

Lesson Self-Check

CAN YOU EXPLAIN IT?

As scientists and engineers plan for the next phase of space exploration—traveling to and colonizing other planets, they must devise ways of meeting the needs of humans. Today's astronauts are studying how plants grow in space. Their results will help scientists determine the best way to keep plants alive until they arrive at the new planet. The next step in this process will be to determine how plants might grow in the new planet's environment.

FIGURE 14: Growing plants in space is important not only as a long-term food source, but also as a connection to life on our home planet, Earth.



Explain Use what you have learned to further explain how plants could be grown on other planets. Address the following in your explanation:

1. What inputs do plants need to carry out photosynthesis, and how might you provide these on another planet?
2. What outputs do plants produce from photosynthesis, and how do these benefit humans?
3. How do plants transfer energy from light to sugar molecules?
4. What questions would you ask about the planet to refine your list of necessary materials?

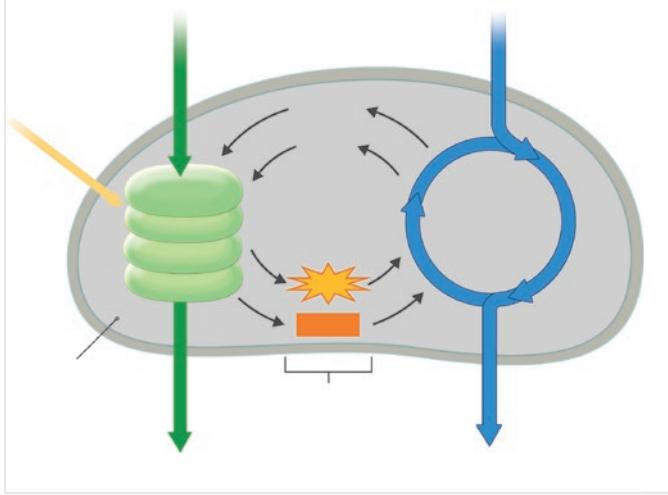
CHECKPOINTS

Check Your Understanding

1. Which of these are the result of producers performing photosynthesis? Select all correct answers.
 - a. Makes oxygen available for cellular respiration
 - b. Transfers carbon dioxide back to the atmosphere
 - c. Transfers energy from sunlight to consumers
 - d. Cycles carbon through the biosphere
2. Write the overall chemical equation for photosynthesis. Be sure to show the relationship of light and enzymes to the reaction.
3. Use the terms below to complete this paragraph:
NADPH, ATP, thylakoids, chlorophyll, chloroplasts, electrons

Light energy is absorbed by __ found in the membranes of __, which are saclike structures inside __. The light energy dislodges __, which are used to make __. Energy from this process is used to make __. The electrons and energy are used to make sugars, which the plant stores or consumes for energy.
4. Draw a Venn diagram to compare chemosynthesis to photosynthesis.

FIGURE 15: The two stages of photosynthesis, light-dependent reactions and light-independent reactions, occur in the chloroplast.



5. Draw the diagram above, and add the following labels to illustrate the transfer of matter and energy in photosynthesis:
NADPH, NADP⁺, sugars, light, ADP, O₂, H₂O, ATP, CO₂

6. Draw a simple ecosystem made up of at least one producer and one consumer. Add arrows and labels to show how energy and matter flow from the sun to the producer and from the producer to the consumer.
7. Draw a diagram showing the interaction between light and chlorophyll. The diagram should show how this interaction results in the transfer of energy and electrons through photosystem I and photosystem II.
8. Is it true that all organisms on Earth depend on the sun as their energy source? Explain your answer.

MAKE YOUR OWN STUDY GUIDE



In your Evidence Notebook, design a study guide that supports the main idea from this lesson:

Photosynthesis is a process used by most producers to transform light energy into stored chemical energy.

Remember to include the following information in your study guide:

- Use examples that model main ideas.
- Record explanations for the phenomena you investigated.
- Use evidence to support your explanations. Your support can include drawings, data, graphs, laboratory conclusions, and other evidence recorded throughout the lesson.

Consider how the models for photosynthesis you have used in this lesson can be used to explain changes in energy and matter. Explain these changes in terms of energy flow and matter cycling within and between systems.