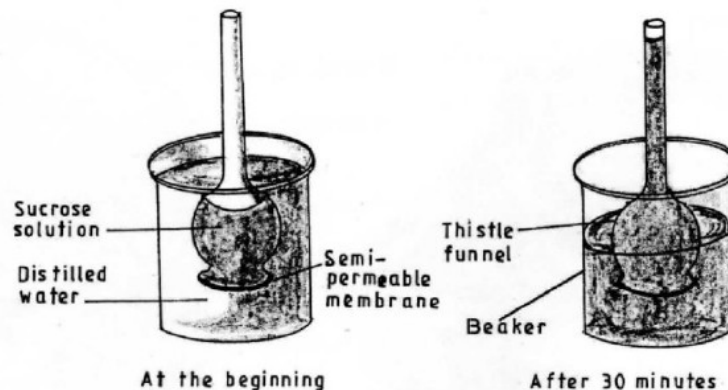


3.5 BIOLOGY (231)

3.5.1 Biology Paper 1 (231/1)

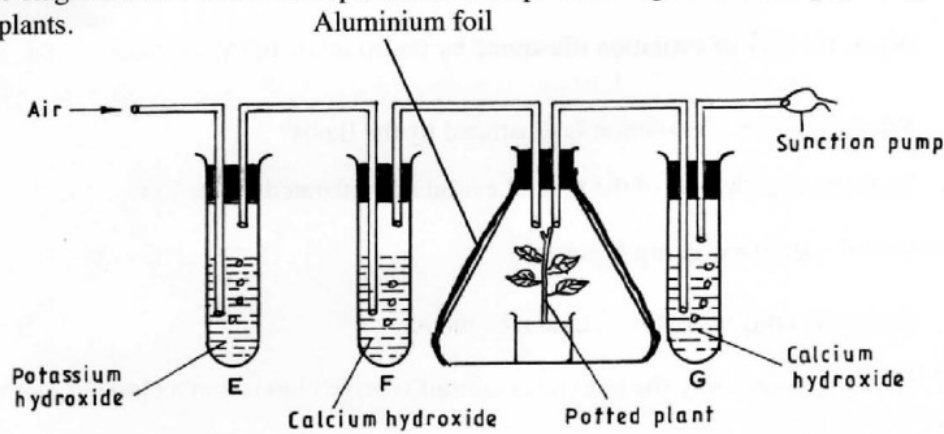
Answer *all* the questions in the spaces provided.

- 1 (a) What is meant by the term binomial nomenclature? (1 mark)
(b) State **two** guidelines that should be followed when typing scientific names. (2 marks)
- 2 During a lesson, students observed the structure of bat, cat and human forelimbs to determine their evolutionary relationship.
 - (a) State the name given to the structure of the limbs observed by the students. (1 mark)
 - (b) Name the type of evolution illustrated by the structure of the limbs observed. (1 mark)
 - (c) What evidence of evolution is illustrated by the limbs? (1 mark)
 - (d) State the significance of the type of evolution illustrated by the limbs. (1 mark)
- 3 An individual is of blood group **B** positive.
 - (a) Name the antigens in the individual's blood. (2 marks)
 - (b) Give the reason why the individual **cannot** receive blood from a blood group **A** donor. (2 marks)
- 4 Colour blindness is a sex linked trait controlled by a recessive gene **b**. If a mother is a carrier and the father is normal, what is the chance that their son will be colour blind? Show your working. (4 marks)
- 5 (a) State **two** advantages of using a coverslip when preparing a specimen for observation under a light microscope. (2 marks)
(b) How is the low power objective lens manipulated to focus a specimen for observation under a light microscope? (2 marks)
- 6 Students set up an experiment as illustrated below.

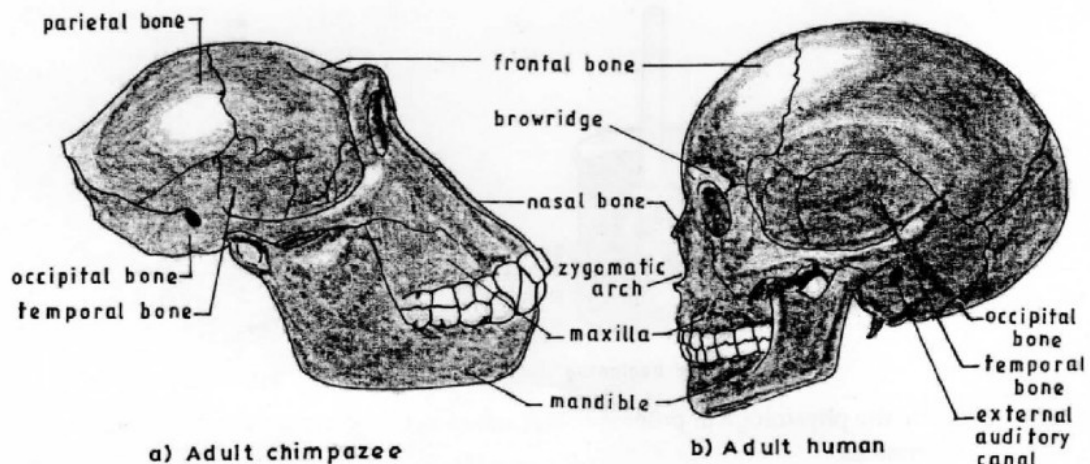


- (a) Name the physiological process that resulted in the observations made after 30 minutes. (1 mark)

- (b) State the importance of the physiological process investigated in plants. (1 mark)
- (c) Explain the observations made after 30 minutes. (2 marks)
- 7 How is a guard cell structurally adapted for gaseous exchange? (4 marks)
- 8 (a) Name the organism that:
- (i) causes malaria; (1 mark)
- (ii) transmits malaria. (1 mark)
- (b) State **two** control measures for malaria. (2 marks)
- 9 The diagram below shows an experimental set up to investigate a certain physiological process in plants.



- (a) State the aim of the experiment. (1 mark)
- (b) State the role of the following in the experiment:
- (i) potassium hydroxide; (1 mark)
- (ii) aluminium foil. (1 mark)
- (c) Account for the expected colour change in tube F. (2 marks)
- 10 The diagram below illustrates the skulls of adult human and chimpanzee.

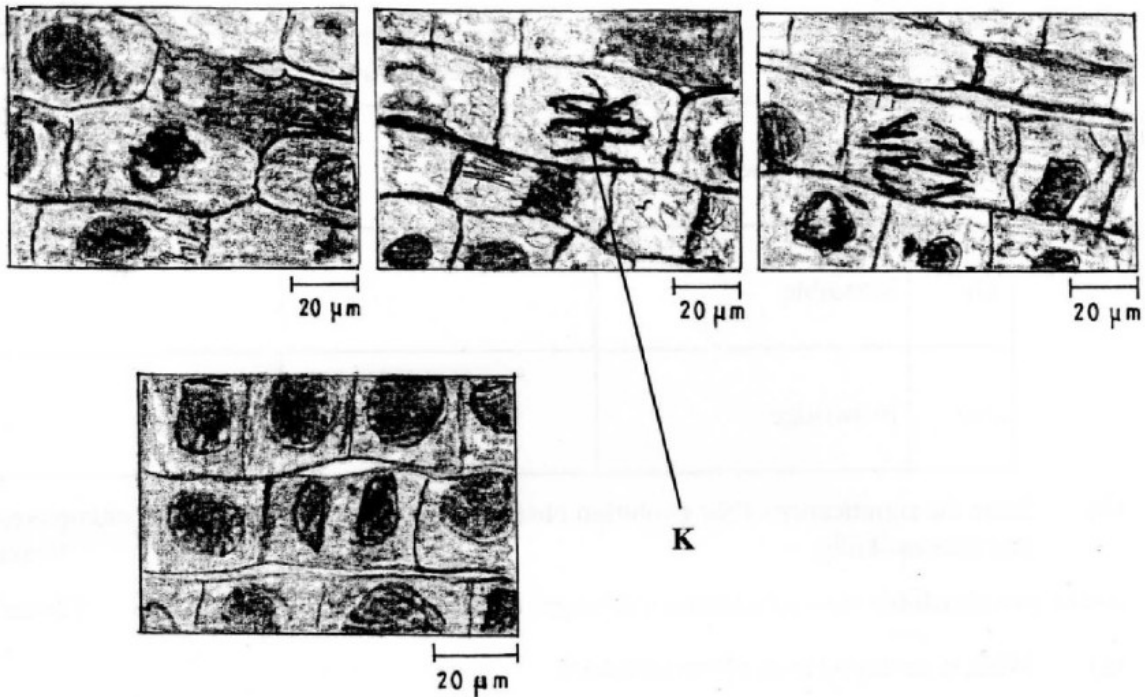


- (a) State **one** difference between the two skulls in the following structures: (3 marks)

	Structure	Chimpanzee Skull	Human Skull
(i)	Parietal bones		
(ii)	Mandible		
(iii)	Browridge		

- (b) State the significance of the evolution observed on the parietal bone in the chimpanzee and human skulls. (1 mark)
- 11 Name **two** structures used for gaseous exchange in plants. (2 marks)
- 12 (a) What is meant by each of the following:
- (i) pyramid of biomass? (1 mark)
- (ii) pyramid of numbers? (1 mark)
- (b) During an ecological visit to the Savanna Grassland, students were able to see lions, antelopes, vultures and pastoralists grazing their cattle. Construct a food chain with four consumer levels to illustrate the energy flow in the ecosystem. (2 marks)
- 13 State **three** differences between the end products of mitosis and meiosis. (3 marks)
- | | |
|----------------|----------------|
| Mitosis | Meiosis |
|----------------|----------------|
- 14 (a) Name **two** types of involuntary muscles in mammals. (2 marks)
- (b) State the location of each of the muscles named in (a) above. (2 marks)

15 The photomicrographs below show the various stages of cell division in a certain plant.



- (a) (i) Name the type of cell division illustrated. (1 mark)
(ii) Give a reason for your answer in (a) (i) above. (1 mark)
- (b) (i) Name the stage of cell division labelled **K**. (1 mark)
(ii) Give a reason for your answer in (b) (i) above. (1 mark)

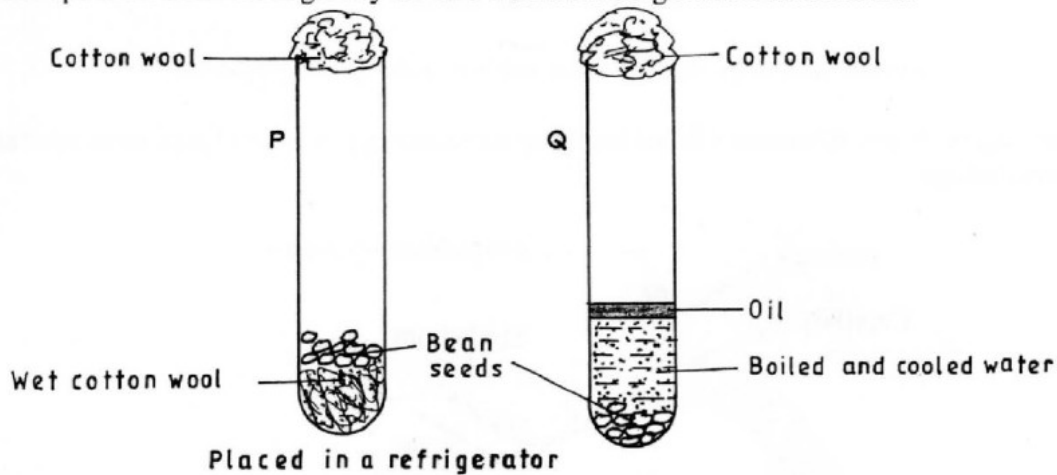
16 State **four** structural differences between millipedes and centipedes. (4 marks)

Millipedes

Centipedes

- 17 (a) How is a human stomach adapted to
- (i) protein digestion? (2 marks)
(ii) churning? (2 marks)
- (b) What happens to the glucose synthesized during photosynthesis? (2 marks)

- 18 The diagram below shows an experimental set-up to investigate the conditions necessary for germination. Test tube P was placed in a refrigerator while Q was left at room temperature. The set-ups were observed regularly for two weeks but no germination occurred.

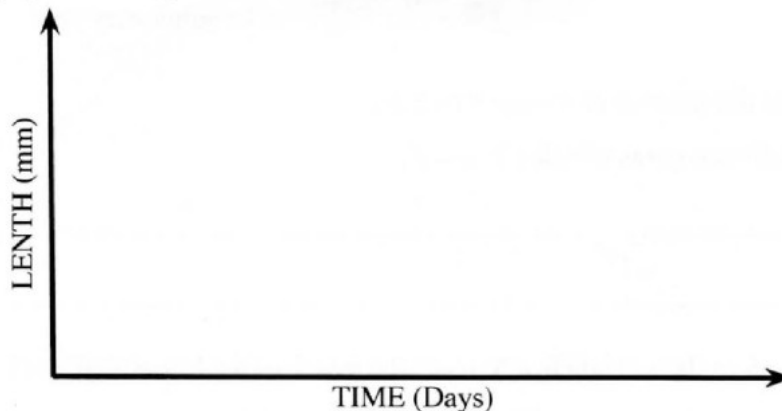


Explain the observations in P and Q.

P (2 marks)

Q (3 marks)

- 19 (a) Using the axes provided below, sketch a curve to illustrate the growth pattern observed in the phylum arthropoda. (2 marks)



- (b) Explain the growth pattern observed in arthropods. (3marks)

- 20 Below are components of a simple reflex pathway:

- interneurone;
- muscle;
- motor neurone;
- sensory neurone;
- pain receptor;
- central nervous system.

List the components in their proper sequence during the transmission of a nerve impulse.

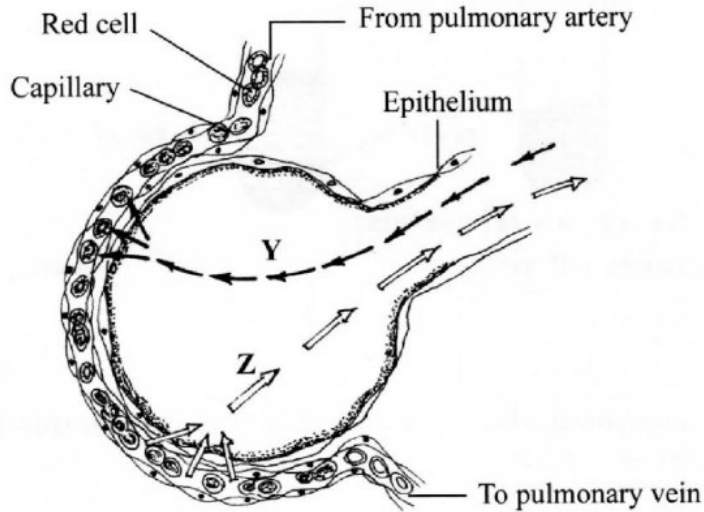
(3 marks)

3.5.2 Biology Paper 2 (231/2)

SECTION A (40 marks)

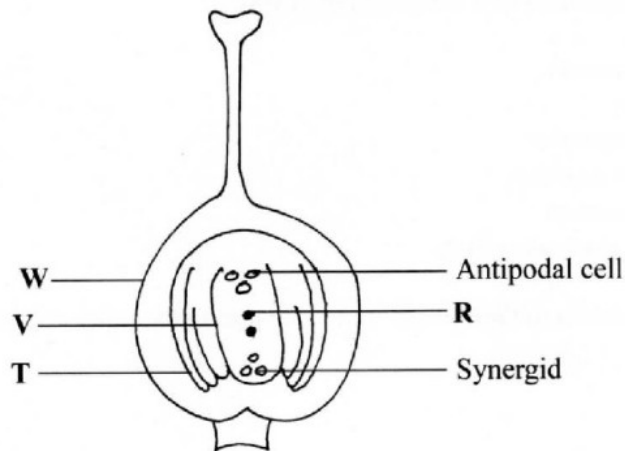
Answer **all** the questions in this section in the spaces provided.

- 1 The diagram below illustrates a blood capillary surrounding a structure for gaseous exchange in human beings.



- (a) Name the gaseous exchange structure. (1 mark)
- (b) Identify the gases labelled Y and Z.
- Y (1 mark)
- Z (1 mark)
- (c) How does the gas labelled Y reach the inside of the blood capillary? (3 marks)
- (d) How does cigarette smoking lead to lung cancer? (2 marks)

- 2 The diagram below illustrates the structure of the female part of a flower.



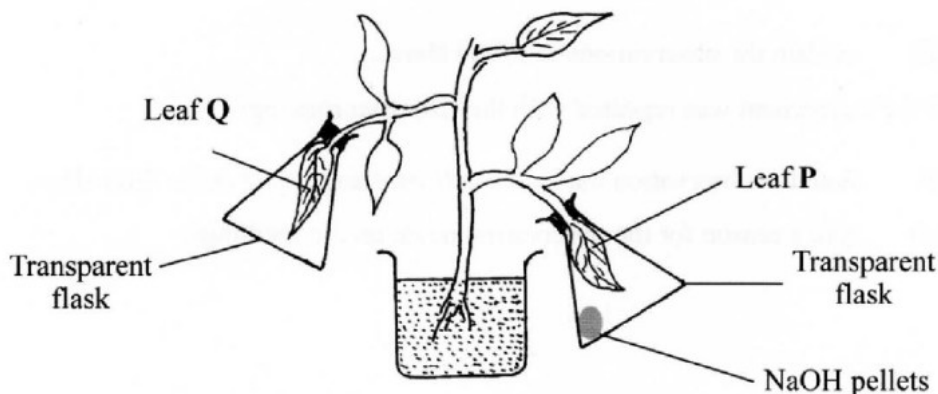
- (a) Name the part labelled **W**. (1 mark)
- (b) Describe what happens when the pollen tube enters the structure labelled **V**. (5 marks)
- (c) What do the structures labelled **R** and **T** develop into after fertilization?

R (1 mark)

T (1 mark)

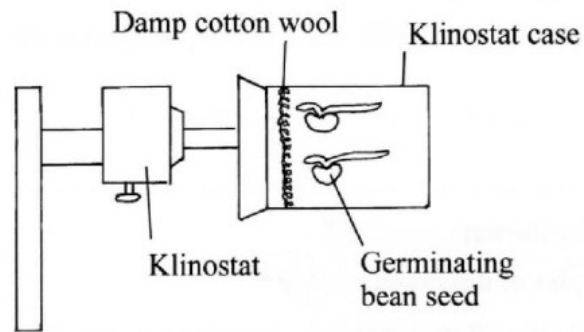
- 3 (a) What is meant by the term genetics? (1 mark)
- (b) State two examples of discontinuous variation. (2 marks)
- (c) A female with sickle cell trait marries a normal man. The allele for sickle cell is Hb^S and the normal allele is Hb^A . Determine the probability that their first born will have the sickle cell trait. Show your working. (5 marks)

4 In an experiment to investigate a factor affecting photosynthesis, a potted plant which had been kept in the dark overnight was treated as shown in the diagram below and exposed to light.



- (a) Why was the potted plant kept in the dark overnight? (1 mark)
- (b) Which factor was being investigated in the experiment? (1 mark)
- (c) (i) Which test did the students perform to confirm photosynthesis in the leaves labelled **P** and **Q**? (1 mark)
- (ii) State the results obtained in the leaves labelled **P** and **Q**.
 - P** (1 mark)
 - Q** (1 mark)
- (iii) Explain the results obtained in the leaves labelled **P** and **Q**.
 - P** (1 mark)
 - Q** (1 mark)
- (d) What was the purpose of leaf **Q** in the experiment? (1 mark)

- 5 In an experiment to investigate a plant response, the set up shown in the diagram below was used.

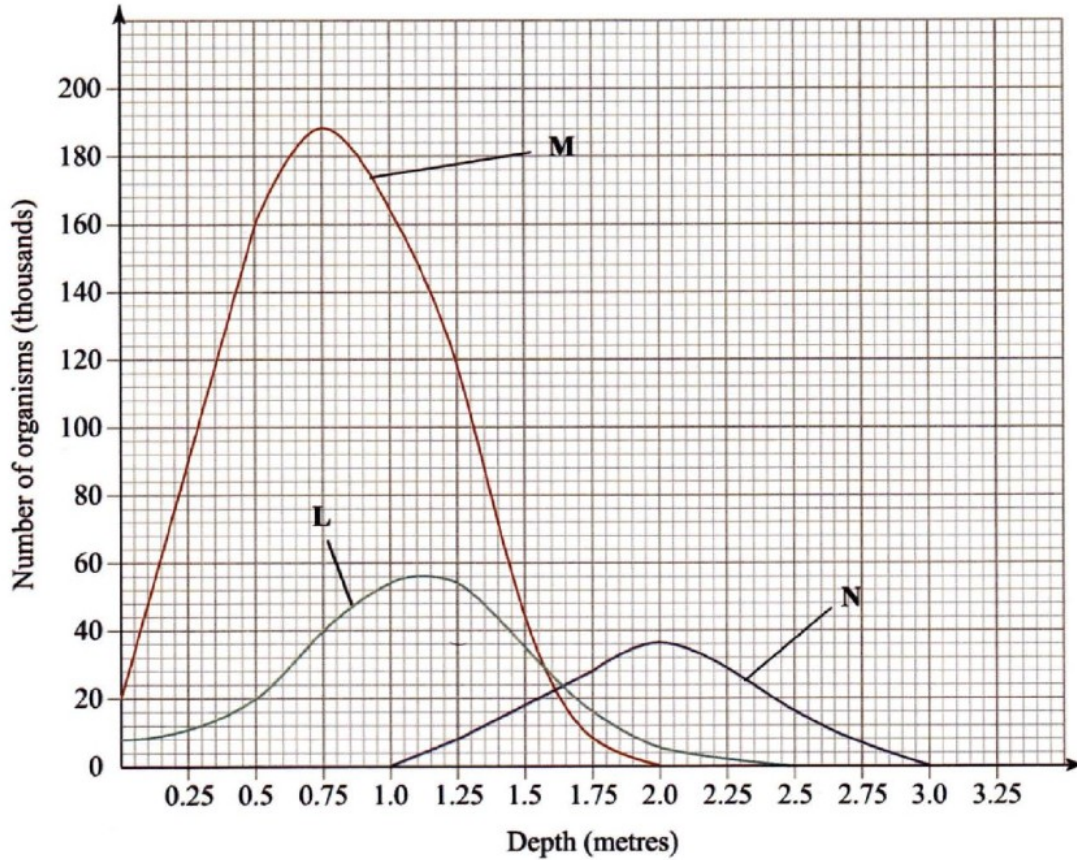


- (a) Name the type of response that was being investigated. (1 mark)
- (b) If the Klinostat was **not** rotating:
- (i) state the observations that would be made on the seedlings after three days; (2 marks)
- (ii) explain the observations in (b) (i) above. (3 marks)
- (c) If the experiment was repeated with the Klinostat rotating:
- (i) state the observation that was made on the seedlings after three days; (1 mark)
- (ii) give a reason for the observation made on the seedlings. (1 mark)

SECTION B (40 marks)

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

6 The graph below shows the relative numbers of three main species of organisms in a pond.



- (a) Giving a reason for your answer, which of the species is a
- (i) producer? (1 mark)
Reason(1 mark)
 - (ii) secondary consumer? (1 mark)
Reason (1 mark)
- (b) State the depths at which each of the populations labelled L, M and N is at its optimum.
- L (1 mark)
 - M (1 mark)
 - N (1 mark)

- (c) (i) Which method may have been used to determine the population of organisms labelled **N** in the pond? (1 mark)
- (ii) Give a reason for your answer in (c) (i) above. (1 mark)
- (iii) State the assumptions made when using the method in (c) (i) above. (4 marks)
- (d) State **two** reasons why primary productivity in the pond decreases with depth. (2 marks)
- (e) Explain the ecological importance of fungi to plants. (2 marks)
- (f) Why is flooding likely to lead to a cholera outbreak? (3 marks)
- 7** Explain the various ways in which seeds and fruits are adapted to dispersal. (20 marks)
- 8** How is a mammalian heart structurally adapted to its function? (20 marks)

3.5.3 Biology Paper 3 (231/3)

1 Using the pictures of animals provided below, complete the construction of the dichotomous key by filling the blank spaces. (13 marks)



Eagle



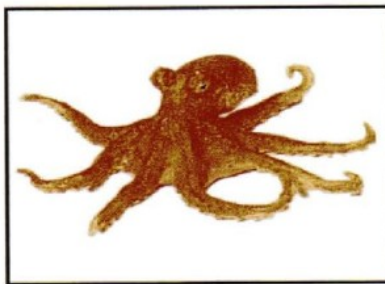
Fish



Earthworm



Tortoise



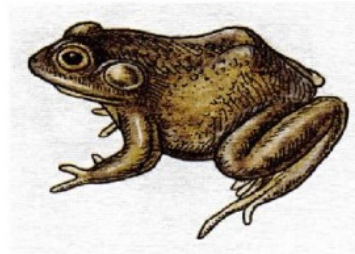
Octopus



Starfish



Spider

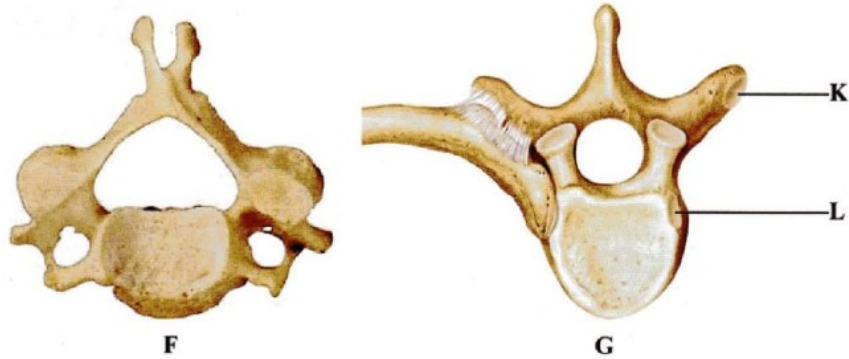


Frog

- | | | | |
|----|-----|--|----------------|
| 1. | (a) | Animals with a backbone | go to 2 |
| | (b) | Animals without a backbone | _____ |
| 2. | (a) | Animals with wings | _____ |
| | (b) | Animals without wings | _____ |
| 3. | (a) | Animals which live in water all the time | _____ |
| | (b) | Animals which live in water some time | _____ |
| 4. | (a) | Animals with scales | _____ |
| | (b) | Animals without scales | _____ |

- | | | | |
|----|-----|---|------------------|
| 5. | (a) | Animals with legs | _____ |
| | (b) | Animals without legs | go to 7 |
| 6. | (a) | Animals with six legs | Butterfly |
| | (b) | Animals with eight legs | _____ |
| 7. | (a) | Animals with a shell | Snail |
| | (b) | Animals without a shell | _____ |
| 8. | (a) | Animals with a jelly-like body | _____ |
| | (b) | Animals without a jelly-like body | _____ |
| 9. | (a) | Animals with a segmented body | _____ |
| | (b) | Animals without a segmented body | Octopus |

2 Below are pictures of three mammalian vertebrae.



H

- (a) Identify the type of vertebra labelled
- F** (1 mark)
- G** (1 mark)
- H** (1 mark)
- (b) Label **five** parts of the vertebra labelled **H**. (5 marks)
- (c) Name the articular facets labelled **K** and **L**.
- K** (1 mark)
- L** (1 mark)
- (d) How does each of the parts of a vertebra enable a mammalian skeleton to carry out its functions? (4 marks)

3 You are provided with a 250ml beaker, four test tubes, solutions labelled **D** and **E**, iodine and Benedict's solutions.

Half fill the beaker with the hot water provided to create a hot water bath.

- (I) Label the four test tubes as follows:
- (i) test tube 1, **D+Iodine**
- (ii) test tube 2, **D+E+Iodine**
- (iii) test tube 3, **D+Benedict's solution**
- (iv) test tube 4, **D+E+Benedict's solution**
- (II) Put 1 cm³ of solution **D** in each of the four test tubes.
- (III) To the **D+Iodine** test tube, add one drop of iodine solution and shake to mix.
- (IV) To the **D+E+Iodine** test tube, add 1 cm³ of solution **E** and two drops of iodine solution. Shake to mix.
- (V) To the **D+Benedict's solution** test tube, add 1 cm³ of Benedict's solution and shake to mix.
- (VI) To the **D+E+Benedict's solution** test tube, add 1 cm³ of solution **E** and 1 cm³ of Benedict's solution. Shake to mix.
- (VII) Observe the changes in each of the four test tubes.
- (VIII) Put all the four test tubes in the hot water bath and observe carefully for about five minutes.

- (a) Record the observations and conclusion for each of the four test tubes in the table below. (8 marks)

NO	TEST TUBE	OBSERVATION	CONCLUSION
1	D+ Iodine		
2	D+ E + Iodine		
3	D+ Benedict's solution		
4	D+ E + Benedict's solution		

- (b) What was the role of each of the following in the experiment?
- (i) solution E (1 mark)
 - (ii) hot water bath. (1 mark)
- (c) Give the identity of E in human beings. (1 mark)
- (d) Explain the observations made on the reagents tested with Benedict's solution. (2 marks)