1 (a) Name the external feature which is common in birds, fish and reptiles. (1 mark)

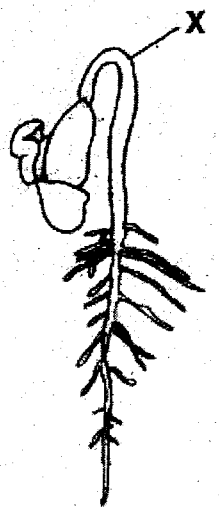
(b) State **two** characteristics of fungi. (2 marks)

2 Name **two** benefits that a parasite derives from the host. (2 marks)

3 State the functions of the following parts of a light microscope: (2 marks)
(a) Objective lens
(b) Diaphragm.

4 (a) **The state during which a seed cannot germinate even when conditions for germination are suitable is called** (1 mark)

(b) The diagram below represents a stage during germination of a seed.



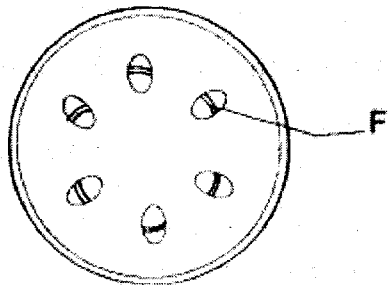

(i) Name the type of germination illustrated in the diagram. (1 mark)

(ii) State the role of the part labelled **X** during germination of the seed. (2 marks)

5 (a) What is meant by the following terms:
(i) hybrid vigour; (1 mark)
(ii) polyploidy? (1 mark)

(b) State **two** causes of chromosomal mutations. (2 marks)

6 The diagram below shows a section through a plant organ.




(a) (i) Name the class of the plant from which the section was obtained. (1 mark)
(ii) Give a reason for your answer in (a)(i) above. (1 mark)

(b) State the function of the part labelled F. (1 mark)

7 State the function of the following cell organelles:

(a) Ribosomes (1 mark)

(b) Lysosomes. (1 mark)

8 (a) Pregnancy continues if the ovary of an expectant mother is removed after 4 months. Explain. (2 marks)

(b) What is the role of the testes in the mammalian reproductive system? (2 marks)

9 (a) Name the causative agents of the following diseases in humans: (2 marks)
(i) typhoid;
(ii) amoebic dysentery.

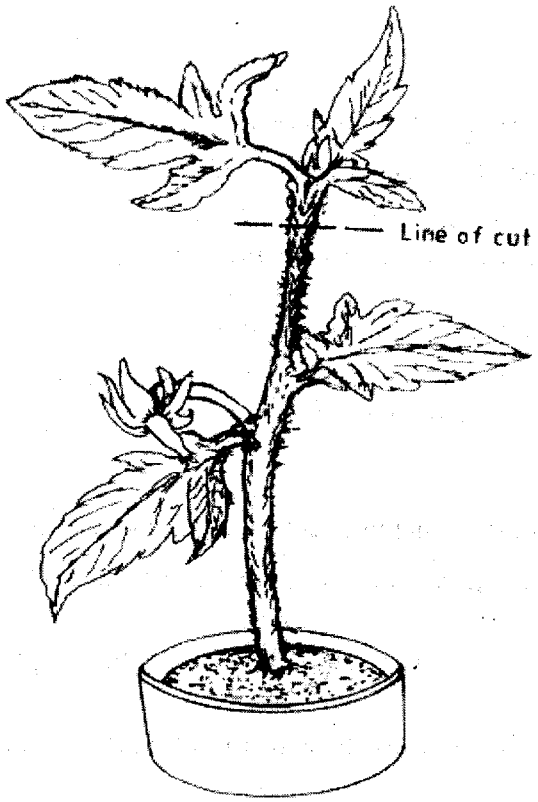
(b) Name the disease in humans caused by *Plasmodium falciparum*. (1 mark)

10 (a) (i) What is meant by vestigial structures? (1 mark)

(ii) Give an example of a vestigial structure in human. (1 mark)

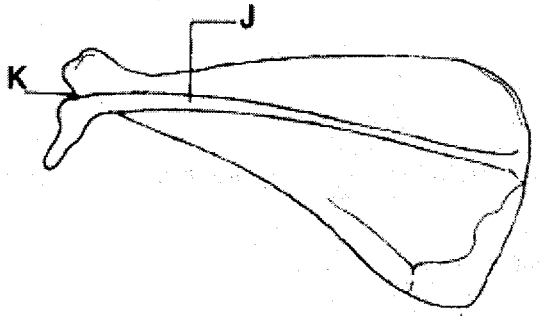
(b) Explain why certain drugs become ineffective in curing a disease after many years of use. (2 marks)

11 In an experiment the shoot tip of a young tomato plant was decapitated as shown in the diagram below.




(a) State the expected results after 2 weeks. (1 mark)
(b) Give a reason for your answer in (a) above. (2 marks)

12 The diagram below represents a bone obtained from a mammal.




(a) Name the bone. (1 mark)

(b) Name the:

(i) bone which articulates with the bone named in (a) above at the cavity labelled K; (1 mark)

(ii) joint formed by the two bones. (1 mark)

(c) State the function of the part labelled J. (1 mark)

13 (a) Distinguish between diffusion and active transport. (2 marks)

(b) State **one** role that is played by osmosis in:
(i) plants; (1 mark)

(ii) animals. (1 mark)

14 Name a support tissue in plants that is not thickened with lignin. (1 mark)

15 Name the type of movement that occurs within a plant cell. (1 mark)

16 (a) Name the gaseous exchange surface in insects. (1 mark)
(b) How is the surface named in (a) above suited to its function? (2 marks)

17 Explain why plants do not require specialised excretory organs. (4 marks)

18 Explain how the following factors affect the rate of photosynthesis:
(a) Concentration of carbon (iv) oxide (1 mark)

(b) Light intensity. (1 mark)

19 (a) State **three effects of dumping untreated sewage into a river.** (3 marks)

(b) Name **one process that is responsible for loss of energy from one trophic level to the next.** (1 mark)

20 Other than using the quadrat, give **two methods of estimating population of grass.** (2 marks)

21 Explain what happens in humans when the concentration of glucose in the blood decreases below the normal level. (4 marks)

22 Explain how the carnassial teeth of a dog are adapted to their function. (2 marks)

23 State the function of iron in the human body. (1 mark)

24 Explain how the following factors determine the daily energy requirement in humans:
(a) Age (1 mark)

(b) Occupation (1 mark)

(c) Sex. (1 mark)

25 State **two** ways in which aerenchyma tissues in aquatic plants are adapted to their function. (2 marks)

26 How are the mitochondria adapted to their function? (2 marks)

27 State **two** ways in which anaerobic respiration is applied in industries. (2 marks)

28 (a) State **three** structural differences between arteries and veins in mammals. (3 marks)

(b) Name a disease that causes thickening and hardening of arteries. (1 mark)

29 Explain why the rate of transpiration is reduced when humidity is high. (1 mark)

## SECTION A (40 marks)

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

1 When the offspring of purple and white flowered pea plants were crossed, they produced purple and white flowered plants in the ratio of 3:1.

Using letter H to represent the gene for purple colour,

(a) State the genotype of:

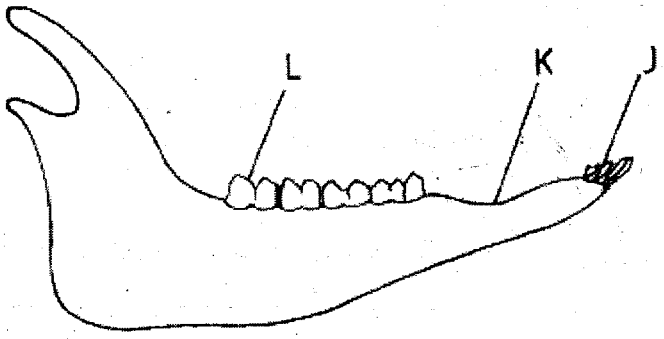
(i) parents; (2 marks)

(ii) $F_1$ generation. (1 mark)

(b) Work out the cross between plants in the $F_1$ generation. (4 marks)

(c) Account for the colour of the flowers in plants of the $F_1$ generation. (1 mark)

2 The diagram below represents the lower jaw of a mammal.




(a) Name the mode of nutrition of the mammal whose jaw is shown. (1 mark)

(b) State **one** structural and **one** functional difference between the teeth labelled **J** and **L**.

Structural. (1 mark)

Functional. (1 mark)

(c) (i) Name the toothless gap labelled **K**. (1 mark)

(ii) State the function of the gap named in (c)(i) above. (1 mark)

(d) Name the substance that is responsible for hardening of teeth. (1 mark)

3 (a) (i) What is meant by the term biological control? (1 mark)

(ii) Give an example of biological control. (1 mark)

(b) (i) What is eutrophication? (3 marks)

(ii) What are the effects of eutrophication? (3 marks)

(c) Name a substance that is responsible for acid rain. (1 mark)

4 (a) (i) Explain the changes that take place in the pupil and iris of a human eye when a person moves from a dark room to a room with bright light. (3 marks)

(ii) What is the significance of the changes explained in (a) (i) above? (1 mark)

(b) How does the human eye obtain nutrients? (3 marks)

(c) Explain why images that form on the blindspot are not perceived. (2 marks)

5 (a) Explain what happens when a wilting young plant is well watered. (3 marks)

(b) Name a support tissue in plants thickened with:

(i) cellulose; (1 mark)

(ii) lignin. (1 mark)

(c) Give **three functions of pectoral and pelvic fins in a fish.** (3 marks)

**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 carried out to investigate the effect of temperature on the rate of a reactior catalysed by an enzyme. The results are shown in the table below.

| Temperature (°C) | Rate of reaction in mg of products per unit time. |
|---|---|
| 5 | 0.2 |
| 10 | 0.5 |
| 15 | 0.8 |
| 20 | 1.1 |
| 25 | 1.5 |
| 30 | 2.1 |
| 35 | 3.0 |
| 40 | 3.7 |
| 45 | 3.4 |
| 50 | 2.8 |
| 55 | 2.1 |
| 60 | 1.1 |

(b) When was the rate of reaction 2.6 mg of product per unit time? (2 marks)

(c) Account for the shape of the graph between:

(i) 5°C and 40°C; (2 marks)

(ii) 45°C and 60°C. (3 marks)

(d) Other than temperature name **two ways** in which the rate of reaction between 5°C and 40°C could be increased. (2 marks)

(e) (i) Name **one** digestive enzyme in the human body which works best in acidic condition. (1 mark)

(ii) How is the acidic condition for the enzyme named in (e)(i) above attained? (2 marks)

(f) The acidic condition in (e)(ii) above is later neutralised.

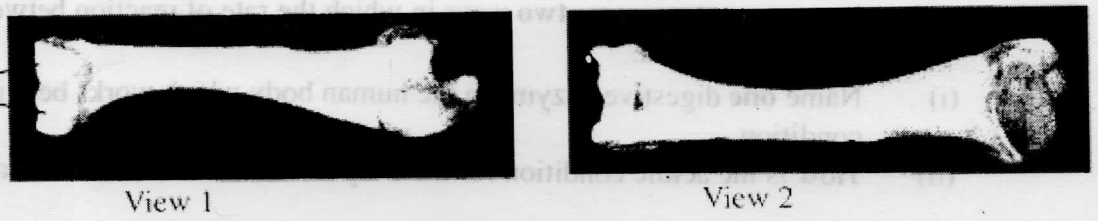
(i) Where does the neutralisation take place? (1 mark)

(ii) Name the substance responsible for neutralisation. (1 mark)

7 How are flowers adapted to wind and insect pollination? (20 marks)

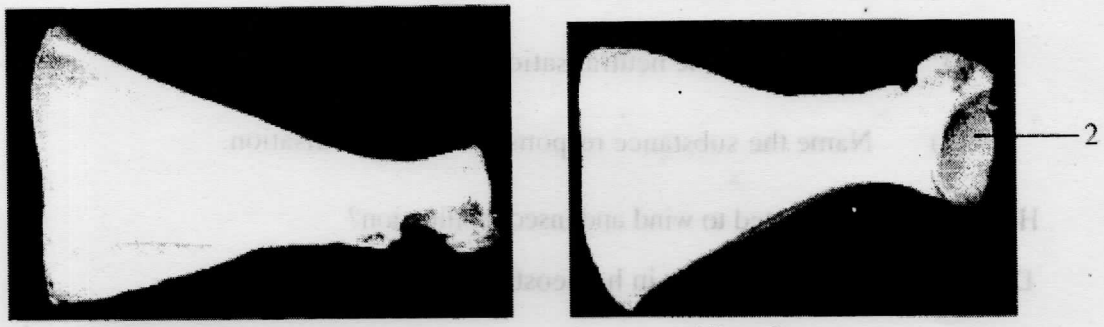
8 Describe the role of the liver in homeostasis in the human body. (20 marks)

1 The photographs labelled **K**, **L**, **M**, **N** and **P** below are of bones obtained from a mammal. For each of the bones **K**, **L** and **M** two views are shown.



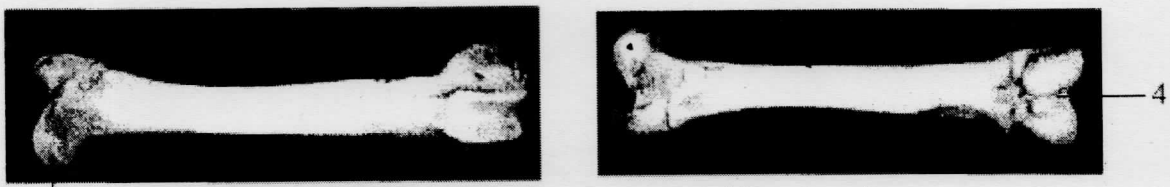

View 1 View 2

**Bone K**



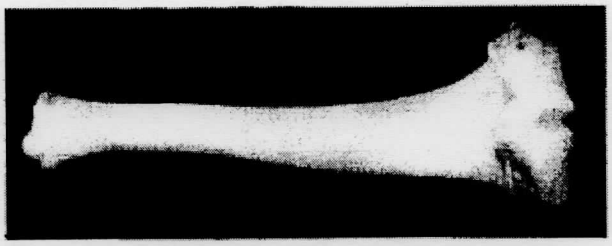

View 1 View 2

**Bone L**

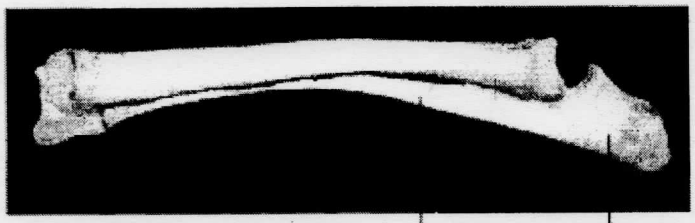



View 1 View 2

**Bone M**



**Bone N**



**Bone P** 5 6

(a) Identify the bones and name the part of the mammalian body from which each was obtained. (5 marks)

| Bone | Identity of the bone | Where found |
|---|---|---|
| K | ..... | ..... |
| L | ..... | ..... |
| M | ..... | ..... |
| N | ..... | ..... |
| P | ..... | ..... |

(b) Name the parts labelled 1, 2, 3, 4 and 5. (5 marks)

1 .....

2 .....

3 .....

4 .....

5 .....

(c) Name the bones that form a joint with bone **K** at its anterior and posterior end and in each case name the type of joint they form. (4 marks)

Anterior end

(i) Bone(s) .....

(ii) Type of joint .....

Posterior end

(i) Bone(s) .....

(ii) Type of joint .....

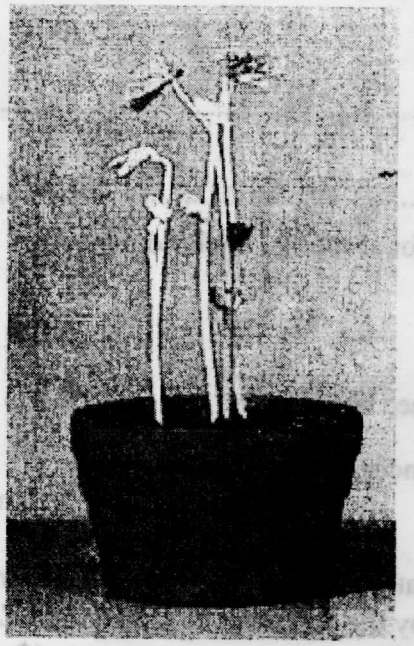
(d) State the function of the structure labelled 6 in bone **P**. (1 mark)

2 You are provided with substances labelled **P, Q, X, Y** and **Z**. **P** and **Q** are food substances, while **X** is dilute hydrochloric acid, **Y** is dilute sodium hydrogencarbonate and **Z** is Benedict's solution. Carry out tests to determine the food substance(s) in **P** and **Q**.

(12 marks)

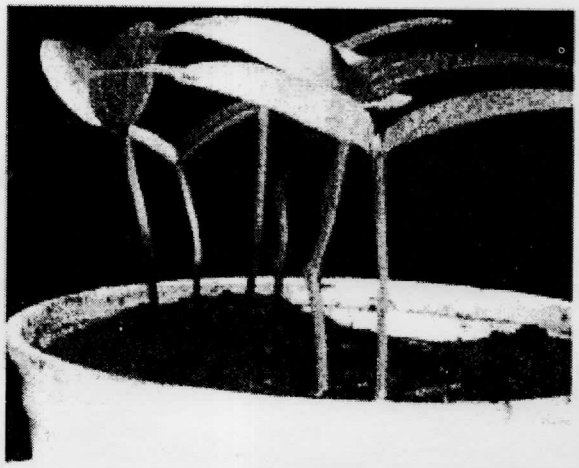
| Substance | Food substance being tested for | Procedure | Observations | Conclusion |
|---|---|---|---|---|
| **P** | | | | |
| **Q** | | | | |

3 The photographs labelled **W, X, Y** and **Z** show seedlings that were grown under different conditions. Examine them.

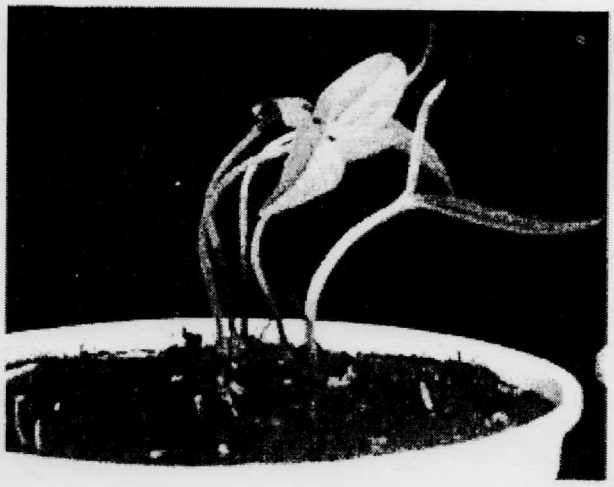


W

X



Y



Z

(a) Label any **three** parts of the seedlings in photograph **W**. (3 marks)

(b) (i) Name the type of germination exhibited by the seedlings. (1 mark)

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

(c) Seedlings in photographs **W** and **X** were planted at the same time.

State the conditions under which the seedlings were grown. **(2 marks)**

Seedlings in photograph **W** .....

Seedlings in photograph **X** .....

(d) When plants are grown in the condition named for seedlings in photograph **W**, they exhibit a certain phenomenon.

(i) Name the phenomenon. **(1 mark)**

(ii) State the significance of the phenomenon named in d(i) above. **(1 mark)**

(e) Using observable features only state three differences between the seedlings in photographs **W** and **X**. **(3 marks)**

(f) Seedlings in photographs **Y** and **Z** were planted at the same time but under different conditions. Explain how the response exhibited by the seedlings in photograph **Z** occurred. **(2 marks)**