**Instructions:** Practice solving problems involving heat. Use the information sheet provided in class to find the equations to use and the necessary constants.

**Specific Heat (Q=mcΔT)**

1. How much energy is needed to warm 85.6 grams of liquid mercury from 12oC to 52oC?
2. How much will the temperature of liquid water change if 1308 grams of water is heated with 44876 J of energy?
3. How much energy is needed to warm a 152.0 gram piece of solid copper from 25oC to 113oC?
4. A student starts with 450.0 grams of liquid water at 85oC.
   1. The student then cools the water until it is at 9.0oC. What was the amount of energy change for water?
   2. Was the energy change for the water *Endothermic* or *Exothermic*? How do you know?
5. A student notices that a certain piece of metal loses 394.7 J of energy when it cools from 87oC to 27oC. If the student measures the mass of the metal to be 50.6 grams, what type of metal is it?

**Heats of Fusion (Q=mHf)/or Vaporization(Q=mHv)**

1. A student has a 35.6 gram sample of water.
   1. How much energy is needed to completely melt it if the sample was ice at 0.0oC?
   2. How much energy is needed to completely boil it if the sample was liquid water at 100oC?
2. An artist has raised the temperature of a 25.2 grams piece of copper just to its melting point. How much more energy is she going to use in order to get the copper to melt?
3. Liquid lead is very hot. As it cools, it reaches its melting temperature. At this point, it begins to turn into a solid.
   1. How much energy is released by a 19.6 grams sample of lead that is solidifying?
   2. Explain why this answer should be a negative number.

**Combination Specific Heat (Q=mcΔT) & Heats of Fusion (Q=mHf)/or Vaporization(Q=mHv)**

1. Silver melts at 962OC.
   1. How much energy is needed to raise the temperature of 100.0 gram of pure silver from 19oC to its melting point?
   2. How much energy would then be necessary to melt the sample of pure silver?
   3. How much total energy is needed to raise solid silver from 19oC until it is just barely all melted?
2. How much energy is needed to change 36.7 grams of solid water at -3.0oC to liquid water at 15oC?