

**Paper Reference(s) 5BI2F/01**

**Edexcel GCSE**

**Biology/Additional Science**

**Unit B2: The Components of Life**

**Foundation Tier**

**Tuesday 15 May 2012 – Morning**

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

**INSTRUCTIONS TO CANDIDATES**

**Write your centre number, candidate number, surname, initials 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>Initial(s)</b>							
<b>Signature</b>							
<b>Paper Reference</b>	<b>5</b>	<b>B</b>	<b>I</b>	<b>2</b>	<b>F</b>	<b>/</b>	<b>0 1</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.

## **MATERIALS REQUIRED FOR EXAMINATION**

**Calculator, ruler**

## **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.
- Questions labelled with an **ASTERISK (\*)** are ones where the quality of your written communication will be assessed – you should take particular care with your spelling, punctuation and grammar, as well as the clarity of expression, on these questions.

## **ADVICE TO CANDIDATES**

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

**(Turn over)**

**ANSWER ALL QUESTIONS.**

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 ☒.

**WATER AND MINERAL UPTAKE BY PLANTS**

1 (a) Complete the sentences by putting a cross (☒) in the box next to your answer.

(i) Plants absorb water from the soil.

The plant cells that absorb water from the soil are called

(1 mark)

A root hair cells

B palisade cells

C stomata cells

D xylem cells

(Question continues on next page)

(Turn over)

(ii) These cells absorb water by a process known as

(1 mark)

A active transport

B osmosis

C photosynthesis

D transpiration

(b) Plants also absorb mineral ions from the soil.

Use words from the box to complete the sentences. (3 marks)

active transport

leaves

xylem

photosynthesis

phloem

roots

Plants absorb mineral ions from the soil through their \_\_\_\_\_ by a process called \_\_\_\_\_. The mineral ions are then transported up the stem through \_\_\_\_\_ vessels.

- (c) Magnesium and nitrates are two mineral ions that are absorbed by plants.

The table shows the amount of magnesium ions and nitrate ions in the tips of sunflower and wheat plants.

TYPE OF PLANT	MINERAL ION CONTENT / ARBITRARY UNITS	
	MAGNESIUM IONS	NITRATE IONS
sunflower	0.730	0.147
wheat	0.225	0.226

- (i) Compare the mineral ion content in the tips of these two plants. (2 marks)

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- (ii) Magnesium is used by plant cells to make chlorophyll.

Describe the function of chlorophyll in plant cells. (2 marks)

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**(Total for Question 1 = 9 marks)**

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**(Questions continue on next page)**

**(Turn over)**

**RACE HORSES**

- 2 Casper is a horse training for the Grand National. Casper's diet contains an increased amount of carbohydrate. Casper runs several miles each day.**

**(a) (i) Use words from the box to complete the sentences. (2 marks)**

<b>fat</b>	<b>oxygen</b>	<b>protein</b>	<b>carbon dioxide</b>	<b>nitrogen</b>
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**During training, Casper's heart rate**

**increases to supply his muscles with more**

**\_\_\_\_\_ . Casper's**

**breathing rate increases to remove excess**

**\_\_\_\_\_ from his**

**blood.**

**(Question continues on next page)**

**(Turn over)**

- (ii) Explain why Casper needs a diet containing an increased amount of carbohydrate.  
(3 marks)

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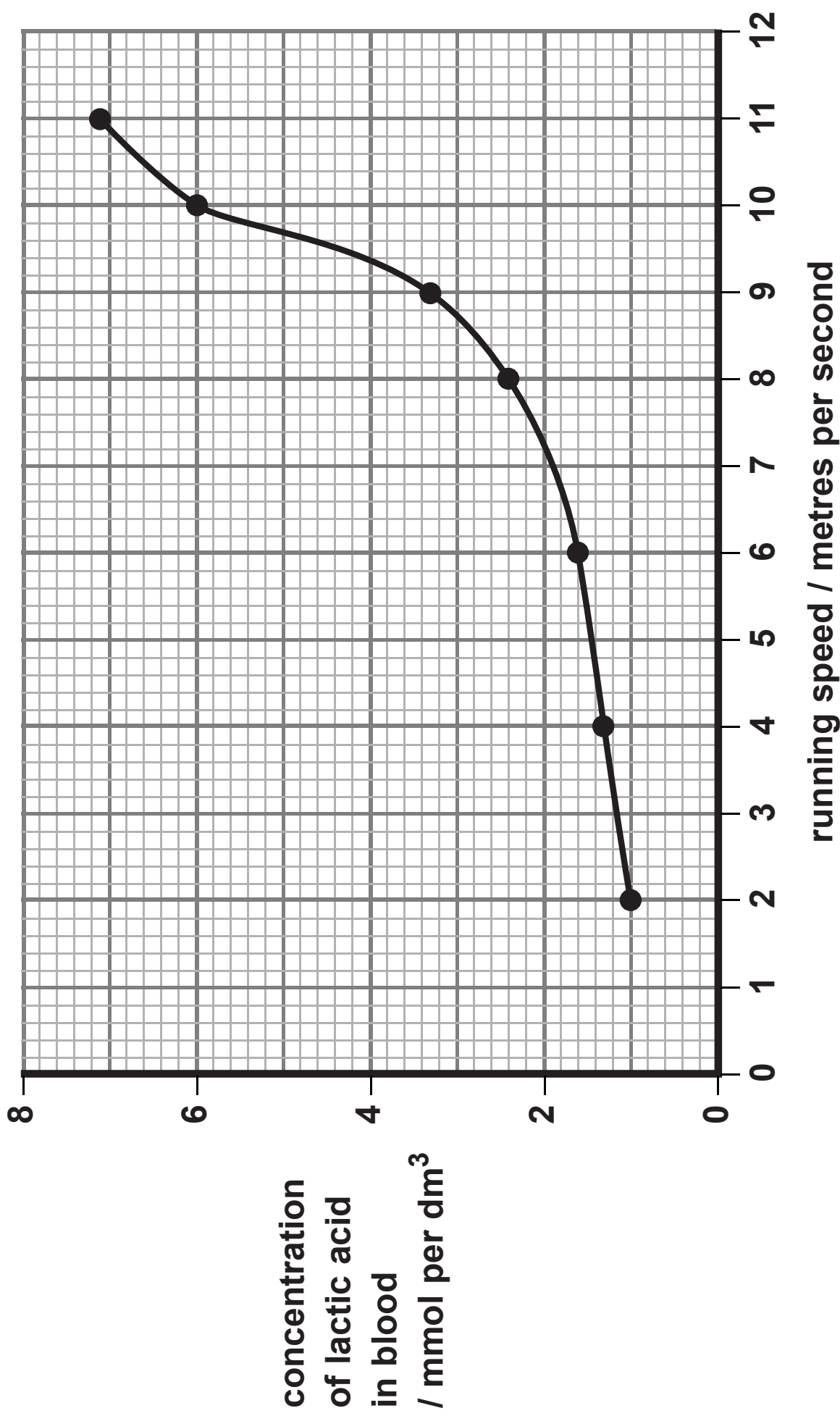
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**(Question continues on next page)**



(b) The graph shows the concentration of lactic acid in Casper's blood as his running speed increases.



- (i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The difference in the concentration of lactic acid in Casper's blood between 2 and 10 metres per second is

(1 mark)

- A 1 mmol per dm<sup>3</sup>
- B 2 mmol per dm<sup>3</sup>
- C 5 mmol per dm<sup>3</sup>
- D 8 mmol per dm<sup>3</sup>

(Question continues on next page)

- (ii) Explain why the concentration of lactic acid in Casper's blood changes as his speed increases. (2 marks)

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(Total for Question 2 = 8 marks)

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(Questions continue on next page)

(Turn over)

**USING GLUCOSE**

**3 Leaf cells produce glucose.**

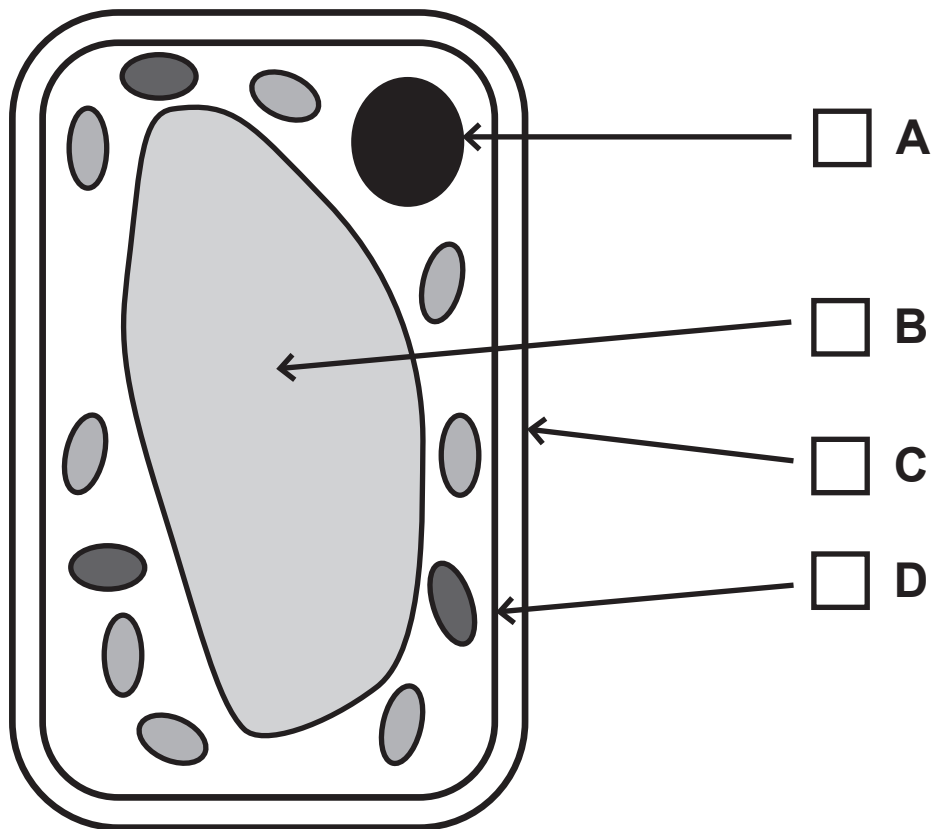
**Plants can use glucose to make oils, cellulose and DNA.**

**(a) (i) Oils are needed to make cell membranes.**

**The diagram shows a plant cell.**

**Which label on the diagram shows the cell membrane? (1 mark)**

**Put a cross (☒) in the box next to your answer.**



**(Question continues on next page)**

**(Turn over)**

**(ii) Cellulose is found in plant cell walls.**

**Describe the function of cell walls in plant cells. (2 marks)**

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**(Question continues on next page)**

- (iii) The nucleus contains chromosomes.  
Chromosomes are made up of DNA.

Describe the structure of DNA. (2 marks)

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(Question continues on next page)

(b) The table shows the concentration of glucose found in plant cells at different times of the day.

TIME OF DAY	6am	9am	midday	3pm	6pm	midnight
CONCENTRATION OF GLUCOSE / mg PER g	2	6	18	12	2	2

(i) Calculate the change in the concentration of glucose from 6am to midday. (1 mark)

answer = \_\_\_\_\_ mg per g

(Question continues on next page)

(Turn over)

- (ii) Describe the pattern shown in the concentration of glucose from 6am to midnight. (2 marks)

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**(Question continues on next page)**



**(iii) Suggest TWO reasons why the concentration of glucose in the plant cells changes between 3pm and 6pm. (2 marks)**

**1** \_\_\_\_\_

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**2** \_\_\_\_\_

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**(Total for Question 3 = 10 marks)**

\_\_\_\_\_

**(Questions continue on next page)**

**(Turn over)**

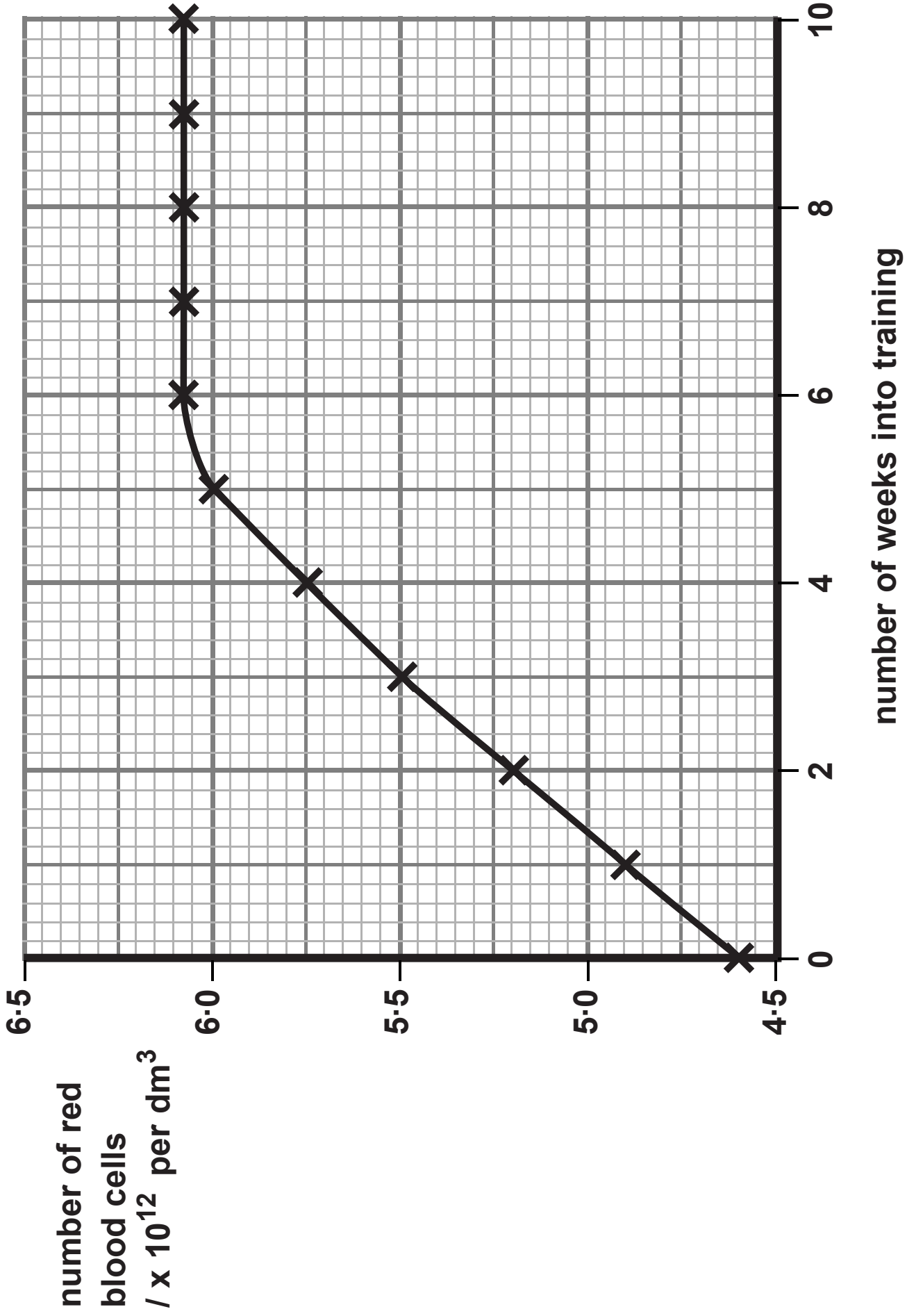
## **ALTITUDE TRAINING**

**4 Some athletes train at high altitudes (over 2000 m above sea level).**

**There is less oxygen in the air at high altitudes.**

**(a) The graph on page 19 shows the number of red blood cells in the blood of an athlete training at high altitudes, over a ten-week period.**

**(Question continues on next page)**



(Question continues on next page)

(Turn over)

- (i) Describe the change in the number of red blood cells during this ten-week training period. (2 marks)

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- (ii) Suggest the minimum training period this athlete needs to produce the highest number of red blood cells. (1 mark)

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- (iii) State the function of red blood cells. (1 mark)

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(Question continues on next page)

(Turn over)

**(b) When athletes train, the size of their hearts can increase.**

**Suggest how an increase in the size of the heart is an advantage to an athlete. (2 marks)**

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**(Question continues on next page)**

- (c) (i) Draw TWO straight lines from the function to the blood vessels that carry out that function. (2 marks)

**FUNCTION****BLOOD VESSEL**

● pulmonary artery

● pulmonary vein

● aorta

● vena cava

● capillary

transport blood  
away from the heart ● ●

- (ii) Name the structures in the heart that prevent the backflow of blood. (1 mark)

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(Total for Question 4 = 9 marks)

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(Questions continue on next page)

(Turn over)

**ENZYMES**

5 (a) Complete the sentences by putting a cross (☒) in the box next to your answer.

(i) Enzymes are  
(1 mark)

- A cells
- B hormones
- C proteins
- D sugars

(ii) An enzyme is a biological catalyst that  
(1 mark)

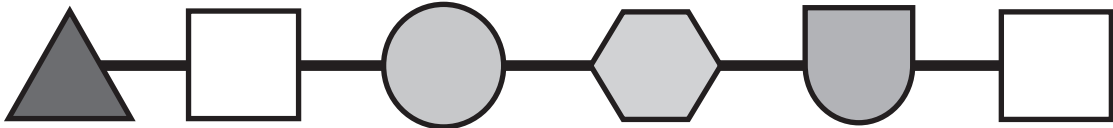
- A slows down all chemical reactions
- B speeds up a chemical reaction
- C prevents all chemical reactions taking place
- D has no effect on a chemical reaction

(Question continues on next page)

(Turn over)

- (b) The diagrams show two sequences of six amino acids.

Sequence 1 is found in an enzyme called catalase.



Sequence 2 is found in an enzyme called amylase.



- (i) Suggest how the structures of the enzymes, catalase and amylase, are different from each other. (2 marks)

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**(ii) Suggest why the action of these two enzymes will be different. (2 marks)**

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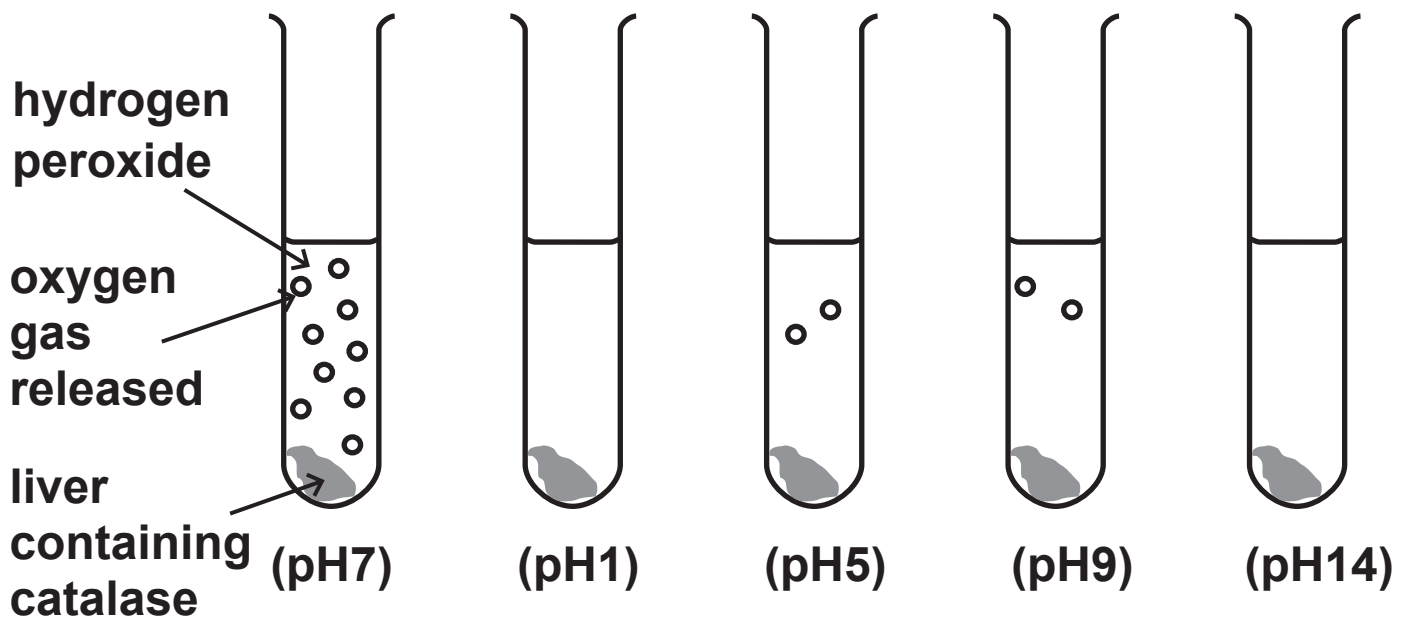
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**(Question continues on next page)**

**\*(c) A student carried out an investigation to study the effect of pH on the activity of catalase.**

**In the presence of catalase, hydrogen peroxide breaks down to release oxygen gas.**

**The student set up five test tubes, as shown in the diagram, and observed the amount of oxygen gas released.**



**Explain the effect of pH on the enzyme catalase in this investigation. (6 marks)**

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(Total for Question 5 = 12 marks)

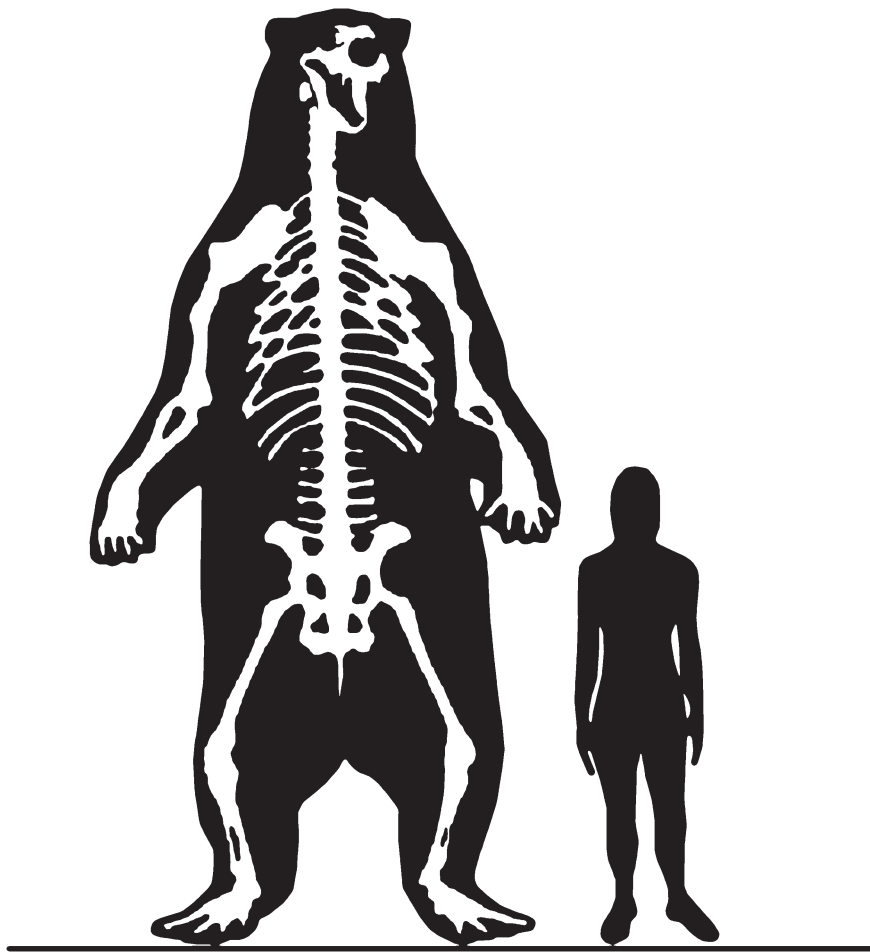
(Questions continue on next page)

(Turn over)

**BEARS**

- 6** A small number of fossil bones from a very large bear was found in South America in 1935. The bones were estimated to be about one million years old. Scientists used these bones to predict the shape and size of the bear.

The diagram shows the bear and a person who is 165 cm tall.



(Question continues on next page)

(Turn over)

**(a) (i) Estimate the height of the bear. (2 marks)**

**answer = \_\_\_\_\_ cm**

**(ii) Which process occurs in animal cells that results in growth? (1 mark)**

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**(Question continues on next page)**

**(Turn over)**

**(b) Explain why scientists can only make predictions about the size and shape of animals when working from fossil evidence. (3 marks)**

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**(Question continues on next page)**

**\*(c) Some species of bears eat leaves.**

**Describe how the structure of a leaf is adapted for photosynthesis. (6 marks)**

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**(Total for Question 6 = 12 marks)**

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**TOTAL FOR PAPER = 60 MARKS**

**END**