

### 3.4 BIOLOGY (231)

#### 3.4.1 Biology Paper 1 (231/1)

Answer **all** the questions.

1 State the importance of each of the following in living organisms:

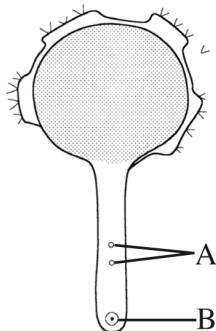
- (a) nutrition (1 mark)
- (b) excretion. (1 mark)

2 (a) What is meant by the term seed dormancy? (1 mark)

(b) State **three** causes of seed dormancy. (3 marks)

3 State **two** functions of the placenta in mammals. (2 marks)

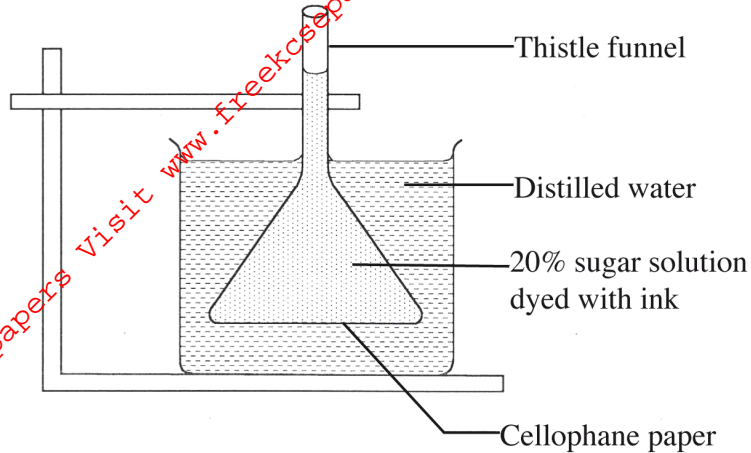
4 The diagram below illustrates a growing pollen tube.



(a) Name the part labelled **B**. (1 mark)

(b) Explain the role of the parts labelled **A**. (2 marks)

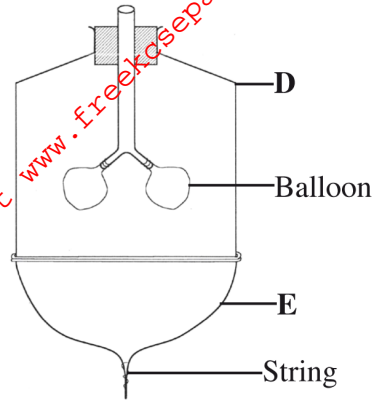
- 5 The diagram below shows a set up for an experiment to demonstrate a certain physiological process.



- (a) What nature of solution is represented by 20% sugar solution? (1 mark)
- (b) Explain the observation made on the set up after one hour. (2 marks)
- 6 State **three** roles of auxins in a plant stem. (3 marks)
- 7 A student drew a 6cm long diagram of a plant flower. If the actual length of the flower was 12cm, calculate the magnification of the drawing made by the student. Show your working. (2 marks)
- 8 Differentiate between phenotype and genotype as used in genetics. (1 mark)
- 9 State **two** functions of intervertebral discs in the mammalian skeleton. (2 marks)
- 10 (a) Explain **two** roles of diffusion in human beings. (4 marks)
- (b) What is meant by each of the following terms?
- (i) Crenated cell. (1 mark)
- (ii) Flaccid cell. (1 mark)
- 11 State **three** differences between tactic and tropic responses. (3 marks)

Tactic Responses	Tropic Responses

12 The diagram below represents a model used to demonstrate breathing in mammals.



(a) Name the mammalian structure represented by the parts labelled **D** and **E**.

(i) **D** ..... (1 mark)

(ii) **E** ..... (1 mark)

(b) State the observation made when the string is pulled downwards. (1 mark)

(c) Explain the observation in (b) above. (2 marks)

13 State **one** function of each of the following parts of a mammalian eye:

(a) eye lashes (1 mark)

(b) lachrymal glands. (1 mark)

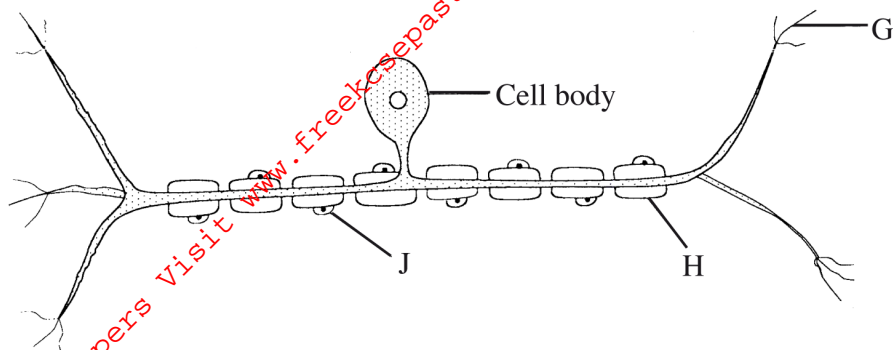
14 State **three** structural differences between DNA and RNA. (3 marks)

DNA	RNA

15 (a) Which type of mammalian muscles is voluntary? (1 mark)

(b) Distinguish between a tendon and a ligament. (1 mark)

16 The diagram below illustrates a nerve cell.



- (a) Name the type of nerve cell illustrated. (1 mark)
- (b) Give a reason for your answer in (a) above. (1 mark)
- (c) Identify the part labelled J. (1 mark)
- (d) State **one** function of each of the parts labelled G and H.
  - (i) G ..... (1 mark)
  - (ii) H ..... (1 mark)

17 Give a reason why the image is not formed when light is focused on the blind spot.

18 Explain why

- (a) mammalian testes are located to hang outside the body (2 marks)
- (b) four months after fertilisation, ovaries can be removed from a human female, without terminating pregnancy. (2 marks)

19 Why is a burning charcoal stove in a poorly ventilated room likely to cause death of the inhabitants? (3 marks)

20 State **one** function of each of the following cell organelles:

- (a) golgi bodies (1 mark)
- (b) lysosomes. (1 mark)

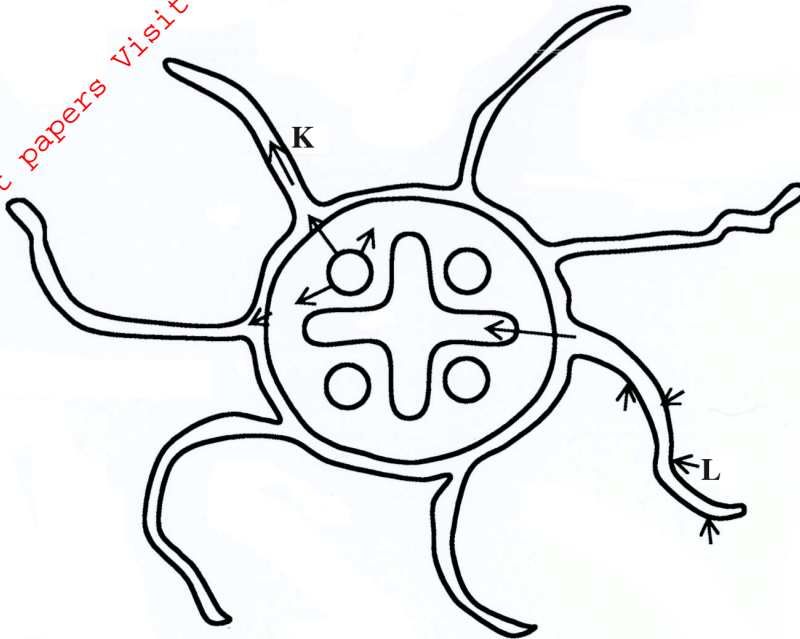
21 Name the type of skeleton that makes up each of the following animals:

- (a) locust (1 mark)
- (b) bird. (1 mark)

22 (a) Name **two** vestigial structures in human beings. (2 marks)

(b) Why are some bacteria able to resist the effect of antibiotics? (2 marks)

23 Below is an illustration of a cross section of a plant root showing the transportation of substances in the plant.



(a) Name the substances transported along the paths labelled **K** and **L**.

**K** ..... (1 mark)

**L** ..... (1 mark)

(b) Give a reason for your answer in **L** above. (1 mark)

24 The table provided shows the transportation of substances in the human body.

Substance	Transported by blood	
	From	To
Oxygen	M	Whole body
N	Liver	Kidneys
P	Intestine	Whole body

Name the substances represented by

M ..... (1 mark)

N ..... (1 mark)

P ..... (1 mark)

25 State **two** roles of luteinising hormone in human reproduction. (2 marks)

26 The table provided shows the concentration of sodium and iodine in sea water and cell sap of a plant.

	Sodium ion concentration	Iodide ion concentration
Sea water	250	35
Cell sap	100	550

(a) (i) Name the process through which the plant cells take up sodium ions. (1 mark)

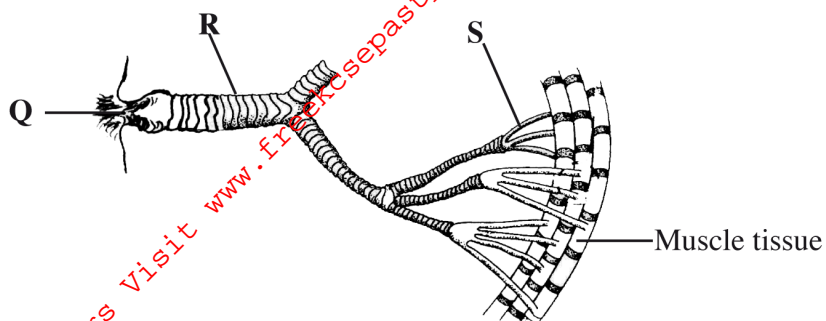
(ii) Give a reason for your answer in (a) (i) above. (1 mark)

(b) If the plant was sprayed with a chemical that inhibits respiration:

(i) which of the two ions uptake will be affected? (1 mark)

(ii) give a reason for your answer in (b) (i) above. (1 mark)

27 The diagram below shows the gaseous exchange system of a locust.



- (a) Name the structure labelled **Q**. (1 mark)
- (b) State the function of the part labelled **R**. (1 mark)
- (c) How is the part labelled **S** structurally adapted to its function? (2 marks)

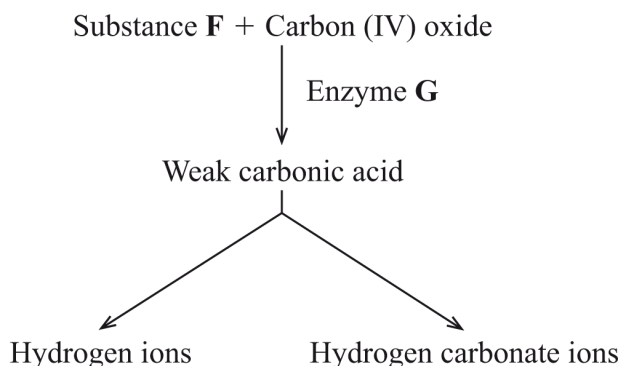
3.4.2 Biology Paper 2 (231/2)

SECTION A (40 marks)

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

- 1 (a) State **four** characteristics of fruits dispersed by animals. (4 marks)
- (b) State **two** roles of each of the following hormones in menstruation:
- (i) luteinising hormone; (2 marks)
- (ii) oestrogen. (2 marks)

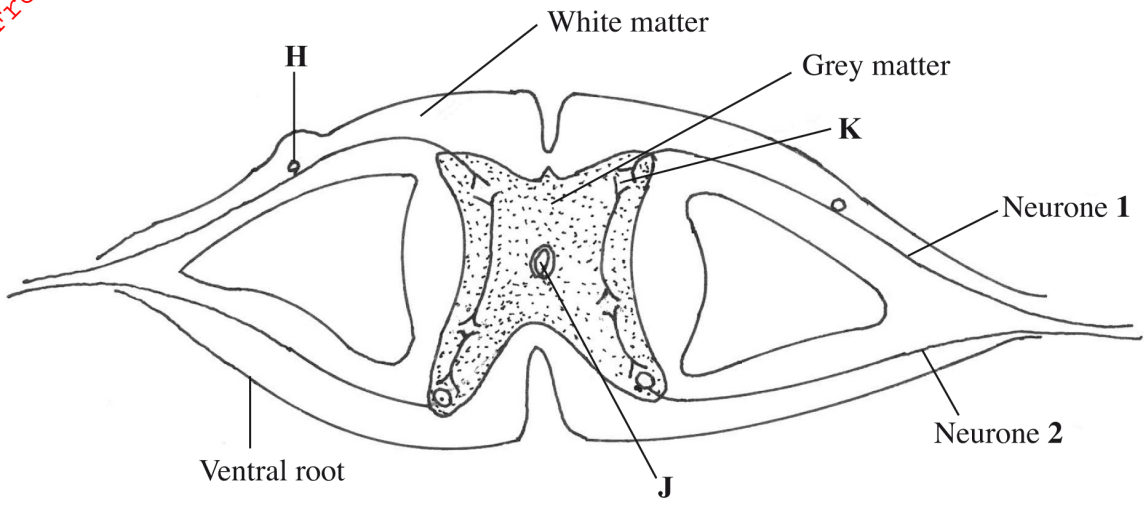
2 The diagram below illustrates the role played by red blood cells in the transportation of carbon (IV) oxide.



- (a) Other than the carbon (IV) oxide transportation in the red blood cells, name the other form of carbon (IV) oxide transportation in humans. (1 mark)
- (b) (i) Name substance **F** ..... (1 mark)
- (ii) Name the enzyme marked **G** and state its role in the reaction. (2 marks)
- Enzyme .....
- Role .....
- (c) Explain why transportation of carbon (IV) oxide in red blood cells is advantageous. (2 marks)
- (d) Explain the role of calcium ions in blood clotting. (2 marks)



- 3 (a) Describe the mechanism of gaseous exchange in plants through the lenticels. (3 marks)
- (b) Explain each of the following:
- (i) the tracheoles lack spiral bands of chitin; (3 marks)
- (ii) the floor of the mouth is lowered during inhalation in a bony fish. (2 marks)
- 4 (a) How is sex determined in man? (4 marks)
- (b) (i) Differentiate between sickle cell anaemia and sickle cell trait. (2 marks)
- (ii) Explain why people with sickle cell trait have an adaptive survival advantage over normal individuals in malaria endemic regions. (2 marks)
- 5 The diagram below represents the transverse section of the spinal cord.



- (a) Name the part labelled **H**. (1 mark)
- (b) State **two** functions of the fluid found in the part labelled **J**. (2 marks)
- (c) Give a reason for the colour of white matter. (1 mark)
- (d) Name and give the function of the enzyme found at the part labelled **K**.  
 Name ..... (1 mark)  
 Function .....  
 ..... (2 marks)
- (e) On the diagram, use an arrow to show the direction of impulse transmission along the neurone labelled **1**. (1 mark)

**SECTION B (40 marks)**

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

- 6 An experiment was done to determine the uptake of nitrogen from the soil by broad bean seedlings. The experiment was done with one set of seedlings **M** grown in the atmosphere enriched with carbon (IV) oxide and another set up of seedlings **N** grown in the normal atmosphere.

The amount of nitrogen in each seedling was measured in milligrams at intervals of ten days. The table below shows the results obtained.

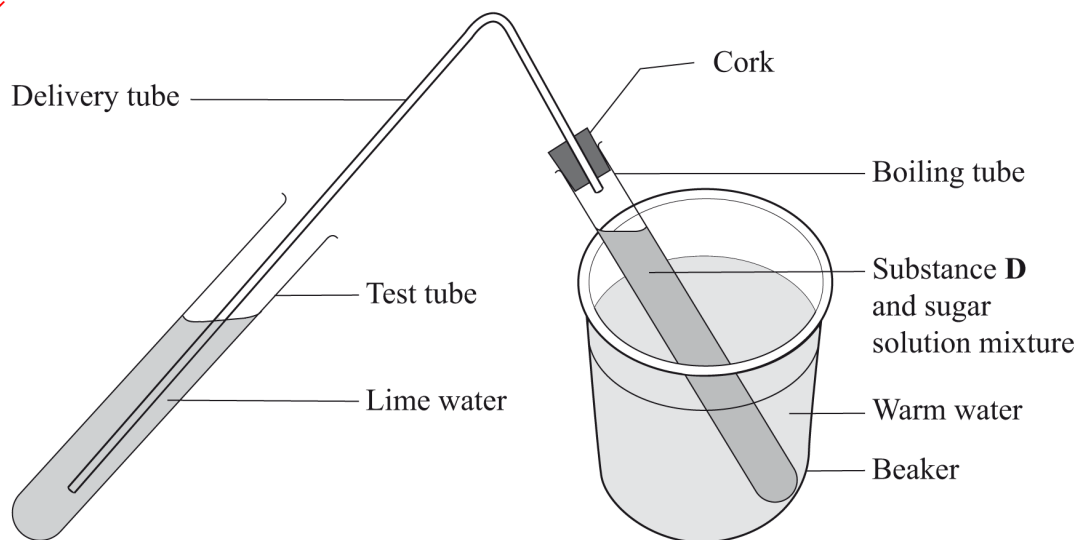
	Amount of Nitrogen in Milligrams									
<b>SET M</b>	0	25	70	125	160	395	635	860	895	915
<b>SET N</b>	0	15	35	50	65	105	120	125	135	140
<b>TIME (DAYS)</b>	15	25	35	45	55	65	75	85	95	105

- (a) Using the same axis draw line graphs of nitrogen uptake by the two (**M** and **N**) sets of broad bean seedlings against time. (8 marks)
- (b) Determine the rate of uptake of nitrogen in Set **M** between 65 and 85 days. (2 marks)
- (c) (i) What is the relationship between carbon (IV) oxide concentration in the air and nitrogen uptake? (1 mark)
- (ii) Account for the relationship in (c)(i) above. (3 marks)
- (d) (i) What would happen to the concentration of nitrogen in the seedlings in set **M**, if after 75 days the seedlings are transferred to a normal atmosphere. (1 mark)
- (ii) Explain your answer in (d)(i) above. (2 marks)
- (e) State **three** ways in which nitrogen fixation occurs. (3 marks)
- 7 (a) Explain how each of the following factors affects the rate of photosynthesis:
- (i) temperature; (2 marks)
- (ii) chlorophyll concentration. (2 marks)
- (b) Describe the process of carbohydrate digestion in human beings. (16 marks)
- 8 (a) How does excretion take place in plants? (4 marks)
- (b) Describe the role of the human skin in homeostasis. (16 marks)

### 3.4.3 Biology Paper 3 (231/3)

- 1 (a) You are provided with solutions labelled **Q** and **R**, a substance labelled **D** and a delivery tube fitted with a rubber bung/cork.

- I Label solution **Q** as **lime water**.
- II Label solution **R** as **10% sugar solution**.
- III Add substance **D** to the 10% sugar solution.
- IV Tightly close/plug the boiling tube with the rubber bung/cork fitted with a delivery tube.
- V Dip the other end of the delivery tube in the test tube containing lime water.
- VI Put the boiling tube in the warm water bath at 40°C and allow the set up to stand as shown in the diagram below.
- VII Observe the set up for about 15 minutes.



- (i) State the observations made in the lime water. (2 marks)
  - (ii) Explain the observations made in the lime water. (2 marks)
  - (iii) Name the physiological process that was being investigated. (1 mark)
  - (iv) Write a word equation for the physiological process investigated. (1 mark)
  - (v) Why was the warm water bath used in the experiment? (2 marks)
- (b) Put a drop of the contents in the boiling tube on a microscope slide. Stain with a drop of methylene blue and cover with a cover slip. Observe it under a light microscope using low, medium and high power objective lenses.
- (i) Draw and label one of the structures observed under the high power objective lens. (3 marks)
  - (ii) State the magnification of your drawing. (1 mark)
  - (iii) State the identity of substance **D**. (1 mark)

2 You are provided with specimens labelled **E** and **F**.

- (a) (i) Name the sub-division to which the specimens belong. (1 mark)
- (ii) Using observable features on the specimens, give **two** reasons for your answer in (a)(i) above. (2 marks)

(b) State the differences between the

- (i) Leaves of specimens **E** and **F**. (5 marks)

LEAF **E**

LEAF **F**

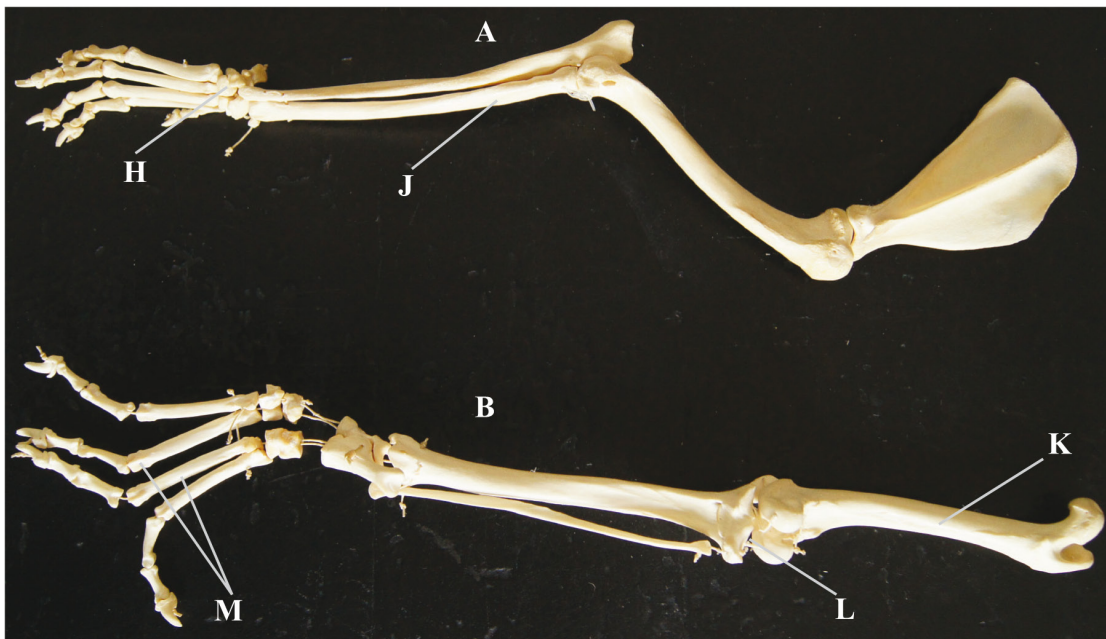
- (ii) Stems of specimens **E** and **F**. (2 marks)

STEM **E**

STEM **F**

- (c) Using observable features on the specimen, state the adaptation of the stem of specimen **E** to its habitat. (4 marks)

3 The photograph below shows two (**A** and **B**) skeletal limbs of a certain mammal.



- (a) (i) Which of the two (**A** and **B**) skeletons represents a forelimb? (1 mark)
- (ii) State **two** features observable on the skeleton to confirm your answer in (a)(i) above. (2 marks)

(b) Name the bones labelled **J**, **K** and **M**.

**J** ..... (1 mark)

**K** ..... (1 mark)

**M** ..... (1 mark)

(c) Which bone forms the second joint with the bone labelled **K**? (1 mark)

(d) Name the type of joint formed at the part labelled **H** and **L**.

**H** ..... (1 mark)

**L** ..... (1 mark)

(e) Apart from the bones, state the function of any **two** other components of a joint. (4 marks)

**Component**

**Function**