Assignment: 5

Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Hour:\_\_\_

**Notes on Heat and Thermodynamics**   
(careful, they’re hot!)

**Energy -** the ability to \_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_, the ability to do \_\_\_\_\_\_\_\_\_\_\_\_

* **Kinetic energy** – energy in \_\_\_\_\_\_\_\_\_\_\_

**Kinetic Molecular Theory of Matter:**

1. Matter is made of \_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. These atoms and molecules are like tiny particles that are \_\_\_\_\_\_\_\_\_\_\_\_\_\_ in \_\_\_\_\_\_\_\_\_\_
3. The \_\_\_\_\_\_\_\_\_\_\_\_\_ the temperature of the substance, the \_\_\_\_\_\_\_\_\_\_\_\_\_ the particles move
4. At the \_\_\_\_\_\_\_\_ temperature, more \_\_\_\_\_\_\_\_\_\_\_\_ particles move \_\_\_\_\_\_\_\_\_\_\_\_ than less massive ones

**Temperature** – measure of **\_\_\_\_\_\_\_\_\_\_\_\_** kinetic energy in an object

1. *Based on what we just talked about do you think molecules that move faster or slower have a higher temperature?*

**Heat (Thermal Energy)** – the **\_\_\_\_\_\_** kinetic energy of the particles that make up a substance, \_\_\_\_\_\_\_\_\_\_ on particle \_\_\_\_\_\_\_\_ (temperature) and \_\_\_\_\_\_\_\_\_\_\_ of particles

* \_\_\_\_ particles of matter are constantly \_\_\_\_\_\_\_\_\_\_, however \_\_\_\_ all at the \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_

1. *If I have a cup of water and a gallon of water that are both the same temperature, which one has a higher amount of thermal energy (heat)? Why?*

* Is a form of \_\_\_\_\_\_\_\_\_ and measured in \_\_\_\_\_\_\_\_\_\_\_\_\_
* Moves energy from \_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_ substances

**Demo: Rubbing alcohol – What does it mean for us?**

* Coolant (aka refrigerant or freon) works the same way (as the rubbing alcohol in the demo does) in a refrigerator except the coolant is trapped in a series of coils
* As the coolant travels through coils \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ valves forces it to convert back and forth between \_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_, as it evaporates it \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_ from the surrounding environment, when it \_\_\_\_\_\_\_\_\_\_\_ it \_\_\_\_\_\_\_\_\_\_\_\_ it (ever feel the back of a fridge?)

**Cooling**

* Air conditioning and refrigerators \_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ also, from \_\_\_\_\_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_ outside of the house or refrigerator
* This requires a \_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_ that moves \_\_\_\_\_\_\_\_\_\_\_\_ against the gradient (from low to high), thus requiring \_\_\_\_\_\_\_\_\_\_\_ (electrical) to run
* So… air conditioners do \_\_\_\_\_\_\_\_\_ make “\_\_\_\_\_\_\_\_\_\_\_\_\_\_”, they simply \_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_ from the air

**Thermal Expansion**

* Thermal expansion – tendency of an object to \_\_\_\_\_\_\_\_\_ in \_\_\_\_\_\_\_\_\_\_\_\_\_\_ in response to a \_\_\_\_\_\_\_\_\_\_\_\_ in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + As molecules move \_\_\_\_\_\_\_\_\_\_ (higher temperature) they tend to \_\_\_\_\_\_\_\_\_\_\_\_\_
  + As molecules move \_\_\_\_\_\_\_\_\_\_\_ (lower temperature) they tend to \_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - Example – think about taking a balloon outside in winter
* What do we find in bridges that allow for the thermal expansion of building materials?
  + \_\_\_\_\_\_\_\_\_\_\_\_

**Heat Transfer**

1. Conduction – movement of heat through \_\_\_\_\_\_\_\_\_\_ of \_\_\_ \_\_\_\_\_\_\_\_\_\_\_
   1. Insulators – material that heat does \_\_\_\_\_\_ move through \_\_\_\_\_\_\_\_\_\_\_
   2. Conductors – material that heat \_\_\_\_\_\_\_ move \_\_\_\_\_\_\_\_\_\_ through
   3. Examples: Touching a stove and being burned, ice cooling down your hand
2. Convection – heat moving in \_\_\_\_\_\_\_\_\_\_\_\_ through matter
   1. Examples: Hot air rising, ocean currents
3. Radiation – heat movement through \_\_\_\_\_\_\_\_\_\_\_
   1. Examples: Sun heat through space, heat from fire to you

**Law of Conservation of Energy**

* Energy cannot be \_\_\_\_\_\_\_\_\_\_\_\_\_ nor \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, but can be \_\_\_\_\_\_\_\_\_\_\_ from \_\_\_\_\_\_ form into \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Power plants do \_\_\_\_\_ make \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and then send it out to be used in our homes, they harvest (\_\_\_\_\_\_\_\_\_\_\_\_) it from \_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_\_\_\_\_\_ to use