

Energy Unit

Essential

EE.1 - Use evidence to explain the cycling of matter and energy in aerobic and anaerobic conditions.

Level 3 Description	Photosynthesis and cellular respiration (including anaerobic processes) provide most of the energy for life processes. Describes that animals eat plants to get sugar for energy. Explains that the products of one reaction acts as reactants in the other. Define aerobic and anaerobic respiration.
Level 4 Description	Describes that plants transfer light energy into chemical energy that is then used by other organisms through the food chain as energy to sustain their metabolism to build the the molecules each needs for life. Discuss cyclical nature and cycling of matter. Diagrams the inputs and outputs of photosynthesis and cellular respiration demonstrating the cyclical relationship. Define each process, describe the benefits and disadvantages of each process, describe the products of the anaerobic processes, and describe commercial uses of them.

EE.2 - Predict how environmental factors would affect photosynthesis and cellular respiration

Level 3 Description	Given a scenario, predict the effect of an event on photosynthesis and cellular respiration.
Level 4 Description	Given a scenario, predict multiple effects of an event on photosynthesis and cellular respiration and what implications that would have on the ecosystem.

Supporting

ES.1 - Use a model to illustrate how photosynthesis transforms light energy in stored chemical energy.

Level 3 Description	Photosynthesis converts light energy to chemical energy that plants then use in their metabolism to build the molecules they need to sustain their lives.
Level 4 Description	Photosynthesis converts carbon dioxide and water into sugars(stored energy) and oxygen. Identify the inputs and outputs of photosynthesis using words or the chemical formula.

ES.2 - Use a model to illustrate how cellular respiration transforms oxygen and the energy in the bonds of food into a usable form of energy (ATP).

Level 3 Description	Describe that cellular respiration is the process that cells use to change the energy in glucose into a usable form of energy(ATP) and provides the energy source for most living organisms. Chemical elements are recombined in different ways to form different products.
Level 4 Description	Energy is transferred from one system of interacting molecules to another. Cellular respiration is a chemical process in which the bonds of food molecules(glucose) and oxygen molecules are broken and new compounds are formed that can transport energy(ATP) Identify the inputs and outputs of cellular respiration using words or the chemical formula.

ES.3 - Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.

Level 3 Description	Describes how matter and energy flows through a system using mathematical representations.
Level 4 Description	Photosynthesis and cellular respiration are important components of the carbon cycle, in which carbon is exchanged among the biosphere, atmosphere, oceans, and geosphere through chemical, physical, geological, and biological processes. Describes how matter(carbon, nitrogen and phosphorus) and energy flows through a system using mathematical representations and use these representations to predict outcomes due to a change in the system.