### Back and Forth: Photosynthesis and Respiration

**Parent Information**

Photosynthesis and Cellular respiration are two fundamental processes of life. During photosynthesis, plants capture energy from sunlight and store it in a molecule of glucose. They need water and carbon dioxide to complete the process. Oxygen is a waste product, released through the leaves. Photosynthesis happens in the chloroplast of a plant cell. Chlorophyll is the green pigment in the chloroplast that captures the sunlight.

\[
\text{Carbon Dioxide + Water + Sunlight = Glucose + Oxygen} \\
6\text{CO}_2 + 6\text{H}_2\text{O} + \text{Sunlight} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2
\]

Nearly every living thing relies on these molecules of glucose for the energy they need for all life processes. Cellular respiration breaks apart the molecule of glucose and releases the energy for use within the cell. The energy is transferred in small amounts to molecules of ATP, which then carry it to wherever it is needed. Oxygen is needed to complete this process, and carbon dioxide and water are waste products that are released. Cellular respiration occurs in the mitochondria of all cells.

\[
\text{Glucose + Oxygen = Carbon Dioxide + Water + Energy} \\
\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + \text{Energy (36 ATP)}
\]

**Benchmark**

SC.912.L.18.9 Explain the interrelated nature of photosynthesis and cellular respiration.

**Objective**

Student will understand how photosynthesis and respiration are connected.

**Duration**

1 week (20 minutes daily)

**Materials**

1. 6 potted plants
2. Aluminum foil
3. Paper clips
4. Scissors

**Procedures**

Question: What happens to the chlorophyll in a plant when light is taken away?

1. Cut a square from the foil large enough to cover ½ of a leaf on the plant.
2. Attach the foil square to the leaf with a paper clip.
3. Leave the plants in a window so that they will receive plenty of sunlight.
4. Make and record observations about the leaves and the weather for 4 days.
5. On day 5, remove the foil and observe the leaves.
6. Draw and color a diagram of the leaf.
7. Put the plants back in the window without the foil for 4 more days. Make and record daily observations about the leaves.
8. On day 5 draw and color a diagram of a leaf.
Discussion Questions:
1. What happened to the chlorophyll when there was no light?
2. Why do you think this happened?
3. Examine the equations for photosynthesis and respiration. Compare the left side (reactants) to the right side (products). What do you notice?
4. How do you think the two processes are related?

FCAT Practice
Which statement below BEST describes the relationship between photosynthesis and cellular respiration?

A. Cellular respiration captures energy and photosynthesis releases energy.
B. Cellular respiration releases energy and photosynthesis captures energy.
C. Cellular respiration and photosynthesis are the same processes.
D. Cellular respiration and photosynthesis are not related.

Answer: B