Cells and Energy

A. Cellular Respiration

1. All ________ living ________ things need energy to survive.

2. Cellular Respiration ________ is a series of chemical reactions that convert the energy in food molecules into a usable form of energy called ATP.

3. The first step of cellular respiration, called glycolysis, occurs in the ________ cytoplasm ________ of all cells.

4. During glycolysis ________ glucose ________, a sugar, is broken into smaller molecules.

5. The second step of cellular respiration occurs in the ________ mitochondria ________ of eukaryotic cells. This step requires ________ oxygen ________.

6. During the second step of cellular respiration, the smaller molecules made during ________ glycolysis ________ are broken down. Large amounts of usable energy, called ________ ATP ________, are produced.

7. ________ Water (H₂O) ________ and carbon dioxide (CO₂) are two waste products that are given off during the second step of cellular respiration.

B. Fermentation

1. Eukaryotic and prokaryotic cells use fermentation to obtain energy from food when ________ oxygen ________ levels are low.

2. Fermentation occurs in a cell’s ________ cytoplasm ________.

3. Lactic-acid fermentation converts ________ glucose ________ into ATP and a waste product called lactic acid.

4. Some types of bacteria and yeasts make ATP during ________ alcohol ________ fermentation. This process produces ________ ethanol ________ and CO₂.

C. Photosynthesis

1. Plants and some unicellular organisms obtain energy from ________ light ________.

2. Photosynthesis is a series of chemical reactions that convert light energy, water, and CO₂ into ________ glucose ________ and ________ oxygen ________.

3. In plants, light energy is absorbed by ________ pigments ________ such as chlorophyll.
Lesson Outline continued

4. The chemical reactions of photosynthesis occur in **chloroplasts**, the organelles in plant cells that convert light energy into food.

5. Photosynthesis uses CO₂ that is released during **cellular respiration** to make food energy and release oxygen.

6. When an organism eats plant material, it takes in **food** energy. An organism's cells use **oxygen** released during photosynthesis.
Cells and Energy

Directions: Work with a partner. Take turns quizzing each other by reading the questions aloud. Use the textbook to research answers that you are unsure about.

1. What does cellular respiration convert?  
   glucose

2. In which organelle does respiration take place?  
   mitochondria and cytoplasm

3. What happens during glycolysis?  
   glucose is broken into smaller pieces

4. What three things are produced during the second step of respiration?  
   ATP, water, and carbon dioxide

5. How does the process of fermentation differ from the process of respiration?  
   fermentation does not use oxygen

6. Where can the process of lactic-acid fermentation be found?  
   in the muscle cells of humans and other animals

7. What do human and animal cells obtain through lactic-acid fermentation during exercise?  
   ATP

8. What does alcohol fermentation produce?  
   ATP, ethanol, and carbon dioxide

9. What do plant cells use to produce glucose and oxygen?  
   light, water, and carbon dioxide

10. What is reflected by a plant to give it a green color?  
    green light

11. What does an animal take in when it eats a plant?  
    glucose

12. Which molecules are involved in photosynthesis and respiration?  
    Carbon Dioxide, Water, Glucose, Oxygen, ATP
School to Home

LESSON 4

Cells and Energy

Directions: Use your textbook to answer each question or respond to each statement.

1. What is cellular respiration?
   Cellular respiration is a series of chemical reactions that convert the energy in food molecules into a usable form of energy called ATP.

2. In which two parts of the cell does cellular respiration occur?
   mitochondria and cytoplasm

3. How is fermentation similar to cellular respiration?
   They both convert glucose into usable energy: ATP.

4. How is fermentation different from cellular respiration?
   1. Fermentation does not use oxygen, but cellular respiration does.
   2. Fermentation produces 2 ATP, and cellular respiration produces 38 ATP.

5. What is photosynthesis?
   Photosynthesis is a series of chemical reactions that convert light energy, water, and carbon dioxide into glucose.

6. Identify the following chemical reactions:
   a. \(6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_12\text{O}_6 + 6\text{O}_2\) Photosynthesis
   b. \(\text{C}_6\text{H}_12\text{O}_6 \rightarrow \text{ATP (energy)} + \text{lactic acid}\) lactic-acid fermentation
   c. \(\text{C}_6\text{H}_12\text{O}_6 \rightarrow 6\text{O}_2 + 6\text{H}_2\text{O} + \text{ATP (energy)}\)
   d. \(\text{C}_6\text{H}_12\text{O}_6 \rightarrow \text{ATP (energy)} + \text{CO}_2 + \text{alcohol}\) alcohol fermentation
   e. \(\text{C}_6\text{H}_12\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + 38\text{ATP}\) cellular respiration

Cell Structure and Function