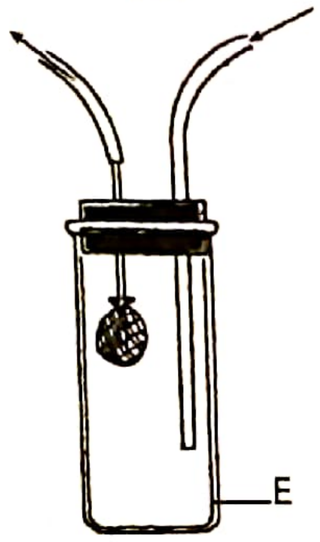
*Answer **all** the questions in the spaces provided.*

1 The following diagram shows an apparatus used in ecological studies.



(a) Name the apparatus. (1 mark)

Pooter / Aspirator;

(b) Why is glass preferred in the making of the part labelled **E**? (1 mark)

Glass is transparent / to (clearly) see / observe / study the observable features / characteristics of the collected specimen); therefor allow light and the specimens can be seen / viewed

2 (a) Name the Kingdom whose members are all microscopic. (1 mark)

Monera

(b) State **two** diseases caused by organisms belonging to the Kingdom named in 2(a). (2 marks)

Whooping cough/Pertusis; Cholera; Tuberculosis; Dental carries; Gonorrhoea; Anthrax; Typhoid; Syphilis; Tetanus; Meningitis; Pneumonia; Diph

3 During a microscopy practical, the following materials were provided:

- a temporary mount of an onion epidermis
- a transparent ruler

(a) State the aim of the experiment. (1 mark)

To estimate the size/diameter of a cell/cells (visible in the field of view);

(b) Explain how the aim stated in 3(a) can be achieved. (3 marks)

- Using the ruler determine the size of field of view (in mm);
- Count the (no. of) cells (that fits) across the field of view;
- Calculate / work out the diameter / size of one cell (in Mm) /

Diameter / size of one cell = Diameter of field of view (in Mm)
No. of cells.

4 The following diagram represents a specialized animal cell.

(a) Identify the cell. (1 mark)

Sperm (cell); / spermatozoon;

(b) (i) Name the cell organelle that is likely to be found in abundance in the part labelled **F**. (1 mark)

Mitochondrion; Accept Mitochondria

(ii) Explain the answer in 4(b)(i). (2 marks)

Mitochondria enable the cell to respire hence provide energy; which aid in propulsion (of the cell);

5 Name **two** components of blood that are absent in the tissue fluid. (2 marks)

Red blood cell / Erythrocytes;

Some White blood cell / Leucocytes / non-Phagocytic leucocytes;

~~Plasma~~ Protein; Platelets / Thrombocytes;

6 Name the structures in plants through which the processes of transpiration and guttation occur.

Process	Structures in plants where it occurs
a) Transpiration	Stomata / stoma; cuticle(s); lenticel(s); (1 mark)
b) Guttation	Hydathodes; (1 mark)

7 Name **two** Classes of the Phylum Arthropoda that have a cephalothorax. (2 marks)

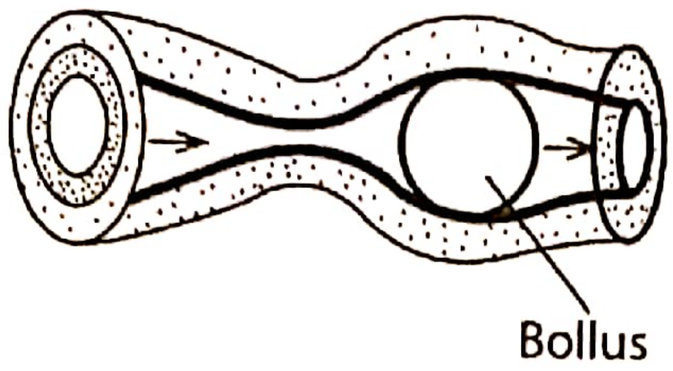
Crustacea ;

Arachnida ;

8 (a) Name the source of hydrochloric acid in the human alimentary canal. (1 mark)

Gastric glands / parietal cells / oxyntic cells ;

(b) The following diagram shows a process along the mammalian digestive system.



(i) Name the process. (1 mark)

Peristalsis ;

(ii) State **two** roles of the process in digestion. (2 marks)

• Facilitate Movt of food (along the digestive tract/system) ;

• Enables Mixing of food (down the alimentary canal) ;

• Enables large intestines/colon/rectum to absorb water from undigested food ;

Name **one** blood disorder caused by gene mutation. (1 mark)

// Sickle cell anaemia / sickle cell trait ; // Haemophilia ;

Name the stage in meiosis where each of the following processes occur:

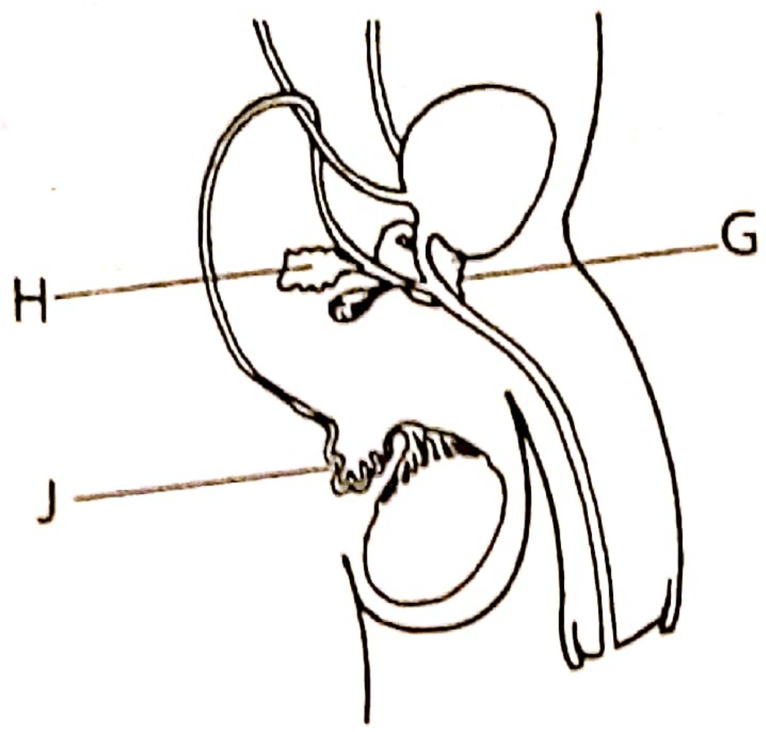
(a) formation of spindle fibres; (1 mark)

Metaphase I / Metaphase II ;

(b) disappearance of nucleolus. (1 mark)

Prophase I / Prophase II ;

11 The following diagram represents part of the human male reproductive system.



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

Prostate gland;

(b) State **one** function of the structure labelled **H**. (1 mark)

• Provides an alkaline fluid to neutralize the acidity of vaginal fluide/ Provides nourishment to the spermatozoa / Aid in sperm movt;

(c) How is the structure labelled **J** adapted to its function? (2 marks)

• Highly coiled;

• To increase the S.A for the storage of the sperms;

12 How do the following structural modifications in plants minimize the rate of water loss?

(a) Leaf folding. (1 mark)

• Reduces the S.A exposed (to light / temperature);

(b) Sunken stomata. (1 mark)

• Water vapour / Moisture accumulates / is departed in the pits / sunken stomata reducing the diff. gradient / saturation deficit (btwn internal air spaces & the pits / inside and outside the leaf);

State **two** reasons for the absence of complex excretory organs in plants. (2 marks)

• Wastes form slowly / little wastes accumulate (due to the inactivity of the plants);

• Some waste materials are recycled / reutilized;

• The wastes are less toxic;

• Some are stored in Plant Parts that are later shed off / stored in dead tissues;

14 State the significance of each of the following characteristics in mammalian gaseous exchange structures and surfaces.

(a) Presence of rings of cartilage in the trachea. (1 mark)

Keep the trachea/wind pipe open/ Prevent from collapsing (for gaseous exchange);

(b) Numerous blood capillaries lining the lungs. (1 mark)

Increase the S.A for diffusion of (respiratory) gases/ increase diffusion gradien / rapid transport of (respiratory) gases/ creates a steep concentration gradient;

15 (a) What is the **most** appropriate method of estimating the population of black ants in a school playing field? (1 mark)

Quadrat/ capture - recapture method;

(b) Why are shorter food chains advantageous in an ecosystem? (2 marks)

- They have fewer less trophic / feeding levels; therefore,
- (more) energy is conserved /minimize /reduce loss of energy;

16 (a) Using an example, define *convergent evolution.* (2 marks)

Is the modification of structures of organisms of different ancestral/embryonic origin to perform similar functions; eg wings of insects & birds / wings of bats/insects (modified for flying) / eyes of Mammals & limbs of mammals and Arthropods / Flippers of whales & fins of fish;

(b) Explain how *natural selection* is advantageous to living organisms. (3 marks)

It serves to identify organisms with desirable traits/ ~~advantageous~~ adaptations that help them survive and reproduce; eliminate organisms with harmful traits (that are less likely to survive and reproduce); pass on beneficial genetic traits/ mutations to subsequent generations through

17 (a) (i) Name the blood vessel that carries oxygenated blood from the heart to the rest of the body tissues. (1 mark)

Aorta;

(ii) State the role of tricuspid valve in the mammalian heart. (1 mark)

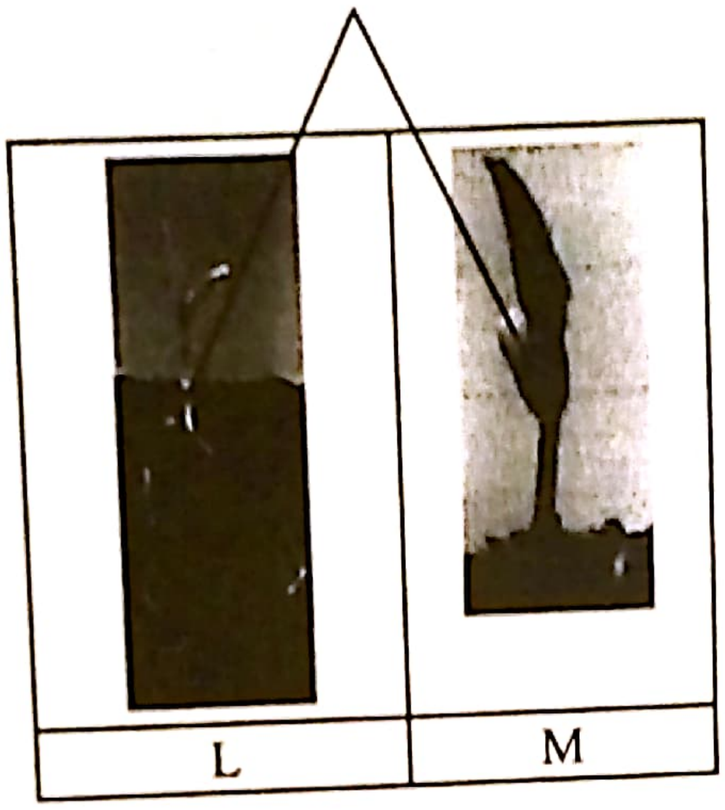
Prevent back-flow into the right atrium (when ventricle muscles contract) / allow flow of blood from right atrium into the right ventricle;

(b) Why are people with blood group **O** referred to as universal donors? (2 marks)

• Blood group O lack antigens / A B ; therefore,

• No agglutination (with recipient antibodies) ;

18 The following diagram shows germination in two different seedlings labelled **L** and **M**.



(a) (i) Identify the type of germination shown in seedling **L**. (1 mark)

Hypogeal ;

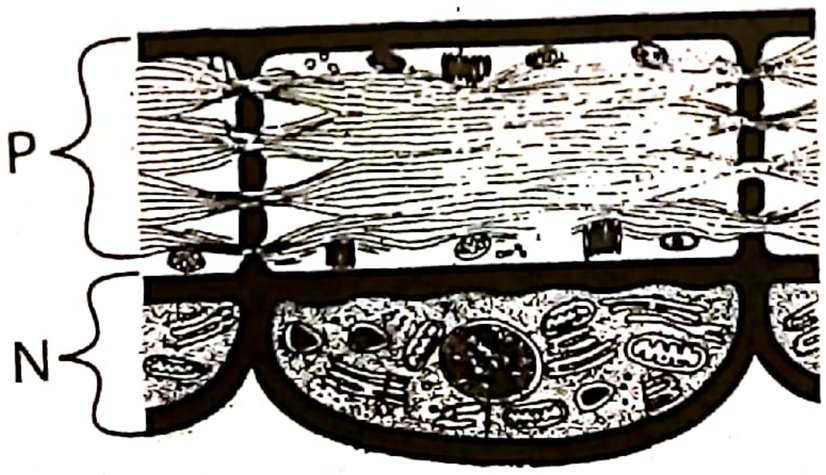
(ii) Give a reason for the answer in 18(a)(i). (1 mark)

• The cotyledon remains below the soil surface / underground.

(b) State **one** common function of the parts labelled **K** in seedlings **L** and **M**. (1 mark)

• storage of food / contain digestive enzymes that breakdown / hydrolyse (stored) food (needed for germination) ;

19 The following diagram represents a longitudinal section through a phloem tissue.



(a) Account for the high concentration of mitochondria in the part labelled N. (3 marks)

• To synthesize the energy;
• Needed for the active transportation / translocation;
• Of food substances in / out of the sieve tubes;

(b) State **one** structural adaptation of the part labelled **P** to its function. (2 marks)

Ok the 1st one function no nbane

• Close to companion cells; for easy access of energy / nutrients;
• Filled with fine cytoplasmic Filaments; for streaming of food from one sieve tube to another;
• Has organelles placed against the wall; increase S.A for packaging of filaments;
• Has (sieve plates) sieve pores; to allow continuous flow of materials;

20 The following word equation represents a metabolic reaction taking place in an animal tissue.

Glucose ⟶ Lactic acid + Energy

(a) State the condition under which the reaction occurs. (1 mark)

In the absence of oxygen / insufficient supply of oxygen / Anaerobic conditions / Anaerobic respiration / Anaerobiosis;

(b) How does the size of an animal affect the rate of respiration? (3 marks)

Small bodied animals have larger SA:VR; exposed to higher / faster heat loss; hence higher rate of respiration to compensate for the lost heat; (and vice versa);

21 (a) How can sexual reproduction in organisms lead to the evolution of new species? (3 marks)

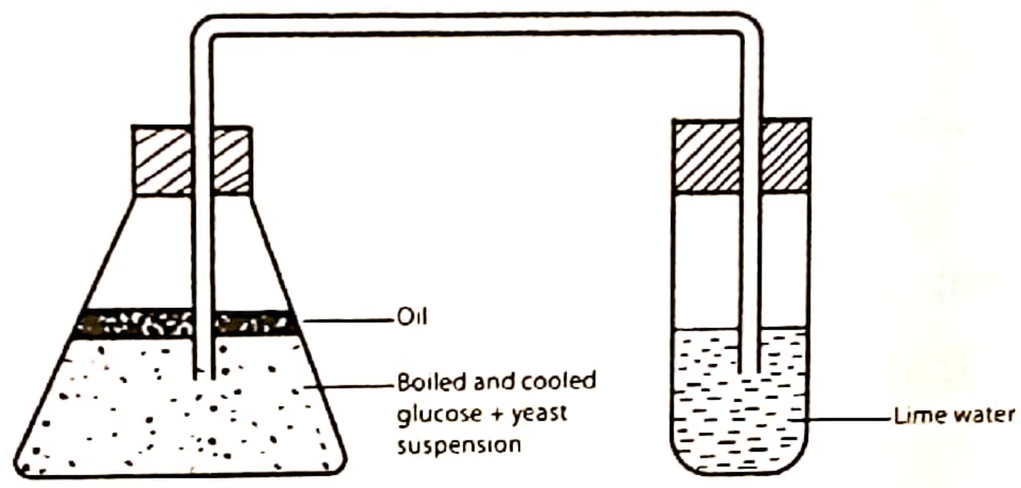
3 Points

• Gametes (with different genes/alles) from different parents;
• Fuse to form a new offspring;
• The varied offspring pass the desirable / advantageous traits to subsequent generations;
• Which may finally result in the establishment of new species over a long period of time; OWTTE

(b) State the role of continental drift in the evolution of organisms. (2 marks)

• Isolation/separation of organisms (with the same genetic composition) from the same origin to different environmental conditions; lead to the development of adaptive xtics/traits (for successful survival in the new habitat); OWTTE

22 The following diagram represents an experimental set-up used to investigate a certain biological process.



(a) (i) Identify the biological process that can be investigated using the set-up. (1 mark)

Anaerobic / Fermentation / Anaerobiosis;

(ii) Give a reason for the answer in 22(a)(i). (1 mark)

Boiling removes/drives out air/oxygen/the layer of oil prevents the entry/supply of oxygen/air;

(b) Write a word equation illustrating the reaction taking place in the experiment. (1 mark)

Glucose → Alcohol/Ethanol + Carbon(IV)oxide + energy (ATP);

(c) Suggest a modification on the set-up that would increase the rate of reaction in the conical flask. (1 mark)

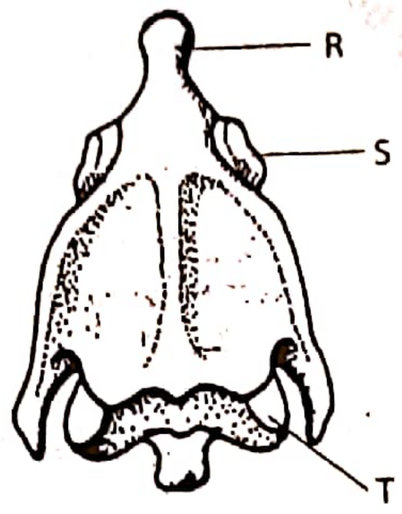
• Increasing temperature to optimum (to activate the respiratory enzyme);
• Increasing the concentration of yeast/Glucose;

Accept - Warming ei - introduce heat

(d) Why is it necessary to cool glucose before adding yeast in the conical flask? (1 mark)

• To avoid killing the yeast cells/denature the enzymes in the yeast/Zymase;

23 The following diagram represents a bone obtained from a mammalian axial skeleton.



(a) Identify the:

(i) bone; (1 mark)

Axis;

(ii) part labelled **R**. (1 mark)

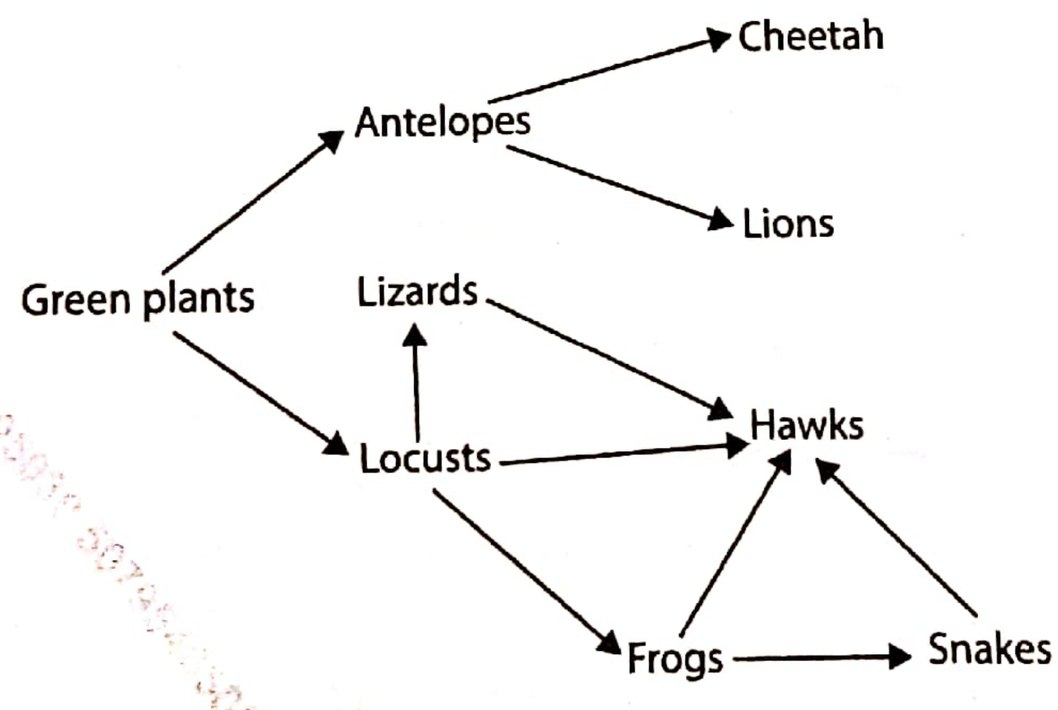
Odontoid process / Peg;

(b) Name the bones that articulate at the points labelled **S** and **T**.

S Atlas (1 mark)

T (Other) Cervical vertebra / 3rd cervical vertebra; (1 mark)

24 The following food web shows a feeding relationship found in a certain ecosystem.



(a) From the food web, identify the:

(i) organism with the lowest biomass; (1 mark)

Hawks;

(ii) trophic level occupied by lizards. (1 mark)

• Secondary consumer / 3rd trophic level;

(b) Name the type of feeding relationship between the:

(i) lion and the cheetah; (1 mark)

(Interspecific) Competition ; Rej intraspecific c

(ii) cheetah and the antelopes. (1 mark)

Predation / Predator-Prey relationship

(c) Explain the role bacteria would play in this ecosystem. (2 marks)

• Decomposition; for releasing / recycling of CMore nutrients in the ecosystem / cleaning the environment ;

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