

Paper Reference(s)    **4SS0/1B**

Pearson Edexcel International GCSE (9–1)

**Biology**

**Unit: 4SS0**

**Science (Single Award)**

**Paper: 1B**

**Friday 7 June 2019 – Afternoon**

**Time: 1 hour 10 minutes plus your additional time allowance**

**INSTRUCTIONS TO CANDIDATES**

**Write your centre number, candidate number, surname, other names and your signature in the boxes below. Check that you have the correct question paper.**

<b>Centre No.</b>					
<b>Candidate No.</b>					
<b>Surname</b>					
<b>Other names</b>					
<b>Signature</b>					
<b>Paper Reference</b>	<b>4</b>	<b>S</b>	<b>S</b>	<b>0</b>	<b>/ 1 B</b>

- Use **BLACK** ink or ball-point pen.
- Answer **ALL** questions.
- Answer the questions in the spaces provided – there may be more space than you need.
- Show all the steps in any calculations and state the units.
- Some questions must be answered with a cross in a box ☐. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☐.

## **MATERIALS REQUIRED FOR EXAMINATION**

**Ruler, calculator**

## **ITEMS INCLUDED WITH QUESTION PAPERS**

**Nil**

## **INFORMATION FOR CANDIDATES**

- The total mark for this paper is 60.
- The marks for **EACH** question are shown in brackets – use this as a guide as to how much time to spend on each question.

## **ADVICE TO CANDIDATES**

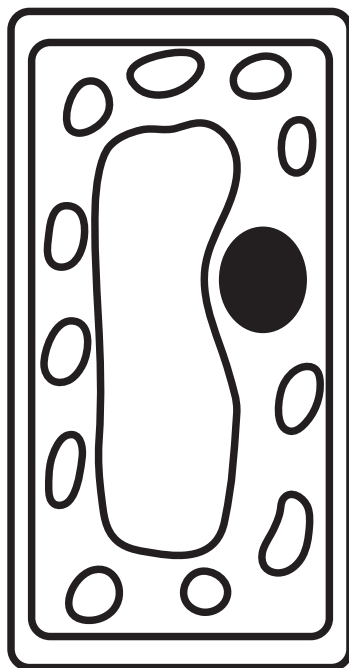
- Read each question carefully before you start to answer it.
- Write your answers neatly and in good English.
- Try to answer every question.
- Check your answers if you have time at the end.

**(Turn over)**

**Answer ALL questions.**

**1 Plant cells contain organelles.**

**The diagram shows a plant cell containing some organelles.**



**(a) (i) What is the total number of organelles shown in the diagram that absorb light? (1 mark)**

☐ **A 1**

☐ **B 6**

☐ **C 11**

☐ **D 12**

**(Question continues on next page)**

**(Turn over)**

- (ii) Name an organelle NOT shown in the diagram that makes ATP. (1 mark)
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- (b) The magnification of the cell is calculated using this formula.

$$\text{magnification} = \frac{\text{width of cell in diagram}}{\text{actual width of cell}}$$

The actual width of the cell is 40  $\mu\text{m}$ .

The magnification of the plant cell is (1 mark)

☐ A  $\times 0.06$

☐ B  $\times 0.6$

☐ C  $\times 6$

☐ D  $\times 600$

(Question continues on next page)

(Turn over)

- (c) (i) Name an organelle found in a plant cell but not found in an animal cell. (1 mark)**
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- (ii) The location of the genetic material in a bacterium is different from the location of the genetic material in a plant cell.**

**Give a location in a bacterium where genetic material is found. (1 mark)**

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**(TOTAL FOR QUESTION 1 = 5 MARKS)**

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**(Questions continue on next page)**

**2 Enzymes are involved in many processes.**

**(a) The table gives some information about different enzymes.**

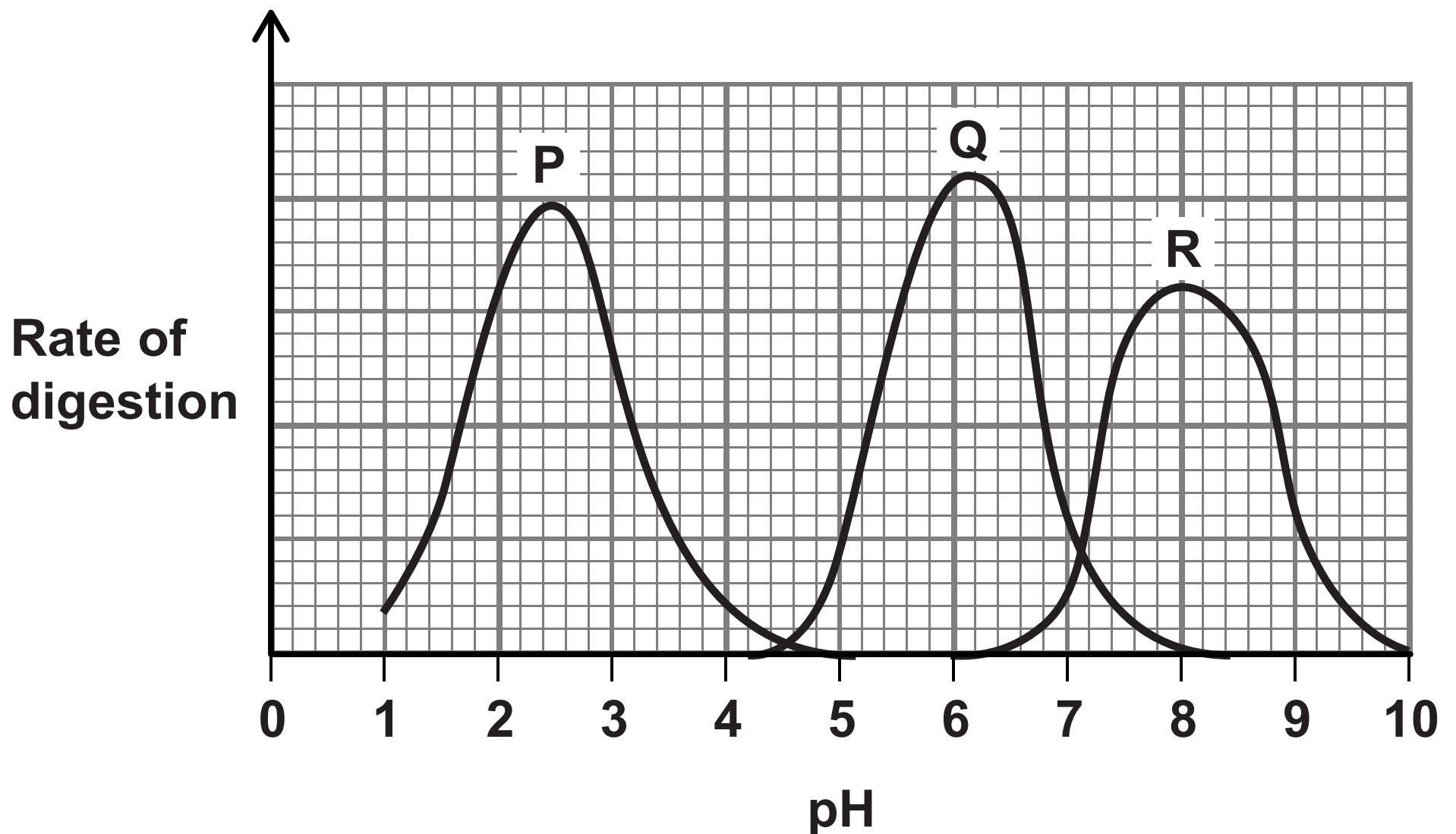
**Complete the table by giving the missing information. (4 marks)**

<b>Enzyme</b>	<b>Function</b>	<b>Name of process</b>
	<b>breakdown of protein into amino acids</b>	
<b>maltase</b>		<b>digestion</b>
	<b>to cut DNA</b>	<b>genetic modification</b>

**(Question continues on next page)**

**(Turn over)**

- (b) The graph shows how pH affects the rate of digestion for reactions involving three enzymes found in the digestive system.



- (i) One of these three enzymes is found in the mouth.

Which is the optimum pH for this enzyme shown on the graph? (1 mark)

- ☐ A 1.0
- ☐ B 2.5
- ☐ C 6.2
- ☐ D 10.0

**(ii) Explain the difference in the rate of digestion by enzyme P at pH 1·0 and pH 2·5 (2 marks)**

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**(TOTAL FOR QUESTION 2 = 7 MARKS)**

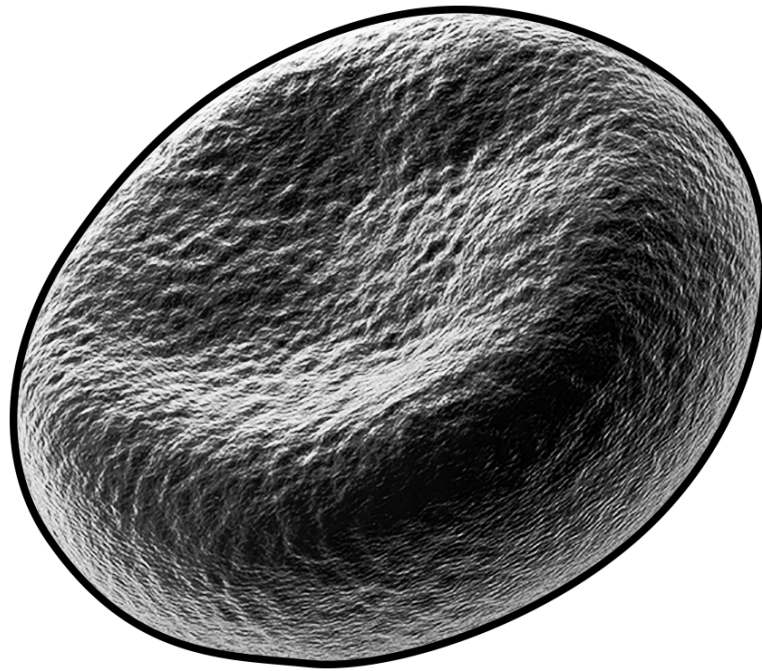
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**(Turn over)**



**3 The diagram shows the appearance of a red blood cell.**



**(a) Describe how the structure of this cell is different from the structure of a white blood cell. (3 marks)**

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**(Question continues on next page)**

**(Turn over)**

**(b) A student investigates the effect of different solutions on red blood cells.**

**He places one drop of blood into each of three test tubes, A, B and C.**

- **test tube A contains water**
- **test tube B contains a dilute salt solution with the same concentration as plasma**
- **test tube C contains a concentrated salt solution**

**After five minutes, the student places samples from each test tube on separate microscope slides.**

**He places each slide under a microscope and counts the number of red blood cells in each sample.**

**The table shows his results.**

<b>Test tube</b>	<b>Number of red blood cells</b>
<b>A</b>	<b>0</b>
<b>B</b>	<b>450</b>
<b>C</b>	<b>450</b>

**(Question continues on next page)**

**(Turn over)**

- (i) Explain why the student does not see any cells in the sample from tube A. (2 marks)

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(Question continues on next page)

- (ii) Draw the appearance of a red blood cell as seen in the sample from tube C. (1 mark)

(Question continues on next page)

- (c) A person has  $5 \times 10^6$  red blood cells in  $1 \text{ mm}^3$  of blood.

The volume of blood in this person is  $4 \text{ dm}^3$  (litres).

Calculate the total number of red blood cells in this person's blood. (2 marks)

total number = \_\_\_\_\_

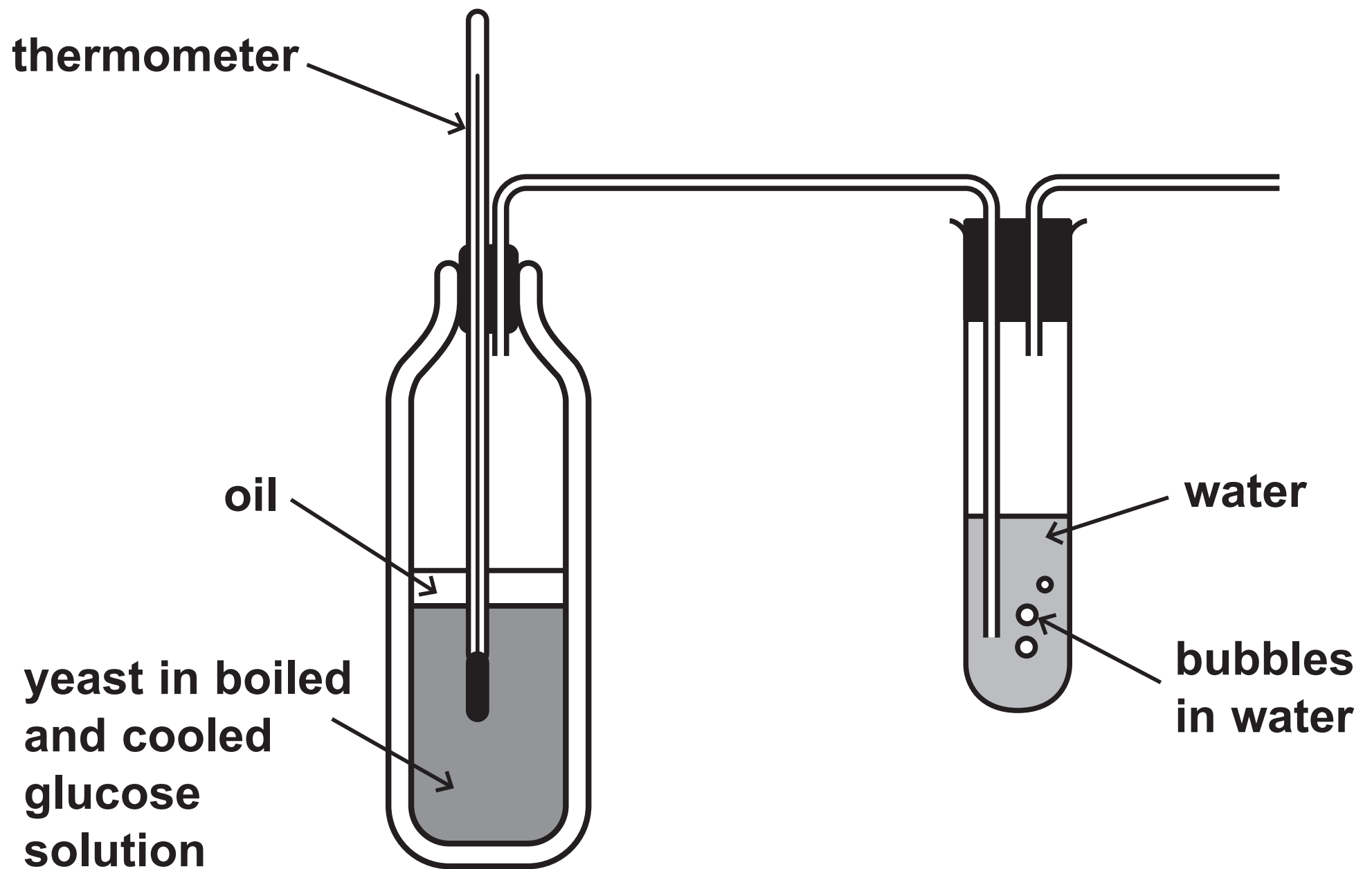
(TOTAL FOR QUESTION 3 = 8 MARKS)

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(Turn over)

- 4 A student uses this apparatus to investigate anaerobic respiration by yeast.



- (a) Explain why the student boils and cools the glucose solution before the yeast is added.  
(2 marks)

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(Continue your answer on next page)

(Turn over)

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**(Question continues on next page)**

- (b) The student measures the rate of anaerobic respiration by counting the number of bubbles produced per minute.

Explain how she could modify her apparatus to obtain a more accurate measurement of the rate of anaerobic respiration. (2 marks)

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(Turn over)



- (c) (i) The student wants to compare the rate of anaerobic respiration with the rate of aerobic respiration by yeast.**

**How should the student modify the apparatus in order to measure the rate of aerobic respiration? (1 mark)**

- ☐ **A    remove liquid oil to allow oxygen diffusion**
- ☐ **B    remove liquid oil to allow carbon dioxide diffusion**
- ☐ **C    add more liquid oil to prevent oxygen diffusion**
- ☐ **D    add more liquid oil to prevent carbon dioxide diffusion**

**(Question continues on next page)**

- (ii) The student found that more bubbles were produced during aerobic respiration than during anaerobic respiration.

Sketch a bar chart to show these results.  
(2 marks)

(TOTAL FOR QUESTION 4 = 7 MARKS)

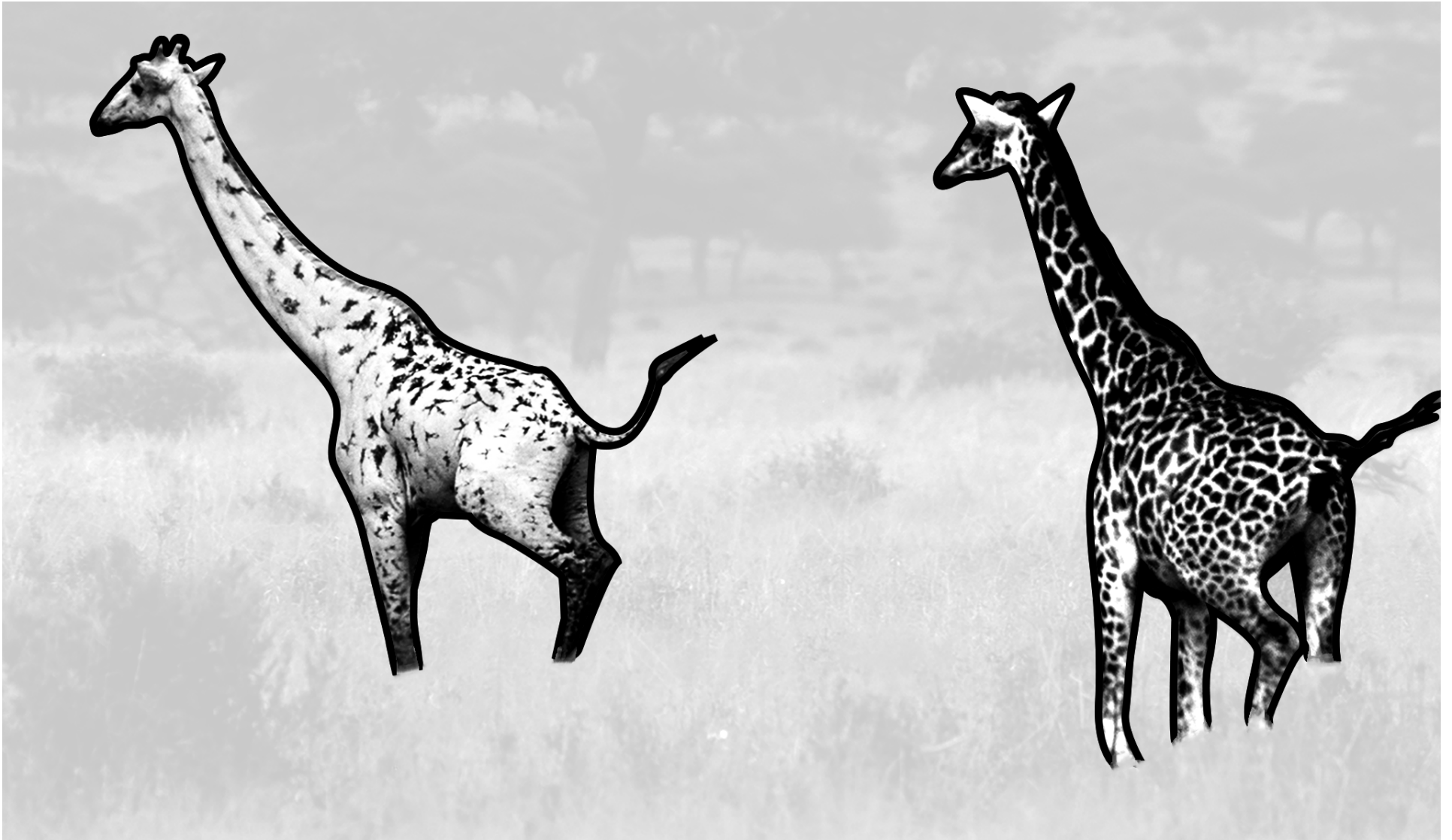
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- 5 The photograph shows a giraffe with normal coat colour and an albino giraffe.**

**Albino giraffes have less pigment in their fur.**



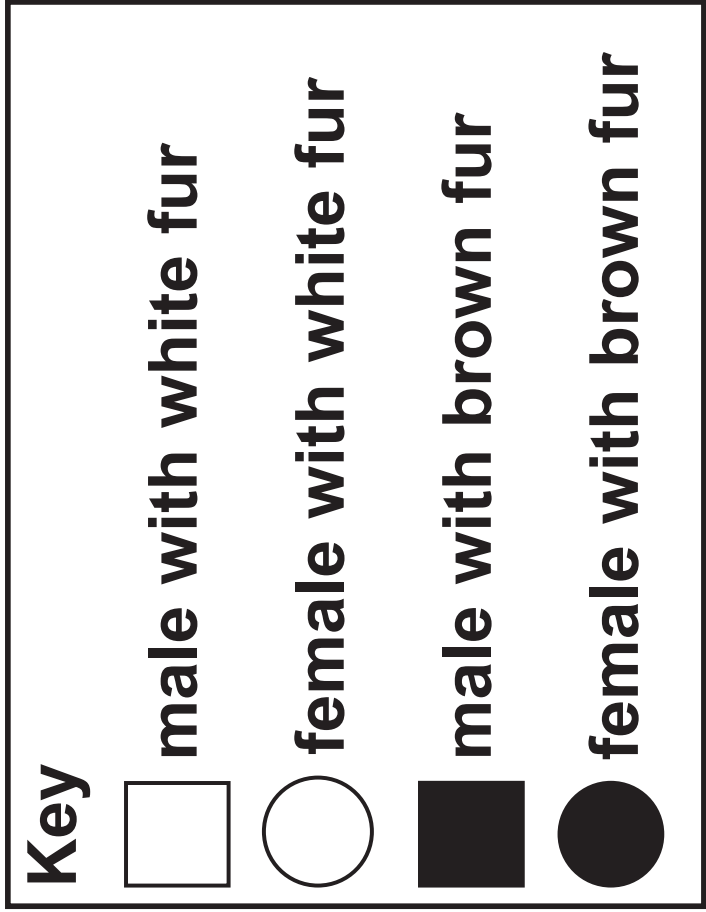
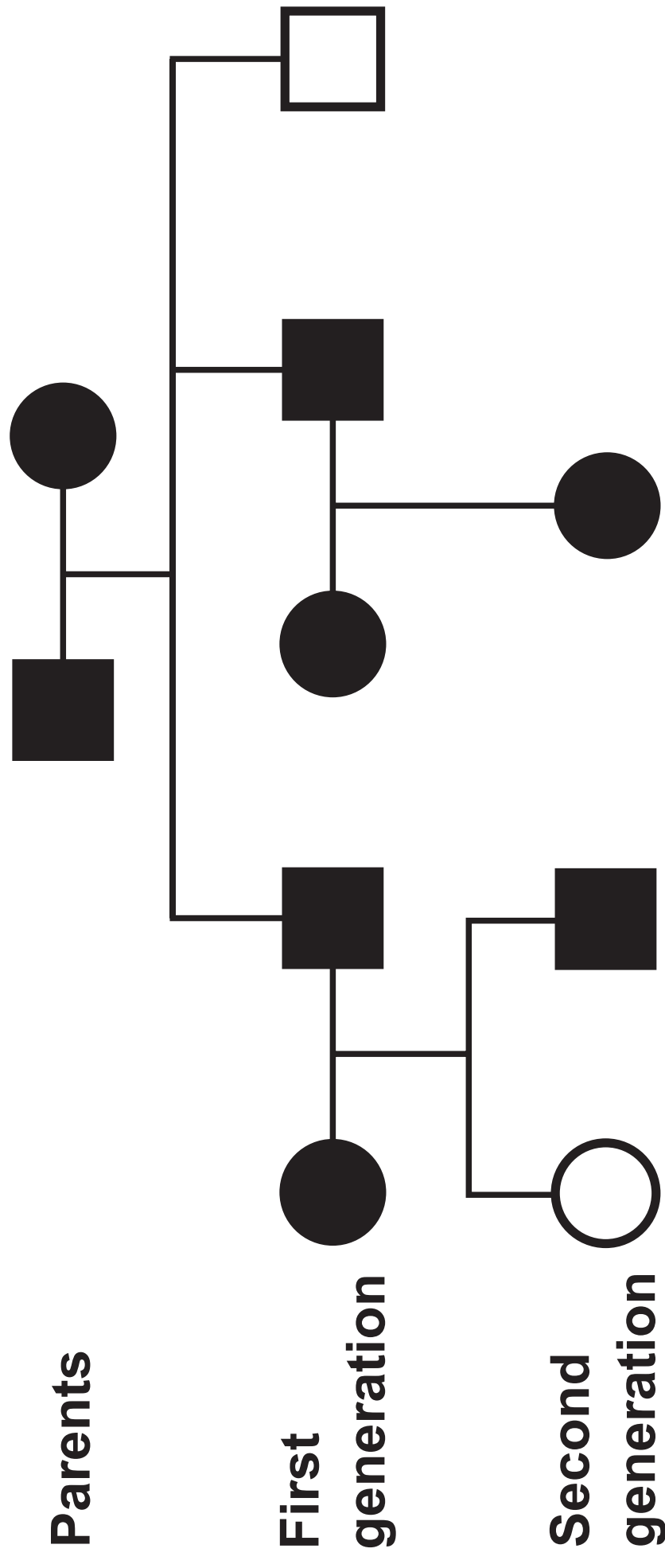
**The fur colour in giraffes is controlled by a gene with two alleles.**

**The allele (B) for brown fur is dominant to the allele (b) for white fur.**

**(Question continues on next page)**

**(Turn over)**

The diagram shows the inheritance of fur colour in a family of giraffes.



(Question continues on next page)

(Turn over)

- (a) (i) Use information from the diagram to deduce the genotype of each parent. (2 marks)**

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- (ii) State the maximum number of giraffes in this family that could be homozygous dominant. (1 mark)**

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**(Question continues on next page)**

**(b) Two heterozygous giraffes have one offspring.**

**Determine the probability that this offspring is male and has white fur. (1 mark)**

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**(c) Explain why there are only a few giraffes with white fur in the wild. (4 marks)**

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**(Continue your answer on next page)**

**(Turn over)**

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**(TOTAL FOR QUESTION 5 = 8 MARKS)**

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**(Questions continue on next page)**

**6 Many farmers keep their chickens in sheds.**

**They claim that their chickens grow larger when kept in sheds rather than outside in fields.**

**(a) Design an investigation to test this claim.**

**Your answer should include experimental details and be written in full sentences. (6 marks)**

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**(Turn over)**

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**(b) Which of these is used to test for protein in chicken meat? (1 mark)**

☐ **A Benedict's reagent**

☐ **B biuret reagent**

☐ **C ethanol**

☐ **D iodine**

**(Question continues on next page)**

**(Turn over)**

**(c) Suggest why the respiration rate of a small chicken is higher than the respiration rate of a large chicken. (4 marks)**

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**(Continue your answer on next page)**

**(Turn over)**

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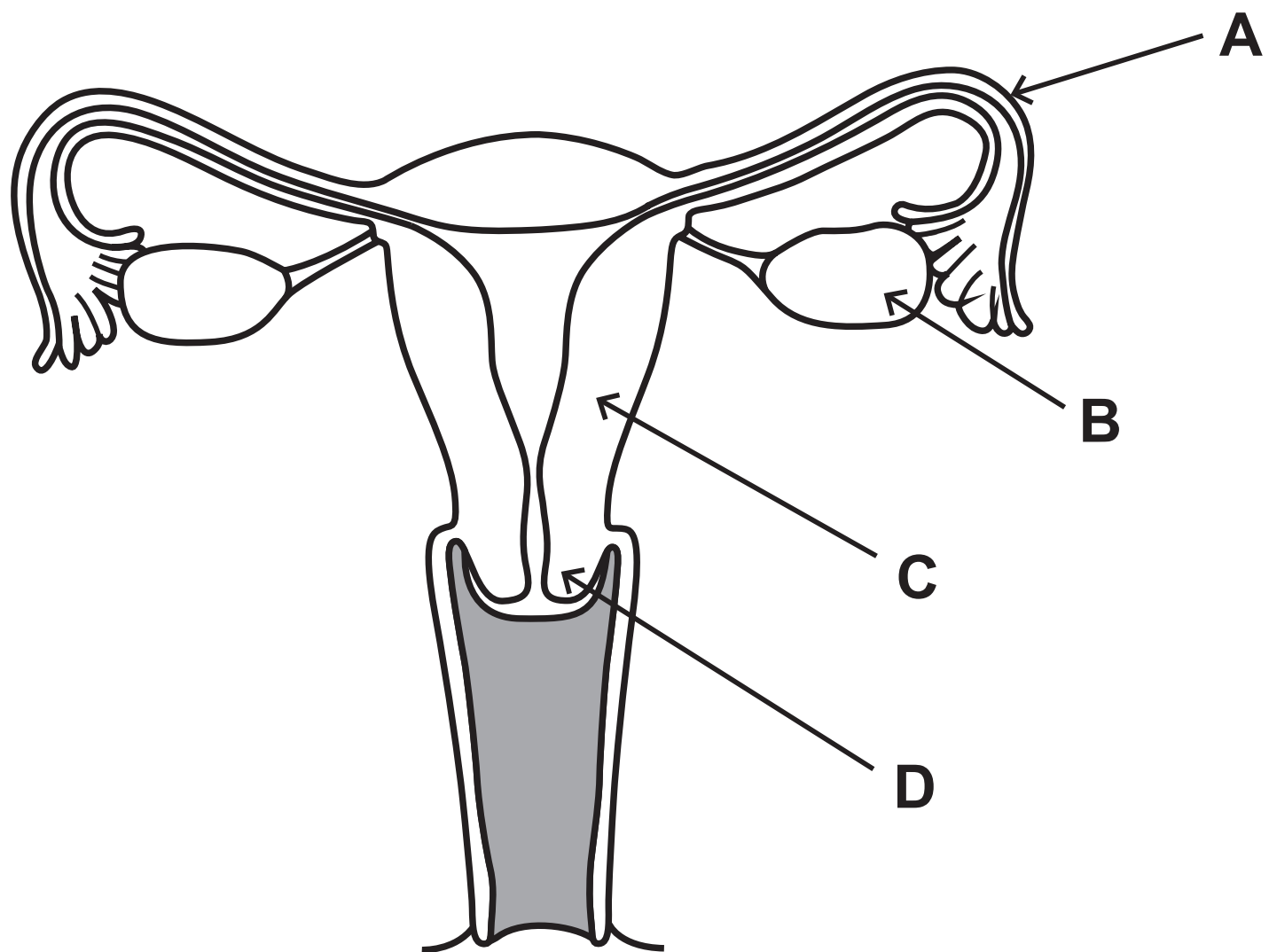
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**(TOTAL FOR QUESTION 6 = 11 MARKS)**

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**(Questions continue on next page)**

7 The diagram shows the female reproductive system.



(a) (i) Give the letter that shows where oestrogen is produced. (1 mark)

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(ii) Give one role of oestrogen. (1 mark)

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(Question continues on next page)

(Turn over)

**(b) When an egg is released it can be fertilised by a sperm.**

**(i) Name the cell produced when an egg is fertilised. (1 mark)**

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**(ii) A sperm travels a distance of 14 cm to fertilise an egg.**

**This sperm travels at a speed of 3.0 mm per minute.**

**Calculate the time taken for this sperm to travel to the egg.**

**Give your answer in minutes. (2 marks)**

**time = \_\_\_\_\_ minutes**

**(TOTAL FOR QUESTION 7 = 5 MARKS)**

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**(Questions continue on next page)**

**(Turn over)**

**8 (a) Fish do not have lungs. They use gills for gas exchange.**

**Fish gills have similar adaptations to the alveoli in lungs.**

**Suggest how fish gills are adapted for gas exchange. (3 marks)**

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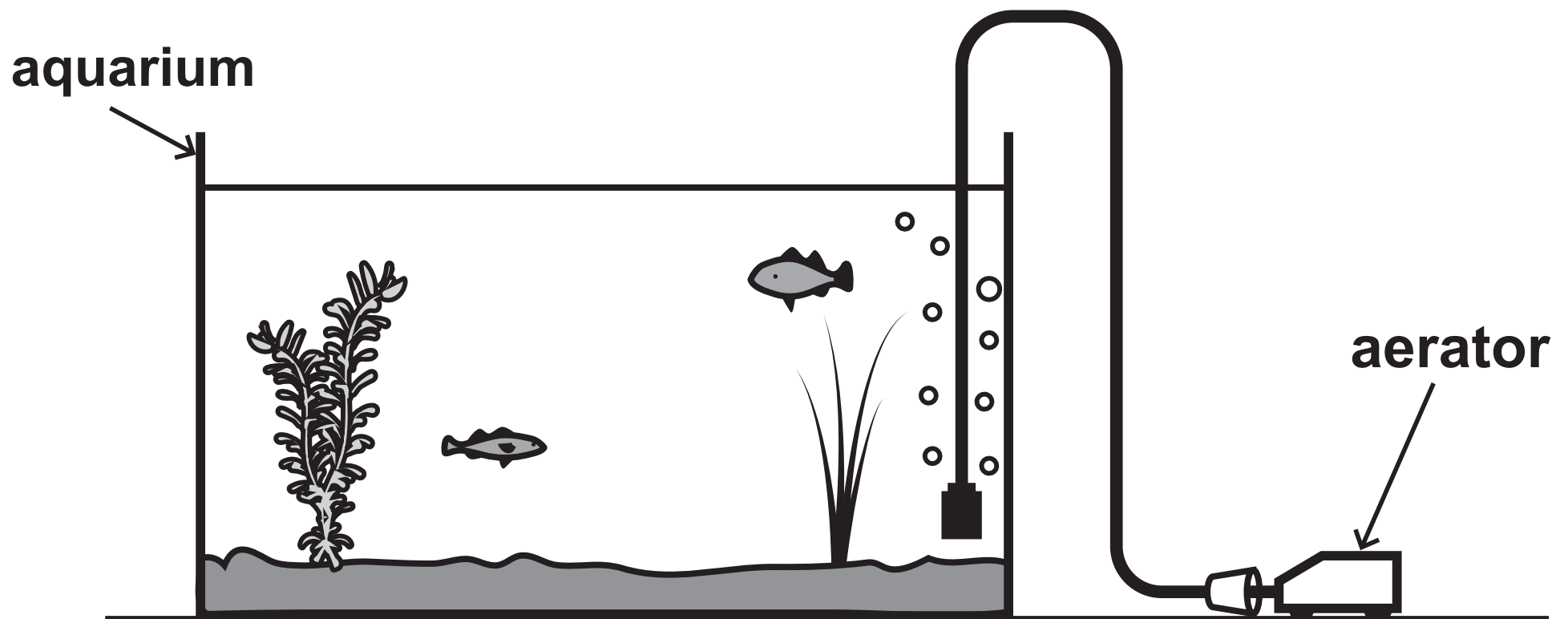
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- (b) A person keeps small fish in a glass container called an aquarium.

The diagram shows an aquarium.



He follows these steps to try and keep his fish healthy.

- place the aquarium near a window
- use the aerator for one hour each day
- set the aerator to pump large bubbles of air rather than small bubbles
- feed the fish several times a day with large amounts of food
- change the water in the aquarium every four days

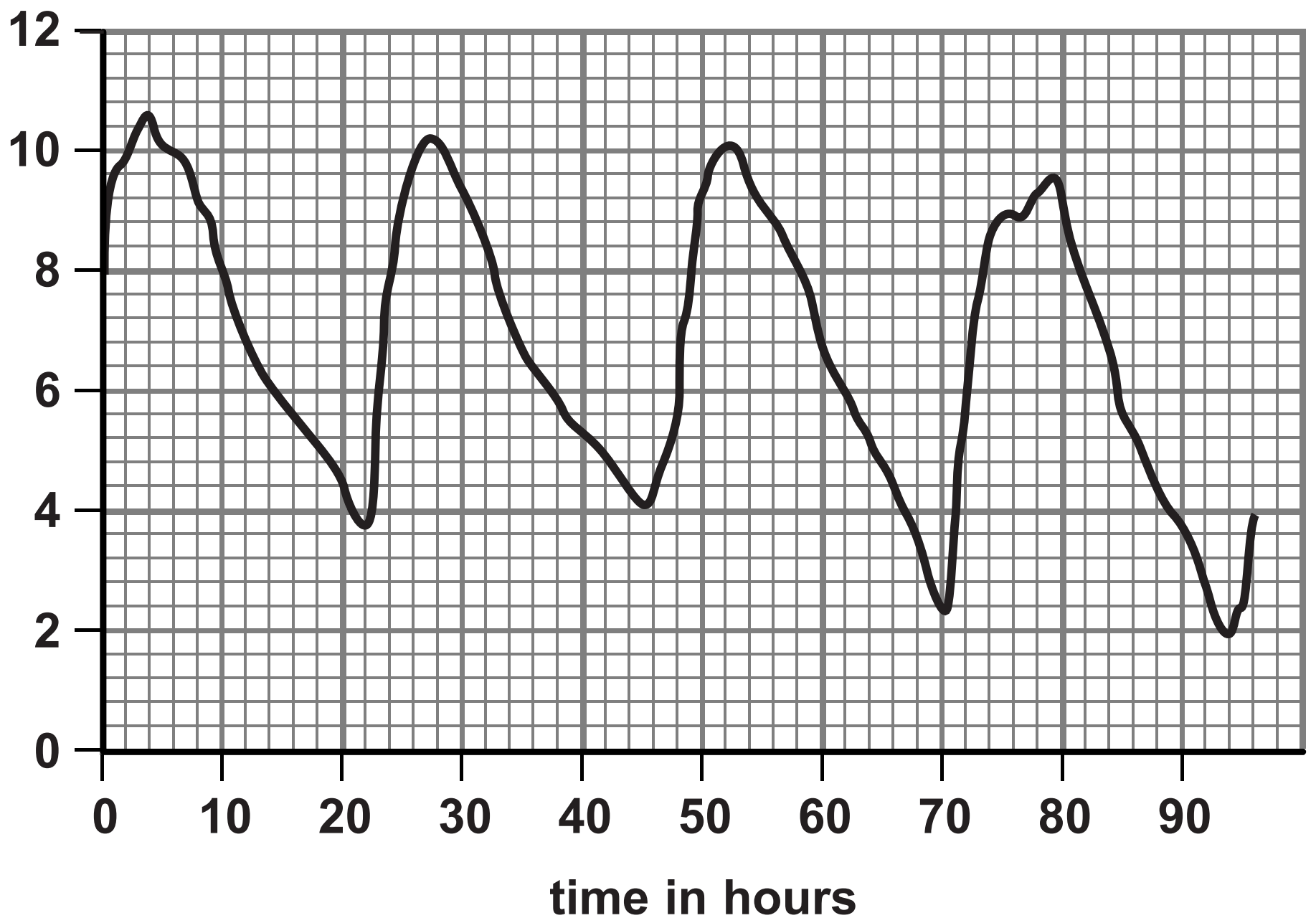
He measures the changes in oxygen concentration in the aquarium water over a period of four days.

(Question continues on next page)

(Turn over)

The graph shows these changes in oxygen concentration.

concentration of oxygen  
in arbitrary units



The person claims he keeps his fish in good conditions.

Evaluate this claim. (6 marks)

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(Continue your answer on next page)

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**(Turn over)**

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**(TOTAL FOR QUESTION 8 = 9 MARKS)**

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**TOTAL FOR PAPER = 60 MARKS**  
**END**