2008 Heat 1

30°C

60°C

A-Day: Due Fri., Jan 25 (Assigned: 1/23) B-Day: Due Mon., Jan 28 (Assigned: 1/24)

- 1) Conduction (1), Convection (2), or Radiation (3)?
 - A. _____Your hand gets warm while underneath (but not touching) a hot pot of water.
 - B. _____Your hand cools down when pushed against the metal on your desk.
 - C. _____Why smoke rises above a campfire.
 - D. _____Molecules bumping against each other.
- 2) Use this picture to answer the following:
 - A. Use an arrow to show which way heat will move.
 - B. Are the objects at thermal equilibrium?
 - C. Which object will lose heat?
 - D. Which object will gain heat?
 - E. For which object will Q be negative?
 - F. For which object will Q be positive?
 - G. How does the amount of Q gained or lost compare?
 - H. Which is the same for both objects: T_i or T_f ?
- 3) You put ice into a cup of hot chocolate. The ice gives its cold to the liquid. Yes or no and why?
- 4) A. Convert 15°C to Kelvin.

- B. Convert 80°F to Celsius.
- 5) How much heat is necessary to raise 8 kg of water from 20°C to 40°C?
- 6) How much heat for copper (using the same mass and temperatures as Q5).
- 7) Use Q5-6 to answer the following:
 - A. Does it take more heat to raise the temperature of copper or water?
 - B. So, if the c_p of iron = 448 and c_p of aluminum = 899, which one will require the most Q to change its temperature?
- 8) Which part of the desk feels colder: the metal or the wood?
- 9) Which one is actually colder: the metal or the wood?
- 10) Why do they feel different?
- 11) A. Draw what will happen to the smoke from the cigarette on the diagram.B. Explain why this occurs (be complete).



- 12) Why did the colder of the two black squares melt the ice faster?
- 13) Which has more internal energy?
 - A. ____2 atoms of super heated helium gas or 25 gallons of freezing water?
 - B. ____Equal masses of iron or steam, if at the same temperature?
- 14) 6 kg of iron begin at 75°C and loses 3.56×10^4 J of heat. What is its final temperature?





- 16) 18 kg of gold at 80°C is dropped into 20 kg of water originally at 10° C. At what temperature will they come to thermal equilibrium?
 - A. What two things the same for both objects?
 - B. Solve for the final temperature:

$$\begin{aligned} -Q_{hot} &= Q \text{ cold} \\ m_h c_p (T_f - T_i)_h &= m_c c_p (T_f - T_i)_c \\ 18(129)(T_f - 80) &= 20(4186)(T_f - 10) \end{aligned}$$