

NCERT Exemplar Solutions of Class 11 Biology – Chapter 11: Transport in plants

MULTIPLE CHOICE QUESTIONS

1. Which of the following statements does not apply to reverse osmosis?

- a. It is used for water purification
- b. In this technique, a pressure greater than the osmotic pressure is applied to the system
- c. It is a passive process
- d. It is an active process

Solution: Option (c) is the answer.

Enhanced Explanation: Reverse osmosis requires external pressure greater than the osmotic pressure to force water molecules through a semipermeable membrane against the concentration gradient. This makes it an active process requiring energy input, not a passive process. It's widely used in water purification to remove dissolved solutes and contaminants.

2. Which one of the following will not directly affect transpiration?

- a. Temperature
- b. Light
- c. Wind speed
- d. Chlorophyll content of leaves

Solution: Option (d) is the answer.

Enhanced Explanation: Transpiration is primarily affected by environmental factors that influence the rate of water evaporation from leaf surfaces. Temperature increases molecular kinetic energy, light opens stomata and increases temperature, and wind speed removes water vapor from leaf surfaces. However, chlorophyll content affects photosynthesis but doesn't directly influence the rate of water loss through transpiration.

3. The lower surface of leaf will have more number of stomata in a

- a. Dorsiventral leaf
- b. Isobilateral leaf
- c. Both a and b
- d. None of the above

Solution: Option (a) is the answer.

Enhanced Explanation: Dorsiventral leaves have distinct upper and lower surfaces, with the lower surface (abaxial) typically having more stomata to minimize water loss while maintaining gas exchange. The upper surface receives direct sunlight and would lose more water if it had many stomata. Isobilateral leaves have stomata distributed equally on both surfaces.

4. The form of sugar transported through phloem is

- a. Glucose
- b. Fructose

- c. Sucrose
- d. Ribose

Solution: Option (c) is the answer.

Enhanced Explanation: Sucrose is the primary form of sugar transported in phloem because it is:

- Non-reducing sugar, making it chemically stable during transport
- Highly soluble in water
- Not readily metabolized during transport
- Easily converted to other sugars at the destination

5. The process of guttation takes place

- a. When the root pressure is high and the rate of transpiration is low
- b. When the root pressure is low and the rate of transpiration is high
- c. When the root pressure equals the rate of transpiration
- d. When the root pressure, as well as rate of transpiration, are high

Solution: Option (a) is the answer.

Enhanced Explanation: Guttation occurs typically during early morning hours when humidity is high, temperature is low, and there's minimal transpiration. High root pressure forces water and dissolved minerals through specialized pores called hydathodes, resulting in water droplets on leaf margins.

6. Which of the following is an example of imbibition?

- a. Uptake of water by root hair
- b. Exchange of gases in stomata
- c. Swelling of seed when putting in soil
- d. Opening of stomata

Solution: Option (c) is the answer.

Enhanced Explanation: Imbibition is the absorption of water by dry or dehydrated materials, causing them to swell. When dry seeds are placed in soil, they absorb water through imbibition, which is the first step in seed germination. This process doesn't require a semipermeable membrane and is driven by the adhesive forces between water molecules and the seed coat components.

7. When a plant undergoes senescence, the nutrients may be

- a. Accumulated
- b. Withdrawn
- c. Translocated
- d. None of the above

Solution: Option (c) is the answer.

Enhanced Explanation: During senescence (aging process), plants actively translocate nutrients from older tissues to younger, growing parts or storage organs. This remobilization ensures efficient use of resources and is why leaves often turn yellow before falling - chlorophyll is broken down and nitrogen is moved to other parts of the plant.

8. Water potential of pure water at standard temperature is equal to

- a. 10
- b. 20
- c. Zero
- d. None of the above

Solution: Option (c) is the answer.

Enhanced Explanation: The water potential (Ψ_w) of pure water at standard temperature and pressure is defined as zero. This serves as the reference point for measuring water potential in other solutions. Any solution will have a negative water potential due to the presence of solutes.

Formula: $\Psi_w = \Psi_s + \Psi_p$ (where Ψ_s = solute potential, Ψ_p = pressure potential)

9. Mycorrhiza is a symbiotic association of a fungus with root system which helps in

- A. Absorption of water
- B. Mineral nutrition
- C. Translocation
- D. Gaseous exchange

Options: a. Only A

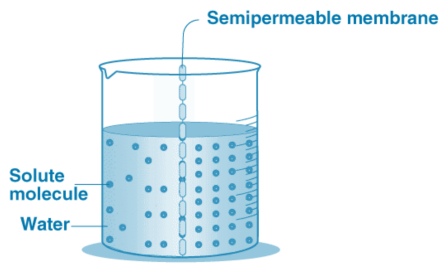
- b. Only B
- c. Both A and B
- d. Both B and C

Solution: Option (c) is the answer.

Enhanced Explanation: Mycorrhizal fungi form symbiotic relationships with plant roots, significantly increasing the surface area for absorption. The fungal hyphae extend far beyond the root system, helping in:

- Enhanced water absorption from soil
- Improved mineral nutrition, especially phosphorus
- Better soil exploration
- Protection against root pathogens

10. Based on the figure given below which of the following statements is not correct?



[Figure shows osmosis setup with semipermeable membrane separating two chambers A and B]

- Movement of solvent molecules will take place from chamber A to B
- Movement of solute will take place from A to B
- Presence of a semipermeable membrane is a prerequisite for this process to occur
- The direction and rate of osmosis depend on both the pressure gradient and concentration gradient

Solution: Option (b) is the answer.

Enhanced Explanation: In osmosis, only solvent molecules (water) move across the semipermeable membrane, not the solute molecules. The semipermeable membrane allows water to pass but restricts the movement of dissolved substances. Solutes cannot move from A to B through the semipermeable membrane - that's what makes it "semipermeable."

11. Match the followings and choose the correct option

Column I	Column II
A. Leaves	i. Anti-transpirant
B. Seed	ii. Transpiration
C. Roots	iii. Negative osmotic potential
D. Aspirin	iv. Imbibition
E. Plasmolyzed cell	v. Absorption

Options: a. A-ii, B-iv, C-v, D-i, E-iii

b. A-iii, B-ii, C-iv, D-i, E-v

c. A-i, B-ii, C-iii, D-iv, E-v

d. A-v, B-iv, C-iii, D-ii, E-i

Solution: Option (a) is the answer.

Enhanced Explanation:

- A. Leaves - ii. Transpiration (leaves are the main site of transpiration)
- B. Seed - iv. Imbibition (seeds absorb water through imbibition during germination)
- C. Roots - v. Absorption (roots absorb water and minerals from soil)
- D. Aspirin - i. Anti-transpirant (aspirin and its derivatives reduce transpiration)

- E. Plasmolyzed cell - iii. Negative osmotic potential (plasmolyzed cells have lost water, creating negative osmotic potential)

12. Mark the mismatched pair

Organelle	Function
a. Amyloplast	Store protein granule
b. Elaioplast	Store oils or fats
c. Chloroplasts	Contain chlorophyll pigments
d. Chromoplasts	Contain coloured pigments other than chlorophyll
e. Leucoplast	Contains colourless pigments

Solution: Option (a) is the answer.

Enhanced Explanation:

- **Amyloplast** stores starch (carbohydrates), not proteins. Proteins are stored in protein bodies or aleurone grains.
- **Elaioplast** correctly stores oils and fats
- **Chloroplasts** correctly contain chlorophyll pigments for photosynthesis
- **Chromoplasts** correctly contain colored pigments other than chlorophyll
- **Leucoplasts** are colorless plastids that store starch, oils, or proteins

