Essential Standard 5.P.3

Heat Transfer Study Guide

- When warmer things are put with cooler things, the warmer things lose heat and the cool things gain heat until they are all at the same temperature. Heat always moves from the WARMER object/material to the COOLER object/material until their temperatures are equal.
    - A warmer object can warm a cooler object by contact or at a distance.
- **Conduction** is the transfer of thermal energy (heat) between things that are touching.
    - Conduction can happen within one object. (For example, thermal energy (heat) can be conducted through the handle of a metal pot.)
- **Convection** is the movement of thermal energy (heat) by the movement of liquids or gases.
    - Convection in the oceans and atmosphere helps to move thermal energy (heat) around Earth, and is an important factor influencing weather and climate.
- **Radiation** is the transfer of energy by waves or rays. Waves can carry energy through places with or without any matter. The Sun is the main source of energy on Earth. Part of this energy, light, is used by producers to make food.
    - Radiation can also happen in other circumstances- in front of a fireplace or camp fire, a microwave etc.
- Heating and cooling can cause changes in the properties of materials, but not all materials respond the same way to being heated and cooled. Example: water turning into steam by boiling and water turning into ice by freezing
- Many kinds of changes occur faster at higher temperatures.
- Some materials conduct heat much better than others, and poor conductors can reduce heat loss.
- **Conductors**: transfer heat WELL
    - Metals (copper, iron, steel, aluminum), glass
- **Insulators**: do NOT transfer heat well; keep warm things warm and cold things cold longer
    - Examples: styrofoam, paper, wood, air, plastic
- Warming of objects that start out cooler than their environment, and vice versa.
- Remember cold does not transfer... heat does! (There's no such thing as "coldness", only less heat energy)