

BENCHMARK SC.912.L.18.9

Molecular and Cellular Biology

Standard 18 Matter and Energy Transformations**SC.912.L.18.9** Explain the interrelated nature of**photosynthesis and cellular respiration. (Also assesses****SC.912.L.18.7, SC.912.L.18.8, and SC.912.L.18.10.)****Also Assesses** SC.912.L.18.7 Identify the reactants, products, and basic functions of photosynthesis.

SC.912.L.18.8 Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.

SC.912.L.18.10 Connect the role of adenosine triphosphate (ATP) to energy transfers within a cell.

Students will explain how the products of photosynthesis are used as reactants for cellular respiration and vice versa.

Students will explain how photosynthesis stores energy in organic compounds and cellular respiration releases energy from organic compounds.

Students will identify the reactants, products, and/or the basic function of photosynthesis.

Students will identify the reactants, products, and/or the basic functions of aerobic and anaerobic cellular respiration.

Students will connect the role of adenosine triphosphate (ATP) to energy transfers within the cell.

Content Limits

Items will not require the memorization of the stages, specific events, or intermediate molecules produced during these processes.

Items will not require the balancing of equations.

Items will not assess plant structures.

Scenarios may include chemical equations.

Scenarios referring to adenosine triphosphate should use the abbreviation ATP rather than the words adenosine triphosphate.

Response Attributes

None specified

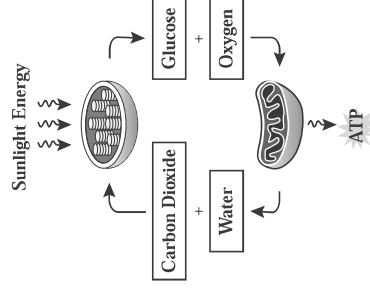
Prior Knowledge

Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge of SC.6.L.14.4, SC.8.L.18.1, SC.8.L.18.2, SC.7.P.11.2, and SC.7.P.11.3.

Sample Item 21

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The diagram below shows the relationship between photosynthesis and cellular respiration and the organelles in which they occur.

Photosynthesis and Cellular Respiration

Which statement describes how photosynthesis and cellular respiration are interrelated?

- A. Oxygen is produced during cellular respiration and stored during photosynthesis.
- ★ B. Carbon dioxide and water released by cellular respiration are used in photosynthesis.
- C. Photosynthesis releases the energy that is stored during the process of cellular respiration.
- D. Glucose is used during cellular respiration to produce food that is broken down during photosynthesis.