

Answer ALL questions in the spaces provided

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1. The table refers to features of the respiratory pigments haemoglobin and myoglobin. If the statement is correct, place a tick (✓) in the appropriate box, and if the statement is incorrect, place a cross (✗) in the appropriate box.

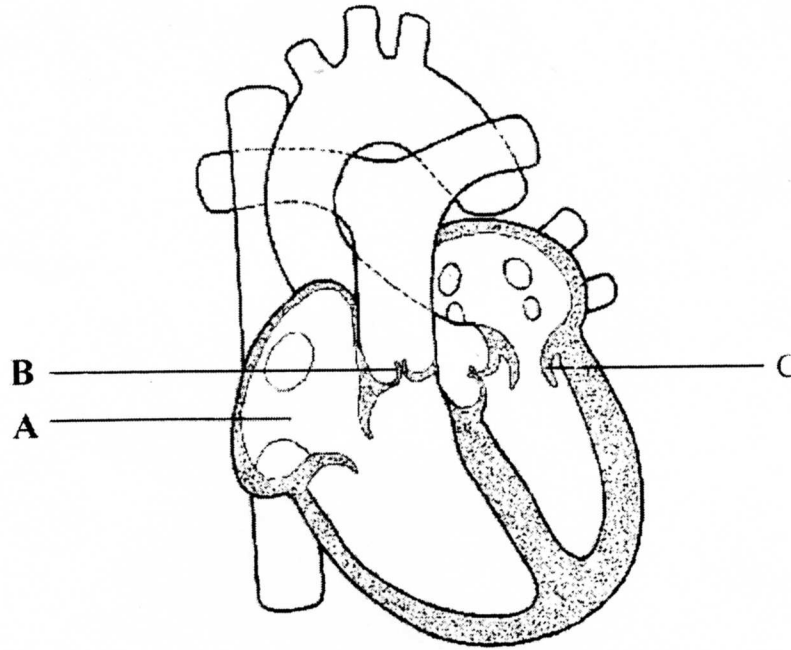
Feature	Haemoglobin	Myoglobin
Is carried in the blood		
Transports oxygen		
Acts as an oxygen store in muscle		
Transports carbon dioxide		

Q1

(Total 4 marks)

2. The diagram shows a section through the heart of a mammal.

Leave
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(a) Name the parts labelled A, B and C.

A

B

C

(3)

(b) Each time the heart beats, the atria contract first and then the ventricles contract. Explain how this sequence of events is coordinated.

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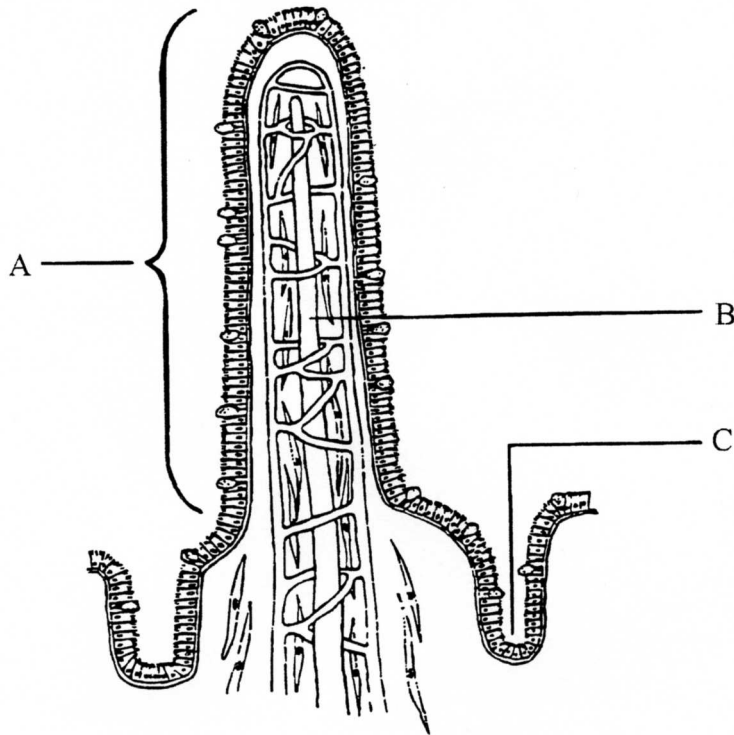
(4)

Q2

(Total 7 marks)

3. The diagram shows the structure of part of the ileum as seen in transverse section.

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(a) Name the parts labelled A, B and C.

A

B

C

(3)

(b) Describe **two** ways in which the structure of part A is adapted for the absorption of the products of digestion.

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(4)

(c) The table below lists some enzymes associated with carbohydrate digestion, their site of secretion and the products of their action.

Complete the table by filling in the blank spaces.

Enzyme	Site of secretion	Products
	Pancreas	Maltose
Lactase		
Sucrase	Lining (mucosa) of ileum	

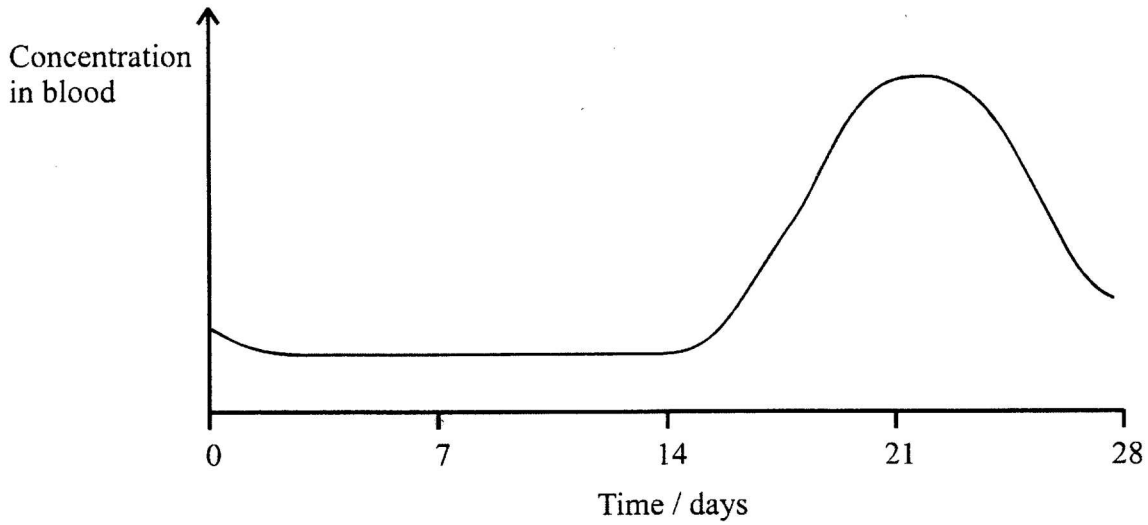
Q3

(4)

(Total 11 marks)

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4. The graph shows changes in the concentration of progesterone in the blood during the menstrual cycle.



- (a) On the graph, draw a line to show how the concentration of **oestrogen** changes from day 0 to day 28 of the menstrual cycle.

(2)

- (b) State where progesterone is produced during the menstrual cycle.

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(1)

- (c) State **one** effect of progesterone.

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(1)

- (d) Explain why the concentration of progesterone decreases towards the end of the menstrual cycle.

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(2)

- (e) Explain what happens to the concentration of progesterone if fertilisation and implantation occur.

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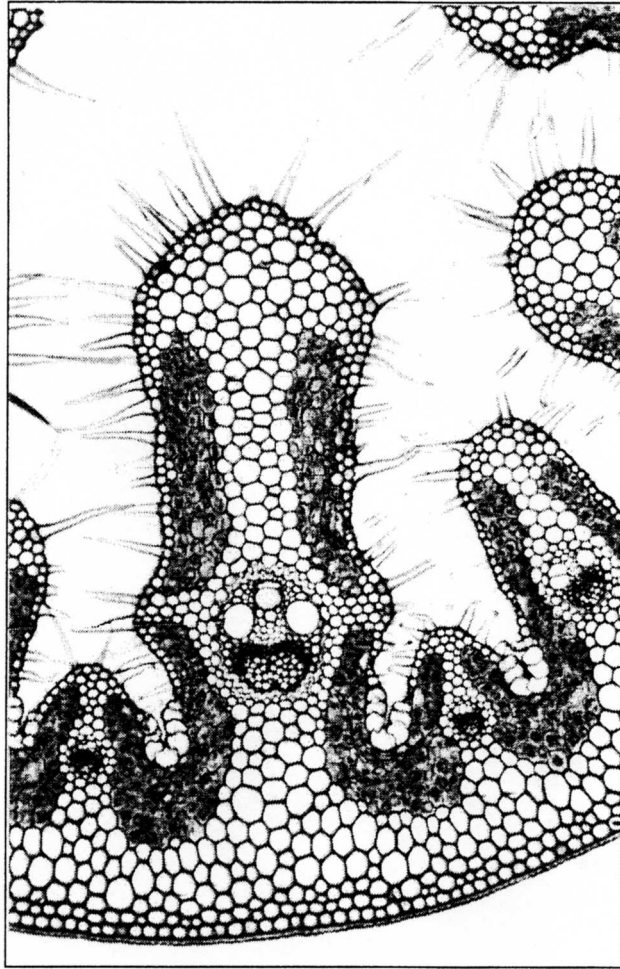
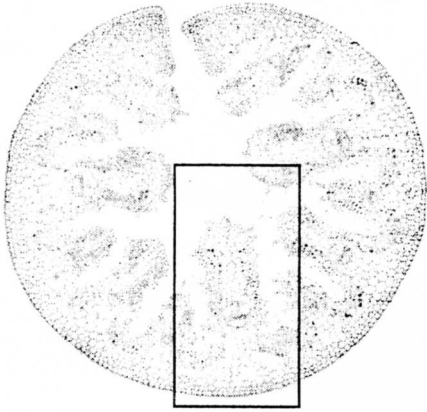
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Q4

(2)



5. The photomicrographs show a transverse section through a leaf of *Ammophila*, which is a xerophyte. The large photomicrograph shows details of the tissues inside the box.



Describe **three** ways in which this leaf is adapted to reduce water loss.

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6. (a) Explain what is meant by the term **pollination**.

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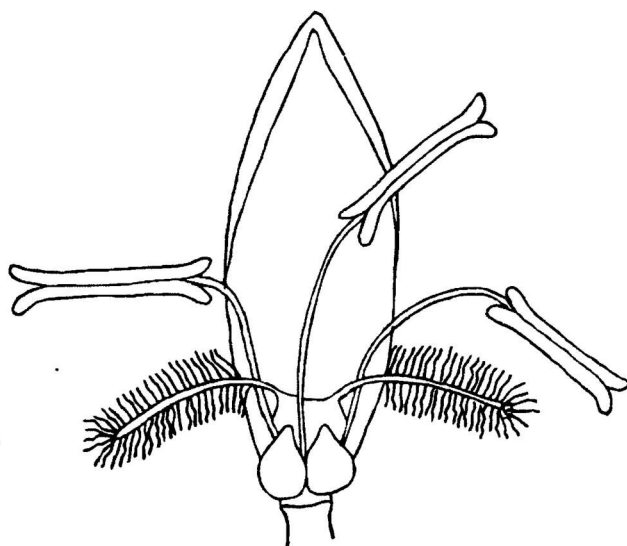
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(2)

(b) The diagram shows the structure of a grass flower.



Describe **two** ways in which this flower is adapted for wind pollination.

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(4)

(c) This grass flower can be self-pollinated. Suggest how the flowers of other grasses might be adapted to avoid self pollination.

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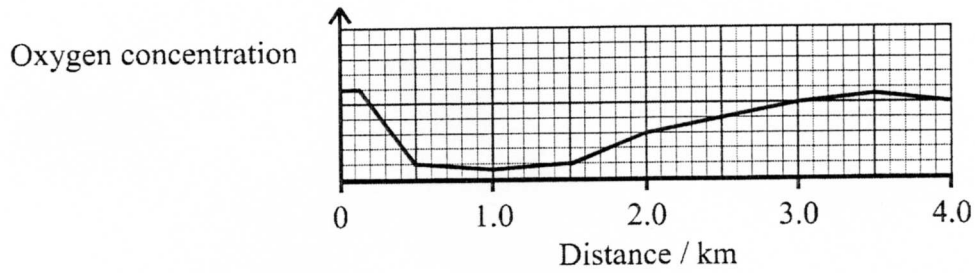
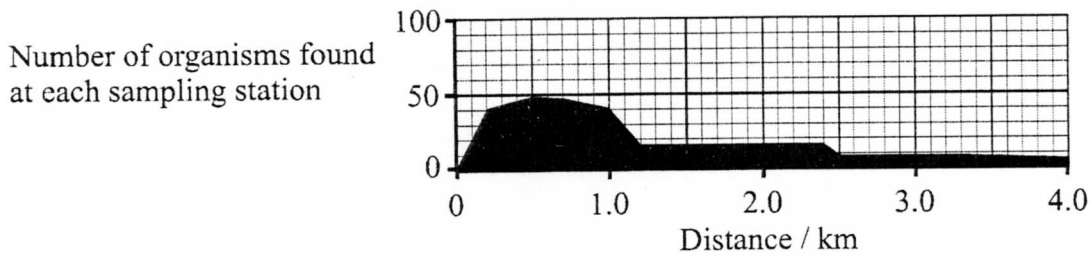
Q6

(3)

(Total 9 marks)

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7. A freshwater stream was sampled over a distance of 4.0 km to determine the abundance of an aquatic invertebrate. The oxygen concentration of the water was measured over the same distance. The results are shown in the graphs below.



(a) Name **one** aquatic invertebrate that might show this distribution along the stream.

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(1)

(b) Suggest **two** adaptations that would enable an invertebrate to thrive between 0.2 and 1.0 km along the stream. In each case state how the adaptation assists survival.

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(4)

(Total 5 marks)

Q7

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8. Experiments were carried out to investigate the uptake of mineral ions by barley roots.

In the first investigation, isolated barley roots were immersed in an aerated culture solution containing potassium ions (K^+) and nitrate ions (NO_3^-). After ten hours, the roots were removed and the concentrations of these ions in the cell sap were determined. The results are shown in the table.

Ion	Concentration in culture solution / mmol per dm^3	Concentration in cell sap / mmol per dm^3
Potassium	7.98	97.8
Nitrate	7.29	38.1

(a) Suggest why the culture solution was aerated.

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(2)

(b) These results show that the concentration of potassium ions in the cell sap is 12.3 times greater than that in the culture solution. This is referred to as the **accumulation ratio**.

Calculate the accumulation ratio for nitrate ions. Show your working.

Answer

(2)

Leave blank

(c) What do these results suggest about the mechanism for the uptake of potassium and nitrate ions? Explain your answer.

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(2)

(d) In a further experiment, the effect of temperature on the uptake of potassium ions was investigated. Isolated barley roots were kept in aerated nutrient solutions at a range of temperatures, and the concentrations of potassium ions in the cell sap were measured after ten hours. The results are shown in the table below.

Temperature / °C	Concentration of potassium ions in cell sap / mmol per dm ³
6	35
12	42
18	70
24	95
30	110

(i) What effect does temperature have on the concentration of potassium ions in the cell sap?

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(ii) Suggest an explanation for these results.

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(4)

Q8

(Total 10 marks)

9. Give an account of gas exchange in flowering plants.