

NCERT QUESTIONS AND SOLUTIONS

Multiple choice questions

1. Complete the following table:

S. No. 1	
Feature	Raw materials
Photosynthesis	Carbon dioxide (CO ₂), Water (H ₂ O), Sunlight
Respiration	Glucose (C ₆ H ₁₂ O ₆), Oxygen (O ₂)

S. No. 2	
Feature	Products
Photosynthesis	Glucose (C ₆ H ₁₂ O ₆), Oxygen (O ₂)
Respiration	Carbon dioxide (CO ₂), Water (H ₂ O), Energy (ATP)

S. No. 3	
Feature	Equation
Photosynthesis	$6\text{CO}_2 + 12\text{H}_2\text{O} \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{H}_2\text{O} + 6\text{O}_2$
Respiration	$\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + \text{ATP}$

S. No. 4	
Feature	Importance
Photosynthesis	Produces food and oxygen; supports life on Earth
Respiration	Releases energy for all cellular activities in living organisms

2. Imagine a situation where all the organisms that carry out photosynthesis on the Earth have disappeared. What would be the impact of this on living organisms?

Ans. If all photosynthetic organisms disappeared, the consequences would be devastating. Oxygen level in the atmosphere would rapidly decline, making it difficult for animals and humans to breathe. Additionally, the primary source of food (plants and algae) would vanish, collapsing the entire food chain and leading to the extinction of most life forms, including humans.

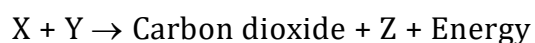
3. A potato slice shows the presence of starch with iodine solution. Where does the starch in potatoes come from? Where is the food synthesised in the plant and how does it reach the potato?

Ans. The starch in potatoes is a stored form of glucose produced during photosynthesis. Glucose is synthesized in the leaves of the plant using sunlight, carbon dioxide and water. The glucose formed is converted into starch and transported through the phloem to different parts of the plant, including underground stems like the potato, where it is stored.

4. Does the broad and flat structure of leaves make plants more efficient for photosynthesis? Justify your answer

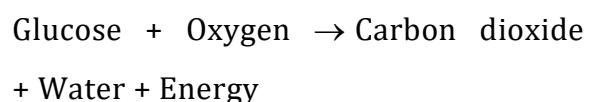
Ans. Yes, the broad and flat structure of leaves increases the surface area available for absorbing sunlight. This maximizes absorption of sunlight, which is essential for photosynthesis. Additionally, it allows for better gas exchange (carbon dioxide in, oxygen out) through the stomata, making the process more efficient.

5. X is broken down using Y to release carbon dioxide, Z and energy.



X, Y and Z are three different components of the process. What do X, Y and Z stand for?

Ans. X stands for glucose, Y is oxygen and Z is water. During aerobic respiration, glucose is broken down in the presence of oxygen to release carbon dioxide, water and energy. This process provides energy required for various life activities.



6. Krishna set-up an experiment with two potted plants of same size and placed one of them in sunlight and the other in a dark room, as shown in fig. answer the following questions –



(a) Sunlight

(b) Complete dark

Experimental pots

- What idea might she be testing through this experiment?
- What are the visible differences in plants in both the conditions?
- According to you, leaves of which plants confirm the iodine test for the presence of starch?

Ans.

- She is testing whether sunlight is necessary for photosynthesis.
- The plant kept in sunlight appears healthy, green and upright. The plant kept in the dark room looks pale or yellowish, weak and droopy due to the absence of sunlight which prevent chlorophyll production and photosynthesis.
- The leaves of the plant kept in sunlight will confirm the iodine test by turning blue-black, indicating the presence of starch. The plant in the dark room will not show a colour change, as no photosynthesis (and thus no starch formation) occurred.

7. Vani believes that 'carbon dioxide is essential for photosynthesis'. She puts an experimental set-up, as shown in fig. to collect evidence to support or reject her idea.



(a)
Sunlight with
carbon dioxide



(b)
Sunlight without
carbon dioxide



(c)
Dark with
carbon dioxide



(d)
Dark without
carbon dioxide

A potted plant with sufficient water is placed under the prescribed conditions

Answer the following questions —

- In which plant(s) in the above set-up(s) will starch be formed?
- In which plant(s) in the above set-up(s) will starch not be formed?
- In which plant(s) in the above set-up(s) will oxygen be generated?
- In which plant(s) in the above set-up(s) will oxygen not be generated?

Ans. (i) (a) only.

Because both sunlight and carbon dioxide are available for photosynthesis.

- (ii) (b), (c) and (d).

Because each of these setups lacks either carbon dioxide or sunlight, so photosynthesis cannot take place.

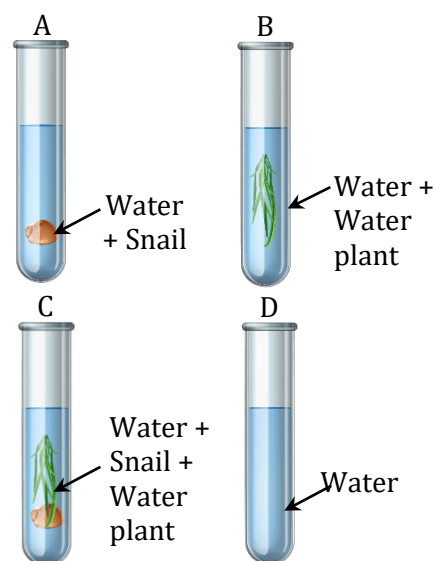
- (iii) (a) only.

Oxygen is released during photosynthesis and only setup (a) has the required conditions.

- (iv) (b), (c) and (d).

Because without photosynthesis (due to missing CO_2 or light), no oxygen is produced.

8. Ananya took four test tubes and filled three-fourth of each test tube with water. She labelled them A, B, C and D. In test tube A, she kept a snail; in test tube B, she kept a water plant; in test tube C, she kept both a snail and a plant. In test tube D, she kept only water. Ananya added a carbon dioxide indicator to all the test tubes. She recorded the initial colour of water and observed if there are any colour changes in the test tubes after 2–3 hours. What do you think she wants to find out? How will she know if she is correct?



Experiment Set-up

Ans. Ananya performed an experiment to understand how plants and animals affect the levels of carbon dioxide in water.

She uses a carbon dioxide indicator to observe changes in the test tubes.

- In the test tube A with the snail, the indicator changes colour because the snail produces carbon dioxide through respiration.
- In the test tube B with the plant, the indicator changes colour as the plant uses carbon dioxide for photosynthesis.
- In the test tube C with both the snail and the plant, the plant uses the carbon dioxide produced by the snail, so the colour change is less noticeable or balanced.
- The test tube D with only water shows no colour change because there is no respiration or photosynthesis.

These observations help Ananya understand the role of carbon dioxide in photosynthesis and respiration. Carbon dioxide is used by plants during photosynthesis to make food, while it is produced by animals and plants during respiration as a waste product.

9. Design an experiment to observe if water transportation in plants is quicker in warm or cold conditions

Aim: To find out whether water moves faster in plants in warm or cold conditions.

Materials:

- Two similar healthy potted plants (or cut celery sticks)
- Two clear glasses or beakers
- Coloured water (use food colouring)
- One warm place (e.g., near a window in sunlight)
- One cold place (e.g., inside the fridge or a cool shaded area)

Procedure:

1. Fill both glasses with coloured water.
2. Place one plant or celery stick in the warm place with coloured water.
3. Place the other plant or celery stick in the cold place with coloured water.
4. After 30 minutes to 1 hour, observe how far the colour has moved up the stem in both plants.

Observation:

- The plant in the warm place will show coloured water moving faster and higher up the stem.
- The plant in the cold place will show slower movement of coloured water.

Conclusion:

Water transportation is quicker in warm conditions because heat increases the rate of evaporation and transpiration, pulling water faster through the plant.

10. Photosynthesis and respiration are essential to maintain balance in nature. Discuss.

Ans. Photosynthesis and respiration work together to keep life on Earth balanced. In photosynthesis, plants use sunlight, carbon dioxide and water to make food (glucose) and release oxygen. This oxygen is essential for animals and humans to carry out respiration. Respiration is the process by which living organisms, including plants and animals, use oxygen to break down glucose and release energy needed for their activities. This process produces carbon dioxide and water as by-products.

The carbon dioxide produced during respiration is used again by plants in photosynthesis and the oxygen released in photosynthesis is used in respiration. This cycle keeps the levels of oxygen and carbon dioxide balanced in the atmosphere, supporting all living beings.