

# Photosynthesis

Plants, algae, and phytoplankton absorb sunlight, take in carbon dioxide from the atmosphere and water from their environment, release oxygen back into the atmosphere, and produce glucose. This is the chemical process of **photosynthesis**. Photosynthetic organisms use sunlight and water to convert carbon dioxide into glucose molecules. Glucose fuels **cellular respiration** producing energy in the form of ATP that can be used to perform every day cellular activities (**energy**) or is stored for growth, repair, and reproduction (**matter**). The chemical equation for photosynthesis is:



## More facts about how matter and energy flow in organisms:

- 1) **Glucose molecules** are used to build amino acids and other molecules which, in turn, are assembled into larger molecules like proteins and DNA, which can be used to form new cells.
- 2) In plants, **carbon dioxide** from the air is being converted into the actual **mass** of the plant tissue. (The molecules that create plant tissue actually come from the air!)
- 3) Plants, algae and other photosynthetic microorganisms, in turn, are consumed by animals (and other organisms), broken down, stored, and used as fuel for bodily functions, growth and reproduction. In this way, the energy of the sun is converted by photosynthetic organisms into fuel that consumer organisms around the planet use to live (**energy**) and grow (**matter**).
- 4) At every level, some energy is lost as **heat**. This is why there is so much more biomass at the bottom of food webs (plants) and why an ecosystem can only support so many organisms.
- 5) The chemical molecules that make up living things pass through food webs, are released into the atmosphere and soil, and are reintegrated into other compounds. In this way, photosynthesis and cellular respiration help drive the **carbon cycle** on Earth, where carbon circulates between the atmosphere, biosphere, hydrosphere and geosphere.

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These resources, through reading, illustrated diagrams, investigations, and critical thinking activities will help students with the following Next Generation Science Standard:

**Performance Expectations:** Students who demonstrate understanding can:

HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.

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