Name _____

Photosynthesis: Nature's Green Energy Factory

Open-Ended Response Answer Key

1. The two main stages of photosynthesis are the light-dependent reactions and the Calvin Cycle. The light-dependent reactions occur in the thylakoid membranes of chloroplasts and involve capturing sunlight, splitting water to release oxygen, and producing ATP and NADPH. The Calvin Cycle takes place in the stroma of the chloroplasts and uses ATP and NADPH to convert carbon dioxide into glucose, serving as the plant's energy source.
2. Photosynthesis is responsible for releasing oxygen into the atmosphere as a byproduct. Oxygen is essential for the respiration of animals, including humans, as well as many other life processes. Without photosynthesis, the Earth's atmosphere would lack sufficient oxygen to support most forms of life.
3. Photosynthesis helps mitigate climate change by absorbing carbon dioxide from the atmosphere and reducing its concentration. This helps regulate Earth's climate by preventing excessive global warming, making it an essential process for maintaining a habitable environment.
4. As a scientist studying photosynthesis, you could conduct experiments to investigate factors that affect the rate of photosynthesis, such as light intensity, temperature, and carbon dioxide levels. You could also study the impact of pollutants on photosynthesis and explore ways to enhance the efficiency of this process in plants to benefit agriculture and the environment.