



231/2 –

BIOLOGY

– Paper 2

Nov. 2017 – 2 hours

Name Index Number

Candidate's Signature Date

Instructions to candidates

- (a) Write your name and index number in the spaces provided above.
- (b) Sign and write the date of examination in the spaces provided above.
- (c) This paper consists of **two** sections; **A** and **B**.
- (d) Answer **all** the questions in section **A** in the spaces provided.
- (e) In section **B** answer question **6 (compulsory)** and either question **7** or **8** in the spaces provided after question **8**.
- (f) **This paper consists of 12 printed pages.**
- (g) **Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**
- (h) **Candidates should answer all the questions in English.**

For Examiner's Use Only

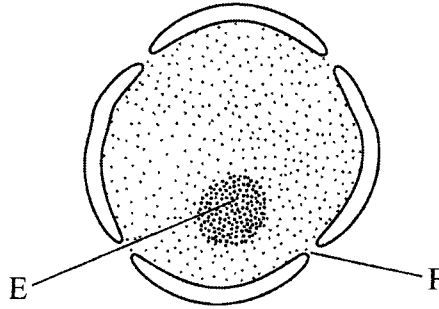
| Section | Question | Maximum Score | Candidate's Score |
|--------------------|----------|---------------|-------------------|
| A | 1 | 8 | |
| | 2 | 8 | |
| | 3 | 8 | |
| | 4 | 8 | |
| | 5 | 8 | |
| B | 6 | 20 | |
| | 7 | 20 | |
| | 8 | 20 | |
| Total Score | | | |



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)

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

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(b) Name the plant cell organelle:

(i) that stores chlorophyll

(1 mark)

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(ii) responsible for intracellular digestion.

(1 mark)

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(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 | | |
|---|--------------|------------------|
| Form of transport | Rest (Mol/l) | Exercise (Mol/l) |
| 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)

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(b) Account for the high total plasma content of carbon (IV) oxide during exercises. (3 marks)

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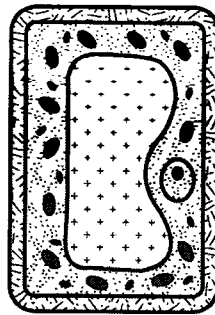
(c) State how one's involvement in the exercises affects blood pH. (2 marks)

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(d) Name the protein responsible for the transport of carbon (IV) oxide in the blood. (1 mark)

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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)

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- (b) Explain the results obtained if a red blood cell is subjected to the same treatment. (3 marks)

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- (c) Explain why transfusion with distilled water is **not** recommended for a dehydrated patient. (2 marks)

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4. (a) Explain how the sex of a male child is determined in human beings. (2 marks)

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- (b) (i) Define the term diploidy. (1 mark)

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- (ii) Name the type of cell division that gives rise to diploid cells. (1 mark)

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- (iii) Name the type of cells in which the process named in (b) (ii) above occurs. (1 mark)

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(iv) State the significance of diploidy. (2 marks)

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(c) Name the hormone responsible for the development of secondary sexual characteristics in human males. (1 mark)

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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)

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(b) State **two** advantages of using genetically modified varieties in bean farming. (2 marks)

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(c) State how in-breeding leads to reduced hybrid vigour. (1 mark)

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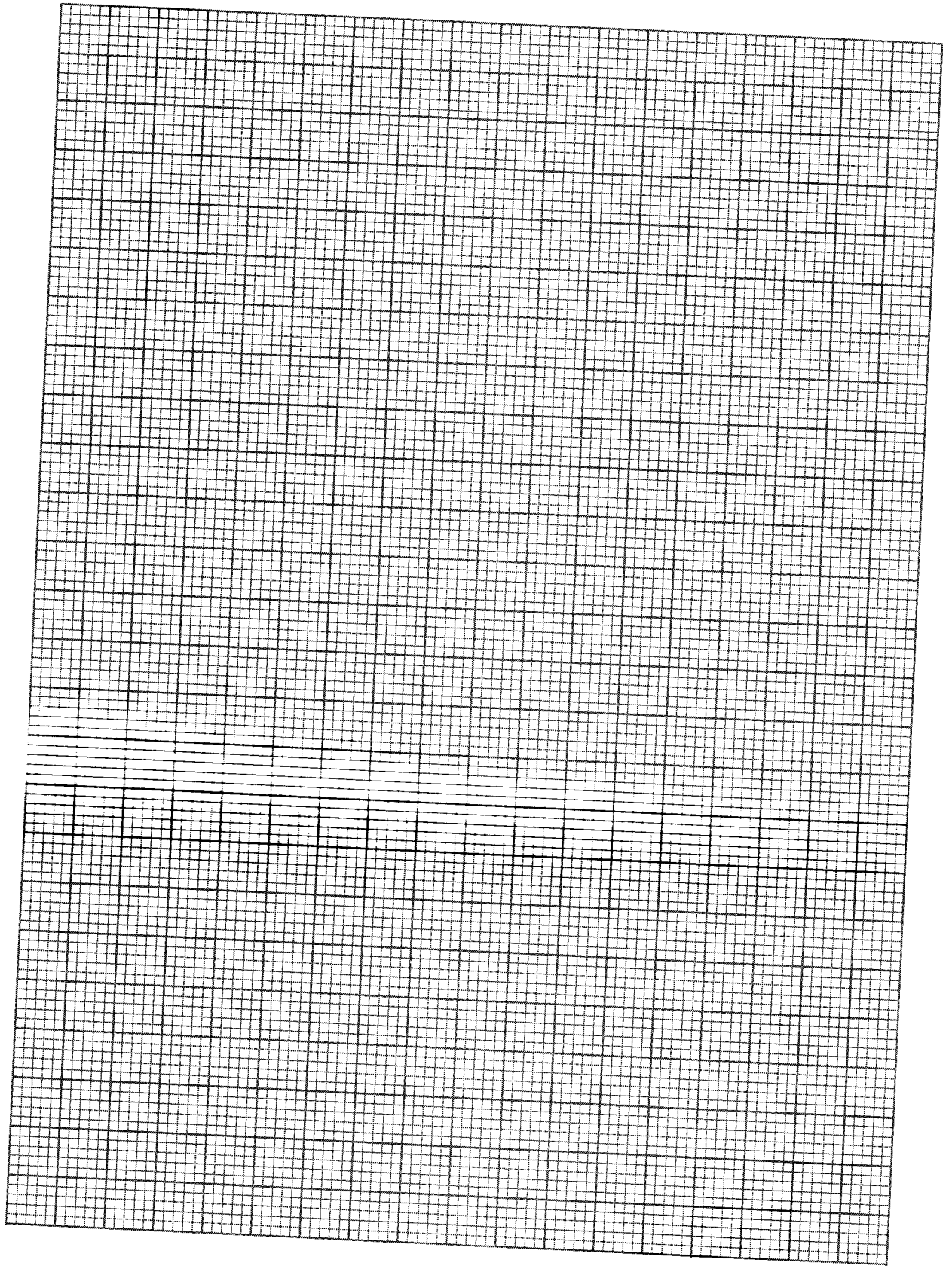
SECTION B (40 marks)

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)

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(c) Account for the difference in the rate of photosynthesis in the two plants. (3 marks)

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(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)

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(ii) 4–8 units. (2 marks)

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(e) (i) Predict the rate of photosynthesis at light intensity of 16 units. (1 mark)

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(ii) Give a reason for your answer in (e) (i) above. (1 mark)

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(f) State **one** internal and **one** external factor that could be limiting in the investigation. (2 marks)

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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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