**Activity 12 Challenge Question:** How do photosynthesis and cellular respiration meet the energy needs of all organisms?

**Introduction:**

Every living cell needs a source of energy. Without energy, metabolism – all of the chemical reactions that occur within cells-will not occur. In this activity, you will learn how the complex chemical reactions of photosynthesis and cellular respiration help meet the energy needs of living things. You will examine the organelles, molecules, and chemical reactions involved in these two processes. You will also learn how a microbe or chemical that disrupts one or more of the steps of photosynthesis or cellular respiration causes disease.

**Before you start:**  Remember back to Unit 1. What cell organelle is responsible for carrying out photosynthesis? What organelle is responsible for carrying out cellular respiration?

**Doing the Activity:** *Read pages 220-227 and answer the following questions while you read.*

Every Cell Needs a Source of Energy

1. What is cellular respiration?
2. What molecule is needed when cells need energy?
3. What is photosynthesis?
4. What are the equations for cellular respiration and photosynthesis?
5. Why are photosynthesis and cellular respiration considered opposites?

Photosynthesis

1. What is pigment and what organisms have pigment?
2. What pigment is found in most producers?
3. What is a chloroplast?
4. Draw and label a chloroplast (page 221).

The Reactions of Photosynthesis

1. What are the two stages of photosynthesis?
2. What do light-dependent reactions rely on?
3. What two molecules are important to the light independent reactions?
4. Light independent is also called the Calvin Cycle, what is the Calvin Cycle?
5. The purpose of photosynthesis is to produce what high energy molecule?
6. Why is the Calvin Cycle also called the light independent stage?

Cellular Respiration

1. How is cellular respiration different from breathing?
2. Where does cellular respiration take place in Eukaryotes?
3. What is the definition of Mitochondria?
4. The inner membrane of mitochondria if folded to form what structures?

Reactions of Cellular Respiration

1. What does Glycolysis mean and where does it occur?
2. What is the net gain of ATP after glycolysis?
3. If oxygen is present, what process will follow glycolysis?
4. Where does the Kreb’s Cycle take place?
5. What happens in the Kreb’s Cycle?
6. What is the final step of cellular respiration?
7. What happens during the electron transport chain?
8. How many ATP molecules are produced from the electron transport chain?
9. Aerobic respiration can produce a total of how many ATP molecules?
10. Anaerobic respiration is also known as what?
11. Where does Anaerobic respiration take place?

*Read the rest of the section and prepare to answer analysis questions 1-4.*

**Analysis Questions: *Using what you have learned, answer the following questions.***

1. What is the role of enzymes in photosynthesis and cellular respiration?
2. What is chlorophyll and what is its role in photosynthesis?
3. How are plants specialized for photosynthesis?
4. Compare Aerobic and Anaerobic respiration. What are the similarities and differences?