

1. Transport of Food and Minerals in Plants

Worksheet

A. Answer in one word.

1. _____ tissues perform the function of transport of materials in plants.
2. The cell wall of root hair is _____ and allows all molecules to pass through.
3. Diffusion is the movement of molecules from an area of _____ concentration to an area of _____ concentration.
4. The upward movement of sap from the roots towards the other parts of the plant is known as _____.
5. Light _____ the rate of transpiration as light causes the stomata to open.

B. State (T) for true and (F) for false statements.

1. Rate of transpiration increases on a humid day. _____
2. Sieve cells are nucleated cells present next to companion cells. _____
3. Root hair are replaced daily by new cells. _____
4. Xylem forms a continuous channel that connects roots to the leaves. _____
5. Iron and chlorine are macronutrients required by plants. _____

C. Match the columns.

Column A

1. Tracheids
2. Sieve cells
3. Root hair
4. Sap
5. Transpiration

Column B

- (a) Phloem tissue
- (b) Contains water and minerals
- (c) Produces cooling effect
- (d) Xylem tissue
- (e) Unicellular and delicate

D. Answer in short.

1. Name different types of xylem tissues.
2. Define osmosis.
3. What are the functions performed by the water absorbed by the roots?
4. How does translocation of food occur in plants?
5. Name any four micronutrients needed by plants.

E. Answer in detail.

1. What is root pressure? Explain its importance.
2. Which tissue helps in translocation of food? Write about them.
3. How does conduction of water takes place in plants?
4. What are the factors that affect the rate of transpiration?
5. What are plant nutrients? Write about the types of essential nutrients needed by plants.

Answers to Worksheet

- A. 1. Vascular 2. permeable 3. high, low
4. ascent of sap 5. increases
- B. 1. False 2. False 3. True 4. True 5. False
- C. 1. (d) 2. (a) 3. (e) 4. (b) 5. (c)
- D. 1. Tracheids, vessel elements and xylem parenchyma are the types of xylem tissues.
2. Osmosis is the process in which water molecules move from an area where they are more in number to an area where they are less in number through a semipermeable membrane.
3. The water absorbed by the roots performs three main functions. They are as follows.
- Transportation
 - Food production
 - Cooling effect
4. The food prepared in the leaves is translocated to different parts of the plant by phloem. The sieve tubes of phloem are placed one above the other to form long tubes through which food is transported. Food moves in both upward and downward direction.
5. Iron, copper, boron and zinc
- E. 1. Water concentration in the xylem is reduced due to accumulation of mineral salts in it. Thus, water and minerals get transported to the stem. The pressure developed in the roots due to continuous inflow of water is called root pressure. This helps in pushing the plant sap upwards. Root pressure appears only when the rate of absorption is higher than the rate of transpiration.
2. Phloem helps in translocation of food. It consists of sieve cells which form long narrow tubes with perforated sieve plates along the thin length. The function of these tissues is to transport food nutrients such as sucrose and amino acids from the leaves to all other cells of the plant. This is called translocation. The phloem tissue is made of columns of living cells, which contain cytoplasm but no nucleus, and its activities are controlled by companion cells. Companion cells are nucleated cells present next to sieve elements. They do not participate in translocation, however, they carry out metabolic functions required for the prolongation of sieve elements
3. Soil solution has a higher water content than the cell sap (fluid or juice) of the root hair. Hence, water from the soil enters into the root cells by osmosis. Root hair now become turgid (swollen), while the adjacent cells of the cortex (inner tissues) have lower water content. This results in movement of water from the root hair into the cortical cells. Water absorbed by the root hair from the soil gradually accumulates in the cortex of roots. As a result, the cortical cells become fully turgid and water moves from the cortical cells into the inner layers of the roots through cell to cell osmosis. Finally, water is pushed into the xylem vessels and tracheids. In xylem, water moves only in upward direction. Xylem forms a continuous channel that connects roots to the leaves through stem and branches. In this way, water is carried to the entire plant.

4. There are several factors like temperature, wind and humidity that affect the rate at which transpiration takes place. These factors are as follows.

Time of the day: The stomata in leaves are open during the day and are closed at night. Thus, more transpiration takes place during the daytime.

Temperature: Higher the temperature faster is the rate of transpiration. Therefore, transpiration is faster on hot days as compared to cold days.

Humidity: Transpiration is lower on a humid day because the air already contains a lot of moisture.

Wind: Wind increases the rate of transpiration since water evaporates faster from the leaves on a windy day.

Light: Light increases the rate of transpiration as light causes the stomata to open.

5. Plants require certain elements for growth and development which are known as plant nutrients. Some elements are essential for plants, for example, carbon, oxygen, hydrogen, sulphur, nitrogen, phosphorus, potassium, calcium, iron and copper. Plants are not able to grow normally and complete their life cycle in their absence.

Essential elements are further classified into two categories which are as follows.

Macronutrients (major elements): These elements are required by plants in large quantities. Carbon, hydrogen, oxygen, nitrogen, phosphorus, potassium, magnesium and calcium are examples of macronutrients.

Micronutrients (minor elements): These elements are required by plants in small quantities. Iron, copper, boron, zinc, manganese and chlorine are examples of micronutrients.

2. Reproduction in Plants and Animals

Worksheet

A. Fill in the blanks.

1. In ginger, the short, branched, underground stem called _____ is used for reproduction.
2. The method of cultivating plants in a suitable nutrient medium in a test tube is called _____.
3. Some plants like banana, grapes and sugarcane do not produce seeds, and thus, are grown by _____.
4. Seed bearing plants are called _____.
5. Testes secrete the male sex hormone called _____.

B. State (T) for true and (F) for false statements.

1. Seminal vesicles secrete an alkaline fluid which serves as a medium for transport of sperms.
2. The development of fertilised egg and foetus takes place in the uterus.
3. Human beings are viviparous.
4. Disease-resistant varieties of plants can be produced by hybridisation.
5. Neutral flowers may either have androecium or gynoecium.

C. Match the columns.

Column A

1. Fertilisation
2. *Chrysanthemum*
3. Sugarcane
4. *Rhododendron*
5. Pollination

Column B

- (a) Propagated by tissue culture
- (b) Transfer of male gametes to the ovary
- (c) Propagated by stem cutting
- (d) Produces zygote
- (e) Propagated by layering

D. Answer in short.

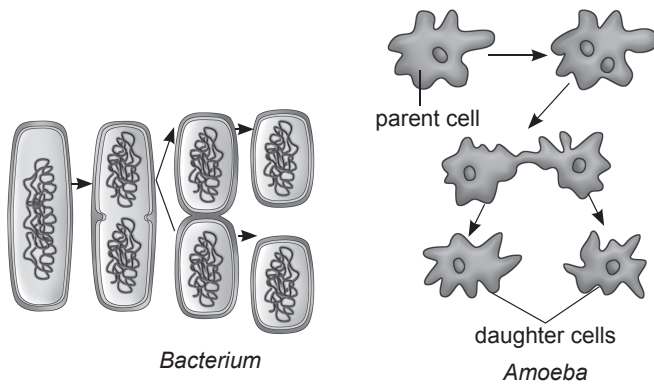
1. What is reproduction? Name the modes of reproduction.
2. Explain in short the process of grafting.
3. Give any two disadvantages of vegetative propagation.
4. What are oviparous animals? Give examples.
5. Describe any two female reproductive organs.

E. Answer in detail.

1. What is vegetative propagation? Explain any two types of artificial vegetative propagation.
2. What is binary fission? Explain with the help of a diagram.
3. Write about the male and female reproductive parts of a flower.
4. Define pollination. Explain its types.
5. Explain the process of fertilisation in humans with the help of a diagram.

Answers to Worksheet

- A. 1. rhizome 2. tissue culture 3. vegetative propagation
4. angiosperms 5. testosterone
- B. 1. False 2. True 3. True 4. True 5. False
- C. 1. (d) 2. (a) 3. (c) 4. (e) 5. (b)
- D. 1. The process by which living organisms produce more of their own kind is known as reproduction. There are two modes of reproduction—sexual reproduction and asexual reproduction
2. In grafting, new varieties of plants are developed by combining the features of two plants. The ends of the stock (root portion) and scion (stem portion) are obliquely cut and firmly tied together. After a few days, the stock and scion join together due to rapid division of cells. In this manner a new plant variety is developed.
3. Following are the two disadvantages of vegetative propagation.
- Since many plants are produced, it results in overcrowding and competition for nutrients as well as sunlight and water.
 - After a certain time, newer generations lose their strength, health and energy.
4. Animals that reproduce by laying eggs are known oviparous animals. Examples include frog, lizard and hen.
5. Following are the two female reproductive organs.
- (i) **Ovaries:** These are two almond-sized, oval-shaped small structures that lie in the abdominal cavity. Ovaries produce ova and secrete female sex hormones namely oestrogen and progesterone.
- (ii) **Oviducts or Fallopian tubes:** Oviducts are two muscular tubes which join the ovaries with the uterus. They also carry ovum from the ovary.
- E. 1. The development of a new plant from the vegetative part like root, stem or leaf of a plant is called vegetative propagation.
- Following are the two types of artificial vegetative propagation.
- (i) **Stem cutting:** In this method, a part of the stem with a bud is cut from the main plant and placed in moist soil. After a few days, roots develop at the lower end of the stem and new leaves come out from the bud at its upper end. Finally the complete plant develops. Plants grown by stem cutting are rose, *champa*, sugarcane, *Bougainvillea*, cactus and pineapple.
- (ii) **Layering:** In this method, one of the lower branches of the main plant is bent down to the ground so that it touches the soil. It is then covered with moist soil. After a few days, roots develop from the part of the stem covered with soil. Then this branch is cut from the main plant and is made to grow as a new plant. Layering is generally used in plants like rose, lemon, jasmine, mint and *Rhododendron*.
2. Binary fission is the most common method of asexual reproduction in unicellular organisms like bacteria, *Amoeba*, *Paramecium* and *Euglena*. In this method, the nucleus first divides into two nuclei. The cytoplasm then divides into two parts each containing a nucleus. Thus, two identical cells called daughter cells are formed which grow into mature cells.



Binary fission

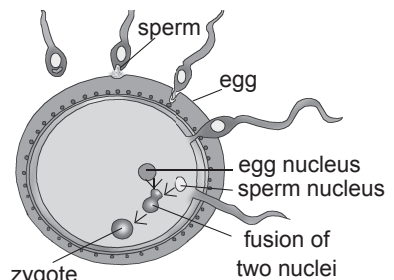
3. Androecium and gynoecium are the male and female reproductive parts of a flower, respectively.

Androecium: It is the third whorl. It is the male reproductive part of the flower and consists of stamens. Each stamen has two parts—a long stalk called filament and a swollen structure at the tip of the filament called anther. Anthers produce hundreds of very small structures called pollen grains. Each pollen grain contains two male gametes.

Gynoecium: It is the innermost whorl of the plant. It is the female reproductive part of the flower. It consists of one or more pistils or carpels. Each pistil consists of stigma, style and ovary. Stigma is the topmost knob-like part of the pistil. It extends into a long tube-like structure called style which ends into a swollen basal portion called ovary. The ovary contains one or many ovules. The female gamete also known as egg is formed inside the ovule.

4. The transfer of pollen grains from the anther of a flower to the stigma of the same or another flower is called pollination. It is of the following two types.
 - (i) **Self-pollination:** In self-pollination, pollen grains are transferred from an anther to the stigma of the same flower or another flower of the same plant.
 - (ii) **Cross-pollination:** When pollen grains are transferred from the anther to the stigma of a flower on another plant of the same kind (species), it is called cross-pollination. External agents are required for cross-pollination to take place.

5. In humans, fertilisation takes place in the Fallopian tubes. The process of release of an egg by the ovary into the Fallopian tube is called ovulation. The sperms that enter the vagina swim upwards with the help of their tail. Out of millions of sperms, only a few reach the upper part of the Fallopian tube or oviduct through the uterus. The rest of them die on their way and are absorbed. If there happens to be an egg in the oviduct, it gets fertilised by just one single sperm. The nucleus of the sperm fuses with the nucleus of the egg and forms the zygote which is the basic unit of life. The zygote moves from the oviduct to the uterus where further development takes place.



Process of fertilisation

3. Ecosystems

Worksheet

A. Fill in the blanks.

1. Plants depend on nature for _____, _____ and water to prepare food.
2. _____ forests are present near the equator and they have the greatest biodiversity.
3. Organisms that eat the food prepared by producers are called consumers or _____.
4. A system of interacting _____ and _____ components of the environment is called ecosystem.
5. Predation is a biological interaction where a _____ feeds on its _____.

B. State (T) for true and (F) for false statements.

1. Predators always kill their prey before eating.
2. Plants are called consumers as they make their own food.
3. Plants and animals depend on each other and are interdependent.
4. Everything that surrounds us is called environment.
5. All plants absorb solar energy and fix it in the form of food energy through photosynthesis.

C. Match the columns.

Column A

1. Abiotic components
2. Natural ecosystem
3. Plant life of a forest
4. Animal life of a forest
5. Socio-cultural environment

Column B

- (a) Forest
- (b) Man-made environment
- (c) Air, water and soil
- (d) Fauna
- (e) Flora

D. Answer in short.

1. Name two omnivores and two scavengers.
2. Green plants are called primary producers. Explain.
3. What is the role played by decomposers?
4. Name the types of pyramids of numbers.
5. Classify vegetation on the basis of different temperature zones.

E. Answer in detail.

1. What is pyramid of numbers? Name its types.
2. Write a note on interdependence of organisms.
3. What is meant by a food web? Explain with the help of examples.
4. Explain the importance of any two abiotic components.
5. Write about any two types of forests found across the world.

Answers to Worksheet

- A. 1. sunlight, carbon dioxide 2. Tropical 3. heterotrophs
4. biotic, abiotic 5. predator, prey
- B. 1. False 2. False 3. True 4. True 5. True
- C. 1. (c) 2. (a) 3. (e) 4. (d) 5. (b)
- D. 1. Omnivores: Crow, bear
Scavengers: Vulture, hyena
2. Green plants use the energy of the sun to make their food. The life of all heterotrophic organisms like animals depends on the energy trapped by the green plants. That is why green plants are called primary producers.
3. Decomposers secrete certain digestive enzymes that decompose the dead bodies into minute particles called minerals. These minerals are again taken up from the soil by the plants. Thus, decomposers help not only in cleaning the environment but also in recycling the minerals.
4. There are three types of pyramid of numbers.
- Upright pyramid of number
 - Partly upright pyramid of number
 - Inverted pyramid of number
5. On the basis of different temperature zones, the vegetation on the earth is classified as equatorial forests, tropical forests, coniferous forests and alpine vegetation.
- E. 1. The pyramid of numbers depicts the relationship in terms of the number of producers, herbivores and carnivores at their successive trophic levels. There is a decrease in the number of individuals from the lower to the higher trophic levels. The number pyramid varies from ecosystem to ecosystem. There are three types of pyramid of numbers.
- Upright pyramid of number
 - Partly upright pyramid of number
 - Inverted pyramid of number
2. Living organisms are dependent on each other for their survival. Some common interdependent relationships are as follows.
- Symbiosis:** Sometimes two organisms live together like a single organism and mutually help each other. These organisms are called symbiotic organisms. This association between two symbiotic organisms is called symbiosis. For example, in lichens, an alga and a fungus live together.
- Parasitism:** Organisms which live on other plants and obtain their food from them are called parasitic organisms. The organism from which a parasite obtains its food is called the host.
- Predation:** It is a biological interaction where a predator (an organism that is hunting) feeds on its prey (the organism that is attacked).
3. In natural conditions, food chains never operate as linear sequences, but remain interconnected with each other through different types of organisms. The

interconnected and interlocking pattern of food chains is known as food web. For example, in grazing food chain of grassland, in the absence of a grasshopper, grass may also be eaten by a mouse which in turn may be eaten by a snake or directly by a hawk. Thus, there are alternatives in nature and together they all constitute some sort of interlocking pattern to form the food web.

4. **Light:** The primary source of light on the earth is the sun. It is the chief source of energy which is used by green plants to make their food. Light also influences other activities of plants like opening and closing of stomata, germination of seeds and flowering.

Air: Air is essential for the survival of living organisms as they take in oxygen from the air for respiration. Plants take in carbon dioxide from air and use it to prepare food. Nitrogen of the air is converted into nitrates by some microorganisms so that it can be utilised by plants. The temperature of the earth is also controlled by air. Moving air called wind helps in pollination of flowers. Wind is also an agent of dispersal of seeds and fruits.

5. **Tropical forests:** These forests are present near the equator and they have the greatest biodiversity. Weather in these forests is hot and humid with heavy rainfall throughout the year. Winter is absent. Multilayered and continuous canopy is found in tropical forests. Flora is highly diverse and mostly comprises of ferns, mosses, orchids, vines, rubber, ebony and palms. Fauna includes a variety of birds, insects, monkeys, gorillas, snakes, frogs and sloth bear.

Temperate forests: These are found above the tropics and are characterised by a well-defined climate. Rain occurs in spring and summers, and winters experience snowfall. Canopy is less dense. Flora mostly comprises of maple, basswood, cottonwood, beech, elm and flowering herbs. Fauna includes birds, squirrels, rabbits, deer, mountain lion, wolf, fox and black bear.