

3. Genetics Worksheet

Understanding Genetics

Genetics is the study of heredity and variation in living organisms. It explains how traits are passed from parents to offspring through DNA. Genes, segments of DNA, carry the instructions for traits such as hair color, eye color, and even certain diseases. The study of genetics helps us understand the diversity of life and the molecular mechanisms that drive evolution.

Fill in the Blank: Fill in the blank with the correct words.

1. -----are the basic units of heredity that determine specific traits.
2. The physical appearance or visible traits of an organism are known as its -----
3. ----- is the molecule that carries genetic information in cells.
4. A ----- is a version of a gene that can result in different traits.
5. The study of how traits are passed from parents to offspring is called -----

Multiple Choice Questions: Choose the correct answer from the choices for each question.

1. What is the molecule that carries genetic instructions in all living things?
 - A) RNA
 - B) DNA
 - C) Protein
 - D) Lipid
 2. What term is used to describe the genetic makeup of an organism?
 - A) Phenotype
 - B) Genotype
 - C) Chromosome
 - D) Allele
 3. Which of the following is a tool used to predict the outcome of genetic crosses?
 - A) Microscope
 - B) Punnett Square
 - C) Genetic Code
 - D) Pedigree Chart
 4. What do we call an organism that has two identical alleles for a trait?
 - A) Heterozygous
 - B) Homozygous
 - C) Dominant
 - D) Recessive
 5. Which of the following describes a dominant trait?
 - A) A trait that is masked by another trait
 - B) A trait that appears only when two recessive alleles are present
 - C) A trait that is expressed even when only one allele is present
 - D) A trait that does not affect the phenotype
- **Answer the following questions in complete sentences.**

1. Explain the difference between genotype and phenotype.

genotype	phenotype.

2. Describe how a Punnett Square is used in genetics.

Puzzle 1: The Mystery Pea Pods

Mendel planted 100 pea plants.

- 25 plants have **green seeds**.
- 75 plants have **yellow seeds**.

These plants came from self-pollination of **heterozygous yellow-seeded plants** ($Yy \times Yy$).

🔍 *Question:*

Can you figure out the **genotypic ratio** and **phenotypic ratio** of these plants? How many of each genotype are there among the 100 plants?

🔑 Puzzle 2: Decode the Family Secret

A tall (Tt) pea plant was crossed with a short (tt) pea plant. The offspring were grown, and **half** of them were tall while the other **half were short**.

🔍 *Question:*

Based on this, can you figure out the genotypes of:

- The parents.-----
- The tall offspring -----
- The short offspring -----

Case 1: Earlobe Attachment

Free earlobes (E) are dominant over attached earlobes (e). A man with attached earlobes marries a woman who is heterozygous for the trait. **Questions:**

- Write the genotypes of the parents. -----
- What are the possible genotypes of their children?-----

- State the phenotypic ratio of the offspring.-----

Case 2: Tongue Rolling

The ability to roll the tongue (R) is dominant over the inability (r). A girl who cannot roll her tongue is born to parents who can both roll their tongues.

Questions: 1.What must be the genotype of the parents?-----

2.Using a cross, show how the child inherited this trait.

3..What is the probability that their next child will also be unable to roll the tongue?

Worksheet: Absorption by Roots (Grade X - ICSE)

Section A: Multiple Choice Questions (MCQs)

1. Root hairs absorb water from the soil through:
 - a) Osmosis
 - b) Diffusion
 - c) Active transport
 - d) All of the above
2. The movement of water from root hair to xylem is due to:
 - a) Root pressure
 - b) Transpiration pull
 - c) Capillary action
 - d) Both (a) and (b)
3. Which of the following is NOT a function of root hairs?
 - a) Increase surface area for absorption
 - b) Help in gaseous exchange
 - c) Anchor the plant firmly
 - d) Store food
4. The concentration of cell sap in root hairs is usually:
 - a) Hypotonic to soil water
 - b) Hypertonic to soil water
 - c) Isotonic to soil water
 - d) None of the above
5. Active transport in roots requires:
 - a) ATP energy
 - b) Sunlight directly
 - c) Osmotic pressure only
 - d) Diffusion gradient

Section B: Assertion-Reason Questions

Directions: Choose the correct option:

- A) Both Assertion (A) and Reason (R) are true, and R is the correct explanation of A.
B) Both A and R are true, but R is not the correct explanation of A.
C) A is true, but R is false.
D) A is false, but R is true.

1. Assertion (A): Root hairs are unicellular extensions of epidermal cells.
Reason (R): They increase the surface area for absorption of water and minerals.
2. Assertion (A): Plants absorb nitrogen in the form of nitrates from the soil.
Reason (R): Nitrogen is essential for protein synthesis in plants.
3. Assertion (A): Osmosis plays a major role in water absorption by roots.

Reason (R): Water moves from a region of lower solute concentration to higher solute concentration.

4. Assertion (A): Active transport is required for mineral absorption in roots.

Reason (R): Minerals are absorbed against the concentration gradient.

5. Assertion (A): Wilting occurs when the rate of transpiration exceeds water absorption.

Reason (R): Root pressure alone is sufficient to supply water to tall trees.

Section C: Critical Thinking Questions

1. Why do root hairs become flaccid when fertilizers are added in excess? Explain with reference to osmosis.

2. Differentiate between passive absorption and active absorption of water in roots.

3. How does the structure of a root hair cell make it efficient for absorption?

4. If a plant is kept in a highly concentrated salt solution, what will happen to its roots? Justify your answer.

5. "Root pressure is not the only force responsible for water movement in tall trees." Explain this statement.

Section D: Diagram-Based Question

Draw a neat, labeled diagram of a root hair absorbing water from the soil.

- Show the direction of water movement.
- Label the root hair, soil particles, and water molecules.

Transpiration- Worksheet

Transpiration is the process by which water is absorbed by plant roots from the soil, moves through plants, and is then released as water vapour through pores in the leaves called stomata. This process is vital for plant health and influences the water cycle in the environment. Transpiration helps in cooling plants, aiding in the transport of nutrients, and maintaining the flow of water from the roots to leaves.

Fill in the Blank: Fill in the blank with the correct words.

1. Transpiration primarily occurs through tiny openings in the leaves called -----
2. The process of transpiration helps in the ----- of plants by releasing excess water.
3. When water evaporates from the leaves, it creates a ----- pressure that pulls water upward from the roots.
4. Transpiration plays a crucial role in the -----cycle by returning water vapor to the atmosphere.
5. ----- is the process by which plants absorb water through their roots and release it as vapour through their leaves.

Multiple Choice Questions: Choose the correct answer from the choices for each question.

1. What is the primary function of stomata in the process of transpiration?
 - A) Absorb sunlight
 - B) Release oxygen
 - C) Release water vapour
 - D) Absorb carbon dioxide
2. Which of the following factors does NOT directly affect the rate of transpiration?
 - A) Temperature
 - B) Wind speed
 - C) Soil colour
 - D) Humidity
3. Transpiration contributes to which part of the water cycle?
 - A) Precipitation
 - B) Evaporation
 - C) Condensation
 - D) Collection
4. What happens to the water potential in the leaves when transpiration increases?
 - A) It becomes higher
 - B) It becomes lower
 - C) It remains unchanged
 - D) It fluctuates randomly
5. Which part of the plant is primarily responsible for absorbing water from the soil?
 - A) Leaves
 - B) Stem
 - C) Flowers
 - D) Roots

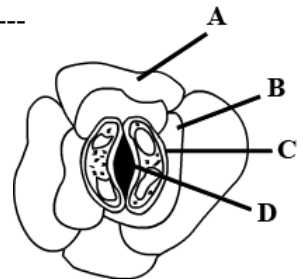
Open-Ended Questions: Answer the following questions in complete sentences.

1. Explain how transpiration helps in the transport of nutrients within a plant.

2. Describe the relationship between transpiration and photosynthesis.

3. How might a plant's environment affect its rate of transpiration? Give examples.

4. Label the parts A- D



Q1.

Assertion (A): Transpiration helps in the upward movement of water in plants.

Reason (R): Transpiration creates a suction force due to water loss from the leaves.

- (a) Both A and R are true, and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true, but R is false.
- (d) A is false, but R is true.

Q2.

Assertion (A): Transpiration rate increases on a windy day.

Reason (R): Wind increases the humidity around the stomata.

- (a) Both A and R are true, and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true, but R is false.
- (d) A is false, but R is true.

Q3.

Assertion (A): Plants wilt during midday even if the soil has sufficient water.

Reason (R): Transpiration exceeds water absorption during hot afternoon hours.

- (a) Both A and R are true, and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true, but R is false.
- (d) A is false, but R is true.

Q4.

Assertion (A): Transpiration is reduced when a plant is kept in a bell jar with high humidity.

Reason (R): High humidity reduces the water vapour concentration gradient between leaf and air.

- (a) Both A and R are true, and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true, but R is false.
- (d) A is false, but R is true.

Q5.

Assertion (A): Transpiration is a necessary evil.

Reason (R): Though it leads to water loss, it also cools the plant and helps in nutrient transport.

- (a) Both A and R are true, and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true, but R is false.
- (d) A is false, but R is true.

NEW STEWART SCHOOL

BIOLOGY WORKSHEET

Photosynthesis - Worksheet

Photosynthesis is a crucial biological process that occurs in plants, algae, and some bacteria. During photosynthesis, these organisms convert light energy, usually from the sun, into chemical energy stored in glucose, a type of sugar. This process primarily takes place in the chloroplasts of plant cells and involves two main stages: the light-dependent reactions and the Calvin cycle (or light-independent reactions). The overall equation for photosynthesis is $6\text{CO}_2 + 6\text{H}_2\text{O} + \text{light energy} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$.

Fill in the Blank: Fill in the blank with the correct words.

1. Photosynthesis occurs in the ----- of plant cells.
2. The main pigment involved in photosynthesis is -----.
3. The two main stages of photosynthesis are the ----- and the -----
4. During photosynthesis, carbon dioxide and water are converted into ----- and -----

5. ----- is the primary source of energy for photosynthesis.

Multiple Choice Questions: Choose the correct answer from the choices for each question.

1. What is the primary function of photosynthesis?
 - A) To produce carbon dioxide
 - B) To convert solar energy into chemical energy
 - C) To release nitrogen into the atmosphere
 - D) To absorb oxygen
2. In which part of the plant does photosynthesis mainly occur?
 - A) Roots
 - B) Flowers
 - C) Leaves
 - D) Stem
3. Which of the following is a product of the light-dependent reactions?
 - A) Glucose
 - B) Oxygen
 - C) Carbon Dioxide
 - D) Water
4. What gas is absorbed by plants during photosynthesis?
 - A) Oxygen
 - B) Nitrogen
 - C) Carbon Dioxide

- D) Hydrogen
- 5. Which molecule acts as the energy carrier during photosynthesis?
 - A) ATP
 - B) DNA
 - C) RNA
 - D) Lipids

Column A	Column B

Answer the following questions in complete sentences.

1. Explain the role of chlorophyll in photosynthesis.

2. Describe the importance of photosynthesis to life on Earth.

3. What might happen to a plant if it does not receive enough sunlight? -----

Column A	Column B
Chloroplast	$\text{CO}_2 + \text{H}_2\text{O} \rightarrow ?$
Oxygen	Site of photosynthesis
Glucose	By-product
Photosynthesis Equation	Food produced

Assertion reason -Answer the f question by using following codes

- (a) Both A and R are true, and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true, but R is false.
- (d) A is false, but R is true

Q1.

Assertion (A): Green plants are called autotrophs.

Reason (R): They can prepare their own food by photosynthesis..

Q2.

Assertion (A): Photosynthesis occurs only during daytime.

Reason (R): Sunlight is essential for splitting water molecules during the light reaction of photosynthesis.

Q3.

Assertion (A): The rate of photosynthesis increases with an increase in carbon dioxide concentration up to a certain limit.

Reason (R): Carbon dioxide is a raw material for photosynthesis.

Q4.

Assertion (A): Starch is not immediately visible in leaves after photosynthesis.

Reason (R): Starch is first converted into glucose and transported to other parts before being stored.

Q5.

Assertion (A): Iodine test can be used to detect photosynthesis.

Reason (R): Iodine solution turns starch blue-black.

- (a) Both A and R are true, and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true, but R is false.
- (d) A is false, but R is true.

Write the Chemical equations :

1. Photolysis of water ? Hill's reaction - -----
 2. Photosynthesis over all reaction -----
 3. Photophosphorylation _____
- Sketch and label the diagram of chloroplast .

Chemical Coordination in Plants- Work sheet

Plants, unlike animals, do not have a nervous system. Instead, they rely on chemical coordination to respond to environmental changes. This involves the use of hormones, which are chemical substances that regulate various functions such as growth, development, and responses to stimuli. Some key plant hormones include auxins, gibberellins, cytokinins, abscisic acid, and ethylene. Each of these hormones plays a specific role in plant processes. For example, auxins are essential for cell elongation, while gibberellins stimulate stem elongation and seed germination. Understanding how these hormones work helps us appreciate how plants adapt to their surroundings and manage growth.

Fill in the Blank: Fill in the blank with the correct words.

1. Auxins are primarily responsible for ----- in plants.
2. Gibberellins help in ----- and seed germination.
3. ----- is a hormone that helps in the ripening of fruits.
4. -----acid is involved in the closing of stomata during water stress.
5. Cytokinins promote ----- in plant cells.

Multiple Choice Questions: Choose the correct answer from the choices for each question.

1. Which hormone is mainly associated with phototropism in plants?
 - A) Gibberellins
 - B) Auxins
 - C) Cytokinins
 - D) Ethylene
2. Which of the following hormones is responsible for promoting cell division?
 - A) Absciscic acid
 - B) Auxins
 - C) Cytokinins
 - D) Gibberellins
3. Which hormone helps in fruit ripening and leaf abscission?
 - A) Gibberellins
 - B) Auxins
 - C) Cytokinins
 - D) Ethylene

4. What is the primary role of abscisic acid in plants?
 - A) Promoting seed germination
 - B) Closing stomata during stress
 - C) Stimulating flower development
 - D) Enhancing fruit ripening
5. Which hormone is crucial for breaking seed dormancy?
 - A) Auxins
 - B) Gibberellins
 - C) Ethylene
 - D) Cytokinins

Answer the following questions in complete sentences.

1. Explain the role of auxins in plant growth and development.

2. Describe how gibberellins affect seed germination and stem elongation.
3. Discuss how plants use chemical coordination to adapt to changing environmental conditions.

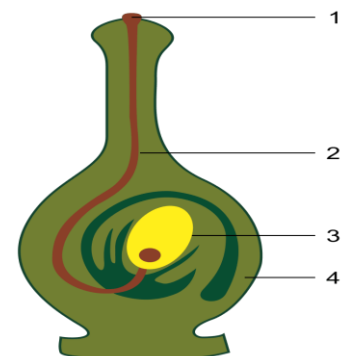
Q.4 Observe the following diagram and answer the questions .

i. Which type of movement is depicted in the diagram ?

ii. Define the movement shown in the diagram .

iii. Label the parts .

1. -----
2. -----
3. -----
4. -----



Q.5 Assertion reason -

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true but R is not the correct explanation of A.
- (c) A is true but R is false.
- (d) A is false but R is true.

Q.1. Assertion (A): Absciscic acid (ABA) is called a stress hormone in plants.

Reason (R): Absciscic acid promotes stomatal opening during drought conditions.

Q2.

Assertion (A): Gibberellins help in breaking seed dormancy and promote germination.

Reason (R): Gibberellins inhibit the synthesis of hydrolytic enzymes in seeds.

Q3.

Assertion (A): Cytokinins delay senescence in leaves.

Reason (R): Cytokinins promote protein breakdown in aging leaves.

Case based study -

Case 1: Elongated Seedlings in Darkness

A student places two sets of germinating seedlings—one in complete darkness and the other in sunlight. After a

week, the seedlings in darkness are tall, thin, and pale, while those in sunlight are shorter, greener, and healthier.

Questions:

- . Identify the hormones responsible for the tall growth of seedlings in the dark.
- . Why do seedlings grown in light remain shorter and greener?

Case 2: Ripening Fruits

A fruit vendor keeps raw bananas covered with a plastic sheet overnight. The next day, they appear yellow and ripe.

Questions:

- . Which hormone helped in ripening the bananas?
- . Suggest one natural method by which this process can be accelerated without using chemicals.

Case 3: Falling of Leaves and Fruits

A farmer notices premature falling of unripe fruits from mango trees during strong winds.

Questions:

- Which hormone is responsible for such abscission?
- .How do artificial sprays of certain hormones help in preventing this loss?

Case 5: Dormancy in Seeds

A gardener observes that certain seeds do not germinate even when placed in moist soil under suitable temperature conditions. After treatment with a chemical, they germinate quickly.

Questions:

- Which hormone prevents germination under normal conditions?
- Name the hormone that breaks dormancy and stimulates germination.

Circulatory System Worksheet

The circulatory system, also known as the cardiovascular system, is responsible for transporting blood, nutrients, oxygen, carbon dioxide, and hormones throughout the body. It consists of the heart, blood vessels, and blood. The heart pumps blood through a network of arteries and veins, ensuring that oxygen-rich blood reaches every part of the body and waste products are carried away for removal. Understanding the circulatory system is crucial for maintaining overall health and recognizing how the body sustains itself.

Fill in the Blank: Fill in the blank with the correct words.

1. The main organ of the circulatory system is the -----.
2. ----- are blood vessels that carry blood away from the heart.
3. The ----- is the liquid part of the blood that transports cells and nutrients.
4. -----are tiny blood vessels where the exchange of gases and nutrients takes place.
5. The -----system includes the heart, blood, and blood vessels.

Word bank: veins, arteries, capillaries, heart, plasma, circulatory

Multiple Choice Questions: Choose the correct answer from the choices for each question.

1. What is the primary function of the circulatory system?
 - A) Digestion
 - B) Respiration
 - C) Transporting nutrients and gases

- D) Excretion
- 2. Which chamber of the heart receives oxygen-poor blood from the body?
 - A) Left atrium
 - B) Right atrium
 - C) Left ventricle
 - D) Right ventricle
- 3. Which component of blood is responsible for clotting?
 - A) Red blood cells
 - B) White blood cells
 - C) Platelets
 - D) Plasma
- 4. Which blood vessels carry oxygenated blood to the body?
 - A) Veins
 - B) Arteries
 - C) Capillaries
 - D) Venules
- 5. What is the main function of capillaries in the circulatory system?
 - A) To pump blood from the heart
 - B) To carry blood to the lungs
 - C) To exchange nutrients and gases
 - D) To remove waste products

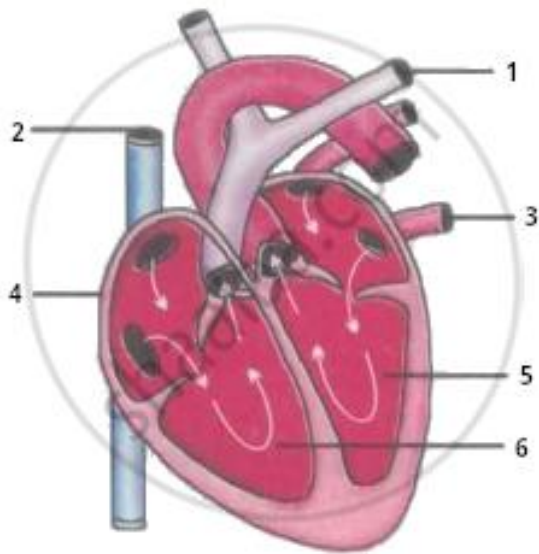
Answer the following questions in complete sentences.

1. Explain how the circulatory system works with the respiratory system to maintain homeostasis.

2. Describe the role of the heart in the circulatory system.

3. Why is it important to maintain a healthy circulatory system?

Q.4 Label the following diagram .Write the type of blood contained within each labelled part .Draw the T.S. of artery and vein in the given box



T.S. Of Artery and Vein

Structure	Type of blood
1	
2	
3	
4	
5	
6	