

# Heat vs. Temp/Thermal Equil. Name \_\_\_\_\_

- 1) What is the difference between heat and temperature?
- 2) Compare a cup of water to a gallon jug of water. Assuming they are the same temperature, the heat energy would best be compared in which way: they have the same heat energy, the cup of water has more heat energy, or the gallon of water has more heat energy.
- 3) Imagine this experiment: You are standing at the center of a room. On one end of the room a vial of Helium gas which has atoms with a mass of 4 units is released. At the same time on the other side of the room a vial of radioactive Radon gas which has atoms with a mass of 222 units is released. All gasses are at room temperature. If the Helium reaches you first it will make your voice sound very high pitched. If the radioactive Radon reaches you first it cause a Geiger counter to start clicking much faster. Which will occur first? Will you start talking funny first or will the radiation be detected first? Explain why.
- 4) Explain why everything that is left out on the counter becomes room temperature. Describe what is happening at the atomic level.

- 5) The second law of thermodynamics states that energy always flows from hot to cold. How can you explain this on an atomic level?
- 6) In fact during the process of reaching thermal equilibrium energy flows both from the hotter substance to the colder substance and from the colder substance to the hotter substance. What is a more exact/correct way to state the second law of thermodynamics?
- 7) A good thermos can keep cold things cold and hot things hot. How does it know? (Hint: Some thermoses have almost all of the atoms between the inner chamber holding the liquid and the outer walls of the thermos removed. In other words, there is a region of empty space containing no atoms which separates the inside from the outside.)