Chapter 4 Energy and Life

1. What is energy?
    a. Living things use energy to power life / survive
        i. Energy- defined as the capacity to do work
            1. Work = Force x Distance moved
    b. Energy is converted from one form to another
        i. Potential energy- the energy an object has due to its location or structure
        ii. Kinetic energy- the energy of motion
        iii. Potential energy is stored in the bonds that hold atoms together into molecules
            1. In cells, ATP is a common energy currency molecule, if a bond breaks energy releases and can drive other processes
    c. Energy can be converted but cannot be created or destroyed
        i. Heat is a byproduct of energy conversion
    d. With each energy conversion heat is released, so the disorder in a system increase
    e. Living things must work to counter entropy, the amount of disorder in a system

2. Energy flow through ecosystems
    a. Life is powered by the Earth
    b. Food contains chemical energy a type of potential energy
        i. Body breaks the chemical bonds in food and converts potential energy into kinetic energy
    c. Producers can absorb the sun's energy and convert it to chemical energy – make own food
        i. Food
        ii. (Photosynthesis) Solar energy → Chemical energy
            1. $CO_2 + H_2O \rightarrow Sugar + O_2$
            2. Energy is stored in the bonds of sugar molecule
            3. Photosynthesis takes place inside the cells of plants and algae in organelle called chloroplasts
                a. Plants and algae produce oxygen gas (O_2) as a byproduct
    d. Consumers obtain energy by eating producers
    e. Both producers and consumers must use cellular respiration to release chemical energy
        i. Allow plants and animals to power life