CHAPTER 6

Life Processes

EXAM DRILL

ANSWERS

1. The end products of anaerobic respiration are lactic acid and energy.
2. No, the root hair is the extension of epidermal cell.

3(i) Animal T could be *Amoeba*.

3(ii) Tracheal respiration

3(iii) **(a)** : Fish always live in water and has gills for respiration.

3(iv) **(b)** : In earthworms, exchange of gases occurs through skin which is thin, moist, vascular and permeable. This type of respiration is called cutaneous respiration.

4(i) The digestive juices P, Q and R are saliva, gastric juice and intestinal juice respectively.

4(ii) 1-Mouth, 2-Stomach, 3-Small intestine

4(iii) **(b)**

4(iv) **(b) :** Gastric juice (Q) contains dilute HCl, mucus, rennin and pepsin. Pepsin gets activated in an acidic medium and acts upon the proteins to convert them into peptones.

5. Coronary arteries

OR

Tissue fluid or lymph transports fatty acids and glycerol from small intestine to blood.

6. **(b) :** Parasitic mode of nutrition is found in *Taenia* (tapeworm).

OR

(d) : The blood platelets are responsible for blood clotting of injured body parts.

7. **(a) :** Stomatal transpiration is the most common and important type of transpiration. About 80–90% of water is evaporated through stomata.
8. **(a) :** Plasma is the basic water part of blood which is composed of clotting factor fibrinogen while serum is a part of blood which lack clotting factor or fibrinogen.
9. **(c) :** The digestion of the food starts in the mouth by the enzyme present in saliva *i.e.*, salivary amylase. It acts in slightly alkaline medium and breaks down starch (carbohydrate) into maltose and isomaltose.

OR

(c) : The process of removing non-gaseous nitrogenous waste along with excess of water, salts and pigments out of body is called excretion. By this process body maintains the composition of body fluids. The correct path of urine in our body is as follows :

Kidney → Ureters → Urinary Bladder → Urethra.

10. **(a) :** Glomerulus is a tuft of capillaries. Blood enters the glomerulus through an afferent arteriole and leaves it through an efferent arteriole. The glucose is filtered out of blood in the glomerulus while in proximal convoluted tubule, glucose is reabsorbed and return it to the blood, so glucose concentration in the tubule declines.
11. **(c) :** In photosynthesis, the production of glucose involves the reduction of carbon dioxide to carbohydrate (glucose). In this process, light energy is converted to chemical energy after its absorption by chlorophyll.
12. **(c)**
13. **(a)**
14. **(c) :** Small intestine is the principal organ for absorption of nutrients. The digestion is completed here and the final products of digestion such as glucose, fructose, fatty acids, glycerol and amino acids are absorbed through the mucosa into the blood stream and lymph. Absorption of water, simple sugars and alcohol, etc., takes place in stomach. In larger intestine, absorption of water, some minerals and drugs takes place.
15. Fish has venous heart. The heart which always contain deoxygenated (impure) blood is called a venous heart. It represents single blood circulation, as the blood passes only once through the heart during a single cardiac cycle.
16. Human heart is four chambered consisting of two atrium and two ventricles. In humans, deoxygenated blood from the body tissues is poured into right atrium.

Contraction of heart forces it into right ventricle. From right ventricle, deoxygenated blood flows to the lungs through pulmonary artery. Oxygenated blood from lungs is returned into left atrium and then into left ventricle. The left ventricle forces the oxygenated blood to the whole body. Thus, for making one complete round or circulation circuit around all body parts, the blood passes through the heart twice. This is known as double circulation of blood.

17. In small intestine, food is mixed with three digestive juices-bile juice of liver; pancreatic juice of pancreas and intestinal juice of intestinal glands. Bile juice neutralises the acidity of the food coming from the stomach and provides alkaline medium and emulsifies (breaks down with the help of bile salts) larger fat globules into smaller fat droplets but is a non-enzymatic digestive juice so has no chemical action on food.

Pancreatic juice contains a number of enzymes like trypsin, pancreatic amylase and pancreatic lipase, which digest the peptones, starch and fats into peptides, maltose, isomaltose and fatty acids respectively.

$$\text{Fats} \xrightarrow{\text{Lipase}} \text{Fatty acids} + \text{Glycerol}$$

Intestinal juice also contains number of enzymes like aminopeptidase, intestinal amylase, maltase, isomaltase and lipase enzymes which hydrolyse peptides to amino acids, starch to maltose, maltose to two glucose, isomaltose to two glucose and fats to fatty acids and glycerol.

So, small intestine is the site of the complete digestion of carbohydrates, proteins and fats.

OR

(i) Xylem is a specialised plant conducting tissue that transports water and minerals from roots to all aerial parts of plants which occurs against gravitational force with the help of ascent of sap.

(ii) Phloem transports food that is prepared in the leaves, through photosynthesis, to various parts of plant. This process is called translocation. Phloem also transports amino acids, hormones synthesised in the shoot tips and root tips and other metabolites.

(iii) Aorta transports oxygenated blood from left atrium to systemic arteries which further take the blood to various body parts and organs.

(iv) Pulmonary vein present in human transport system brings oxygenated blood from lungs to the left atrium of heart.

(v) Vena cava transports deoxygenated blood collected by all veins of body except pulmonary vein and passes it to the right atrium of heart.

(vi) Pulmonary artery transports deoxygenated blood from right atrium of heart to lungs for oxygenation.

18. In plants, respiration occurs in day as well as in night. However, photosynthesis does not occur at night and CO_2 elimination is the major exchange activity going on. During the day, the rate of photosynthesis is faster than respiration thus, CO_2 generated during respiration is used up for photosynthesis, hence there is no CO_2 release. Instead, oxygen release is the major event during daytime. Therefore, we agree with the statement that, all plants give out oxygen during day and carbon dioxide during night.

19. Differences between light and dark phases in photosynthesis are as follows:

S. No.	Light phase	Dark phase
(i)	It occurs over thylakoids.	It occurs in matrix of chloroplasts.
(ii)	The phase is dependent on light.	The phase does not require light.
(iii)	Temperature has little effect over it.	It is influenced by temperature.
(iv)	It produces NADPH and ATP (assimilatory power).	It consumes NADPH and ATP.
(v)	Oxygen is evolved.	Glucose is the end product.

OR

Platelets are tiny, flat and non-nucleated fragments of the cells. They are simply bits of protoplasm, bounded by a membrane and contain a few cell organelles and secretory granules in the cytoplasm. When an injury is caused, the blood platelets release certain chemicals which are called the platelet factors (*e.g.*, thromboplastin). The platelet factors help in the clotting of blood. Thus, in the absence of platelets, clotting of blood will be affected.

20. Leaves are the main sites of photosynthesis. They undergo different adaptations for photosynthesis. These are as follows :

(i) Expanded lamina - It provides larger surface area for the maximum absorption of light by the leaves.

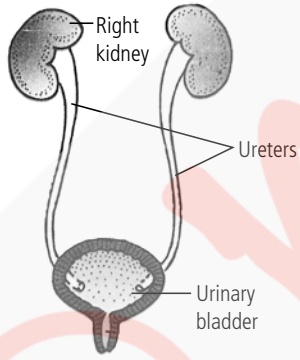
(ii) Presence of stomata - Numerous stomata are present in the epidermis of leaf for efficient exchange of gases by the means of opening and closing of guard cells.

(iii) Orientation towards light - The leaves are oriented at 90° towards the direction of the sun so as to get the maximum light.

(iv) Presence of chloroplast - They are present on both the surfaces. However, on the upper surface they are found in large number for the maximum absorption of light.

(v) Extensive network of veins - The extensive network of veins enables quick transport of the material to and from the mesophyll cells.

21. The diagram of human excretory system is shown below:



OR

Differences between blood and lymph are as follows:

S.No.	Characteristic	Blood	Lymph
(i)	Colour	Red in colour	Colourless
(ii)	Components	Consists of plasma, erythrocytes, leucocytes and platelets. Contains several plasma proteins and high concentration of calcium and phosphorus.	Consists of plasma and leucocytes only. Contains fewer plasma proteins and low concentration of calcium and phosphorus.
(iii)	Direction of flow	Path of circulation is heart to body organs and from body organs back to heart.	Path of circulation is body tissues to heart.

22. Osmoregulation is the process of regulating the water content and ion concentration in the body. It is an important process particularly in relation to the habitat in which the organisms live. For example, the organisms living in fresh water take up large amount of water through their skin or mouth. Excess water must be removed in order to survive. Similarly, marine and terrestrial animals need to conserve water. Thus, osmoregulation is important because the water content of body cells must be in accordance with their surrounding media.

23. **(a)** *Amoeba* engulf its food by forming pseudopodia around it. When the food gets completely surrounded from all the sides the tips of encircling pseudopodia fuse with each other and the food is encaptured along with a few lysosomes into the cell in the form of a bag called food vacuole.

(b) Veins have thin walls as compared to arteries because blood in the veins flows under low pressure and have valves to prevent backflow of blood.

(c) The main significances of having four chambered heart are:

(i) It supplies more oxygen to meet energy needs of birds and mammals.

(ii) There is no mixing of oxygenated and deoxygenated blood.

(iii) Efficiency of body organs increases, as oxygenated blood is supplied to them.

24. Xylem tracheids and vessels are two water conducting tissues present in plants that help in rapid movement of water. In xylem tissue, vessels and tracheids of the roots, stems and leaves are interconnected to form a continuous system of water conducting channels reaching all parts of the plant.

Minerals and water needed by the plants are absorbed by roots. The root hairs absorb water from the soil by the process of osmosis and take in minerals by the process of diffusion. Thus, a difference in concentration of ions is created between the roots and the soil which

enables the water to enter into roots to compensate the difference in concentration. The water, alongwith dissolved minerals from root hairs, passes into xylem vessels through cells of the cortex, endodermis and pericycle and then ascent of sap (*i.e.*, upward movement of water and mineral salts from roots to the aerial parts of the plant against the gravitational force) takes place from xylem of the roots to the xylem of stem and leaves through vessels and tracheids. Evaporation of water molecules from the cells of leaves creates a suction which pulls the water from xylem cells.

25. (i) The given diagram is L.S. of the phloem in which labelled part 1 to 4 are sieve plate, sieve tubes, companion cell and phloem parenchyma respectively.

(ii) Sieve tubes

(iii) The labelled part 3, *i.e.*, companion cell helps in maintaining pressure gradient in the sieve tube through plasmodesmata.

26. **(a)** Differences between autotroph and heterotroph are:

S.No.	Autotroph	Heterotroph
(i)	It can make their own food so is called producer.	It cannot make their food and depend upon plants and other organism for its nutritional requirements so is also called consumer.
(ii)	It can be photoautotrophs or chemoautotrophs.	It can be herbivores, carnivores or omnivores.
(iii)	It possesses chlorophyll.	It lacks chlorophyll.
(iv)	It converts light energy into chemical energy.	It first digest and absorbs food, assimilate it in tissue and then utilises it to obtain energy.

(b) No, this plant will not remain healthy for a long time as leaves of plants possess stomata which are helpful in gaseous exchange during photosynthesis and respiration. Stomata also help in transpiration where water is released in the form of water vapour. This generates transpirational pull which is necessary for the ascent of sap. If leaves are coated with vaseline, it will affect respiration, photosynthesis as well as transpiration and thus plant will not remain healthy for a long time.

OR

The process of digestion of food in mouth, stomach and small intestine in human body is as follows :

(i) Mouth : Food is chewed with the help of premolars and molars which increases the rate of action of salivary amylase. Food is mixed with saliva of salivary glands. Salivary amylase hydrolyses about 30-40% of starch into maltose and isomaltose at pH 6.8.

$$\text{Starch} \xrightarrow[\text{pH 6.8}]{\text{Salivary amylase}} \text{Maltose + Isomaltose}$$

(ii) Stomach : Food is mixed with gastric juice which contains mucus, hydrochloric acid, pepsin, rennin and a weak lipase enzyme. Mucus lubricates the food and protects the inner lining of the stomach from the action of acid. Hydrochloric acid stops the action of saliva in stomach, kills the bacteria present in the food and provides acidic medium (pH 1-2) of gastric juice so that pepsin gets active for protein digestion.

Pepsin hydrolyses proteins into proteoses and peptones, while gastric lipase enzymes hydrolyses small amounts of fats into fatty acids and glycerol. Curdling of milk is done by the enzyme rennin, which increases the period of action of pepsin on milk proteins.

$$\text{Proteins} \xrightarrow[\text{pH 1-2}]{\text{Pepsin}} \text{Proteoses + Peptones}$$

In addition to chemical digestion, food also undergoes mechanical churning inside the stomach.

27. **(a)** Nutrition is a process of intake, as well as utilisation of nutrients by an organism. The different modes of nutrition are: (i) Autotrophic and (ii) Heterotrophic. The heterotrophic nutrition may be : Saprotrophic (saprophytic), Parasitic and Holozoic.

(b) Differences between aerobic and anaerobic respiration are:

S.No.	Aerobic respiration	Anaerobic respiration
(i)	It takes place in the presence of oxygen.	It takes place in the absence of oxygen.
(ii)	It occurs in cytoplasm (glycolysis) and in mitochondria (Krebs' cycle).	It occurs only in cytoplasm.

(iii)	Complete oxidation of respiratory substrate (glucose) into CO_2 and H_2O occurs.	Incomplete oxidation results in the formation of alcohol or acids.
(iv)	Large amount of energy is liberated.	Less amount of energy is liberated.

(c) In desert plants, stomata open at night and take in carbon dioxide (CO_2). Stomata remain closed during daytime to prevent the loss of water by transpiration. They store the CO_2 in their cells until the sun comes out so that they can carry on with photosynthesis during the daytime.

OR

During various biochemical reactions metabolic wastes are produced in human bodies. Kidneys play a prominent role in excretion of waste products from the body in the form of urine. Each kidney comprises of millions of nephrons. ***Nephrons*** are the structural and functional unit of kidney.

Each nephron is formed of two parts : (i) Bowman's capsule and (ii) Nephric tubule.

Bowman's capsule : It is a cup shaped structure containing a bunch of capillaries called glomerulus. Glomerulus acts as the site of filtration under pressure (ultrafiltration). Large amount of water along with useful components and certain harmful substances filtered out into Bowman's capsule (nephric filtrate).

Nephric tubule : It is a long coiled tubular structure. Bowman's capsule leads into nephric tubule which ultimately joins the collecting ducts. It is further divided into three parts :

(i) Proximal convoluted tubule (PCT) - It forms the main site of selective reabsorption of sodium, calcium, glucose, amino acids, etc., from the nephric filtrate.

(ii) Loop of Henle - It is a U-shaped tubular structure. It is formed of two limbs. Descending limb is permeable to water and ascending limb is permeable to sodium chloride.

(iii) Distal convoluted tubule (DCT) - It leads to the reabsorption of water and drains into the collecting duct. Here, active tubular secretion takes place from the blood to the filtrate (excretion of potassium, phenol, some drugs, penicillin, etc.).

The fluid which now flows through collecting tubule is urine which consists of water, urea, uric acid, mineral ions like sodium, potassium, chloride, phosphates, etc.

28. Due to electric shock, drowning or inhalation of carbon monoxide, breathing may stop. To revive the person's breathing, artificial respiration is practised. The most common way of artificial respiration is mouth-to-mouth breathing. It is performed in the following ways:

(i) Operator lifts the patient's neck by placing a hand below it.

(ii) Operator closes the nostrils of the patient by his fingers.

(iii) Operator keeps his mouth around the mouth of the patient and inflate the lungs of patient by blowing about 1 litre of air.

(iv) Then operator releases the patient's mouth to allow expiration.

(v) The process is repeated for 10-15 minutes.

29. (a) Only plants cells containing chloroplasts synthesise food. Such cells are located in superficial layers where light is easily accessible. So, all the other non-green tissues and cells of plants need food for oxidation. The food from green cells is translocated to its non-green parts. Hence, the given statement is false.

(b) Liver is the largest gland of the body that secretes bile juice. Bile juice neutralises acidity of food coming from stomach and provides alkaline medium and helps in digestion of fats in small intestine by bringing about fat emulsification (conversion of large fat droplets into smaller ones) making it easier for enzymes to act and digest them.

Pancreas is a soft, lobulated greyish-pink gland which has both endocrine and exocrine parts. Cells of exocrine part secrete pancreatic juice which contains enzymes like pancreatic amylase, trypsin and lipase that help in digestion of starch, proteins and fats, respectively. The cells of endocrine part secrete hormones such as glucagon and insulin that take part in glucose metabolism.

30. (i) Dental caries or tooth decay begins when bacteria (***Streptococcus mutans***) grow on food particles especially sugars sticking to the teeth and produce acids. The acids act upon the tooth and cause softening

or demineralisation of enamel and dentine. The bacterial colony grows in size and forms a dental plaque. Finally leading to inflammation and necrosis of pulp called pulpitis. Regular brushing the teeth after meals removes the plaque.

(ii) The heart is a hollow muscular pumping organ about the size of one's fist. It lies obliquely in the thorax between the lungs immediately above the diaphragm. Its lower conical part is tilted to the left. It is enclosed in a bony cage formed of ribs, backbone and sternum bones. Heart is enclosed in a double-layered membranous sac called pericardium. Between the two layers of pericardium lies the pericardial fluid. It keeps the heart moist and protects it from injury and friction.

(iii) The oesophagus is a long and tubular structure which serves to carry the food from pharynx to the stomach. The wall of oesophagus is highly muscular. The oesophagus is not concerned with the digestion of the food. It exhibits peristaltic movement, *i.e.*, contraction and expansion movement of walls, so that the partially digested food is pushed towards the tract. In fact, this movement occurs throughout the alimentary canal.

OR

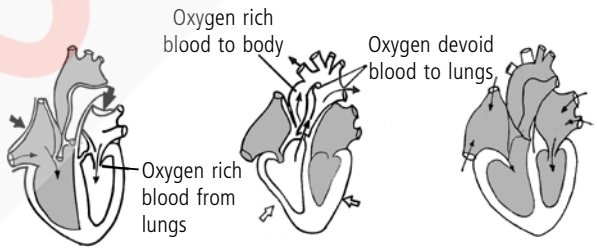
The process of circulation in human being are described as :

(i) Joint diastole. During the time when the muscles of all four chambers of the heart are relaxed, the blood returning to the heart under low pressure in the veins enters the two atria. Blood from large veins, called vena cava, pours into right atrium. This blood comes from head, upper body parts and lower body parts where oxygen has been used up and the blood is free from oxygen, *i.e.*, deoxygenated. Thus, the deoxygenated blood enters the right atrium. At the same time, the pulmonary vein from lungs pours oxygenated blood into the left atrium. Thus, the oxygenated blood enters the left atrium.

(ii) Atrial systole. As the right and left atria fill with blood, pressure in them rises so that the bicuspid valve or mitral valve and between right atrium and right ventricle *i.e.*, tricuspid valve open and the atria contract. Atrial contraction (atrial diastole) forces pumping of deoxygenated blood from right atrium into the right ventricle through tricuspid valve and oxygenated blood from left atrium into left ventricle through bicuspid valve.

(iii) Ventricular Systole : It involves the contraction of ventricles. During contraction of ventricles, the deoxygenated blood from right ventricle flows to the lungs through pulmonary artery and the oxygenated blood from left ventricle is distributed to all the parts of the body through the largest artery, called aorta.

The cardiae cycle can be shown the events during heartbeat is as follows :



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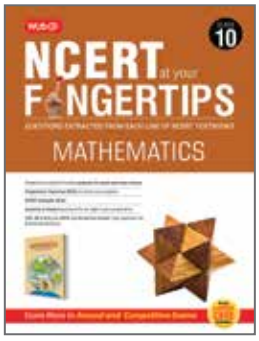

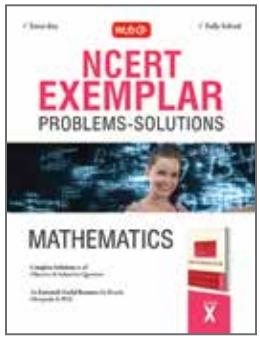

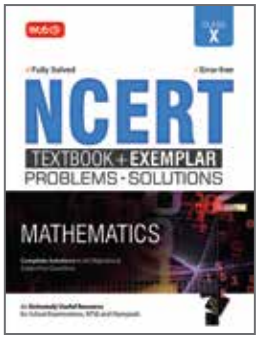

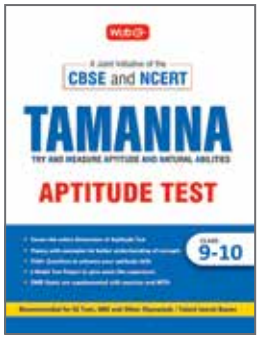

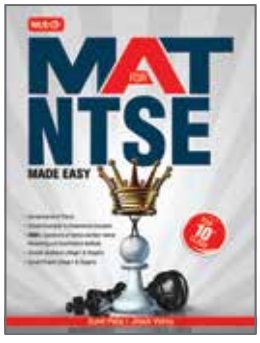

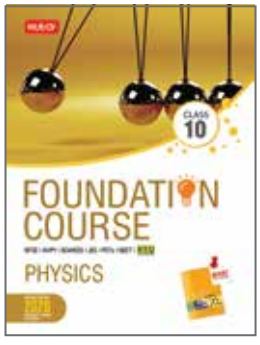

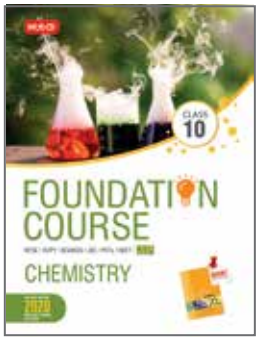

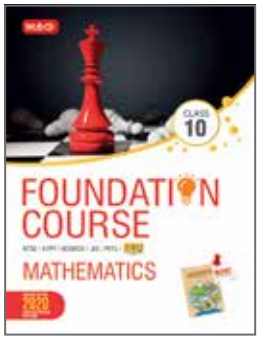

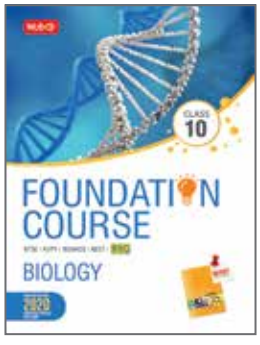

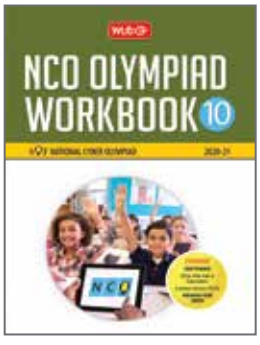

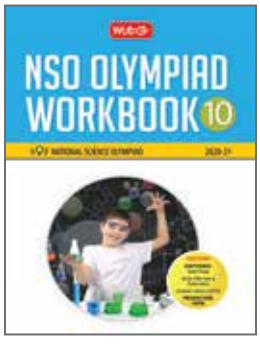

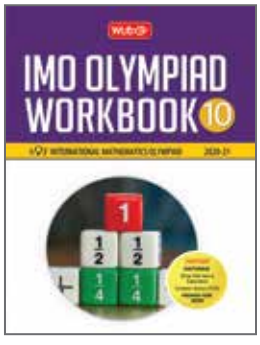

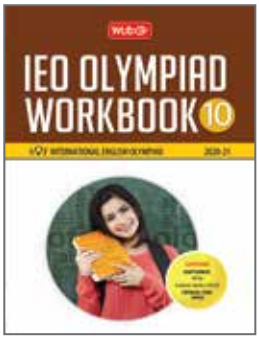

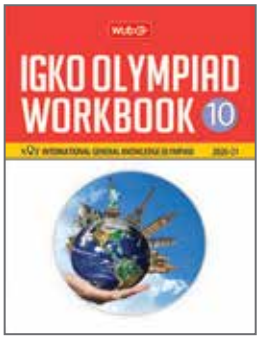

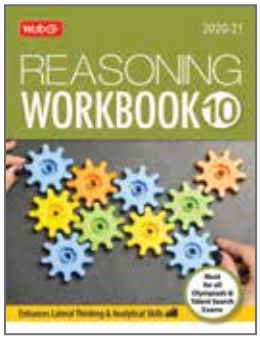

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