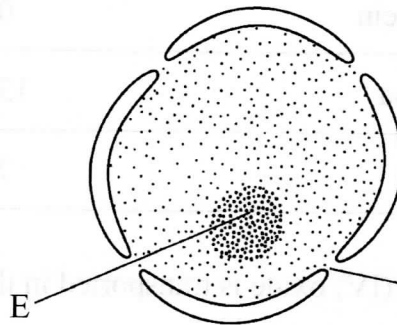


SECTION A (40 marks)

Answer **all** the questions in this section in the spaces provided.

1. The diagram below represents a nucleus.



(a) Name the structures labelled E and F. (2 marks)

(i) E .....

F .....

(ii) State the function of F. (1 mark)

(iii) With reference to the nucleus, state **one** difference between an animal and a bacterial cell. (1 mark)

(b) Name the plant cell organelle:

(i) that stores chlorophyll (1 mark)

(ii) responsible for intracellular digestion. (1 mark)

(c) State **two** main functions of the vacuole in the amoeba. (2 marks)

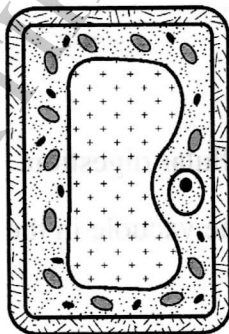
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2. The table below shows variations in the form carbon (IV) oxide is transported in the blood at rest and during physical exercise.

Carbon (IV) oxide transport in blood plasma at rest and during exercise		
<u>Form of transport</u>	<u>Rest (Mol/l)</u>	<u>Exercise (Mol/l)</u>
Dissolved carbon (IV) oxide	0.52	0.97
Bicarbonate ion	12.34	13.68
Carbon (IV) oxide bound to protein	0.26	0.16
Total carbon (IV) oxide in plasma	13.12	14.81
pH of blood	7.42	7.09

- (a) Explain why more carbon (IV) oxide is transported in the form of bicarbonate ion. (2 marks)
- (b) Account for the high total plasma content of carbon (IV) oxide during exercises. (3 marks)
- (c) State how one's involvement in the exercises affects blood pH. (2 marks)
- (d) Name the protein responsible for the transport of carbon (IV) oxide in the blood. (1 mark)
3. The diagram below illustrates the appearance of a plant cell after it had been put in a certain solution.



- (a) Explain the appearance of the cell at the end of the treatment. (3 marks)
- (b) Explain the results obtained if a red blood cell is subjected to the same treatment. (3 marks)
- (c) Explain why transfusion with distilled water is **not** recommended for a dehydrated patient. (2 marks)
4. (a) Explain how the sex of a male child is determined in human beings. (2 marks)
- (b) (i) Define the term diploidy. (1 mark)

- (ii) Name the type of cell division that gives rise to diploid cells. (1 mark)
- (iii) Name the type of cells in which the process named in (b) (ii) above occurs. (1 mark)
- (iv) State the significance of diploidy. (2 marks)
- (c) Name the hormone responsible for the development of secondary sexual characteristics in human males. (1 mark)

5. In beans, the gene for purple colour is dominant over the gene for white colour. A pure breeding bean plant with purple colour was crossed with a heterozygous bean plant.

- (a) Using the letter P to represent the gene for purple colour, work out the genotypic ratio of the offspring. (5 marks)
- (b) State **two** advantages of using genetically modified varieties in bean farming. (2 marks)
- (c) State how in-breeding leads to reduced hybrid vigour. (1 mark)

### SECTION B (40 marks)

Answer question 6 (compulsory) and either question 7 or 8 in the spaces provided after question 8.

6. In an investigation, two potted plants G and H belonging to the same species were exposed to increasing light intensities at different temperatures, 30°C and 20°C respectively. The rate of photosynthesis was measured for each plant and results recorded as shown in the table below:

Light intensity (in arbitrary units)	1	2	3	4	5	6	7	8
Rate of photosynthesis for plant G at 30°C	0	84	148	196	232	260	284	296
Rate of photosynthesis for plant H at 20°C	0	72	115	148	170	186	204	216

- (a) On the same axis, plot graphs of rate of photosynthesis against light intensity for plants G and H. (8 marks)
- (b) State the aim of the investigation. (1 mark)
- (c) Account for the difference in the rate of photosynthesis in the two plants. (3 marks)
- (d) Account for the difference in the rate of photosynthesis in the two plants between the following light intensities:
  - (i) 1–4 units (2 marks)
  - (ii) 4–8 units. (2 marks)



- (e) (i) Predict the rate of photosynthesis at light intensity of 16 units. (1 mark)
- (ii) Give a reason for your answer in (e) (i) above. (1 mark)
- (f) State **one** internal and **one** external factor that could be limiting in the investigation. (2 marks)
7. Explain the importance of protecting the forest ecosystem with reference to the following: (20 marks)
- (a) climate change
  - (b) biodiversity
  - (c) biotechnology
  - (d) water conservation
  - (e) pollution.
8. Describe how the mammalian eye is structurally adapted to its function. (20 marks)

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