Notes – Photosynthesis (09)

1. **What is photosynthesis? (p.205)** *Photosynthesis is the process by which plants make food, using carbon dioxide from the air and water from the ground as ingredients, and sunlight as an energy source, to create glucose, a form of sugar, and oxygen as products. Almost all life on Earth depends on the process of photosynthesis to create food.*

2. **What is the source of almost all energy on Earth? (p.205)** *Other than the small amount of thermal and nuclear energy released from the Earth's core, all energy supporting life on Earth comes from the Sun. Nuclear fusion reactions, combining four hydrogen atoms into one helium atom, release large quantities of electromagnetic energy. That electromagnetic energy, including visible light, infrared radiation and ultraviolet light, travel through the vacuum of space to Earth, where it powers the photosynthesis process and heats the Earth to temperatures required to support life.*

3. **What are the components of white light? (p.205)** *White light as the human eye perceives it is actually a mix of all the different colors of light contained in the rainbow—red, orange, yellow, green, blue, indigo and violet.*

4. **Which colors of light do plants absorb, and which color do plants reflect? (p.206)** *Plants generally absorb all colors of light except green, and reflect green light. This is why plants usually looks green—because green is the only color that is not absorbed by plants.*

5. **What pigment absorbs the light in plants?** *Where is this pigment found in plants? (p.206) The pigment in plants that absorbs the energy of light is called chlorophyll. It is located in organelles within the leave of plants called chloroplasts. It is in that organelle that photosynthesis takes place.*

6. **What energy conversion occurs in photosynthesis? (p.206)** *In photosynthesis, electromagnetic energy from the Sun is converted to chemical energy stored in glucose molecules.*

7. **Describe the photosynthesis process. What are the reactants and products in the process? (p.207)** *In photosynthesis, electromagnetic energy, in the form of visible light, is absorbed by the chlorophyll pigment within the chloroplasts of plant cells. That energy causes the atomic bonds in carbon dioxide and water molecules to break down, and the atoms to reassemble themselves into glucose and oxygen molecules. Much more energy is stored in the atomic bonds of glucose than was released from the carbon dioxide and water. This extra energy comes from the Sun. The reactants (or ingredients) for photosynthesis are carbon dioxide and water, and the products (the end result) are glucose and oxygen.*

8. **What is the chemical equation for photosynthesis? (p.208)** *The chemical equation for photosynthesis is:* $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$*; the reactants are carbon dioxide and water, and the products are glucose and oxygen. Electromagnetic energy from sunlight is converted to chemical energy stored in the atomic bonds of glucose during the reaction.*

9. **In what process do plants and animals use glucose to grow? (p.208)** *Respiration is the process that a plant or animal uses to break down glucose and oxygen and release the chemical*

energy stored in the glucose's atomic bonds. The chemical energy in glucose is converted to thermal and mechanical energy. The products of respiration are carbon dioxide and water. The chemical equation for respiration is: $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$*; the exact opposite of the equation for photosynthesis.*

10. **What are fossil fuels? How are they made? (p.209)** *Fossil fuels are energy resources like petroleum, natural gas, propane and coal that formed deep underground over millions of years as heat and pressure converted the remains of buried plants and animals into carbon-containing fuels.*

11. **What is gravitropism? (p.131)** *Gravitropism is the response of plants, especially sprouting seeds underground, to the force of gravity. The roots of the seedlings will grow straight down towards the source of gravity (the center of the Earth), and the stems will grow straight up away from the source of gravity.*

12. **What is phototropism?** *Phototropism is the response of plants to the stimulus of light, causing the plants to turn or grow towards light. It explains why trees in a dense forest grow straight up towards the only light without many side branches, and why trees in an open field grow branches on their sides, because the light comes from all around.*