

PERIOD 15 AND 16

Respiration in plants

Teacher guided discussion

Define respiration as breakdown of glucose with oxygen to produce CO_2 , H_2O and energy. Explain that respiration occurs in day and night; photosynthesis only in sunlight. Discuss the experiment showing respiration in plants. Mention that all parts of a plant respire independently. Explain how respiration takes place through leaves and roots of the plants.

NEP

Art-integrated learning: The teacher can ask students to draw in their notebooks to show that carbon dioxide is given out during respiration in plants.

Suggested home assignment

Point out the difference between respiration and photosynthesis.

PERIOD 17

Revise all the topics covered in the previous lesson.

Using Resources

Refer to the corresponding chapter in the Digital Support given in the book.

PERIOD 18

Discuss the exercises given at the end of the chapter.

PERIOD 19

Assessment of understanding of the chapter could be done with the help of the given worksheet for the chapter.

TEXT BOOK ANSWERS

Objective Type Questions

1. Name the following:

(a) Stomata

(b) Photosynthesis

(c) Carbon dioxide

(d) Chlorophyll

(e) Xylem

(f) Respiration

2. Fill in the following blanks with suitable words:

(a) starch

(b) glucose

(c) Chlorophyll

(d) stomata

(e) oxygen

(f) phloem

(g) glucose, energy

3. State whether the following statements are true or false:

- (a) False (b) True (c) True (d) False (e) True

4. Match the items given in column I with those in column II:

- (a) (iv) (b) (v) (c) (i) (d) (ii) (e) (iii)

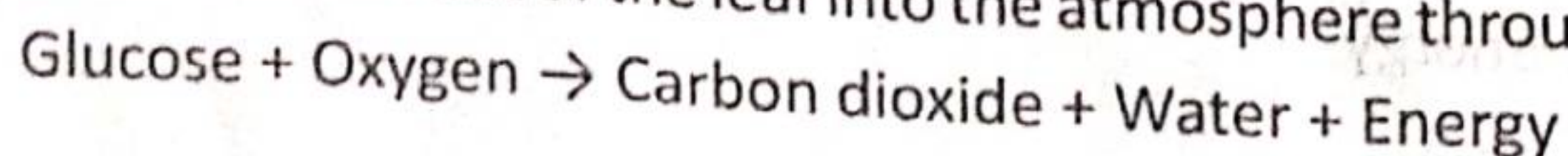
Subjective Type Questions

Short Answer Type Questions

- The starch in potatoes comes from the glucose produced during photosynthesis in the leaves of the plant. The food is synthesised in the leaves using carbon dioxide, water, and sunlight. The prepared food is then transported through the phloem to different parts of the plant.
- Life Processes in Plants

S. No.	Feature	Photosynthesis	Respiration
1.	Raw materials	Carbon dioxide and water (in the presence of sunlight and chlorophyll)	Glucose and oxygen
2.	Products	Glucose and oxygen	Carbon dioxide, water, and energy
3.	Word equation	Carbon dioxide + Water → Glucose + Oxygen (in presence of sunlight and chlorophyll)	Glucose + Oxygen → Carbon dioxide + Water + Energy
4.	Importance	Prepares food and releases oxygen necessary for all living beings	Releases energy required for growth and other life processes

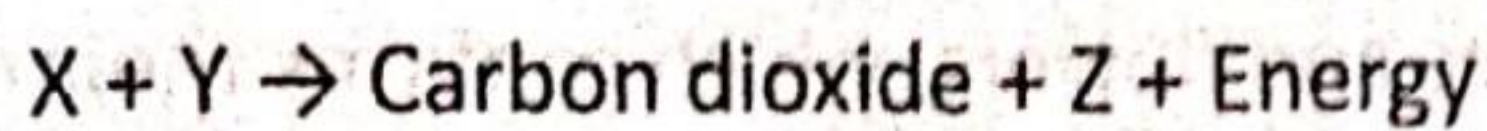
- Organisms need to take food to obtain energy for daily activities, for growth and development, and for repairing and maintaining their cells and tissues. Food also provides the nutrients necessary to build the body.
- We cannot make food by photosynthesis like plants because our bodies lack chlorophyll, the green pigment that absorbs sunlight and converts it into chemical energy. Humans and animals do not have chloroplasts.
- Yes, photosynthesis can take place in colourful leaves because even though they appear red, yellow, or purple due to other pigments, they still contain chlorophyll beneath those pigments. The chlorophyll is masked by the coloured pigments, but it continues to absorb sunlight and carry out photosynthesis to make food for the plant.
- Xylem and phloem are the two vascular tissues in plants that transport essential substances. Xylem's function is to transport water and minerals from the roots to the rest of the plant, while phloem's function is to transport food (sugars) from the leaves to other parts of the plant.
- Respiration in leaves is a process where they exchange gases through tiny pores called stomata to break down glucose for energy. Oxygen enters the leaf through the stomata and is used to break down glucose, releasing carbon dioxide, water, and energy (ATP). The carbon dioxide then diffuses out of the leaf into the atmosphere through the same stomata.



Answer Type Questions

1. (a) Yes, the broad and flat structure of leaves makes plants more efficient for photosynthesis. The large surface area allows leaves to capture more sunlight. This maximises the plant's ability to prepare food.

- (b) The equation for respiration:

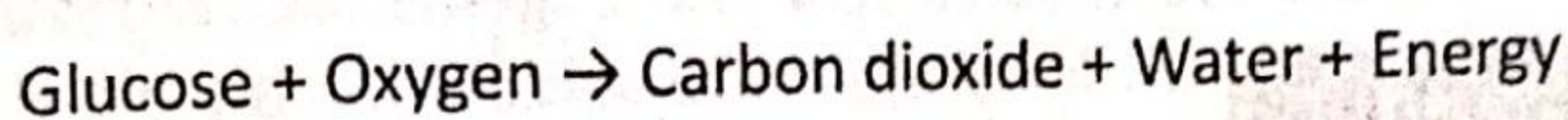


X = Glucose (the food being broken down)

Y = Oxygen (required for oxidation)

Z = Water (produced along with carbon dioxide and energy)

Complete reaction:



2. (a) Krishna is testing whether sunlight is necessary for photosynthesis in plants or not.

- (b) **Visible differences in plants:**

(i) Plant in sunlight: Healthy, green leaves, normal growth.

(ii) Plant in complete dark: Pale or yellowish leaves, weak stem, poor growth.

- (c) **Iodine test for starch:** Leaves of the plant kept in sunlight will test positive for starch with iodine solution because photosynthesis occurs in the presence of light. The plant kept in the dark will not show starch because it cannot make food without sunlight.

3. (a) Plants get carbon dioxide from the air through tiny openings on leaves called stomata. Each stoma (singular of stomata) is surrounded by guard cells that control its opening and closing. During photosynthesis, when sunlight is available, the stomata open, allowing carbon dioxide to enter the leaf and oxygen to exit. The carbon dioxide then diffuses into the cells containing chlorophyll, where it is used to make food (glucose).
- (b) The roots of the plant absorb water and minerals from the soil. The xylem vessels carry the water and dissolved minerals upward through the stem and branches. Water evaporates from the surface of leaves through tiny pores called stomata in a process called transpiration. This creates a suction force that pulls more water upward from the roots. In this way, water and minerals reach the leaves where they are used for photosynthesis.

4. (a) **Experiment to prove that carbon dioxide is needed for photosynthesis:**

Set up: Take two potted green plants of the same type. Cover one plant with a transparent glass jar containing soda lime (which absorbs CO₂) and leave the other plant uncovered as a control. Expose both to sunlight for several hours.

Observation: After exposure, test a leaf from both plants for starch using iodine solution.

Result: The control plant's leaf turns blue-black, showing starch formation, while the leaf from the plant in the jar with soda lime does not, proving that CO₂ is essential for photosynthesis.

(b) **Experiment to prove that xylem conducts water and minerals:**

Set up: Take a plant with white flowers and place its stem in coloured water (e.g., blue ink or eosin solution). Leave it for a few hours.

Observation: The coloured water moves upward and reaches the petals.

Result: The xylem vessels are seen to carry water (and dissolved minerals) from the roots to the leaves and flowers, which confirms their role in conduction.

Multiple Choice Questions (MCQ)

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|----------------------|-------------------|------------------------|
| 1. (b) Stomata | 2. (c) Starch | 3. (b) Chemical energy |
| 4. (d) Leaves | 5. (d) A and D | 6. (c) Oxygen |
| 7. (b) Transpiration | 8. (d) Both C & D | 9. (d) All the parts |

21st Century Skills

- (a) (i) Gas A: Carbon dioxide
(ii) Liquid B: Water

(b) (i) Food C: Glucose (simple sugar)
(ii) Food E: Starch (complex food)

(c) Process D: Photosynthesis

(d) Food E (starch) gives a blue-black colour with dilute iodine solution.

(e) The pigment present in leaves is chlorophyll.
- (a) Desert plants have spines instead of leaves to reduce water loss by minimising transpiration and to protect themselves from herbivores.

(b) The tissue that helps in water transport in a cactus is xylem.

(c) The plant absorbs water from the soil through its roots.
- (a) In the absence of light, photosynthesis stopped because it requires sunlight, but respiration continued. As a result, the plant consumed oxygen and released carbon dioxide, which makes the air inside the jar richer in carbon dioxide and poorer in oxygen. The plant looked droopy because it could not make food and lost water from its leaves and cells.

(b) The air in the jar had carbon dioxide and a little water vapour. These gases were formed because the plant kept respiring, using up oxygen and releasing carbon dioxide.

(c) If a burning candle were placed in the jar, it would go out quickly because the candle consumes oxygen to burn. Since oxygen levels inside the sealed jar would drop due to the plant's respiration, there would not be enough oxygen to sustain the flame.