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## Chapter 6- Thermal Energy

### I. Temperature and Heat

- A. **Temperature** related to the average kinetic energy of an object's atoms or molecules.
  - B. **Thermal energy** the sum of the kinetic and potential energy of all the atoms in an object.
    - 1. Thermal energy **increases** as temperature increases.
    - 2. At constant temperature, thermal energy increases if **mass** increases.
  - C. Thermal energy that flows from something at a higher temperature to something at a lower temperature is called **heat**.
  - D. **Specific heat** amount of heat needed to raise the temperature of 1 kg of a material by 1 degree C or K.
  - E. Changes in thermal energy can be calculated as change in thermal energy equals **mass** times change in temperature times specific heat.
    - 1. Calculating change in energy:  $\Delta E = cm\Delta T$  **Change in energy = JT = Change in temperature**
    - 2. When heat flows into an object and its temperature rises, the change in temperature is **positive**.
    - 3. When heat flows out of an object and its temperature decreases, the change in temperature is **negative**.
    - 4. A **calorimeter** is used to measure specific heat.
- ### II. Transferring Thermal Energy
- A. **Conduction** transfer of thermal energy through matter by direct contact of particles.
    - 1. Kinetic energy is transferred as particles **vibrate**.
    - 2. **Good** ordinary materials are good heat conductors.
  - B. The transfer of energy by the motion of thermal particles in a fluid is called **convection**.
    - 1. Convection **carries** transfer heat from warmer to cooler parts of a fluid.
    - 2. Convection currents create **convection** and **advection** over different regions of Earth.
  - C. **Convection currents** take place in liquids and air.
  - D. **Radiation** energy transfer by electromagnetic waves.
    - 1. Some radiators are **absorbed** and some is **reflected** when it strikes a material.
    - 2. Heat transfer by radiation **occurs** in a vacuum as in liquid or solid.
  - E. Most living things control the flow of heat by using special features such as fur, **blubber**, or scales.
  - F. **Insulation** material that does not let heat flow through it easily.
    - 1. Gases such as **air** usually make better insulators than liquids or solids.
    - 2. A **vacuum** layer in a thermos is a good insulator because it contains almost no matter to allow conduction or convection to occur.

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