**Chapter 4: Thermal Energy Notes**

Thermal energy (heat)-

* Total kinetic energy of the molecules in an object or substance.
* Molecules are constantly moving in all directions
* Speed (kinetic energy) of molecules is different for each state of matter.

State of matter SOLID LIQUID GAS

Speed of Molecules Lowest speed Most speed

* Size of the object affects the amount of thermal energy it has

Size of object SMALL MEDIUM LARGE

Amt of Thermal Energy Least energy Most energy

Eg: A cup of boiling water (temperature 212º F has less thermal energy than in Lake Okechobee is 80º F,

Temperature

* The average kinetic energy (or average speed) of the molecules in an object or substance
* objects that have higher temperatures have molecules that move faster

Temperature LOW HIGH

Speed of Molecules Slower Faster

Adding or Removing Heat

* thermal equilibrium - heat will always and automatically move from warmer objects to cooler objects until the amount of heat is the same in both.

Eg: If you leave a spoon in a hot cup of cocoa – the hot coffee gives heat to the cooler spoon until the spoon and the coffee are the same temperature.

continued

* Adding heat
  + Increases the speed of the molecules
  + increased temperature
  + can cause a change of state

adding heat adding heat

SOLID LIQUID GAS

Melting evaporation

* Removing heat
  + Decreases the speed of the molecules
  + Decreases the temperature
  + Can cause a change of state

Removing heat Removing heat

SOLID LIQUID GAS

Freezing condensation