1/12/05 – "Prentice Hall Physical Science," Dean Hurd, Myrna Silver, Angela Bornn Bacher, Charles William McLaughlin, New Jersey, 1998

Heat Transfer: The movement of heat from a warmer object to a colder one – when two substances at different temperatures are mixed together, heat flows from the warmer body to the cooler body **until they reach the same temperature (Zeroth Law of Thermodynamics – Thermal Equilibrium)**. Part of the heat lost by the warmer body is transferred t the cooler body and part is lost to the surrounding object or the air.

Energy of motion is called kinetic energy – when molecules are heated, their kinetic energy increases.

Temperature is a measure of the average kinetic energy of molecules - The higher the temperature of a substance, the faster the molecules in that substance are moving on average.
Ex – pot of boiling water – molecules of water moving faster is one at 90^{o} C.

Thermometer is an instrument for measuring temperature. As the liquid in the thermometer gets warmer, the molecules move faster and farther apart, the liquid expands and rises in the tube. – use Kelvin scale (add 273^{o} to Celsius temperature)
Absolute Zero is when all molecular motion stops.

Phase Change – The physical change of matter from the solid phase to the liquid phase is called a phase change. Phase change occurs when a solid becomes a liquid (melting) and liquid becomes a solid (freezing). Change of liquid to gas (vaporization) and gas to liquid (condensation) are also phase changes.

Melting Point, Freezing Point, Boiling Point

Change of phase requires a change in heat energy. When ice melts and changes into water, energy in the form of heat is being absorbed by the ice – The energy is needed to overcome the forces of attraction that hold the water molecules together in the solid phase – heat coming from surroundings.

During a phase change, there is a change in heat energy, but no change in temperature. Forces of attraction between molecules are overcome, but the average kinetic energy of the molecules remains the same. Only after the phase change has been completed will a change in heat energy produce a temperature change.

As heat energy is added to the solid, the kinetic energy of the molecules increases and their vibrations speed up. The molecules move farther away from their fixed positions and farther away from each other. This separation of molecules causes the solid to expand.