AFAQ SUN SERIES

Based on National Curriculum 2022

KEYBOOK

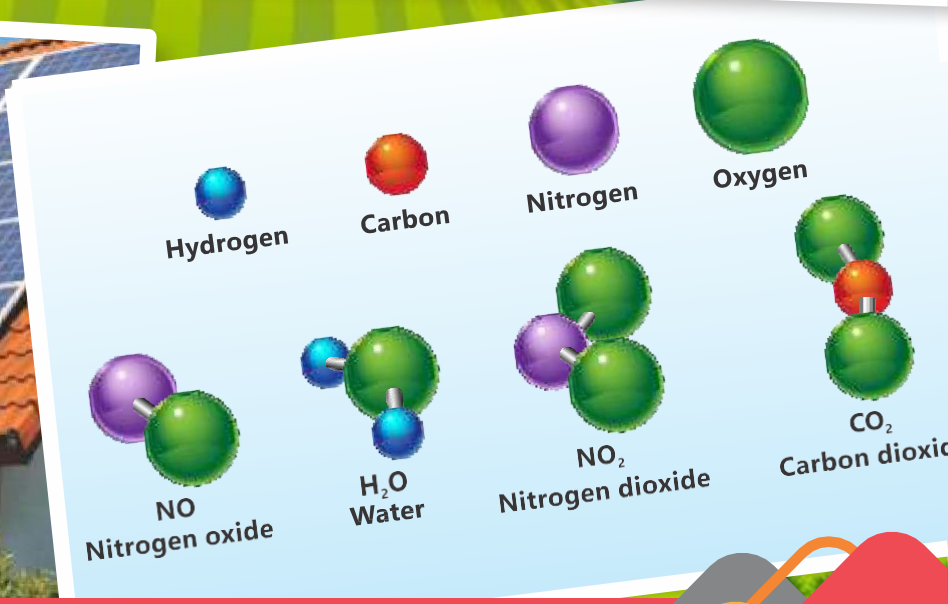
Science

GRADE 6





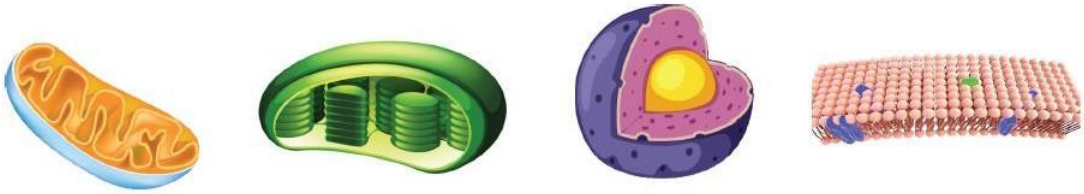




Term 1 Periodic Unit 1
Unit 1: Cellular Organization

A. Choose the correct option.

1. The control house of a cell is:
   a. mitochondria
   b. the nucleus
   c. chloroplasts
   d. a cell membrane
   The correct answer is b.
2. Tissues combine to form a/an:
   a. cell
   b. organ
   c. organ system
   d. organism
   The correct answer is b.
3. The correct sequence of cellular organization is:
   a. cell-tissue-organ-organism-organ system
   b. tissue-cell-organ-organism-organ system
   c. cell-tissue-organ system-organ-organism
   d. cell-tissue-organ-organ system-organism
   The correct answer is d.
4. The organelle which gives the green colour to a plant is:



i ii iii iv

   a. iii
   b. i
   c. iv
   d. ii
   The correct answer is d.

5. The role of a vacuole in the plant cell is to:
   a. provide energy
   b. store nutrients
   c. give green pigment
   d. provide protection

   The correct answer is b.
6. Which of the following organelles contain genetic material and control the activities of a cell?
   a. cytoplasm
   b. vacuole
   c. mitochondria
   d. nucleus

   The correct answer is d.
7. Chlorophyll is a green pigment in a plant cell. It is involved in:
   a. protection of cell
   b. transport of materials
   c. making food
   d. storage of food

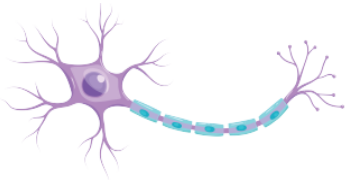
   The correct answer is c.
8. Transport of oxygen to all parts of the human body is the job of:
   a. xylem cells
   b. nerve cells
   c. muscle cells
   d. red blood cells

   The correct answer is d.
9. The organ system found in plants is the:
   a. shoot system
   b. circulatory system
   c. digestive system
   d. respiratory system

   The correct answer is a.
10. Animal and plant cells both have the following organelles:
    a. a cell wall and cell membrane
    b. a nucleus and cytoplasm
    c. a cell wall and chloroplast
    d. mitochondria and a chloroplast

    The correct answer is b.

B. Look at the pictures. Write the names and functions of the following cells.



Name: **Nerve cell**

Function: **It carries messages from one part of the body to another.**



Name: **Red blood cell**

Function: **It transports oxygen to all parts of the body.**



Name: **Epithelium cell**

Function: **It provides protection and is involved in absorption and secretion.**

C. Constructive response questions.

Amina observed plant and animal cells under a microscope. She observed that a strong and hard cell wall, a large vacuole and a chloroplast are present only in a plant cell. While all other organelles are present in both plant and animal cells. Chromosomes contain genetic material in the nucleus. Mitochondria provide energy to the cell.

i. Name the substance which makes the cell wall.

Answer:

The substance that makes the cell wall in the plant cells is cellulose.

ii. Suggest any one similarity and two differences in a red blood cell and an epithelium cell.

Answer:

The similarity between red blood cells and epithelial cells

One similarity between red blood cells and epithelial cells is that both types of cells lack a nucleus in their mature form.

Differences between red blood cells and epithelial cells

Two differences between red blood cells and epithelial cells are:

- Red blood cells (also known as erythrocytes) primarily function to transport oxygen to various tissues and organs in the body, while epithelial cells function to protect and line various surfaces and organs in the body.
- Red blood cells have a unique biconcave disc shape that allows them to be flexible and move through narrow capillaries. Epithelial cells, on the other hand, can have a variety of shapes and structures depending on their location and function, such as flat and thin in the lungs for gas exchange or tall and cylindrical in the intestines for absorption.

iii. Name the hereditary material in the nucleus.

Answer:

The hereditary material in the nucleus is DNA (deoxyribonucleic acid).

iv. Why are mitochondria called the power house of a cell?

Answer:

Mitochondria are called the powerhouse of a cell because they are responsible for producing the energy needed by the cell to carry out its

functions. The energy is produced in the mitochondria through a process called cellular respiration. Therefore, the mitochondria play a crucial role in meeting the energy needs of the cell and are thus referred to as the powerhouse of the cell.

D. Answer the following questions briefly.

1. Describe the cell as the basic unit of life.
   Answer:
   The cell is the basic unit of life. It is the smallest unit of living organisms that can carry out all of the functions necessary for life. It is responsible for carrying out all of the processes that allow living organisms to function, grow, metabolise and reproduce. Cells are typically microscopic and cannot be observed with the naked eye. It contains cytoplasm and genetic material enclosed in a membrane. Thus, cells are the building blocks of all living organisms.

2. Differentiate between a cell and a tissue.
   Answer:
   Differences between a cell and a tissue are:

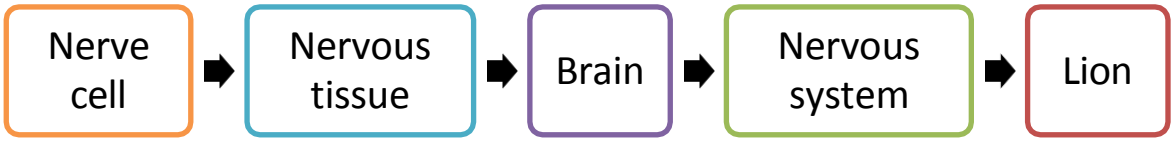
Cell	Tissue
Cells are the smallest structural and functional units of an organism.	Tissues are the groups of similar cells that work together to perform a specific task.
Cells are microscopic.	Tissues are macroscopic.
Cells are found in both unicellular and multicellular organisms.	Tissues are found only in multicellular organisms.
Cells have different cellular organelles including the nucleus, mitochondria, cell membrane, cytoplasm, etc.	Tissues are composed of multiple cells that are similar in structure and function.

3. What would happen if mitochondria were not present in a cell?

Answer:
Mitochondria are the powerhouse of a cell. They are responsible for producing energy for the cell to perform different functions. If the mitochondria are absent, cells would not be able to generate energy, which would severely limit their ability to carry out essential functions. The cell would likely become weaker and more susceptible to damage or death due to which organisms cannot survive.

4. If cellulose becomes part of an animal cell, which organelle will you find in an animal cell?
Answer:
If cellulose becomes part of an animal cell then the cell wall is found in an animal cell.

5. Write down the cellular organization of a lion.
Answer:
The cellular organization of a lion is:



The cellular organization of a lion is complex, with a hierarchy of structures that work together to maintain the proper function of the organism as a whole.

E. Investigating questions.

1. If you are provided with a prepared slide of a cell, how will you identify it as a plant or animal cell? Write in detail.
Answer:
To identify whether the given slide contains a plant or animal cell, the following several key features can look for:
Cell shape: Plant cells have a rigid and rectangular shape while animal cells are round or irregular in shape.
Cell wall: Plant cells have a cell wall made of cellulose while animal cells lack a

cell wall.

Chloroplasts: Plant cells contain chloroplasts while chloroplasts are not present in animal cells.

Vacuoles: Plant cells have a large central vacuole that occupies a significant portion of the cell's volume while animal cells may have smaller vacuoles.

If the cell has a rigid, rectangular shape and contains chloroplasts and a central vacuole then the given slide has a plant cell. On the other hand, if the cell has a round or irregular shape and contains a central nucleus but no chloroplasts or cell walls, then it is the slide of an animal cell.

2. List a few multicellular organisms found in your surroundings and write how they are different from unicellular organisms.

Answer:

Some multicellular organisms found in my surroundings are plants, animals, insects, birds and humans.

Multicellular organisms are more complex and specialized as compared to unicellular organisms. They are composed of many different types of cells, each with a specific function, and can perform a wide range of tasks that are not possible for unicellular organisms. They are also able to respond to their environment in more complex and sophisticated ways, through mechanisms such as nervous systems, hormonal signalling, and complex behaviours. Additionally, multicellular organisms can reproduce sexually, which allows for greater genetic diversity and adaptability.

F. Answer the following questions in detail.

1. Explain cell organelles which are part of only plant cells.

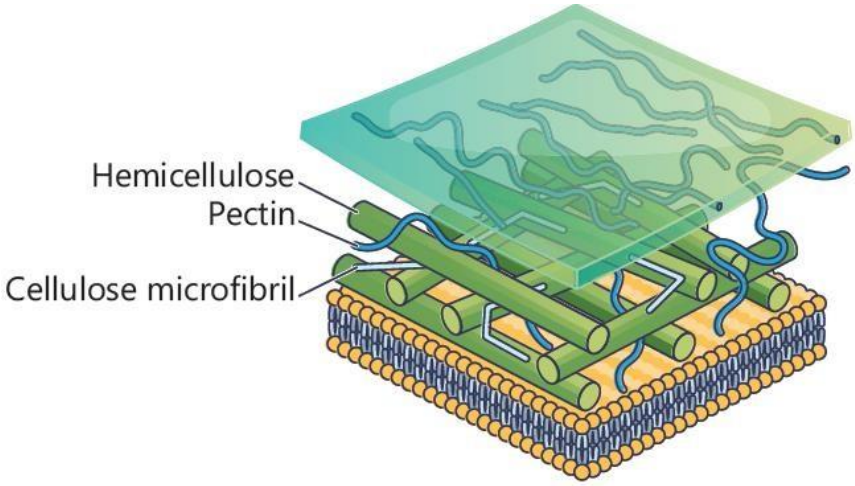
Answer:

Cell organelles

In living organisms, cells have many smaller subunits that aid them in carrying out their specific functions. These subunits are called organelles. They are very important for cells because they perform various useful tasks. Some of these cell organelles which are only present in plant cells are discussed below:

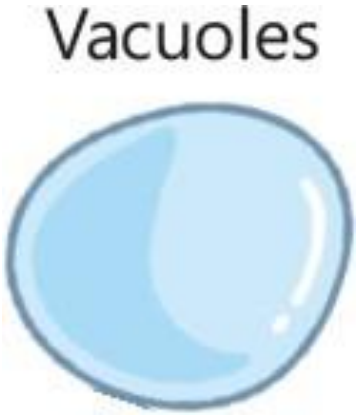
Cell wall

The outermost covering of a plant cell is called the cell wall. It gives a well-defined shape to the plant cell. It is composed of a strong, hard material called cellulose. It provides protection and support to the cell.



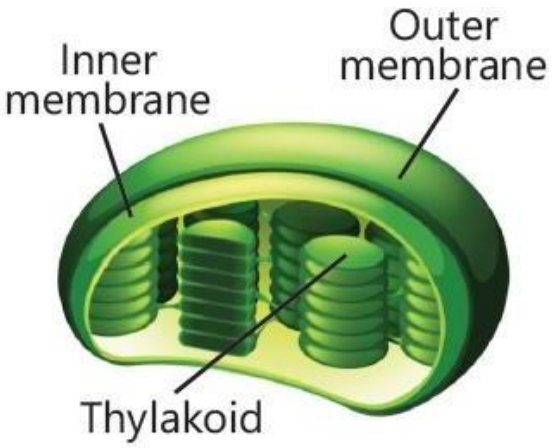
Vacuole

Plants have a big single vacuole in their cells. They are responsible for storing nutrients, waste and other substances.



Chloroplast

Chloroplasts are tiny disc-like structures having a green pigment called chlorophyll inside them. They are only present in a plant cell and give the green colour to plants. They capture the energy of the Sun and use it to make food for the plants through a process called photosynthesis. Leaves are called food factories of plants because they have chloroplasts inside them.



2. What are tissues? Explain the different types of tissues in animals and plants.
   Answer:
   Tissue
   A group of similar cells is called tissue. For example, blood is a type of tissue that transports oxygen, food and waste material in the whole body.
   There are many different tissues in an animal and a plant that help them to survive.
   Plant tissues
   The tissues present in plants are epithelial tissue, vascular tissues and mesophyll tissues.
   Epithelial tissue: Epithelial tissues protect the internal parts of the plant from the external environment.
   Vascular tissue: Vascular tissues are responsible for the transportation of water, minerals and nutrients to the different parts of a plant.
   Mesophyll tissue: Mesophyll tissues play a vital role in synthesising the food for the cell.
   Animal tissues
   The tissues present in animals are epithelial tissue, nervous tissue and muscle tissue.
   Epithelial tissue: Epithelial tissues protect the internal parts of the animal from the external environment.
   Nervous tissues: Nervous tissues are responsible for delivering messages from the brain to the different parts of the body and back to the brain of the animals.
   Muscle tissue: Muscle tissues are involved in the movement of different parts of the body such as arms, legs, etc.

3. List down the similarities and differences between a plant cell and an animal cell.

Answer:

Similarities between an animal cell and a plant cell

Both animal and plant cells have:

- A cell membrane
- Mitochondria
- The cytoplasm
- A nucleus

Differences between an animal cell and a plant cell

The differences between an animal cell and a plant cell are given below.

Organelles	Animal cell	Plant cell
Cell wall 	There is no cell wall and the outer covering is the cell membrane.	The cell wall is the outer covering.
Chloroplast 	There is no chloroplast in an animal cell, which is why it cannot prepare its food.	The chloroplasts containing the chlorophyll are used to make food.
Vacuoles 	Many small vacuoles are present for storing food, water and waste materials.	A single vacuole filled with water maintains the shape of the cell.

Term 1 Periodic Unit 1
Unit 2: Reproduction in Plants

A. Choose the correct option.

1. Vegetative propagation found in daffodils is:
   a. bulbs
   b. runners
   c. tubers
   d. suckers
   The correct answer is a.
2. This image shows the process of:



   a. layering
   b. grafting
   c. cutting
   d. planting
   The correct answer is b.
3. In asexual reproduction in plants:
   a. gametes are produced.
   b. pollen is released.
   c. the parent and offspring are identical.
   d. seeds are produced.
   The correct answer is c.
4. The natural method of asexual reproduction includes:
   a. layering
   b. cutting
   c. budding
   d. grafting
   The correct answer is c.
5. Male gametes in plants are called:
   a. eggs
   b. pollen grains
   c. petals
   d. sepals
   The correct answer is b.
6. Asexual reproduction in plants needs:
   a. both parents

b. only one parent
c. only a female gamete
d. only a male gamete

The correct answer is b.

7. The part of a plant that is involved in sexual reproduction is:
   a. root
   b. flower
   c. stem
   d. leaves

   The correct answer is b.

8. Offspring produced by sexual reproduction are:
   a. genetically similar to parents
   b. genetically different from parents
   c. identical to the female parent
   d. identical to the male parent

   The correct answer is b.

9. Vegetative propagation in plants is:
   a. expensive and takes a long time
   b. expensive and takes a short time
   c. less expensive and takes a long time
   d. less expensive and takes a short time

   The correct answer is d.

10. The method in which a soft branch is bent towards the ground and develops into a new plant is _____.
    a. layering
    b. cutting
    c. grafting
    d. budding

    The correct answer is a.

B. Constructive response questions.

i. A rose plant is reproduced by the asexual method. Name the types of asexual methods.

Answer:

There are a few different types of asexual reproduction methods that can be used to propagate a rose plant, including:

Stem Cuttings: Cutting is a process in which a section of the stem is taken from the parent rose plant and planted in soil or water. This cutting of the rose will develop roots and eventually grow into a new rose plant that is genetically identical to the parent rose plant.

Grafting: Grafting involves the joining of a cutting scion from the desired rose plant to the rootstock of another rose plant. The cutting and rootstock are joined together and allowed to heal, resulting in a new plant that has mixed traits of both rose plants.

Layering: Layering involves burying a low-growing branch of the rose plant in soil, allowing it to develop roots while still attached to the parent plant. Once the new plant has developed roots, it can be separated from the parent plant and transplanted.

All of these methods of asexual reproduction allow for the propagation of a new rose plant that is identical to the parent plant, ensuring that desirable traits are preserved and propagated.

ii. Onions and potatoes are reproduced by the asexual method. Onions and potatoes are which part of a plant? Name the processes briefly involved in the reproduction of onions and potatoes.

Answer:

Onions and potatoes are both underground storage organs of a plant. Onions are a type of bulb, while potatoes are a type of tuber.

Reproduction in onions

The process of asexual reproduction in onions is bulbs. It involves planting individual onion bulbs in the soil, where they will sprout and produce a new onion plant. The bulb contains a small section of stem tissue, which produces new roots and shoots under the right conditions. As the new plant grows, it will produce new bulbs that can be harvested and replanted.

Reproduction in potatoes

The process of asexual reproduction in potatoes involves planting sections of

potato tuber, each of which contains buds that will sprout into new potato plants. The tuber serves as a source of stored energy and nutrients for the developing plant. As the plant grows, it will produce new tubers that can be harvested and replanted.

iii. Lemons reproduce by layering and apples by grafting. Compare both methods of asexual reproduction.

Answer:

Layering and grafting both are methods of asexual reproduction used to propagate desirable varieties of plants, including lemons and apples.

Comparison between layering and grafting

The comparison between layering and grafting is as follows.

Layering	Grafting
Layering involves bending a low-growing branch of a plant down to the ground and covering a section of it with soil, leaving a small portion of the branch exposed.	Grafting is a method of inserting a part of one plant into another plant in such a way that the two will unite and continue their growth.
Layering allows for the propagation of a larger number of the same type of new plants from a single-parent plant.	It is beneficial for getting more varieties from a single plant.
Layering is a simple and low-tech method that can be done without special equipment.	Grafting is regarded as a highly achievable strategy in the agricultural field. It is a more complex method that requires skill and specialized tools.
In the layering technique, we can get the same qualities from the parent plant to the new plant.	We can obtain exceptionally appealing characteristics from the parent ‘stock' plant to various ‘scions' using the grafting strategy.
Examples: Jasmine, lemon, etc.	**Examples:** Mango, apple, etc.

C. Answer the following questions briefly.

1. Explain the importance of reproduction.

   Answer:

   Reproduction is a process by which new offspring are produced from their parents.

   Reproduction is important for the continuation of life, genetic diversity, adaptation to changing environments, and evolution. Without reproduction, the survival and continuity of living organisms would be at risk.

2. Individuals that are produced asexually are identical to their parent plants. Why is that so?

   Answer:

   Individuals that are produced asexually are identical to their parent plants because they inherit all their genetic information from a single parent. Asexual reproduction is a process where a single organism produces offspring without the involvement of sex cells. In this process, the genetic information of the parent is passed on to the offspring, and there is no recombination of genetic material as occurs during sexual reproduction. As a result, the offspring produced by asexual reproduction are genetically identical to their parent.

3. How does a strawberry plant reproduce?

   Answer:

   A strawberry plant produces flowers and seeds, yet it reproduces asexually through stolons. These are the stems that grow horizontally on the surface of the ground as runners. Over time, these runners develop roots and buds with intervals, forming a new plant.

4. Describe the importance of artificial propagation in agriculture.

   Answer:

   In the agriculture field, asexual reproduction is important in the following ways:

   - Artificial propagation allows farmers to produce large quantities of plants with uniform quality and characteristics.
   - It can be used to propagate endangered or rare species, which helps to conserve genetic diversity and prevent extinction.

- Farmers can increase their crop yields by using artificial propagation to produce new plants with desirable traits, such as high yield, pest resistance, and drought tolerance.
- It helps farmers to produce more food with less land, water, and resources.
- It also plays a crucial role in the development of new crop varieties, which can help farmers adapt to changing environmental conditions and sustainably increase their crop yields.

5. Differentiate between sexual and asexual reproduction in plants.

Answer:

Difference between the sexual and asexual reproduction in plants is:

Sexual reproduction	Asexual reproduction
In sexual reproduction, two parents are involved.	In asexual reproduction, only one parent is involved.
Sex cells are involved in it to produce new offspring.	No sex cells are involved instead offspring are produced from vegetative parts.
Offspring produced through sexual reproduction resemble their parents.	Offsprings produced by asexual reproduction are identical to their parents.
Few offspring are produced.	A large number of offspring are produced.

D. Investigating questions.

1. Grow a plant by the cutting method. Write the procedure you will follow.

Answer:

I grow a money plant by the cutting method. The procedure that I follow to grow the money plant by the cutting method is given below:

Materials

- Scissors
- Soil

- A clean, small pot
- Water

Procedure

- I selected a healthy, mature money plant. I choose a stem that is 4-6 inches long and has at least two leaves attached.
- By using scissors I make a clean cut just below a node (where the leaves attach to the stem).
- I remove the leaves from the lower half of the stem, leaving only one or two leaves at the top.
- I fill a small pot with soil and make a small hole in the centre.
- Then I insert the cut end of the stem into the hole and water the cutting thoroughly, making sure the soil is evenly moist.
- I place the pot in a warm, bright spot, but out of direct sunlight.
- After a few weeks, a new money plant is grown up in the pot.

Note: Students can take any other plant like aloe vera which is available for them.

2. Investigate how grafting and cutting are similar. List the plants that can grow using both methods of vegetative propagation.

Answer:

Grafting and cutting are similar in that they are both methods of vegetative propagation, which means they allow a plant to reproduce asexually and create offspring that are genetically identical to the parent plant. Both grafting and cutting involve taking a piece of a parent plant and encouraging it to grow into a new plant.

Grafting: In grafting, a piece of stem or branch, called a scion, is taken from one plant and attached to a different plant, called the rootstock.

Cutting: In cutting, a stem or branch is taken from a plant and placed in soil or water to encourage it to grow roots and develop into a new plant.

Plants using both cutting and grafting methods for propagation

Some of the plants that can be propagated using both grafting and cutting include:

- Apple
- Grape
- Roses
- Citrus
- Pomegranate

- Blueberry
- Blackberry
- Raspberry

E. Answer the following questions in detail.

1. Define reproduction. Explain the types of reproduction.

Answer:

Reproduction

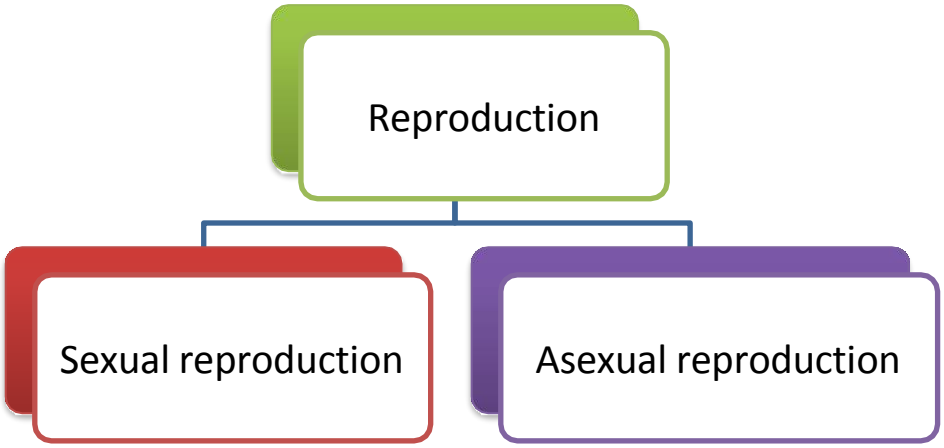
A process by which new offspring are produced from their parents is called reproduction. All living things, including plants and microorganisms, are capable of reproduction.

Importance of reproduction

Reproduction ensures the continuity of life. Without reproduction, no living being would have been able to continue their race.

Types of reproduction in plants

Plants reproduce in different ways. The two basic ways by which plants reproduce are shown below.

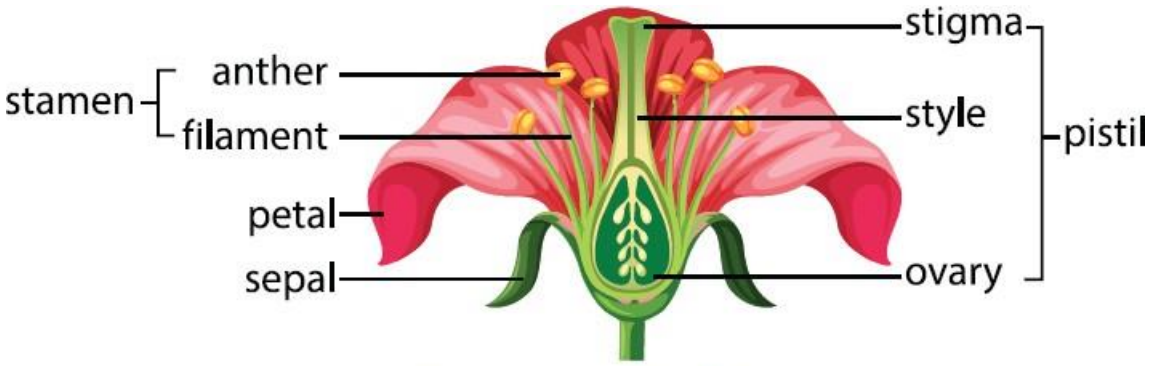


Sexual reproduction

The type of reproduction in plants involves the fusion of male and female gametes, which means both parts (male and female) take part in reproduction is called sexual reproduction.

Male and female reproductive cells are called gametes. Male gametes in plants are contained in pollen grains, while a female gamete is called an egg. Both male and female gametes are produced by the reproductive organs of a

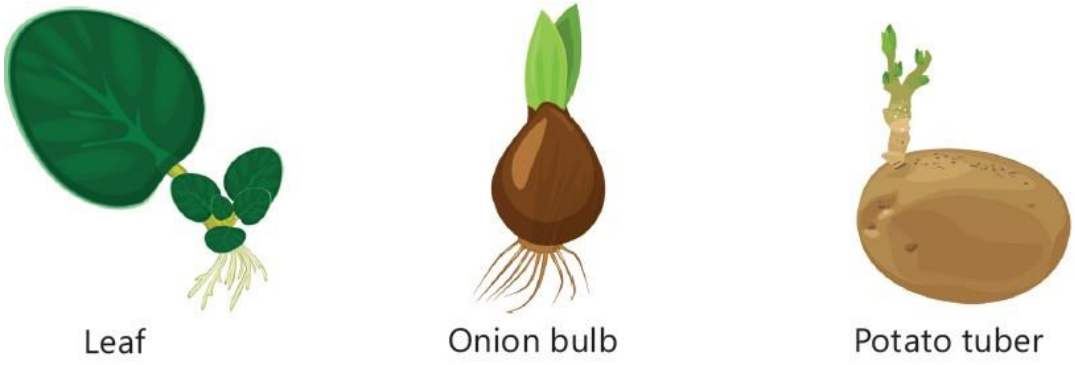
flower. As a result, seeds are produced. The union of male and female gametes is called fertilization (a type of sexual reproduction in plants).



Structure of a flower

Asexual reproduction

Asexual reproduction does not involve the union of gametes. In this type of reproduction, a plant can grow into a new plant from any vegetative part. Roots, stems and leaves are the vegetative parts of a plant. The resulting individual will be identical to its parent plant. Asexual reproduction is possible because almost every cell of a plant can regenerate into an entirely new plant under experimental conditions.



Asexual reproduction in vegetative parts

2. Describe the natural ways of vegetative propagation.

Answer:

Natural ways of vegetative propagation

The vegetative parts of a plant that are involved in reproduction are called vegetative propagation. It is carried out by natural as well as artificial methods.

The natural method of asexual reproduction

In this method of asexual reproduction, the plant is produced by its roots or stem. It includes methods that help the plant grow by self-propagation. The following are some natural methods of asexual reproduction in plants.

Budding

Budding is the most common method of asexual reproduction. A bud, commonly referred to as an eye, is an outgrowth on the surface of some plants, such as a potato plant, from which a new plant originates. Budding is most common in yeast.

Bulbs

Bulbs are underground stems with fleshy leaves. These underground stems grow into a new plant. Common examples of plants growing from bulbs are onion, garlic, tulip, daffodil, etc.

Tubers

Tubers, such as potatoes, are fleshy underground storage structures. Tubers are underground stems. Have you ever seen eyes on a potato? At each eye, there is a bud which is capable of growing into a new plant. Sprouting points on potatoes are called eyes.

Stolons

A strawberry plant produces flowers and seeds, yet it reproduces asexually through stolons. These are the stems that grow horizontally on the surface of the ground as runners. Over time, these runners develop roots and buds with intervals, forming a new plant.

Runner

A runner is a stem which grows underground and has nodes. These nodes grow into roots and then into a new plant.

3. Explain sexual reproduction in plants.

Answer:

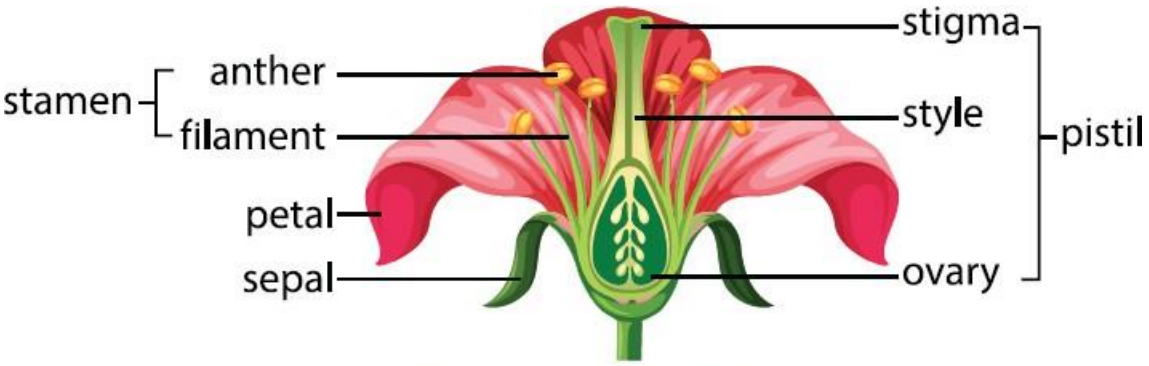
Sexual reproduction

The type of reproduction in plants involves the fusion of male and female gametes, which means both parts (male and female) take part in reproduction is called sexual reproduction.

Structure of a flower

Male and female reproductive cells are called gametes. Male gametes in plants are contained in pollen grains, while a female gamete is called an egg. Both male and female gametes are produced by the reproductive organs of a

flower. As a result, seeds are produced. The union of male and female gametes is called fertilization (a type of sexual reproduction in plants).

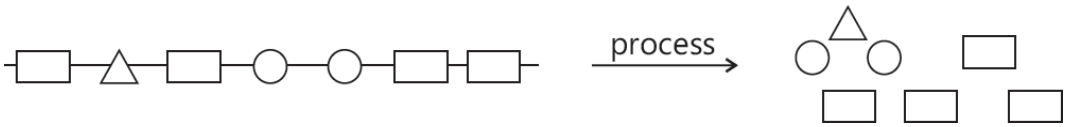


Structure of a flower

Term 1 Periodic Unit 2
Unit 3: Human Digestive System

A. Choose the correct option.

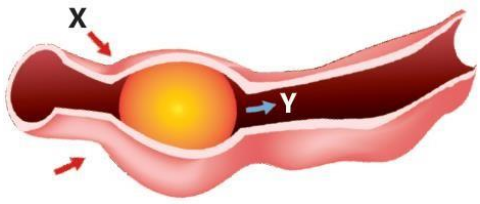
1. The correct sequence of digestion is:
   a. uptake-breakdown-utilization-removal
   b. uptake- breakdown-removal-utilization
   c. breakdown-utilization-uptake-removal
   d. breakdown-uptake-utilization-removal
   The correct answer is a.
2. The part of the digestive system which absorbs food is the:
   a. mouth
   b. stomach
   c. small intestine
   d. large intestine
   The correct answer is c.
3. The enzyme that acts on carbohydrates in rice is:
   a. pepsin
   b. amylase
   c. trypsin
   d. lipase
   The correct answer is b.
4. The food moves through the alimentary canal by:
   a. gravity
   b. peristalsis
   c. water
   d. enzymes
   The correct answer is b.
5. The chemical digestion of protein starts in the:
   a. mouth
   b. oesophagus
   c. stomach
   d. small intestine
   The correct answer is c.
6. Which of the following processes describes the diagram?



a. absorption
b. chewing
c. digestion
d. secretion

The correct answer is c.

7. The diagram shows peristaltic movement.

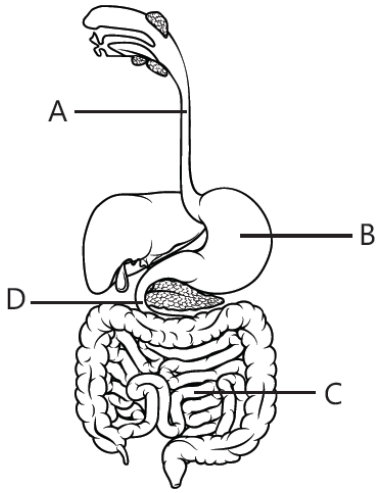


What is happening at X and Y?

	X	Y
a	Contraction	Contraction
b	Relaxation	Contraction
c	Relaxation	Relaxation
d	Contraction	Relaxation

The correct answer is d.

8. The diagram shows part of the human alimentary canal. In which part does the absorption of food occur?



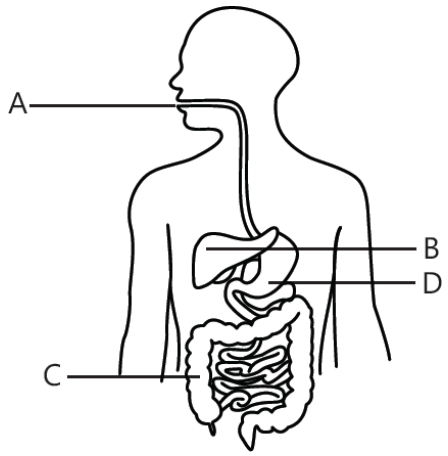
a. A
b. B
c. C
d. D

The correct answer is c.

9. Hardening of faeces occurs in:
   a. ulcer
   b. diarrhoea
   c. constipation
   d. scurvy

   The correct answer is c.

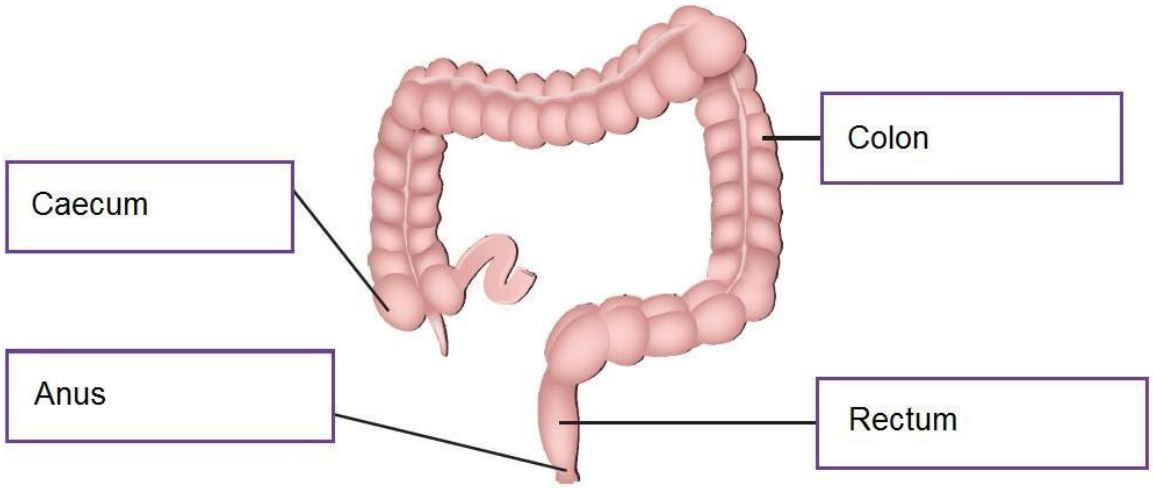
10. The diagram shows the human alimentary canal. Which structure does not secrete digestive enzymes:



a. A
b. B
c. C
d. D

The correct answer is c.

B. Label the diagram of the large intestine.



C. Who am I?



I am: a stomach.

I do: I churns and squashes the food.



I am: a small intestine.

I do: I absorb the nutrients.

D. Constructive response questions.

i. The digestive system consists of a long tube-like structure called the digestive tract. It begins at the mouth and ends at the anus. What is the length of the digestive tract?

Answer:

The length of the human digestive tract is about 10 meters.

ii. Digestion is of two types, physical and chemical digestion. Teeth help in physical digestion. Name four types of teeth.

Answer:

The four types of teeth are incisors, canines, premolars and molars.

iii. Ingestion, digestion, absorption, assimilation and egestion are the steps of the digestive process. In which part does digestion occur?
Answer:
Digestion primarily occurs in the stomach and small intestine.

E. Answer the following questions briefly.

1. Why do we need to digest food? Infer your answer.
Answer:
We need to digest food to obtain nutrients that are essential for our body's growth, maintenance, and energy production. When we consume food, it undergoes a complex process of digestion that breaks down the ingested food into smaller, simpler molecules that can be absorbed and utilized by our body.

2. What is the role of digestive juices in the process of digestion?
Answer:
Digestive juices play a vital role in the process of digestion by breaking the food into smaller molecules. These juices are secreted by various glands and organs along the digestive tract. They provide the necessary enzymes and chemicals to initiate and facilitate the chemical reactions involved in digestion.

3. If a person vomits, which part of his digestive system is unable to deliver the food to the next organ?
Answer:
If a person vomits, the stomach is unable to deliver the partially digested food to the next organ in the digestive system, which is the small intestine.

4. Describe the role of the epiglottis in the digestion of food.
Answer:
A flexible flap of cartilage located at the base of the tongue, in the throat region called the epiglottis. It prevents food or liquid from entering the windpipe (trachea) and the lungs during the process of swallowing.

5. Differentiate between the bolus and chyme.

Answer:
The difference between the bolus and chyme is:

Bolus	Chyme
The partly digested food is rolled by the tongue into an oval lump called the bolus.	The food in the stomach is mixed with gastric juice and converted into a thick creamy semi-solid mass called the chyme.
Bolus is swallowed by the upward and backward movement of the tongue.	Chyme is stored in the stomach for some time and then moved to the small intestine.

F. Investigating questions.

1. Ali ate a burger from a canteen. After some time, he had belly pain and passed loose stools. If you think he had diarrhoea, what could be other symptoms?

   Answer:
   If Ali had belly pain and passed loose stools after eating a burger, he experienced diarrhoea.

   Symptoms of diarrhoea
   Diarrhoea is characterized by frequent, watery bowel movements. Other common symptoms of diarrhoea may include:
   - Abdominal cramps
   - Nausea and vomiting
   - Fever
   - Dehydration
   - Increased thirst
   - Dry mouth
   - Reduced urine output
   - Fatigue
   - Dizziness

2. Predict what would happen to a person if his pancreas is not producing

enough trypsin.

Answer:

If the pancreas of a person is not producing enough trypsin, it has several effects on his digestive system. Trypsin helps in the digestion of proteins produced by the pancreas. He may suffer from:

- Trypsin plays a crucial role in breaking down proteins into smaller peptides and amino acids. This can lead to difficulty in absorbing essential amino acids.
- Inadequate trypsin production can lead to nutritional deficiencies and related health issues.
- Insufficient trypsin production can cause digestive disturbances, including bloating, gas, and discomfort after meals.
- The lack of trypsin can result in weight loss and malnutrition. Their deficiency can lead to muscle wasting, weakness, and overall compromised health.
- A deficiency of trypsin can be a sign of underlying pancreatic disorders, such as chronic pancreatitis or pancreatic insufficiency.

3. Search the internet and write the causes and symptoms of GERD and gastroenteritis. Also, write the preventive measures against them.

Answer:

GERD (Gastroesophageal Reflux Disease)

Gastroesophageal reflux disease (GERD) is a disease in which undigested food moves up from the stomach into the esophagus.

Causes

- The lower esophageal sphincter (LES) is a muscular ring that prevents stomach acid from flowing back into the esophagus. If the LES is weak or does not close properly, it can result in acid reflux and GERD.
- Being overweight can increase pressure on the stomach and contribute to the development of GERD.
- Spicy or fatty foods, citrus fruits, tomatoes, coffee, and carbonated beverages can cause GERD.

Symptoms

- Heartburn
- Chest pain
- Chronic cough or sore throat
- Difficulty swallowing

Preventive measures

- Losing weight can help to reduce the pressure on the stomach and GERD.
- Avoid foods and beverages that trigger GERD.
- Wait at least two to three hours after eating before lying down or going to bed.

Gastroenteritis

Gastroenteritis is a disease that causes diarrhoea and vomiting. It is usually caused by bacteria or viruses.

Causes

- Gastroenteritis is commonly caused by viral infections, such as norovirus or rotavirus.
- Bacteria like Salmonella, Escherichia coli (E. coli), and Campylobacter in contaminated food or water can also cause gastroenteritis.
- If contaminated food or water contains parasites like Giardia or Cryptosporidium ingested can lead to gastroenteritis.
- Lack of proper handwashing can contribute to gastroenteritis.

Symptoms

- Loose or watery stools
- Nausea and vomiting
- Abdominal pain and cramps
- Fever
- Fatigue and body aches

Preventive measures

- Wash hands thoroughly with soap and water, especially before preparing or eating food and after using the washroom.
- Properly cook and store food.
- Drink water from safe and clean sources.
- Maintain proper sanitation and cleanliness in the food.

G. Answer the following questions in detail.

1. Describe the functions of small and large intestines in the digestive system.

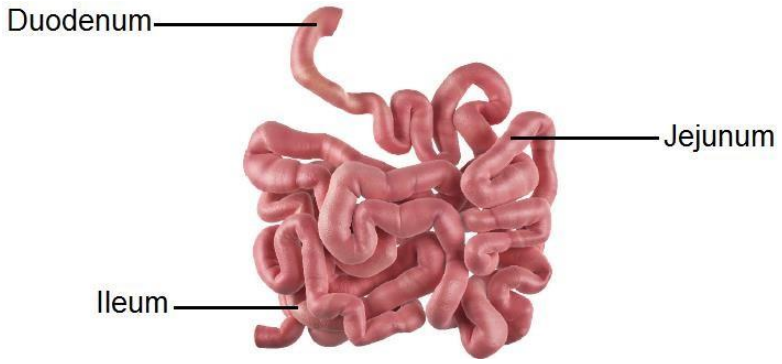
Answer:

Small intestine

The small intestine is a long tube consisting of three parts.

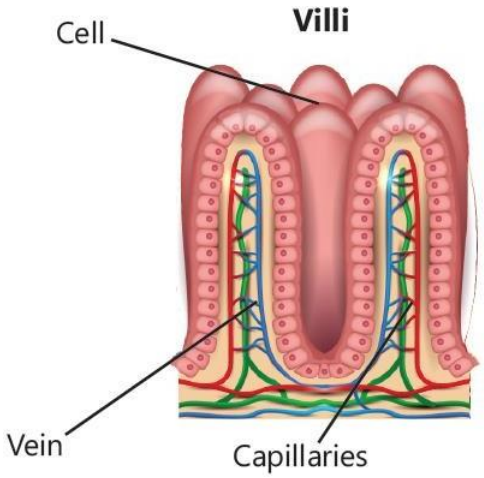
- Duodenum

- Jejunum
- Ileum



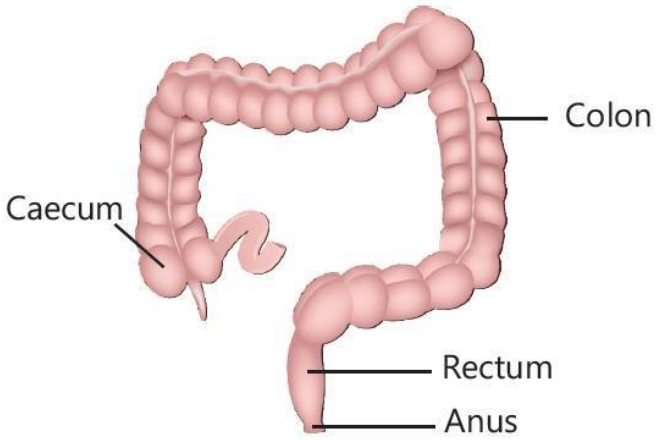
Functions of the small intestine

When the chyme enters the small intestine, it is mixed with secretions from the liver, pancreas and duodenum walls and is completely broken down. After digestion, the food is absorbed by the small intestine and then it enters the blood. Almost all absorption takes place in the small intestine. The small intestine has many folds. These folds are finger-like outgrowths called villi, present in the intestine which help in the absorption of food. Villi increase the surface area of the small intestine for maximum absorption of digested food. The absorbed food is then passed to the blood. The blood transports the absorbed food to the liver. It is then used for different purposes. The food that remains undigested in the ileum is then moved to the large intestine.



Large intestine

It is made of three parts, i.e. caecum, colon and rectum.



Functions of the large intestine

The material that enters the large intestine contains a large amount of water, salts and undigested food. Water and salts are absorbed into the blood, while the undigested food is converted into a solid form. This undigested food is called faeces. It contains dead bacteria, plant fibre, cholesterol and bile pigments.

2. How does less water intake affect the digestive system?

Answer:

Insufficient water intake can have several effects on the digestive system, as water plays a crucial role in its proper functioning. Here are some ways in which inadequate water intake can affect the digestive system:

Constipation

If the absorption of water occurs excessively in the large intestine or there is less intake of water, it may lead to the hardening of faeces. This condition is called constipation. In this condition, passing faeces out of the body becomes difficult.

Dehydration

Less water intake can lead to dehydration. Dehydration causes dry mouth, reduced saliva production, and decreased secretion of mucus in the digestive tract, which weakens its normal working.

Digestive discomfort

Water helps to lubricate the digestive system, enabling the smooth movement of food through the digestive tract. Less water intake can result in dryness and irritation in the digestive system. Which may lead to discomfort, bloating, and indigestion.

3. Differentiate between mechanical and chemical digestion. Explain the process of digestion in each part of the digestive system.

Answer:

Differences between mechanical and chemical digestion are as follows.

Mechanical digestion	Chemical digestion
It involves the physical breakdown of food into smaller particles.	It involves the breakdown of food into simpler units by the action of enzymes.
Chewing, churning and mixing are parts of mechanical digestion.	The process of digestion starts with food intake.

The process of digestion in the digestive system

In the mouth

Mechanical digestion begins in the mouth. Where food is broken down into smaller pieces by the action of teeth. The tongue also helps in mixing the food with saliva, forming a bolus that can be easily swallowed.

Chemical digestion also begins with the secretion of saliva. Saliva contains the enzyme amylase, which starts the breakdown of carbohydrates into smaller sugars.

In the stomach

The food enters the stomach and it undergoes further mechanical digestion through the churning and mixing action of the muscular walls. This helps to break down the food into a semi-liquid mass called chyme.

Chemical digestion also starts in the stomach. Gastric glands secrete gastric juice, which contains hydrochloric acid and the enzyme pepsin. Pepsin starts the digestion of proteins into smaller peptides.

In the small intestine

The small intestine is the primary site of chemical digestion and nutrient absorption. It receives digestive enzymes from the pancreas and bile from the liver and gallbladder. All enzymes in the small intestine involve the breaking of carbohydrates, proteins, and fats into simple sugars, amino acids and fatty acids respectively.

In the large intestine

The large intestine mainly absorbs water, electrolytes, and vitamins produced by gut bacteria. It does not have a significant role in chemical digestion.

4. Define peristalsis. Discuss its role in digestion.

Answer:

Peristalsis

Peristalsis is a muscular contraction and relaxation movement in the digestive system. It helps to push food through the digestive tract for efficient digestion and absorption of nutrients.

Role of peristalsis

Several roles of peristalsis in digestion are:

- Peristalsis helps move ingested food along the digestive tract. Peristaltic contractions in the esophagus push the bolus towards the stomach. In the stomach, peristalsis pushes the chyme into the small intestine.
- Peristaltic movements in the stomach and small intestine contribute to mechanical digestion.
- The peristaltic contractions help in properly absorbing nutrients into the bloodstream.
- Peristalsis also plays a crucial role in eliminating waste products from the body. Peristaltic contractions in the colon help move the waste material along, allowing for the reabsorption of water and the formation of solid faeces.
- Peristalsis pushes the faeces towards the rectum and anus for elimination.
- Hunger pangs are peristaltic contractions which are felt when you have not eaten for a long time.

Term 1 Periodic Unit 2
Unit 4: Balanced Diet

A. Choose the correct option.

1. Cheese is a rich source of:
   a. carbohydrates
   b. proteins
   c. dietary fibre
   d. fats
   The correct answer is d.
2. The disease due to protein deficiency is:
   a. scurvy
   b. osteomalacia
   c. rickets
   d. kwashiorkor
   The correct answer is d.
3. Scurvy causes:
   a. bleeding of gums
   b. loss of weight
   c. accumulation of fluids
   d. sweating
   The correct answer is a.
4. The most abundant inorganic substance/substances in our body is/are:
   a. water
   b. fats
   c. proteins
   d. dietary fibre
   The correct answer is a.
5. The food pyramid represents:
   a. different groups of food
   b. nutrients present in food
   c. amount of food required
   d. items of food
   The correct answer is c.
6. The essential nutrients for body growth and repair of lost and damaged parts of the body are:

a. carbohydrates
b. proteins
c. fats
d. vitamins

The correct answer is b.

7. Glucose is the simplest unit of:
   a. carbohydrates
   b. proteins
   c. fats
   d. vitamins

   The correct answer is a.
8. Keratin is:
   a. a vitamin
   b. a protein
   c. a fat
   d. dietary fibre

   The correct answer is b.
9. Which of the following regulates the body temperature and provides a medium for chemical reactions in our body?
   a. balanced diet
   b. water
   c. dietary fibre
   d. vitamins

   The correct answer is b.
10. Poor development and deformities of bones are caused by the deficiency of:
    a. dietary fibre
    b. fats
    c. calcium
    d. proteins

    The correct answer is c.

B. Name the essential nutrients of the following food sources.

Food source	Essential nutrient
Egg	Proteins and vitamins
Butter	Vitamins and fats
Peas	Carbohydrates and proteins
Lentil	Proteins and carbohydrates

C. Constructive response questions.

i. Your body uses calories from food for daily activities such as walking, running, thinking, breathing and other important functions. These calories are stored in the food we eat; therefore, a balanced diet is very important. Who needs more calories, a labourer (working outside) or an office worker (sitting in a chair)? Discuss.

Answer:

A labourer who works in construction, farming or any physically demanding occupation requires more calories compared to an office worker who sits in a chair for most of the day. The need for calories depends on physical activities, body composition and overall health of an individual.

The labourer is engaged in activities that require constant movement, lifting and carrying. These activities require a significant amount of energy and therefore, more calories are needed to fulfil the energy demands of their body.

On the other hand, office workers spend most of their day sitting on a chair and engaging in few physical activities. Their energy requirement is generally lower compared to a labourer. The daily activities of an office worker involve walking and typing.

ii. Dietary fibre is not digested. It is not a source of energy. Why is dietary fibre an essential part of a balanced diet? Explain.

Answer:

Dietary fibre is an essential part of a balanced diet, despite not being digested or a source of energy. Some reasons why dietary fibre is important:

- Dietary fibre plays a vital role in maintaining a healthy digestive system. Fibre helps prevent some digestive disorders such as constipation. It also promotes regular bowel movements and contributes to overall gut health.
- High-fibre foods can help to control appetite, which is useful for weight management. It takes longer to chew and digest and it helps to avoid overeating.
- Fibre-rich foods can help to regulate blood sugar levels.
- Certain types of dietary fibre can help lower cholesterol levels. By reducing cholesterol levels, dietary fibre contributes to cardiovascular health and lowers the risk of heart disease.
- Dietary fibre acts as a prebiotic, providing nourishment for beneficial bacteria in the gut.

iii. Calcium and vitamin D are the most important nutrients to keep bones healthy and strong. Name some other nutrients that are essential for the development of healthy bones.

Answer:

Some nutrients that are essential for the development of healthy bones are:

- Magnesium
- Phosphorus
- Vitamin A
- Vitamin B
- Vitamin C
- Vitamin K

D. Answer the following questions briefly.

1. Differentiate between rickets and osteomalacia.

Answer:

The difference between rickets and Osteomalacia is:

Rickets	Osteomalacia
Rickets is a disease of poor development and growth of bones.	Osteomalacia is a disease of bones, which makes bones soft.
Symptoms: Pain in the bones, muscle weakness and bowing legs are some symptoms of rickets.	**Symptoms:** Weakness of bones and frequent bone fractures are some symptoms of osteomalacia.
Causes: Lack of calcium or vitamin D in the body causes rickets.	**Causes:** Lack of vitamin D in the body causes osteomalacia.
Treatment: Take a calcium and vitamin D-rich diet for the treatment of rickets.	**Treatment:** Take vitamin D supplements and get sunlight exposure for the treatment of osteomalacia.

2. Water is necessary for our bodies. Justify.
   Answer:
   Water is necessary for our bodies because it is the most abundant inorganic substance in our bodies. It constitutes about 60% of our body weight. Our brain also contains water. Water provides a medium for many reactions taking place in our bodies. It regulates the body temperature and is also a major constituent of blood. Water deficiency can cause diseases like constipation, dryness, dehydration, etc.

3. Write down the sources of vitamin C.
   Answer:
   The sources of vitamin C are oranges, spinach, kiwi, tomatoes, broccoli, etc.

4. What would happen if you were suffering from iron deficiency?
   Answer:
   If we are suffering from Iron deficiency, it causes anaemia.

5. A healthy diet means a healthy body. Justify.
   Answer:
   A healthy diet maintains a healthy body for several reasons:
   - A balanced and nutritious diet provides the body with essential nutrients,

including vitamins, minerals, proteins, carbohydrates, and fats.

- A healthy diet can help prevent various chronic diseases and conditions.
- A balanced intake of carbohydrates, proteins, and healthy fats supplies energy for daily activities, supports brain function, and helps maintain mental clarity and focus.
- A well-nourished body is better equipped to fight off infections and diseases.
- A healthy diet improves mood, promotes better sleep, enhances cognitive function, and increases feelings of vitality and happiness.

E. Investigating questions.

1. Identify two diseases due to malnutrition in your surroundings and write about them in detail. Suggest how these diseases can be cured.

Answer:

Two common diseases caused by malnutrition in my surroundings are Kwashiorkor and scurvy.

Kwashiorkor

Kwashiorkor is a severe form of malnutrition caused by insufficient protein intake. It often affects young children who have a limited diet lacking essential nutrients.

Here are the key features of Kwashiorkor:

Symptoms: Kwashiorkor is characterized by swelling of the abdomen and limbs. Stunted growth, muscle wasting, fatigue, irritability, skin changes, hair loss, poor growth and a weakened immune system are some other symptoms.

Treatment: Kwashiorkor can be treated by taking adequate protein. Intake of protein-rich foods such as fortified milk, legumes, and eggs can cure the kwashiorkor. Some nutritional supplements may also be given for their treatment. Medical care is also provided to manage the complications and address other health issues.

Scurvy

Scurvy is a malnutrition disease caused by the deficiency of vitamin C (ascorbic acid) in the diet.

Symptoms: Symptoms of scurvy include weakness, fatigue, swollen and bleeding gums, joint pain, poor wound healing, and skin discolouration.

Treatment: Consuming foods rich in vitamin C or taking vitamin C supplements is the primary treatment for scurvy. This helps to replenish

vitamin C levels in the body and correct the deficiency. Good sources of vitamin C include citrus fruits, berries, kiwi, peppers, and leafy greens. In severe cases, individuals with scurvy may require additional medical care to address other complications.

2. Fats and oils cause obesity. Investigate why fats are essential for our body.

Answer:

Fats are also essential for our bodies. They are capable of providing a large amount of energy. They are the major components of cell membranes. Fats are storage compounds. They can store energy that can be utilized later. Fats are essential for the absorption of fat-soluble vitamins (A, D, E, and K) and other fat-soluble compounds. Fats help to insulate and protect the main organs in the body. It also helps to maintain the body temperature by acting as an insulating layer.

F. Answer the following questions in detail.

1. What is a balanced diet? How can it be achieved?

Answer:

Balanced diet

A balanced diet contains all the required nutrients in the right amounts as required by the body for its proper functioning.

Different nutrients found in a balanced diet are:

- Proteins
- Carbohydrates
- Fats
- Vitamins
- Minerals
- Water

Achieving a balanced diet

Achieving a balanced diet can be done by considering the following:

- Eat a variety of foods including fruits, vegetables, whole grains, lean proteins, dairy or dairy alternatives, and healthy fats to ensure a diverse intake of nutrients.
- Balance your plate with appropriate servings of each food group, ensuring proper distribution of nutrients.
- Choose complex carbohydrates such as whole grains, legumes and

vegetables. They provide sustained energy and essential nutrients.

- Intake of proteins such as poultry, fish, tofu, legumes, and dairy products. These provide essential amino acids for the growth, repair, and maintenance of body tissues.
- Incorporate healthy fats from sources like avocados, nuts, seeds and olive oil.
- Consume a variety of colourful fruits and vegetables as they are rich in vitamins, minerals, and antioxidants.
- Drink an adequate amount of water throughout the day to maintain proper hydration and support bodily functions.

Intake of a variety of food is required to maintain the desired nutrient levels in the body and to be healthy.

2. What are carbohydrates? Write down their chemical composition along with their sources.

Answer:

Carbohydrates

Carbohydrates are a chief source of energy in our bodies. They constitute around 60-70% of the energy produced by the body. Carbohydrates are made up of carbon, hydrogen and oxygen. The main sources of carbohydrates are sugar, pulses, cereals, bread, etc.

Types of carbohydrates

There are two types of carbohydrates, simple and complex.

Simple carbohydrates: Simple carbohydrates are sugars, such as glucose, that provide food and energy to the body. Other carbohydrates like sucrose and lactose are also important for our bodies.

Complex carbohydrates: Complex carbohydrates include cellulose, starch, glycogen, etc. They provide fibre, vitamins, and nutrients to the body.

3. List down the essential nutrients required by the body and describe their importance.

Answer:

Essential nutrients

The nutrients that are necessary for our body are called essential nutrients. The deficiency of any of these nutrients can cause serious malnutrition or a disorder.

The following are the essential nutrients required by the body:

- Protein
- Carbohydrates
- Dietary fibre
- Fats and oils
- Vitamin
- Minerals
- Water

Proteins

Our hair, nails and flesh are made up of proteins. Proteins are macromolecules made up of amino acids.

Types of proteins

There are two types of proteins, structural proteins and functional proteins.

Structural proteins: Structural proteins provide structure and support to cells. Keratin is a structural protein that makes hair and nails.

Functional proteins: Functional proteins perform various functions in our body. Haemoglobin present in red blood cells is a functional protein that carries oxygen to other cells.

Proteins are essential for the growth, repair and working of our body. Protein-rich foods include eggs, meat, fish, milk, pulses, beans, etc.

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Complex carbohydrates: Complex carbohydrates include cellulose, starch, glycogen, etc. They provide fibre, vitamins, and nutrients to the body.

Dietary fibre

Fibre is a type of carbohydrate (complex carbohydrates) that is not digested in the human digestive system. Fibre is also called roughage. Fibre can be either soluble or insoluble. It is very important to our diet as it decreases the risk of many diseases. It helps in the working of the digestive system.

Fats and oil

Fats and oils are also essential for our bodies. They are capable of providing a large amount of energy. Fats are part of the cell membrane. Fats are storage compounds. They can store energy that can be utilized later. Cholesterol helps in the synthesis of other important molecules. Oils are unsaturated fats used for cooking purposes. Major sources of fats are cheese, butter, eggs, meat, etc. Oils extracted from plants include sunflower, coconut, peanut, etc.

Vitamins

Vitamins are chemical compounds required in very small amounts in the body but are essential for the normal working of the human body.

Types of vitamins

There are two types of vitamins, i.e. water-soluble and fat-soluble.

Water soluble vitamins: Water soluble vitamins can dissolve in water, e.g. vitamins B and C.

Fat-soluble vitamins: Fat-soluble vitamins can dissolve in fats, e.g. vitamins A, D, E, etc.

Categories of vitamins

Vitamins are categorised as A, C, D, K, etc.

Vitamin A: It is a fat-soluble vitamin present in leafy vegetables, fish oils, milk, etc. It helps in the proper functioning of different organs such as the liver, kidney, heart etc. It is very important for normal vision.

Vitamin C: It helps in the growth and repair of human tissues. It is present in oranges, spinach, kiwi, tomatoes, broccoli, etc.

Vitamin D: It is also very important for our body. It helps in the maintenance of our bones. Our body produces vitamin D in the presence of sunlight. Its sources include eggs, fish, milk, etc.

Minerals

Minerals are inorganic substances required in small amounts in our bodies. Minerals include calcium, iron, sulphur, sodium, etc.

Calcium: It is part of our bones and blood. Our teeth also contain calcium. It is required for muscle contraction. Calcium is present in milk and milk products as well as leafy vegetables.

Iron: It is also an important mineral. It is part of the heme group of haemoglobin. Its deficiency can cause anaemia. Iron is present in meat and leafy vegetables.

Water

Water is the most abundant inorganic substance in our bodies. It constitutes

about 60% of our body weight. Our brain also contains water. Water provides a medium for many reactions taking place in our bodies. It regulates the body temperature and is also a major constituent of blood. Water deficiency can cause diseases like constipation, dryness, dehydration, etc.

Term 2 Periodic Unit 1
Unit 5: Matter as Particles

A. Choose the correct option.

1. Which of the following does not take the shape of the container?
   a. pencil
   b. lemonade
   c. oil
   d. water
   The correct answer is a.
2. Which of the following states of matter has a definite shape and definite volume?
   a. solid
   b. liquid
   c. gas
   d. plasma
   The correct answer is a.
3. The state of matter is changed by changing its:
   a. pressure
   b. temperature
   c. density
   d. volume
   The correct answer is b.
4. The group that represents gases is:
   a. honey and sugar
   b. milk and juice
   c. smoke and steam
   d. water and water vapour
   The correct answer is c.
5. When the water in the freezer goes from a liquid to a solid state, the process is called:
   a. melting
   b. boiling
   c. freezing
   d. evaporation
   The correct answer is c.

6. The substance in which the particles remain close together and slowly move over each other is:
   a. water
   b. ice
   c. steam
   d. air

   The correct answer is a.
7. An example of diffusion is:
   a. pollen from flowers is blown by the wind
   b. ice cream melts in a warm room
   c. a kitchen towel soaks up some spilt milk
   d. the smell of cooking spreads throughout a house

   The correct answer is d.
8. A few drops of perfume were spilt on the floor. A few minutes later the perfume could be smelt a few metres away. The two processes that took place are:
   a. evaporation and condensation
   b. distillation and diffusion
   c. distillation and condensation
   d. evaporation and diffusion

   The correct answer is d.
9. A process in which the particles move close together but remain in motion is:
   a. diffusion
   b. condensation
   c. freezing
   d. evaporation

   The correct answer is a.
10. The change of state that takes place during evaporation is:
    a. liquid to liquid
    b. liquid to solid
    c. liquid to gas
    d. solid to gas

    The correct answer is c.

B. Constructive response questions.

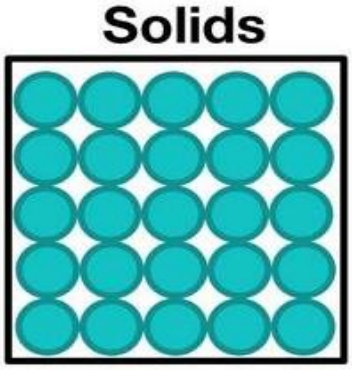
i. The matter is anything which has mass and occupies space. Solids, liquids and

gases are three different forms of matter. Discuss the arrangement of particles and shapes in solids, liquids and gases.

Answer:

Solids, liquids, and gases are three states of matter, and they differ in terms of the arrangement of particles and the shapes they exhibit.

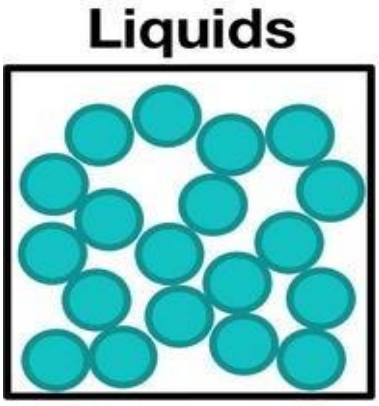
Solids



In a solid, the particles are tightly packed and arranged in a regular and ordered pattern. The particles in a solid vibrate in their positions, but they do not move around each other. They have strong intermolecular forces that hold them together, resulting in a fixed shape and volume.

Examples: A piece of wood, a metal rod, a rock, etc.

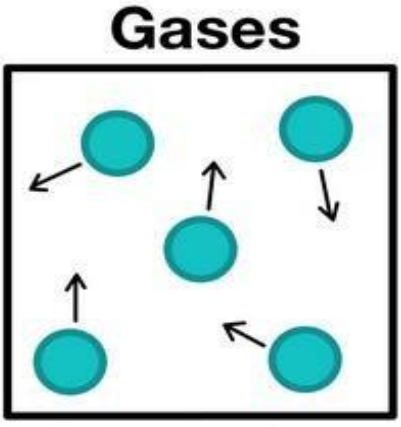
Liquids



In a liquid, the particles are close together but not as tightly packed as in a solid. The particles in a liquid can slide past each other, giving the liquid its fluidity. The particles have weaker intermolecular forces compared to solids, allowing them to move more freely. Liquids take the shape of the container they are poured into, but they maintain a constant volume.

Examples: Water, milk, oil, etc.

Gases



In a gas, the particles are spaced far apart and move freely in all directions. Gas particles have very weak intermolecular forces, allowing them to move independently of each other. Gases do not have a fixed shape or volume and can expand to fill the entire space available to them. They take the shape of the container they are in and can be compressed or expanded easily.

Examples: Air, oxygen gas, carbon dioxide gas, etc.

ii. Density is mass per unit volume. Explain why solids are denser than liquids, and liquids are denser than gases.

Answer:

Solids are denser than liquids and liquids are denser than gases due to the arrangement and movement of particles within each state of matter.

Solids

The particles are tightly packed and closely bound together in solids. They have strong intermolecular forces that hold the particles in a fixed position with no space. That is why they have a high mass-per-unit volume ratio and are much denser.

Liquids

The particles have little space between them to move and slide over one another in liquids. They have weaker intermolecular forces than solids, allowing them to move and flow. As a result, liquids have a lower density compared to solids.

Gases

The particles are far away from each other and they. Gas particles have weak intermolecular forces, allowing them to move freely in all directions. They have a low mass per unit volume ratio due to the large empty spaces between gas particles and therefore they have a low density.

C. Answer the following questions briefly.

1. Define states of matter with examples.

   Answer:

   The three primary states of matter are solid, liquid, and gas.

   Solids: The state of matter which is hard and has a fixed shape and volume, is called solids. Ice, wood, metal, rock, etc. are some examples of solids.

   Liquids: The state of matter does not have a fixed shape but they have a fixed volume called liquid. Water, milk, oil, juice, etc. are some examples of liquids.

   Gas: The state of matter which has neither a fixed shape nor a fixed volume is called gas. Oxygen gas, steam, air, etc. are some examples of gases.

   Plasma: Another state of matter which exists under highly specialized conditions is called plasma. Plasma is found in stars, lightning, and some laboratory settings.

2. List down ten materials around you and categorise them based on states of matter.

Answer:

Ten common materials are categorized based on their states of matter:

Solids

- Desk
- Book
- Pen
- Glass
- Door

Liquids

- Water
- Tea
- Milk

Gases

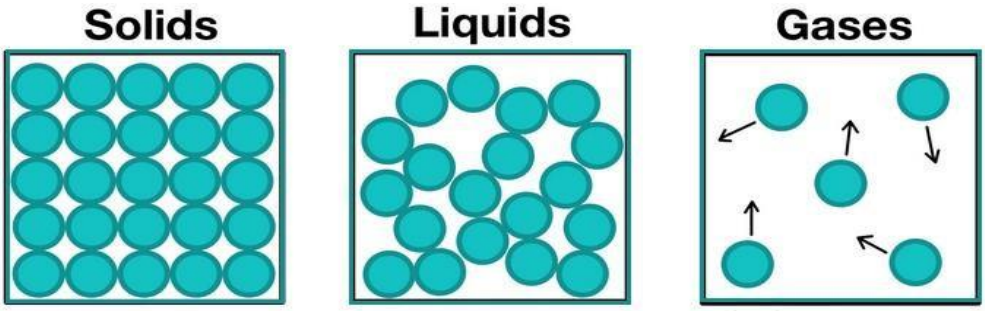
- Air in classroom
- Steam

Note: Materials can vary depending on the student's selection of materials.

3. Draw the arrangement of particles in all states of matter.

Answer:

Arrangement of particles in states of matter:



4. Differentiate between sublimation and deposition.

Answer:

Sublimation and deposition are both phase transitions involving the conversion of a substance between the solid and gaseous states, but they occur in opposite directions.

Difference between sublimation and deposition

The difference between sublimation and deposition is given below.

Sublimation	Deposition
The transition of a solid to a gas without passing through the intermediate liquid state is known as sublimation.	The change of gas directly to a solid without passing through the intermediate liquid state is called deposition.
For example: Frozen carbon dioxide, commonly known as dry ice, sublimes from a solid to a gas, at a temperature of -78^{o}C.	**For example:** Water vapour turns into ice crystals. This is how frost forms on the ground or other surfaces.

5. Give two examples of diffusion from daily life.

Answer:

Two examples of diffusion from daily life are:

- When an air freshener is sprayed in one part of the room, we feel and smell it all over the room. It happens because scented particles of gas spread throughout the room and reach your nose through the process of diffusion. The air freshener molecules move from an area of high concentration (where the scent was initially added) to an area of lower concentration (the rest of the room), spreading and mixing until the entire room has a uniform scent.
- If we drop a few drops of food colouring into a glass of water, the colour spreads and is evenly distributed throughout the water. This is due to diffusion. The food colouring molecules move from an area of high concentration (where the drops were initially added) to an area of lower concentration (the rest of the water), spreading and mixing until the entire solution has a uniform colour.

D. Investigating questions.

1. Hang a wet piece of cloth outside on a clothesline. Investigate how quickly it dries and what factors might affect how quickly it dries.

Answer:

Note the time taken for the cloth to dry completely. Make periodic observations to track the progress of drying.

While conducting the investigation, the following factors affect the drying

time of the cloth.

Temperature

Higher temperatures generally accelerate the evaporation process, leading to faster drying.

Humidity

Higher humidity levels can hinder the evaporation process and result in slower drying.

Air

Adequate air circulation plays a crucial role in drying. If there is a gentle breeze or wind, it can help in evaporating the moisture from the cloth more quickly.

Sunlight

Sunlight provides heat energy that aids in the evaporation process. Exposure to sunlight can potentially speed up drying.

2. Investigate changes in the states of matter in daily life.

Answer:

Following are a few examples of changes in states of matter in daily life:

Melting

Observe the process of ice cubes melting in a glass of water. Take note of the time it takes for the ice cubes to melt completely into the water.

Freezing

Observe the process of freezing by placing a bowl of water in a freezer and note the time takes for the formation of ice.

Boiling

Investigate the boiling process by heating a pot of water on a stove. Observe the formation of bubbles and the conversion of water from a liquid to a gas (water vapour) as it reaches its boiling point.

Evaporation

Investigate the process of evaporation by leaving a shallow container of water exposed to the air. Observe the gradual disappearance of the water as it changes from a liquid to a gas. You can track the evaporation process by measuring the water level over time.

Condensation

Investigate condensation by placing a cold beverage or a cold object (such as a metal spoon) in a warm and humid room. Observe the formation of water droplets on the surface of the cold object or the outside of the cold beverage

container. This demonstrates the change from a gas (water vapour) to a liquid (condensation).

3. Write the steps to check the factors that affect the rate of diffusion.

Answer:

To check the factors that affect the rate of diffusion, conduct the following experiment with the following steps:

Materials

- 2 clear glass cups
- Two different inks (red and blue)
- Water
- A stopwatch or timer

Procedure

- Fill both the glass cups with the water.
- Add a few drops of red ink in one glass cup and a few drops of blue ink in other glass cups.
- Start the stopwatch or timer and observe the time taken by both inks to mix through the water in the glass cups.
- Note the time taken by both inks.
- Repeat the experiment with different factors to test their effects on diffusion. For example, change the temperature or concentration to observe how they impact the rate of diffusion.
- Now, fill one glass cup with hot water and the other with cold water.
- Add a few drops of ink to the hot cup and the cold one.
- Watch and wait for the ink to disperse entirely.
- Note down the time taken by the ink in both cups.
- Based on your observations and data, conclude the factors that affect the rate of diffusion. Discuss any relationships or trends you observed and provide explanations for your findings.

E. Answer the following questions in detail.

1. Describe the particle theory of matter. Discuss the movement of particles in solids, liquids and gases according to the kinetic theory of particles.

Answer:

Particle theory of matter

Scientists developed a theory that deals with the study of the behaviour of particles of matter, called the particle theory of matter.

Postulates of particle theory of matter

According to the particle theory of matter,

- All matter is made up of very small indivisible particles.
- Particles are in constant motion. They move randomly and possess kinetic energy.
- All particles have empty spaces among them.
- Particles move faster when they are heated.

The kinetic theory of particles, which is closely related to the particle theory of matter, describes the movement of particles in different states of matter:

Solids

In solids, the particles are tightly packed and held together by strong intermolecular forces. They vibrate in fixed positions but do not change their relative positions. The particles have the least amount of kinetic energy in solids, resulting in a fixed shape and volume.

Liquids

In liquids, the particles are still close together, but they have more freedom to move. The intermolecular forces are weaker than in solids, allowing the particles to slide past one another. This results in a fluid state where liquids can change shape but still have a fixed volume.

Gases

In gases, the particles are widely spaced and move freely. The intermolecular forces are very weak, and the particles have high kinetic energy. They move randomly, and rapidly. Gases have neither a fixed shape nor a fixed volume and can expand to fill the available space.

2. Differentiate between ice, water and water vapour based on the particle theory.

Answer:

Differences between ice, water and water vapour are:

Ice	Water	Water vapour
Ice has a fixed shape and a fixed volume.	Water does not have a fixed shape but a fixed volume.	Water vapour has neither a fixed shape nor a fixed volume.
It does not flow.	It flows and fills the container shape from the bottom.	It flows and fills the container.
It cannot be compressed.	It can be compressed to some extent.	It can be compressed easily.
The particles of ice are held together by strong.	It has weaker forces than ice.	It has the weakest forces than the ice and water.
		

3. What is diffusion? Explain with examples.

Answer:

Diffusion

The process in which the particles move from a region of higher concentration to a region of lower concentration is called diffusion.

Factors affecting the rate of diffusion

Various factors affect diffusion such as temperature, the number of particles, the size of particles and the distance among them.

- The diffusion of particles becomes faster when the temperature is increased.
- The rate of diffusion will be faster with a greater number of particles in a solution.

- The kind of material in the solution also affects the rate of diffusion. Smaller and lighter particles can spread more easily than larger and heavier ones. Therefore, the gaseous particles diffuse faster than the particles in solids or liquids.
- The distance to travel affects the rate of diffusion between the two points.
- The shorter the distance for the particles to travel, the faster the rate will be.

Examples

- Diffusion is an important phenomenon in various aspects of our daily lives.
- When we spray perfume in one corner of a room, we can smell it throughout the room after some time. This is because the perfume molecules diffuse through the air, moving from an area where the perfume was sprayed to the rest of the room. The diffusion of perfume molecules allows the scent to spread evenly.
- When we stir a spoonful of sugar into a cup of hot tea or coffee, the sugar dissolves and evenly spreads throughout the liquid. This is a result of diffusion. The sugar molecules move from an area of high concentration (the spoonful of sugar) to an area of low concentration (the surrounding liquid), making the drink sweet and homogeneous.

Term 2 Periodic Unit 1
Unit 6: Elements and Compounds

A. Choose the correct option.

1. The gas we need to survive is:
   a. hydrogen
   b. helium
   c. oxygen
   d. carbon dioxide
   The correct answer is c.
2. Which of the following is a compound?
   a. H
   b. H_2
   c. H_2O
   d. OH^-
   The correct answer is c.
3. The correct statement about metals is:
   a. They have dull surfaces.
   b. They have low density.
   c. They have a shiny appearance.
   d. They have low melting and boiling points.
   The correct answer is c.
4. A word equation is a representation of a chemical reaction in the form of:
   a. letters
   b. symbols
   c. words
   d. numbers
   The correct answer is c.
5. Carbon dioxide is made of:
   a. 1 element
   b. 2 elements
   c. 3 elements
   d. 4 elements
   The correct answer is b.
6. Lithium and beryllium are:
   a. metals

b. non-metals
c. metalloids
d. noble gases

The correct answer is a.

7. The metal which is liquid at room temperature is:
   a. Iron
   b. Silver
   c. Mercury
   d. Aluminium

   The correct answer is c.

8. The symbol for magnesium is:
   a. Mn
   b. Mg
   c. Mt
   d. Md

   The correct answer is b.

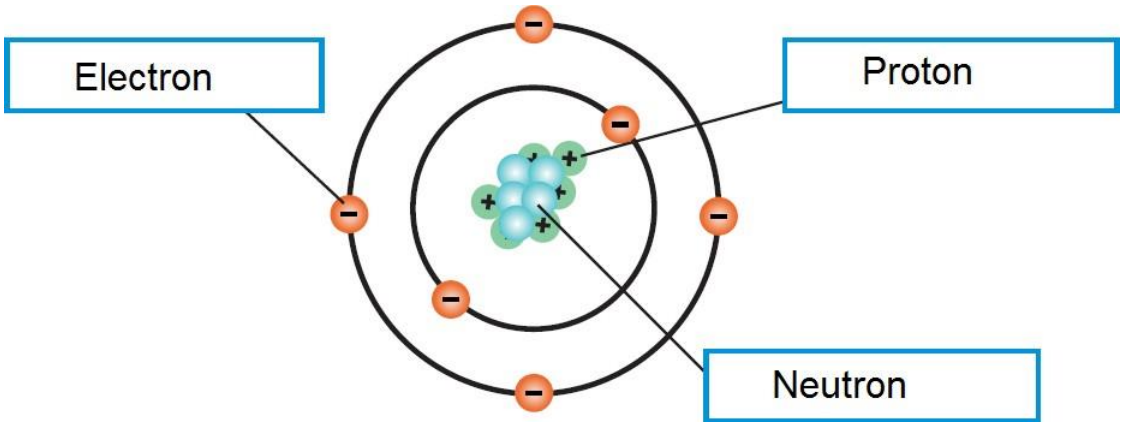
9. Aeroplanes and ships are usually made of:
   a. aluminium
   b. carbon
   c. sodium
   d. iron

   The correct answer is a.

10. The correct statement about an atom is:
    a. neutrons are negatively charged particles
    b. protons are positively charged particles
    c. the atomic number is the number of neutrons
    d. atoms contain protons and electrons in the nucleus

    The correct answer is b.

B. Label the picture of the atom.



C. Constructive response questions.

All elements are arranged in the periodic table according to the increasing atomic numbers.

i. Use a copy of the periodic table and count the total number of elements arranged in the periodic table. Also, count the number of metals and non-metals.

Answer:

The total number of elements arranged in the periodic table is 118. These elements range from hydrogen (H) with atomic number 1 to oganesson (Og) with atomic number 118.

Metals are found on the left-hand side and the middle of the periodic table. There are a total of 93 elements which are metals.

Non-metals, on the other hand, are found on the upper right-hand side of the periodic table. The number of non-metals is 18.

ii. Use a copy of the periodic table and identify the names of elements having atomic numbers 6, 12, 24, 48 and 96.

Answer:

The names of the elements corresponding to the given atomic numbers:

- Atomic number 6: Carbon (C)
- Atomic number 12: Magnesium (Mg)
- Atomic number 24: Chromium (Cr)
- Atomic number 48: Cadmium (Cd)

- Atomic number 96: Curium (Cm)

iii. Iron is an element and sodium chloride is a compound. Discuss the reasons why iron is an element and sodium chloride is a compound.

Answer:

Iron (Fe) is an element as it consists of only one kind of atom. Iron is composed of iron atoms, which are all identical in their chemical properties. It cannot be broken down into simpler substances by any physical or chemical methods. Each iron atom has 26 protons in its nucleus, giving it the atomic number 26. It has sharp melting and boiling points.

On the other hand, sodium chloride (NaCl) is a compound because it is composed of two or more different elements chemically bonded together. Sodium chloride is formed by the chemical combination of sodium (Na) and chlorine (Cl) atoms in a fixed composition. It can be broken into its constituent elements by some chemical means. It has distinct chemical and physical properties different from its constituent elements.

iv. Use a copy of the periodic table and write symbols of the following elements. Gold, hydrogen, iron, chlorine, nitrogen and sodium.

Answer:

The symbols of the given elements are:

Elements	Symbols
Gold	Au
Hydrogen	H
Iron	Fe
Chlorine	Cl
Nitrogen	N
Sodium	Na

D. Answer the following questions briefly.

1. What are symbols? How are elements assigned different symbols?

Answer:

Symbols are the abbreviations for the names of elements often derived from their English, Greek or Latin names. Each element is assigned a unique symbol, usually consisting of one or two letters, derived from the element's name.

The assignment of symbols to elements follows certain rules and conventions. The symbols of some elements are derived from their English names. For example, the symbol for hydrogen is 'H'. Symbols can be derived from the element's name in another language. For example, the symbol for iron is 'Fe', derived from the Latin word 'Ferrum'. While writing the symbols, the first letter is a capital letter and the second letter is small, e.g. the symbol for lithium is 'Li'.

2. Write the word equation for the formation of carbon dioxide, sodium chloride and water.

Answer:

The word equation for the formation of carbon dioxide is:

$$Carbon + Oxygen \rightarrow Carbon\ dioxide$$

The word equation for the formation of sodium chloride is:

$$Sodium + Chlorine \rightarrow Sodium\ chloride$$

The word equation for the formation of water is:

$$Hydrogen + Oxygen \rightarrow Water$$

3. What are the different types of molecules? Give examples of each type.

Answer:

There are two types of molecules based on the composition of atoms including similar types and different types of atoms.

Similar types of atoms

The type of molecule is made up of similar types of atoms bonded together.

Examples: Oxygen (O_2), nitrogen (N_2), and hydrogen (H_2).

