PRISM WORLD

Std.: 10 (English) Science - II

Chapter: 2

Q.1 Textbook activity question. **22**

1 What is respiration? How does it occur?

Ans i. The process of release of energy by oxidation of food is called as respiration.
ii. In living organisms, respiration occurs at two levels-body and cellular level.
iii. In case of body level, oxygen and carbon dioxide are exchanged between the body and surrounding.
iv. In case of cellular level, food is oxidized either with or without the help of oxygen to release energy.

2 Which cell organelle is necessary for complete oxidation of glucose?

Ans Mitochondria is necessary for complete oxidation of glucose.

3 How many atoms of C, H and O are respectively present in a molecule of glucose?

Ans There are 6 atoms of C,12 atoms of H and 6 atoms of O present in a molecule of glucose ($C_6H_{12}O_6$)

4 What is the importance of digestive juices in digestive system?

Ans i. Digestive juices create conditions requried for digestion of food.
ii. Digestive juices contain enzymes which break down different components of food like carbohydrates proteins and fats, so that the essential nutrients are absorbed and properly utilized by the body.

5 Which type of cellular respiration performs complete oxidation of glucose?

Ans Complete oxidation of glucose occurs during aerobic respiration.

6 Why may be the players consuming these food stuffs?

Ans i. Players are in need of continuous energy during games.
ii. Carbohydrates (glucose) are major and quick source of energy.
iii. Hence, players are seen consuming food stuffs rich in carbohydrated during breaks of the game.

7 Which different functions are performed by muscles in body?

Ans Muscles are mainly responsible for the movements of // in the human body :
There are three main types of muscles :

a. Striated (Voluntary) muscles :
These muscles are attached to the bones (hence also called as skeletal muscles) and bring about movement of arms, legs.

b. Non-Striated (Involunary) muslces:
These muscles bring about movement of eyelids, passage of food through alimentary canal, contracton and relaxation of blood vessels.

c. Cardiac muscles :
Cardiac muscles bring about contraction and relaxation of the heart.

8 What happens to the cells of injured tissue?

Ans The cells of the injured tissue start dividing and increase in numbers to repair and heal the injured tissue.

9 In terms of Chemistry what happens actually when a molecule is oxidized?

Ans When an ionic chemical reaction occurs on a metal's surface while oxygen while oxygen is present, oxidation of metal takes place. There is a movement of electrons from the metal to the oxygen molecules during this process. The negative oxygen ions generated enter the metal & leads to the creation of an oxide surface. Thus, oxidation is a form of metal corrosion.

10 What is the importance of balanced diet for body?

Ans A balanced diet supplies the nutrients your body needs to work effectively. Without balanced nutrition, your body is more prone to disease, infection, fatigue, and low performance. Children who don't get enough healthy foods may face growth and developmental problems, poor academic performance, and frequent infections.

11 How the new individual of a species is formed from existing one of same species?

Ans i. New individual of a species is formed from the existing one of the same species by the process of reproduction.
ii. It involves cell division-mitosis and meiosis.

12 How does the growth of any living organism occur? Does the number of cells in their body increase? If yes, how?

Ans i. Growth of any living organism occurs due to cell division.
ii. Yes, the number of cells in their bosy increase.
iii. The number of cells increases by the process of mitosis.

13 Do the plants get injured when do we pluck the flowers? How are those wounds healed?

Ans Yes, plants get injured when we pluck flowers. Meristematic tissue present in plants gives rise to new cells at the site of injury and help plants to heal their wounds.

14 Which types of chemical bonds are present between all these atoms?

Ans In glucose molecule, atomsof carbon, hydrogen and oxygen are held together by covalent bonds.

15 What is the role of circulatory system in energy production?

Ans In the circulatory system, arteries carry oxygen rich blood from heart to the different parts of thebody. Along with oxygen, this blood also contains energy- rich nutrients such as glucose, fatty acids which are used by cells to produce energy.

16 Whether the gametes are diploid or haploid? Why?

Ans The cells that give rise to gamtes are dipliod (2n). But by meisosis they give rise to gametes which are haploid (n.) Two haploid gametes undergo fertillization and the zygote formed becomes once again diploid (2n).

17 Whether new cells are formed during healing of wound?

Ans Yes, the injured cells are restored by the formation of new cells.

18 How are the foodstuffs and their nutrient contents useful for body?

Ans Foodstuffs and their nutrients are required for normal functioning of our body. Food stuffs are broken down during digestion to convert them into soluble nutrients which are carried by the blood to various cells of the body. The nutrients are oxidized by cellular respiration to release energy.
Importance of some major nutrients is as follows :

a. Nutrients like carbohydrates and fats provide energy to perform various activities.
b. Proteins are the major structural components of cells. They are called body building nutrients, as they are responsible for building and repairing the body tissues. In our body, proteins are used to make amino acids, hormones and other body chemicals.
c. Vitamins and minerals act asthe protective and regulating nutrients in our body.

19 Which system is in action for removal of waste materials produced in human body?

Ans Excretory system is employed in discharging waste materials from the body.

20 Many times, we experience dryness in mouth.

Ans Dry mouth is also known as xerostomia. It's a condition that happens when salivary glands in your mouth don't produce enough saliva. It causes a parched, or dry, feeling in your mouth. It can also cause other symptoms, such as a rough tongue, mouth sores, and cracked lips.

21 We sweat during summer and heavy exercise.

Ans i. Human beings are warm-blooded. We need to maintain a constant body temperature irrespective of the surrounding conditions.
ii. In summer and during heavy exercise, lot of heat is generated which raises our body temperature.
iii. Sweating leads to loss of excess body heat and brings down the body temperature to normal.
iv. Therefore, we sweat during summer and heavy exercise.

22 How are the various processes occurring in human body controlled? In how many ways?

Ans i. Various organ systems are continuously performing their functions in human body.
ii. Along with the various systems like digestive, respiratory, circulatory, excretory and control systems, different external and internal organs are performing their functions independently but through a complete co-ordination.
iii. This is controlled in two ways-Nervous control by nervous system and chemical control by the hormones secreted by the endocrine glands.

Q.2 Give scientific reasons **8**

1 Sometimes, higher plants and animals too perform anaerobic respiration.

Ans 1. Anaerobic respiration is performed by microorganisms like bacteria, in which glucose is incompletely oxidized and less amount of energy is obtained.
2. Sometimes, higher plants and animals perform anaerobic respiration when there is depletion of oxygen level in the surrounding.
3. Higher animals such as human beings also perform anaerobic respiration.
4. For example – When we exercise, our muscle cells perform anaerobic respiration, as oxygen is used faster and hence it gets depleted in the muscles. Due to this, less energy is produced in our body and lactic acid accumulates.

2 Kreb's cycle is also known as citric acid cycle.

Ans 1. Krebs cycle involves a series of cyclic chain reactions where substances are completely oxidized.
2. Citric acid (a type of tricarboxylic acid) is the first stable product formed in this cycle.
3. Hence, Krebs cycle is also known as citric acid cycle.

3 Cell division is one of the important properties of cell and organisms.

Ans 1. A new organism is formed from an existing one (as in Amoeba or Paramoecium) by cell division.
2. In a multicellular organism, cell division, i.e. mitosis is necessary for an organism to grow for replacement of damaged cells, wound healing, formation of blood cells, etc.
3. Some unicellular organisms use mitosis as their form of reproduction.
4. Meiosis is required for gamete production and ultimately for reproduction.
5. Hence, cell division is an important property of cells and organisms.

4 Fibers are one of the important nutrients.

Ans 1. Fibres are obtained from leafy vegetables, fruits, cereals, etc.
2. Fibres are not digested in the body.
3. However, they help in the digestion of other substances and egestion of undigested substances.
4. Elimination of waste is a very important process of digestion; therefore fibres are important.

Q.3 Laws / Define / Principles **12**

1 Nutrients.

Ans Nutrient is a substance available in food that helps us to stay healthy. The main nutrients available in food are carbohydrates, fats, proteins, vitamins, minerals and roughage.

2 Aerobic respiration.

Ans Cellular respiration occurs by two processes i.e. aerobic and anaerobic respiration. The process by which the breakdown of carbohydrates occurs in the presence of oxygen resulting in the release of energy in the form of ATP is called aerobic respiration.

3 Cellular respiration.

Ans Cellular respiration is a process in which respiratory substrates such as starch, glucose, fats and proteins are

broken down to release energy. This energy is then trapped for the synthesis of ATP to release CO_2.

4 Nutrition.

Ans The process by which organisms take up nutrients and utilise these nutrients for various biological activities is called nutrition. Nutrition can be categorised as autotrophic or heterotrophic. Autotrophic nutrition refers to the process by which organisms synthesise their own food from inorganic raw materials, for example, green plants and some bacteria. In heterotrophic nutrition, the organisms are unable to use light energy for the synthesis of food and are dependant on other organisms to fulfil their energy requirements.

5 Proteins

Ans Large molecules composed of one or more chains of amino acids in a specific order determined by the base sequence of nucleotides in the DNA coding for the protein. Proteins are required for the structure, function, and regulation of the body's cells, tissues, and organs. Each protein has unique functions. Proteins are essential components of muscles, skin, bones, and the body as a whole. Examples of proteins include whole classes of important molecules, among them enzymes, hormones, and antibodies. Proteins are one of the three types of nutrients used as energy sources by the body, the other two being carbohydrates and fat. Proteins and carbohydrates each provide 4 calories of energy per gram, while fats produce 9 calories per gram.

6 Glycolysis.

Ans Glycolysis is the first step in respiration. In this step, six-carbon glucose is broken down into a three-carbon molecule called pyruvate. This does not require oxygen. One glucose molecule produces 2 pyruvate molecules.

Q.4 **Write Short Notes on** **4**

1 Kreb's cycle with reaction.

Ans
i. The cyclical reactions of tricarboxylic acid cycle were discovered by Sir Hans Kreb. Hence, this cyclical process is also called as Kreb's cycle.
ii. In tricarboxylic acid cycle, both the molecules of acetyl-CoA formed in glycolysis, enter the mitochondria.
iii. Cyclic chain of reactions called as tricarboxylic acid cycle is operated on it in the mitochondria.
iv. Acetyl part of acetyl-CoA is completely oxidized through this cyclical process and molecules CO_2, H_2O, $NADH_2$, $FADH_2$ are derived.

2 Glycolysis.

Ans
i. A molecule of glucose is oxidized step by step in this process and two molecules of each i.e. pyruvic acid, ATP, $NADH_2$ and water are formed.
ii. The process of glycolysis occurs in cytoplasm.
iii. The molecules of pyruvic acid formed in glycolysis Process are converted into molecules of Acetyl-Coenzyme-A.
iv. Two molecules of $NADH_2$ and two molecules of CO_2 are released during this process.

Q.5 **Write Distinguish between** **6**

1 Aerobic respiration and Anaerobic respiration

Ans

Aerobic respiration	Anaerobic respiration
1. In aerobic respiration, energy production takes place in the presence of oxygen.	1. In anaerobic respiration, energy production takes place in the absence of oxygen.
2. Glucose is completely oxidized in this process.	2. Glucose is incompletely oxidized in this process.
3. High amount of energy is produced.	3. Less amount of energy is produced.
4. The final products are CO_2 and water.	4. The final products are CO_2 and either ethanol, lactic acid, or vinegar.
5. This normally takes place in higher plants and animals.	5. It takes place in organisms which cannot live in the presence of oxygen, e.g. some bacteria. Some higher plants, animals, and aerobic microorganisms also perform anaerobic respiration if there is a depletion of oxygen level in the surroundings. Our muscles also perform anaerobic respiration when we exercise.

2 Mitosis and Meiosis.

Ans

Mitosis	Meiosis
1. Mitosis is a type of cell division which occurs in somatic cells and stem cells.	1. Meiosis is a type of cell division which occurs in germ cells.
2. In this type of cell division, the daughter cells maintain the original chromosome number.	2. In this type of cell division, the number of chromosomes become half (2n to n).
3. The daughter cells are diploid.	3. The daughter cells are haploid.
4. In this division 2 new cells are formed.	4. In this division 4 new cells are formed.
5. It is important for growth and restoration of emaciated body.	5. This division is required for production of gametes.

3 Glycolysis and TCA cycle

Ans

Glycolysis	TCA cycle
1. Glycolysis occurs in the cytoplasm.	1. TCA cycle occurs in the mitochondria.
2. It is a linear pathway.	2. It is a cyclic process.
3. It is also called the EMP pathway.	3. It is also called the Krebs cycle.
4. In this process, a molecule of glucose is oxidized step by step, and two molecules each of pyruvic acid, ATP, $NADH_2$, and water are formed. Pyruvic acid is then converted to acetyl-Coenzyme-A.	4. In this cycle, Acetyl-Coenzyme-A undergoes a series of cyclic chain reactions, and molecules of CO_2, H_2O, $NADH_2$, and $FADH_2$ are obtained.
5. Glycolysis takes place in both aerobic and anaerobic respiration.	5. TCA cycle takes place only during aerobic respiration.

Q.6 **Give explanation using the given statements.** **15**

1 Fill in the blanks and explain the statements.
All chromosomes are arranged parallel to equatorial plane of cell in ..... phase of mitosis.

Ans i. All chromosomes are arranged parallel to equatorial plane of cell in **metaphase** of mitosis.
ii. In metaphase, the chromosome complete their condensation and become clearly visible along with their sister chromatids.
iii. All chromosomes are arranged parallel to equatorial plane of the cell.

2 Fill in the blanks and explain the statements.
Genetic recombination occurs in _____ phase of prophase of meiosis-I.

Ans i. Genetic recombination occurs in crossing over phase of prophase of meiosis-I.
ii. It is the prophase-I of meiosis that chromosomes duplicate and produce homologues.
iii. This homologous chromosomes then pair as bivalent.
iv. Crossing over takes place in the prophase-I of meiosis-I.
v. This crossing over helps in bringing the recombination.

3 Fill in the blanks and explain the statements.
At the end of glycolysis, ... molecules are obtained.

Ans i. At the end of glycolysis, two molecules are obtained.
ii. These two molecules are each of pyruvic acid, ATP, $NADH_2$ and water.
iii. Glycolysis takes place in the cytoplasm of the cell.
iv. In this step, glucose is broken in a stepwise manner into two molecules of pyruvic acid, ATP, $NADH_2$ and water.

4 Fill in the blanks and explain the statements.
After complete oxidation of a glucose molecule, ... number of ATP molecules are formed.

Ans i. After complete oxidation of a glucose molecule, 38 number of ATP molecules are formed.
ii. Aerobic respiration is one in which molecular oxygen is used for the complete oxidation of glucose to yield CO_2, H_2O and 38 ATP molecules.
iii. Aerobic respiration takes place in three stages-Glycolysis,
iv. Kerb's cycle and Electron transport system.

5 Fill in the blanks and explain the statements.
For formation of plasma membrane, ... molecules are necessary.

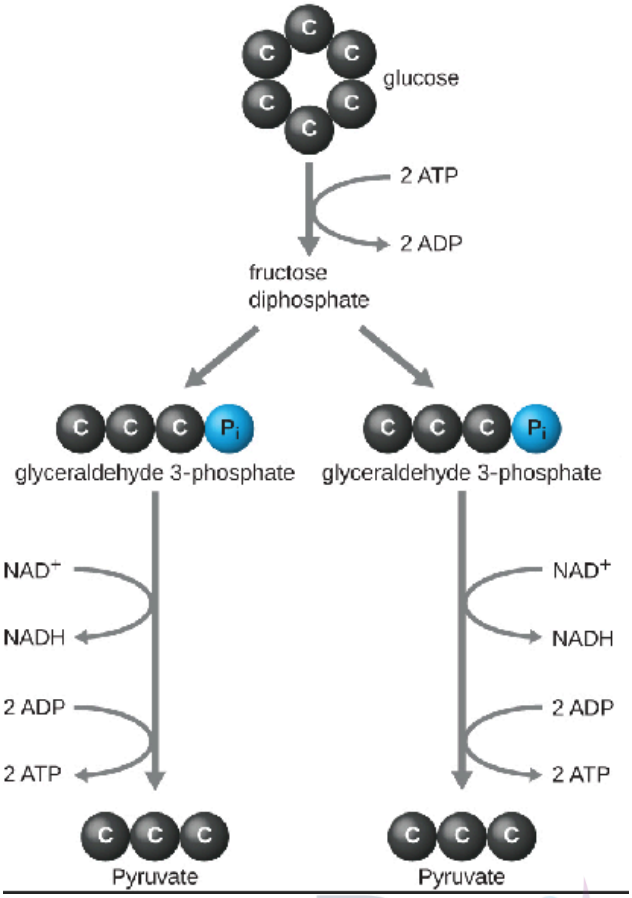
Ans i. For formation of plasma membrane, **Phospho lipids** molecules are necessary.
ii. The lipids break down to form fatty acids and alcohol after digestion.
iii. Fatty acids are absorbed up and distributed everywhere within the body.
iv. From these fatty acids different cells produce various substances necessary for themselves.
v. For example: the molecules called as phosphor lipids which are essential for producing plasma membrane are formed from fatty acids.

Q.7 **Answer the following in detail** **15**

1 Explain the glycolysis in detail.

Ans Glycolysis was first given by Embden, Meyerhof and Parnas, and is referred to as EMP pathway. This process occurs in the cytoplasm of the cell and is present in all living organisms.
In this pathway, glucose undergoes partial oxidation to form two molecules of pyruvic acid, which can enter either Krebs cycle (in the case of aerobic respiration) or fermentation pathway (in the case of anaerobic

respiration). In the course of conversion of glucose into pyruvate, energy is produced in the form of two molecules of ATP.



2 With the help of suitable diagrams, explain the mitosis in detail.

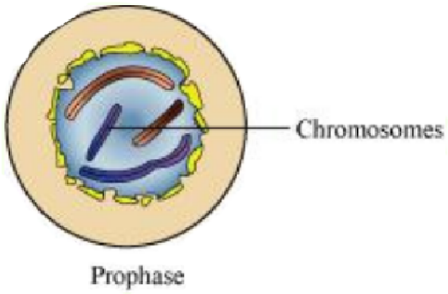
Ans Mitosis cell division is completed in two steps.

(i) Division of nucleus (karyon (nucleus) + kinesis (division) = Karyokinesis)

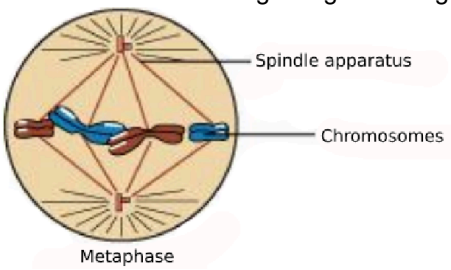
(ii) Division of cytoplasm (cyto (cytoplasm) + kinesis (division) = cytokinesis))

(i) Karyokinesis is further divided into four steps:

(a) Prophase: It is the first stage of mitosis that is marked by the initiation of the condensation of chromosomal material. Each chromosome is composed of two chromatids, which are attached by the centromere. At the end of prophase, the mitotic spindle begins to form from the centrioles. The nuclear membrane and the nucleolus disappear completely by the end of this stage.

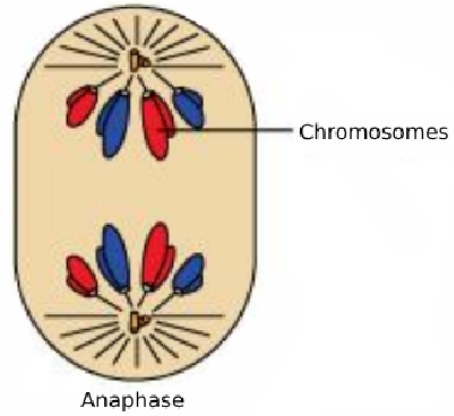


(b) Metaphase: It is the second stage of mitosis in which the condensation of the chromosomal material and the spindle formation gets complete. The spindle fibres get attached to the kinetochores of the chromosomes and the chromosomes get aligned along the metaphase plate in the middle of the nucleus.

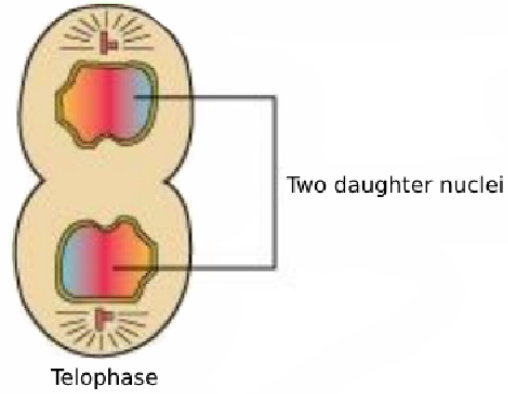


(c) Anaphase: It is the stage of mitosis where the centromere of the chromosomes split and the chromatids get separated. The contraction of the spindle fibres moves the sister chromatid apart, towards the two

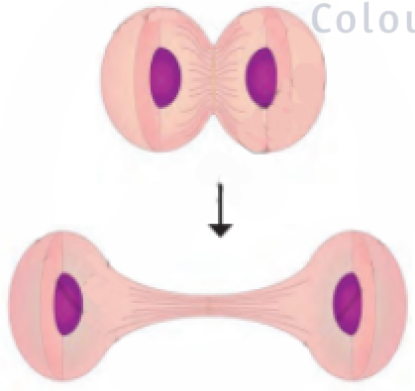
opposite poles.



(d) Telophase: It is the last stage of mitosis. In this stage, chromosomes finally reach their respective poles. The spindle fibres disappear and the nuclear envelope reappears around the chromosome cluster. Also, the nucleolus, Golgi complex, endoplasmic reticulum, and other cell organelles re-appear.



(e) Cytokinesis: The cytoplasm divides by cytokinesis and two new cells are formed which are called as daughter cells. In this process, a notch is formed at the equatorial plane of the cell which deepens gradually and thereby two new cells are formed. However, in case of plant cells, instead of the notch, a cell plate is formed exactly along midline of the cell and thus cytokinesis is completed.



3 Explain the Krebs cycle with reaction.

Ans The reactions which help in converting pyruvic acid to carbon dioxide and water in mitochondria is called Krebs cycle. It is also known as citric acid or tricarboxylic acid cycle (TCA cycle).

In the first reaction of citric acid cycle, acetyl CoA combines with the oxaloacetic acid to form citric acid. This reaction is catalyzed by citric acid synthetase. Citric acid contains three carboxylic acid groups. Citric acid is dehydrated to form cis-aconitic acid in the presence of aconitase. The same enzyme aconitase catalyzes the formation of isocitric acid from the cis-aconitic acid by the addition of the molecule of water. Citric acid, cis-aconitic acid, and isocitric acid contain three carboxylic acid groups. The isocitric acid is oxidatively decarboxylated to a-a-ketoglutaric acid. This reaction is catalyzed by an isocitric dehydrogenase. During this reaction, one NADH2 is formed. The a-ketoglutaric acid is oxidatively decarboxylated to form succinyl co-a. This reaction is catalyzed by an alpha-ketoglutaric dehydrogenase. The energy released during this reaction is conserved in NADH2. The succinyl-CoA is hydrolyzed to succinic acid in the presence of succinyl co-a synthetase. In this reaction, ADP is phosphorylated to ATP. This is called substrate-level phosphorylation. The succinic acid is oxidized to form fumaric acid by a succinic dehydrogenase. FAD++ is reduced to FADH2. The

fumaric acid is converted to malic acid by the addition of a molecule of water. This reaction is catalyzed by fumarase. The malic acid is oxidized to oxaloacetic acid by the enzyme malic dehydrogenase.