Name _____Answer Key_____ Date _____

Honors Physics Thermodynamics WS #2H

Period _____ Mrs. Nadworny

Thermal Equilibrium

Directions: Read online textbook pages 357 – 360. Answer the following questions using your knowledge of physics.

1. Two cups of hot chocolate, one at 50 ^{0}C and one at 60 ^{0}C, are poured together into a large container.
   a. The final temperature of the double batch will be

      (A) less than 50 ^{0}C (B) between 50 ^{0}C and 60 ^{0}C (C)greater than 60 ^{0} C

   b. Explain your choice using complete sentences.

      For energy to be conserved, the final temperature must be somewhere between the two initial temperatures. If it was less than 50 ^{0}C or greater than 60 ^{0}C then extra energy would have been lost to or gained from an external source.

2. A cup of hot tea is poured from a teapot into a cup. A swimming pool is filled with cold water.
   a. Which one has a higher total internal energy? Explain your choice using complete sentences.

      The water in the swimming poil has more internal energy. The much larger volume and therefore larger number of particles makes up for the lower temperature.

   b. Which one has a higher average kinetic energy? Explain your choice using complete sentences.

      The hot tea has a higher average kinetic energy because temperature is proportional to the average kinetic energy.

3. A hot copper pan is dropped into a tub of water.
   a. If the temperature of the water rises, what will happen to the temperature of the pan?

      The temperature of the pan will decrease because it is giving some of its energy to raising the waters temperature.

   b. How will you know when the water and copper pan reach thermal equilibrium?

      They will reach thermal equilibrium when the they no longer exchange energy and the temperature stabilizes.