

Surname						Other Names					
Centre Number						Candidate Number					
Candidate Signature											

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General Certificate of Education
 June 2003
 Advanced Subsidiary Examination



**BIOLOGY (SPECIFICATION B)
 Unit 3 Physiology and Transport**

BYB3/W

Monday 2 June 2003 Morning Session

In addition to this paper you will require:

- a ruler with millimetre measurements.

You may use a calculator.

For Examiner's Use			
Number	Mark	Number	Mark
1			
2			
3			
4			
5			
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7			
QWC			
Total (Column 1)	→		
Total (Column 2)	→		
TOTAL			
Examiner's Initials			

Time allowed: 1 hour

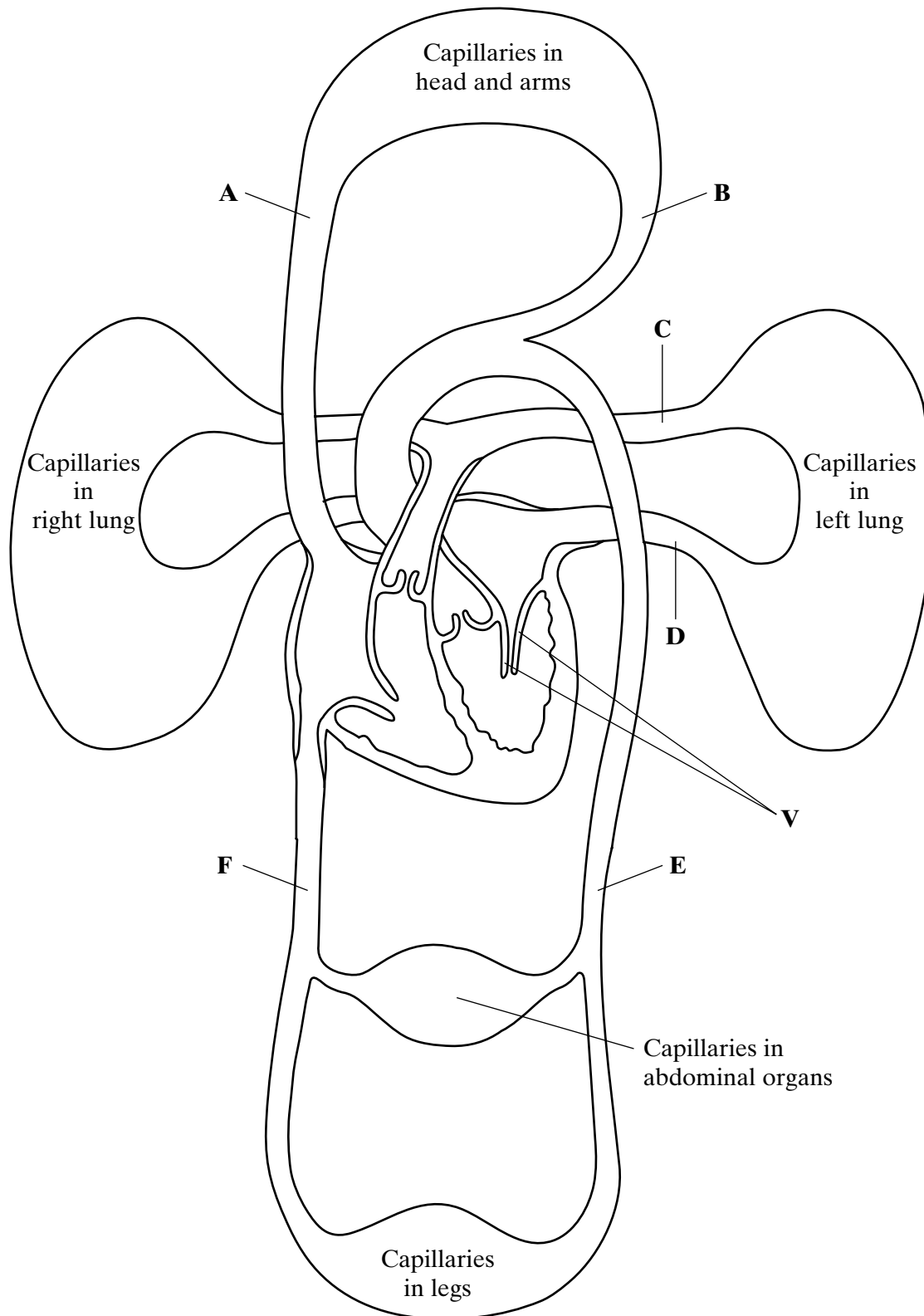
Instructions

- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided. All working must be shown.
- Do all rough work in this book. Cross through any work you do not want marked.

Information

- The maximum mark for this paper is 54.
- Mark allocations are shown in brackets.
- Answers for **Questions 1 to 6** are expected to be short and precise.
- Question 7** should be answered in continuous prose. Quality of Written Communication will be assessed in the answer. You will be awarded up to 1 mark for your ability to use an appropriate form and style of writing, to organise relevant information clearly and coherently, and to use specialist vocabulary, where appropriate. The legibility of your handwriting and the accuracy of your spelling, punctuation and grammar will also be taken into account.

1 The diagram shows the circulatory system of a human in a simplified way.



(a) In the blood vessels in the diagram, add arrows next to the letters, **A**, **B**, **C** and **D** to show the direction of blood flow at each position.

(2 marks)

(b) Which of the blood vessels, **A** to **F**,

(i) carries blood with the highest concentration of oxygen;

(ii) contains the carotid bodies?

(2 marks)

(c) The valve, **V**, helps to maintain blood flow through the heart. Describe how it carries out this function.

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(2 marks)



TURN OVER FOR THE NEXT QUESTION

Turn over

- 2 (a) Root hairs absorb ions from the soil. Put a tick in the correct boxes to show which of the following are ions that may enter a root hair from the soil.

Phosphate	
Nitrogen	
Magnesium	
Nitrate	
Water	

(1 mark)

- (b) (i) Describe how ions enter a root hair.

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(2 marks)

- (ii) Through which tissue are ions transported from the roots to the leaves?

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(1 mark)

- (c) Some desert plants lose their root hairs during the long, dry season. After rainfall, new root hairs grow within hours. Explain the advantage of having no root hairs during the dry season.

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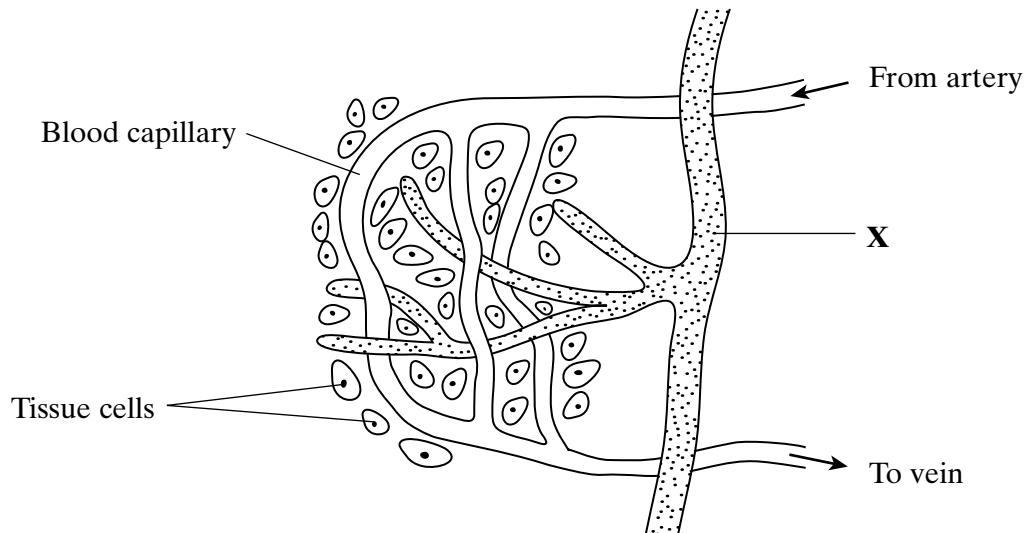
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(2 marks)

6

Turn over ►

- 3 (a) The diagram shows some vessels in skin.



- (i) Name the system to which the vessel labelled **X** belongs.

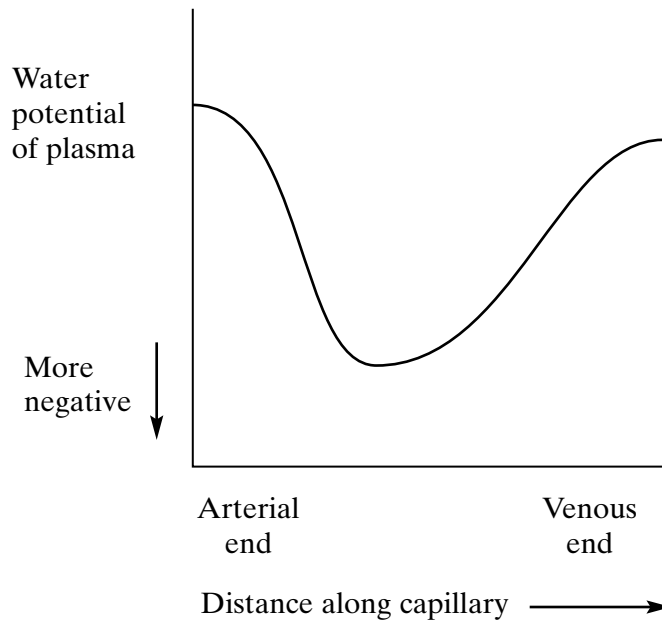
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(1 mark)

- (ii) Describe the function of the vessels in this system.

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 (2 marks)

- (b) The graph shows the changes in the water potential of the plasma along the length of a blood capillary.



- (i) Explain what causes the decrease in water potential at the arterial end of the capillary.

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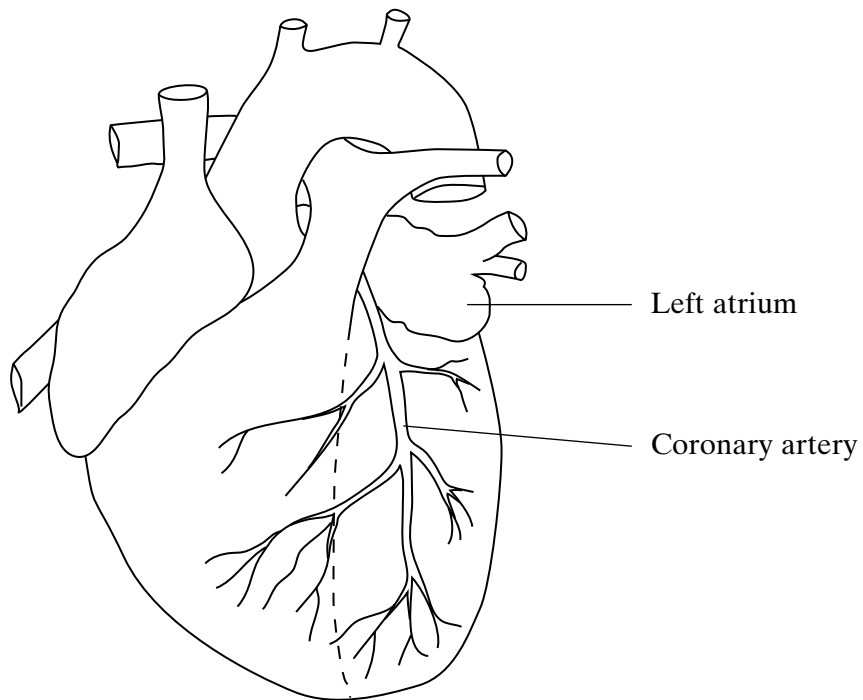
(2 marks)

- (ii) Explain what causes the increase in water potential towards the venous end of the capillary.

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(2 marks)

- 4 (a) The diagram shows a human heart.



- (i) Use a guideline and label to show the position of the sinoatrial node (SAN).
(1 mark)

- (ii) What is the function of the coronary artery?

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(1 mark)

5 (a) (i) What is the immediate source of energy for muscle contraction?

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(1 mark)

(ii) Apart from this immediate source and glycogen, give **two** other sources of energy that can be used by muscles during exercise.

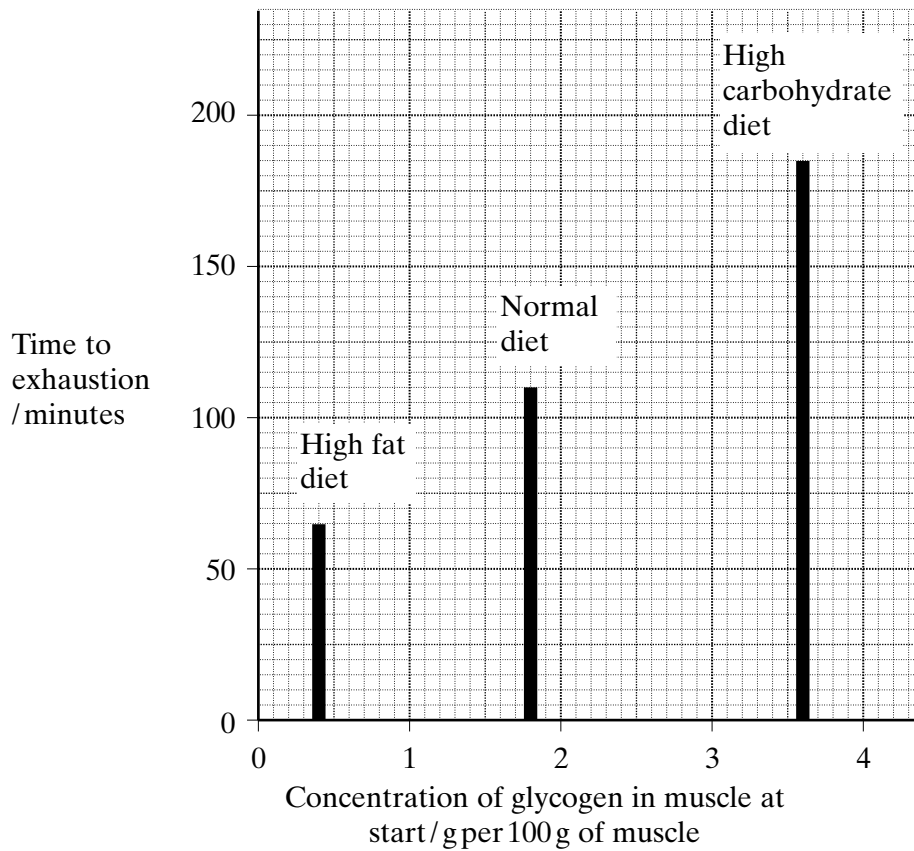
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2

(2 marks)

In an investigation, three groups of athletes were each fed on a different diet for three days. Then the concentration of glycogen in their leg muscles was measured.

The athletes then exercised on a cycling machine at maximum level until they were exhausted. The bar chart shows the results.



- (b) The investigators made sure that the diets contained the same amounts of protein, vitamins and minerals.

Give **one** other feature of the diets that should be the same, so that a valid comparison could be made.

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(1 mark)

- (c) Explain why the athletes given a high carbohydrate diet had a high glycogen concentration before exercising.

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(2 marks)

- (d) The group of athletes on the high fat diet became exhausted more quickly than the other groups. Explain why their energy stores were less quickly available during the exercise.

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(2 marks)

8

TURN OVER FOR THE NEXT QUESTION

Turn over ▶

- 6 In an investigation, two similar plants were selected. The stem of one plant was ringed; the other was unringed. One leaf of each plant was supplied with carbon dioxide in which the carbon was the radioactive isotope, ^{14}C , as shown in **Figure 1**.

The plants were kept in bright light for one hour. The level of radioactivity was then measured at four positions on each plant, as shown in **Figure 2**.

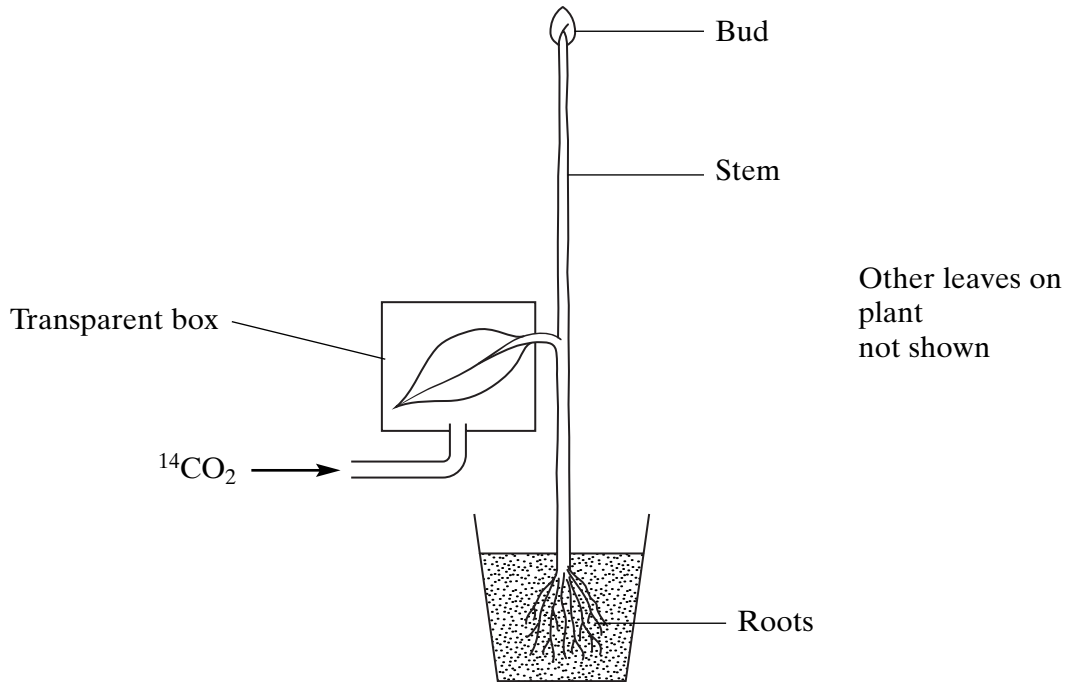


Figure 1

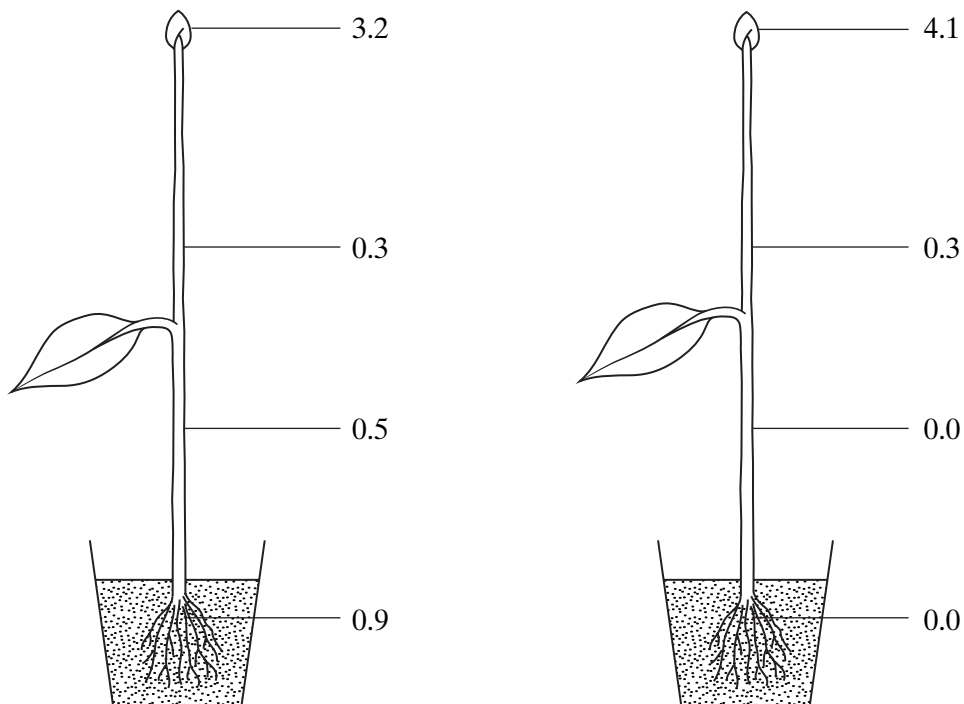


Figure 2

(a) (i) Mark with an **X** on the ringed plant in **Figure 2** the position at which the stem was ringed.

(1 mark)

(ii) Explain how radioactive carbon from the carbon dioxide supplied reached the buds at the end of the stem.

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(3 marks)

(b) Suggest why the level of radioactivity in the stem below the bud was lower than in the bud itself.

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(2 marks)

(c) Explain the results in the ringed plant.

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(2 marks)

Answers to **Question 7** should be written in continuous prose.
Quality of Written Communication will be assessed in the answer.

7 (a) Explain how blood capillaries are adapted for their function of gas exchange.

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(4 marks)

(b) Describe how haemoglobin is involved in absorbing oxygen in the lungs and transporting it to respiring tissues.

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(6 marks)

END OF QUESTIONS

QWC

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