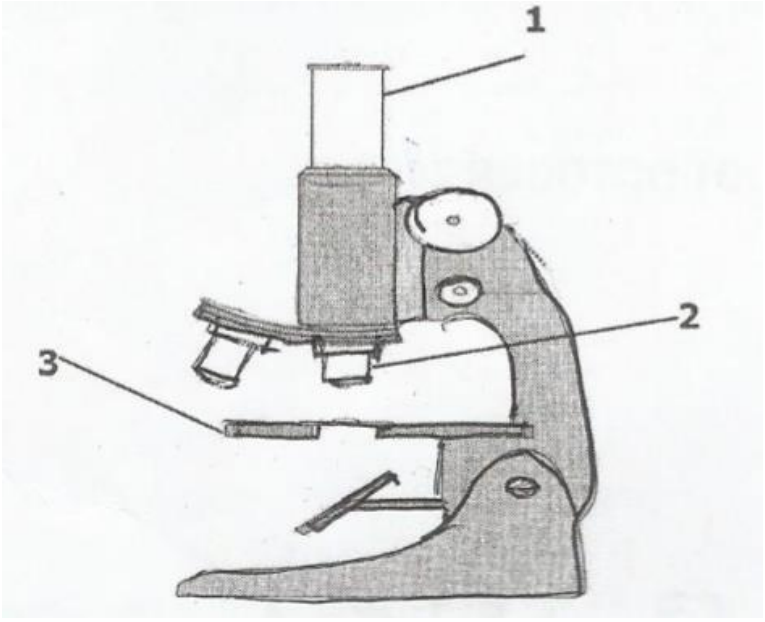
UNIT 1.0 PLANTS AND ANIMAL STRUCTURES

PAPER ONE (1) Type Questions (Multiple Choice)

1 The diagram shows a compound microscope.



What are the labelled parts 1, 2 and 3?

	1	2	3
A	Eye Piece	Objective Lens	Stage
B	Eye Piece	Objective Lens	Mirror
C	Objective Lens	Eye Piece	Stage
D	Objective Lens	Eye Piece	Mirror

Associated Facts and Reasoning

1 That is where the observers eye is directed.
2 The lens which is directed to the specimen.
3 Where a specimen slide is placed

Correct Answer is A.

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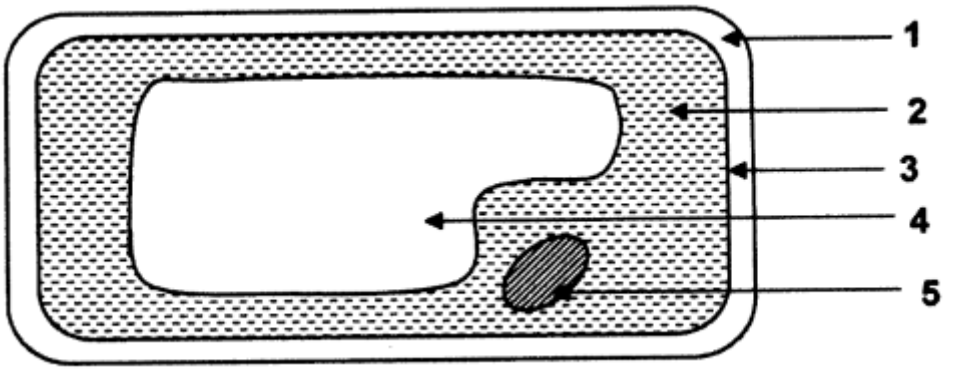
2 The diagram below shows a plant cell.



A 1, 2, 3

B 2, 3, 5

C 3, 4, 5

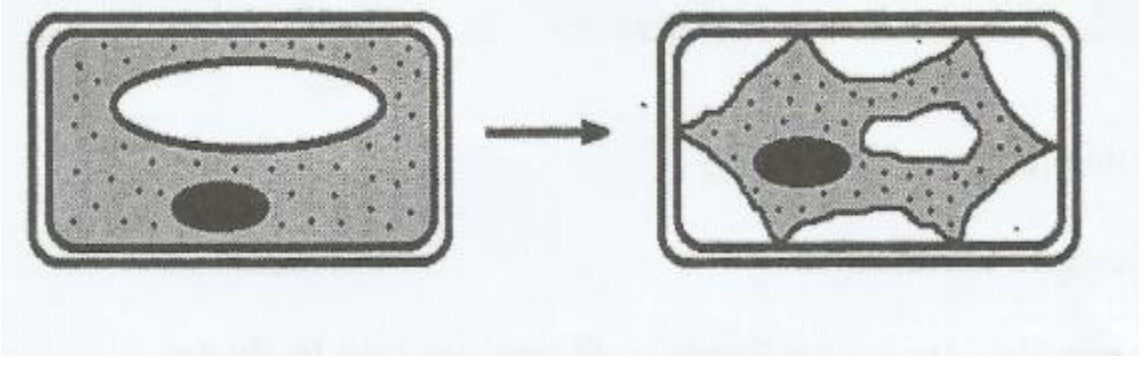
D 1, 4, 5

Reasoning

- Protoplasm consists mainly of cytoplasm and nucleus.
- In this case membrane is also included because it encompasses both cytoplasm and nucleus.

Correct answer is B

3 The diagram illustrates the effect of osmosis on a plant cell that has been placed in liquid Q for several minutes.



What type of liquid is Q?

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A Distilled water

B Isotonic solution

C Hypertonic solution

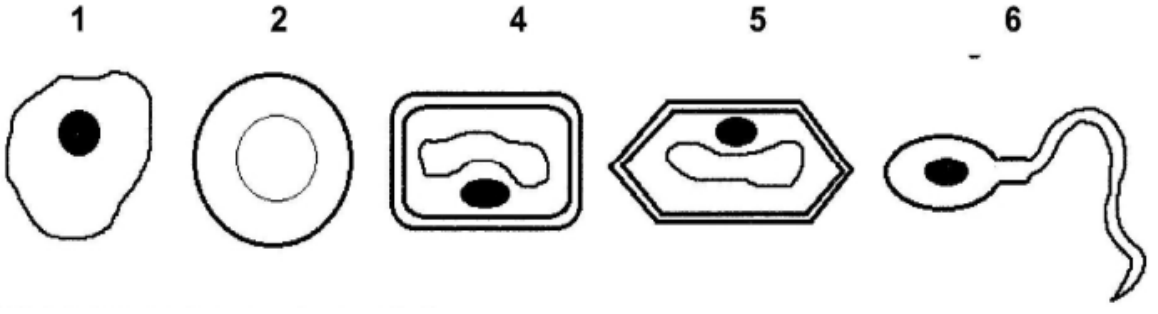
D Hypotonic solution

Associated Facts and Reasoning

- Distilled water has no solute in it.
- Isotonic solution: Two solution having the same osmotic pressure across semi-permeable membranes. This allows for free movement of water across the membrane without changing the concentration of the solution on either side.
- Hypertonic solution: This is the type of solution that has a greater concentration of solutes on the outside of a cell when compared with the inside of a cell. Therefor the liquid in the cell moves out to dilute the outside solution.
- Hypertonic: A solution that has less solute and move water than another solution.

The correct answer is C

4 The diagram below shows five different cells as seen through a microscope.



A 1 and 2

B 2 and 3

C 3 and 4

D 4 and 5

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Reason

1. It is an animal cell. It has no cell wall.
2. It is a disc shape i.e red blood cell.
3. and 4. both have cell walls.
5. It is a male reproductive cell i.e spermatozoon?

Correct answer is C

5 What parts of a plant are affected when the cell is immersed in concentrated sucrose solution? Cell_____.

A Wall and Membrane

B Wall and Cytoplasm

C Cytoplasm and Vacuole

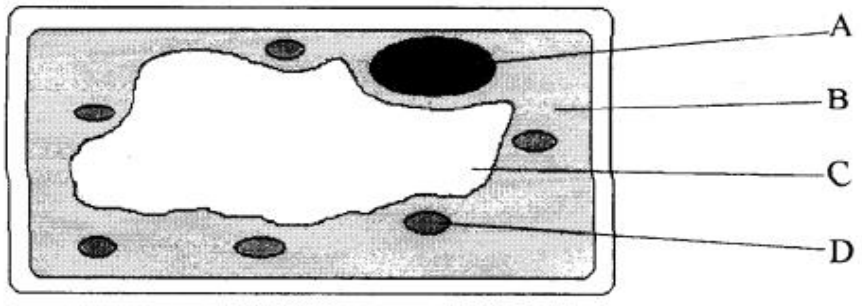
D Membrane and Cell wall

Reason

- The cell will lose liquid to go and dilute concentrated sucrose solution. Cytoplasm and Vacuole contain liquid.

Correct answer is C

6 The diagram below shows a cell from a leaf of a plant. Which of the labelled part below stores salts?



Reason

- In a plant cell water and dissolved mineral salts are stored in a vacuole.

Correct answer is C

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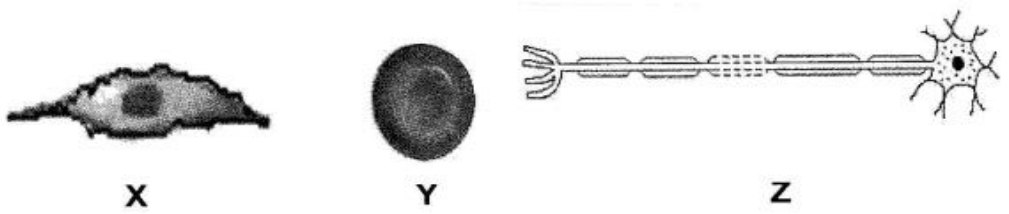
7 The diagram below shows three specialized cells found in a human being.



What is cell R, S and T?

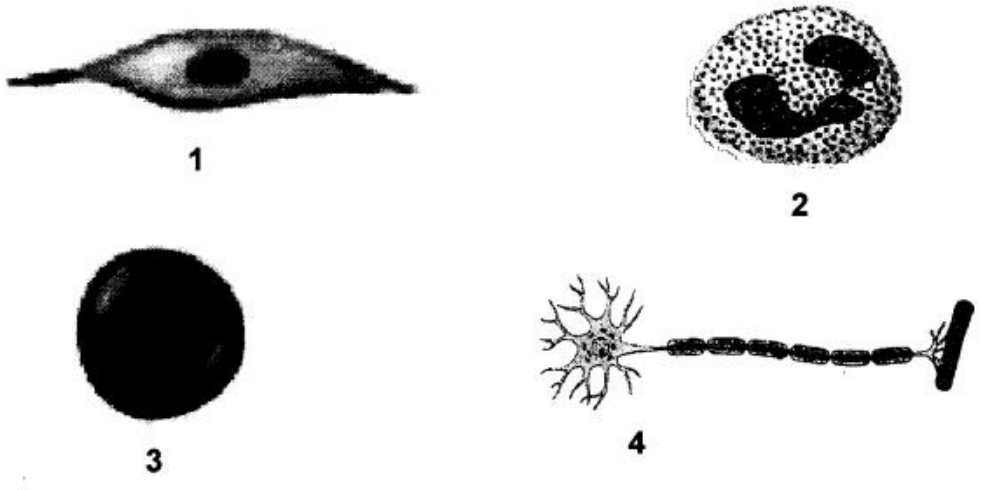
	Cell X	Cell Y	Cell Z
A	Blood	Nerve	Muscle
B	Muscle	Blood	Nerve
C	Nerve	Muscle	Blood
D	Muscle	Nerve	Blood

Reasoning.

R: is Muscle
S: is Red blood cell
T: Nerve cell

Correct answer is B

8 The diagram below shows four different animal cells as seen through a microscope.



What are these cells called?

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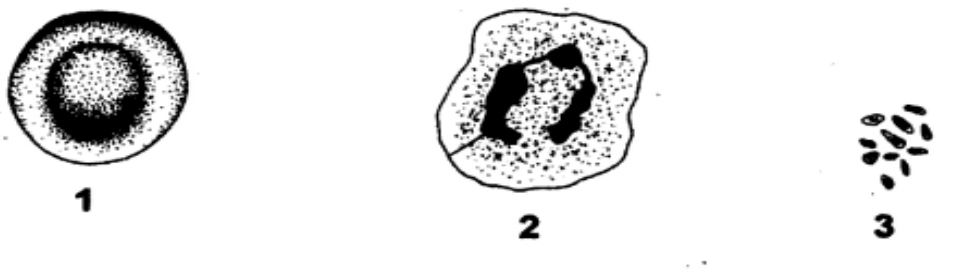
	1	2	3	4
A	Neuron	Red Blood Cell	White Blood Cell	Muscle Cell
B	Muscle Cell	White Blood Cell	Red Blood Cell	Neuron
C	Muscle Cell	Neuron	Red Blood Cell	White Blood Cell
D	White Blood Cell	Muscle Cell	Red Blood Cell	Neuron

Reasoning

1. Muscle
2. White Blood cell
3. Red Blood Cell
4. Neuron

Correct answer is B

9 The diagrams below represent cells of blood components.



Which of the following correctly identifies the function of blood component cell?

	1	2	3
A	Carry oxygen	Engulf Bacteria	Blood clotting
B	Blood clotting	Carry oxygen	Engulf Bacteria
C	Engulf Bacteria	Blood clotting	Carry oxygen
D	Carry oxygen	Blood clotting	Engulf Bacteria

Associated Facts and Reasoning.

1. Represents red blood cell, which carries oxygen.
2. Represent white blood cell, which engulf bacteria.
3. Platelets which produce fibrinogen which help in clotting of blood.

Correct answer is A

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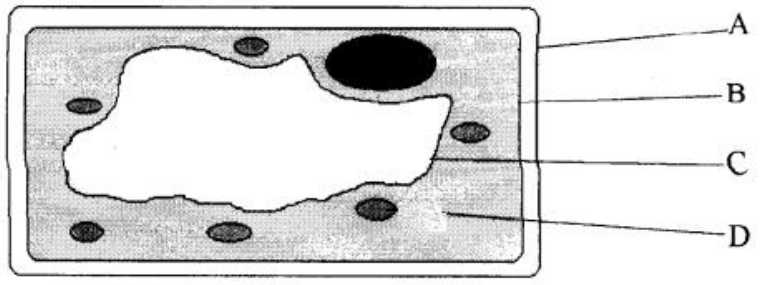
10 The diagram below shows a plant cell



Which labelled part controls the movement of substances into and out of the cell?

Associated Facts and Reasoning.

A. Represent cell wall
B. Represent cell membrane
C. Cytoplasm contains fluid and salts.
D. Vacuole store substances e.g mineral salts

Correct answer is B

11 Some stages in the preparation of the epidermis of an onion for observation under a microscope are listed below.

1. Focus the microscope
2. Place the epidermis in a glass slide
3. Peel the epidermis from an onion
4. Over the epidermis with a cover slide
5. Add iodine solution to the epidermis

Which one of the above is the correct order leading to the observation of the onion epidermis?

A	2	4	3	5	1
B	3	1	4	5	2
C	3	2	5	4	1
D	2	4	1	3	5

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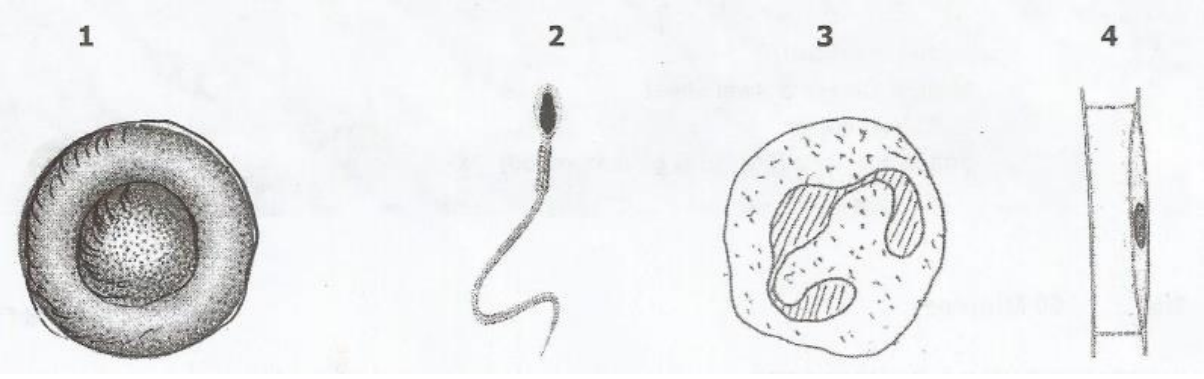
Associated Facts and Reasoning.

Peeling is done first. Placing the peel of onion on a glass is second step. Dropping iodine to the onion peel is the third step

Correct answer is C

12 Which of these cells can move on its on?



A 1 and 3

B 1 and 4

C 2 and 3

D 3 and 4

Associated facts and Reasoning

- Cell '1' is a red blood cell which is carried around the body by plasma
- Cell '4' is a plant cell which is stationary.
- Cell '2' is a sperm cell which is able to swim with the help of its tail.
- Cell '3' is a white blood cell. Though carried around the body by plasma, it is able to move within the plasma toward foreign body to engulf it.

Correct answer is C

13 The diagram shows a cross section of a dicot stem and root.

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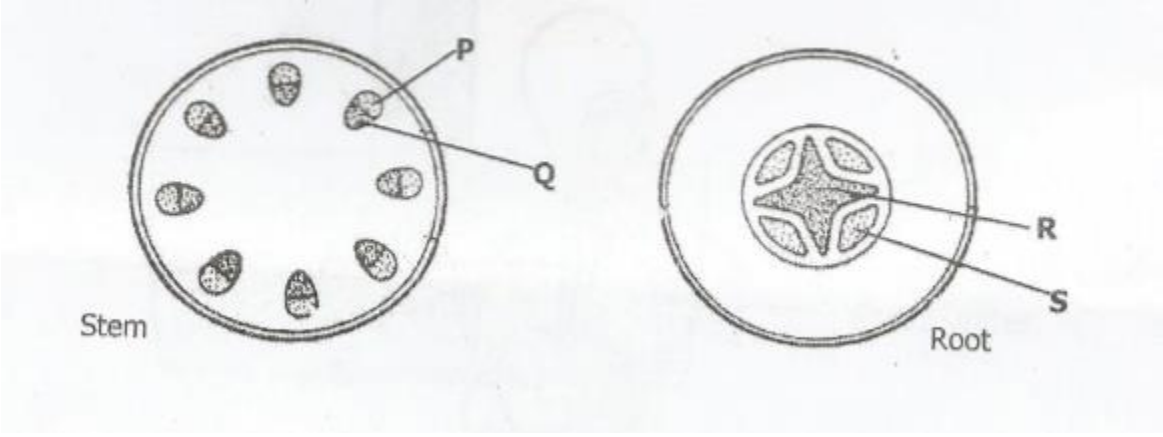


Which labelled region contain xylem vessels?

A P and R

B P and S

C Q and R

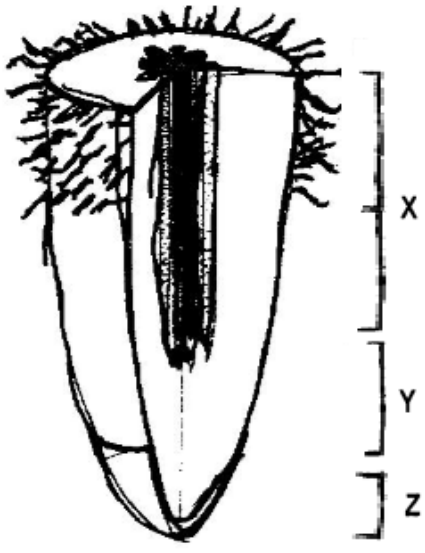
D Q and S

Associated facts and Reasoning

In a dicot stem the xylem are found on the inner side whiled the phloem are on the outside. In case of a root xylem form a star and phloem are in the gaps

Correct answer is C

14 The diagram shows a section through the root meristem.



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Which of the labelled parts is the region of cell division, elongation, and cell differentiation?

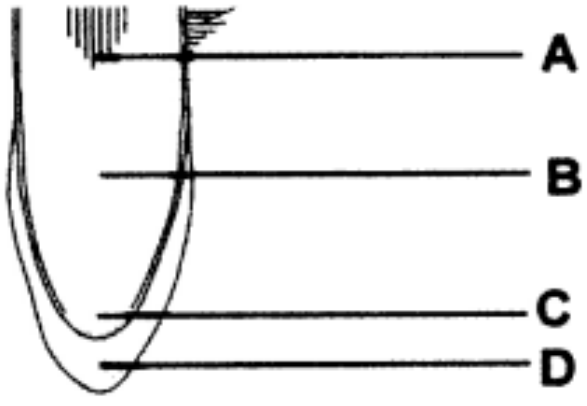
	X	Y	Z
A	Cell Division	Differentiation	Cell Elongation
B	Cell Division	Cell Elongation	Differentiation
C	Differentiation	Cell Elongation	Cell Division
D	Cell Elongation	Cell Division	Differentiation

Reasoning

- Cell division takes place near the root tip.
- Cell elongation takes place below meristem
- Cell differentiation takes place where root hairs begin to rom and maturation takes place.

Correct answer is C

15 The diagram shows a longitudinal section through a dicotyledonous root. Which of the labelled parts produce auxins?



Reasoning

- A is where cell differentiation takes place.
- B is cell elongation. Which takes place only after cell division
- Auxin is produced in the root tip
- 'D' represents root cap.

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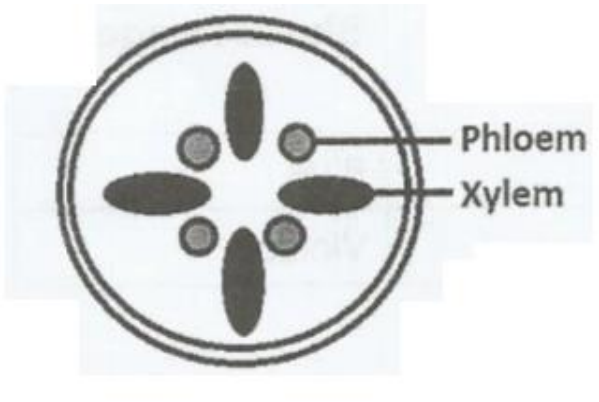
Correct answer is C.

16 The diagram below represents a cross section of a part of a plant.



From which part of the plant was this section cut?

A Monocotyledonous root

B Dicotyledonous root

C Monocotyledonous stem

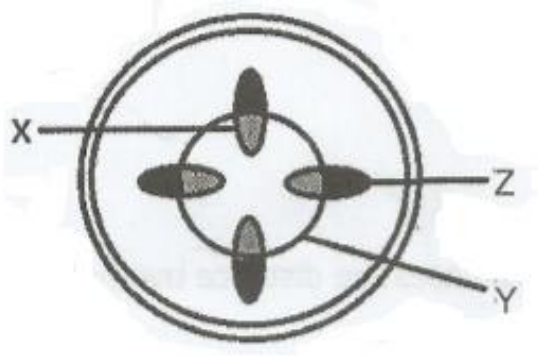
D Dicotyledonous stem

Associated facts and Reasoning

- In a monocotyledonous root xylem vessels alternate with phloem vessels

Correct answer is A

17 The diagram below shows a cross section through a part of the plant.



Which part(s) are responsible for transportation of amino acids and sucrose?

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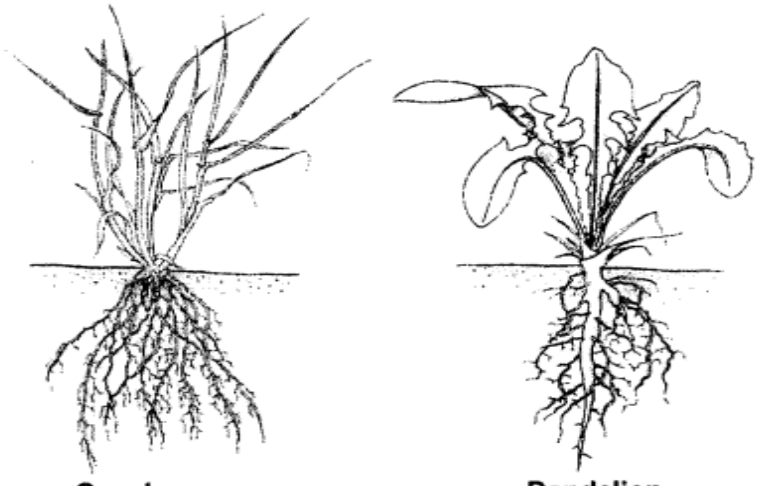
	Amino acids	Sucrose
A	X	X
B	X	Z
C	Z	Z
D	Z	X

Reasoning

Phloem vessels transport food substances (sugars, amino acid) to all parts of the plant

Correct answer is B

18 Which of the following correctly identifies the types of root system?



	Couch-grass	Dandelion
A	Tap root	Fibrous root
B	Adventitious roots	Fibrous root
C	Tap root	Adventitious roots
D	Fibrous root	Tap root

Reasoning

- Couch grass has no tap root while dandelion has tap roots.
- Couch glass has roots that come from the node

Correct answer is D

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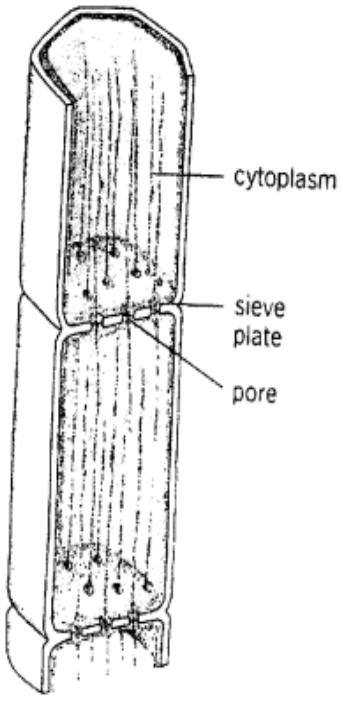
19 The diagram shows a longitudinal section through a phloem.



Name a substance that is conducted across the sieve plates.

A Glucose

B Starch

C Sucrose

D Proteins

Reasoning

- Phloem transport starch from leaves to all parts of the plants where it is converted to other sugars, proteins and oil.

Correct answer is B

20 The figure below shows the longitudinal section of a maize seed. Which of the labelled parts grow into roots?

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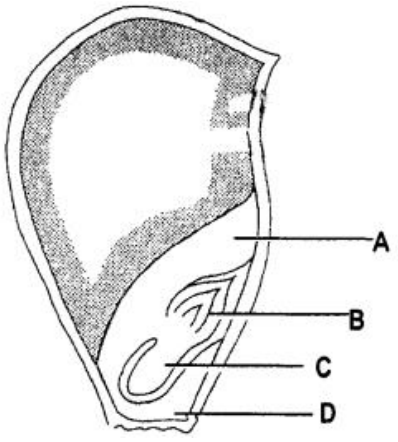
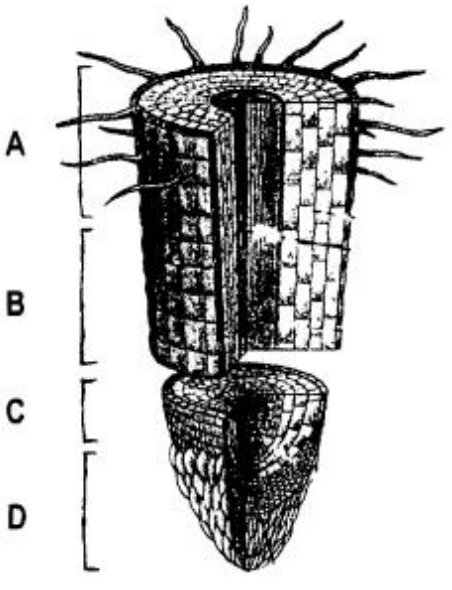


Reasoning

- The plumule in the maize seed is placed away from the stalk. The radicle which develops in a root lies on the side of the stalk.

Correct answer is C

21 The diagram below shows part of a growing root.



Identify the region on cell differentiation and specialization.

Reasoning

- Tips of the root is the region of cell division, which is followed by region of elongation. In the region of maturation, where cell differentiate, seen by root hairs.

Correct answer is A

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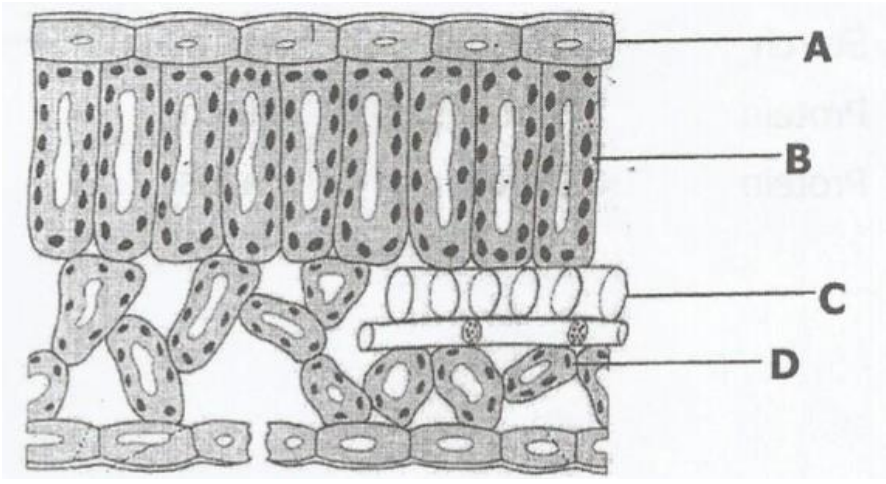
22 The diagram shows a section through a leaf, seen under a microscope. In which part is the carbon dioxide concentration lowest on a sunny day?



Reasoning

- Most of the photosynthesis takes place in the palisade cells. Most of the carbon dioxide is used and there is high concentration of oxygen which has been produced by the process of photosynthesis

Correct answer is B

23 What structures help not hair cells to take up water?

A Contractile fibres

B Thick outer wall

C Large surface area

D Cell membrane.

Reasoning

- Root hairs have a large surface area which helps them to absorb water.

Correct answer is C

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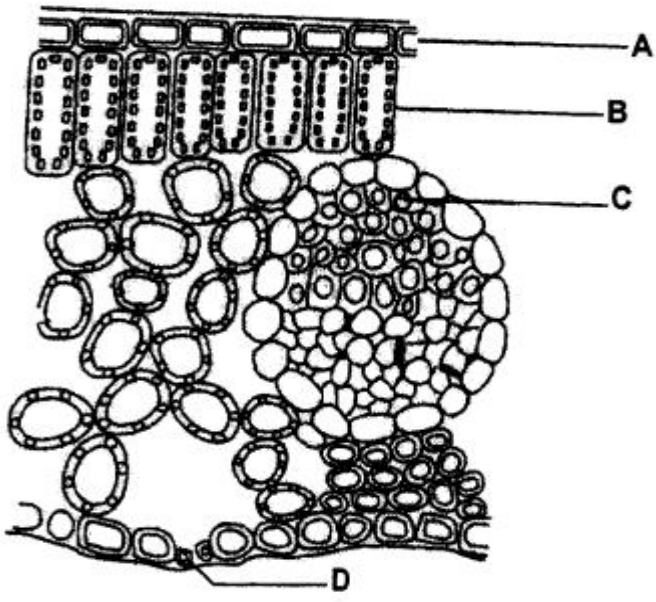
24 Diagram below shows the internal structure of a dicotyledonous leaf. Which labelled part plays a role in conducting of mineral salts and water to the leaf?

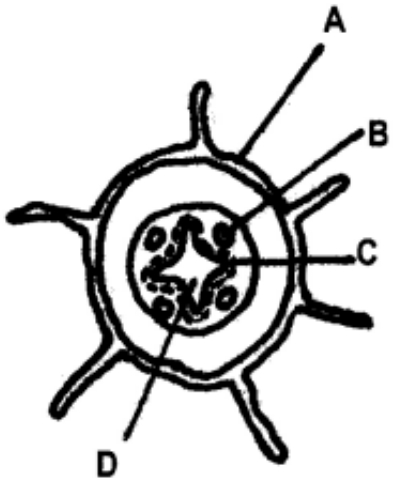


Reasoning

- The main vein which consist of xylem and phloem vessel is found at the middle of the leaf.

Correct answer is C

25 The diagram below shows the transverse section of a dicotyledonous root, which of the labelled tissues contain meristematic cells?



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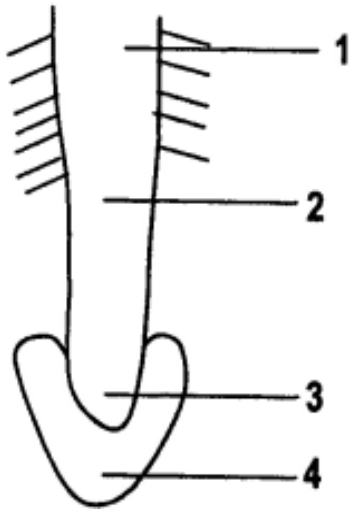
Reasoning

- The meristematic cells form a boundary between xylem and phloem. The broken line does just that

Correct answer is C

26 The diagram below shows a longitudinal section of the root tip of a flowering plant.



Which of the regions marked 1-4 is the region for maximum growth, differentiation and cell division?

	Maximum growth	Differentiation	Cell division
A	1	2	4
B	3	4	2
C	2	1	3
D	4	3	2

Reasoning

- Near the tip of the root, cell division takes place. Cell maturity takes place near the root hairs and maximum growth in the region of root hairs

Correct answer is C

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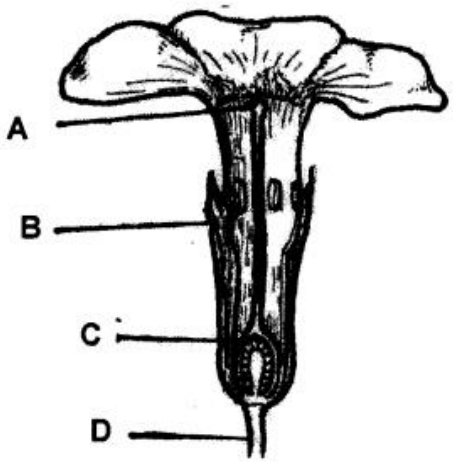
27 The diagram shows a longitudinal section of a primrose flower. Which of the parts labelled A, B, C, D or D shows that the flower is insect-pollinated.



Reasoning

- Insect are attracted to the bright colour of petals and the sweet juice found in the nectar.

Correct answer is B

28 The diagram below shows a flower of a grass species.

The flower is pollinated by?

A Birds

B Insects

C Water

D Wind

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Reasoning

- The flower has exposed lose and hanging anthers. The stigma is also hairy.

Correct answer is B

29 The diagram below shows an underground stem.

What name is given to the underground stem?

A Corm

B Tuber

C Rhizome

D Runner

Reasoning

- The plant consists of fibrous roots and the previous years growth has shrivelled.

Correct answer is A

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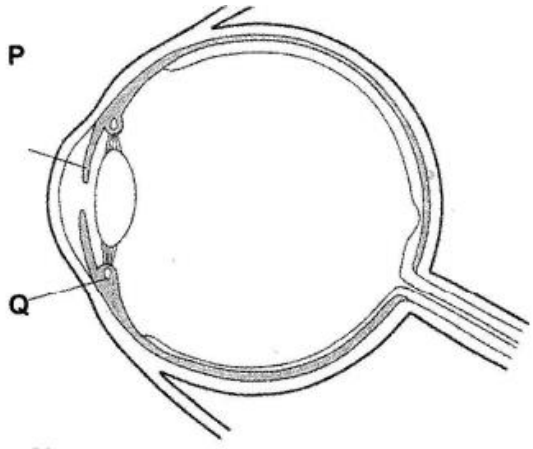
30 The diagram below shows a human eye in section.



What happen to the circular muscle at P, when the eye focuses a near object in dim light?

	P	Q
A	Contract	Relax
B	Contract	Relax
C	Relax	Contract
D	Relax	Contract

Reasoning

- In the darkness Q will relax (go flat) thereby pulling the muscle to pull backward hence the pupil opens wider in order to accommodate a near object in the dark

Correct answer is A

31 What is the name and function of the tooth illustrated below?

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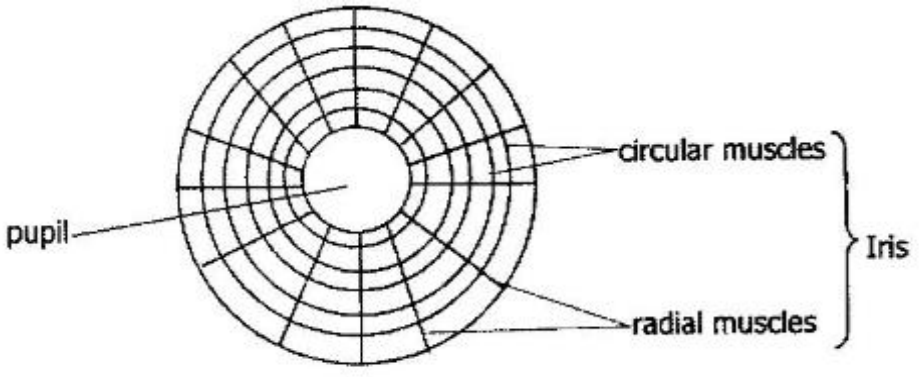
	Name	Function
A	Canines	Tearing of flesh
B	Canines	Biting and cutting of food
C	Incisors	Biting and cutting of food
D	Molar	Crushing and grinding of food

Reasoning

- Canines are sharp with straight edge
- Incisors are sharp chisel shaped with chisel edge

Correct answer id D

32 The diagram shows the muscles which control the size of the pupil in an eye.



How do these muscles make the pupil larger?

	Circular Muscles	Radial Muscles
A	Contract	Contract
B	Contract	Relax
C	Relax	Contract
D	Relax	Relax

Reasoning

- Radial muscle will pull backward making the circular muscles open wider, thus pupil becomes larger.

Correct answer is C

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33 The skeleton system found in insects is the _____

A Endoskeleton

B Exoskeleton

C Hydroskeleton

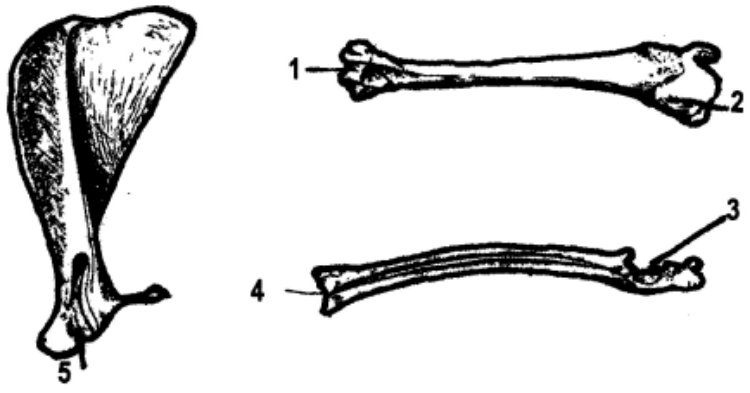
D Eposkeleton

Reasoning

- An insect does not have bones.it has an external chitinous material which forms the shape of an insect.

Correct answer is B

34 The diagram shows bones of the fore arm.



Between which points can a hinge joint form?

A 1 and 3
B 1 and 4
C 2 and 3
D 2 and 5

Associated facts and Reasoning

- The diagram showing part 4 and 3 is for the lower arm which consists of radius and ulna. Part 4 is where a piece of bones for the arm are connected. The bone with part 1 and 2 is humerus, whose part 1 fit into part 3 to from hinge joint.

Correct answer is A

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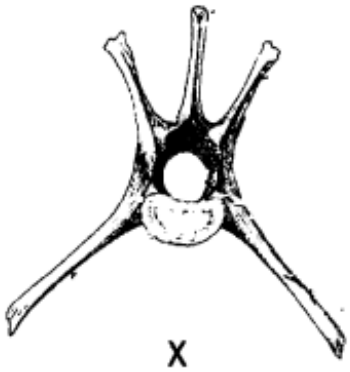
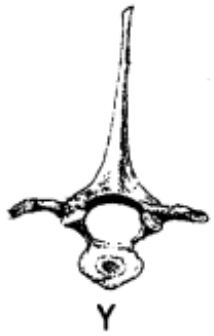
35 The diagram below shows anterior view of the two bones from the vertebral column.





From which regions of the vertebral column are the two bones found?

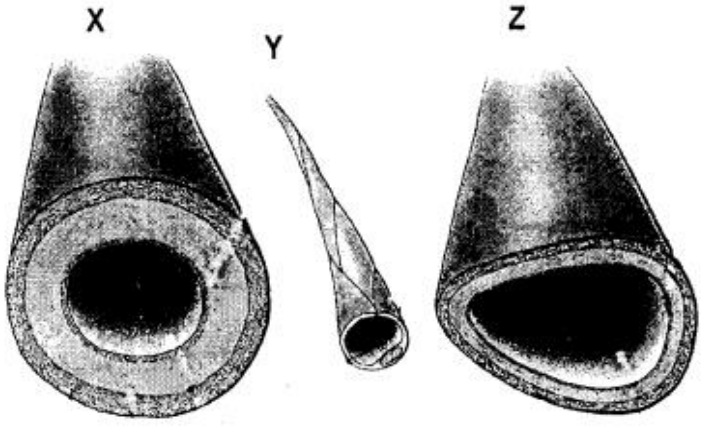
	X	Y
A	Thoracic	Cervical
B	Thoracic	Lumba
C	Lumba	Thoracic
D	Cervical	Sacral

Associated facts and Reasoning

- The lumba vertebra has a number of projections, while the thoracic vertebra has a long neural spine.

Correct answer is C

36 The diagrams below show a cross section of the three type of blood vessels drawn to scale.



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What are these blood vessels called?

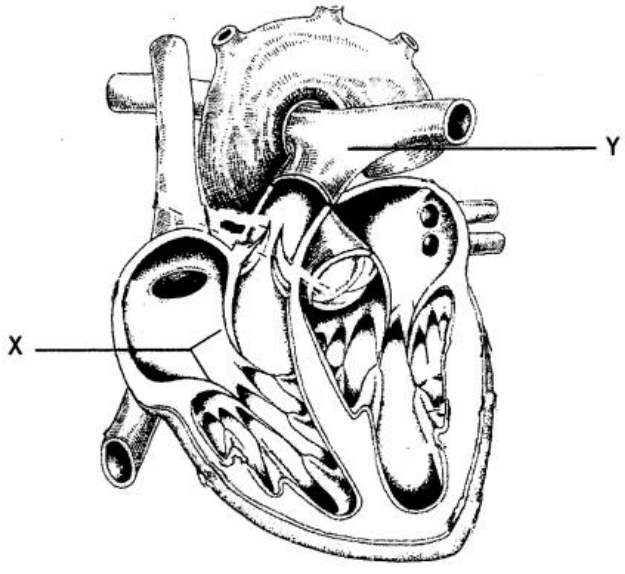
	X	Y	Z
A	Veins	Artery	Capillary
B	Capillary	Veins	Artery
C	Veins	Capillary	Artery
D	Artery	Capillary	Veins

Associated facts and Reasoning

- Arteries have very think walls to with stand pressure as they carry blood pumped direct from the heart.
- Veins are thin walled as they are very far from the heart as they carry blood at low pressure.
- Capillaries are very thin walled and only one cell thick to allow diffusion of gases, nutrients and waste produces.

Correct answer is D

37 The diagram below shows the internal structure of the heart.



Identify valve X and vessel Y.

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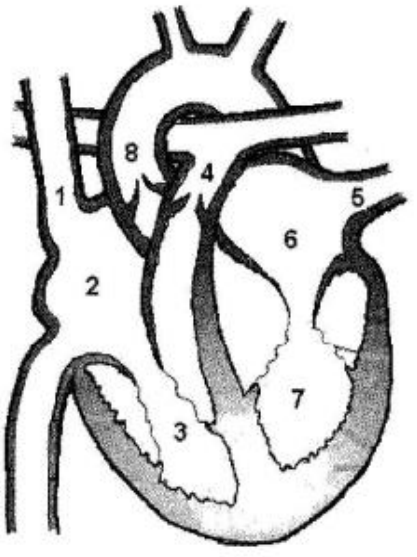
	Valve X	Vessel Y
A	Bicuspid	Pulmonary Vein
B	Tricuspid	Pulmonary Artery
C	Semilunar	Aorta
D	Semilunar	Vena Cava

Associated facts and Reasoning

- Blood vessels Y is connected to the right ventricle and has two branches each going to a particular lung. It is therefore a pulmonary artery.
- Value X is located in the right atrium. It is the tricuspid valve.

Correct answer is B

38 The diagram below shows a section through the human hear.



Which sequence shows the flow of deoxygenated blood through the heart?

A 1, 2, 3, 4

B 4, 3, 2, 1

C 5, 6, 7, 8

D 8, 7, 6, 5

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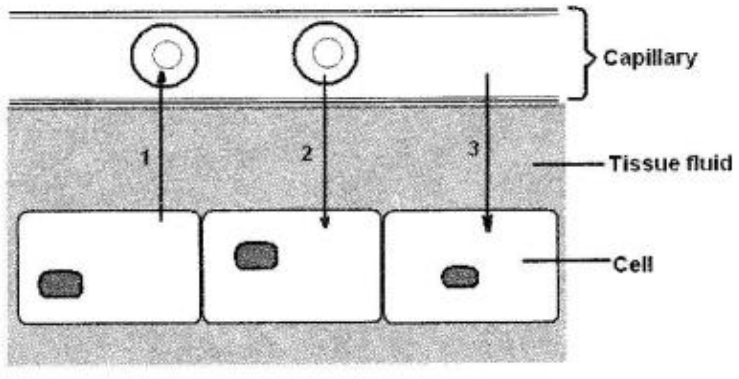
Associated facts and Reasoning

- Deoxygenated blood enters the heart through the vena cava. It reaches the right atrium, to the right ventricle and out of the heart through the pulmonary artery. In this case 1, 2, 3, and 4

Correct answer is A

39 The diagram below represents a blood capillary in the leg with adjacent cells. Arrows represent movement of substances between blood and cells.



Which arrows represent, carbon dioxide, oxygen and glucose?

	Carbon dioxide	Oxygen	Glucose
A	1	2	3
B	1	3	2
C	2	1	3
D	3	3	1

Associated facts and Reasoning

- Oxygen and glucose enter the cells from blood capillaries. In the cells the process of respiration takes place where oxygen burns glucose to form. Carbon dioxide is a waste product and is taken out of the cells through the capillaries.

Correct answer is A

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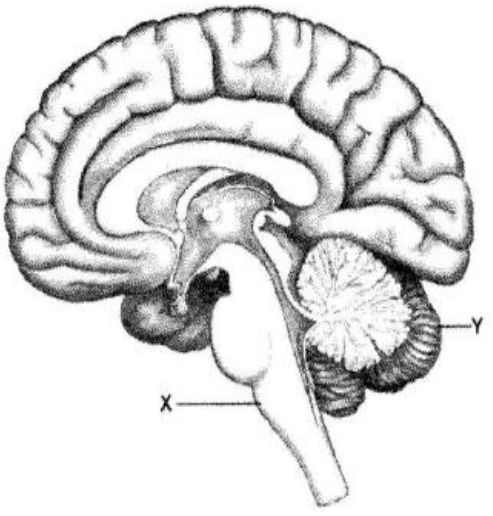
40 The diagram below shows the human brain seen from the rear side.



The parts labelled X and Y are_____

	X	Y
A	Cerebellum	Medulla Oblongata
B	Hypothalamus	Cerebellum
C	Medulla Oblongata	Cerebellum
D	Pituitary Gland	Hypothalamus

Associated facts and Reasoning

- Hypothalamus is at the centre if the brain, Pituitary gland is not part of the brain. It is part of the endocrine system. Therefore, X is Medulla Oblongata and Y is Cerebellum

Correct answer is C

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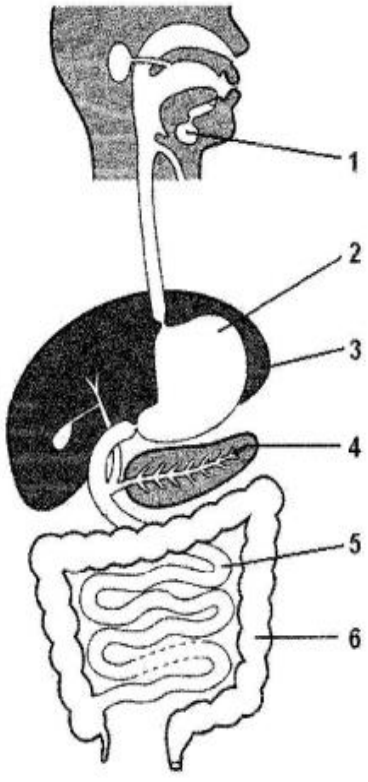
41 The diagram below shows the alimentary canal and associated structures.



Which numbered structures produce digestive enzymes?

A 1, 2, 3, 6

B 1, 2, 4, 5

C 2, 3, 4, 5

D 2, 4, 5, 6

Associated facts and Reasoning

The salivary gland in the mouth produces amylase which contain an enzyme called ptylin. Stomach produces gastric juice which contains pepsin.
Small intestine, pancreas produces pancreatic juice which contains amylase, trypsin and lipase.
Second part of the small intestine produces i.e ileum produces a number of enzymes i.e maltase, lactase, lipase etc.

Correct answer is B

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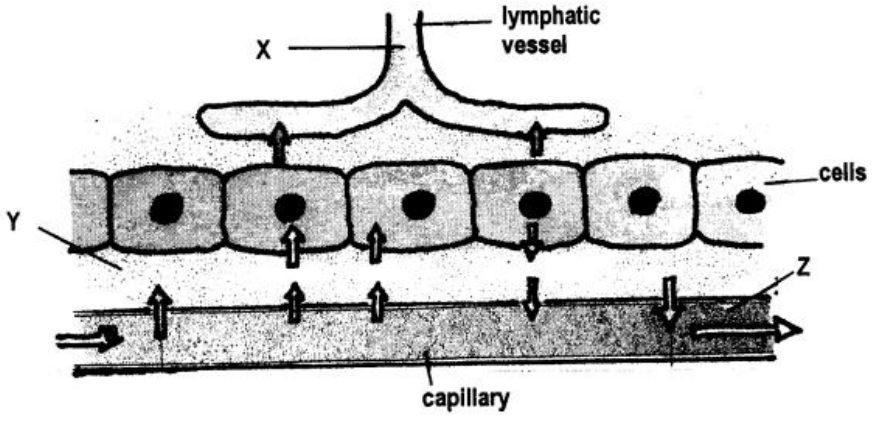
42 The diagram below shows a capillary bed.



What are the names of the fluids found at X, Y and Z?

	X	Y	Z
A	Plasma	Lymph	Tissue fluid
B	Plasma	Tissue fluid	Lymph
C	Lymph	Plasma	Tissue fluid
D	Lymph	Tissue fluid	Blood

Associated facts and Reasoning

- Lymphatic vessel carries fluid.
- Capillary caries blood which consist of many other components (plasma, red blood cells, white blood cells, platelets, nutrients and waste products.
- In between the structure in the diagram are tissue fluids.

Correct answer is D

43 The diagram below shows the skull of a goat.

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What is the dental formula for the goat?

A $i\frac{3}{3}, c\frac{1}{1}, Pm\frac{3}{2}, m\frac{1}{1}$

B $i\frac{0}{3}, c\frac{0}{1}, Pm\frac{3}{3}, m\frac{3}{3}$

C $i\frac{1}{1}, c\frac{0}{0}, Pm\frac{0}{0}, m\frac{3}{3}$

D $i\frac{2}{2}, c\frac{1}{1}, Pm\frac{2}{2}, m\frac{3}{3}$

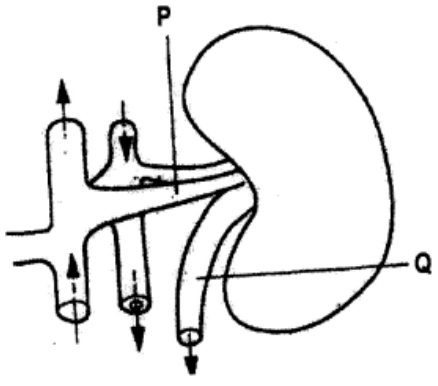
Associated facts and Reasoning

A goat belongs to a group of animals called herbivores. Such animals have no incisors on the upper jaw. They have a hard pad instead, which is used as a chopping board for grass. They also don not have canines on the per jaw. And this space is called a diastema.

Correct answer is B

44 The diagram below shows the kidney and associated structures while the table list the percentages of certain components found within structures P and Q.

	Concentration in structure **P%**	Concentration in structure **Q%**
Urea	0.03	2.00
Glucose	0.10	0.00
Amino acids	0.05	0.00
Salts	0.72	1.50
Proteins	8.00	0.00



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Deduce the function of the kidney based on information given in the table

A Removal of excess glucose from the blood.

B Removal of urea and salts from the blood.

C Removal of excess amino acids from the blood

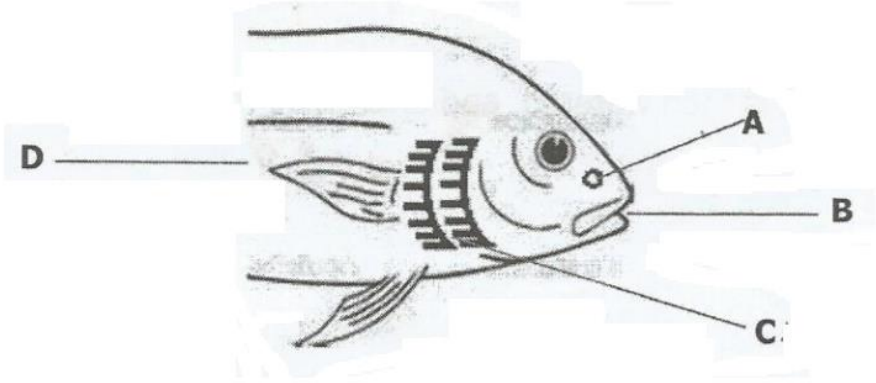
D Removal of excess proteins from the blood.

Associated facts and Reasoning

The part labelled Q is ureter which carries waste products urea (urine) and excess salts to the urinary bladder, in readiness for expulsion from the body.

Correct answer is B

45 The diagram shows the respiratory organs of a fish.
In which of the labelled parts will gaseous exchange take place?



Associated facts and Reasoning

Gaseous exchange takes place in the gill. The gill filaments have many protrusions called gill lamellae, which increase the surface are for absorption of oxygen.

Correct answer is C

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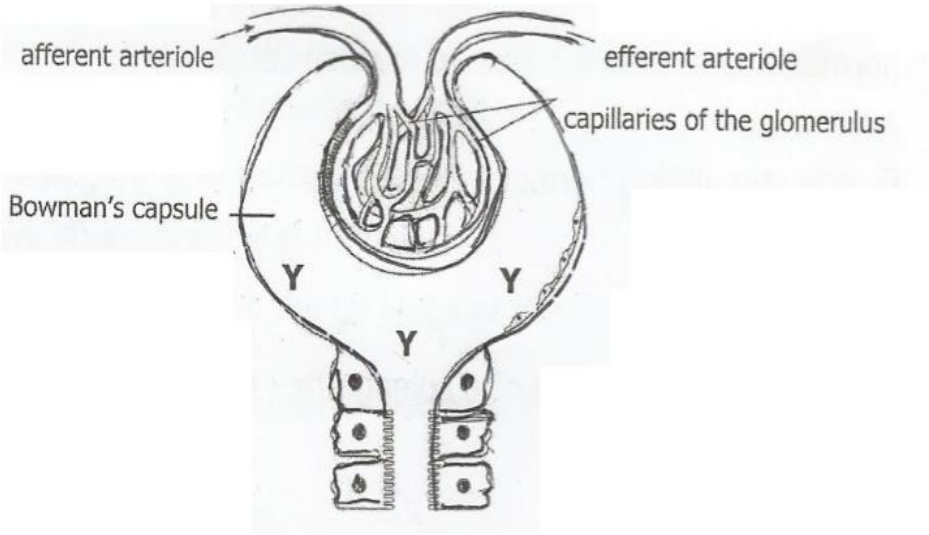
46 The diagram shows part of the nephron from a kidney.



Apart from water, what other substance are present in the fluid Y.

	Glucose	Mineral ions	protein	urea
A	✓	✓	✓	✗
B	✗	✓	✗	✓
C	✓	✗	✓	✓
D	✓	✓	✗	✓

KEY
✓= present
✗= absent

Associated facts and Reasoning

Excretory products by the kidney contain chiefly urea, uric acid, ammonia compounds, sodium chloride and crystals of drugs in water a soluble compound.

In this case excretory products are urea and mineral ions.

Correct answer is B

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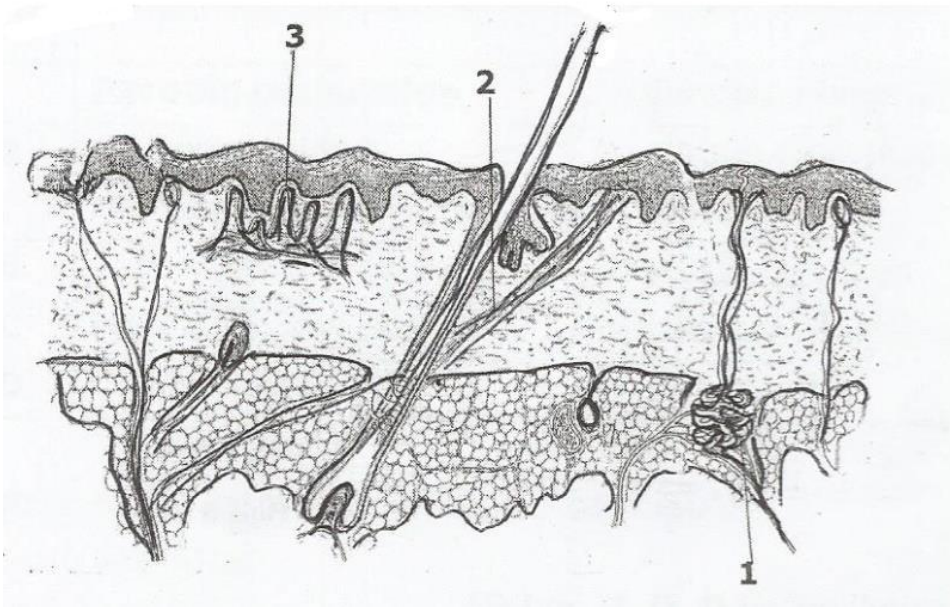
47 The diagram shows a section through the human skin.



How do the structures numbered 1, 2 and 3 help to regulate the body temperature on a hot day?

	1	2	3
A	Produce less sweat	Relaxes	vasoconstricts
B	Produce less sweat	Relaxes	vasodilates
C	Produce more sweat	Contracts	vasoconstricts
D	Produce less sweat	Contracts	vasodilates

Associated facts and Reasoning

- When it is hot the blood vessels widen and come close to the surface (vasodilates), thereby losing more heat.
- Sweat glands produce more swear as a result more heat is carried with it. Thus cooling of the body takes place.
- Erector muscle contracts and makes hair upright to lose more sweat.

Correct answer is D

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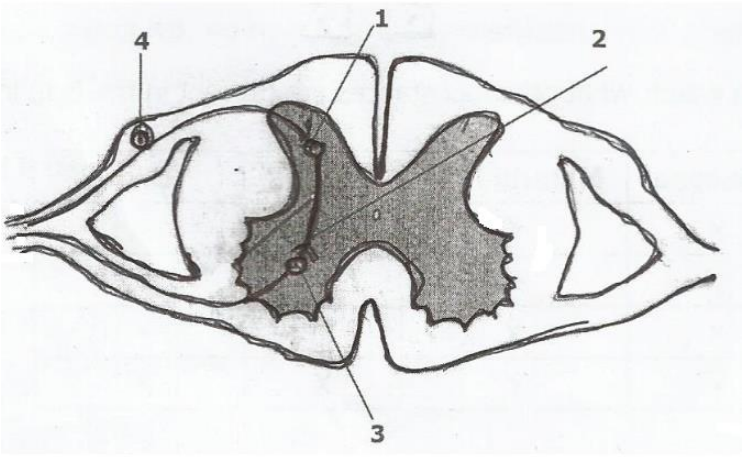
48 The diagram below shows part of a spinal reflex arc.



At which labelled parts is the neurotransmitter released?

A 1 and 2 only

B 1 and 3 only

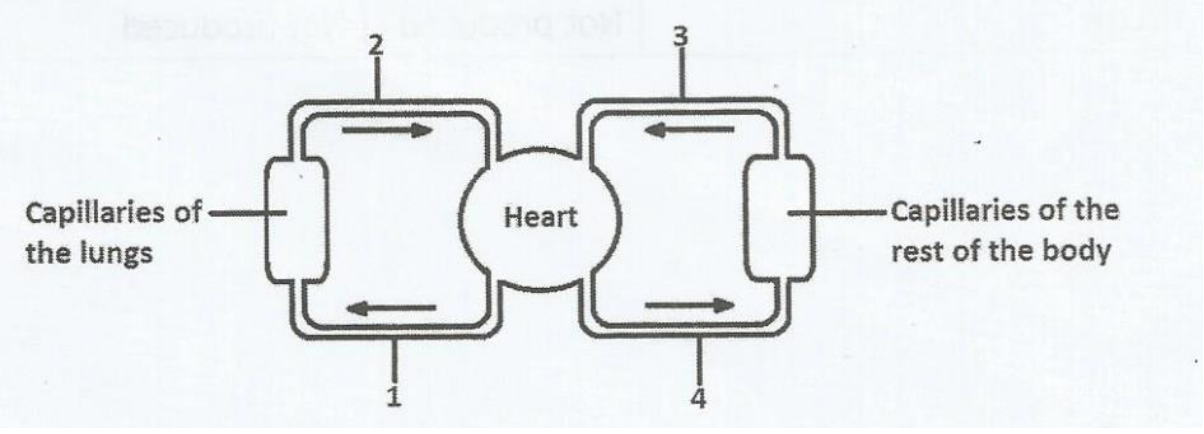
C 2 and 3 only

D 2 and 4 only

Associated facts and Reasoning
Transmission of messages takes place at points where two neurons meet. This is called a synapse where fibres of the two neurons come close.

Correct answer is B

49 The diagram below shoes a double circulatory system.



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Which vessels carry oxygenated blood?

A 1 and 2

B 1 and 4

C 2 and 3

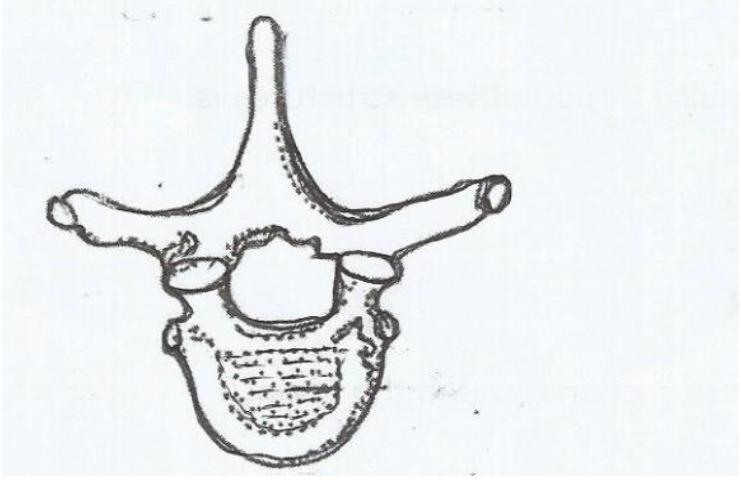
D 2 and 4

Associated facts and Reasoning

- A blood vessel from the lungs carries oxygenated blood.
- A blood vessel from the heart to the rest of the body caries oxygenated blood.
- In this case 2 and 4

Correct answer is D

50 The diagram below shows a vertebra.



To which region of the vertebra column does it belong?

A Cervical

B Lumbar

C Thoracic

D Sacral

Associated facts and Reasoning

- It has long neural spines
- It has facets that attribute with one end rib to form a rib cage.

Correct answer is C

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51 Which two bones form the ball and socket joint of the shoulder?

A Femur and Pelvic girdle

B Femur and Tibia

C Humerus and Scapula

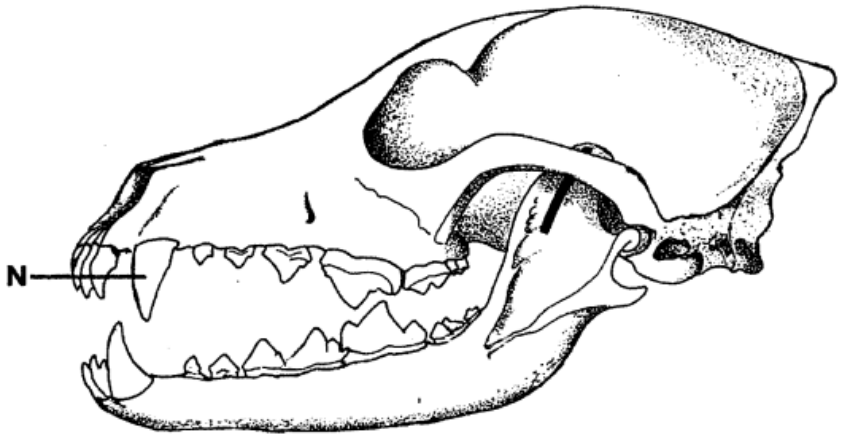
D Ulna and Humerus

Associated facts and Reasoning

Humerus is the upper bone of the arm which joins the shoulder bone also known as scapula

Correct answer is C

52 The diagram below shows a skull of an animal.



Identify tooth N and the animal to which the skull belongs.

	Tooth N	Type of Animal
A	Canine	Carnivore
B	Incisor	Omnivore
C	Canine	Omnivore
D	Incisor	Carnivore

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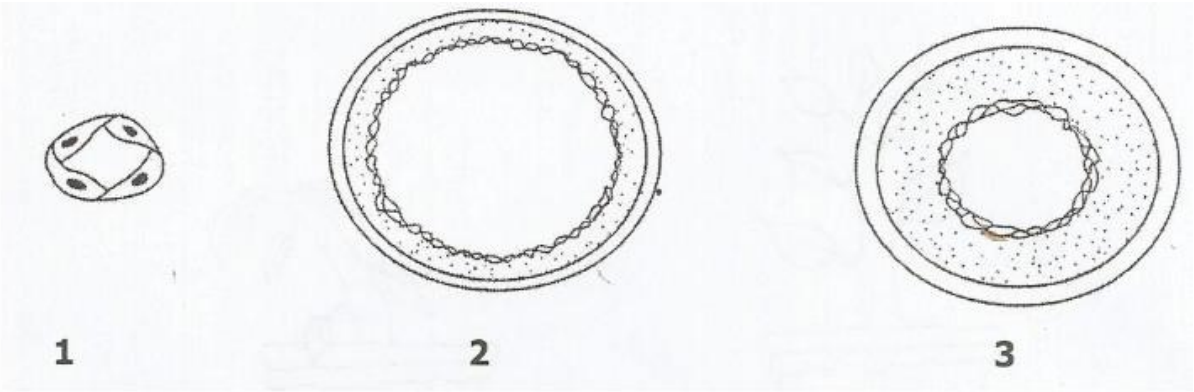
Associated facts and Reasoning

Canine are pointed and larger than other teeth. They are used for tearing meat, so prominent in carnivore animals.

Correct answer is A

53 The diagram shows the three blood vessels



In which order would blood flow through these in passing from the heart through the lungs and back to the heart.

	From heart	Through Lungs	To Heart
A	1	2	3
B	2	3	1
C	3	1	2
D	3	2	1

Associated facts and Reasoning

- Note that blood will move from the heart to the lungs and back to the heart i.e pulmonary circuilation. The path is Heart → Pulmonary Artery → Lungs → Pulmonary Vein → Heart.
- Capillaries are around alveolus in the lungs. (3 → 1 → 2)

Correct answer is C

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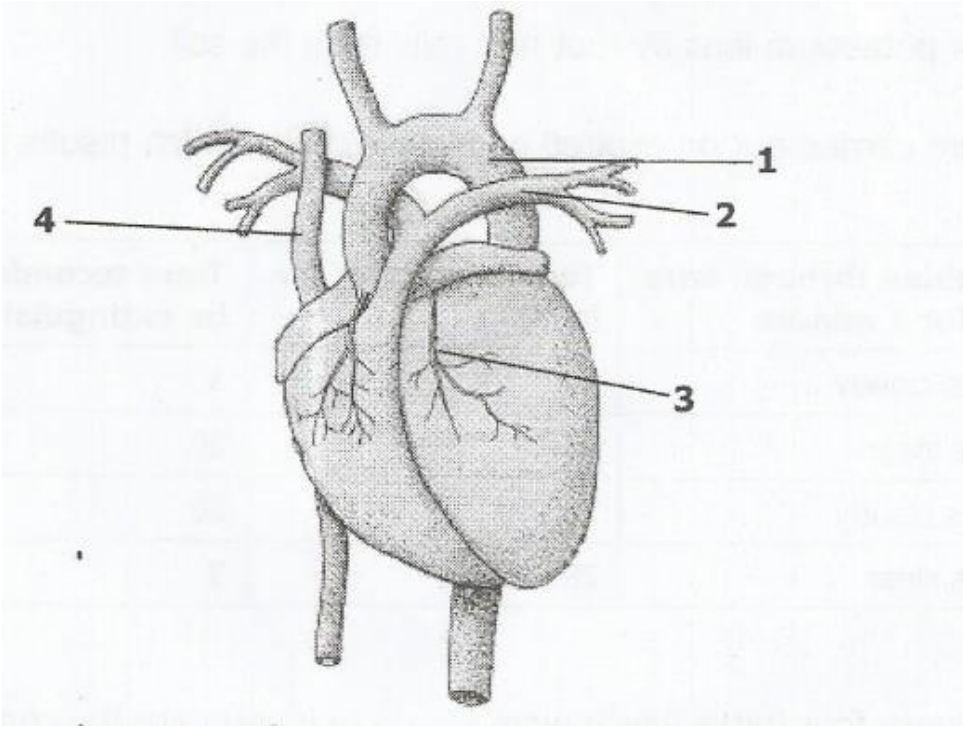
54 The diagram shows an external view of a mammalian heart.



What are the numbered structures?

	Aorta	Coronary Artery	Pulmonary Artery	Vena Cava
A	1	2	3	4
B	1	3	2	4
C	2	3	1	4
D	4	2	3	1

Associated facts and Reasoning

1 is Aorta
2 is Pulmonary Artery
3 is Coronary Artery which supplies blood to the muscles of the heart.
4 is the Vena Cava

Correct answer is B

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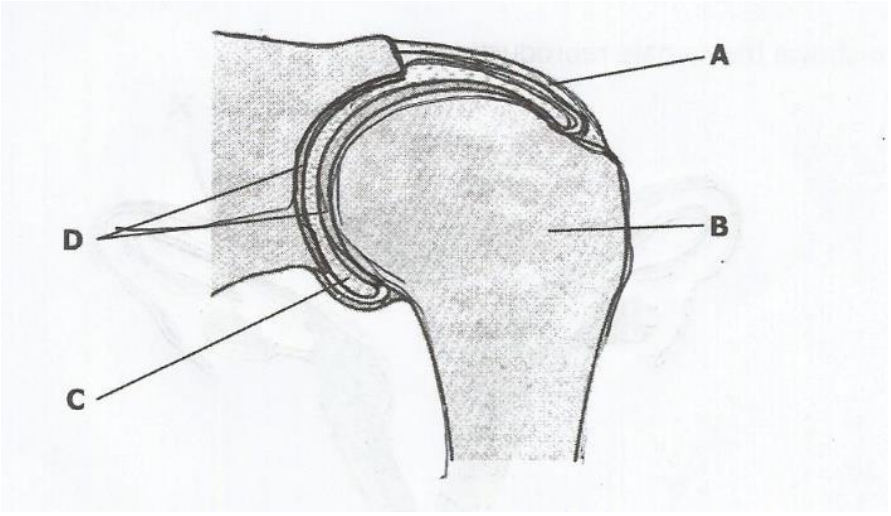
55 The diagram shows a section through a joint.



Which labelled part prevents dislocation of the joint?

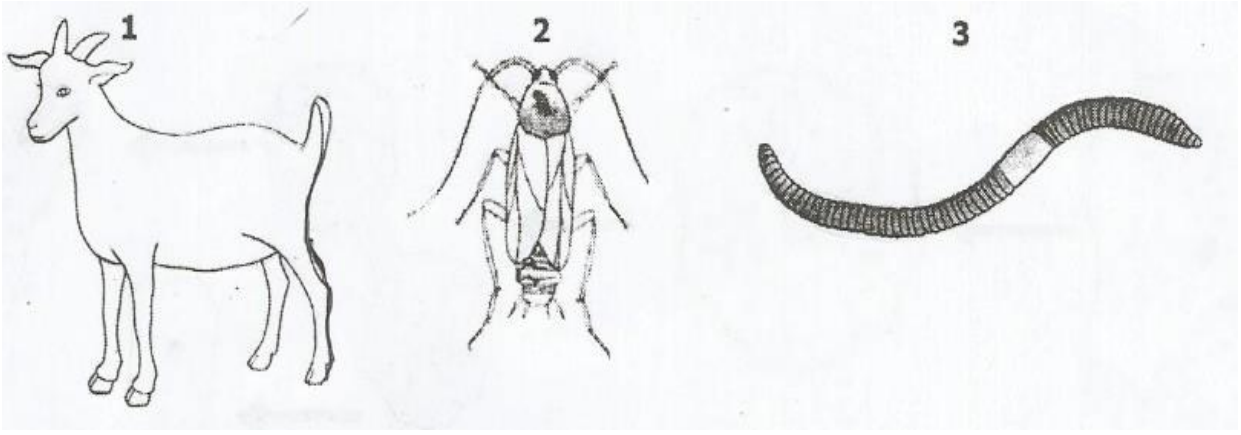
Associated facts and Reasoning

Ligaments represented by 'A' in the diagram holds the bone together (prevent dislocation) but does not hinder their movement.

Cartilage represented by 'D' in the diagram prevents friction and is helped by synovial fluid represented by 'C' in preventing friction by acting as a lubricant

Correct answer is A

56 The diagram below shows three different organisms.



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What kind of skeleton is found in each of these organisms?

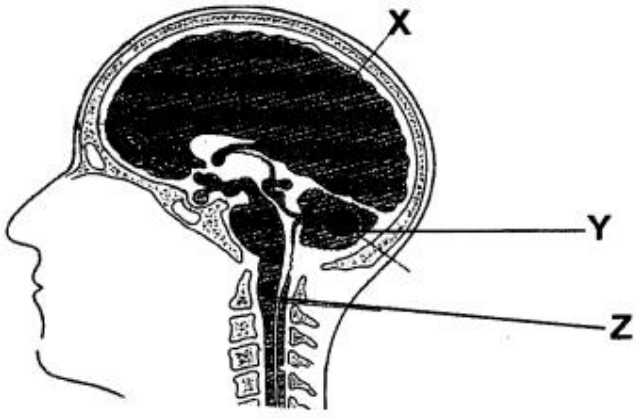
	1	2	3
A	Endoskeleton	Exoskeleton	Hydrostatic
B	Endoskeleton	Hydrostatic	Exoskeleton
C	Exoskeleton	Endoskeleton	Hydrostatic
D	Exoskeleton	Hydrostatic	Endoskeleton

Associated facts and Reasoning

- Endoskeleton is where the skeleton is found beneath the muscles e.g mammals.
- Insects have no bones but have hard material (chitin) which form the outer body and its shape.
- Earth worms have rings of muscles that are filled with fluid i.e hydrostatic

Correct answer is A

57 The diagram below shows a section through the head of a human being to show parts of the brain.



Identify X, Y and Z.

	X	Y	Z
A	Cerebellum	Medulla Oblongata	Cerebrum
B	Cerebrum	Cerebellum	Medulla Oblongata
C	Cerebellum	Cerebrum	Medulla Oblongata
D	Cerebrum	Medulla Oblongata	Cerebellum

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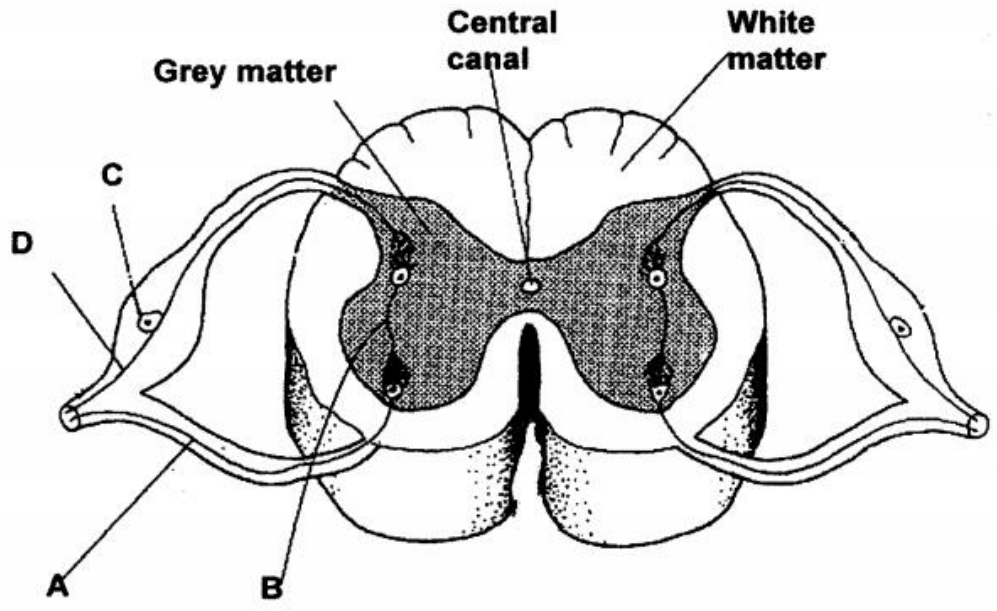
Associated facts and Reasoning

- The largest part of the brain is Cerebrum.
- At the base of the Cerebrum is the Cerebellum.
- The other one that appear to come from the spinal cord is the Medulla Oblongata.

Correct answer is B

58 The diagram shows a transverse section of a spinal cord and nerves.



Which of the labelled structures is a motor neurone?

Associated facts and Reasoning

- The motor nerve has a nucleus head in the spinal cord where it makes a synapse with the relay neuron. However, the dendrite of the motor neuron is connected to the effector muscle.
- The sensory neuron has a nucleus head along its length.
- The relay neuron is short and is found in the grey matter.

Correct answer is A

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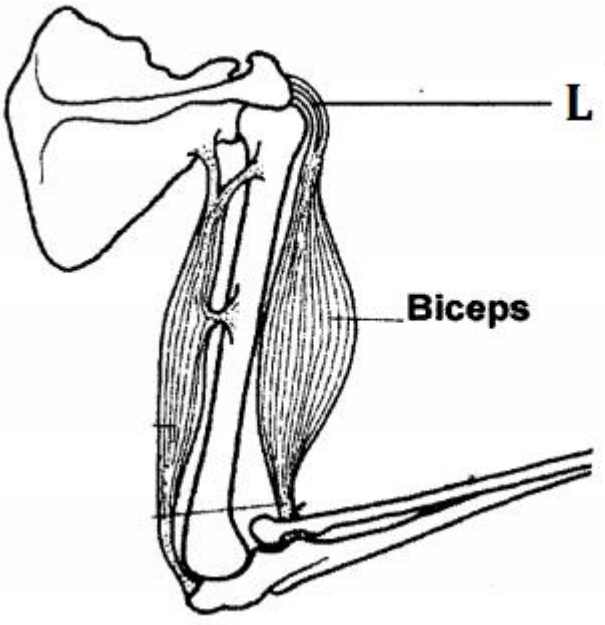
59 The diagram below shows the position of the bicep muscle in a human arm.



What is structure L?

A Tendon

B Ligament

C Cartilage

D Synovial Membrane

Associated facts and Reasoning

The part marked 'L' is the end part of the biceps, which is connect to the bone on the shoulder bone.

Correct answer is A

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60 A Vertebra has the following characteristics

Centrum → Large

Neural Canal → Large

Neural spine → Long

Transverse Process → Short

What type of vertebra is this?

A Thorax

B Lumba

C Cervical

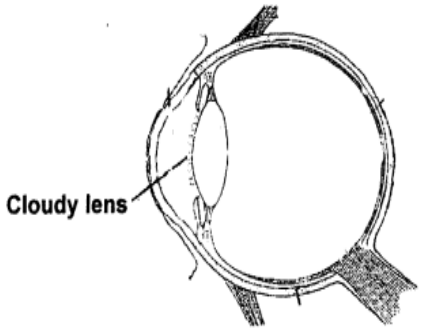
D Sacral

Associated facts and Reasoning

Thoracic vertebra, has long spine, large neural canal, long neural spine and transverse process which is short.

Correct answer is A

61 The Diagram shows a defective eye of a person.



Which eye disease is the person suffering from?

A Cataracts

B Glaucoma

C Ulcer

D Conjunctivitis

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Associated facts and Reasoning

A cataract is a clouding of the eyes natural lens. The eyes lens is made mainly of water and proteins which are clear.

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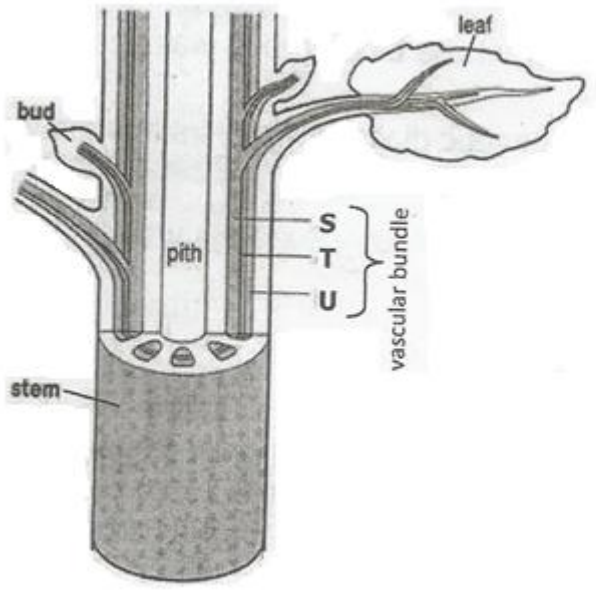
UNIT 1.1 PLANTS AND ANIMAL STRUCTURES

PAPER TWO (2) Type Questions: Section A

1 The diagram shows the longitudinal section of a stem.



a) (i) Which letter in the diagram correspond to cambium, xylem and phloem.

(ii) Explain the function of 'S' and 'T' in the plant.

b) (i) Which letter need companion cells to function properly?

(ii) Which letter in the diagram corresponds to the structure in which substances can move up or down?

Reasoning Solutions and Answers.

a) (i) T is cambium. Cambium marks the demarcation between xylem and phloem.

- **S** is xylem. It is found on the inner side of the cambium.
- **U** is the phloem. it is found on the outside of the cambium.

(ii) S transport water and mineral salts to all parts of the plant.

T it separate xylem and phloem vessels.

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- Its cells divide and multiply to from secondary growth in plants in which it increases in plants in which it increases in girth size (increase in diameter).

b) (i) U – Sieve tubes need companion cells. They are made up walls which are thin and made of cellulose. They have no nucleus. Companion cells are parenchyma, have protoplasm and nucleus, thin walled and living.

(ii) S – Depending on region of concentration, substances come up when concentration is high in the adjacent cells, in order to dilute it. However, if the concentration is in the soil, substances move from up to down to dilute the high concentration in the soil.

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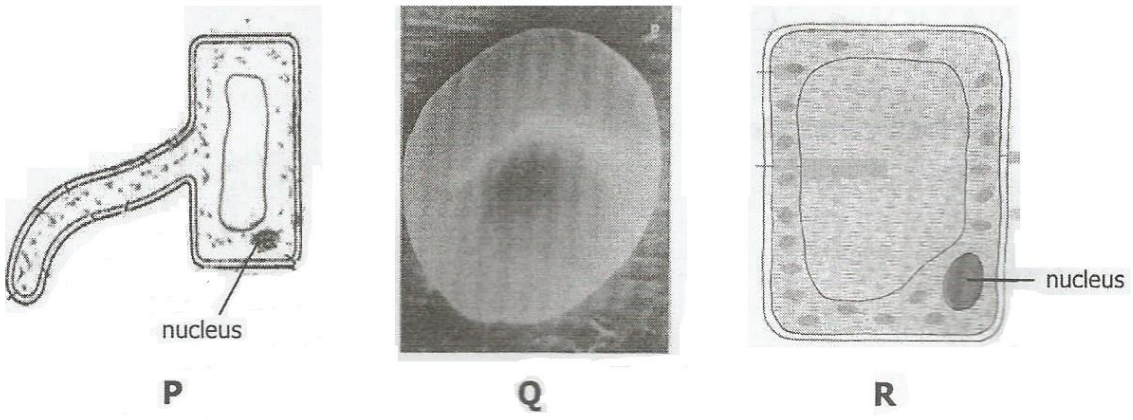
2 In the diagram shows some specialized cells P, Q and R.



a) Name each of the cell above P, Q and R.

b) (i) state the function of cells P and R.

(ii) Explain the adaption for cells P and Q to their function.

c) Where in the leaf is cell R located?

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Reasoning and Answers

a) P = Root hair cell. It has a projection which is a hair itself.
Q = Red blood cell. It has a disc shape
R = Epidermal cell of a plant. It has a rectangular shape.

b) (i) Function P: to absorb water and mineral salts from soil.
Function of Q: to transport oxygen to all parts of the body

(ii) Adaption of cell P: it is one cell thick for easily absorption of water and substances. It also has a large surface area for absorption.
Adaption of cell Q: The red colour is due to the presence of haemoglobin which is made up of iron. Iron forms a weak bond with oxygen called oxy-haemoglobin.

c) Cell R is found in the outer layer of the internal structure of the leaf. It forms the wall of the leaf.

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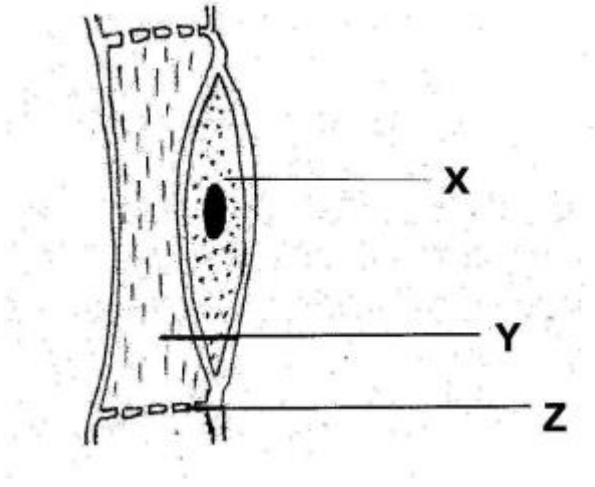
3 The diagram shows some cell take from a vascular tissue of a plant.



a) Identify cells X and Y and structure labelled Z.

b) What is the function of the cells labelled?

(i) X

(ii) Y

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(iii) What structure in the human body, performs a similar function as structure Y?

c) What two conditions are necessary for osmosis to take place?

Associated facts and Answers

a) X = companion cell

Y = phloem cell

Z = sieve plate

b) Functions of:

(i) X: companion cells are living and supply energy to sieve tubes.

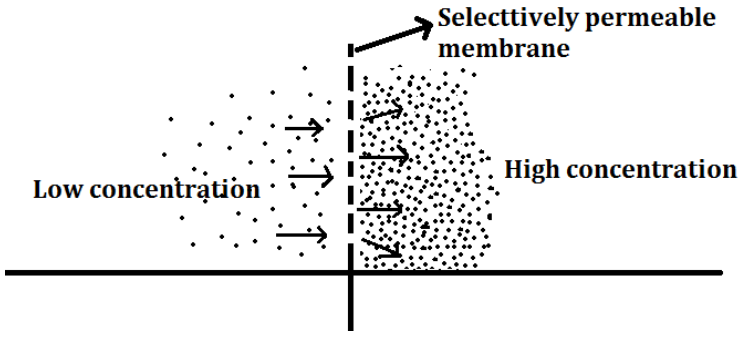
(ii) Y: Phloem transport food to different parts of the plant.

(iii) Sieve plate, this is where cells communicate with one another and dissolved food is passed through the holes during its transport through the stem.

c) Two conditions are:

- There must be two regions separated by a selectively permeable membrane.
- There must be a difference in concentration of solution the two sides

Reasoning



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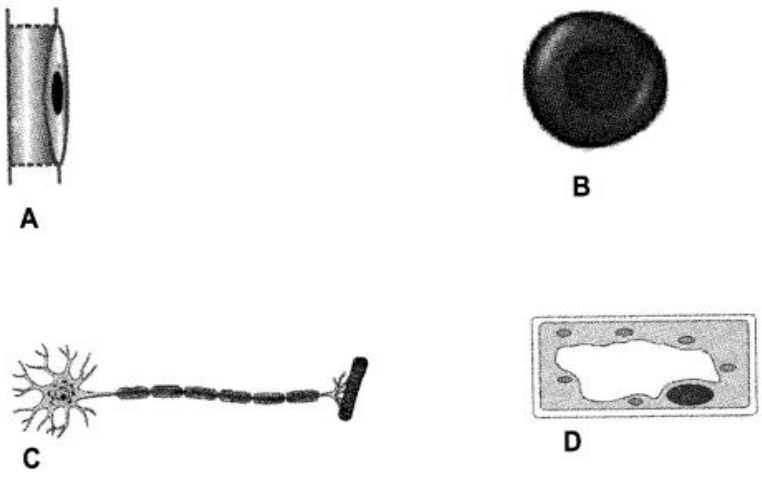
4 The diagram below shows four specialized cells.



a) (i) Using the letters of the cells, identify animal cells and name them.

	Identity	Name
1		
1		

(ii) For each named animal cell in (a)(i) above, state one of its characteristics features.

- Features in animal cell 1
- Features in animal cell 2

b) From cells A and D, name the substance found in the cells which enables it to perform its specialised function.

Cell	Substance	Functions
A		
D		

c) Diagram below shows an experiment on osmosis.

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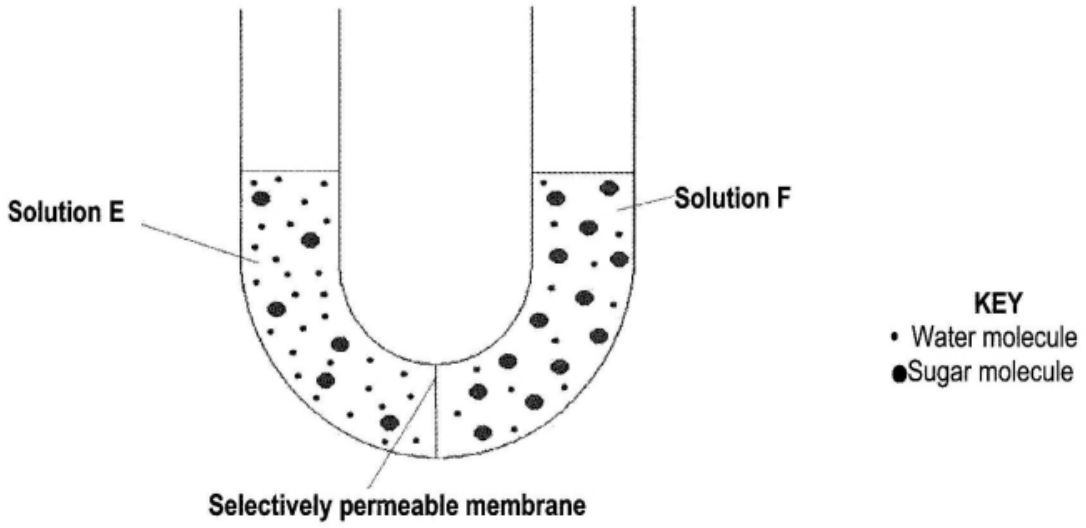

(i) From which solution in the diagram above will there be flow of water molecule by osmosis?

(ii) When will the flow of the water molecules across the membrane stop by osmosis?

(iii) Suggest one reason why on water molecules can move across this membrane.

Associated facts and answers.

a) (i) Using the letters of the cells, identify animal cells and name them.

	Identity	Name
1	B	Red blood cell
1	C	Neuron (nerve)

(ii) Characteristics.

- Animal cell 1: has a concave shape i.e thin at the centre and thick on its circumference.
- Animal cell 2: any features of the following can be given: -

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- It is long structured
- Its length is covered with myelin sheath
- One end has a nucleus and a number of dendrons.

b) From cells A and D, name the substance found in the cells which enables it to perform its specialised function.

Cell	Substance	Functions
A	Sieve plates	Allow food to pass through these sieves from cell to the other
B	Cellulose	Cell wall is made up of cellulose. Cellulose makes the cell wall strong and tough to protect the inner tissues and substances of the cell.

c) (i) Solution E.

Reasoning: solution E is dilute. So water will flow to F where concentration is high. This obeys the definition of osmosis i.e movement of molecules from dilute solution to concentrated solution through a semi permeable membrane.

(ii) Water molecules will stop when the solution on either side has have equal concentration.

(iii) The membrane across the solution is selectively permeable which means it only allow certain materials to pass through.

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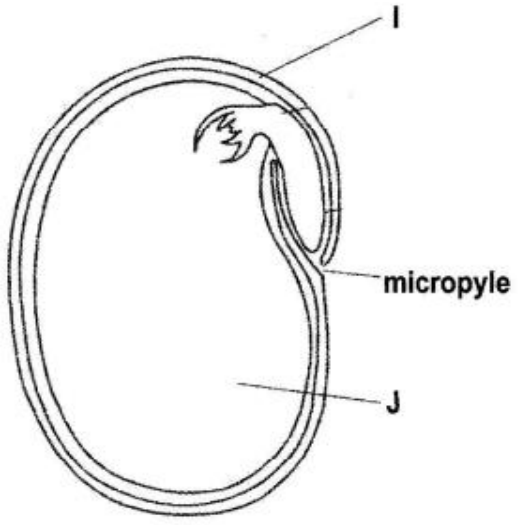
5 The diagram shows a longitudinal section through a bean seed



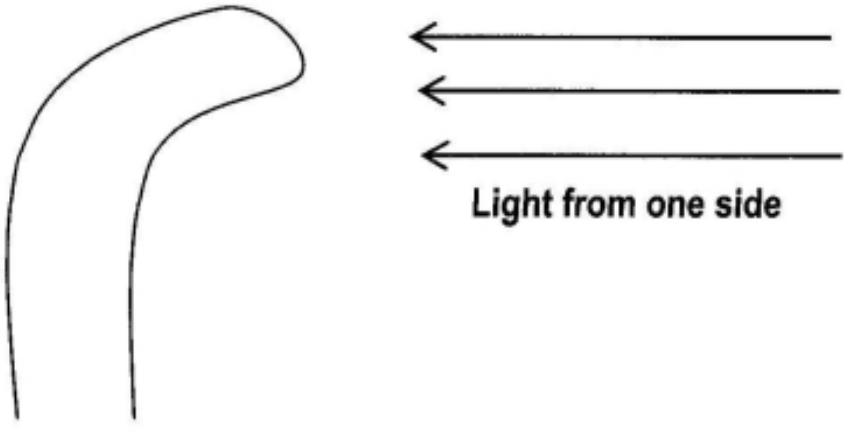
a) Identify the parts labelled I and J

b) Describe the role of the micropyle and structure J\

(i) Micropyle

(ii) Structure J

c) The diagram below shows the position of the plumule exposure of a seedling to one side light for five days.



(i) Explain the effect of one sided light on the tip of the plumule.

(ii) What is the benefit of this effect to the seedling?

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Associated facts and answers.

a) Names of the part I and J.

I = Seed coat

J = Cotyledon (food store)

b) (i) The role of the Micropyle: the role of the micropyle is to absorb water.

Note that the position of the radicle which is a young root, is next to the micropyle i.e an opening leading to the inside of a seed.

(ii) The role of the Cotyledon is store food for the young embryo to be used at germination and before it forms its leaves.

c) (i) Growth hormone (auxin) move from the illuminated side to the dark side.

- The high concentration of auxin on the dark side causes faster growth on the same side.
- The faster growth on the unilluminated side than the illuminated caused the shoot to bend toward light.

(ii) Benefits include.

- A shoot brings its leaves into the best situation for photosynthesis.
- Flowers are brought in position where they are likely to be seen and pollinated by insects.

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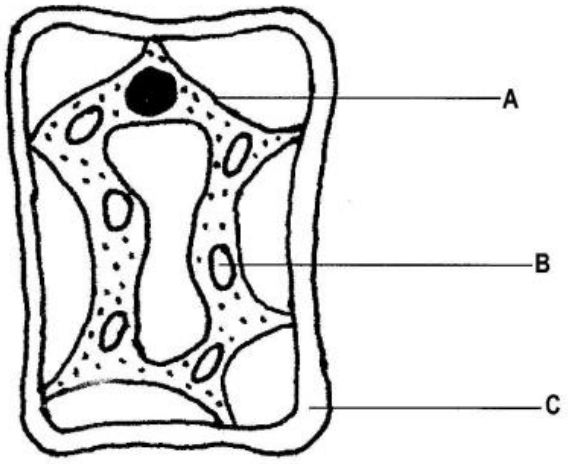
6 The diagram below shows a plant cell which has been in a concentrated salt solution.



a) Identify parts labelled A and B

b) (i) What happened for the plant cell to reach this stage?

(ii) State the term given to the cell in this condition.

(iii) How can this condition be reversed?

c) Give one reason why the structure labelled C remained in its natural state.

d) Give two differences between a plant cell and an animal cell.

Associated facts and answers

a) A = Cytoplasm

B = Chloroplast

* In the cytoplasm that is where nucleus and chloroplast is found.

b) (i) The cell was put in a concentrated salt solution. Due to the process of osmosis it lost most of its cell fluid to go and dilute the concentrated salt solution.

(ii) The term used is flaccid.

(iii) To make the concentrated salt solution more dilute than solution in the cell i.e reverse the osmotic process.

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c) Structure C was not affected because it is made up of cellulose which is tough i.e cell wall.

d) Differences between animal cell and plant cell.

(i) Animal cell has no cell wall while plant cell has a cell wall.

(ii) A plant cell has chloroplast while and animal cell has no chloroplast.

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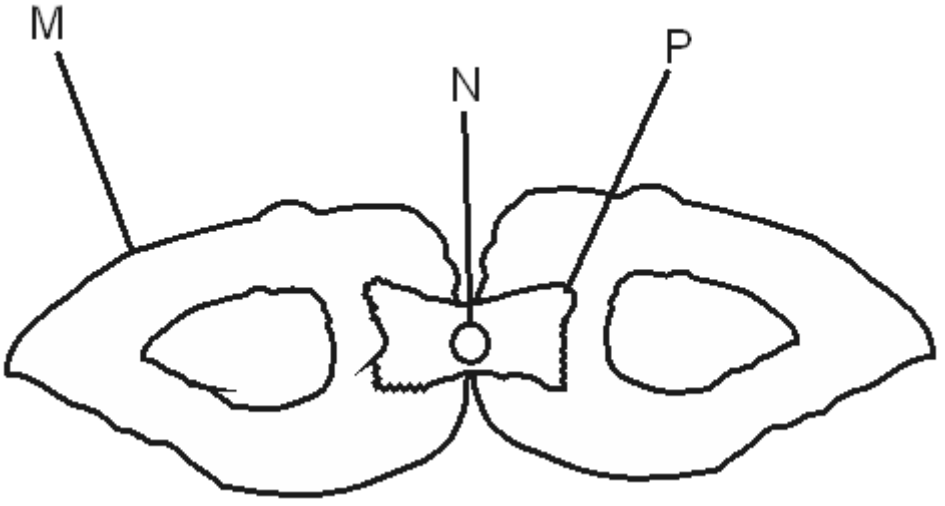
7 The diagram shows a cross section through a spinal cord.



a) Identify the labelled parts M and P in the diagram above.

b) The part labelled N contains some type of fluid. What is the role of the fluid found in N?

c) Draw the reflex arc on the diagram above.

d) Distinguish between a sensory and a motor neurone.

<u>Reasoning and answers</u>

a) Labelled parts are:

M = Dorsal root

P = Grey matter.

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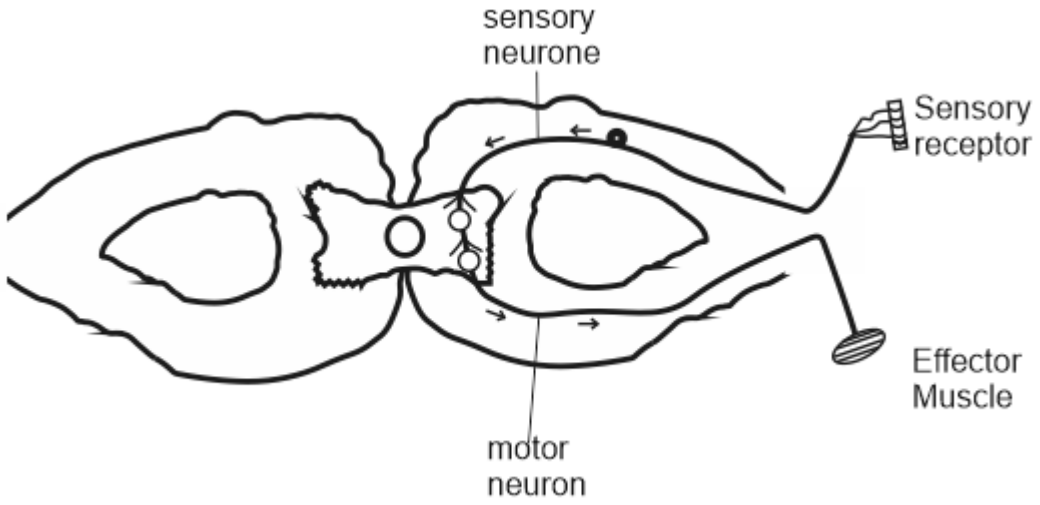
b) The fluid found in N which is the central canal is cerebrospinal fluid. Its roles are:

- Cushion the brain within the skull.
- Serve as a shock absorber for the central nervous system
- Circulates nutrients and chemicals filtered from the blood
- Removes waste product from the brain.

c) Reflex arc



d) Motor neurone and sensory neurone can be distinguished as follows.

- Cell body of the motor neurone is at one posterior end while for sensory neurone the cell body is on in its length.
- Motor neurone stimulates the effector muscles while sensory neurone picks up signals from sense organs.

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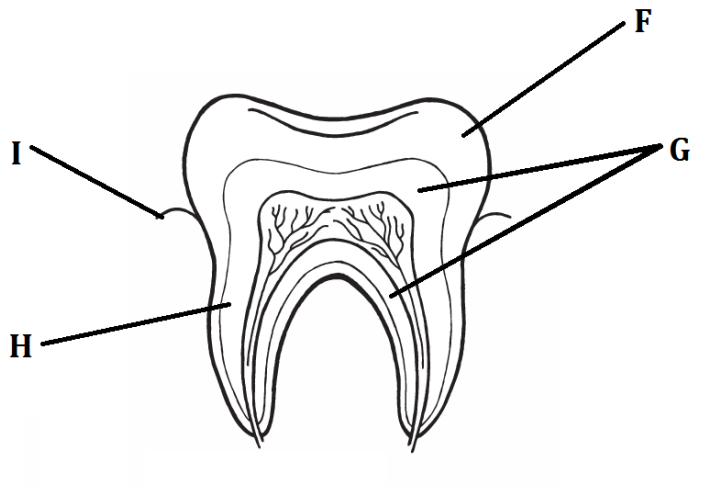
8 The diagram shows a section through a human tooth.



a) (i) State the name of the parts labelled F and G

(ii) Explain the function of the parts labelled H and I.

b) (i) Explain how tooth decay is brought about.

(ii) Suggest two ways of preventing tooth decay.

Reasoning and Answers

a) (i) F = Enamel (out hard part of the tooth)

G = Dentine (living part of the tooth)

(iii) **H** is the pulp: Contains soft connective tissue which make u dentine and keep the tooth alive. It has nerve cells which makes the tooth aware of its surrounding.it react to hotness (heat) or coldness.

I is the gum: gum is the muscle that covers the root of the tooth. This prevent the cold air, sweet stuff, salt staff and hot stuff from entering which causes sensation to the root of the tooth creating pain.

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b) (i) Tooth decay is as a result of failure to obey hygiene rules of the mouth. The food particles left in between the teeth after each meal attracts bacteria. In the process of bacteria breaking down the food particles in the teeth gaps, acid is produced. Acid react with the calcium in the enamel causing tooth cavities. These cavities may go up to the dentine and pulp. Once in the dentine and pulp, pain is felt. Bad smell is produced i.e tooth decay.

(ii) Two ways of preventing tooth decay

- Following hygiene rules of the mouth will prevent tooth decay.
- Cleaning your teeth with a tooth brush twice a day i.e in the morning after waking up from bed and evening before you go to bed.
- See dentist regularly for check-up.

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SECTION B TYPE QUESTIONS (ESSAY QUESTIONS)

9 **a)** Describe the structure of the synovial joint and explain the functions of its parts.

b) Differentiate the following:

(i) Tendon and ligament

(ii) Ball and socket joint and hinges joint

Associated facts and Answers

a) The synovial joints are also known as movable joint. The end of the bones at the end are covered by a layer of cartilage, to create a smooth slippery surface so that the bound together. The joint is enclosed by a fibrous capsule and the capsule is lined by a synovial membrane. Synovial fluid is within the cavity of the membrane. The bones are held in place by fibrous tissue called ligament.

The functions of the parts of the parts of the synovial joints is as follows:

- cartilage: reduce friction between bones
- synovial fluid: reduces between bones
- synovial membrane: contains synovial fluid
- ligament: keeps the bones together but allows their movement

b) Differences of the following:

(i) Tendon and ligament

A tendon is a tough, flexible band of fibrous connective tissue that connects muscles to bones while ligament is a band of

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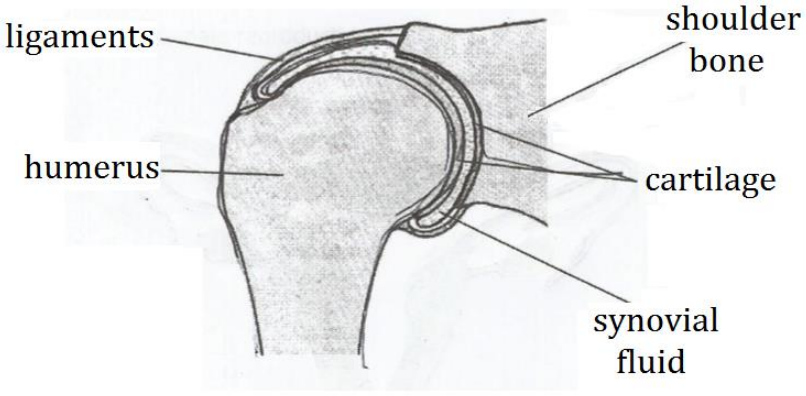
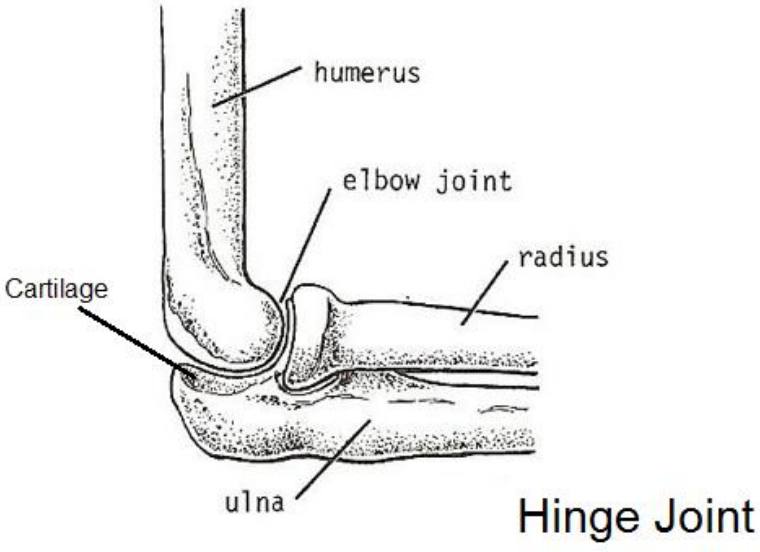
dense white fibrous elastic tissue which connects the ends of the bones together in order to form a joint

(ii) Ball and socket joint

These are called ball and socket joint because of the shape of the femur the humerus. The head of the femur and humerus fit into the cup-like glenoid cavity and acetabulum respectively. Ball and socket joints allow movement in several directions.



(iii) Hinges joint: It is also a synovial joint but moves in one direction only. It is formed between two bones or axis. The main hinge joint is the need and the elbow joint. The diagram is as shown below.



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UNIT 2.0 PHOTOSYNTHESIS, TRANSLOCATION AND RESPIRATION/EXCRETION

PAPER ONE (1) Type Questions (Multiple Choice)

1 Photosynthesis is a chemical reaction that takes place in a plant. Which characteristic of living organisms is described by the statement above?

A Excretion

B Locomotion

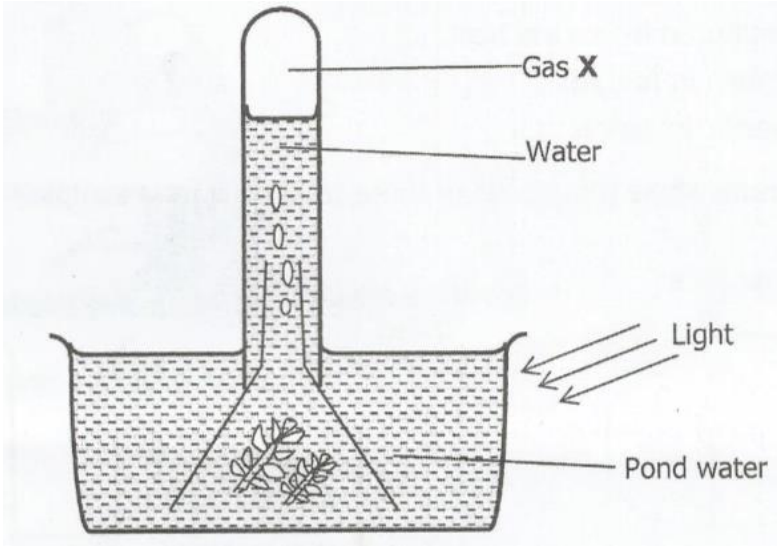
C Nutrition

D Reproduction

Reasoning
The process of photosynthesis manufactures food i.e starch or carbohydrates. Starch is consumed by living organism

Correct answer is C

2 The diagram shows an experiment to demonstrate photosynthesis.



What is the name of gas X?

A Carbon dioxide

B Hydrogen

C Nitrogen

D Oxygen

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Reasoning

During photosynthesis Oxygen is produced as shown in the word equation.

Carbon dioxide + Water $\xrightarrow[Chlorophyll]{Light}$ starch + Oxygen.

Correct answer is D

3 Which of the following carbohydrates is found in most cell wall of fundi?

A Cellulose

B Chitin

C Sugar

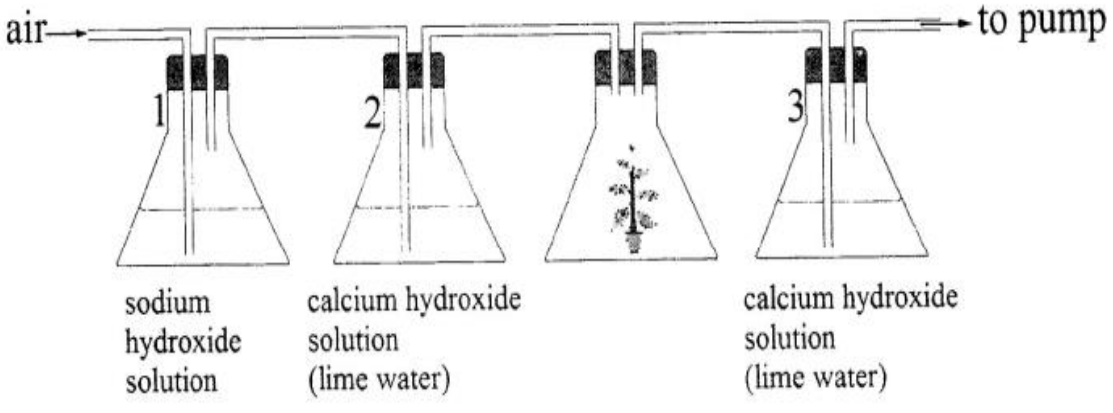
D Keratin

Reasoning

- Cellulose is found in plant cells
- Chitin in fungi
- Sugar is a food
- Keratin is a constituent in hair, features, hoots, claws, horns etc.

Correct answer is B

4 The diagram below shows the apparatus that can be used to investigate whether carbon dioxide is given off by a potted plant during respiration.



Which of the following would you expect to observe in the flask labelled 1, 2 and 3?

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	Flask 1	Flask 2	Flask 3
A	Cloudy	Clear	Cloudy
B	Cloudy	Cloudy	Clear
C	Clear	Clear	Cloudy
D	Clear	Cloudy	Cloudy

Reasoning

When carbon dioxide dissolves in calcium hydroxide solution form a cloud. However, when carbon dioxide dissolves in sodium hydroxide solution forms a clear solution

Correct answer is C

5 Which of the following is a nitrogenous waste in plant?

A Urea

B Cocaine

C Latex

D Oil

Reasoning

Both plant and animals excrete nitrogenous waste in the form of urea, uric acid or ammonia.

Correct answer is A

6 Which of the following is not an importance of saprophytic nutrition?

A Decomposition of the following

B Manufacturing of food nutrient

C Produce anti bodies

D Recycling of nutrients

Reasoning

Recycling of nutrient is done by plants. The rest are done by saprophytic nutrition

Correct answer is D

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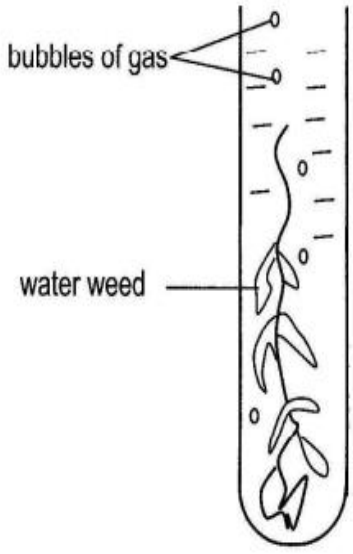
7 The diagram below shows an experiment to investigate photosynthesis.



Under what conditions would the plants produce most bubbles?

	Dissolved Carbon dioxide	Light	Temperature.
A	Present	Bright	Warm
B	Present	Bright	Cool
C	Absent	Dim	Warm
D	Absent	Bright	Cool

Reasoning

Photosynthesis takes place when carbon dioxide, light and suitable temperature are present, hence more bubbles will be produce.

Correct answer is A

8 The diagram on the next page shows the experiment used to demonstrate that carbon dioxide is released during respiration.

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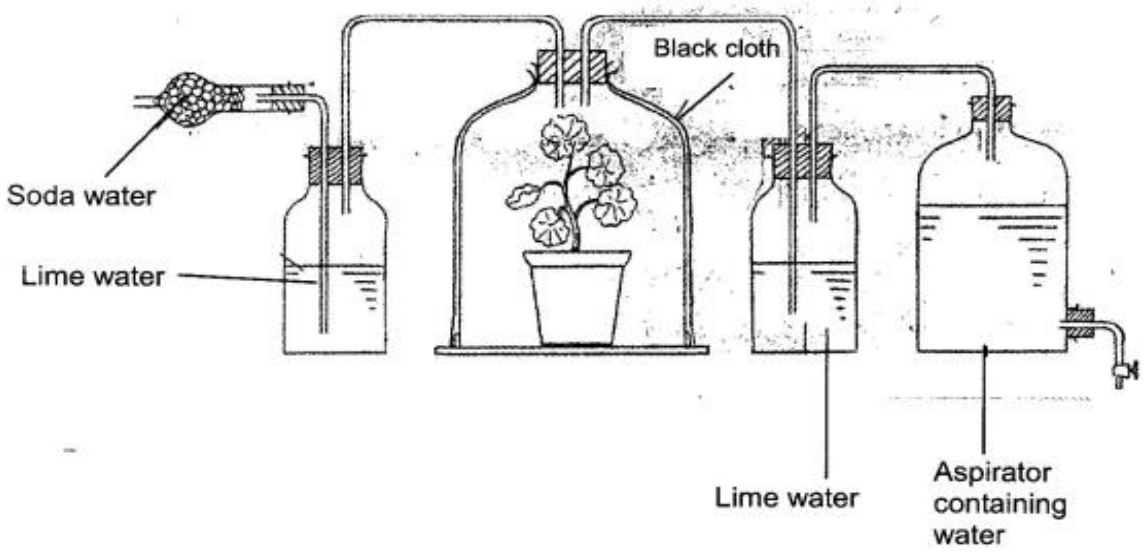


What is the function of the aspirator on this exercise?

A To pump out air through soda lime

B To draw air in through the soda lime

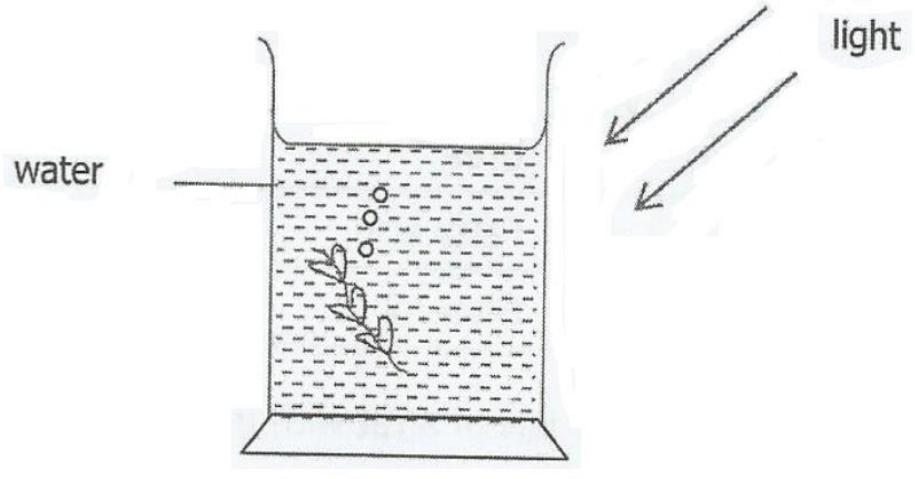
C To produce oxygen

D To absorb carbon dioxide

Reasoning
The aspirator does not pump out air, produce oxygen nor absorb carbon dioxide but it draws in air through the apparatus via the soda lime

Correct answer is B

9 The diagram shows a photosynthesising water plant. The rate of photosynthesis is measured by bubbles of gas release.



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Which factor in the water was limiting?

A Carbon dioxide

B Chlorophyll

C Light

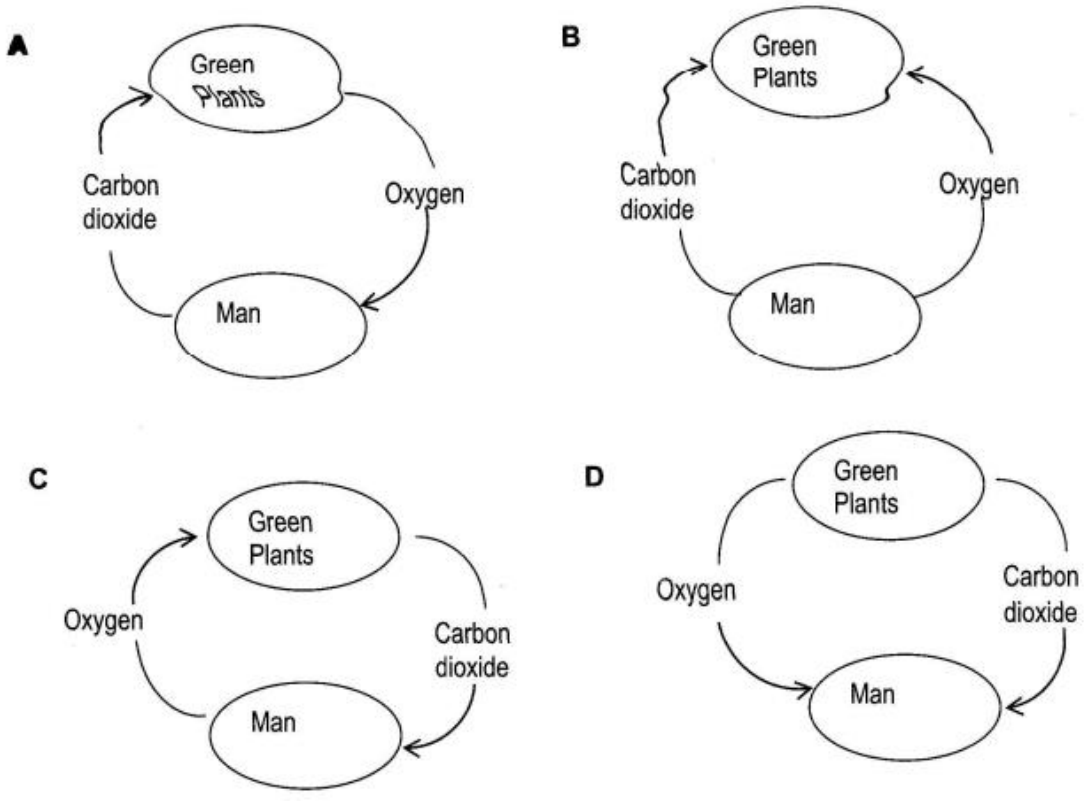
D Water

Reasoning

Water, light and chlorophyll are readily available. As more carbon dioxide is used, it gets less and less and bubbles will also reduce.

Correct answer is A

10 Which cycles shows the transfer of gases between man and plant during photosynthesis?



Reasoning

Man produces carbon dioxide during the process of respiration which is taken up by green plants in the process of photosynthesis. During photosynthesis green plants produce oxygen which man used during respiration

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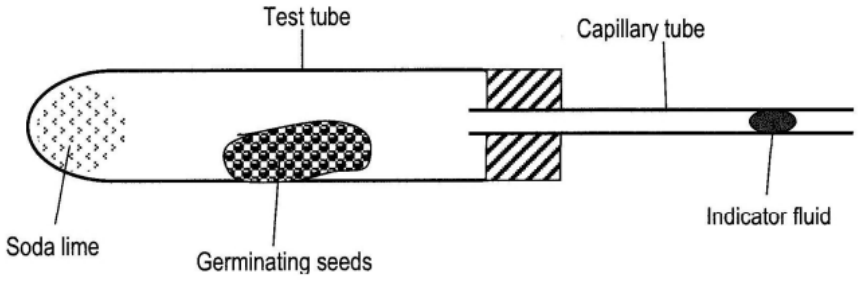
Correct answer is A

11 The diagram below is an experiment set up to investigate respiration in germinating seeds.



What happens to the indicator fluid in the capillary tube?

A Moves towards the test tube because of carbon dioxide intake by the seed.

B Moves towards the test tube because of oxygen intake by the seed.

C Move away from the test tube because of the output by the seed.

D Remains stationary because carbon dioxide and oxygen intake are equal.

Reasoning

Germinating seeds use oxygen and produce carbon dioxide. In the experiment however, carbon dioxide produce is absorbed by the soda lime. There is more air pressure in the inside than the outside of the test tube. The indicator therefor draws to the test tube.

Correct answer is B

12 The process that can reduce the rate of photosynthesis is?

A Respiration

B Pollution

C Germination

D Transpiration

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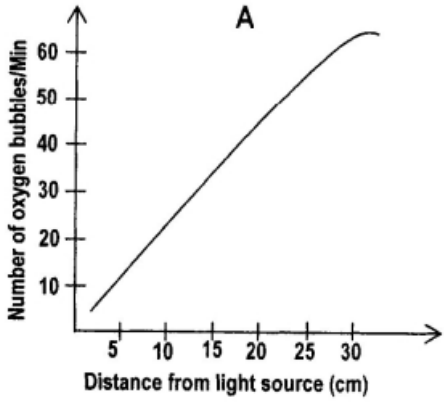
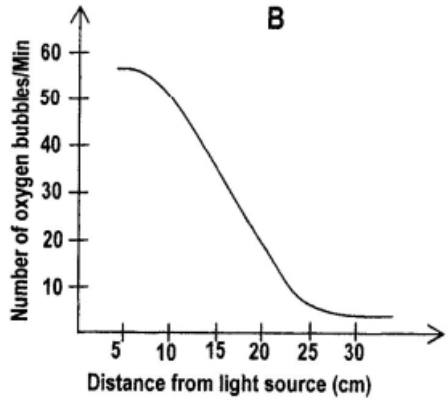
Associated facts and Reasoning

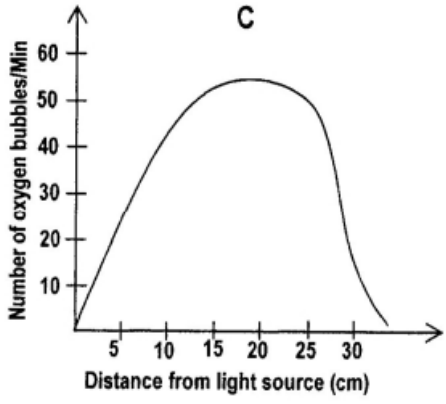
Respiration, germination and transpiration are temporary factors that affects photosynthesis. But permanent reduction is by pollution

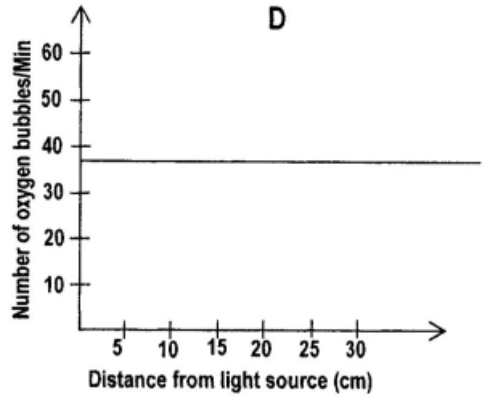
Correct answer is B

13 Which of the following graphs shows the effect of light intensity on the rate of photosynthesis in a pond weed?









Associated facts and Reasoning

The chances are that as light moves away from the plant the number if oxygen bubbles begin to get less and less

Correct answer is B

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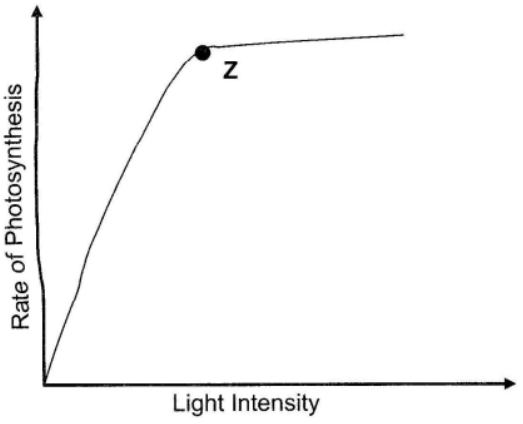
14 The graph below shows the results of an experiment measuring the rate of photosynthesis in a pong plant at different light intensities.



Which of the following are the limiting factors in the experiment at point Z?

A Carbon dioxide and temperature
B Light intensity and water
C Temperature and water
D Water and carbon dioxide.

Reasoning

Light is available at different intensities, therefore, it will affect temperature. Water is available but as photosynthesis continues to take place carbon dioxide will be affected

Correct answer is A

15 Which of the following is the correct word equation for photosynthesis?

A Carbohydrates + Oxygen $\xrightarrow[Chlorophyll]{Light\ energy}$ Carbon dioxide + Water

B Carbohydrates + Water $\xrightarrow[Chlorophyll]{Light\ energy}$ Carbohydrates + Oxygen

C Carbon dioxide + Water $\xrightarrow[Chlorophyll]{Light\ energy}$ Carbohydrates + Oxygen

D Carbon dioxide + Oxygen $\xrightarrow[Chlorophyll]{Light\ energy}$ Carbohydrates + Water

Associated facts and Reasoning

Photosynthesis is possible when water and carbon dioxide react in the presence of light and chlorophyll.

Correct answer is C

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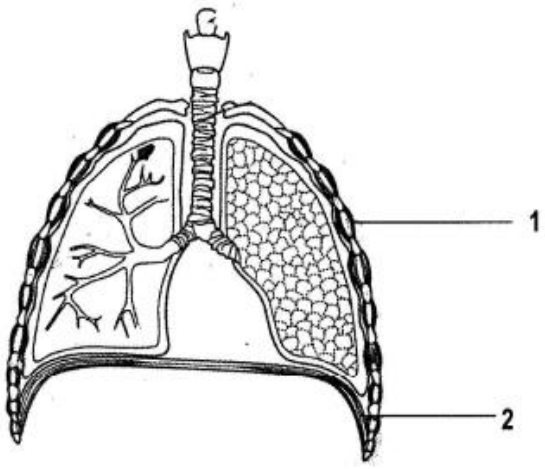
16 The diagram shows a section through a human thorax.



What changes occur in order for air to leave the lungs?

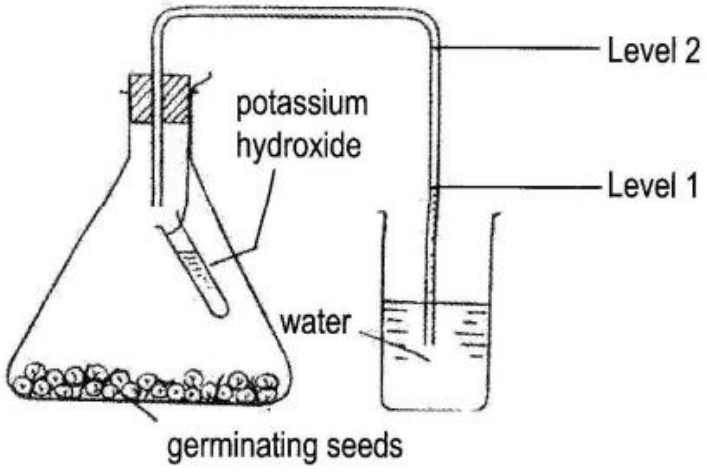
	Muscle 1	Muscle 2	Pressure in thorax
A	Contract	Contract	Reduced
B	Contract	Relax	Reduced
C	Relax	Contract	Increased
D	Relax	Contract	Increased

Associated facts and Reasoning

The diaphragm relaxes to form a dome shaped. Intercostal muscles also relaxed allowing ribs to move downwards. Pressure increases forcing air to go out of the lungs.

Correct answer is D

17 The diagram below shows the setup of apparatus to demonstrate respiration in germinating seeds.



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What causes the level of water to rise from level one to level 2 in the glass tube after six hours of experiment?

A Production of carbon dioxide by germinating seeds

B Absorption of oxygen by the germinating seeds

C Absorption of carbon dioxide by the germinating seeds

D Increased pressure inside the conical flask.

Associated facts and Reasoning

Germinating seeds use oxygen, which leaves low pressure in the flask. This cause a sanction power through the delivery tube causing water to rise from level one to level two. Potassium hydroxide absorbs carbon dioxide.

Correct answer is B

18 Which of the following best explains why insects survive without any oxygen carrying pigment in their blood?

A The body is small and sufficient oxygen can diffuse through the surface.

B Sufficient oxygen is carried dissolved and in the plasma

C The trancheoles conduct oxygen directly to the tissues

D Oxygen is absorbed directly into the tissues at the spiracles

Associated facts and Reasoning

Oxygen diffuse into the tissue via the trancheoles which are minute tubes

Correct answer is C

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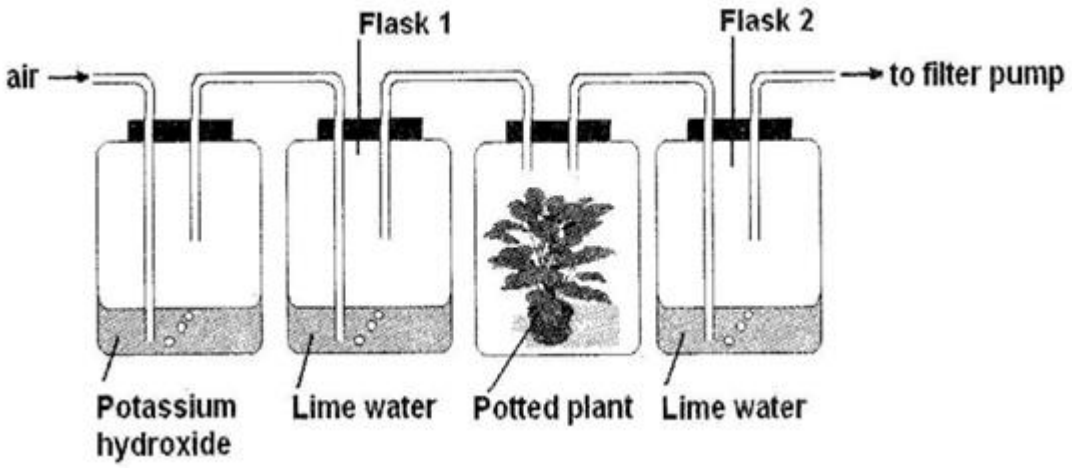
19 The diagram below was set up to demonstrate respiration in plants



Which changes would occur to flask 1 and flask 2 after two hours of experiment?

	Flask 1	Flask 2
A	Remained colourless	Remained colourless
B	Remained colourless	Turned milky
C	Turned milky	Turned milky
D	Turned milky	Remained colourless

Associated facts and Reasoning

Carbon dioxide turns lime water milky. Since carbon dioxide is absorbed by potassium hydroxide, flask 1 lime water will remain clear. However, the potted plant will produce carbon dioxide which will turn lime water in flask 2 milky

Correct answer is B

20 Which of the following is a difference between aerobic and anaerobic respiration?

	Aerobic Respiration	Anaerobic Respiration
A	Carbon dioxide is produce	No carbon dioxide produced
B	Lactic acid is produced	Alcohol is produced
C	More energy is produced	Less energy is produce
D	Oxygen not used	Oxygen is produced

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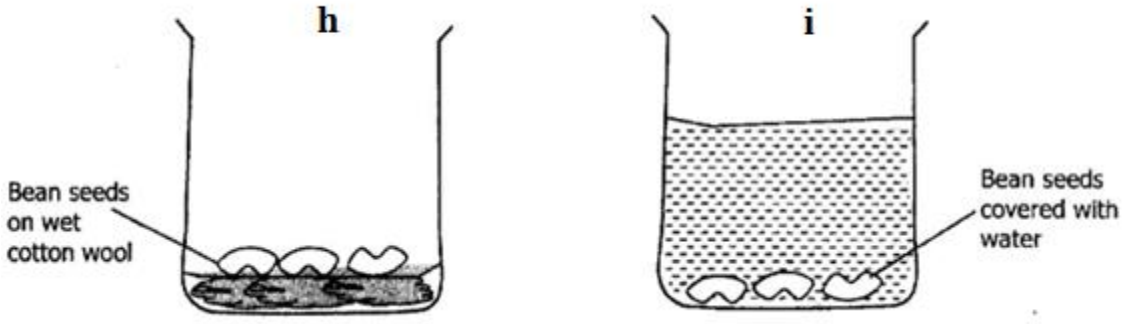
Associated facts and Reasoning

In 180g of glucose, aerobic produces 2830Kj of energy while with the same amount of glucose anaerobic produces 118Kj of energy.

Correct answer is C

21 The diagram shows some beans seeds that have been left to germinate for four days.



Why would seeds in 'i' not germinated? This is because the seeds in 'i' cannot receive enough?_____

A Carbon dioxide for photosynthesis

B Light for photosynthesis

C Nitrates for their growth

D Oxygen for respiration

Associated facts and Reasoning

One of the conditions necessary for germination is oxygen, which is required by seeds for respiration, I order to break down stored starch.

Correct answer is D

22 Between which of the following parts of an insect does gaseous exchange occur?

A Tissue and spiracles

B Blood and trachea

C Blood and spiracle

D Tissue and trachea

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Associated facts and Reasoning

Air is pumped in and out of the trachea by the movement of the abdomen and wings. Oxygen diffuses through the tissues via the fluid called smaller tracheoles, while carbon dioxide diffuses out through the tracheae and partly through the body surface

Correct answer is D

23 The table below shows the percentage of a gas inspired and expired in human beings.

What gas is being referred to?

Inspired air	Expired air
20%	16%

A Carbon dioxide

B Nitrogen

C Oxygen

D Water vapour

Associated facts and Reasoning

The amount of oxygen in the atmosphere by percentage is 20%, when air is inspired 4% is used and 16% is expired.

Correct answer is C

24 Which if the events occur during inspiration in a fish?

	Floor of mouth	operculum	Movement of water
A	Lowered	Closed	Enters
B	Lowered	Opened	Comes out
C	Raised	Closed	Enters
D	Raised	Opened	Comes out.

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Associated facts and Reasoning

During inspiration, floor of the mouth is lower, which reduces pressure and allows more water to enter.
The opercula remains closed

Correct answer is A

25 During a long distance race the body temperature of an athlete begins to rise. Which of the following changes occur in the body to help return the body temperature to normal?

	Sweating	Blood vessels in the skin
A	Increases	Constrict
B	Increase	Dilate
C	Decrease	Dilate
D	Decrease	Constrict

Associated facts and Reasoning

During racing the body temperature increase causing sweating to increase. Sweat take heat with it from the body. Similar blood vessels come close to the surface of the skin (dilate) in order to release heat. The two activities lower the body temperature.

Correct answer is B

26 Which features of the alveolus decreases the distance over which oxygen and carbon dioxide molecules diffuse?

A Each alveolus has a large blood supply

B Each alveolus is only 0.2mm in diameter

C There are numerus alveolus in the lungs

D The walls of the alveolus

Associated facts and Reasoning

The distance over which oxygen and carbon dioxide diffuse is reduced because the alveolus is only one cell thick.

Correct answer is D

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27 Chemicals in tobacco smoke lead to the breakdown of the tissues of the alveoli walls. What name is given to the condition?

A Bronchitis

B Emphysema

C Heart disease

D Lung cancer

Associated facts and Reasoning

Emphysema is a breakdown of the alveoli the chemical in tobacco weaken the wall of the alveoli. The crushing of a smoke bursts some of the alveoli, thereby reducing the intake of oxygen.

Correct answer is B

28 The table below shows the aspect of respiration.
Which one is correct for anaerobic respiration in plants?

	Amount of glucose per glucose molecule	Alcohol	Carbon dioxide
A	High	Produced	Not Produced
B	Low	Produced	Produced
C	High	Not Produced	Produced
D	High	Not Produced	Not Produced

Associated facts and Reasoning

- Energy produced per 180Kj. (i) Anaerobic 2830Kj. (ii) 118Kj.
- Both produce carbon dioxide.
- Only anaerobic produces alcohol

Correct answer is B

29 Which of the following pairs of words correctly state the function of ribosomes and mitochondria respectively?

	Ribosomes	Mitochondria
A	Respiration	Protein synthesis
B	Protein synthesis	Respiration
C	Transport within cells	Respiration
D	Protein synthesis	Transport within cells

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Associated facts and Reasoning

Ribosomes help in the process of protein synthesis while mitochondria perform cellular respiration i.e it takes in nutrients from the cell, breaks it down and turns it into energy.

Correct answer is C

30 A piece of glass was left on top of a green grass with two wood supports to keep it away from the grass as shown in diagram 1. After 48 hours, the piece of grass was removed and an observation, the grass had changed as shown in diagram 2.

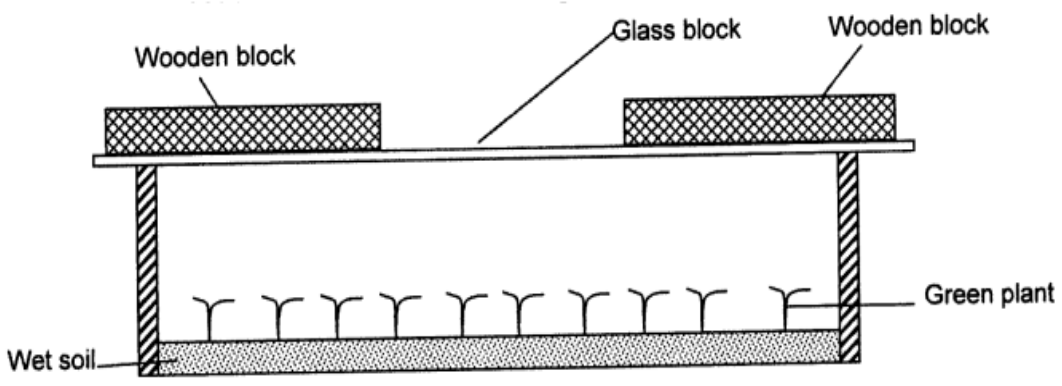

Diagram 1.

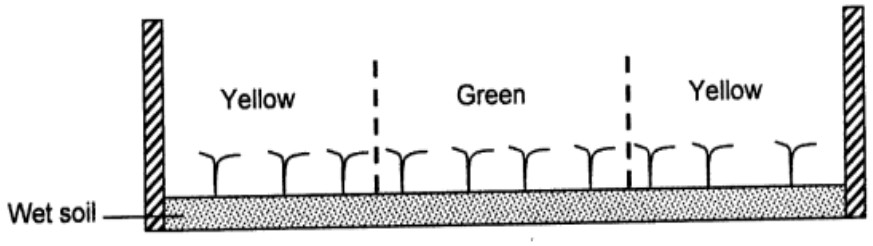

Diagram 2.

What caused the change in the colour of the grass in diagram 2?

A Lack of water

B Lack of magnesium

C Lack of light

D Lack of carbon dioxide

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Associated facts and Reasoning

The yellow plants are under shade due to wooden blocks, which have not allowed light to be supplied to them. The plant under the glass block continue receiving high light.

Correct answer is C

31 Which if the following correctly shows the organism and it product of anaerobic respiration?

	Organism	**Products of its anaerobic respiration**
A	Bacteria	Lactic acid
B	Yeast	Lactic acid
C	Human being	Alcohol
D	Rhizoid	Alcohol

Associated facts and Reasoning

In some cases, in anaerobic respiration bacteria produces lactic acid

Correct answer is A

32 The table below shows the rate of breathing and volume of air exchanged.

	Breathing rate as breaths per minute	Product of its anaerobic respiration
At rest	14	500
After exercise	28	1000

What was the increase in volume of air exchange per minute as a result of the exercise?

A 7,000cm^3

B 14,000cm^3

C 21,000cm^3

D 28,000cm^3

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Associated facts and Reasoning

- Breathing rate per minute at rest = 14
- Each breath = $500cm^3$
- Total volume for 14 breathes = $500cm^3$ X 14
  $=7000cm^3$
- Breathing rate per minute after exercise = 28
- Each breath volume of air = $1000cm^3$
- Total volume for 14 breathes = $1000cm^3$ X 28
  $=28,000cm^3$

  Increase in volume of air exchange $=28,000cm^3$
  $– 7,000cm^3$
  $21,000cm^3$

Correct answer is C

33 Which process is not carried out by all living organism?

A Nutrition

B Photosynthesis

C Respiration

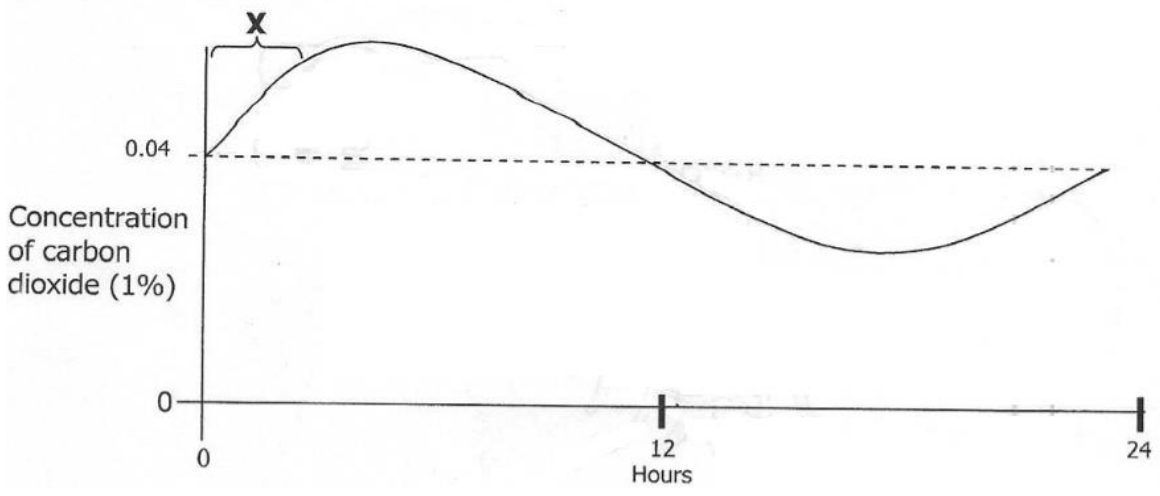
D Reproduction

Associated facts and Reasoning

- All living organisms carry out the following process: nutrition, respiration and reproduction
- However, not all living organism photosynthesize

Correct answer is B

34 The graph shows the concentration of carbon dioxide in the air surrounding a plant measured over a period of 24 hours.



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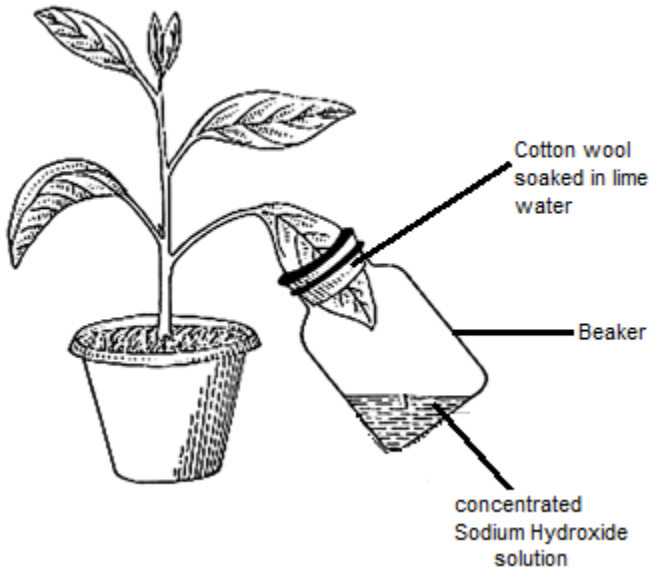
What explains the change in carbon dioxide concentration during the period X?

Associated facts and Reasoning
▪ At night plants respire and carbon dioxide concentration around the plant is high. ▪ However, during day time, the plant use up carbon dioxide by the process of photosynthesis

Correct answer is C

35 The diagram below shows an experiment on photosynthesis.



What is the purpose of sodium hydroxide solution and the cotton wool?

	Sodium Hydroxide solution	Cotton wool
A	Supplies water to the leaf in the beaker	Supplies carbon dioxide to the leaf in the beaker
B	Removes water vapour from the beaker	Absorbs carbon dioxide from the beaker
C	Removes carbon dioxide from the beaker	Prevents the entry of oxygen from the beaker
D	Supplies carbon dioxide to the leaf in the beaker	Prevent entry of carbon dioxide in the beaker

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Associated facts and Reasoning

- Consider that sodium hydroxide absorbs carbon dioxide. Lime water also reacts with carbon dioxide from the atmosphere.
- In that way carbon dioxide from the atmosphere fails to enter the beaker.
- The idea is that the leaf in the beaker should not be supplied with carbon dioxide

Correct answer is D

36 The colours shown below appear in a series of colour changes when a monosaccharide is burned with benedict solution.

1. Green
2. Orange
3. Blue
4. Yellow

Which one of the following is the correct order in which the colour changes would occur?

A	3	1	2	4
B	3	1	4	2
C	2	3	1	4
D	4	3	1	2

Associated facts and Reasoning

Note before heating the colour is blue. As heating processes it changes to green then yellow finally orange.

Correct answer is B

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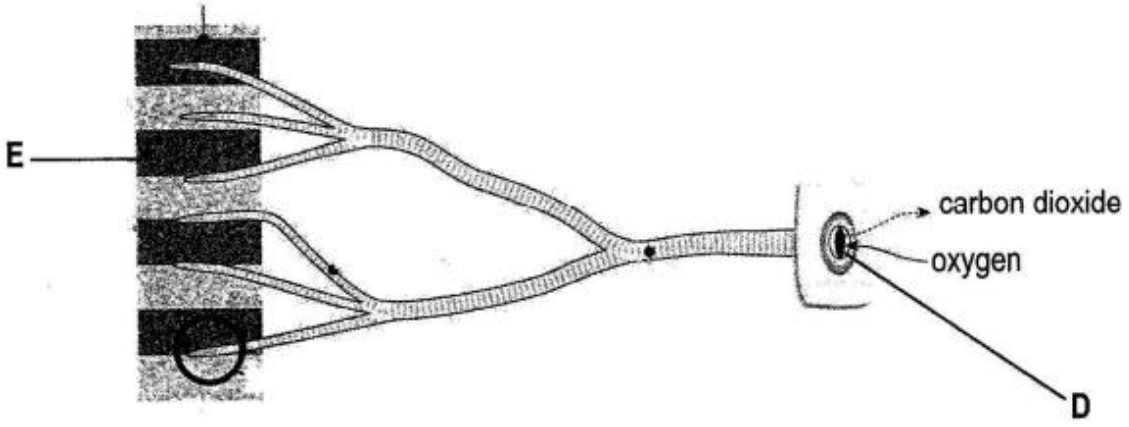
UNIT 2.1 PHOTOSYNTHESIS, TRANSLOCATION AND RESPIRATION/EXCRETION

PAPER TWO (2) Type Questions

1 The diagram below shows part of the respiratory system of an insect



a) Name each of the cell above

b) Explain how oxygen from the atmosphere is able to reach tissue labelled E.

c) Explain how the energy released from respiration in an insect is used.

d) State two ways in which the respiratory system shown differs from that of a fish.

Reasoning and Answers

a) D = Spiracle

E = Muscle cells

b) Oxygen enters the insect through the spiracles which connect to the main pipe the trachea.

Trachea branches into many tubes called tracheole, which eventually reaches the tissues.

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Movement of abdomen and wings help air to go in and out

c) Energy is used up for:

-Movement of abdomen and wings during the process of respiration

-Flying and ground movement.

-Eating

d) Air enters insect through spiracles while in fish it enters through gills. Distribution of air throughout the body is done by a trachea system in an insect while in a fish distribution is done by blood vessels system.

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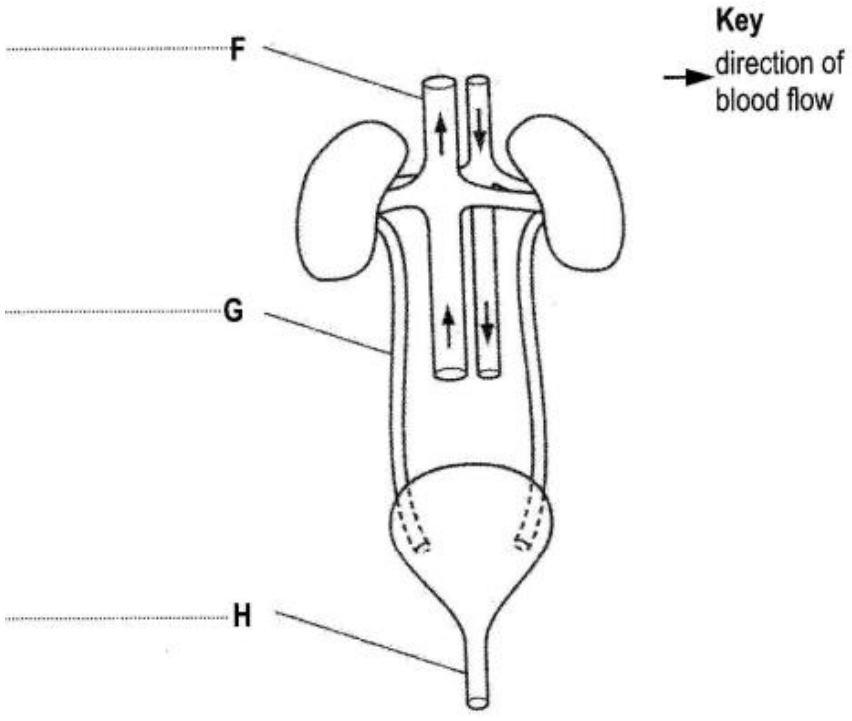
2 The diagram below shows the urinary system and it blood supply.



a) Name the structures labelled F, G and H in the diagram above.

b) State two process that are involved in the urine formation.

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c) The table below shows the relative quantities of several substances in the blood in the renal artery and renal vein.

Substance	Relative quantities in blood in renal artery (arbitrary units)	Relative quantities in blood in renal vein (arbitrary units)
Glucose	10.0	9.5
Oxygen	100.0	40.0
Sodium salts	32.0	27.0
Urea	6.0	2.5
Water	180.0	175.0

Explain what happens in the kidney to bring about changes in the relative quantities of:

(i) Glucose

(ii) Oxygen

(iii) Sodium salts

(iv) Urea

Reasoning and Answers

a) Labelled structures are:

F = Vena Cava

It takes used blood away from the tissues.

G = Ureter

Takes urine from the kidneys to the urinary bladder

H = Urethra

Takes urine out of the bladder to the outside.

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b) – Ultra filtration

- Selective re-absorption

c) Refer to the table above.

Consider what takes place during the process of ultra-filtration and selective re-absorption.

Glucose: Most of the glucose is re-absorbed in the blood, excess is stored as glycogen in the liver and muscles. In the table 0.5 glucose is excreted with urine.

Oxygen: 60.0 units of the oxygen used up, 40 units is retained. Oxygen is used during respiration in the body tissues, defecation, metabolism process, working etc.

Sodium Salts: only 5.0 units of the sodium salts excreted the rest are retained

Urea: 3.5 units of urea is excreted. Less than half is retained.

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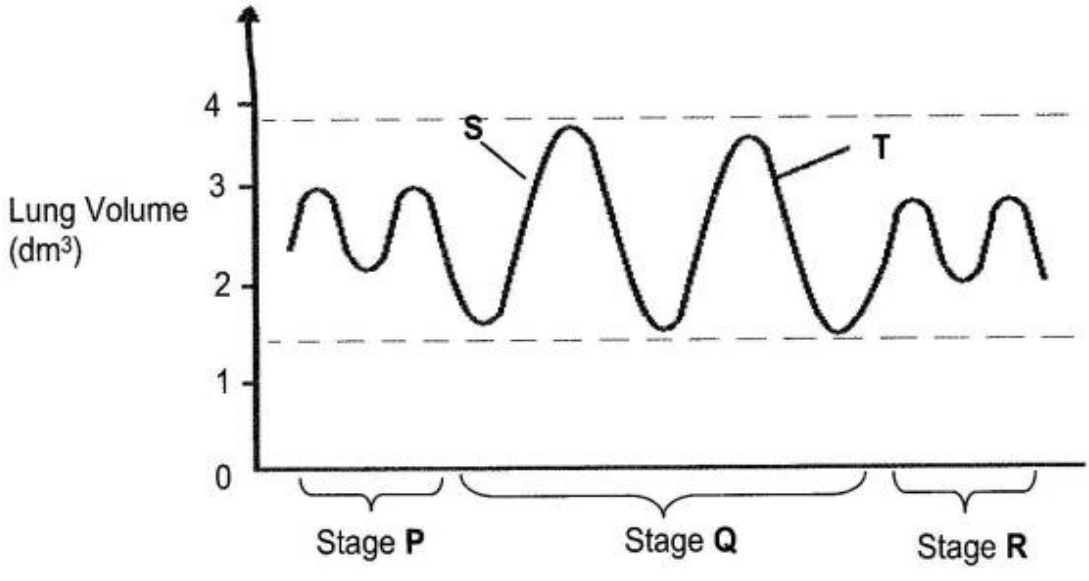
3 The graph below shows changes in volume of air during breathing in the lungs of a person.



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a) (i) Which letter shows the process of inspiration taking place?

(ii) Suggest activities taking place at P, Q, R.

b) Explain why there is an increase in volume during stage Q.

c) Describe the changes that will take place in the thorax during inspiration in order to facilitate the increase in volume at stage Q.

Reasoning and Answers

a) (i) Recall that breathing involves expansion and contraction of the chest

Inspiration calls for increase in volume of the chest to allow more air to go in.

Answer is S

(ii) Stage P = Expiration

Stage Q = Inspiration

Stage R = Expiration

b) During inspiration the chest expands as a results more air goes in, because a vacuum is created.

c) Inspiration

- Diaphragm contract pushing the ribs outwards
- The intercostal muscles contracts pulling the ribs upwards
- Chest cavity volume increases creating a vacuum that makes to be drawn.

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4 The table below shows of tests on urine samples taken from four different people, identified as L, M, N and O.

Each sample was tested for the presence of alcohol, glucose and amino-acids

Person	Alcohol	Glucose	Amino acid	Urea
L	✓	×	×	✓
M	×	✓	×	✓
N	✓	×	×	✓
O	×	×	×	×

a) (i) from the table above, identify which person is likely to suffer from diabetes.

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

(iii) Suggested a remedy for diabetes.

b) (i) From the table, identify which person has kidney failure?

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

(iii) Suggest two remedies for kidney failure.

Reasoning and Answers

a) (i) Person M

(ii) Recall that diabetes is lack of proper regulation of sugar in the body.

Presence of glucose in urine is a sign of diabetes, which M has.

(iii) Remedy can be any of the following:

- Good and well controlled diet. Eat fruits, vegetables. Avoid refined food, too much sugar, carbohydrates etc.

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- Oral medication and insulin
- Do exercises regularly.
- Regular screening for complications

b) (i) Recall what kidney failure is the inability to get rid of waste products from the body.

There is a build-up of waste products and excess fluids in the body like the case of O in the table.

Answer is O

(ii) The absence of wasted products in urine. The kidney has failed to get rid of them.

(iii) The following can assist.

- Take vitamin E
- Take aloe Vera i.e helps reduce urinal calcium.
- Take lemon etc.
- Last resort dialysis machine.

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SECTION B TYPE QUESTIONS (ESSAY QUESTIONS)

1 **a)** Explain what is meant by the term respiration.

b) Describe the importance of respiration to living organism.

c) Describe the adverse effect of cigarette smoking on the health of human.

Reasoning and Answers

a) Recall the definition of respiration.

Respiration is the process by which food is broken down in the cells of animals and plants in order for organisms to obtain energy.

It is a complex metabolic activity which take place in the mitochondria of the cell.

Respiration uses oxygen to burn glucose in order to produce energy. This process can be summarised by the equation below.

$$C_6H_{12}O_6 + 6O_6 \rightarrow 6CO_2 + 6H_2O_6 + Energy$$

b) Respiration provides cells in the body or plants with oxygen.

It produces energy that is essential for the normal functioning of the body.

It also expels toxic carbon dioxide.

It is important for the synthesis of essential molecules e.g proteins.

It also maintains body temperature.

c) Cigarette diseases include:

(i) Chronic bronchitis.

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(ii) Lung cancer; most cancer is caused by smoking.

(iii) Those with asthma smoking can trigger an attack.

(iv) Long term smoking can cause throat cancer.

(v) Cn cause death. In America 480,000 die each year of cigarette related diseases

---

2 **a)** Explain how leaves are adapted to carry out photosynthesis.

b) How does a plant get and used the following elements?

(i) Nitrogen

(ii) Magnesium

c) Explain how enzymes activity is affected by the PH and concentration of the substrate.

Reasoning and Answers

a) Photosynthesis is the process by which leaves absorb light and carbon dioxide to produce carbohydrates.

Leaves are adapted to perform their function in the following ways:

- They have a large surface area to absorb sunlight and.
- They have a thin margin to allow carbon dioxide to reach the cells.
- They have a green colour (chlorophyll) in order to absorb sunlight.
- They have a network of veins to help transport carbohydrates and water.
- Stoma this allows carbon dioxide to enter the leaf.

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b) (i) Plants get nitrogen from the soil in the form of nitrates.

They take them through roots as amino acids, nitrates, nitrites and ammonia

(ii) Plants take up Magnesium in the form of salts.

These are dissolved in soil water and diffuse into the roots.

From the roots into the stem up to the leaves, transpiration pull helps to transport the salts through xylem vessels.

Magnesium is used by the plant in the following ways:

- It is used in the photosynthesis process as a building block of chlorophyll which makes leaves appear green.
- Magnesium enables chlorophyll capture sunlight.

c) Note that acids and alkaline conditions after chemical properties of enzymes.

Each enzyme works best at a particular level of acidity and alkalinity i.e PH.

-For Example: Stomach enzymes work well at PH 2, enzymes inside body cells work well at PH 7.

Although changes in PH affect the activities of enzymes, these effects are reversible.

an enzyme which is inactive by the a low PH will resume its activities when its optimum PH is reversed.

On the other hand the increase in substrate concentration, the more substrate molecules collide with enzymes i.e more products are produced.

As the concentration increase the reaction increase but a maximum point will be reached when the increase in concentration in substrate the velocity reaction does not increase.

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It reaches what is known as enzyme substrate complex.

Enzyme therefore, have a maximum substrate concentration on which they can work.

3 **a)** Describe the following terms of artificial vegetation propagation.

(i) Grafting

(ii) Budding

b) Explain the following terms:

(i) Pollination

(ii) Fertilization

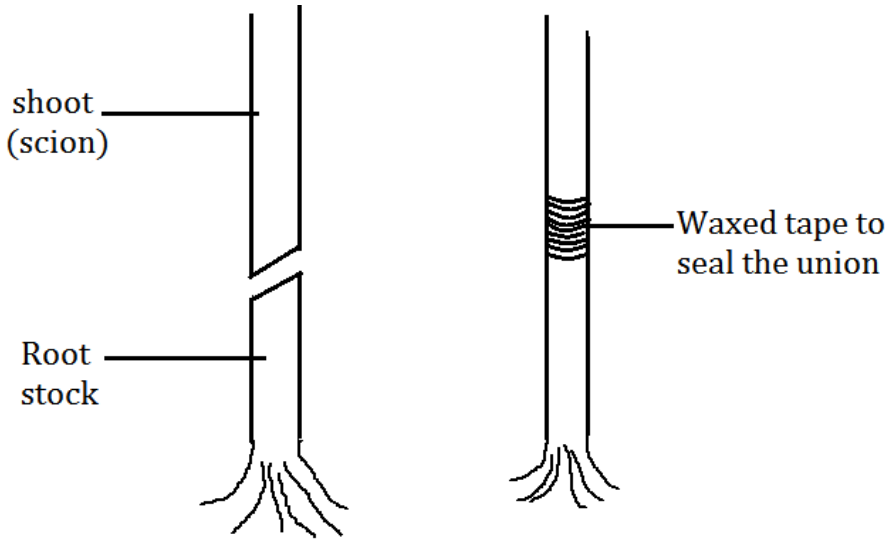
Reasoning and Answers

(a) (i) Grafting

The term grafting mainly refers to a scion which is a shoot or twig

The root stock and the scion must belong to the same species.

A shoot which is the same diameter as the rootstock is inserted on the rootstock as shown in the diagram next page.



Grafting

The two are held together by putting a tape.

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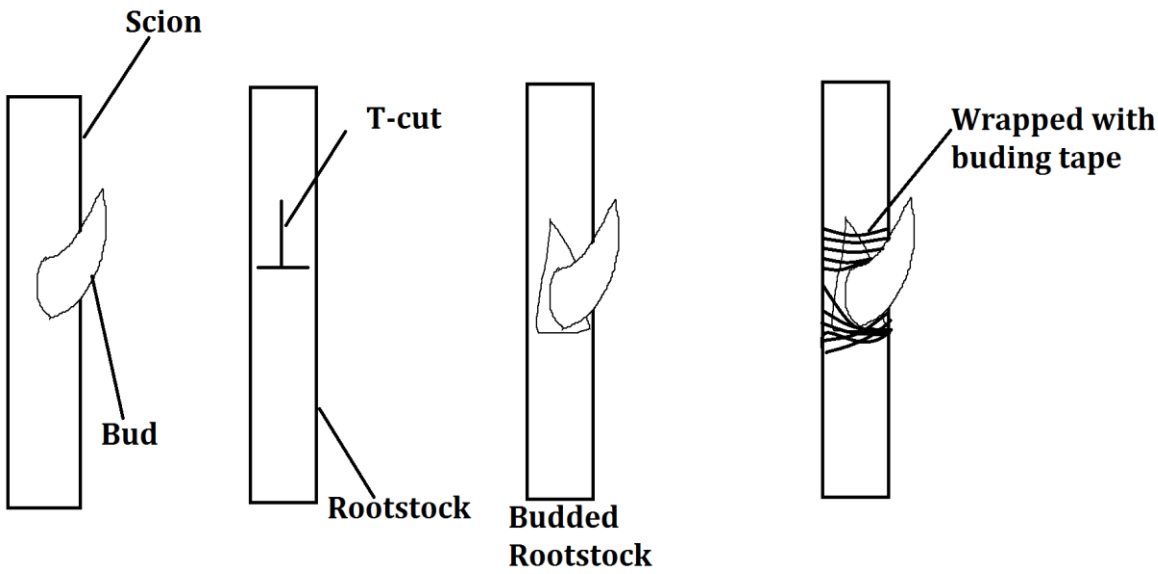
(ii) Budding involves inserting a bud from a desired plant onto the rootstock of the same species.

An upside down T cut is made in the rootstock.
Then a bud is inserted into the rootstock which has been grown in the nursery when it has a pencil thick stem and a light of 30cm.

The process is shown below.



It is wrapped with budding tape so that the bud is in position and to prevent water going of the budding as it could develop fungus diseases.

b) Pollination

(i) Pollination can be defined as the transfer of pollen grain from the anther to the stigma of the plant of the same species.

There are two types of pollination that is:
Self-pollination and cross-pollination.

Self-pollination mean pollen is transferred from the anther to the stigma of the same flower. But it can also be of the same variety

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Cross-pollination is the transfer of pollen grain from the anther to the stigma of a different variety but of the same species.

(ii) Fertilization is the fusion of male and female gamete.

Fusion of male and female gamete takes place in the ovary.

Fusion of the two sex cell (pollen + ovum) results into a zygote which develops into an embryo, eventually seed of fruit.

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UNIT 3.0 WATER UPTAKE IN PLANTS / TRANSPIRATION / BLOOD CIRCULATION IN HUMANS / FOOD INTAKE AND DIGESTION.

1 Which of the following best explains the significance of transportation in plants?

A It makes plant

B Promotes respiration in plants

C Causes carbon dioxide to be excreted

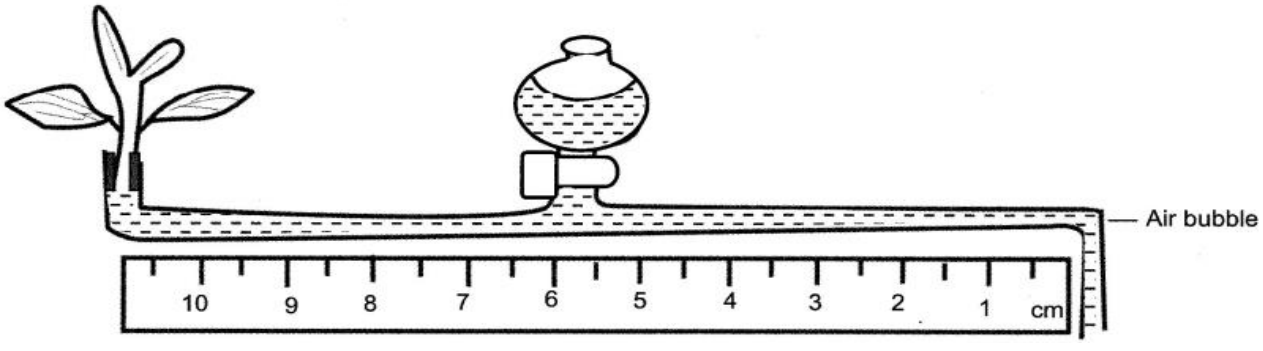
D Enables water to move up the plant

Associated facts and Reasoning

Transpiration creates a negative pressure gradient that helps draw water and minerals up through the plant from it root

Correct answer is D

2 The diagram below shows a photometer used to measure the rate of transpiration in varying environment conditions.



The table below shows the results obtained during this experiment.

Results obtained

Environment condition	1 High light intensity	2 High humidity	3 Windy electrical fan over plant	4 Low humidity
Time taken for bubble to move	6	18	2	12

During which environmental condition was transpiration rate highest?

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A 1

B 2

C 3

D 4

Associated facts and Reasoning
It only took 2 minutes for an air bubble to move a 10cm distance under an electrical fan propelled wind.

Correct answer is C

3 Leaves of two different plants X and Y have blue cobalt chloride papers fixed on their lower surface. After a period of five minutes, the paper on the leaf of plant X has turned pink and the other one on plant Y remains the same.

A Plant X has a greater rate of respiration

B Plant X has a greater rate of transpiration

C Plant X has a greater rate of photosynthesis

D Plant X has a greater rate of translocation

Associated facts and Reasoning
Blue chloride paper turns to pink when it comes in contact with water. Transpiration is loss of water from plant through leaves.

Correct answer is B

4 A green plant starts to wilt. It is then watered and after a short time it recovers. What process cause this recovery?

A Active transport

B Respiration

C Assimilation

D Transpiration

Correct answer is D

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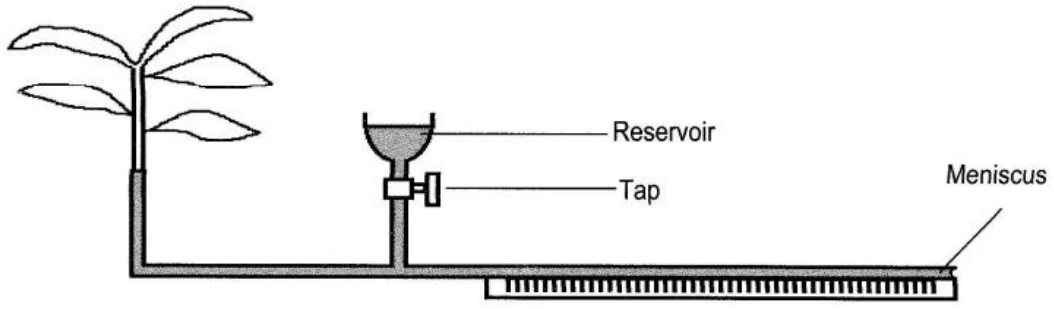
5 The diagram below shows a photometer used to investigate water uptake by a cut leaf twig.



In which of the following set of conditions the tap need to be used most often?

A Light, no wind, humidity

B Light, wind, dry

C Dark, no wind, humidity

D Dark, wind, dry

Associated facts and Reasoning

Water uptake is greatly influence positively by light intensity, wind and dry conditions.

Correct answer is B

6 By what process do phosphate enter root hairs cells of a plant?

A Photosynthesis

B Diffusion

C Active transport

D Osmosis

Associated facts and Reasoning

Although transpiration, diffusion, osmosis and respiration play a role in the uptake of mineral salts by root hairs. However active transport plays an important role in the transport of salts.

Correct answer is C

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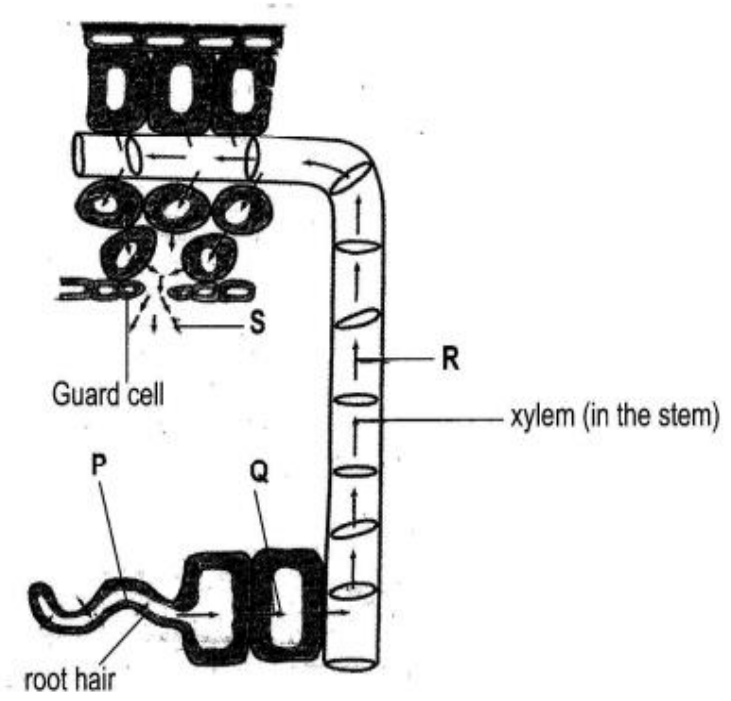
7 The schematic diagram below shows movement of water in a plant from the roots to the leaves.



What processes are responsible for the movement of water at points P, Q R and S?

	P	Q	R	S
A	Osmosis	Osmosis	Transpiration pull	Evaporation
B	Osmosis	Transpiration pull	Osmosis	Evaporation
C	Osmosis	Evaporation	Osmosis	Transpiration pull
D	Osmosis	Transpiration pull	Evaporation	Osmosis

Associated facts and Reasoning

Water enters root hair by osmosis. It also moves from one cell to the other by osmosis within the root.
In the xylem vessel of the stem water moves by transpiration pull.
Evaporation at the leaf causes water to move.

Correct answer is A

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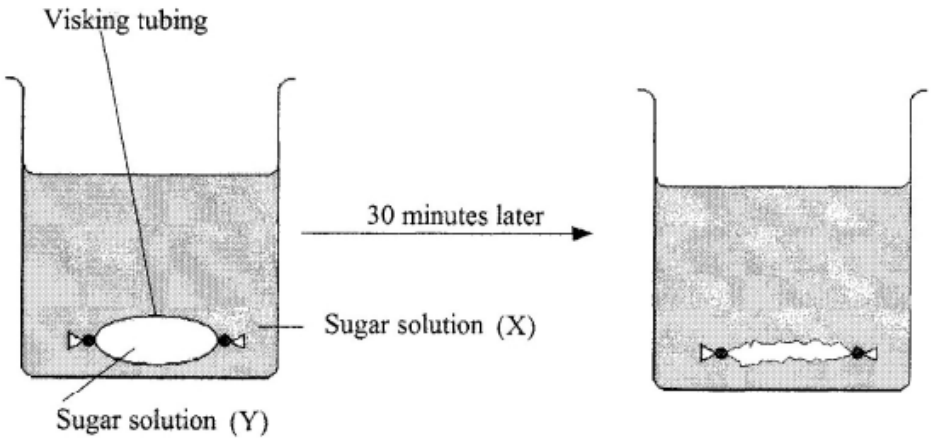
8 The diagram below shows an experiment to investigate osmosis.



Which of the following statement is true about sugar solution X and Solution Y?

A Solution Y is more concentrated than solution X

B Solution X is more concentrated than solution Y

C Both solutions X and Y are of equal concentration

D Sugar molecules diffuse out of solution T into solution X

Associated facts and Reasoning

After 30 minutes the visking tubing has reduce is size. The sugar solution in Y has diffused into sugar solution X.

Correct answer A

9 In an experiment to investigate transpiration of four identical leaf shoots were treated as follows.

Shoot 1: upper leaf surfaces covered with Vaseline water proof jelly

Shoot 2: lower leaf surfaces covered with Vaseline water proof jelly

Shoot 3: upper and lower surfaces covered with Vaseline water proof jelly

Shoot 4: untreated

The graph shows the water loss by the four shoots. Which line shows the result for shoot 1?

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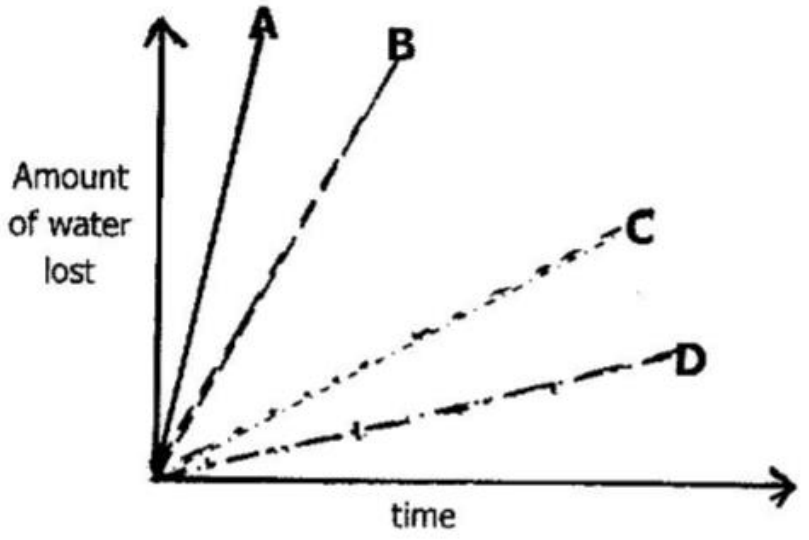
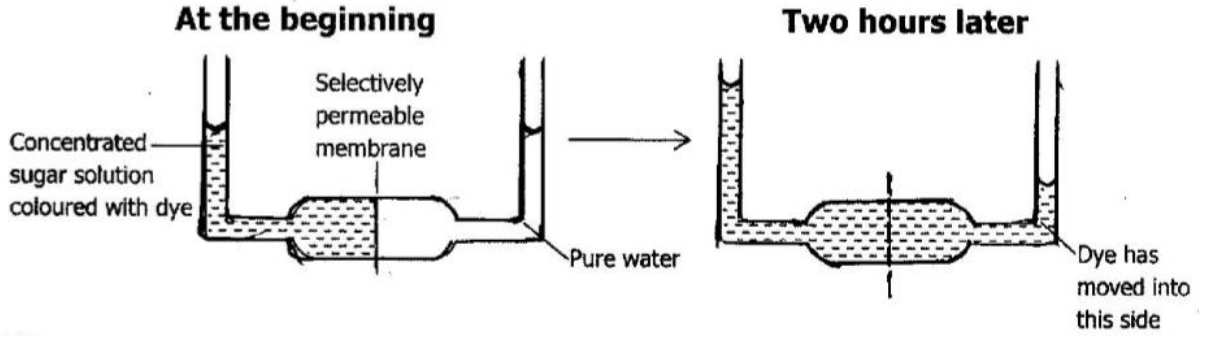


Associated facts and Reasoning

Lower surface of the surface has more stomata than the upper surface hence transpiration occurs more at the lower surface than at the upper surface. Shoot 4 which is untreated will lose more water than shoot 1. While shoot 3 will not lose water as both surfaces are covered with Vaseline jelly. Shoot 2 covered with Vaseline jelly will lose much less water through the uncovered upper surface

Correct answer is B

10 The diagram shows an experiment to demonstrate biological process.



What process are responsible for the movement of water and dye?

	Movement of water	Movement of dye
A	Diffusion	Osmosis
B	Osmosis	Diffusion
C	Osmosis	Translocation
D	Translocation	Diffuse

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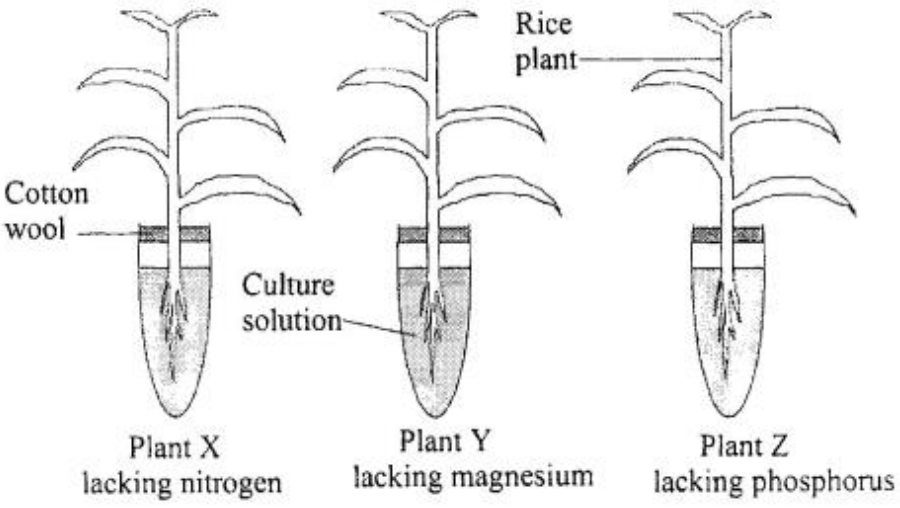
Associated facts and Reasoning

Water is moving dilute region to a high concentrated coloured sugar solution i.e osmosis, while dye has move from high concentration to low concentration i.e diffusion.

Correct answer is B

11 The following diagrams show an experimental procedure to investigate the mineral salt requirement of the rice plant in different culture solutions.



What would be the deficiency symptoms observed in plant X, Y and Z?

	Deficiency symptom plant X	**Deficiency symptom plant Y**	**Deficiency symptom plant Z**
A	Stunted growth	Poor root development	Yellowish of leaves
B	Stunted growth	Yellowing of leaves	Poor root development
C	Poor root development	Stunted growth	Yellowing of leaves
D	Poor root development	Yellowing of leaves	Stunted growth

Associated facts and Reasoning

Deficiency symptoms of most nutrients are common. In this case however, stunted is for nitrogen, yellowing is for magnesium and poor root development is for phosphate.

Correct answer is B

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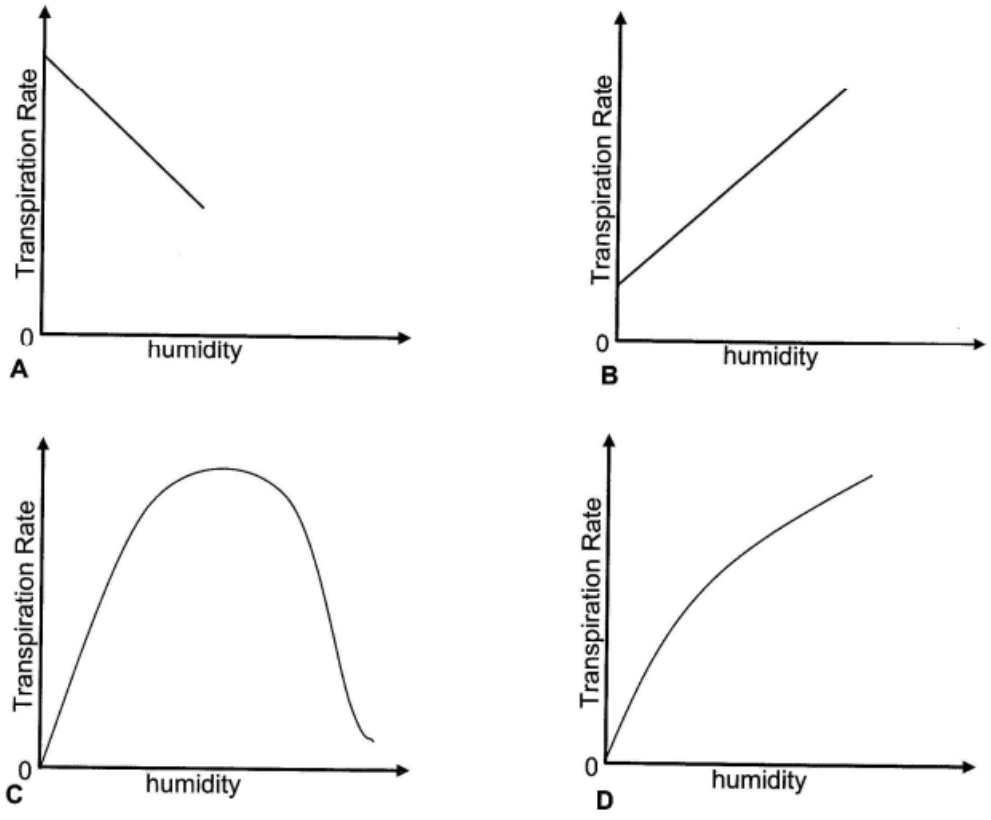
12 Which diagram below shows the effect of increasing humidity on the transpiration rate of a plant?



Associated facts and Reasoning

As humidity increases, transpiration reduces. It means that when humidity is low transpiration increases, but as humidity keep increasing, a point will be reached when transpiration will start to decrease

Correct answer is A

13 During translocation in plant substance X is moved from organ Y to organ Z.

What is X, Y and Z

	X	Y	Z
A	Sucrose	Anther	Stigma
B	Sucrose	Leaf	Root
C	Water	Root	Leaf
D	Water	Soil	Hair

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Associated facts and Reasoning

Sucrose is sugar manufactured in a leaf and it's translocated to all parts of the plant including the roots.

Correct answer is B

14 The table below shows the results of samples that were listed.

Sample	Iodine Solution	Benedict solution	Burette reagent
1	Brown	Orange	Blue
2	Blue/Black	Blue	Violet

What do the results show?

A Sample 1 contains starch and sugar

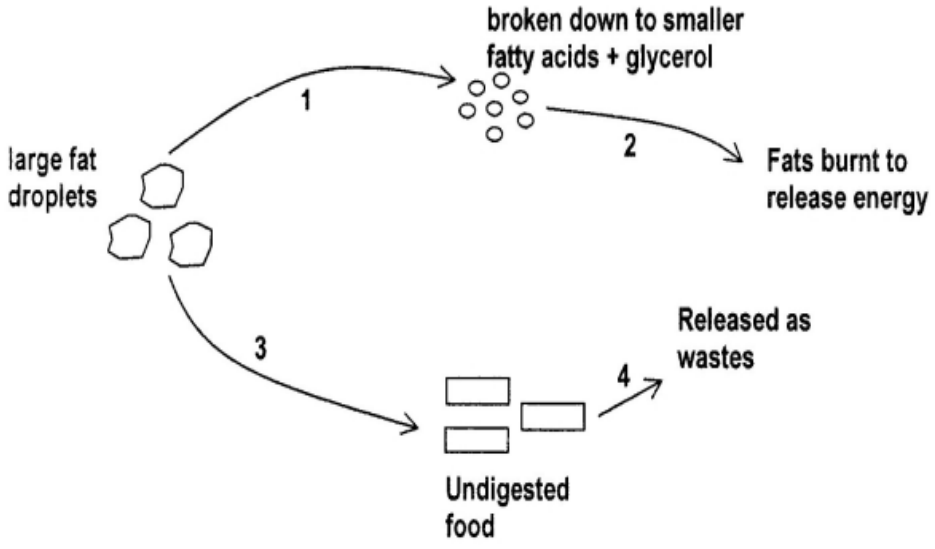
B Sample 1 contains starch only

C Sample 2 contains starch and proteins

D Sample 2 contains proteins only

Correct answer is C

15 The diagram below shows process taking place in an organism.



Which numbered part represent the process of respiration?

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A 2 only

B 1 and 2

C 1 and 3

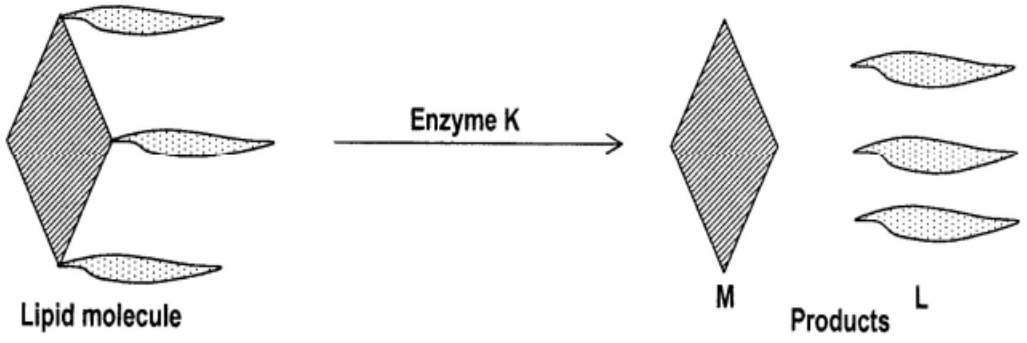
D 2 and 3

Associated facts and Reasoning

The term burnt in the diagram refers to respiration. Respiration is a slow process which takes place in the cells of the body in order to release Energy for use by the body. Other terms for burning are combustion and oxidation.

Correct answer is A

16 The diagram below shows chemical digestion of a nutrient in the human body.



Identify enzyme K and product M

	Enzyme K	Product M	Product L
A	Lipase	Fatty acids	Glycerol
B	Lipase	Glycerol	Fatty acids
C	Trypsin	Peptide	Amino-acids
D	Maltase	Glucose	Fructose

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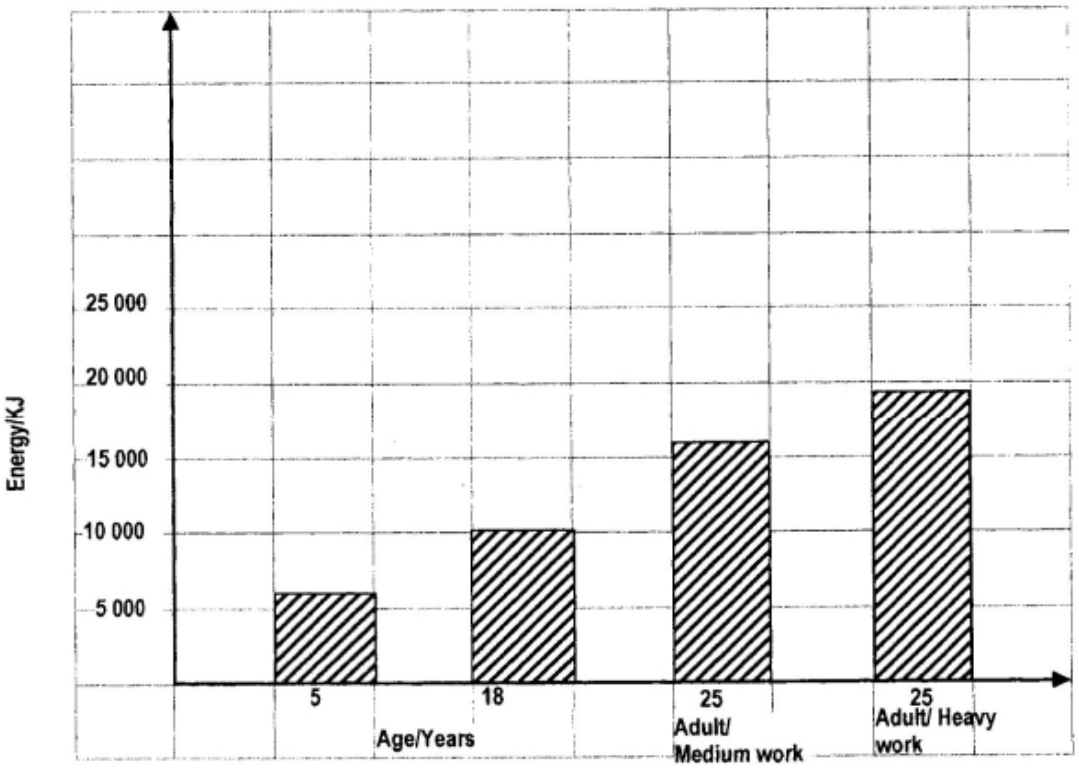
Associated facts and Reasoning

The term lipids refers to fats.
The enzyme that digests (breaks) fats is lipase
Lipase breaks fats into glycerol and fatty acids

Correct answer is B

17 The diagram below shows changing energy requirements with age and type of occupation.



What is the difference in energy requirement between a boy aged 5 years and a 25 years old adult doing heavy work?

A 8,000Kj

B 10,000Kj

C 12,000Kj

D 14,000Kj

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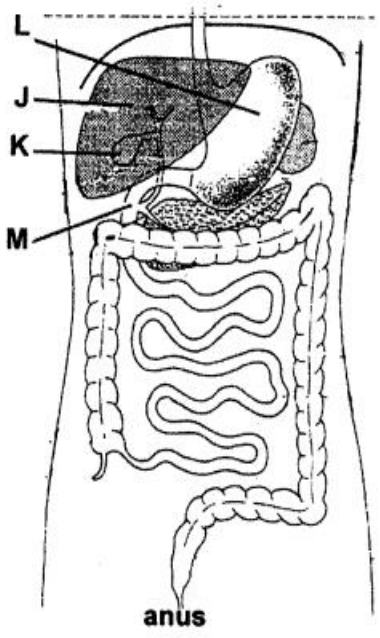
Associated facts and Reasoning

- Pepsin breaks protein in the stomach.
- Trypsin breaks protein in the duodenum.
- Peptide breaks protein in the ileum.

Correct answer is B

18 The diagram shows the digestive system of a human being.



Which two labelled structures do not secrete enzyme into the alimentary canal?

A J and K

B K and L

C L and M

D M and J

Associated facts and Reasoning

Stomach and duodenum produce enzymes. Liver does not produce enzymes. Gall bladder produce bile which neutralizes acids leaving the stomach and emulsifies fats

Correct answer is A

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19 Which of the following best describe metabolism?

A Biological reaction involving break down process

B Biological reactions involving building up process

C Reaction involving enzymes in the alimentary canal

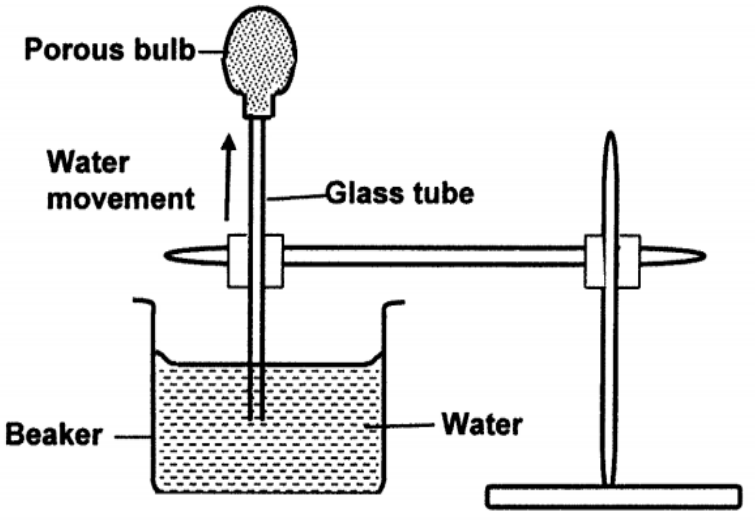
D Reaction involving all enzymes in all cells in the body

Associated facts and Reasoning

Metabolism can be defined as chemical process which occur in living organisms where organic compounds are broken down and built up. The term metabolism is commonly used to refer specifically to the breakdown of food and its transformation into energy.

Correct answer is A

20 The apparatus was used to show the movement of water in a glass tube.



Which of the following activities must occur to create an upward movement of water in the glass tube and which plant tissue can be represented by the glass tube?

	Activity	Plant tissue
A	Evaporation of water from porous bulb	Xylem
B	Evaporation of water from focus bulb	Phloem
C	Evaporation of water from the beaker	Phloem
D	Evaporation of water from the speaker	Xylem

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Associated facts and Reasoning

The porous bulb represents the leaf which consist of stomata, through which water evaporates. The glass tube represents water which transport water from the soil to the leaf, with the help of transpiration and evaporation.

Correct answer is A

21 Which of the following would be the characteristic of the leaves of a plant growing in a hot, dry climate?

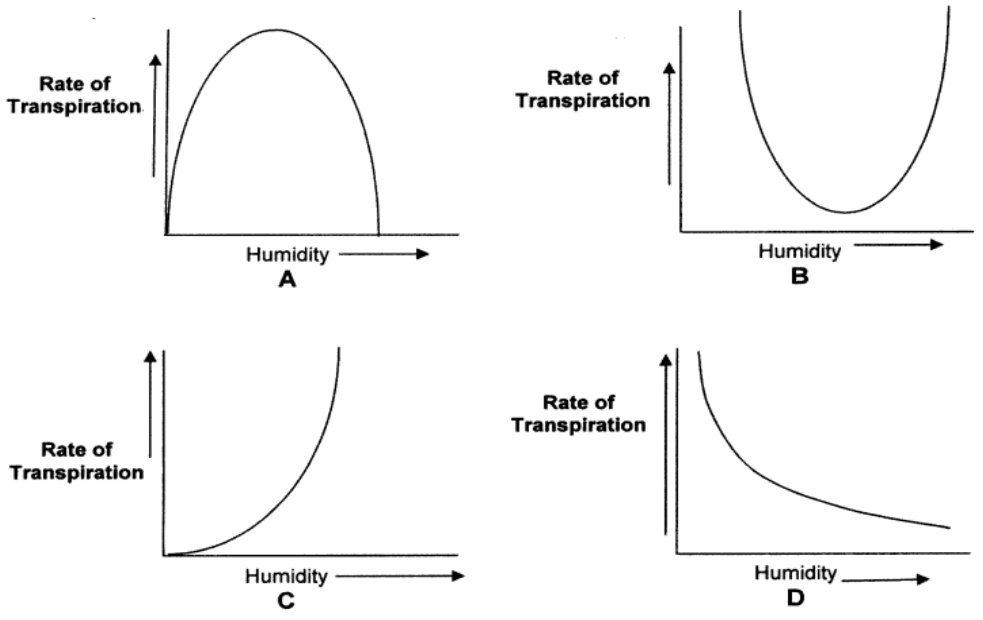
	Stomata	Cuticle
A	Few	Thick and not waxy
B	Few	Thick and waxy
C	Plenty	Thick and waxy
D	Plenty	Thick and not waxy

Associated facts and Reasoning

Plant in hot, dry climate e.g desert have features adapted to the area, in order to reduce water loss through transpiration. Leaves have few cuticle and way

Correct answer is B

22 Which of the following graph represent the effect of humidity on the rate of transpiration?



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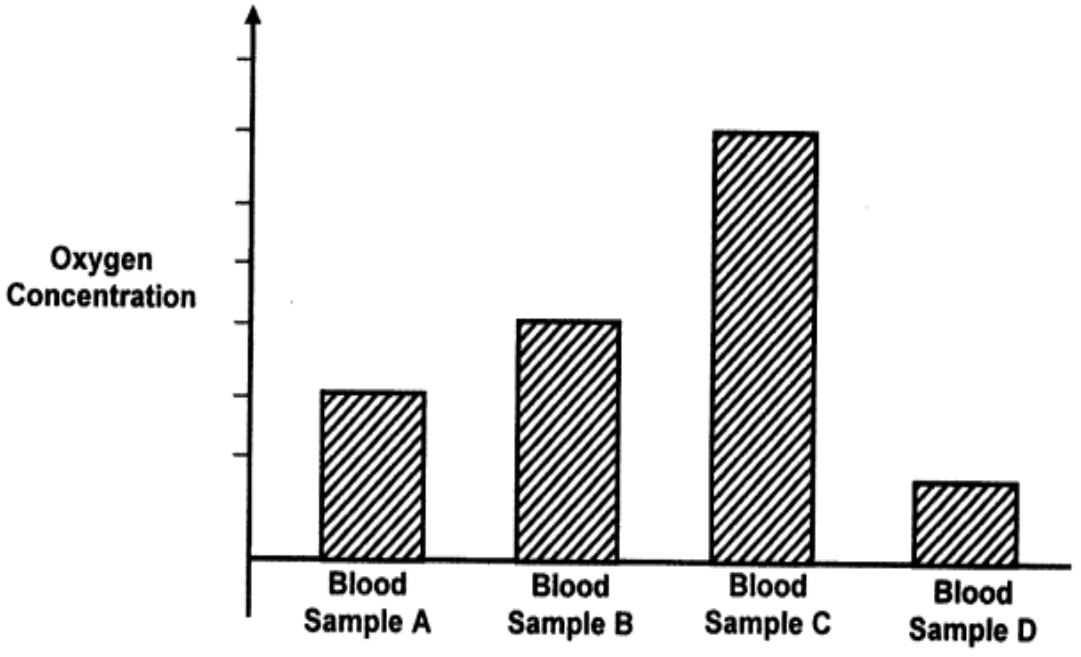
Associated facts and Reasoning

The less humidity the more transpiration because the air around the leaves is dry. However, the higher the humidity the less the transpiration.

Correct answer is D

23 The bar charts show the concentration of oxygen in four blood samples taken from different blood vessels in the circulatory system of a mammal.

Which sample was taken from the pulmonary vein?



Associated facts and Reasoning

Pulmonary vein receives from the lungs. Blood receives fresh oxygen in the lungs. Therefore, pulmonary vein has high oxygen contents.

Correct answer is C

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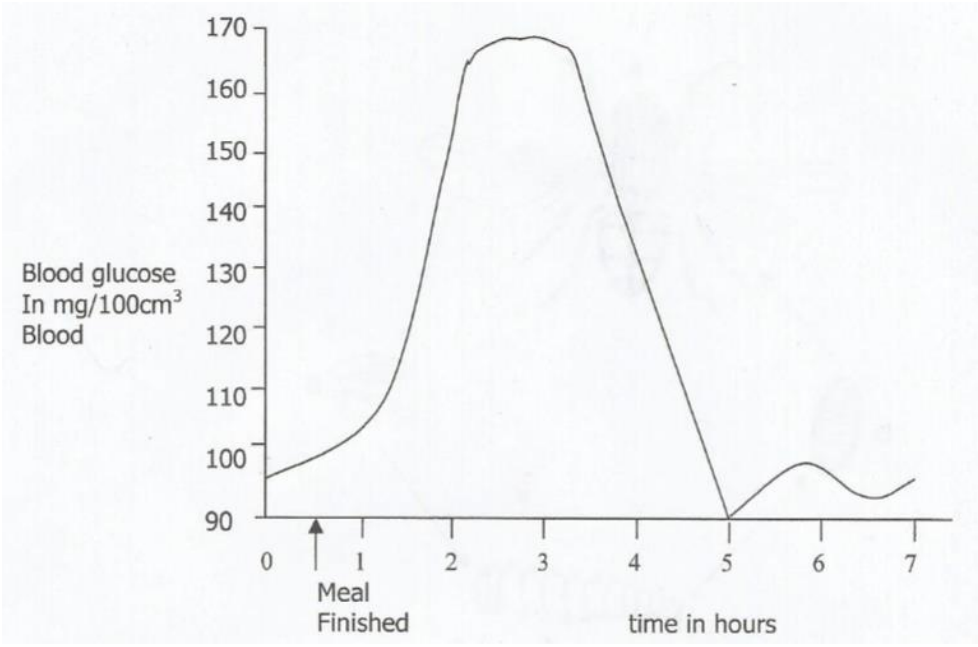
24 The graph shows the blood glucose concentration of a person after a meal rich in starch.



During which period after the meal would the secretion of glucagon begin to rise?

A 1 – 2 hours
B 2 – 3 hours
C 3 – 4 hours
D 4 – 5 hours

Associated facts and Reasoning

Glucagon is a hormone produced by the pancreas. Its role is to allow the body to regulate the utilization of glucose and fats.

Glucagon is released in response to low blood glucose levels and events where the body needs additional glucose as glucagon stimulate the liver to breakdown glycogen to be released into blood as glucose.

Correct answer is D

25 Which of the following is an effect adrenaline?

A Promoting growth

B Changing glucose into glycogen

C Promoting deamination of proteins

D Changing glycogen into glucose

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Associated facts and Reasoning

Adrenaline is said to be the fight of fright hormone. Stimulate the conversion of glycogen into glucose so that it can be converted to energy by the process of respiration.

Correct answer is D

26 The table below shows the average daily intake of nutrients of four pupils who sustained wounds in an accident.

FOOD	Pupil A	Pupil B	Pupil C	Pupil D
Protein	35g	100g	85g	60g
Carbohydrate	570g	45g	45g	540g
Fat	105g	25g	50g	25g
Iron	10mg	15mg	30mg	25g
Vitamin C	90mg	95mg	10mg	15g

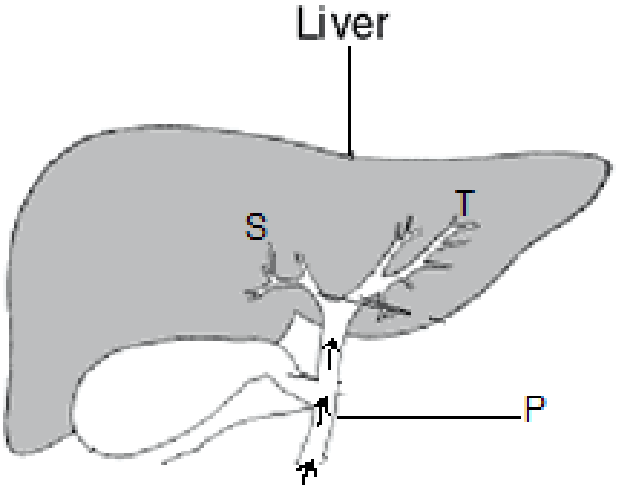
Associated facts and Reasoning

Good intake of the following will enhance fast healing of wounds: Protein, Vitamin C

Large quantities intake of the following would delay healing: fats, carbohydrates

Correct answer is B

27 The diagram shows the movement of digested materials from the gut to the liver.



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What is blood vessel P and nutrients 'S' and 'T'

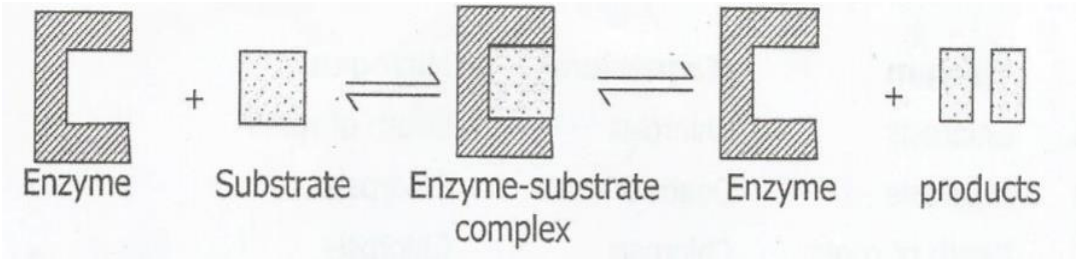
	Blood vessel P	Material S	Material T
A	Hepatic portal vein	Glucose	Amino acids
B	Lateal	Fatty acid	Amino acids
C	Hepatic portal vein	Glucose	Fatty acids
D	Lateal	Amino acid	Fatty acids

Associated facts and Reasoning

Recall that hepatic portal vein delivers food nutrients to the liver i.e glucose, amino acid, mineral salts etc.

Correct answer is A

28 The diagram shows an enzyme catalyst reaction.



Which if the following characteristics of enzymes is being illustrated in the diagram? The enzyme is_____

A Affected by PH

B Denatured at high temperature

C Protein in nature

D Specific in action

Associated facts and Reasoning

Note that enzymes are specific in nature.

They break down a particular food substance. After that they are ready to go back to start digesting another substance.

Correct answer is D

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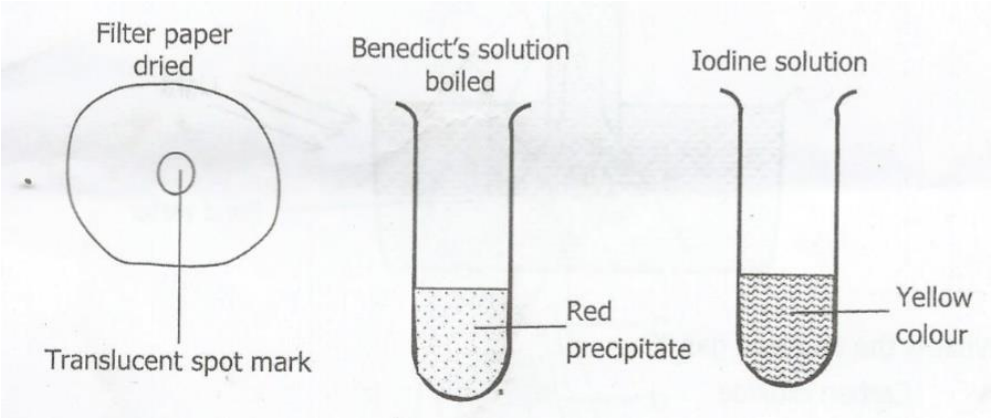
29 The diagram below shows the result of three tests on a food sample



Which nutrient were present in the food sample?

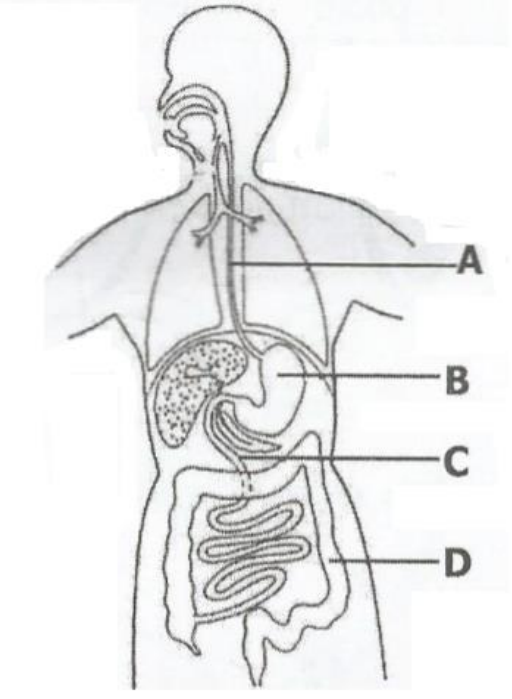
A Fat only
B Fat and reducing sugar only
C Fat, reducing sugar and starch
D Reducing sugar and starch only

Associated facts and Reasoning

- Translucent spot, shows presence of glucose
- Red precipitate shows presence of glucose
- Yellow colour in response to iodine solution indicates no starch

Correct answer is B

30 The diagram shows the digestive system of a human being



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Which labelled part produces gastric juice?

Associated facts and Reasoning

- Recall that gastric juice is produce in the stomach.
- Liver produces bile from the gall bladder
- Gullet is passage for food
- Larger intestine decomposes the food by means of bacteria

Correct answer is B

31 Peter has blood group AB. He needs blood transfusion.

From which blood group could he receive blood?

A A only

B A and B only

C AB only

D A, B, AB and O

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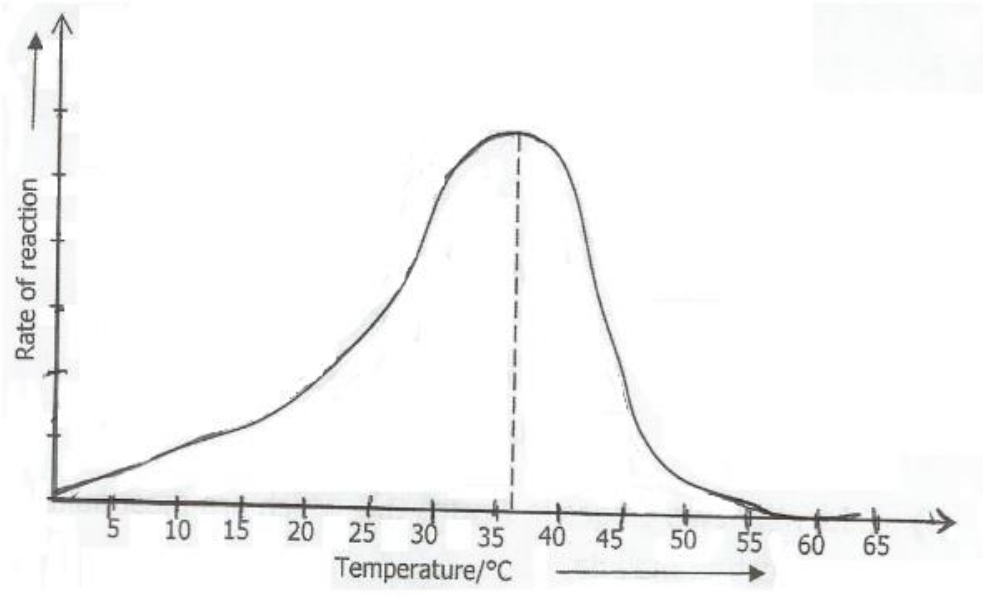
UNIT 3.1 WATER UPTAKE IN PLANTS / TRANSPIRATION / BLOOD CIRCULATION IN HUMANS / FOOD INTAKE AND DIGESTION.

PAPER TWO (2) Type Questions: Section A

1 The diagram below shows the effect of temperature on an enzyme.



a) (i) What is an enzyme

(ii) What is the optimum temperature of the enzyme reaction shown in the graph above?

b) (i) At what temperature in the graph above is the enzyme completely denatured

(ii) Give a reason to your answer in (b)(i) above

c) (i) Explain why it is important to measure the body temperature when a person is sick.

(ii) Propose two ways the body temperature of a sick person can be brought down to normal.

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Reasoning and Answers

a) (i) An enzyme is a substance produced by a living organism, which acts as a catalyst to bring about a specific reaction.

(ii) 36°C as shown on the graph.

b) (i) 60°C as shown on the graph.

(ii) The graph has dropped to zero from 60°C

c) (i) To determine the cause of the patient's condition. It determines the disease, injury or other responsible factors.

(ii) Use aspirin or Panadol to bring down temperature back to normal. Note that aspirin should not be given to children.
Rest and drink water. High fever cause dehydration
Use a wet cloth rub the body.

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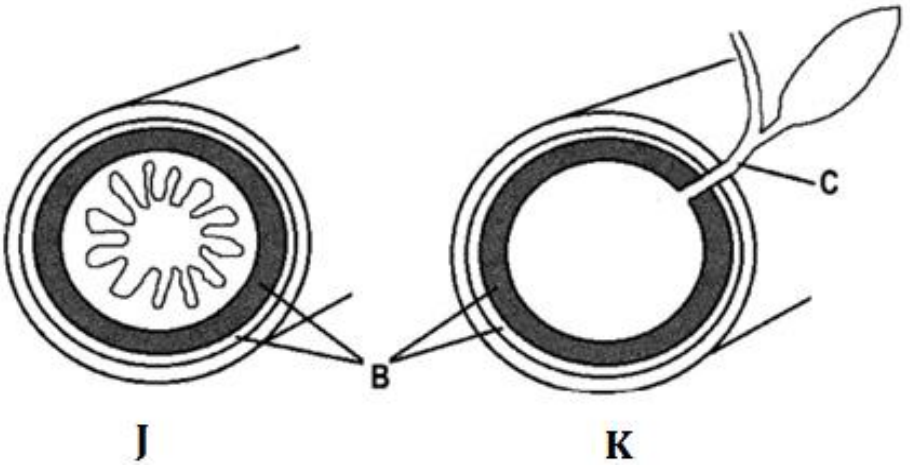
2 The diagram below shows the cross section through two different portions of the human alimentary canal.



a) (i) From which part of the alimentary canal were these cross sections taken J and K?

(ii) Give reason to your answer in (a)(i) above.

b) Explain the role played by B in the alimentary canal.

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c) Name two juices passing through the tube C

Associated Facts, Reasoning and Answers

a) **(i)** J is small intestine also known as ileum

K is Duodenum

(ii) J: Because it has projection in the inner lining called villi (villus)

K: Because it has a duct which opens into it.

b) Parts labelled B in the represent longitudinal and circular muscles these contract during peristalsis and push the food down and keep the food moving on its way through the digestive system.

c) Two juice produced at 'C' are: -

- Pancreatic juice
- Bile

Reasoning: Bile comes from the gall bladder in the liver, while pancreatic juice comes from the pancreas. These open in the duodenum.

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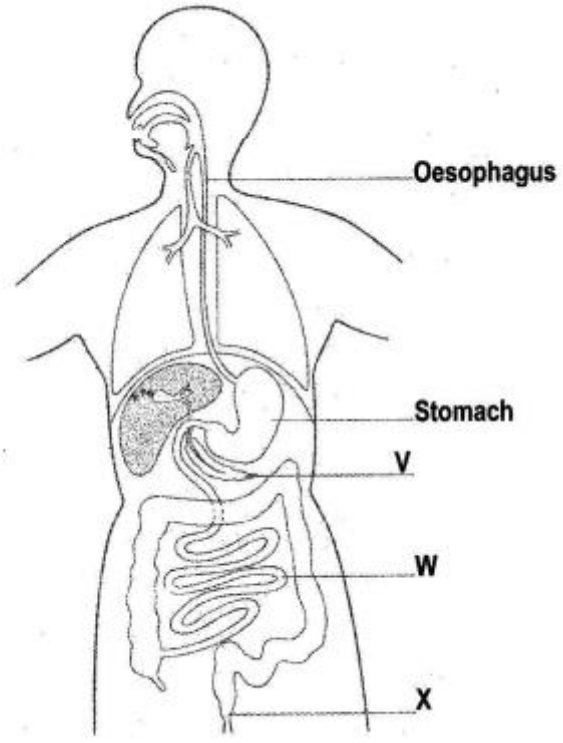
3 The diagram shows the human digestive system.



a) From the diagram above select the letters where:

(i) Egestion occurs

(ii) Pancreatic juice is formed

(iii) Villi are present

b) The stomach produces hydrochloric acid. State two functions of this acid in the stomach.

c) Describe the role of the liver in

(i) Digestion

(ii) Assimilation

Associated Facts and Answers

a) From the diagram above select the letters where:

(i) Egestion occurs at X

(ii) Pancreatic juice is formed at Y

(iii) Villi are present in W

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Reasoning: Villi are projections found in the inner lining of the small intestine wall.

b) Two functions of Hydrochloric acid, pick any of the following:

(i) Activate inactive pepsinogen to form pepsin.

(ii) It destroys most of the bacteria found in food.

(iii) It stops the activities of salivary amylase.

c) Roles of the liver:

(i) Digestion

Liver has gall bladder which secretes bile. Bile has two functions. To neutralize Hydrochloric acid in the chime from the stomach.

(ii) Assimilation

Amino acids and glucose are stored in the liver and enzyme converts them to glycogen.

On diffusion into the cells of the body glycogen is converted into amino acids and are incorporated into the cells of the body as new protoplasm.

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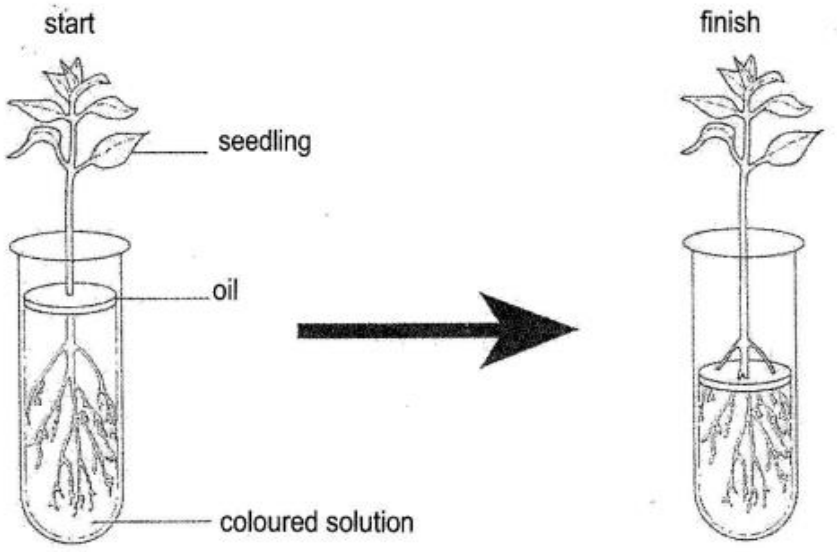
4 The diagram below shows the movement of coloured solution in a plant.



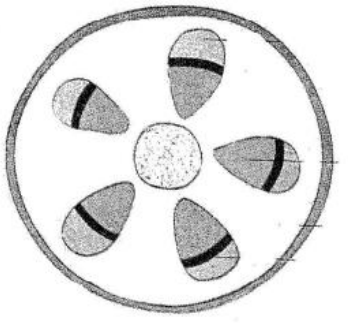
a) Name the process by which

(i) Water in the solution was absorbed by the plant.

(ii) Coloured solute in the solution was absorbed by the plant.

b) Why was oil put on top of the coloured solution?

c) The diagram shows the cross section of the stem obtained from the above diagram at the end of the experiment.



(i) Using the X, label the part in the diagram which was stained by the dye.

(ii) Identify the part labelled X in the diagram in C above.

(iii) Name two substances transported by X and give one function for each.

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Reasoning and Answers

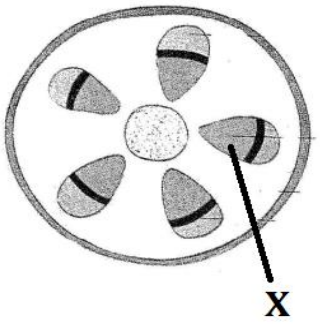
a) **(i)** Osmosis

(ii) Diffusion

Note: Water moves in root hair cells by osmosis. Since coloured solute in solution has particles, the particles are taken up by diffusion.

b) To prevent water from evaporating.

c) **(i)**



(ii) Xylem

Note: Xylem is found on the inner side of the cambium (bark line)

(iii) **Name of substance:** Water

Function: Water is a raw material for photosynthesis in the manufacturing of starch.

Name of substance: Mineral salts

Function: used in production of food substance in plants. Plants need mineral salts for their health and building tissues.

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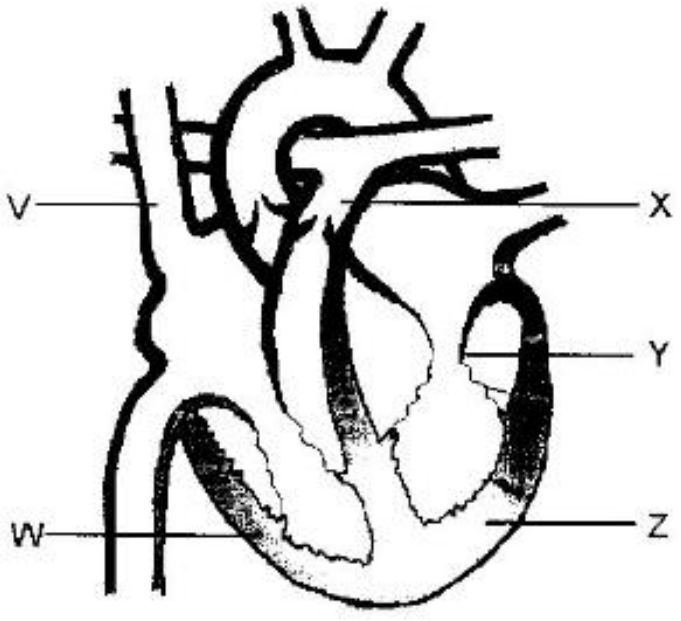
5 The diagram shows a longitudinal section through the human heart.



c) (i) identify the parts labelled X and Y in the diagram above.

(ii) Suggest tow structure differences between vessels V and X.

b) Explain why the part labelled Z is thicker than W.

Reasoning and Answers

d) (i) X = Pulmonary Artery

Y = Bicuspid Valve

(ii) –V is the vena cava, that is the main vein. It has thin walls while X is the pulmonary artery which has thick walls to withstand pressure from the right ventricle.

- The vena (V) has valves throughout while pulmonary artery has no valves.

(iii) Recall that Z is the left ventricle and W is the right ventricle.

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- The thick muscle is to allow the left ventricle to pump blood to all part of the body through the aorta.
- While the thin muscle on the right ventricle enables it to pump blood through a short distance to the lungs and back to the heart i.e left atrium.

c) (i) The muscles of the heart have their own blood circulation. It receives blood through the coronary artery.

(ii) Diet is necessary to supply the required amount of nutrient to the muscles of the heart for it to function properly.
Exercise is also important to keep the muscle of the heart fit. It also helps to turn excess fats that accumulates on the heart.
Excess fats could bring heart problem in terms of pumping.

---

6 The diagrams below show the structure of specialised cells in plants.

a) (i) identify the cells A and B.

(ii) Identify the parts labelled C and D.

b) (i) Which diagram shows a closed stoma X or Y?

(ii) Explain how the opening of the stoma is brought about?

Reasoning and Answers

a) (i) A = Epidermal cells.

B = Guard cells

(ii) Parts C = Chloroplast

C = Cytoplasm

b) (i) the one with a straight line in between the two guard cells i.e X

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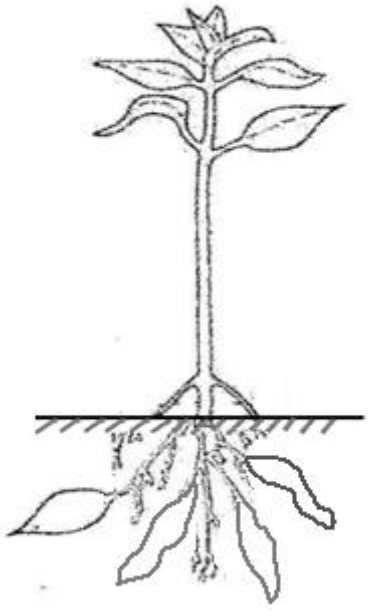
(ii) The changes in the turgor pressure in the guard cell can open or close the stoma.

If more water goes into the guard cell the turgor cell wall is high (becomes turgid) the stoma opens.

However, if the turgor pressure is low (cell is flaccid) the stoma closes as the wall of the guard cells meet.

---

7 The diagram shows a cassava plant with root tubers.



a) (i) Which common food is stored in the root tuber.

(ii) State where this food in the root was manufactured.

(iii) Explain how this food manufactured in (a)(i) above, found itself in storage form in the root tubers.

b) (i) State the nutrient in the soil which is necessary for photosynthesis.

(ii) Suggest how the nutrient is taken up from the soil to the leaves in the plant above.

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Associated facts and Reasoning

a) (i) note that tubers are storage organs. The food commonly stored is carbohydrates.

Answer is starch.

(ii) Process that manufactures food in plants takes place in leaves, through the process of photosynthesis.

(iii) Recall that food manufactured in the leaves is used by the plant itself. Excess is stored.

Translocation is the process by which food from the leaves is transported to storage organs through the phloem vessels.

b) (i) Magnesium: it is part of the chlorophyll in green plants

It activates enzymes needed for plant growth.

(ii) Magnesium is taken up by plants in ionic form is Mg^{+2}.

From soil to the root it is taken in by process of diffusion.

In the stem to the leaves it is taken up by transpiration pull in together with water.

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SECTION B TYPE QUESTIONS (ESSAY QUESTIONS)

1 a) Explain the process of transpiration.

b) Describe the three environmental factors which affect transpiration.

c) Relate the significance of transpiration to plants and the environment.

Reasoning Solutions and Answer.

a) Transpiration is the loss of water from a plant mainly through the stomata of leaves.

Transpiration can also occur in the stem.

Water moves from the root hairs to the xylem vessels by osmotic pressure.

In the xylem vessels of the stem to the xylem vessels of the leaf water moves by transpiration pull.

Finally, water reaches the mesophyll up to stoma.

b)
- Humidity
- Air movement
- Temperature

Humidity: the higher the humidity the less transpiration.

The lower the humidity in the atmosphere the higher the humidity.

Air movement: on a windy day transpiration is high while on a calm day transpiration is low.

Temperature: on a hot day transpiration is high as opposed to a cool day or cold day transpiration is low.

c) Transpiration is important in the following ways.

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- Plants supply moisture to the atmosphere which is very important for rain formation.
- Transpiration helps to cool plants through cooling effects of evaporation.
- It regulates the amount of water required by a plant.

---

2 (a) Explain what is meant by the terms

(i) Absorption

(ii) Egestion

c) Describe the process if lipid (fat) in humans.

d) Discuss two common ailment of the alimentary canal.

Reasoning and Answers

a) (i) Recall that digestion takes place at various stages in the alimentary canal.

The essence of digestion is to break down the complex molecules of food substance into simpler form like glucose, amino acids, fatty acids and glycerol.

Absorption refers to the food nutrient leaving the small intestine by diffusing in the blood capillaries of the villi.

Lastly the food nutrients are distributed to all parts of the body.

(ii) Not all food is digested. Some of it will reach the large intestine undigested e.g cellulose.

This can be said to be waste matter, residue of faeces. This cannot be kept in the body any longer. This waste has to be expelled from the body by the contraction and relaxation of the

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circular and longitudinal muscle of the large intestine by the process of peristalsis. That is what is called egestion of defecation.

b) Digestion of lipids in humans start in the duodenum. Organic salts such as sodium glycocholate and taurocholate emulsify liquid fats. Emulsification breaks fats into numerous droplet increasing the surface are for enzymes to act.

In the duodenum again the pancreatic lipase catalyses the hydrolysis of lipids into fatty acids and glycerol.

Finally, in the small intestine lipase from succuss entricus breaks lipids into fatty acids and glycerol.

c) Common ailment of the alimentary canal are:

(i) Constipation

(ii) Diarrhoea

(iii) Indigestion

Constipation: lack of roughage or fibre in the diet. Causes the sluggish of the rectum and colon.

Constipation lead to failure to go the toilet.

Indigestion: over feeding of one's belly puts the digestive system under overdose conditions. Consequently, the food is not properly digested. A person feels bloated and have abdominal pains.

Diarrhoea: this is the passing of water stool frequently. The body is trying to get rid of anything irritating or dangerous. This could lead to dehydration and dehydration can cause death.

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3 a) (i) Explain the importance of transpiration.

(ii) Explain how two environmental factors affect the rate of transpiration.

b) Describe the role of blood in transporting materials in the body.

Associated Facts and Answers

a) (i) recall that transpiration is the loss of water through the stomata of the leaves.

This process is important in the following ways:

- It helps in the continuous flow of water through the xylem vessels of the plant. This is achieved by the force of transpiration pull.
- It helps in the intake of mineral salt. The mineral salts are dissolved in water, as the water is pulled upward it carries the dissolved mineral salts.
- It helps cool down the plant through the process of cooling effect of evaporation. As the water evaporates it carries the heat with it.

(ii) Rate of transpiration changes with environmental factors. The following are some of the factors. Any of these would be used.

- Wind or air movement: on a windy day the water trapped in the stomata is blown off and immediately replace by water from the xylem. The repeated removal and replacement causes the rate to increase and water loss is high.
  When air is still less, less water is removed from the stomata hence less transpiration.

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- Light intensity: Light intensity has influence on the rate of transpiration. When light intensity is high stomata opens as a result transpiration rate is high. When it is dark or cloudy, stomata close and rate of transpiration is low.
- Temperature: The higher the temperature the greater the rate of transpiration. Similarly, the lower the temperature the lower the rate of transpiration.
- Humidity: Humidity is the presence of water vapour in the atmosphere. When humidity in the air is high(saturated) the rate of transpiration reduce. Similarly, when the atmosphere is dry the rate of water coming out of the stomata increase i.e transpiration rate is high.

b) Blood is the main transport of various substances. Note that blood is composed of many components some of which are directly involved in the transportation process. The roles are as follows:

- Transport of hormones. These are transported each time they are required by the organ. Hormones needed on emergencies hence transported by blood at a high speed e.g adrenaline can be released when one is fighting to allow one to run faster that one has ever ran before.
- Carbon dioxide is transported by plasma the liquid part of blood. Carbon dioxide is not allowed to accumulate in the body. Blood takes it to the lungs where it diffuses into the capillaries in alveoli and finally diffuse out of the chest through the nose.
- Blood also transport oxygen to all parts of the body where it is needed for the process of respiration in order to produce energy

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to be used by the body. Red blood cells transport oxygen in the form of oxy-haemoglobin. This is a weak bond.

- Blood transport digested food and nutrients to all parts of the body. Plasma transport nutrients such as glucose, amino acids, glycerol and fatty acids and glycerol, vitamins and mineral salts.

---

4 **(i)** Explain the role of the kidney in excretion.

(ii) Explain the role of the kidney in homeostasis.

Reasoning and Answers.

(i) Excretion is the removal of waste products from the body. So the role it plays is as follows:

- Regulate body temperature
- Regulate PH of the body fluid
- Removal of excess metabolic products from the body
- Regulate amount of water in the body.
- Removal of excretory toxic substances from the body.

(ii) Homeostasis refers to maintaining equilibrium of the body. It controls the amount of substance such as water, toxic substances, temperature and salts as follows:

- It keeps the body fluid stead, such as concentration, acidity, temperature is adjusted so as to remain steady (same).
- In the body chemical reactions are controlled by the enzymes. These are sensitive to changes; any rise or drop can stop them from functioning. So the kidney balances all these to create a conclusive environment for enzymes to work properly.

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- All cell membranes control substances which enter and leave them. High concentration outside the cell, would cause the water to move out of the body by osmosis and become dehydrated. If the tissue fluid were to dilute the cells would take up water by osmosis and cause tissue to swell.

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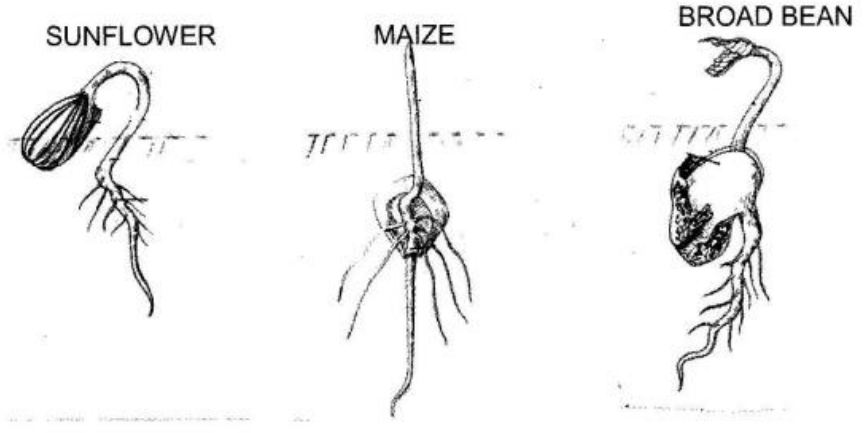
UNIT 4.0 REPRODUCTION IN PLANTS/ ANIMALS/ GERMINATION AND TROPISM/ SEED DISPERSAL AND GENETICS

PAPER ONE (1) Type Questions (Multiple Choice)

1 The diagram below shows germinating seedling.



What type of germination are illustrated?

	Maize	Sunflower	Broad bean
A	Epigeal	Hypogeal	Epigeal
B	Epigeal	Epigeal	Hypogeal
C	Hypogeal	Epigeal	Hypogeal
D	Hypogeal	Hypogeal	Epigeal

Associated facts and Reasoning

- Hypogeal cotyledon remains in the soil.
- Epigeal cotyledon come out of the soil
- In the diagram above sunflower is epigeal while maize and broad bean are hypogeal

Correct answer is C

2 Where in the plant is auxin made and what is its effect on the plant?

	Where made	Effects
A	Leaves	Promotes cell elongation
B	Root tip	Promote cell elongation
C	Shoot tip	Promotes leaf enlargement
D	Stem	promotes secondary growth

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Associated facts and Reasoning

Auxin are produced in the root tip and shoot tip where they promote elongation. The pair which suit well is that of the root tip and promotes cell elongation.

Correct answer is B

3 Which of these plant responses are phototropic?

A A leaf of Venus fly-trap catches a fly that walks on it.

B Daisies open in the morning and close as the dun sets

C The shoot of an indoor plant grows in the direction of the window

D The tendril of a vine twists round a support

Associated facts and Reasoning

Phototropic plant exhibit growth response towards light. A plant growing towards the window is phototropic. Opening of daisies in the morning and closing at sunset is not growth response

Correct answer is C

4 Which conditions are necessary for the germination of most seeds.

	Light	Oxygen	Water
A	✓	✓	×
B	×	✓	×
C	✓	✓	✓
D	×	✓	✓

KEY

✓ - necessary

× - not necessary

Associated facts and Reasoning

Water and oxygen are necessary for germination. Water is used to dissolve food substances stored in the cotyledons, while oxygen is used in respiration where food is broken down

Correct answer is D

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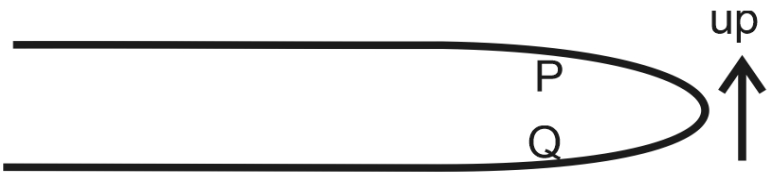
5 The diagram shows a shoot which has been placed horizontally. The shoot begins to grow upwards.



What causes the shoot to grow upwards?

A Increased cell division by meiosis at P

B Increased cell division by mitosis at P

C More cell elongation at P than at Q

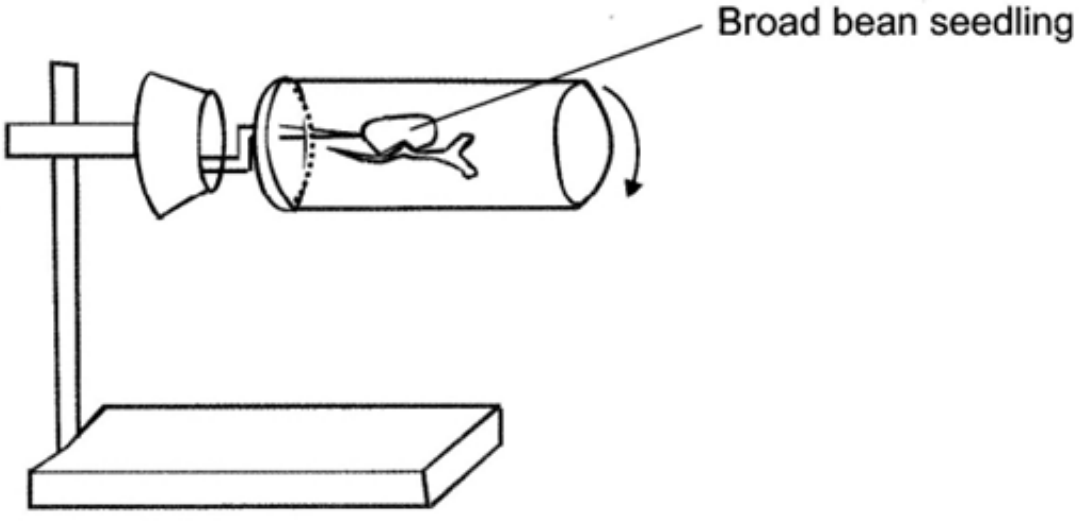
D More cell elongation at Q than at P

Associated facts and Reasoning

Light coming from one side effects auxin distribution. The side that receives light has less auxin while the one away from light has more auxin. The result is that the side away from light, cell elongate transfer than the side with light, causing the shoot to grow in a curve towards light.

Correct answer is D

6 The diagram below represents a clinostat used to demonstrate the response on a seedling to stimuli.
It is set at a rotation speed of one complete rotation.



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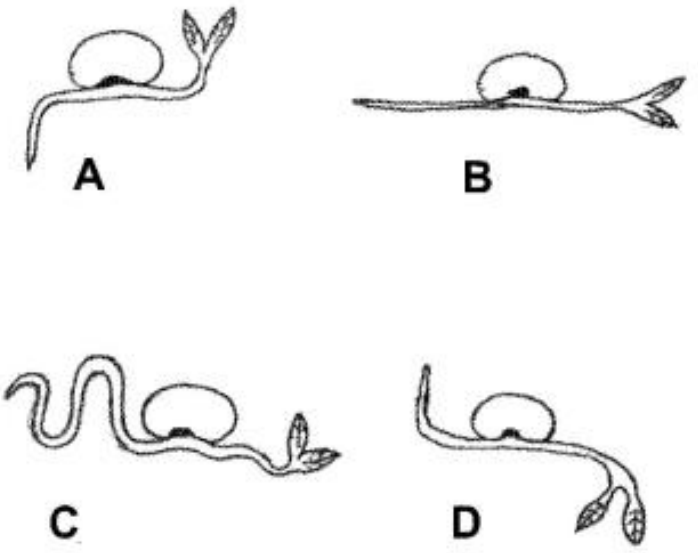
Which of the following shows the resultant growth of the seedling after days?

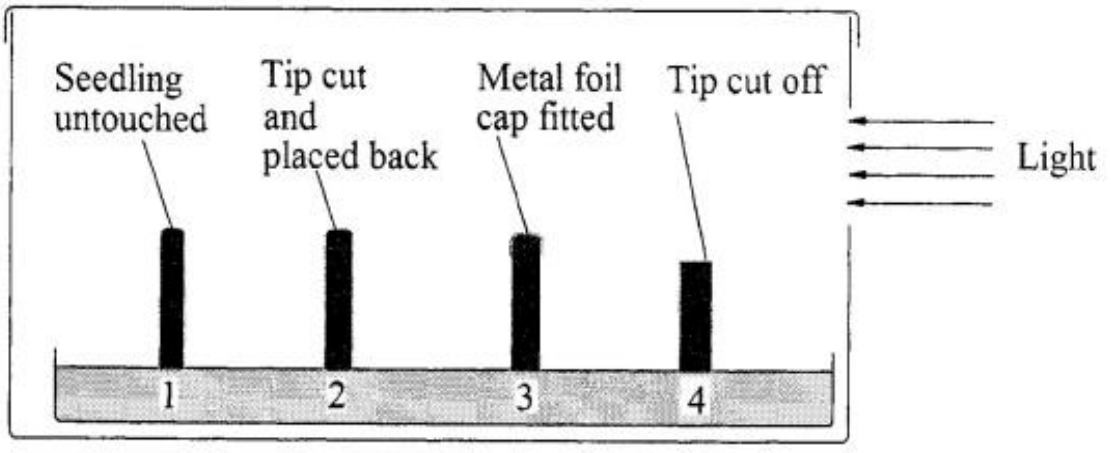


Associated facts and Reasoning

Radicle is geotropic i.e it grows towards the earth while shoot is phototropic which means it grows towards the sun.

Correct answer is A

7 The diagram below show an experiment set up to demonstrate the response of maize seedling to light. They are growing in a box with a hole cut at one end.



Which of the seedling labelled will grow towards light?

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A 2 and 3

B 1 and 2

C 3 and 4

D 4 and 1

Associated facts and Reasoning

Growth it takes place below the shoot tip. When the tip is cut growth stops. However, if tip is put back, growth resumes. The plant fitted with a foil, the area of response to phototrophic is covered and will not receive light. Therefore, it will not grow towards light. The untouched tip will grow towards light.

Correct answer is B

8 Which of the following pairs of stimuli cam affect the distribution of auxins in plant roots and shoots?

A Light and water

B Gravity and water

C Gravity and light

D Light and chemical

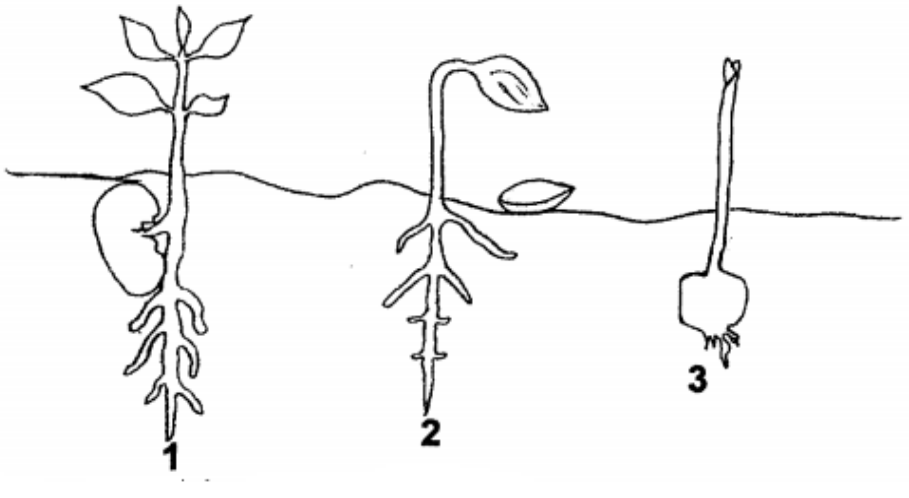
Associated facts and Reasoning

Shoot is positively phototropic i.e grows towards the light.

Root is positively geotropic i.e grows towards gravity or earth

Correct answer is C

9 The diagram below shows a seedling after germination.



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Which diagram(s) above show epigeal germination?

A 1 and 2

B 2 and 3

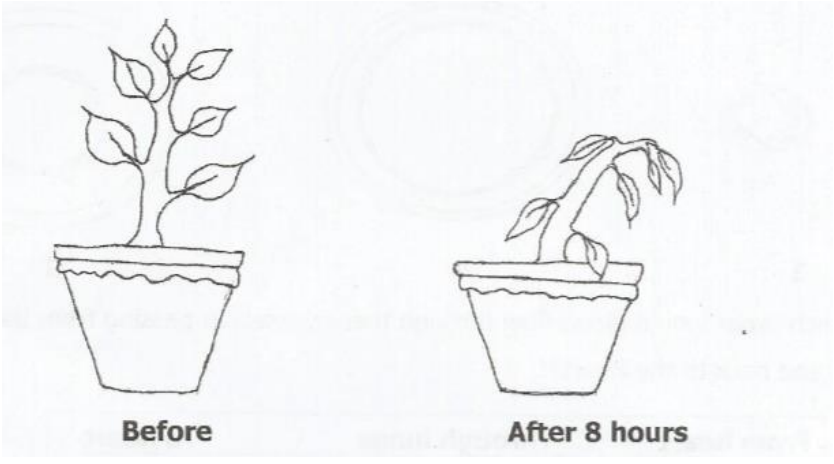
C 1 only

D 2 only

Associated facts and Reasoning
In epigeal germination the plumule comes out of the soil together with cotyledon

Correct answer is D

10 The diagram shows a potted plant which was left in open air four eight hours.



Which environmental conditions caused the change illustrated by the diagram?

	Temperature	**Humidity**	**Light intensity**
A	High	High	High
B	High	Low	High
C	Low	High	Low
D	Low	Low	Low

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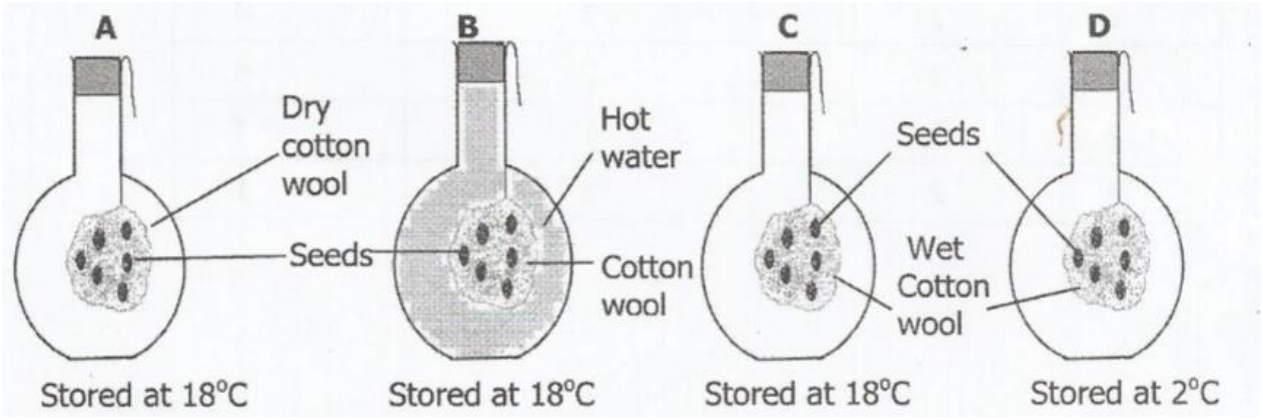
Associated facts and Reasoning

The plant is wilting, probable due to lack of water caused by high temperature, low humidity and high light intensity.

Correct answer is B

11 The diagram shows four flasks which were set up to investigate the condition needed for germination. In which experiment will the seedling germinate most quickly?



Associated facts and Reasoning

Note that conditions necessary for germination are oxygen, water (moisture) and warmth. All the conditions have to be present for germination to be successful.

- Flask A lacks moisture
- Flask B lack oxygen as water is hot and has killed the seed
- Flask C has all the necessary conditions
- Flask D the temperature is close to freezing point.

Correct answer is C

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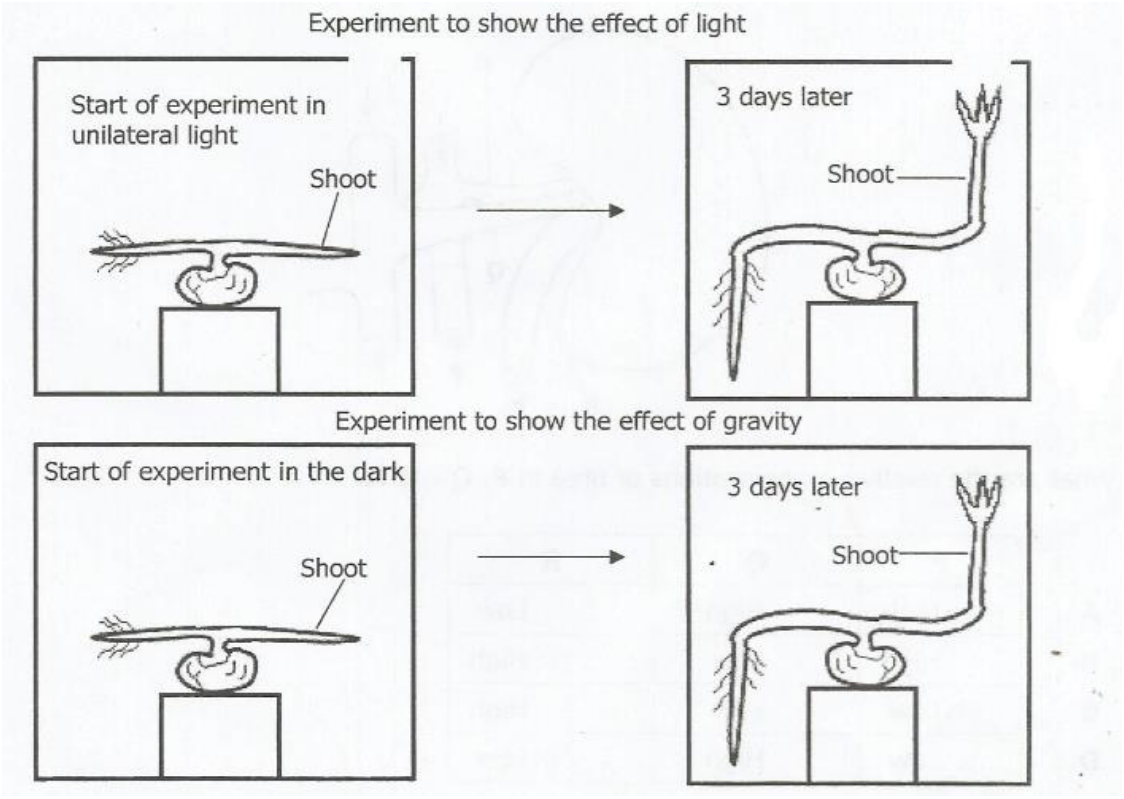
12 The diagram shows seedlings experiment on the topic response of shoots to gravity and light.



How has the shoot responded?

	To gravity	To light
A	✓	✓
B	✓	×
C	×	✓
D	×	×

Associated facts and Reasoning

In the two experiment, shoots have changed from horizontal direction to upward direction, indication of a positive phototropic response.

Correct answer is C

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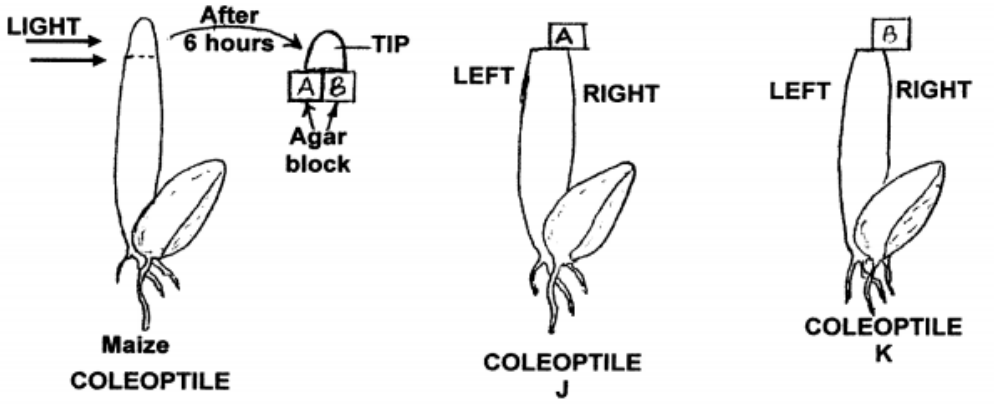
13 The diagram below shows a maize coleoptile exposed to light. After 6 hours the tip was cut off and place two agar blocks and the later agar block were placed on two different coleoptile J and K whose tips had been cut off.



What would be the growth response of the coleoptile V and W?

	Coleoptile V	**Coleoptile W**
A	Remaining upright	Curve leftwards
B	Remaining upright	Curve rightwards
C	Curve rightwards	Remaining upright
D	Curve rightwards	Remaining upright

Associated facts and Reasoning

- Growth hormones (Auxin) in plants move away from the side receiving light and gather on the shadow side (leeward).
- Growth will be more on the leeward side than the area receiving light, hence pant grows towards light.
- Agar A received less auxin while agar B hard more auxin.
- Coleoptile W will grow towards light (left) while V will remain upright.

Correct answer is A

14 Which of the following groups of insect is negative phototropic?

A Ants

B Houseflies

C Beetles

D Cockroaches

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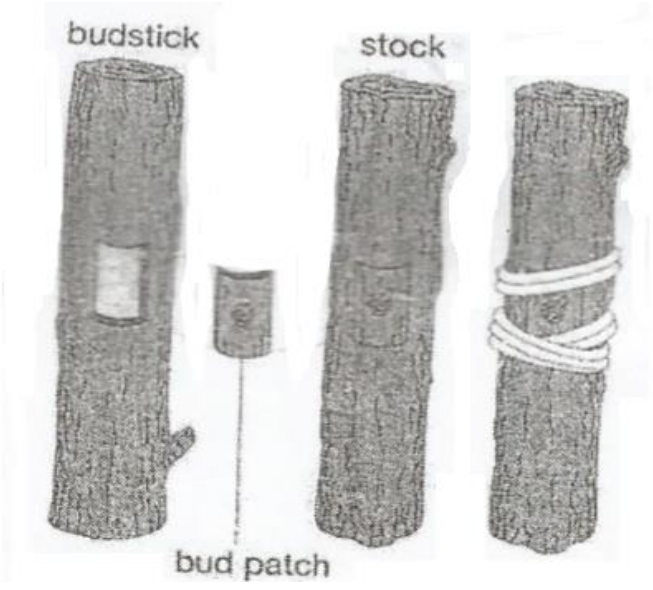
Associated facts and Reasoning

Negative phototropic means moving away from light. Such insects like shade. Their eyes are sensitive to light. A cockroach is such an example, they like habiting in buildings.

Correct answer is D

15 The diagram represents one of the methods of optical propagation.



Which method of artificial propagation is shown?

A Budding

B Fragmentation

C Layering

D Stem cutting

Associated facts and Reasoning

A bud has been taken from one plant to the other. Such an action is known as budding.

Correct answer is A

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16 Which structure is not necessary in a wing pollinated flower?

A Anther

B Ovary

C Petal

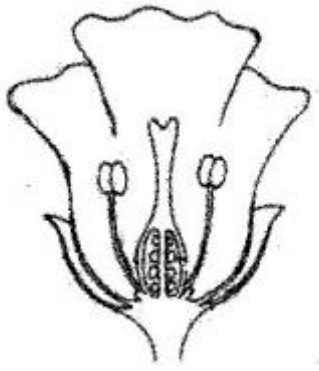
D Stigma

Associated facts and Reasoning

All the other parts appear in both plants except petals, which are only found in insect pollinated flowers. Petals attracts insects.

Correct answer is C

17 The diagram shows the structure of an insect pollinated flower.



Which feature on the diagram shows that the flower cannot be self-pollinated?

A Presence of petals

B Presence of sepals

C Large anther

D Short filament

Associated facts and Reasoning

The anthers are far from the stigma because filaments are shorts

Correct answer is D

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18 What type of asexual reproduction occurs in yeast?

A Budding

B Regeneration

C Crafting

D Binary fission

Associated facts and Reasoning
Cells of yeast reproduce by dividing in twos e.g 1→ 2 → 4 → 8 → 16 etc.

Correct answer is A

19 The diagram shows Irish potatoes in a natural vegetative propagation.

What type of vegetation organ is shown?

A Bulb

B Corm

C Root

D Stem tuber

Associated facts and Reasoning
Tubers that originates from the stem are known as stem tubers. The diagram shows just that.

Correct answer is D

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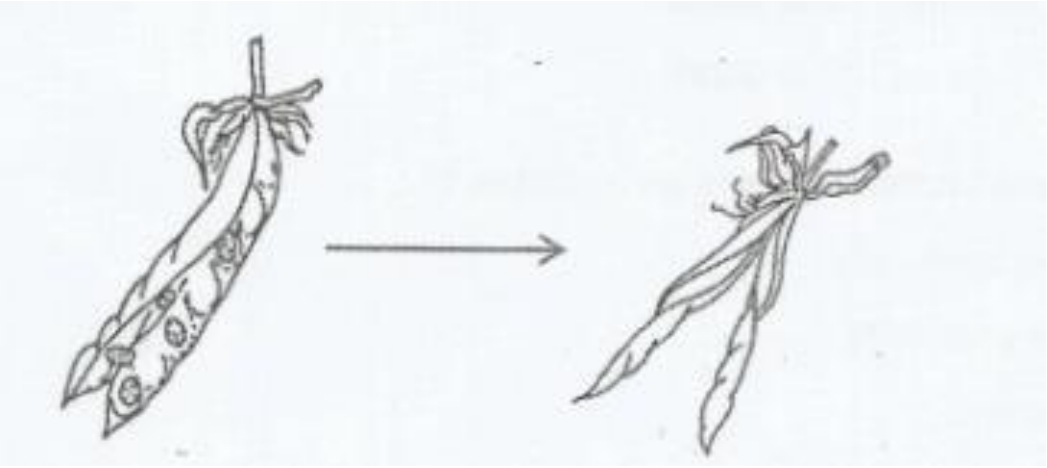
20 What type of seed dispersal is shown in the diagram?



A Animal dispersal

B Self-dispersal

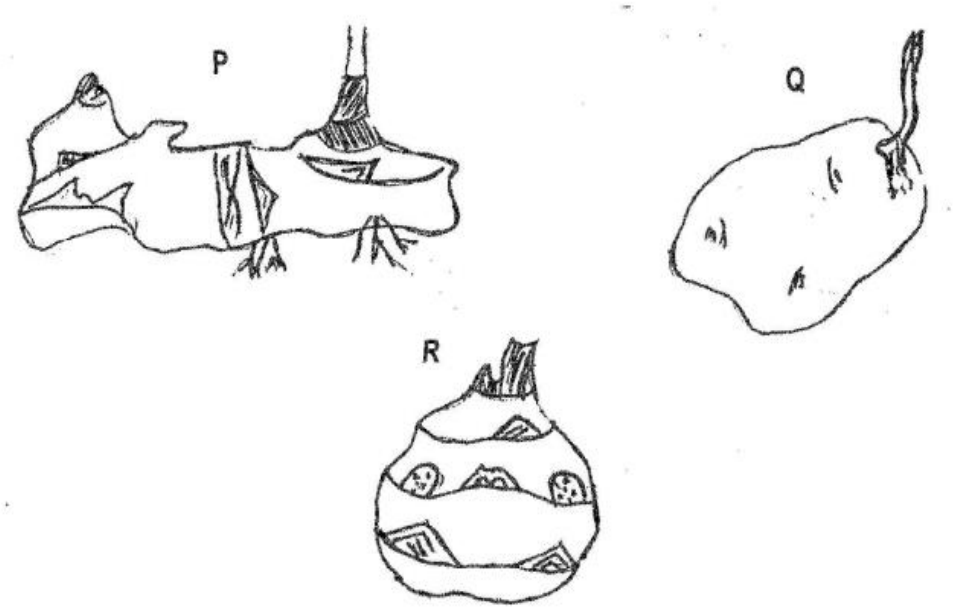
C Water dispersal

D Wind dispersal

Associated facts and Reasoning
The pod explodes when dry and seeds scatter.

Correct answer is

21 Which are the names of the following underground stem from which new plants may arise?



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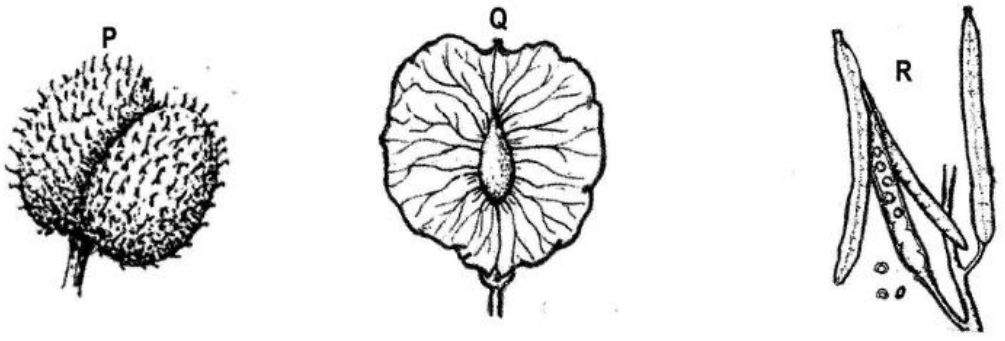
	P	Q	R
A	Rhizome	Tuber	Corm
B	Rhizome	Corm	Tuber
C	Tuber	Rhizome	Corm
D	Tuber	Corm	Rhizome

Associated facts and Reasoning

- Rhizome is a horizontal underground stem i.e P
- Corm is a vertical underground stem i.e R
- Tuber is not a stem, it is a swelling from a stem i.e Q

Correct answer is A

22 How are the seeds of the following fruits dispersed?



	P	Q	R
A	Animal	Self	Wind
B	Animal	Wind	Self
C	Self	Animal	Wind
D	Self	Wind	animal

Associated facts and Reasoning

P has hooks which cling to animal for or human cloth i.e dispersed by animal.

Q has wings which enables it to be blown by wind for it to land in a new area.

R has pods which explode when dry and seeds scatter i.e self

Correct answer is B

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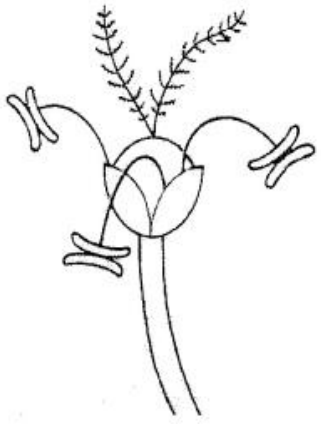
23 The diagram below shows a flower of a type wind pollination grass called ileucine indica.



In the diagram, what feature shows that the flower is wind-pollinated?

A Club-shaped stigma

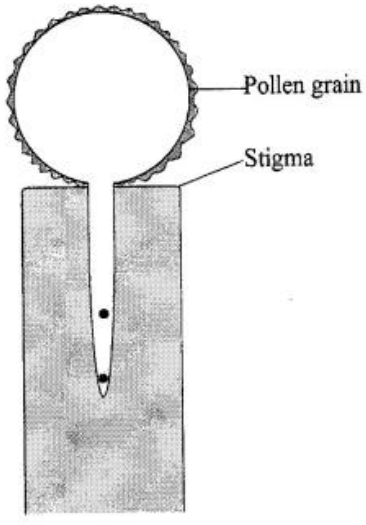
B petals

C Nectar gland

D Feathery stigma

Correct answer is D

24 The diagram below shows a pollen grain soon after it landed on the stigma.



What process has the pollen grain undergone to appear as shown in the diagram above?

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A Pollination

B Fertilization

C Elongation

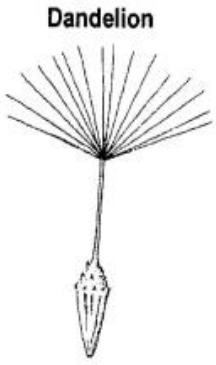
D Germination

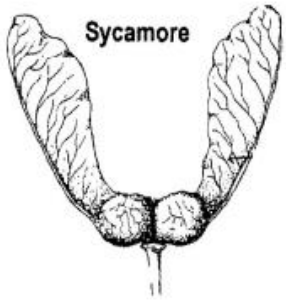
Associated facts and Reasoning

When the pollen grain landed on the stigma tube, which it gets stimulation, causing it to develop and penetrates the stigma and style. This process is known as germination.

Correct answer is D

25 The diagram below shows the fruits of dandelion and sycamore.





How is each dispersed?

	Dandelion	Sycamore
A	Animal	Water
B	Self	Wind
C	Wind	Wind
D	Wind	Animal

Associated facts and Reasoning

Dandelion has feathery hairs either from fruit or seed. This makes it possible to get in the air.

Sycamore has leaf-like from the tree and can be carried by the wing.

Correct answer is C

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26 Which if the following is the most important advantage of sexual reproduction over asexual reproduction?

A It protects its embryo during its early growth

B It ensures the survival and growth of the species

C It allows variation to arise in the offspring

D It produces offspring more often

Associated facts and Reasoning

Sexual reproduction involves fertilization of a male and female gametes. These have different characteristics from both parents. Forming and individual with unique characteristics from parents

Vegetative propagation comes from one parent emanating from any of its parts i.e root, stem, leaf, bud etc. the offspring has the same characteristics as the parent.

Correct answer is C

27 Which of these correctly identifies a natural and artificial method of propagation?

	Natural	Artificial
A	Corms	Grafting
B	Corms	Suckers
C	Runners	Sucker
D	Runners	Corms

Associated facts and Reasoning

Corms, runners and suckers fall under natural vegetative propagation. They come a parent plant and become independent.

Grafting is an artificial propagation technique carried out by man. A twig is taken from a desired plant and inserted on the other plant of the same kind.

Correct answer is A

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28 Flowers show adaption for wind or insect pollination. Which of these adaptions are found in wind pollinated flowers?

	Anther	Nectar	Stigma
A	Firmly attached	Present	
B	Firmly attached	Present	Outside flower
C	Loosely attached	Absent	Inside flower
D	Loosely attached	Absent	Outside flower

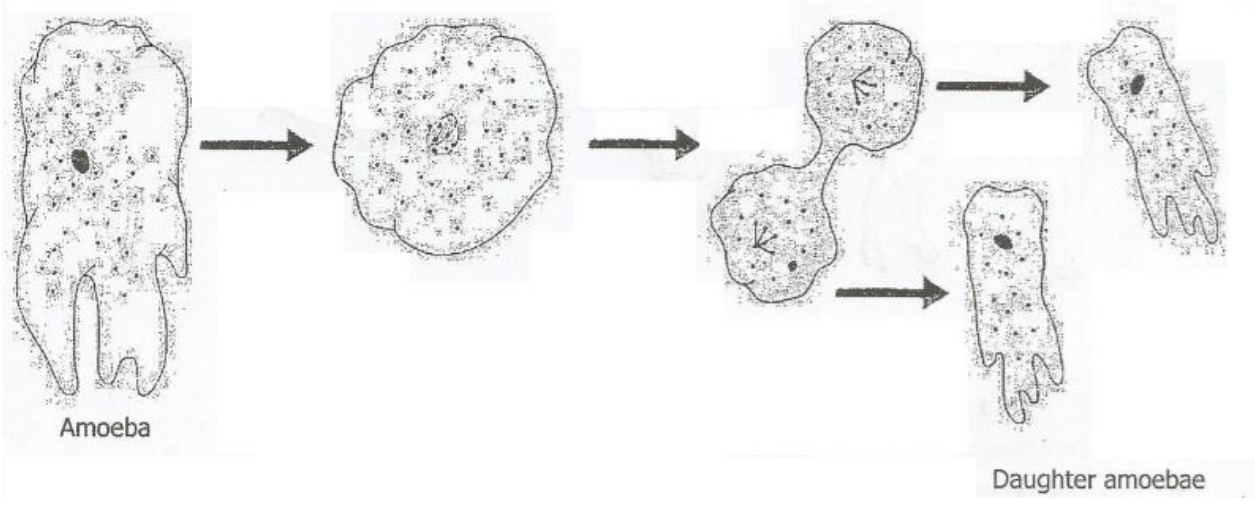
Associated facts and Reasoning

Insect pollinates flower have anthers and nectar inside flower. Stigma, depending on flower can be inside or slightly emerge out from flower.

In wind pollinated flowers, both anthers and stigma are exposed. They have no nectar.

Correct answer is D

29 What type of sexual reproduction is illustrated in the diagram?



A Binary fission

B Budding

C Fragmentation

D Spore formation

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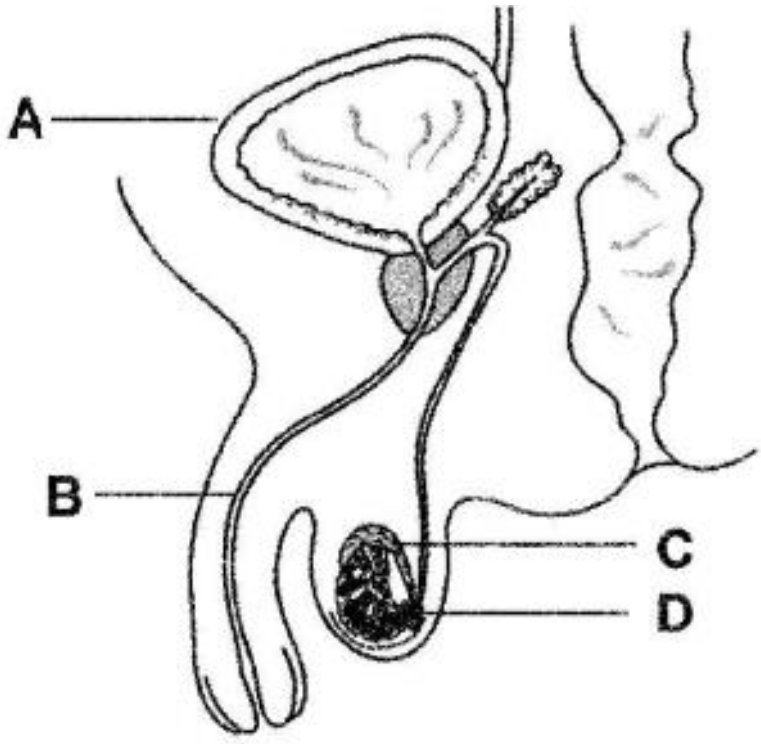
Associated facts and Reasoning

When an amoeba is fully grown, the nucleus lengthens and divides into two equal parts. The cytoplasm also does the same. Two daughter cells are produced. This process is known as binary fission.

Correct answer is A

30 The diagram below shows the male reproductive system of a human.



Which labelled structure is responsible for storing male gametes?

Associated facts and Reasoning

Bladder stores urin, urethra is the passage for urine and sperms, testis manufactures sperms and epididymis stores sperms.

Correct answer is D

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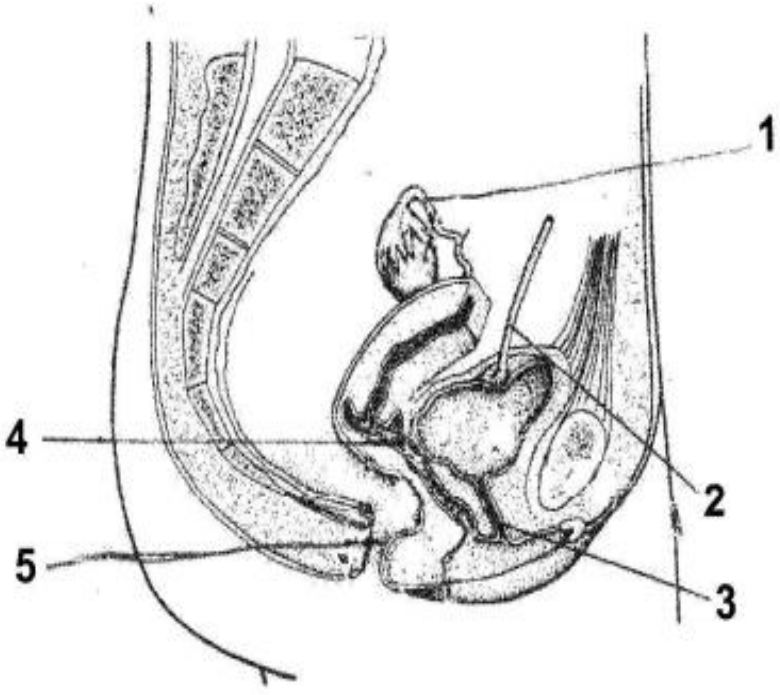
31 The diagram below shows the side view of the female reproductive organ.



	Release of Sperm	Fission of sperm/ovum
A	3	2
B	4	1
C	5	4
D	3	1

Associated facts and Reasoning

Sperms are deposited in the vagina and fission f sperm and ovum takes place in the fallopian tube.

Correct answer is D

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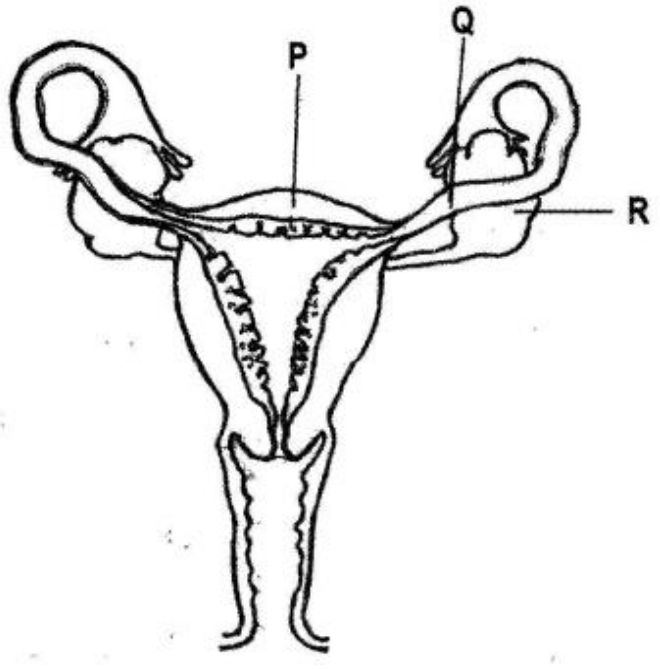
32 The diagram represents part of the reproductive system of a female mammal.



Where do fertilization, implantation and ovulation takes place?

	Fertilization	Implantation	Ovulation
A	P	Q	R
B	P	R	Q
C	Q	P	R
D	Q	R	P

Associated facts and Reasoning

- Fertilization takes place in the fallopian tube
- Implantation takes place in the womb
- Ovulation takes place at the ovary

Correct answer is A

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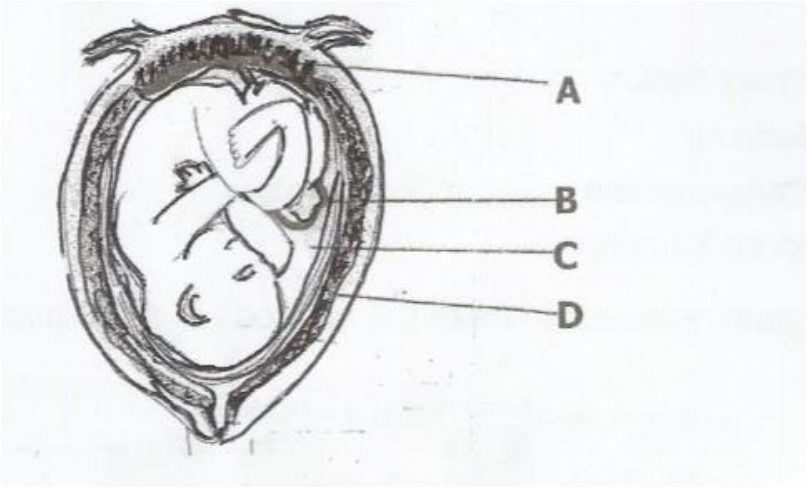
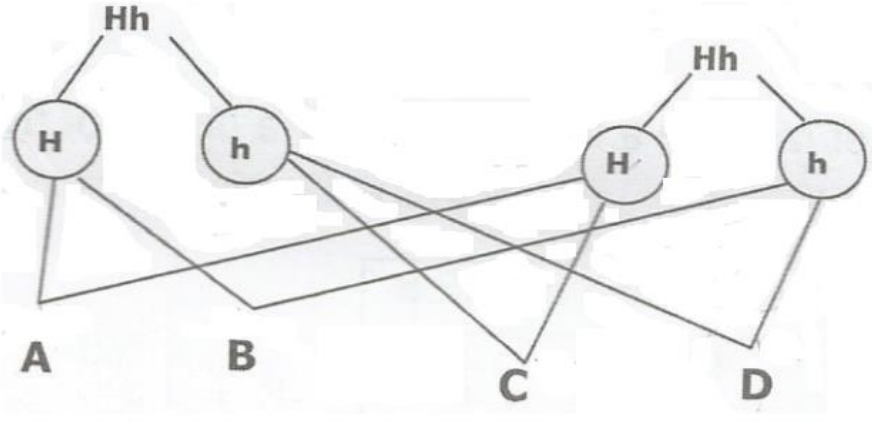
33 The diagram below shows a developing foetus in the uterus.
Where does gaseous exchange between mother and foetus occur?



Associated facts and Reasoning
Gaseous exchange takes place in the umbilical cord and the uterine wall form a placenta

Correct answer is A

34 The diagram shows the inheritance of sickle cell anaemia in a family.
The allele for normal haemoglobin is represented by H and the allele for defective haemoglobin by h.



Which child is homozygous recessive?

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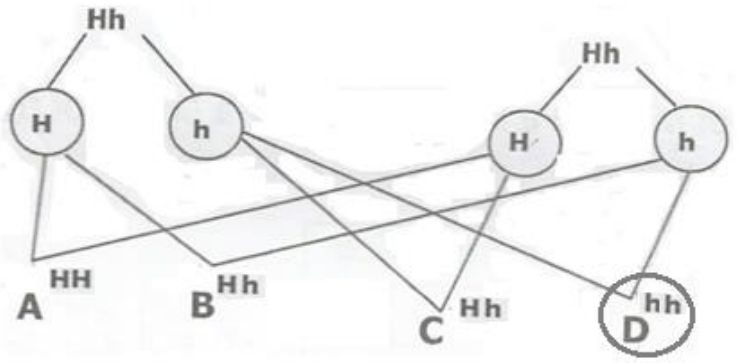
Associated facts and Reasoning

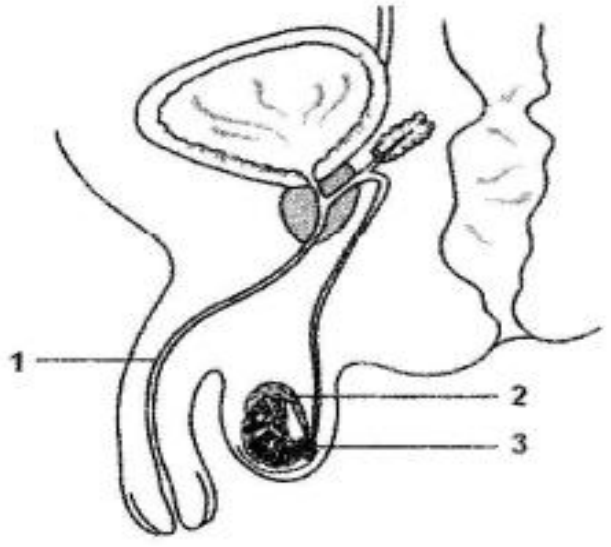
Let the diagram in the question be finalised. It will give the following results.



hh is homozygous recessive. This means it has an allele for defective haemoglobin

Correct answer is D

35 The diagram below shows the male reproductive system in humans.



Where are sperms produced and where are they stored?

	Produced	Stored
A	1	2
B	2	3
C	2	4
D	3	4

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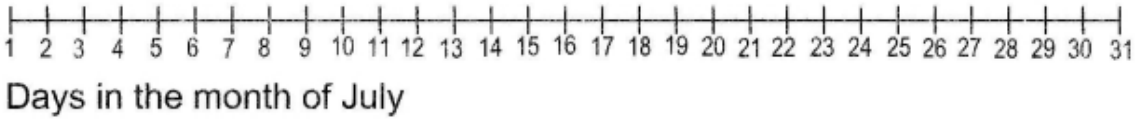
Associated facts and Reasoning

Sperms are produced in the testis and stored in the epididymis

Correct answer is B

36 The diagram below represents the mistral cycle of a female human during the month of July. Menstruation occurs from 4th – 9th July.



What was the likely day of ovulation?

A 4th July

B 9th July

C 18th July

D 28th July

Associated facts and Reasoning

Ovulation takes place 14 days from the first day of menstruation. Which means count 14 days from 4th July.

Correct answer is C

37 Which of the following birth control method is hormonal?

A Condom

B Contraceptive pill

C Intrauterine device

D Tubal ligation

Associated facts and Reasoning

Contraceptive pill is hormonal method which suppresses the process of ovulation.

Correct answer is B

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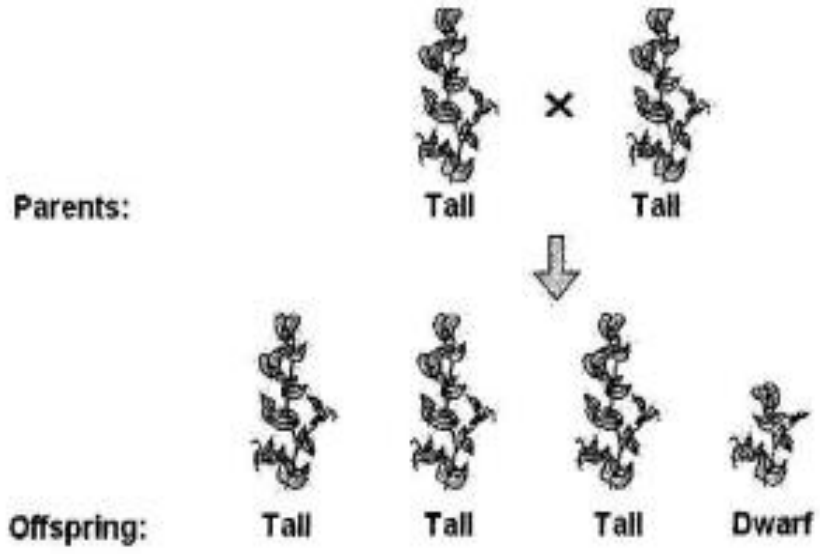
38 The diagram below shows a genetic cross between two plants.



Which of the following would be the genotype of the parent plants?

A TT and TT

B TT and tt

C Tt and Tt

D TT and Tt

Associated facts and Reasoning
There are two genotypes TT and tt. I.e. ¾ are tall and ¼ are duct

Correct answer is B

39 S pure breading black male mouse is mated with a brown female mouse and they produce 12 offspring. If the allele for black fur is dominant to the allele for brown fur, what would be one possible distribution of fur?

A 6 brown females and black males

B 12 brown

C 9 black 3 brown

D 12 black

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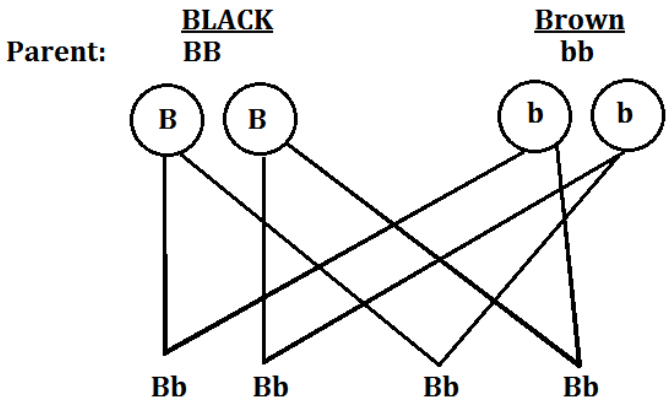
Associated facts and Reasoning

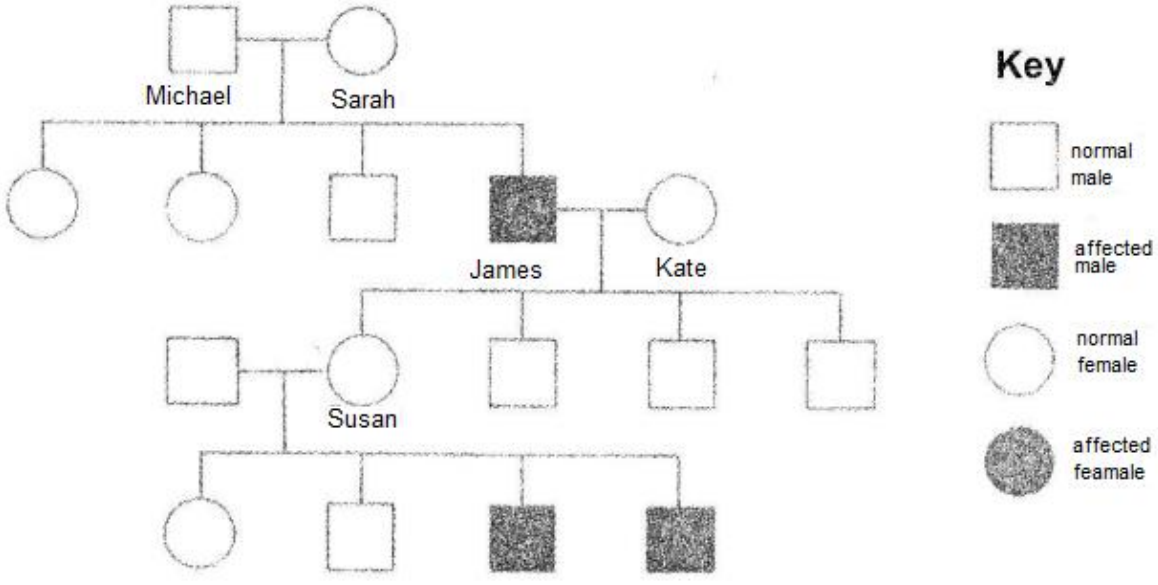
There is need to work out to arrive at an answer.



Since black is dominant to brown the outcome is all black.

Correct answer is D

40 The family pedigree below shows the pattern of inheritance of a genetic disease caused by a sex-linked gene.



What conclusion can be drawn from the diagram?

A Both male and female are carriers

B Only females are carriers

C Only males are carriers

D There are no carriers in the pedigree

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Associated facts and Reasoning

The trait of the father cannot be transmitted directly to the son if the mother is not a carrier. In this case the sons area affected and it can only happen if the mother is a carrier.

Correct answer is B

41 Which structure are found in the human sperm call?

	Sperm membrane	Cell wall	Haploid nucleus
A	✓	×	×
B	✓	×	✓
C	✓	✓	✓
D	×	✓	✓

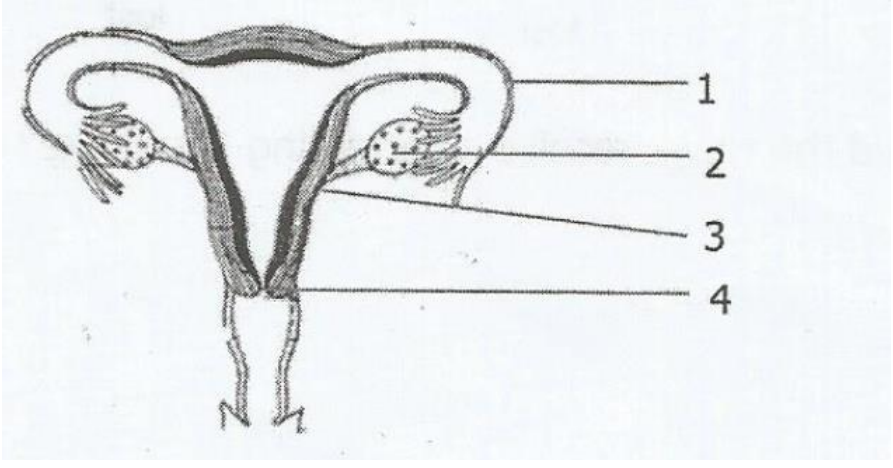
KEY
✓= present
×= absent

Associated facts and Reasoning

Animal cells have no cell wall. Therefore, sperm has no cell wall. It has a membrane. Its nucleus has half genetic characteristics

Correct answer is B

42 The diagram below shows the female reproductive system.



In which numbered parts does ovulation, fertilization and implantation takes place?

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	Ovulation	Fertilization	Implantation
A	1	2	3
B	2	1	3
C	2	1	4
D	3	2	4

Associated facts and Reasoning

Ovulation is the first thing that takes place. It is the release of the ovary. The second activity is fertilization which occurs in the fallopian tube

Correct answer is B

43 Which of the following is a hormonal and which one is a mechanical method of contraception?

	Hormonal	Mechanical
A	Condom	spermicide
B	Condom	Intra-Uterine device
C	Pill	Spermicide
D	Pill	Intra-uterine device

Associated facts and Reasoning

Pill suppresses the hormones and affect ovulation. Spermicide is a chemical which is smeared into the vagina to prevent sperms from swimming i.e chemical method. Condom and intrauterine device ae mechanical methods

Correct answer is D

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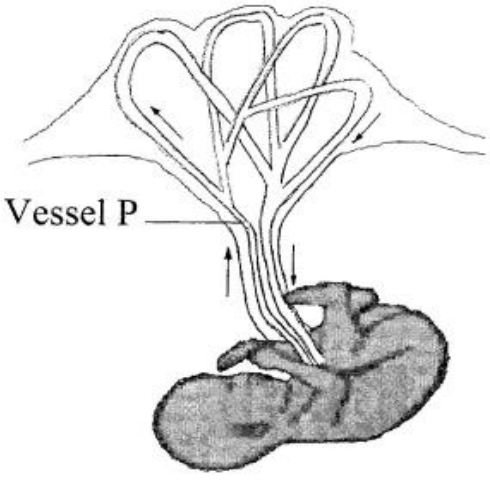
44 The following diagram shows a developing foetus in the uterus.



Which of the following shows the composition of blood in blood vessel P?

	Concentration of glucose	Concentration of oxygen	Concentration of carbon dioxide
A	Low	High	low
B	Low	Low	High
C	High	Low	Low
D	High	High	High

Associated facts and Reasoning

The blood going into the body is rich in oxygen and food nutrient. These are used up by the body of the baby for growth and respiration. The blood leaving the baby's body carries nitrogenous waste and carbon dioxide which are of high concentration.

Correct answer is A

45 The following are events which occur during sexual reproduction in plants.

1. Fusion of male and female nuclei
2. Dispersal of seeds
3. Germination of pollen grains
4. Transport of pollen grain from the anther to the stigma
5. Formation of seeds from ovules

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In which order do these events occur??

A 5 → 4 →3 →2 →1

B 4 → 3 →1 →5 →2

C 3 → 5 →4 →2 →1

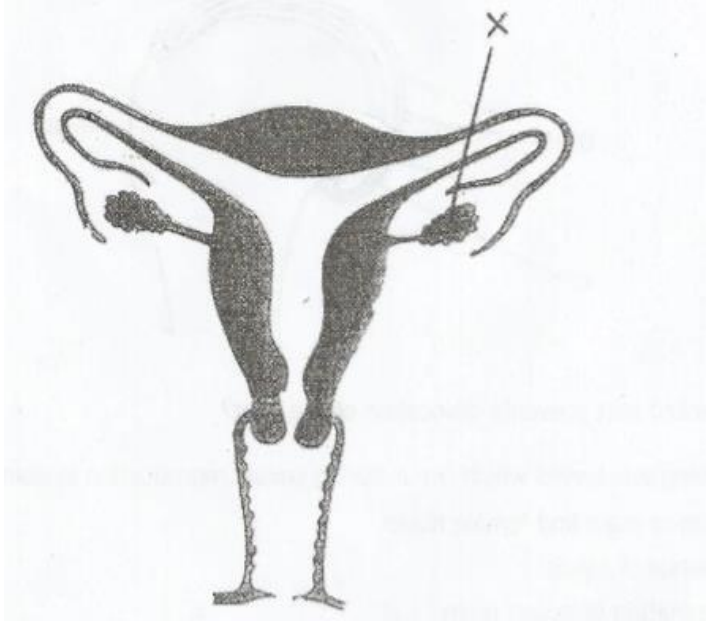
D 2 → 1 →4 →5 →3

Associated facts and Reasoning

The whole process starts with transfer of pollen grains from the anther to the stigma. The pollen grain germinates on the stigma, pushing it down the tube to the ovary through the style. Then the male and female nuclei fuse to form seeds which latter get dispersed

Correct answer is B

46 The diagram shows the female reproductive system.



What is the function of the parts labelled X?

A Hormone secretion and implantation

B Production of gametes and hormone secretion

C Production gametes and implantation

D Site for fertilization of ovum by sperm

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Associated facts and Reasoning

The ovary produces gametes (ova) and tow hormones oestrogen and progesterone.

Correct answer is B

47 Which type of production and which type of cells division produces nuclei half the number of chromosomes?

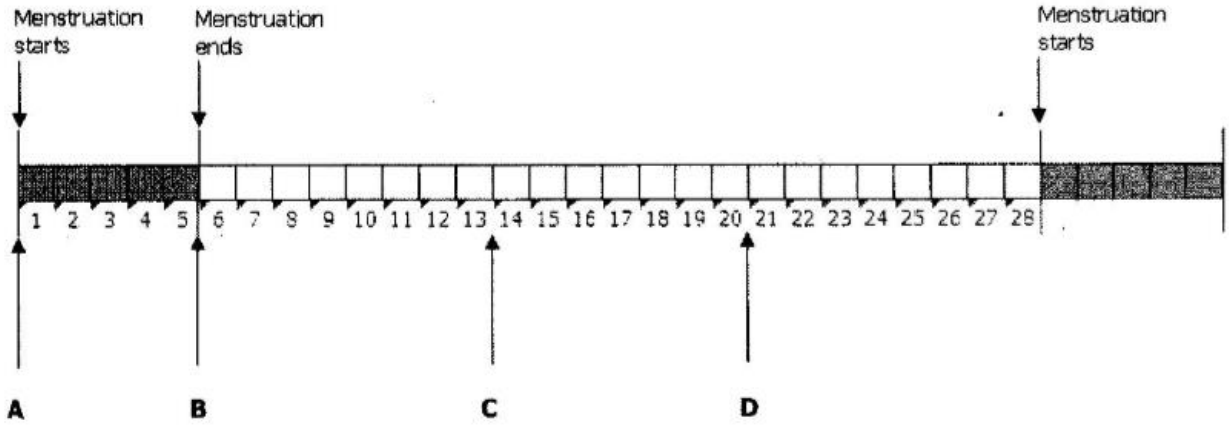
	Type of production	Type of cell division
A	Asexual	Meiosis
B	Asexual	Mitosis
C	Sexual	Meiosis
D	Sexual	Mitosis

Associated facts and Reasoning

The type of reproduction is sexual. It involves the fusion of haploid gametes from each parent with half the normal number of chromosomes to make a new cell containing both parent's genetic material. Haploid cells are a result of Meiosis

Correct answer is C

48 The diagram shows a woman's menstrual cycle. On which day is intercourse most likely to result in the woman getting pregnant?



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Associated facts and Reasoning

The egg is released 14 days after menstruation. Fertility is high between 15th day

Correct answer is C

49 What is the advantage of passive immunity?

A It gives immediate protection

B It lasts longer than active immunity

C It makes anti-bodies very quickly

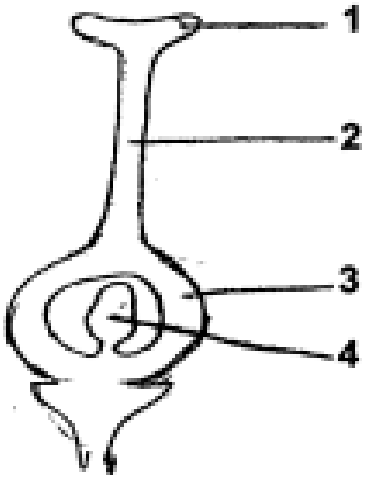
D It makes the white blood cells produce anti-bodies

Associated facts and Reasoning

Passive immunity makes maternal antibodies which are passed to the new born immunity system having lasting effects on the baby's health such as decreased risk of obesity.

Correct answer is B

50 The diagram below shows a section through the carpel of a flower



Where do pollination and fertilization occur?

	Pollination	Fertilization
A	1	4
B	2	3
C	3	2
D	4	1

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Associated facts and Reasoning

Pollination is the transfer of pollen grains from the anther (male) part of the flower to the stigma (female) part of the flower. Stigma is 1. Fertilization is the fusion of the pollen grain nucleus and the ovule nucleus and takes place in the ovary i.e part labelled 4.

Correct answer is

51 Which one of the following is the correct order of events leading to fertilization in a flower?

1. Germination of pollen grain
2. Transfer of pollen grain to stigma
3. Fusion of male and female gametes
4. Pollen tube entering the micropyle

A 2, 3, 4, 1

B 2, 3, 4, 1

C 2, 1, 4, 3

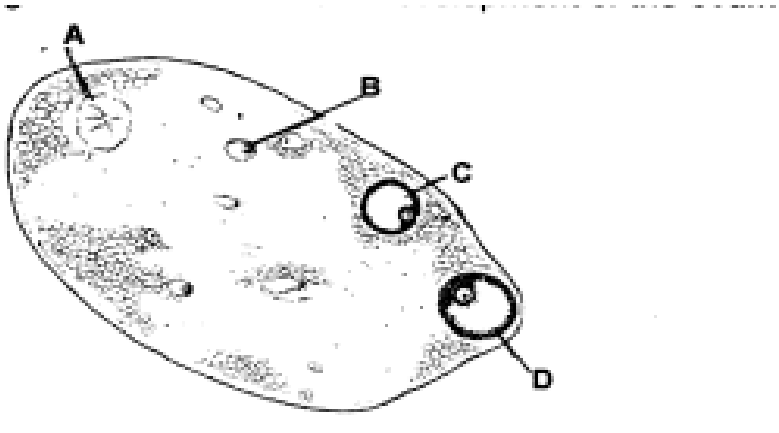
D 2, 4, 1, 3

Associated facts and Reasoning

The first to take place is transfer of pollen grain from the anther to the stigma. Germination of pollen grains at the stigma is the step 2. The third is pollen entering the micropyle. Lastly fusion of male and female gametes

Correct answer is

52 The diagram below shows the development of the ovum in the ovary at various stages.



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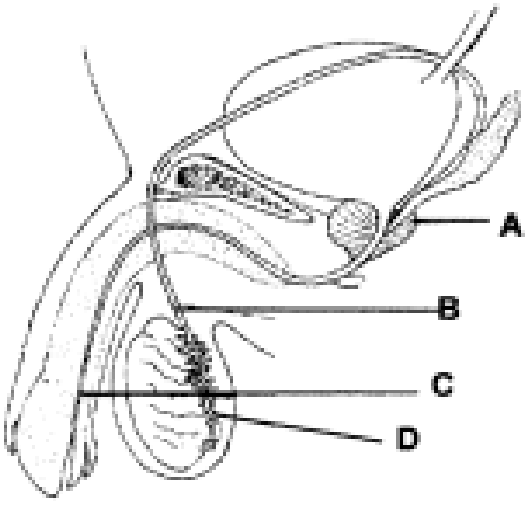
Which of the labelled structures A, B, C and D is the corpus luteum?

Associated facts and Reasoning

The corpus luteum is an outcome of a follicle which has released its ovum. It is characterised by a star at its centre.

Correct answer is A

53 The diagram below shows the male reproductive organ.



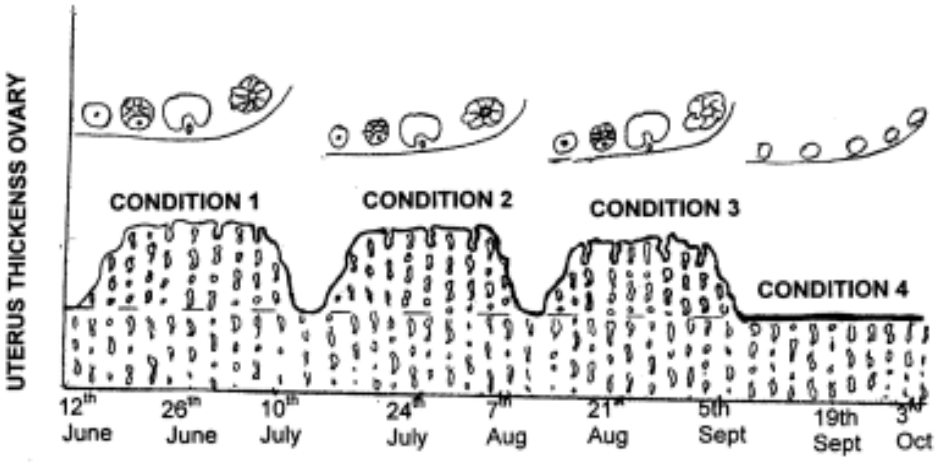
Wat which point would a doctor perform a vasectomy operation?

Associated facts and Reasoning

Vasectomy is a process where either the vas-deferens is tied or a small portion of it is cut out and removed. Both prevent sperms from being ejaculated.

Correct answer is B

54 The diagram below shows a series of menstrual cycle in human female.



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Which of the following best distinguish condition 4?

A Menstruation

B Pregnancy

C Implantation

D Menopause

Associated facts and Reasoning

The process of menstruation and ovulation has come to a halt. This means pregnancy.

Correct answer is B

55 Which of the following is an inherited disorder?

A Basilar dysentery

B Ring worm

C Leukaemia

D Sickle cell anaemia

Associated facts and Reasoning

Leukaemia is a genetic disease but not and hereditary. Sickle cell is an inherited lifelong serious disorder. Basically dysentery is dangerous and highly contagious bacterial infection of the colon. Cannot be inherited. Ring worm is a common pathogen that infects the skin, hair and nails of people and animals but cannot be inherited.

Correct answer is D

56 Which of the following is caused by a mutation?

A Coronary heart disease

B Tuberculosis

C Rhesus factor

D Down syndrome

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Associated facts and Reasoning

Down syndrome is usually caused by an error in cell division called non disjunction. This leaves a sperm or egg with an extra copy of chromosome. This is a mutation.

Correct answer is D

57 Which of the following is the least effective family planning method?

A Contraceptive pill

B Spermicide

C Condom

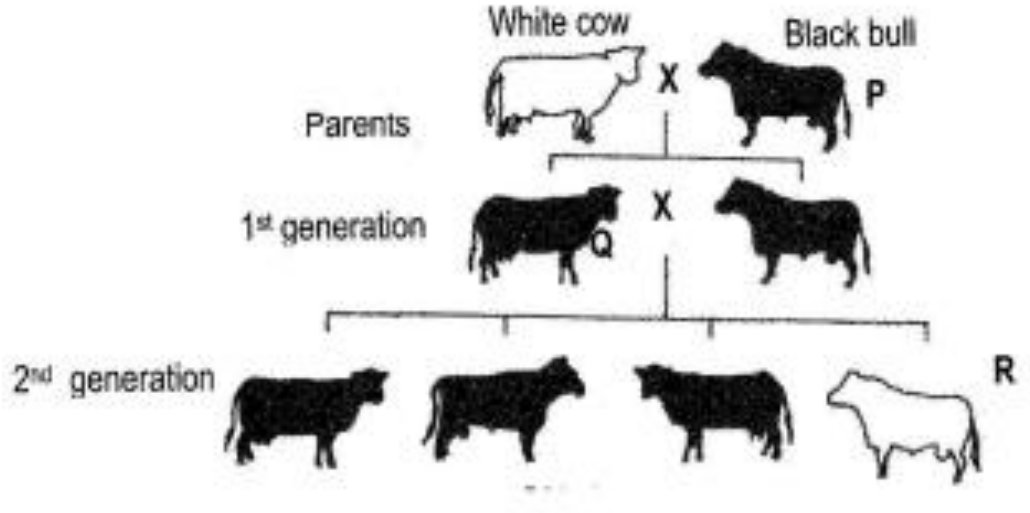
D Natural method.

Associated facts and Reasoning

Although commonly used, condom is the least effective control method because it can rapture. However, it is to prevent contracting STI's

Correct answer is C

58 The diagram below shows the offspring of the cross between a black tall white cow.



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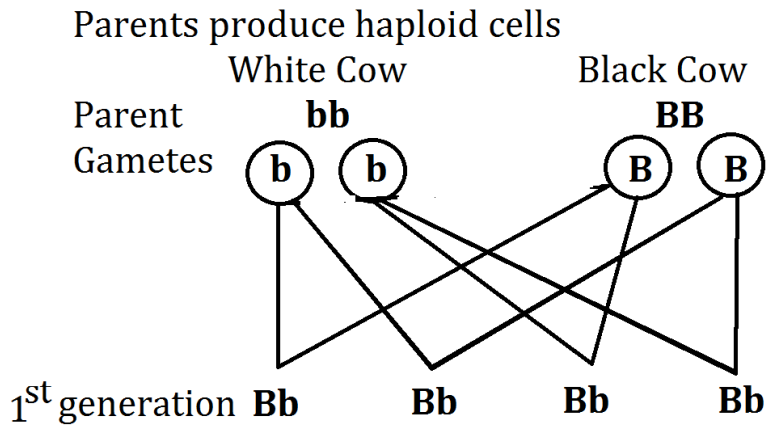
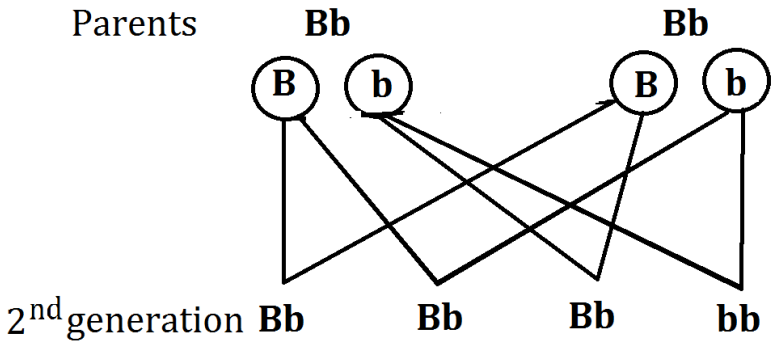
What are the genotype of the animals labelled P, Q and R?

	P	Q	R
A	Bb	BB	bb
B	BB	Bb	bb
C	Bb	Bb	bb
D	BB	BB	Bb

Associated facts and Reasoning

The solution to this could be as follows.





Correct answer is B

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UNIT 4.1 REPRODUCTION IN PLANTS/ ANIMALS/ GERMINATION AND TROPISM/ SEED DISPERSAL AND GENETICS

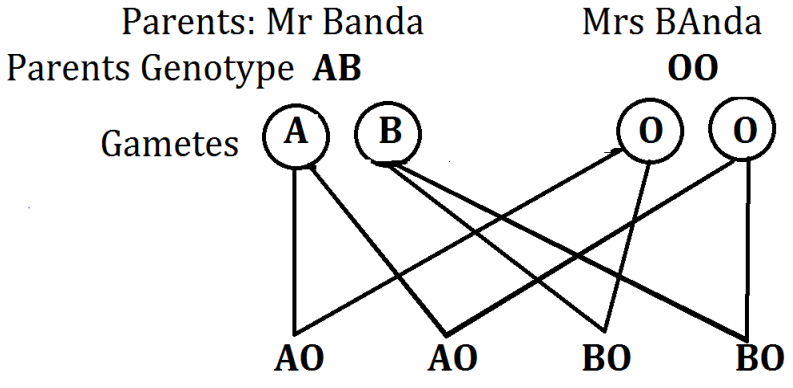
PAPER TWO (2) Type Questions: Section A

1 **a)** Mrs Banda delivered a baby in the hospital. Mrs Banda has blood group O and the father to the girl has blood group AB. Mrs Banda sues the hospital for giving her a wrong baby whose blood group was O. Explain using a genetic diagram why Mrs Banda would win or lose the case.

b) What could have been the correct genotype of the father?

Associated facts and Solution

a)



The results show two genotypes of offspring AO and BO.

Since O is recessive the child is expected to be either group A or B. Mrs Banda was given a wrong baby who had group O.

Mrs Banda wins the case.

b) The genotype of the actual father could be AO.

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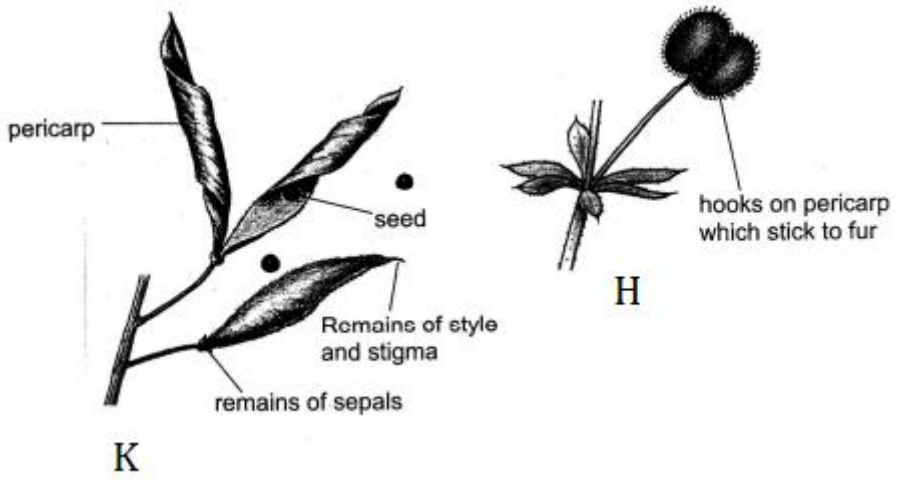
2 The diagram shows some fruits from a dicot plant.



a) (i) State the type of dispersal fruit K and H undergoes.

(ii) Give a reason for your answer is (a)(i) for each fruit K and H.

b) (i) Which fruit disperses seeds over a short distance?

(ii) Which dispersal will involve seeds and not the fruit?

c) Give three differences between fruit H and tomato.

Associated facts and Solution

a) (i) Dispersal type for each fruit:

- K: self-dispersal or explosion. (it breaks open) and seeds scatter.
- H: animal dispersal (hooks of the fruit stick to animal's fur).

(ii) K: When the fruit reaches maturity, it explodes and scatters the seeds.

H: The presence of hooks on the pericarp enables it to stick to fur of animals passing by.

b) (i) K: Seeds cover a short distance because the explosion does not scatter very far.

(ii) K: The pericarp of fruit remains on the plant. Only the seed scatter.

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c) 1. The pericarp of fruit H has hooks while the pericarp of tomato is smooth and shiny.

2. Pericarp of fruit H is hard while pericarp of tomato is fleshy.
3. Fruit H scatters seeds by exploding as type of dispersal while tomato does not.

---

3 **(a)** The table below shows the blood group in humans.

A	B	AB	O

(i) Which two blood groups exist in two forms?

(ii) Which blood group can be donated to any person?

(iii) Which blood group can receive any other group of blood?

b) Outline the five steps involved in blood clotting.

Associated facts and Solutions.

a) **(i)** - Blood group **A**.

Reason: it can either be AA or AO:

Its genotype could be I^A I^A homozygous

Or is I^A I^O heterozygous

- Blood group **B.**

Reason: it can either be BB or BO:

Its genotypes could be I^B I^B homozygous

Or I^B I^O heterozygous

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(ii) Blood group O can be donated to any person:

Reason: Group O has not antigens, so this blood functions quite safe in other people. They are said to be universal donor.

(iii) Blood group AB.

Reason: Because serum if blood group AB does not have antibodies to fight against antigen. They are said to be universal recipients.

c) 1. Tissue damaged and blood vessel cut

2. Platelets and damaged cells at the would produce protein called Fibrinogen.
3. Fibrinogen is changed to fibrin.
4. Fibrin works on the fibre.
5. Network of fibre traps blood to a blood clot.

---

4 **a)** Complete the diagram below by filling in the blank spaces.

	HORMONE	**SOURCE**	**ACTION**
i)		Ovary	Begins rebuilding the living of the uterus
ii)	Thyroxin	Thyroid gland	
iii)		Adrenal gland	

b) What happens to the hormone after completing their action in the target organs?

c) State two ways in which hormones and nerves differ in controlling body process.

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Associated facts and Solutions

a) Complete the diagram below by filling in the blank spaces.

	HORMONE	SOURCE	ACTION
i)	Oestrogen	Ovary	Begins rebuilding the living of the uterus.
ii)	Thyroxin	Thyroid gland	Increases metabolism rates and promote growth in children both mentally and physically.
iii)	Adrenaline	Adrenal gland	It increases heart rate. Increases blood flow to the brain and muscles. Stimulates break down of glycogen. Stimulates the nervous system making it alert for danger.

b) Once hormones have served their purpose on their target organs or tissue, they are destroyed.

c) The main difference is:

- Nervous system uses electrical signals or impulses while, while hormones use chemical signal.
- Hormones use the blood as their transport system to reach organs and tissue while nervous system use the neurons (nerve fibres).

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5 **a)** Haemophilia is an example of a sex-linked inherited disease arising from a blood group disorder.

(i) What is a sex-linked characteristic?

(ii) Explain why males are more likely to suffer from sex-linked diseases than females.

b) Colour blind is another sex-linked disease. Using a genetic diagram, show the chances of having a colour blind child from a couple made up of a normal male parent and a carrier female parent.
Use the symbols X^RX^r.

Associated facts and reasoning

a) (i) Genes located on the sex chromosome are said to be sex-linked and therefore have sex-linkage.
Sex linkage is where certain genes controlling non-sex character are located on the sex chromosome.

(ii) Males suffer from sex-linked diseases because:

- All sex-linked genes are found on the X-chromosome. X-chromosome is actually female. Note that there are no corresponding alleles on the Y-chromosome because it is shorter than the X-chromosome. As a result, sex-linked diseases are mostly found in males than in females.

b) To show the chances to have a colour blind child from parents who are:

- Father is normal X^RY
- Mother is a carrier X^RX^r

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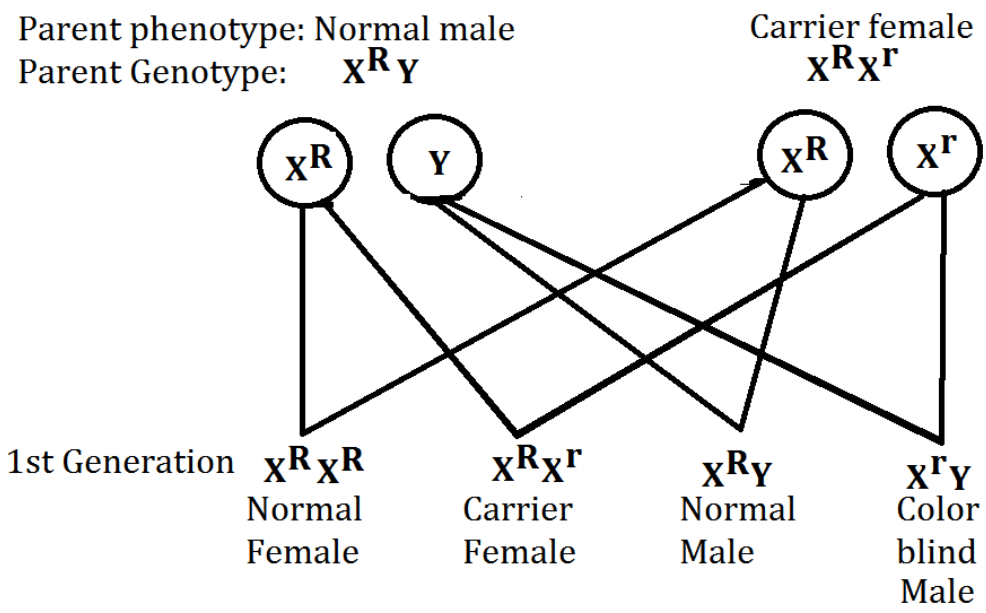

Chances are there:

Reasoning: Result show that:

1 normal female

1 carrier female

1 normal male

1 colour blind male

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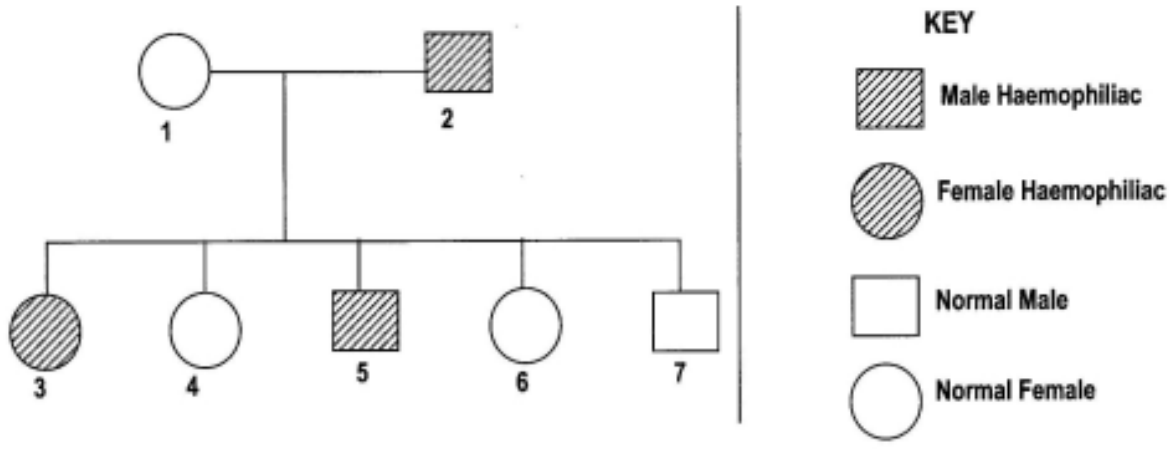
6 The diagram below shows the inheritance of haemophilia in a family.



a) Taking the allele for haemophilia to be X^h, what is the genotype of the offspring 3 and 7?

b) Offspring 4 married someone with similar genotypes to offspring 7.

(i) Draw a genetic diagram to show the genotypes and the phenotypes of the offspring.

Associated facts and Solutions

a) Haemophilia is a sex-linked disease.

Females can only be carriers with recessive X^h.

Genotype for 3 is:

X^HX^h

is male and is normal.

Genotype is:

X^HY

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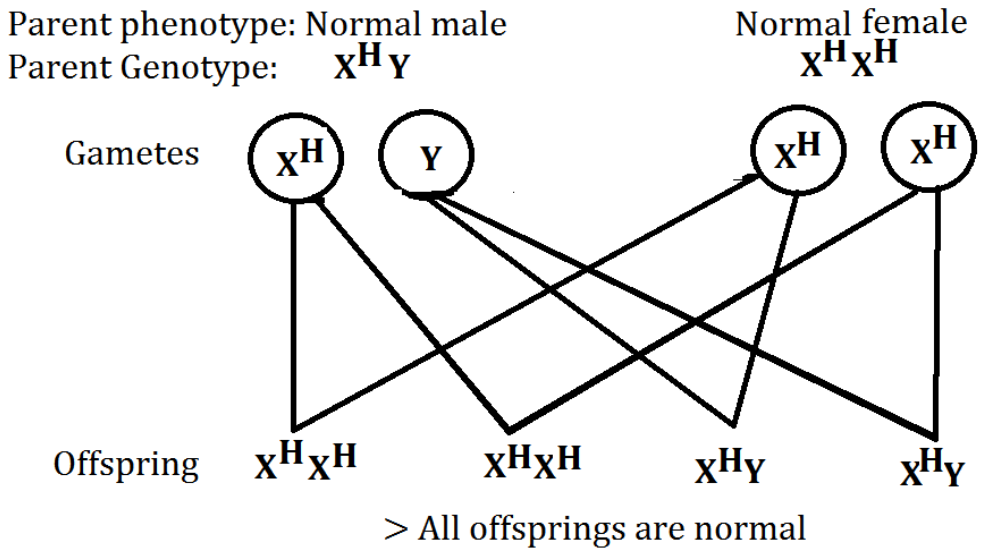
b) Note that 4 is normal female and also 7 is normal.

4 = normal

7 = normal



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SECTION B TYPE QUESTIONS (ESSAY QUESTIONS)

1 **a)** Describe the process of pollination in a flowering plants.

b) Distinguish between insect pollinated and wind pollinated flower.

Reasoning and Answers

a) Pollination is the transfer of pollen grains from the anther to the stigma of a flower. When in search of a sweet juice from a nectar in a flower an insect e.g a bee, rubs its body on anthers as it enters the flower. In the process it picks pollen grains which sticks to its body. On its way out is rubs against the stigma, resulting into depositing of pollen grains on to it. Pollination takes place as soon as the pollen grains are deposited on the stigma.

c) The differences between insect and wind pollinated flowers are as followers:

Characteristics of insect pollinated flower.

- They often have sweet scent
- They are usually large
- They produce nectar
- They have bright coloured petals
- They have sticky stigma
- The position of the nectar enables the insect to rub against anthers and stigma.

Characteristics of wind pollinated flowers.

- They are usually small and ugly.

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- They produce large quantities of light Powderly pollen grains
- They have dull bracts (in place of petals)
- The stigma is large and feathery
- The stamen has long filaments
- They have no scent
- They have no nectar

---

2 **a)** Describe the special dietary needs of a pregnant woman.

b) Discuss the artificial methods of birth control.

Associated reasoning and solutions

a) Recall that a pregnant woman is in a special stage of reproduction. She should have enough adequate diet. She should take enough carbohydrates, proteins, vitamin and mineral salts in order for her and the baby to health and grow well.

The following are recommended the foods; sweet potatoes, nsima, Irish potatoes, cassava, to supply energy and carry out some work. For growth protein sources include milk, eggs, beans, meat, chicken, fish and many others. Both foetus and mother require protective foods from, green vegetables, fruits.

It must be mentioned that mineral salts such as calcium, phosphorus are important for bone formation and iron for haemoglobin in the red blood cells. Note that lack of the above requirements, the body of the mother will release the nutrients to supply to the baby.

b) The following are artificial methods of birth control.

- Condom

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- Intra uterine device (IUD)

Condom: This is a rubber sheath which worn on the penis to prevent semen from getting into the vagina. It the most reliable method and cost effective. But ensure that it does not get torn or rapture during coitus. Another precaution is to read the expiry date before using it.

Intra uterine device (IUD): It is a device made up of a plastic. It has a shape English T copper. It is inserted into the uterus. With the help of threads, women can check if its inserted properly. It is safe and effective.

---

3 **a)** Define growth.

b) Describe the process of growth in plants.

c) Outline the life cycle of a housefly.

Associated facts and reasoning

a) **(i)** Growth is the permanent increase in size and complexity of organisms. Organisms grow as they transfer the food they eat into living materials, which add to their tissues. Plants grow independently while animals stop when they reach maturity. Living organism grow in length and girth (diameter).

(ii) Germination is the process during which the embryo develops into a seedling. Seeds of well-developed dry seeds normally undergo dormancy. Seeds germinate when conditions are favourable. Conditions necessary for germination are water,

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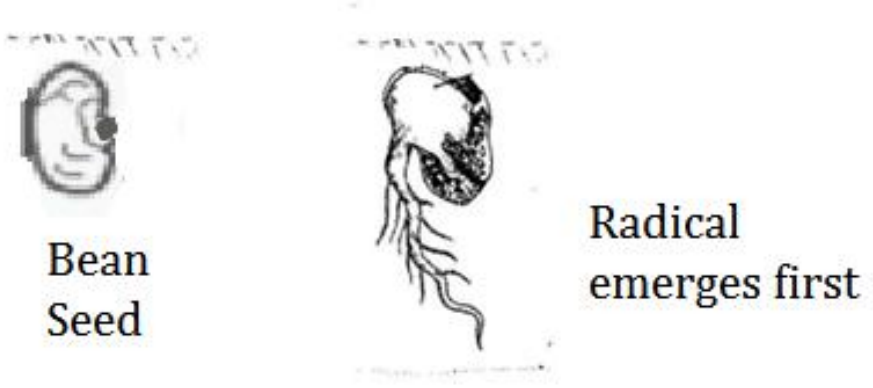
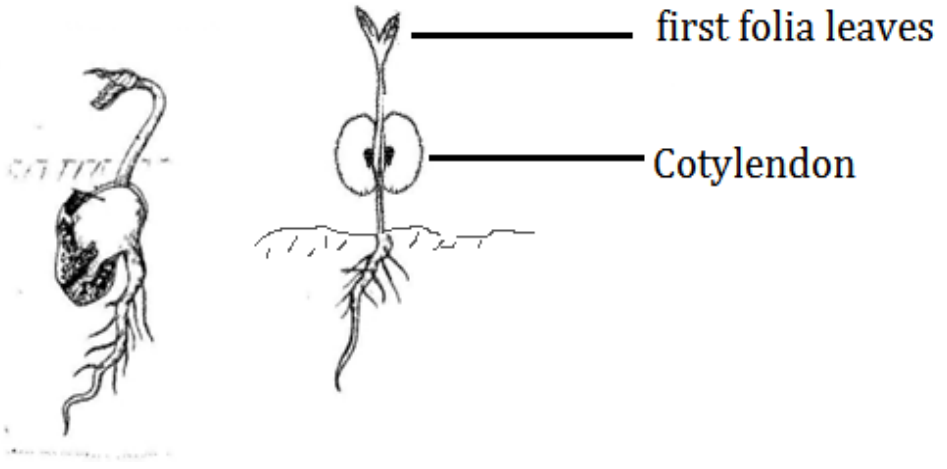
air, warmth (suitable temperature) and viable seed. Once conditions are provided, the enzyme in the seed begins to digest food into the embryo from the food store (cotyledon). The first part that begins to grow (elongate) is the radical (young root). It is necessary for the radicle to grow first in order for it to obtain mineral slats on behalf of the plant as shown below.



The second part to germinate is the plumule (shoot) which is illustrated in the diagram below.



Once the seedling has the first folia leaves it will begin to photosynthesize. It will grow both in length and girth.

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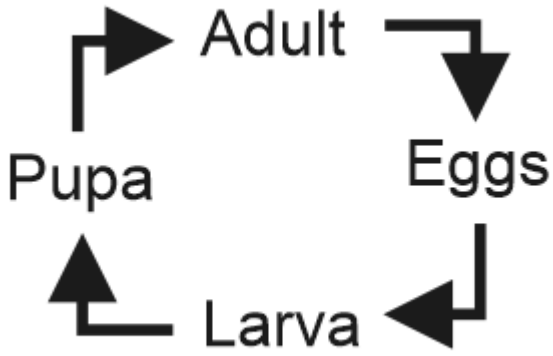
b) Insects undergo metamorphosis. Insects lay eggs which hatch to larvae (maggots) often no resemblance with adults. The larvae become pupa which develops into an adult housefly. The life cycle is shown below.



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4 **a)** What is meant by the term hormone?

b) Describe the function of auxin in plants.

c) Relate the effects of auxins in geotropism.

Associated facts and Solutions

a) A hormone is a chemical substance produced by ductless glands into the body that controls or regulate the activities of certain cells or organs. Many hormones are secreted by special glands such as thyroid hormone produced by thyroid gland. Hormones are directly transported in the blood.

b) The main function of auxin is to help plants grow. They stimulate plants cells to elongate. Auxins are produced in the epical meristem of plants. They also elongate root cells down in the ground and elongate shoot cells up. Auxins help plants grow in girth and repair wounds.

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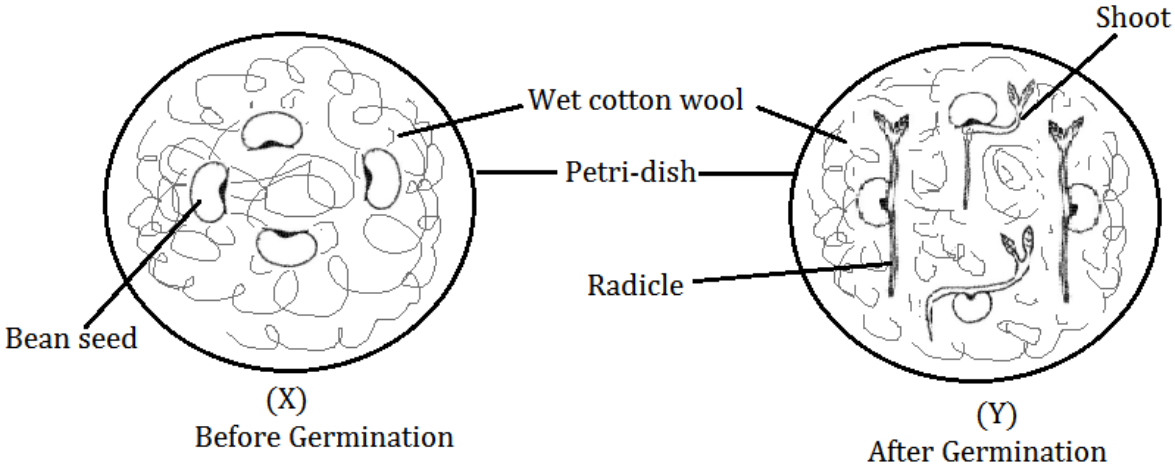
c) Auxin is a plant hormone that regulate cell elongation. Geotropism is the growth response of plants to the pull of gravity.

Growth towards the ground exhibited by roots is known as positive geotropism.

Growth due to geotropism is as a result of changes in concentration of the auxin within the plant cells in roots. Consequently, there is an inhabitation of cell expansion on the lower side producing a curvature of the roots towards gravity.

Illustration can be shown in the experiment below.

1. Place wet cotton in a petri-dish
2. Place bean seeds in the wet cotton, the hilum should face different positions
3. Allow the petri-dish to be put upright position



In your diagram Y the radicles curved towards gravity, while the shoot curved upwards.

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5 **a)** what are the advantages of sexual reproduction over asexual reproduction in flowering plant.

b) Explain asexual reproduction in fungi such as rhizopus takes place.

c) Describe the sequence of events which take place in a flower from pollination to fertilization.

Associated facts and answers

a) Sexual reproduction involves the fusion of male and female gamete (pollen and ovule respectively) resulting into a new offspring consisting of characteristics from both parents.

Asexual reproduction involves raising an offspring from part of the plant tissue e.g stem, bud, tuber, corm etc.

The advantages of sexual reproduction include:

- The new offspring has hybrid vigour i.e can resist some diseases and pests.
- New varieties can be raised which can produce bigger fruits or grain, can withstand hash conditions e.g drought.
- Varieties that can grow fast that is early maturity can be developed.

b) Note that reproduction in rhizopus fungus occurs as sexual and asexual. Asexual reproduction takes place when unfavourable conditions prevail such as drought or hot weather. Fungus is made up of many lipids (upright tubes) in which are lined nuclei throughout its length. The nuclei the migrates to the tip and it swells forming a ball called sporangium. A hypha with a sporangium at its tip is called a sporangiosphore. The nuclei mature and becomes spores.

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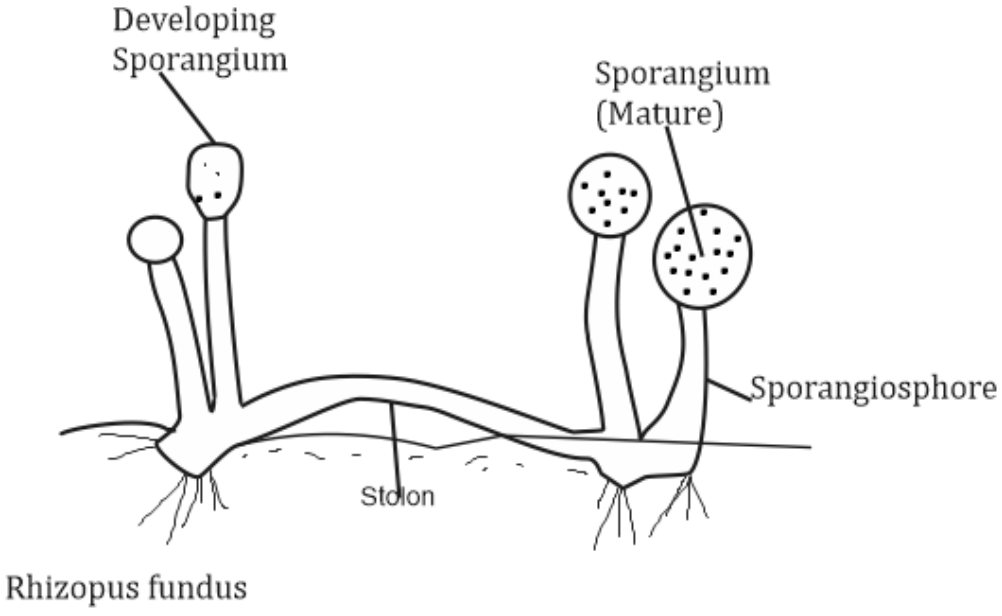
Under favourable conditions sporangium burst and scatter the spores where they meet good conditions e.g moisture, substrate and warmth spores germinate.



c) Pollination occurs when pollen grains are transferred from the anther to the stigma. When a pollen grain lands on the stigma, it absorbs water and germinates to produce a tube. The tube grows down the style to the ovary. The molecule of the pollen grain divides into two to form the tube nucleus and generative nucleus. Tube nucleus goes to the tip of the tube and directs its growth. The generative nucleus divides mitotically two made nuclei and follow the tube, they enter the ovary through the micropyle. Upon reaching the ovary sac the tube nucleus disintegrates leaving a clear passage for the two nuclei. One of the male nuclei fuses with the ovum to form a diploid zygote while the other fuses with polar nuclei to form triploid endosperm. The fusion of male and female

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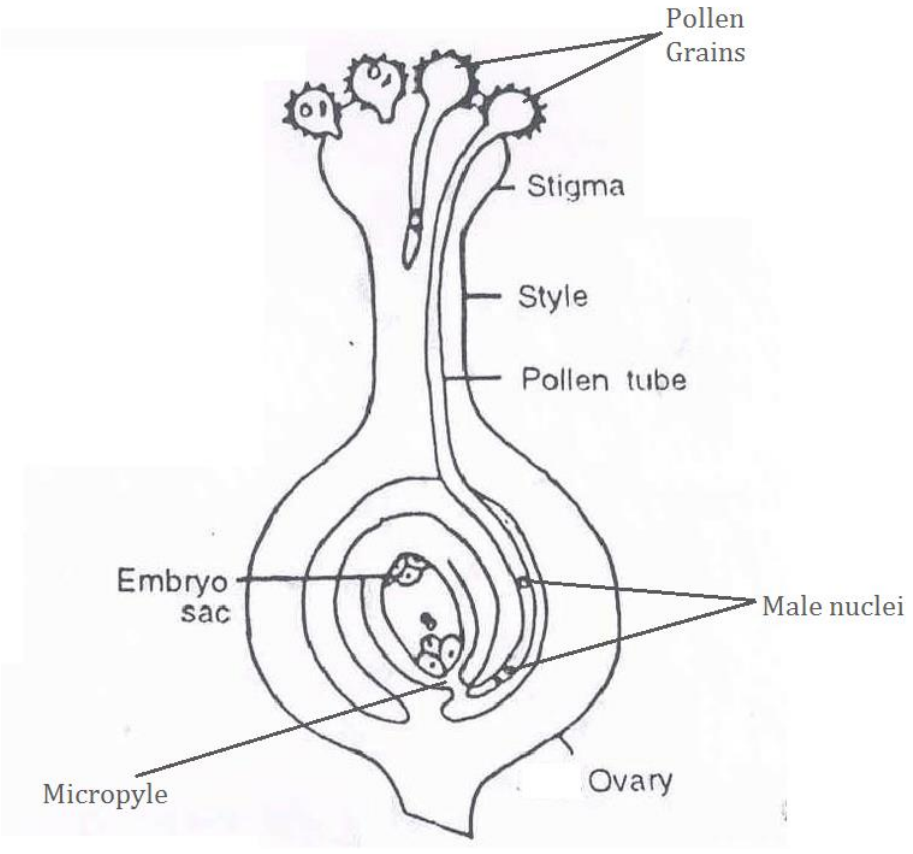
gamete is known as fertilization. Fertilization has taken place hence the development of the embryo and the fruit has begun.

See diagram below



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6 **a)** Using the auxin theory, explain the effects of light coming from one direction on the growth of shoot

b) describe the term taxic response with examples.

<u>Associated facts and answers</u>

a) auxin is a hormone responsible for growth response towards a stimulus in plants. Light being the stimulus and shoots tends to grow towards it. This is known as positive phototropic. Plant growth response towards stimulus is known as tropism. To

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examine the auxin theory, a simple experiment can be done. Put a potted plant that was left in sunlight for 48 hours. Put the potted plant under a carton box with a small hole made on one side. Leave another potted plant to act as a control.

Beginning of experiment

After some time, the result was as shown in the diagram below.

End of experiment

The result seen was that light coming from one side the shoot in the carton box bent towards light while the one for control remained straight. Conclusion could be that shoots grow towards light.

Why does a plant grow toward light from one direction? Auxin hormone moves away from the direction of light. The side on which auxin accumulates grows faster than the direction that has received light. Consequently, the plant bends towards light.

b) Taxic responses

7 Explain the meaning of the following terms:

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(i) Positive geotro-pism

(ii) Positive Phototropism

Associated facts and answers

(i) Geotropism

This is growth movement of part of a plant towards gravity. Auxin accumulated on the lower side of the root which lies on the ground. The high concentration of auxin makes the lower part of the shoot to grow faster while that of the root slower. This result into the shoot to grow away from gravity (negative geotropism), at the same time the root bends towards gravity (positive geotropism)

(ii) Phototropism

This is the growth movement of part of a plant towards a stimulus. When a shoot receives one sided light, light moves towards the dark side. The concentration of auxin on the dark side makes the dark side to grow faster than the side with light. This causes shoot to bend towards light. This is positive phototropism.

8 **a)** Identify causes of infertility in human beings.

b) Describe how a healthy pregnancy can be maintained.

c) Describe safe child birth.

Associated facts and solutions

a) Infertility can be defined as the failure to produce pregnancy.

Cause of infertility can include the following in females:

- Lack of ovulation
- Blocked or damaged fallopian tubes

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- Damaged uterus'
- Anti-bodies to sperms
- Damaged cervix

Causes of infertility in males include

- Impotency (inability to have or maintain penis erection)
- Low sperm count
- Absence of sperm
- Premature ejaculation
- Abnormal sperms (no tail, two tails, no head or abnormal shape)

b) During pregnancy, care must be taken to avoid complications. This can be achieved by the following

- The woman must have adequate and good diet for herself and the developing embryo.
- Must have light exercises, such as walking.
- Must visit anti-natal clinic regularly.

However, the woman must avoid the following:

- Taking any drugs unless under doctors' advice
- Drinking alcohol or smoking (these lead to underweight babies, miscarriage, damage brain to foetus etc)

c) In order to have safe birth the following could be followed:

- Delivery must be taken at the hospital.
- The woman, the attendant and the place of delivery must be hygienically clean.
- There must be health care providers.
- Expectant mothers must be given child health education.

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UNIT 5.0 ECOLOGY, SOIL MICROORGANISMS & FOOD CHAINS, NUTRITIONAL DISEASES OF PLANTS & ANIMALS AND CYCLES.

PAPER ONE (1) Type Questions (Multiple Choice)

1 Which two type of diseases are transmitted through contaminated water?

A Malaria / Bilharzia

B Malaria / Tuberculosis

C Cholera / Tuberculosis

D cholera / Bilharzia

Associated facts and Reasoning

Cholera and bilharzia are transmitted through contaminated water. Tuberculosis is air-borne while malaria is transmitted by Mosquito.

correct answer is D

2 What does the human body produce when live vaccines of measles are injected into it?

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A Antigens

B Antibodies

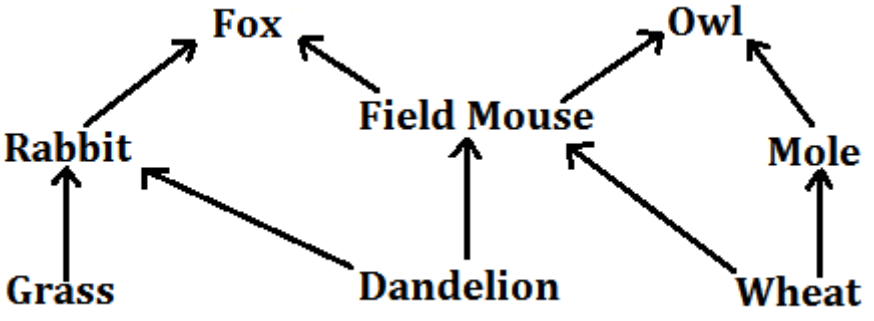
C Antibiotics

D Antiseptics

Associated facts and Reasoning
When vaccine is introduced in the human body, the body produces antibodies. This give immunity against measles antigens make up of vaccine.

Correct answer is B

3 The diagram below shows a food web.



Which organism in the foo web are autotrophic?

A Grass, wheat and dandelion

B Field mouse, dandelion and grass

C Rabbits, grass and field mouse

D Wheat, dandelion and field mouse

Associated facts and Reasoning
Autotrophic means (producer) an organism that makes its own food from light energy using photosynthesis, mostly green plants. They are the base of the food chain.

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Correct answer is A

4 Which of the following process in the nitrogen cycle occurs in water logged soil?

A Ammonia

B Denitrification

C Nitrification

D Nitrogen fixation

Associated facts and Reasoning

In water logged soil, nitrates and nitrites are lost through the process of denitrification, because water logging reduced oxygen in soil.

Correct answer is B

5 The table below shows the oxygen level. Number of plants and fish in rivers flowing through four towns.

Town	Oxygen Levels	Plants	Fish
A	High	Few	Many
B	High	Many	Many
C	Low	Few	Few
D	Low	Many	Few

Associated facts and Reasoning

Micro-organism use oxygen to decompose sewage, as a result oxygen reduces, so aquatic animals such as fish may not survive, however, plants may thrive (use carbon dioxide)

Correct answer is D

6 The table below show four different diets. Which diet would cause an individual to suffer from scurvy and anaemia?

Key

✓ - Nutrition available

× - Nutrition not available

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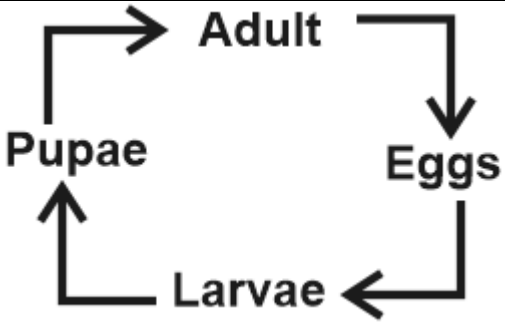
Associated facts and Reasoning

Lack of vitamin C in diet causes scurvy while lack of iron causes anaemia.

Correct answer is A

7 The diagram below shows the life cycle of a mosquito.

	Carbohydrates	Vitamins	Proteins	iron
A	✓	×	✓	×
B	×	✓	✓	×
C	✓	×	×	✓
D	✓	✓	×	✓



Which stage transmit pathogen?

A Adult

B Eggs

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C Larvae

D Pupa

Associated facts and Reasoning

Pathogens are germs that cause diseases. An adult mosquito is responsible for transmitting pathogens. Larvae eat tissues of other organism. Eggs seem to be harmful as well as pupa.

Correct answer is A

8 An organism being examined under a microscope was found to have three body parts and three pairs of leap. To which class of organism does it belong?

A Arachnida

B Arthropoda

C Diplopoda

D Insecta

Associated facts and Reasoning

Insecta is a group of organisms that have a body segmented into three parts (head, thorax and abdomen) and has six leap. It can have wings or no wings. Arachnida these have small head and big abdomen (ticks) and have eight leaps. Diplopoda refers to all insect, spiders which have jointed leap.

Correct answer is D

9 How is bilharzia transmitted?

A Inhaling contaminated air

B Shaking hands with an infected person

C Swimming in contaminated water

D Walking bare foot on water

Associated facts and Reasoning

A parasite that causes bilharzia is known as Schistosome which is a flat worm found in water especially rivers, lakes and dams. One can contract bilharzia if you swim or stand in contaminated water

Correct answer is C

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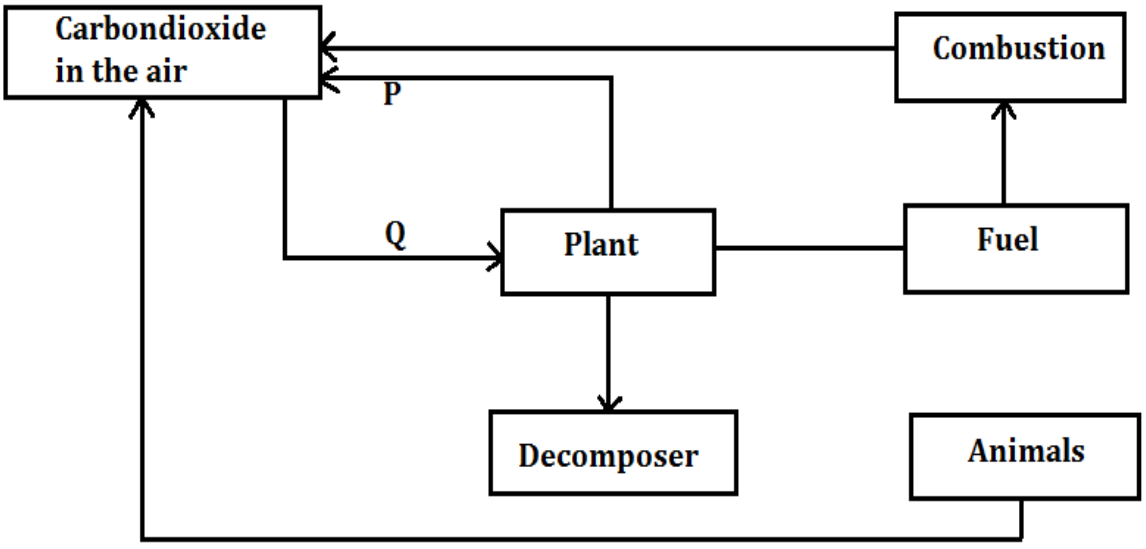
10 The diagram shows the carbon cycle.



What process are represented by P and Q?

	P	Q
A	Photosynthesis	Photosynthesis
B	Photosynthesis	Respiration
C	Respiration	Respiration
D	Respiration	Photosynthesis

Associated facts and Reasoning

Plant use carbon dioxide during the process of photosynthesis which is taking place at Q. however, plants use oxygen at night for respiration in order to break down carbohydrates, which is taking place at P

Correct answer is D

11 Which of the following effect of man on ecosystem is reduced by proper treatment of sewage?

A Acid rain

B Death of fish due to lack of oxygen

C Increasing carbon dioxide in the atmosphere

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D Lack of soil nutrients

Associated facts and Reasoning

Proper treatment of sewage reduces micro-organisms activities on (decomposition) faecal matter. Thereby reducing excessive use of oxygen. This saves life of fish.

Correct answer is B

12 Match the followi0ng diseases with the causative agents.

	Influenza	**Tuberculosis**	**Malaria**
A	Virus	Bacterium	Protozoan
B	Protozoan	Virus	Bacterium
C	Protozoan	Bacterium	Virus
D	Virus	Protozoan	Bacterium

Associated facts and Reasoning

Influenza is caused by virus and Tuberculosis is caused by bacteria, while Malaria is caused by Protozoan

Correct answer is A

13 The diagram below shows the carbon cycle.

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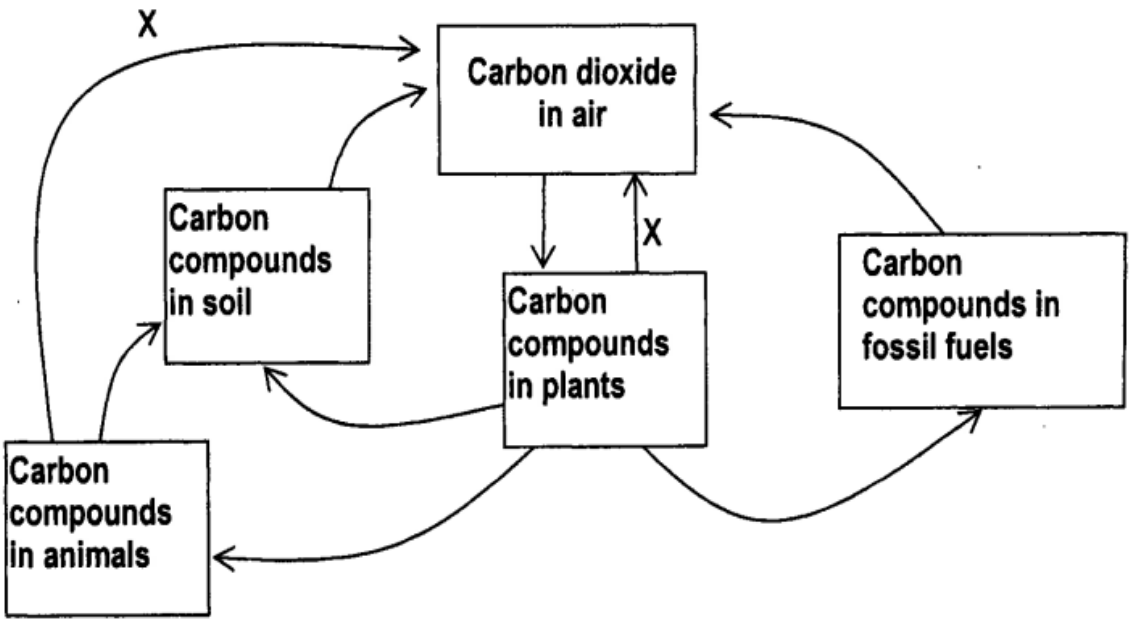

Identify process represented by letter X.

A Photosynthesis

B Decomposition

C Combustion

D Respiration

Associated facts and Reasoning

Plants and animals produce carbon dioxide during the process of respiration. Animals respire throughout while plants respire mainly at night.

Correct answer is D

14 The diagram shows part of the water cycle.

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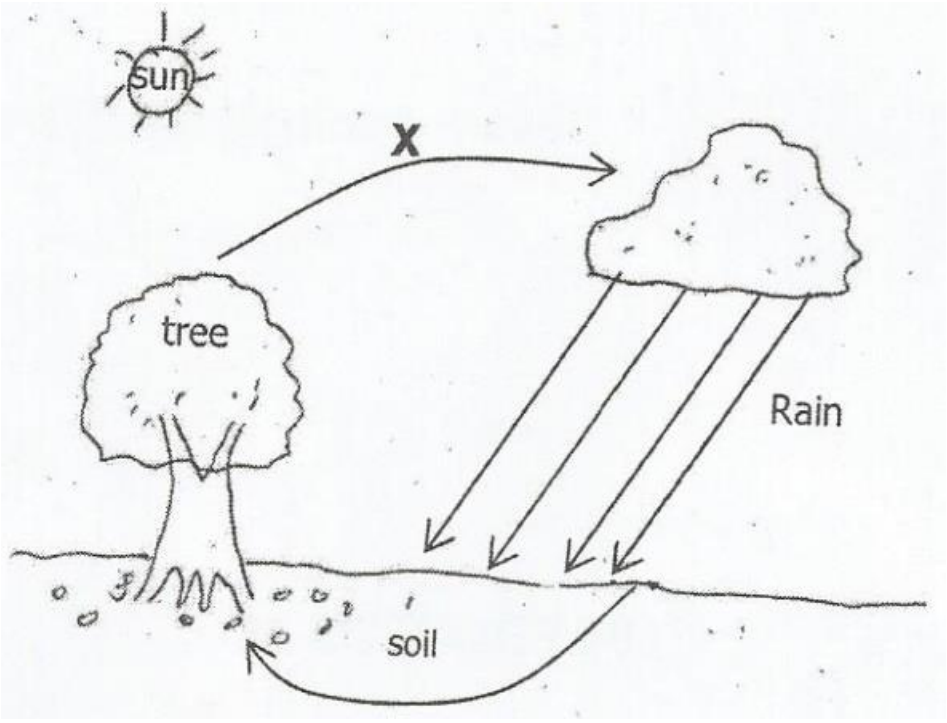

What process is represented by X?

A Condensation

B Respiration

C Translocation

D Transpiration

Associated facts and Reasoning

Loss of water from the plant through stomata of the leaves to the atmosphere is known as transpiration.

Correct answer is D

15 The diagram shows the population of mice on a large farm over a period of five years.

Year	Population size
1	4000
2	4800
3	5200
4	6500
5	500

What could have caused the changes in the population size of mice between the 4th and 5th years?

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A Immunity to disease

B Less pollution

C More predators

D Plenty of food

Associated facts and Reasoning

Less pollution, immunity to disease and plenty of food would cause the population of mice to increase. More predators would decrease the population of mice.

Correct answer is C

16 The table shows soil samples A, B, C and D collected from different fields and their PH are tested.
Which soil sample could be improved by adding lime?

Soil Sample	A	B	C	D
PH	6	7	8	9

Associated facts and Reasoning

- PH 7 is neutral soil does not require liming.
- PH 8 – 9 is alkaline soil (hydroxide). Lime is also hydroxide e.g calcium hydroxide. Lime cannot be added to alkaline soils.
- However, lime can neutralize acid soil such as PH 6

Correct answer is A

17 The following is a simple food chain

Grass ⟶ Rabbits ⟶ Eagle

What could cause the highest increase in rabbits?

A Less grass and fewer Eagles

B Less grass and more Eagles

C More grass and fewer Eagles

D More grass and more Eagles

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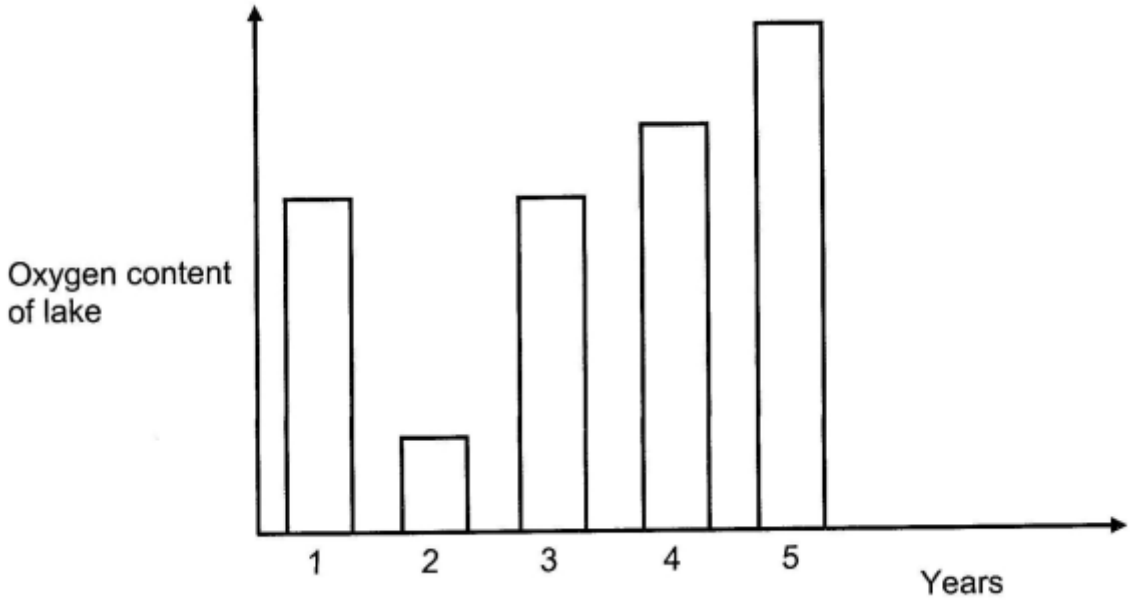
Associated facts and Reasoning

More eagles and less grass would cause a decrease in the number if rabbits. However, more grass and few eagles would cause an increase in the number of rabbits.

Correct answer is C

18 The diagram shows the average oxygen content of a lake during a period of 5 years.



What occurred in year 2?

A Raw sewage was discharged into the lake

B Some weed grew on the surface of the lake

C The lake was stocked with fish

D The use of herbicides on land around the lake was stopped

Associated facts and Reasoning

The high possibility is that some weed grew on the surface of the water due to raw sewage which could have been discharged in the lake

Correct answer is A

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19 Which tow poisonous substances are found in motor exhaust fumes?

A Asbestos and lead

B Lead and nitrogen dioxide

C Nitrogen dioxide and sulphur dioxide

D Asbestos and carbon dioxide

Associated facts and Reasoning

Exhaust fumes consist of poisonous chemicals such as carbon dioxide, sulph+ur dioxide, nitrogen dioxide, shoot etc.

Correct answer is C

20 Which of the following human activities destroy biodiversity?

A Cutting down of trees for settlement and farming

B Creation of forest reserve and game reserve

C Fishing and hunting bans during the breeding season of animals.

D Recycling of products made from natural resources

Associated facts and Reasoning

Forest and game reserves, fishing and hunting bans and recycling of products are human activities aimed at preserving biodiversity.

Through cutting down of trees for settlement and farming appears to be good intention for human survival but are very harmful to biodiversity. Some species of animals and plants die; others have to look for new habitants where adaption is a challenge.

Correct answer is A

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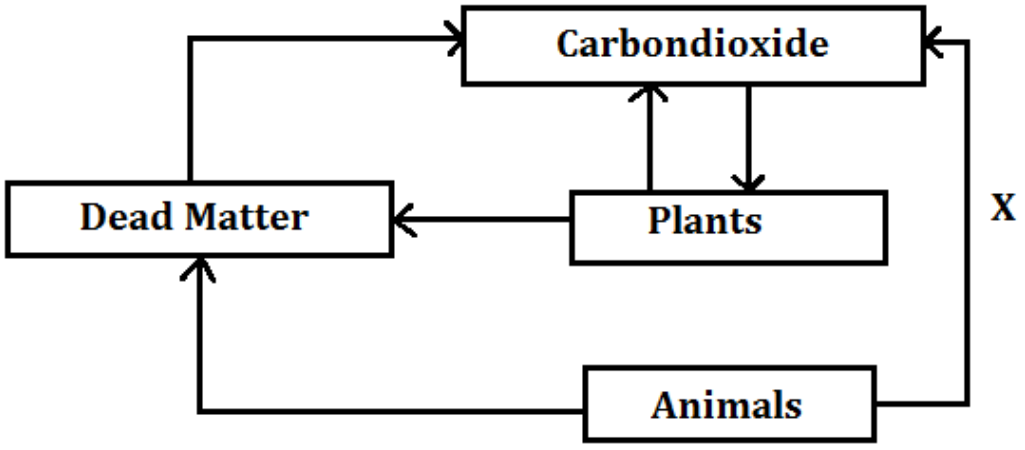
21 The diagram below shows part of the carbon cycle.



What process is represented by the arrow X?

A Decay

B Nutrition

C Photosynthesis

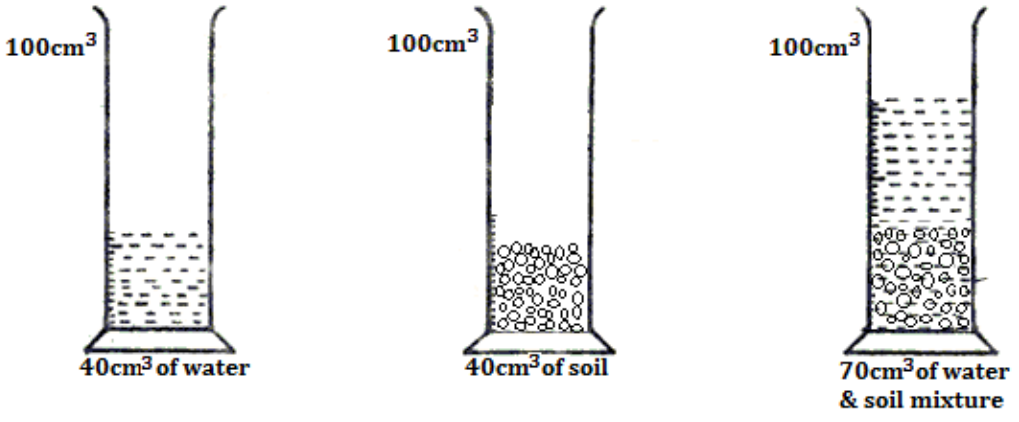
D Respiration

Associated facts and Reasoning

Decay takes place in dead matter which produce carbon dioxide. Photosynthesis is the manufacture of food by plants by using carbon dioxide and water in the presence of light trapped by chlorophyll. Animals produce carbon dioxide during the process of respiration

Correct answer is D

22 The diagram shows an experiment to find the proportion of air in a soil sample.



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What is the percentage of air content by volume of the said sample?

A 10%

B 20%

C 25%

D 70%

Associated facts and Reasoning

In usual arithmetic $40cm^3$ of water

$+40cm^3$ of soil

Should give $80cm^3$ of water/soil mixture

In reality as shown in the diagram above

$40cm^3$ of water

$+40cm^3$ of soil

Should give $70cm^3$ of water/soil mixture

- Where has the $10cm^3$ gone?
- Water has sunk into the pure spaces found in soil, which was occupied by air earlier on. It means water displaced air from the soil. So $10cm^3$ has displaced $10cm^3$ of air. The volume of air is $10cm^3$.
- To calculate the volume by percentage:

  Volume of air = $10cm^3$

  Volume of soil = $40cm^3$

  $$\therefore \frac{10cm^3}{40cm^3} \times 100$$

  $$= 25$$

Correct answer is C

23 The following organisms are found in the ecosystem.

1. Grass
2. Snake
3. Grasshopper
4. Bird'

Which of the following food chains correctly represent the feeding relationship in this ecosystem?

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A 1 – 2 – 3 -4

B 1 – 3 – 4 – 2

C 2 – 3 – 4 – 1

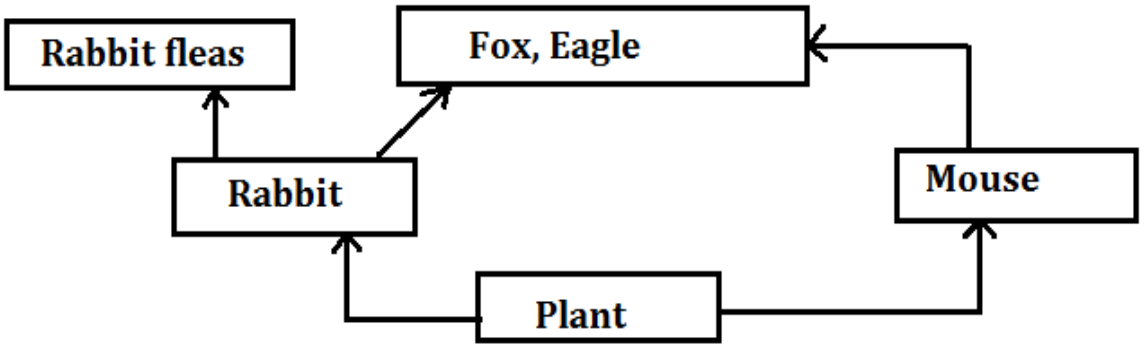
D 2 – 4 – 3 – 1

Associated facts and Reasoning

Grass is producer, where grasshopper feeds on grass, birds feed on grasshopper, and finally snake feeds on bird.

Correct answer is B

24 The diagram below shows a simple food web.



Which one of the following organisms in the food we is the primary consumer.?

A Fox

B Plant

C Rabbit

D Rabbit fleas

Associated facts and Reasoning

Plant is the primary producer. Rabbit which eats plant is the primary consumer.

Correct answer is C

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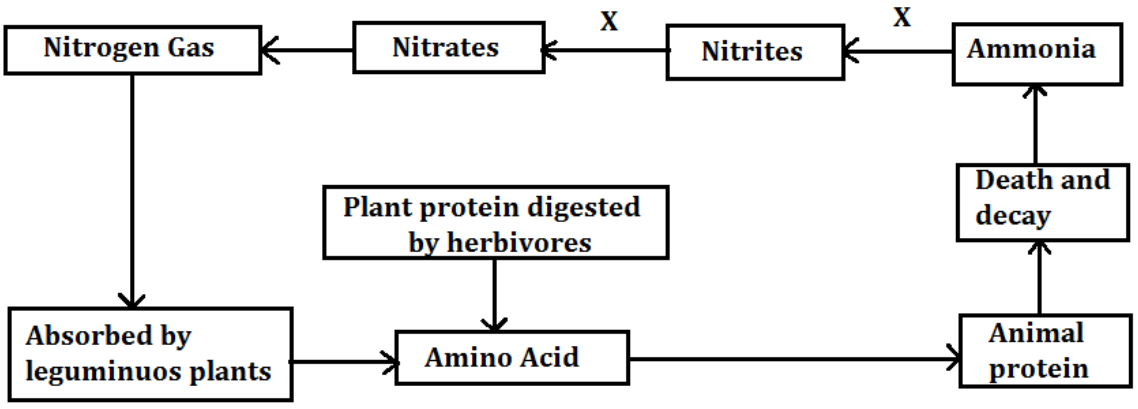
25 The diagram below shows some stages in the nitrogen cycle.



What is process X?

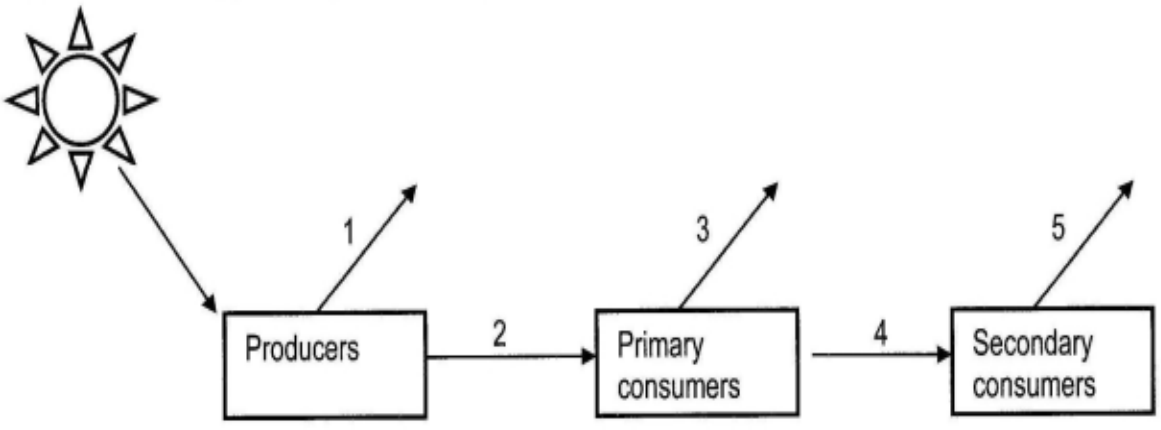
A Denitrification
B Nitrification
C Nitrogen fixation
D Respiration

Associated facts and Reasoning

The process taking place at X is nitrification. Nitrosomonas bacteria changes ammonia to nitrites and nitrobactor changes nitrites finally.

Correct answer is B

26 The flow of energy through an ecosystem is shown.



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Which arrow represent the least amount of energy transferred between organism and the greatest amount of energy lost to the environment?

	Least energy Transferred	Greatest energy Transferred
A	1	4
B	1	5
C	4	1
D	4	2

Associated facts and Reasoning

The flow of energy from the produce to primary consumer is not efficient and constitute 10% only. The greatest loss of energy is at 1. The least transferred is at 4.

Correct answer is C

27 Which of the following diseases is caused by a virus?

A Cholera

B AIDS

C Tuberculosis

D Bilharzia

Associated facts and Reasoning

Cholera and Bilharzia is caused by bacteria.

AIDS is caused by a virus.

Correct answer is B

28 Why is a cholera patient given oral rehydration salt?

A To help prevent dehydration of the body

B To increase antibodies and salt

C To prevent the cholera bacteria from multiplying

D To remove the cholera bacteria

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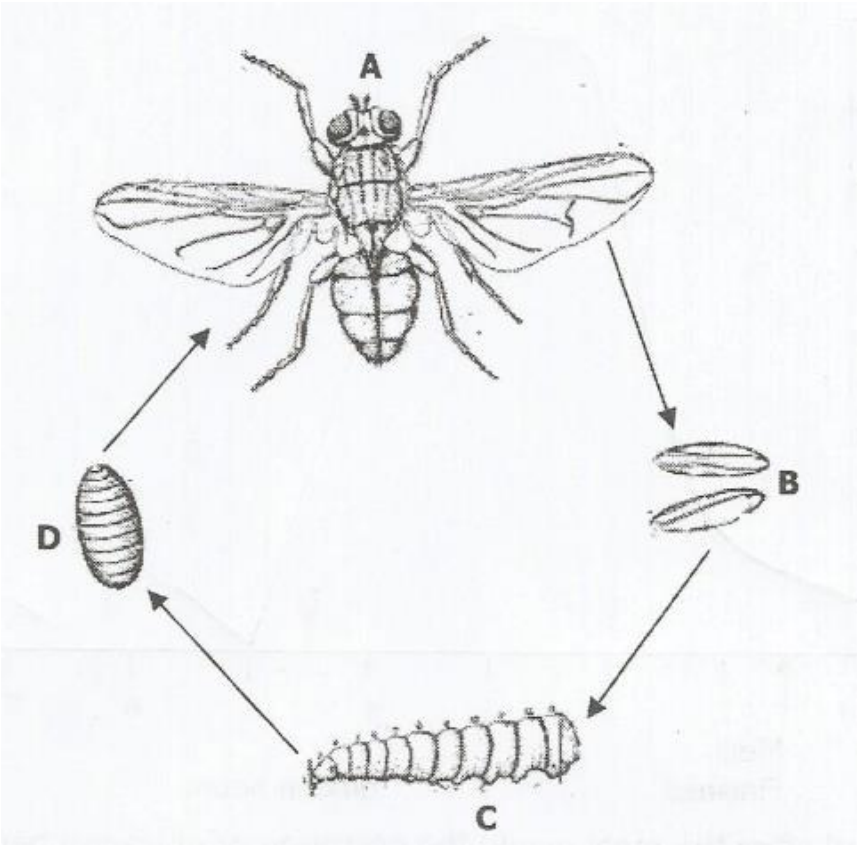
Associated facts and Reasoning

A cholera patient loses a lot of body fluids and salts through diarrhoea and vomiting. This leaves the patient at high risk of dying. To replace fluids and salts, oral rehydration is done.

Correct answer is A

29 The diagram below shows a life cycle of a housefly, which stage spreads the cholera pathogen?



Associated facts and Reasoning

The mobile stage of the life cycle is responsible for spreading the cholera. The adult stage is very mobile and can fly from a contaminated areas and spread the pathogen to other areas.

Correct answer is A

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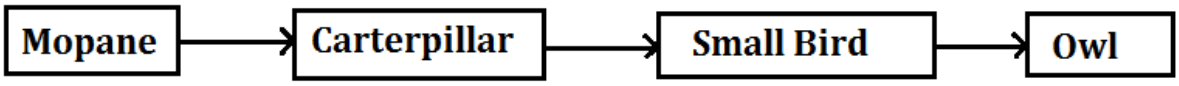
30 The following is a food chain



In this food chain, which population has the largest biomass and which one has the largest population size?

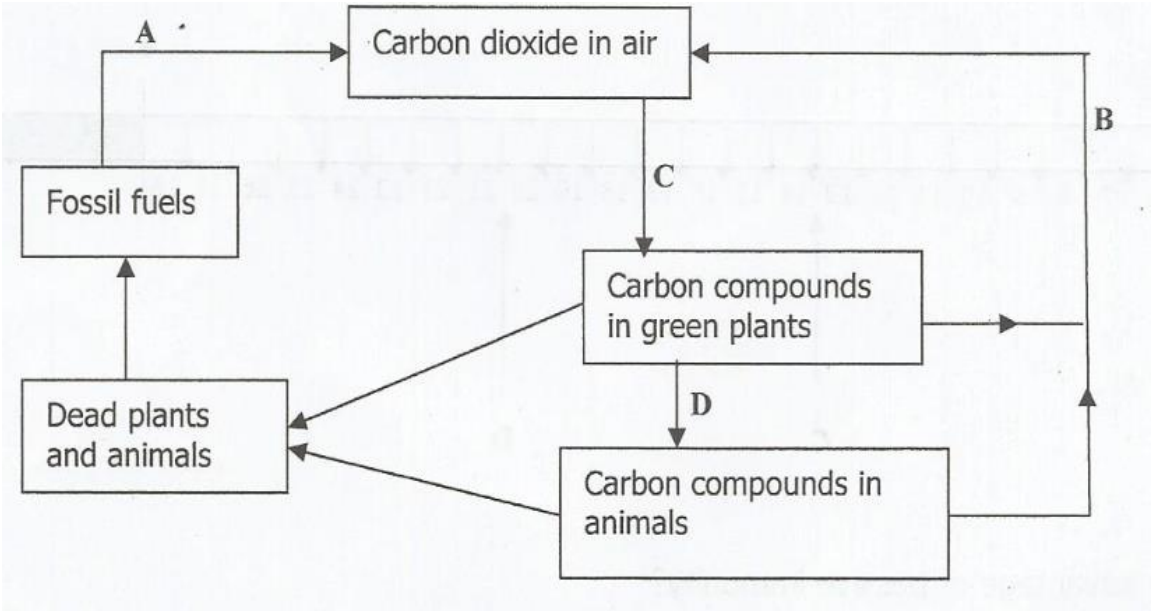
	Largest Biomass	Largest Population
A	Owl	Mopane tree
B	Owl	Small Bird
C	Mopane tree	Caterpillar
D	Mopane tree	Owl

Associated facts and Reasoning

Biomass refers to the biological material derived from living or recently living organisms. In the context for biomass for energy the term is often used to mean plant material, but it can also apply to animal derived material. One insect lays thousands of eggs in breeding season, while birds lay two eggs in most cases. Birds also feed on caterpillar and insects.

Correct answer is C

31 Which part of the carbon cycle involves the release of energy food substances in all living cells?



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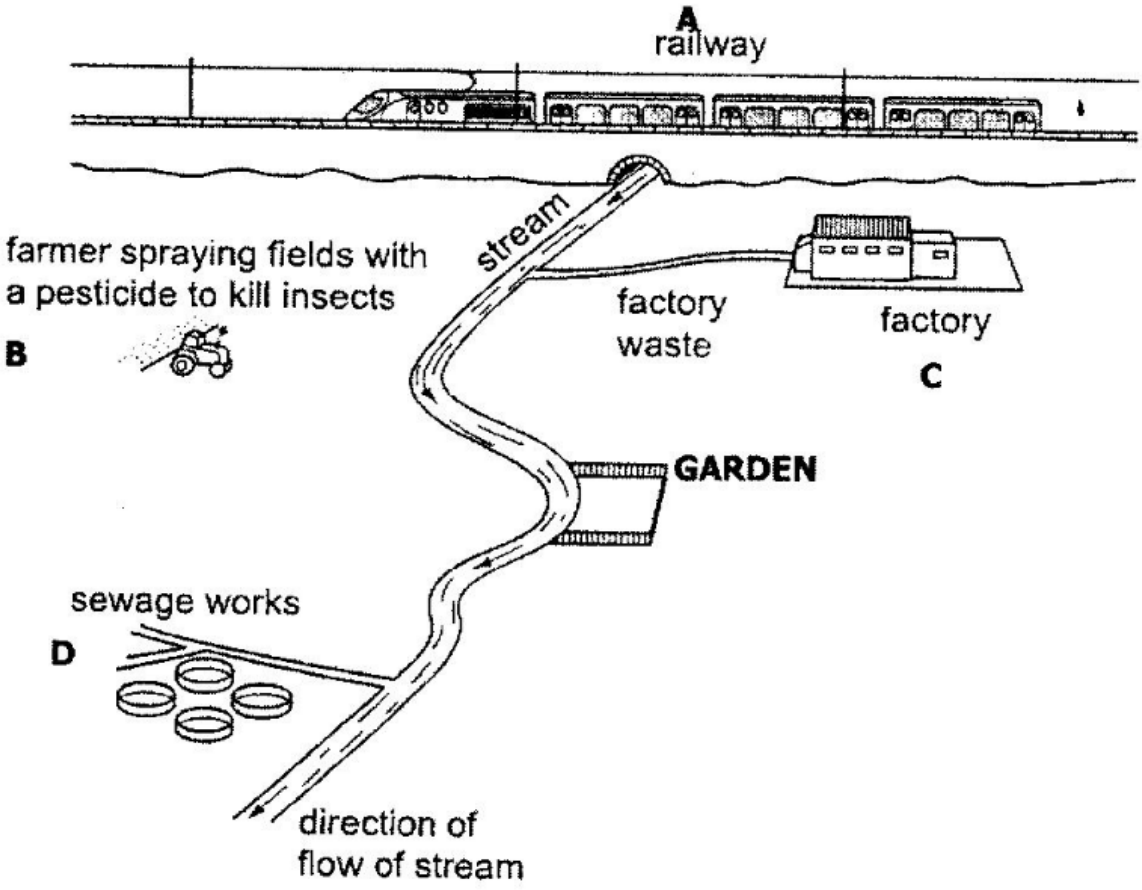
Associated facts and Reasoning

The process that release energy in all living things is respiration. The products of respiration are carbon dioxide and water taking place at B. At A decay is taking place which produces carbon dioxide. At C, Photosynthesis is taking place. At D oxygen from plant is being used by animals.

Correct answer is B

32 A gardener planted some vegetables in a garden on the bank of a stream as shown in the diagram. At first, the vegetable grows well but after a while they die.

Which of the labelled sources of pollution is most likely to have caused the death of the vegetables?



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Associated facts and Reasoning

The exhausted gases from train are released into the atmosphere and blowing wind. Pesticides would kill the living organism in the water. Factory waste is the most likely cause of death to the vegetables. Sewage work have no effects as it is downstream.

Correct answer is C

33 In what ways are houseflies and mosquitoes similar?

A They are both vectors of diseases.

B They are both disease causing agent.

C They both feed on blood.

D The lay eggs on stagnant water.

Associated facts and Reasoning

The two insects do not cause diseases; they simply transfer pathogen from one victim to another. Mosquitoes feed on blood and houseflies feed on food and left over food. Mosquito lay eggs in water but houseflies lay eggs in faeces.

Correct answer is A

34 To which of the following phylum does spiders belong to?

A Nematode

B Arthropod

C Annelida

D Animalia

Associated facts and Reasoning

Spiders belong to the phylum Arthropod. The kingdom is Animalia while the order is araneae and class is Arachnida.

Correct answer is B

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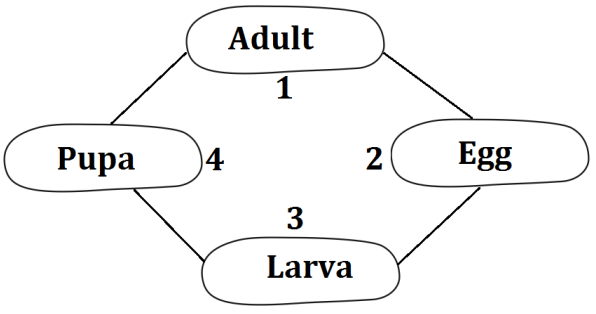
35 At which stage(s) is a biological control must effective in the lifecycle of a mosquito?



A 1 only

B 4 only

C 1 and 2

D 2, 3 and 4

Associated facts and Reasoning
Effective bio control methods include predatory fish which feeds on larvae and pupa.

Correct answer is D

36 Which of the following is an example of natural immunity?

A Production of antibodies after an infection

B Antiseptic tear fluid spread after an infection

C Vaccination against polio in children

D Taking antibiotics after an infection

Associated facts and Reasoning
Natural immunity implies the body defends itself against pathogen.

Correct answer is A

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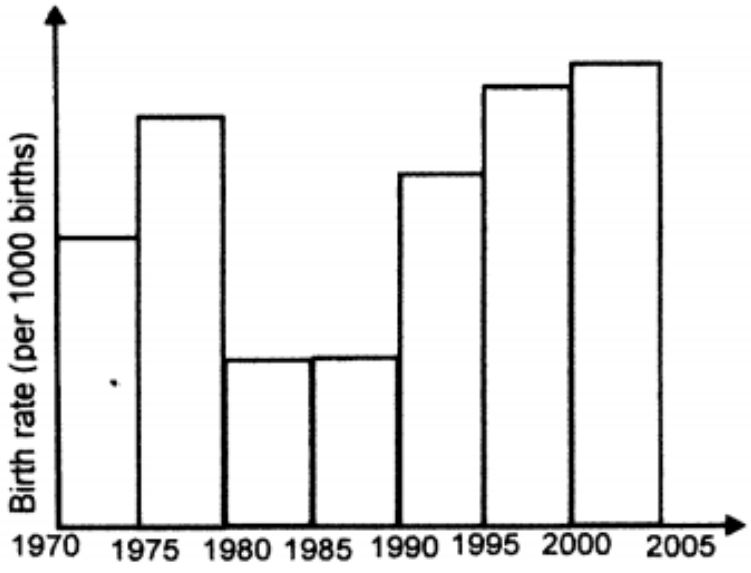
37 The graph below shows the birth rate of human beings every five years.



Which of the following could have been a factor that contributed to the drop in the birth rate between 1980 and 1990?

A Death rate of adults increased

B Death of infant increased

C Growth rate of adult increased

D Growth rate of infants increased

Associated facts and Reasoning

The drop in the birth rate could be due to high death rate of adults. Adults are the ones involved in child bearing.

Correct answer is A

38 Which one of the following is as a result of gene mutation?

A Down syndrome

B Sickle cell anaemia

C Klinefelters syndrome

D Turners syndrome

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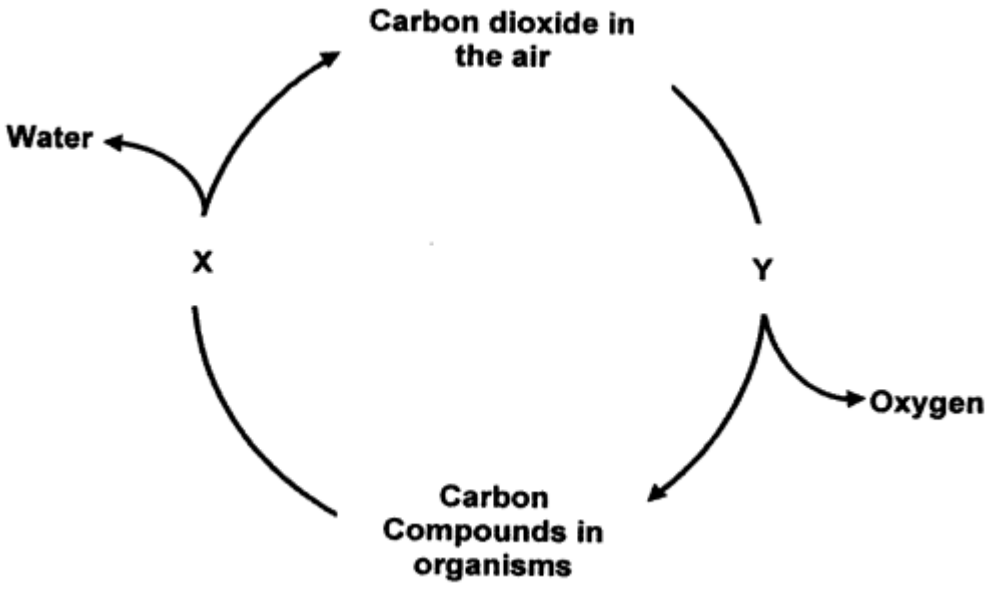
Associated facts and Reasoning

Sickle cell anaemia is a genetic disease. The disease is caused by a mutated version of the gene which helps to make haemoglobin.

Correct answer is B

39 The diagram below shows part of a carbon cycle.



What do X and Y represent?

	X	Y
A	Respiration	Photosynthesis
B	Photosynthesis	Combustion
C	Photosynthesis	Respiration
D	Respiration	Decomposition

Associated facts and Reasoning

The product 'Y' is oxygen. Which means that photosynthesis is taking place. The products at 'X' are carbon dioxide and water. This could be the result of respiration.

Correct answer is

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40 A Eucalyptus tree planted in Europe takes about 100 years to reach a height of 40 meters, while the same tree planted in Zambia takes 20 years to reach the same height.

What is the most likely cause of the difference in the rate of growth?

A Genetic factors

B Mutation factors

C Environmental factors

D Evolutionary factors

Associated facts and Reasoning

The variance in the rate of growth is an environmental factor. The two plants belong to the same species and probably the same genetic makeup. The difference in height is due to environmental conditions such as length of day light, temperature, soil type etc.

Correct answer is C

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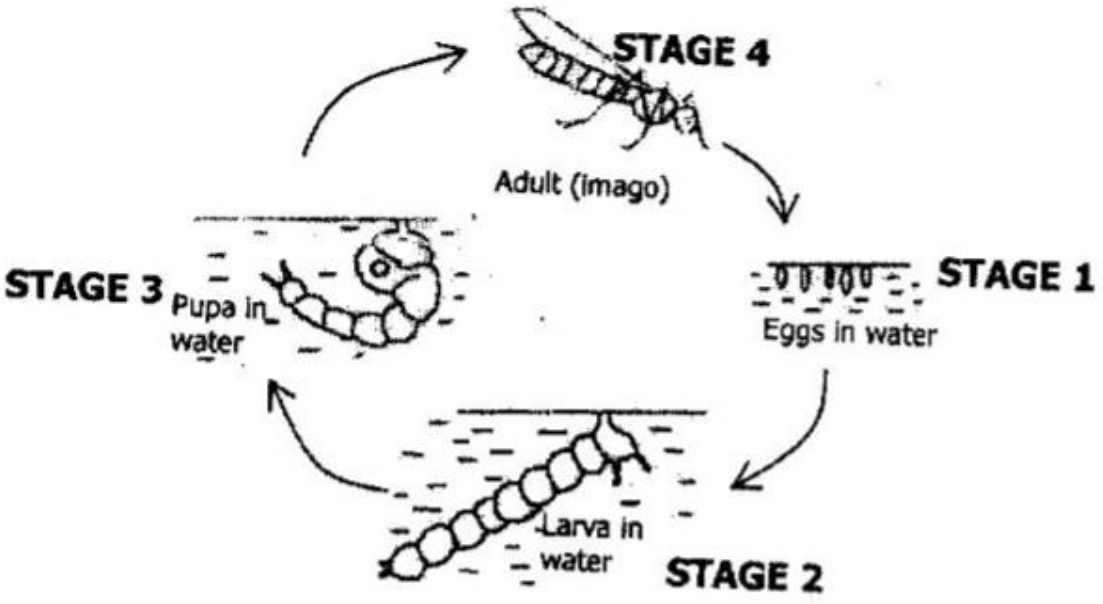
UNIT 5.1 ECOLOGY, SOIL MICROORGANISMS & FOOD CHAINS, NUTRITIONAL DISEASES OF PLANTS & ANIMALS AND CYCLES.

PAPER TWO (2) Type Questions: Section A

1 The diagram below shows the life cycle of a mosquito.



a) (i) identify two stages in the diagram which are most suitable for eradicating malaria.

(ii) For each stage identified in (a)(i) above, state how malaria can be eradicated.

(iii) Suggested two ways in which malaria can be controlled in the community.

b) What term is given to the mosquito based on its role in the transmission of malaria?

c) (i) Define pathogen

(ii) Name the malaria causing pathogen.

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Associated Facts and Answers

b) (i) Stage 1

Stage 2

(ii) Stage 1: Spraying stagnant water with Kerosene or using oil.

Stage 2: Burry shallow water ponds, break tiny bottles that could hold water.

(iii) Way 1: use insecticide treated mosquito nets.

Way 2: Residue spray in residential houses.

b) Anopheles Mosquito

c) (i) Pathogen is any organism that causes a disease.

(ii) Plasmodium

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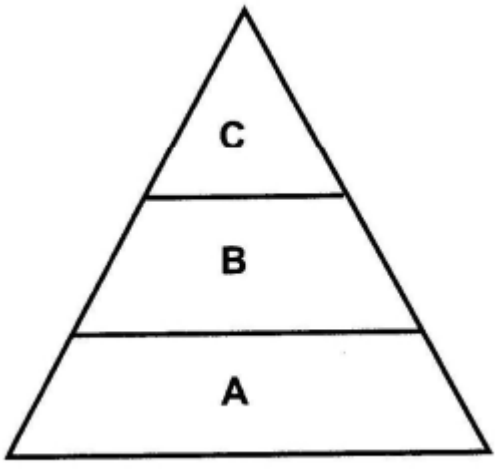
2 The diagram below shows a pyramid of biomass



a) (i) identify trophic level B and C

(ii) State the name given to the organism that feed at trophic level C and B.

(iii) Explain why level C s much smaller than the other levels.

b) Describe the flow of energy in the pyramid.

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Associated facts and Answers

a) (i) Trophic level B: Primary Consumer.

Trophic level C: Secondary Consumer.

(ii) Trophic level B organisms: Herbivores (Note that they eat produce which are mainly plants or green vegetation.

Trophic level C organisms: Carnivores

(iii) The lower of the trophically support the higher members in terms of their food and energy requirements.

Producers must have a higher rate number of reproduction than their consumers. This ensures continuity in the flow of energy and survival of organisms in various trophic levels.

b) Producers are mainly photosynthetic organisms which mainly refers to plants. These get their energy from the sun during the process of photosynthesis where food such as starch is manufactured.

Producers will use some of this energy for their own functions and partly stored. The remainder is supplied to other consumers in the food chain. The flow of energy from one level to another in the food chain in the pyramid diminishes. It is stated that only 10% of energy is released from one lever to the next.

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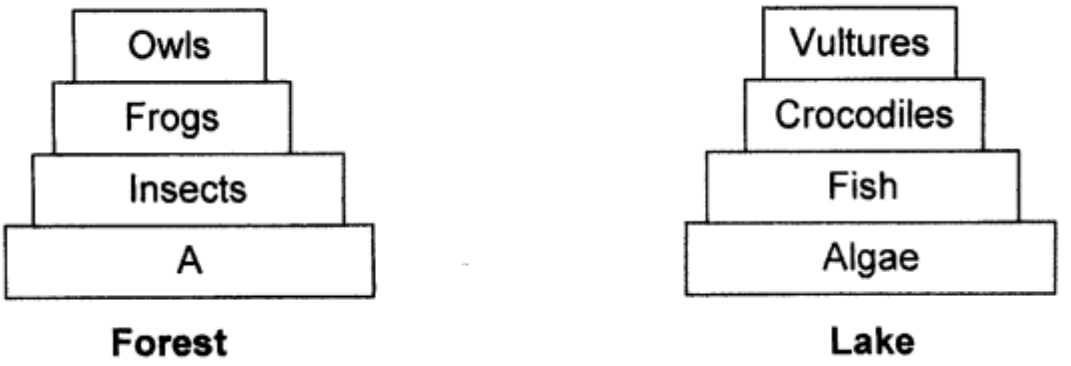
3 The diagram below shows pyramids of food relationship among organisms. Its forest and a lake.



a) (i) Identify the organisms found in the trophic level labelled A of the forest pyramid.

(ii) What if the population of insect in the forest pyramid was reduced?

b) (i) What is the ultimate source of energy to both pyramid?

(ii) Explain the differences in energy between trophic levels as you go up the pyramid.

c) Traces of DDT on a nearby dam were washed by rain in the lake and were taken up by algae.

Why was there more DDT in organisms in fourth trophic level than those in the first level?

<u>Associated Facts and Answers.</u>

a) (i) Plants

Reasoning: plants are recognised as producers and fall under the base of the pyramid for most living things on Earth.

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(ii) Reduction in insect population would cause shortage of food and energy for the higher pyramid level i.e. frogs would scramble for limited resources.

Reasoning: the lower level in the pyramid should outnumber the higher level in order to sustain them.

b) (i) >Sun

Reasoning: Both ecosystem of the two diagram depend on solar energy. The producers kick starts the whole process by manufacturing food through photosynthesis and pass on to another level in the pyramid.

(ii) The flow of energy from the producer to primary level is inefficient where only 10% is passed on. The same applies to secondary and tertiary level. Each level uses most of the energy for its purpose such as respiration, excretion, metabolic activities etc. therefor the end use of energy gets the least portion, though adequate for utilisation.

c) The population in the higher level in most cases is less than that in the lower level. The same amount of DDT was shared among a large population. So each member got a little that was available. However, the higher level (with small population) had a lot of food from the lower level as a result each member consumed a lot of DDT.

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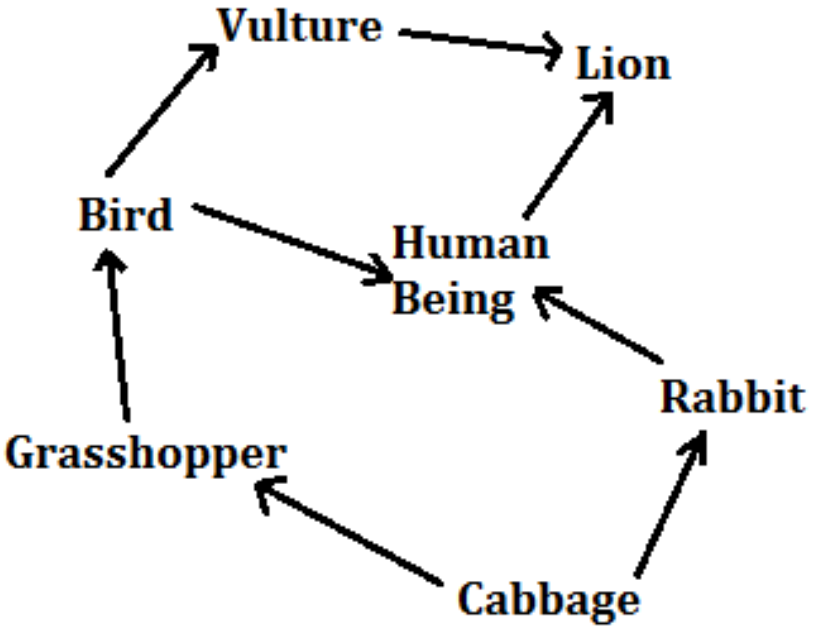
4 The diagram below shows a food web in a given ecosystem.



a) (i) Identify any primary consumer.

(ii) Construct a food chain using three organisms from the diagram above.

(iii) Using the food chain in (a)(ii) above, construct a pyramid of energy

b) Distinguish between a food chain and a food wed.

c) Explain why organisms at the end of the food chain have least amount of energy?

<u>Reasoning and Answers</u>

a) (i) A primary consumer is an organism that feeds direct from the producers.

Answer: Rabbit or Grasshopper

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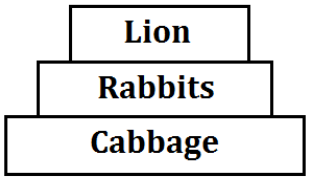
(ii) Food Chain

Answer: Cabbage ⟶ Rabbit ⟶ Lion

(iii) Pyramid Energy



b) A food chain is a sequence flow of energy from one trophic level to another and from producers to consumers through eating and from being eaten. A food wed is a where many food chains exist in an ecosystem. Food chains can be linked at different trophic levels forming what is known as a Food web.

c) Nature has it that the population at the lower level must be higher than that at a higher level. Transfer of an amount of energy at each level to the higher level reduces.

Reduction is as a result of utilization of energy at each level by organisms. Consequently, less energy is transferred to the next level so on and so forth. The top most organisms receive the least amount of energy. This does not mean that the top most trophic level is starved of energy. The energy they receive meet their demand.

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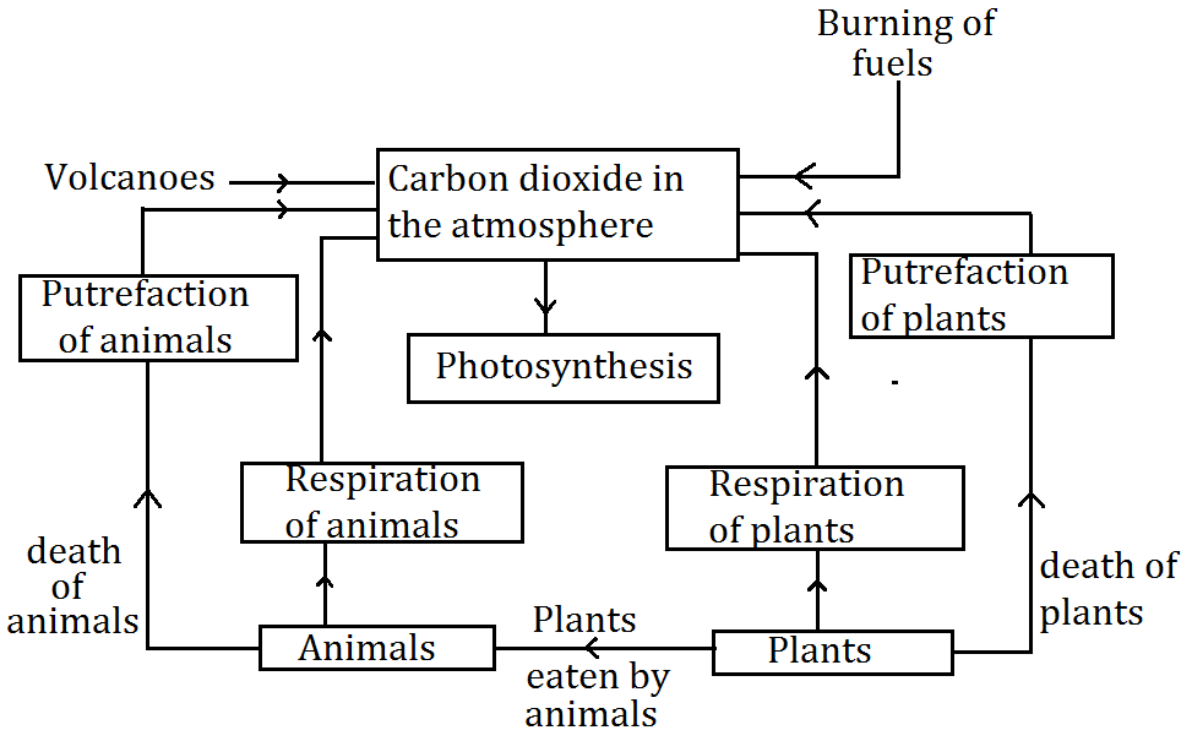
SECTION B TYPE QUESTIONS (ESSAY QUESTIONS)

1 **a)** With the aid of a labelled diagram, describe the carbon cycle.

b) discuss the effect if deforestation on carbon cycle.

<u>Reasoning and Answers</u>

a)



b) Forest use most of the carbon dioxide in the atmosphere to produce food and oxygen both required by animals. Deforestation will make the carbon dioxide to accumulate in the atmosphere. Carbon dioxide as one of the greenhouse gas is jointly responsible for global warming and climate change.

Forest are a source of raw materials for timber, farming, boats, firewood, charcoal etc. Deforestation affects the economy as many

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industries would come to a halt. Poverty would spread together with hunger, disease, prostitution.

Other industries that can be affected are those that deal in tannin, resin, rubber, pulp.

Forest provide habitation for animals and micro-organisms which are of biological importance. Deforestation disturbs natural habitat to the point of losing wildlife as they can no longer survive under new conditions while others will migrate to new areas. The ecosystem is greatly affected.

Deforestation causes soil erosion, soil becomes poor and unproductive. The effects are many and varied, they cannot all be covered.

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2 **a)** Explain what is meant by the term biodiversity.

b) Describe the importance of biodiversity to humans.

c) Discuss factors that are responsible for the loss of biodiversity.

Reasoning and Answers

a) -Biodiversity is the sum of all the variation in nature, the kind and number of species.

- This include diversity between species and within species of the ecosystem.
- It refers to the variety of plants and animals in the world.
- These are the terrestrial, marine and other aqua ecosystem and the ecological complex of which they are part.

b) Biodiversity is important to humans. Each species has a role to play in the ecosystem (this is called a niche). No matter how small or big

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it maybe. When one specie goes extinct, many other species existence is at stake. We are not separate from nature, the consequence for people are the same

Humans benefit in the following ways from the ecosystem:

- Stabilizes climate
- Cleans water for drinking
- From crops produce fruits, which are pollinated by insects
- Medicine resource
- Protection from soil erosion
- Firewood, timber
- Meat as a source of proteins
- Biodiversity increases our mental wellbeing.

c) Habitant destruction is responsible for loss of biodiversity. Humans are the centre of this destruction with a small portion attribute to natural factors. Human factors include:

- Deforestation (timber, charcoal etc.)
- Over population
- Pollution (industries)
- Land clearing for farms, settlement, road and airport construction
- Global warming
- Wars
- Mining
- Climate change

Animals, plants living in oceans, forest deserts have been affected by habitant destruction.

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3 **a)** Explain the term immunity to disease

b) Distinguish between active immunity and passive immunity, giving one example in each case immunity, giving one example in each case.

c) Discuss how immunity to disease is reduced.

Reasoning and Answers

a) The term immunity implies the state of being immune especially a condition of being able to resist a particular disease especially through preventing development of a pathogenic micro-organism or by contracting the effects of the products.

b) Active immunity

This is developed when body cells of an individual produce antibodies in defence to infections or vaccine.

Active immunity last long. It does not have side effects. Its real efficiency is felt after a long time.

A good example of active immunity comes from the mother's milk which is rich in antibodies which give the baby its first immunity.

Passive Immunity

This is when antibodies produced in other organisms are introduced into an individual to counter antigens like those of a spider bite poison.

Unlike the early immunity:

- It gives immediate relief.
- It may cause side effects
- It does not last longer than (once it gives relief its excreted)

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A good example of passive immunity is the slain. It prevents organisms from evading the body.

c) An immune deficiency disease occurs when the immune system is not performing properly. This means an individual has a weak immune system, thus failure to defend the body from diseases.

Factors that lower immunity includes:

- When immunity soldiers are interfered with there is a reduced immunity.
- Stress causes weak immunity. The fight against pathogen is reduced

A weak immune system can easily sarcum to colds, viruses, often sick and tiredness.

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4 **a)** Describe how nitrogen is cycled within the ecosystem.

b) Describe the importance of each of the physical components of soil.

Reasoning and Answers

a) Recall that consists of processes which continually gets used up and replenished naturally.

- Nitrogen is taken up by plants and other organisms straight as nitrogen gas. It has to be converted into nitrogenous compounds e.g Nitrates.
- Note that nitrogen cycle consist of two sides.
    - Process that change nitrogen gas into nitrates and
    - Process that changes nitrates into nitrogen.

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- Three processes exist that converts nitrogen gas to nitrate. These include:
    - Ammonification: where bacteria decomposes plants and animal remains into ammonia and ammonium compounds.
    - Nitrification: where other bacteria converts ammonium compounds into nitrates. The bacteria involved in such reaction are nitrobacter and nitrosomonas.
    - Nitrogen filtration occurs in the soil where bacteria converts nitrogen gas into compounds.

      This process is carried out by bacteria such as Azotobacter and clostridium.

      The other bacteria Rhizobium living symbiotically with legumes plants work together to change nitrogen gas into nitrates.
- The other process that takes part in fixing nitrogen gasses into nitrates is lightening. Nitrogen gas combine with oxygen to form oxides of nitrogen, which combine with rain water to form nitric acid. Nitric acid combines with metals in soil to form nitrates.
- To complete the cycle, the opposing process which converts nitrates into nitrogen gas is known as ***denitrification.***
- This is carried out by anaerobic bacteria known as pseudomonas denitrificans.

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b) The physical components of soils include:

- Mineral salts
- Organic matter

- Sand and silt particles are inert. They cannot be decomposed, i.e they don't supply nutrients to plants.
- However their irregular shape leaves spaces between them to be occupied by air and water. Their surface is covered by clay particles, bacteria, humus and salts
- Clay particles are negatively charged and carry positively charged metallic ions such as potassium, calcium and magnesium.
- Clay is a viable source of these ions which are needed by plants. Clay also help to retain water held by capillary attraction between particles.
- Organic matter is another physical component of soil. It also known as humus.
- Organic matter is derived from dead and decaying plants, animals and micro-organisms. Organic matter is important in the following ways.
    - Helps to glue sand, clay together to form a crumbs i.e it improves soil structure.
    - Improves water holding capacity (water retention) since humus absorbs water
    - Improves micro-organism content in the soil as humus attract micro-organisms.

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- Improves air content as the as the soil opens up.
- Improves nutrients content as the organic matter contains nutrients.
- Soil texture is improved making it easier to work on.

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5 **a)** Explain the term population.

b) Discuss factors that cause changes in population.

Reasoning and Answers

a) *Population* can be defined as: individuals (organism usually) belonging to the same species with a community.

It can be population of humans, animals or plants of the same species living in a given area.

Note that population will include: adults, youths and babies both male and female.

It can be pointed out that population is never evenly distributed, depending on available economic resource. In towns where industries are found, population is higher than in rural areas. In rural areas also population changes from one place to the other.

b) The following factors can cause change in population size

- Birth rate
- Death rate
- Migration

Birth rate / Death rate

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- Birth rate is defined as the number of birth in a total population in one thousand.
- Death rate (mortality) is the number of deaths in a total population in one thousand.
- When birth rate exceeds death rate, the population tends to increase. However, if the number of death exceeds the number of birth rate, population decreases.

Migration

- Migrations involves movement of individuals or groups from one place to another. There are two types of migrations, namely immigration and emigration.
- Immigration is movement of organisms into the population. Factors that compel people into the population include:
    - Job opportunities
    - Amenities (e.g hospitals, schools, markets, food availability.)
    - Electricity
    - Water
    - Good road network and other forms of transport i.e rail, air or boats
- The above increases population.
- Emigration is the moving out of an individual or a group from a population i.e emigrant. Factors which causes emigration include:
    - Poverty
    - Climate change e.g drought
    - Disease

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- Disasters (earthquakes, floods etc)
- Civil wars
- Lack of space for farming and or grazing

The above are known as push factors and tend to reduce population

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