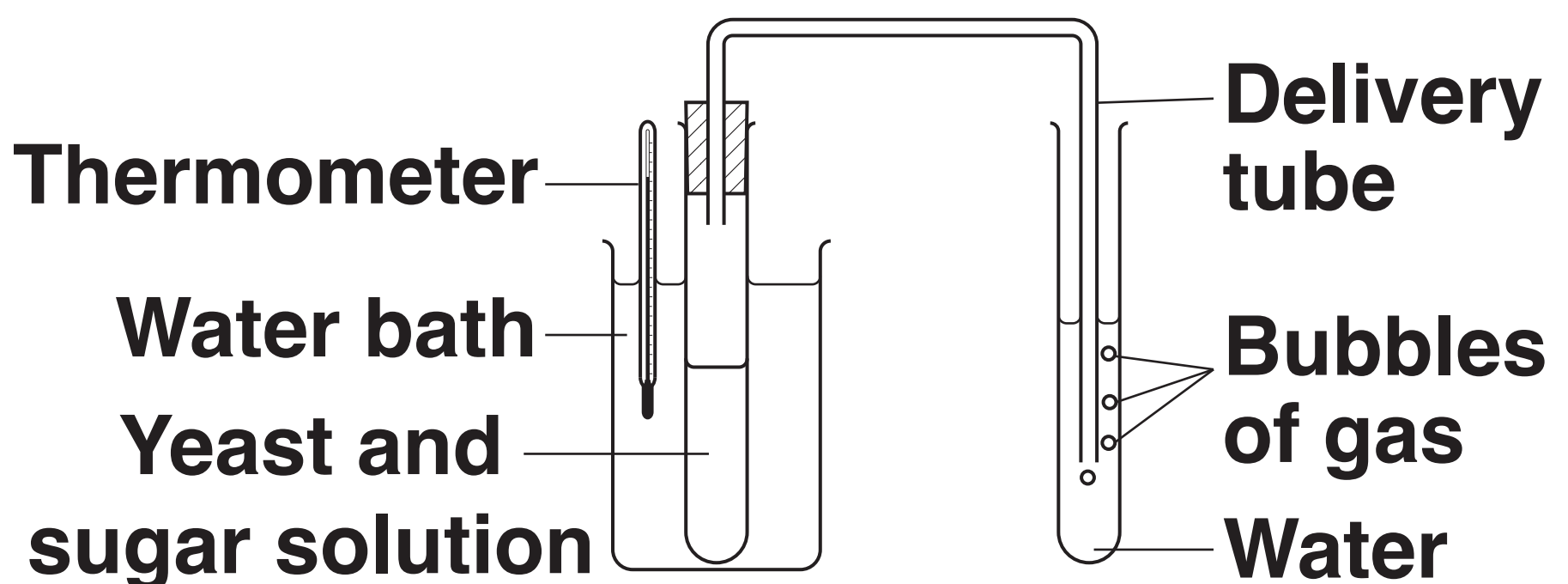
**Connect the boiling tube to a delivery tube**

**Put the other end of the delivery tube into a boiling tube filled with water**

**Count the number of gas bubbles released in one minute**

**Warm the water bath to 20 °C and count the bubbles again for one minute**

**Repeat the last step until they have results for five different temperatures.**



**(a) Which gas makes the bubbles?**

\_\_\_\_\_ **[1]**

**(b)\* The students think they could improve their method.**

**They will count the bubbles three times at each temperature. This would show up any anomalous results.**

**Describe other ways they could improve their method to obtain more **PRECISE** and **REPEATABLE** results.**

**For each improvement explain why it is needed. [6]**

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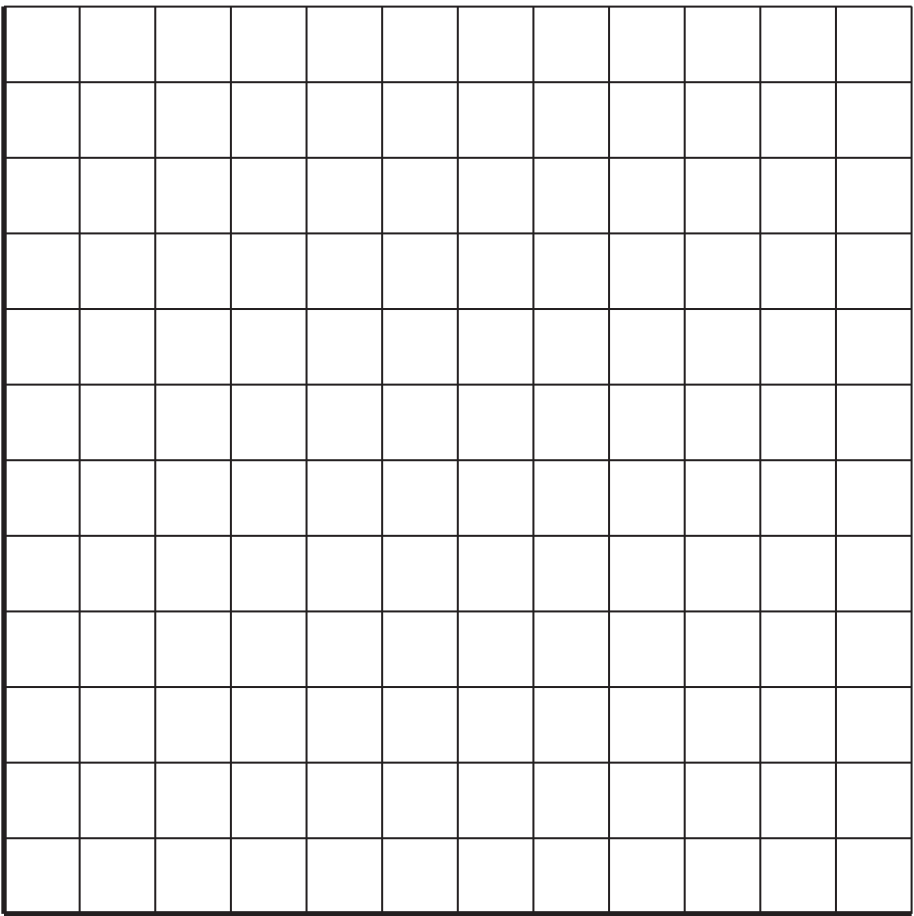
- (c) The students count the bubbles three times at each temperature. They then calculate the mean number of bubbles at each temperature.**

**The table shows their results.**

<b>Temperature (°C)</b>	<b>Mean number of bubbles per minute</b>
<b>10</b>	<b>3</b>
<b>20</b>	<b>6</b>
<b>30</b>	<b>11</b>
<b>40</b>	<b>5</b>
<b>50</b>	<b>2</b>
<b>60</b>	<b>1</b>

**(i) Plot the results on the grid. [2]**

**Mean number  
of bubbles  
per minute**



**Temperature (°C)**

**(ii) Draw a line of best fit. [1]**

**(d) Respiration is an enzyme controlled reaction.**

**Use ideas about enzymes to explain the pattern in the results.**

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[4]

## 16 This question is about circulatory systems.

- (a) The picture shows three different blood vessels X, Y and Z, seen using a light microscope.



- (i) Compare blood vessels X and Z and describe the differences that can be SEEN in the picture.

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[2]

**(ii) Blood vessel Y is a capillary.  
Explain how the structure of  
a capillary is adapted to its  
function.**

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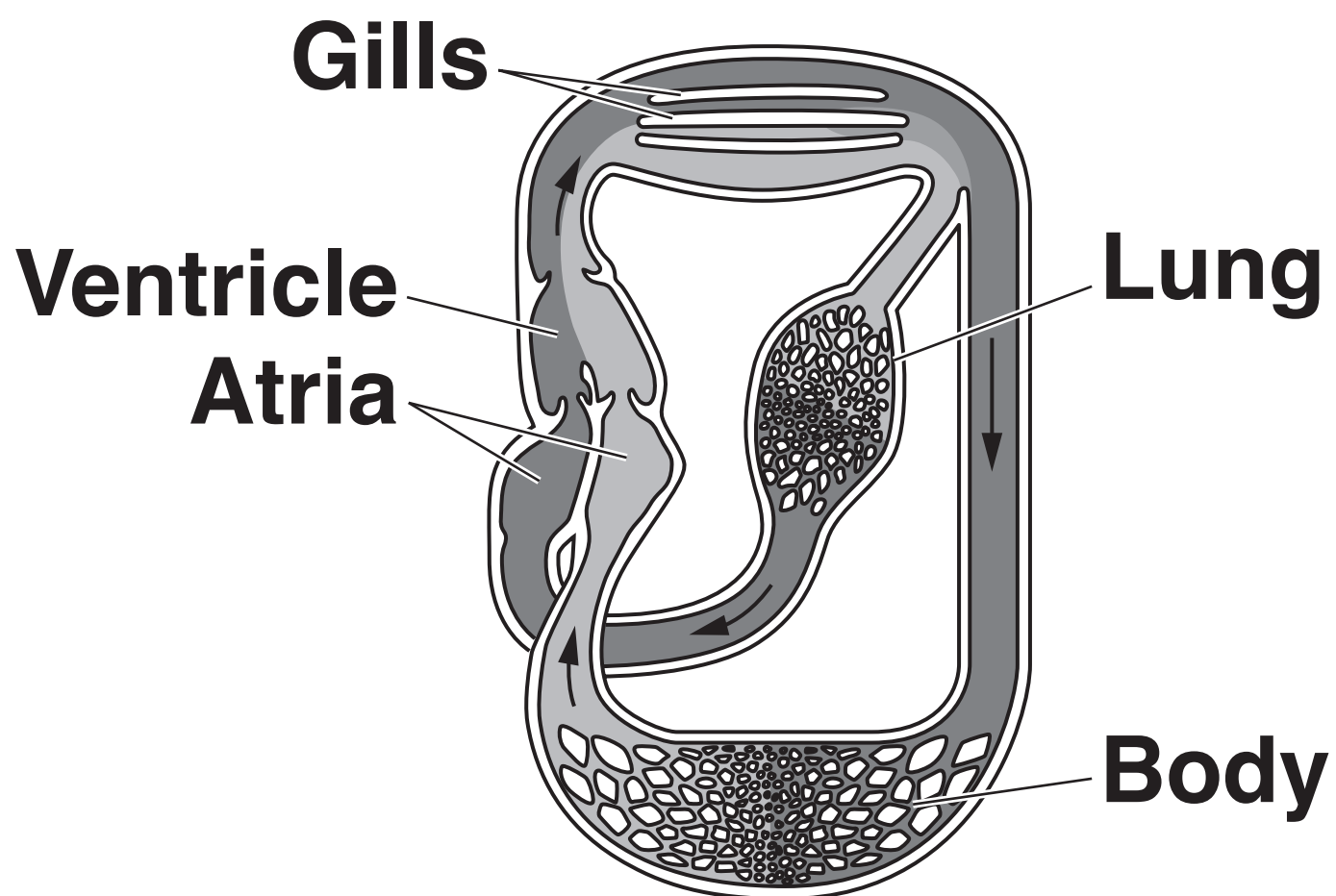
**[2]**

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**(b) Lungfish are fish that have both gills and a lung.**

**When in water, the blood flows through the gills. When on land, blood flow to the gills is stopped and the blood enters the lung instead.**

**The diagram shows the circulatory system of a lungfish.**





**The lungfish circulatory system is different to that of humans.**

**Blood in the lungfish can flow through gills and lungs, humans only have lungs.**

- (i) Write down one OTHER way the STRUCTURE of the lungfish circulatory system is different to that of humans.**

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**[1]**

**(ii) When lungfish and humans are on land, the human circulatory system is more efficient than that of lungfish.**

**Suggest why the human circulatory system is more efficient.**

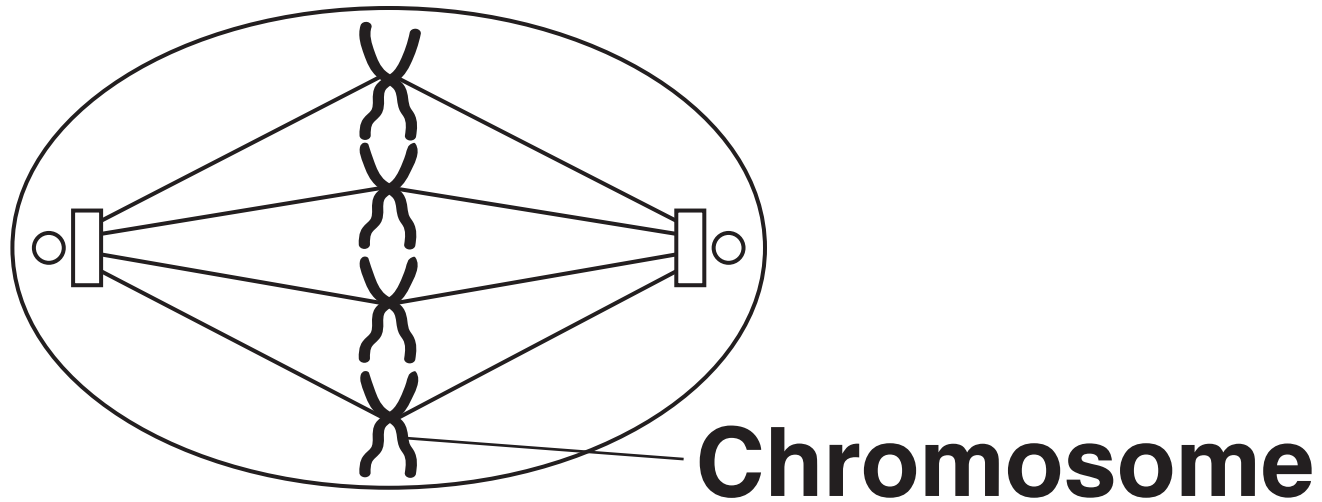
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**[2]**

**17 (a) The diagram shows a cell during one stage of MITOSIS.**



**(i) Describe TWO things that happen to the chromosomes in the next stage of mitosis.**

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**[2]**

**(ii) Chromosomes are made of DNA.**

**Describe the structure of DNA.**

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[2]

**(b) After mitosis, cell differentiation takes place.**

**What is meant by the term CELL DIFFERENTIATION?**

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[1]

**END OF QUESTION PAPER**

## ADDITIONAL ANSWER SPACE

**If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margin(s).**

This image shows a blank sheet of white paper with horizontal ruling lines. A single vertical line runs down the left side, creating a narrow margin. There are ten horizontal lines spaced evenly across the page, starting from the top margin and ending at the bottom edge. The lines are thin and black.








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