A-Day: Due Tues., Jan 29 (Assigned: 1/31)
B-Day: Due Wed., Jan 30 (Assigned: 2/1)

2008 Heat 2

1) Which do you use: Heat of fusion (L_f) or Heat of vaporization (L_v)?

A) _____ From a liquid to a gas?
B) _____ From a liquid to a solid?
C) _____ From a gas to a liquid?
D) _____ During melting?
E) _____ Turning to steam?
F) _____ During condensation?
G) _____ From a solid to a liquid?
H) _____ During freezing?
I) _____ During a temp change?

2) If something liquefies, it is changing from _____ to a _____.

3) How much heat is released when 2 kg of *oxygen* liquefies?

4) 6 kg of ice is at 0ºC.

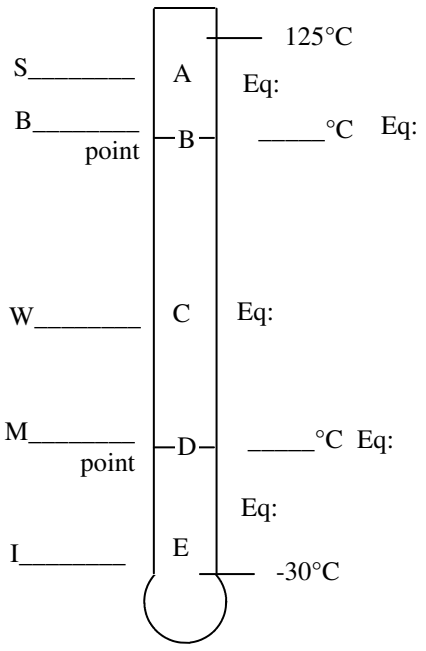
A) How much heat is necessary to melt the ice into water?

B) How much heat is necessary to raise the water from 0ºC to 30ºC? (C_p of water = 4186)

C) SOOO, how much heat is necessary to take the 6 kg of ice to water at 30ºC? (The whole process.)

5) The diagram at the right shows a thermometer for water.

A. Fill in the blanks on the graph (including temperatures at B and D).
B. Everywhere there is an "Eq:" put the equation for the heat for that region or point. (Either $Q = mc_p\Delta T$ or $Q = mL$)
C. If the temperature on the thermometer goes down is Q + or -?
D. If water goes from region C to A do you use Lf or Lv?
E. If it goes from region C to E, then L = _____?
F. Find the total heat that is necessary to take 6 kg of water from –30°C to 125°C. (*You can either do it in many steps or in one big equation.)*



6) Conduction (1), Convection (2), or Radiation (3)?

A) ___ Why the upstairs of your house is hotter.
B) ___ Wearing a coat stops this.
C) ___ Why the silver dish on the space heater I brought in allows it to direct the heat.

More on back

A	E	I	M
B	F	J	N
C	G	K	O
D	H	L	P

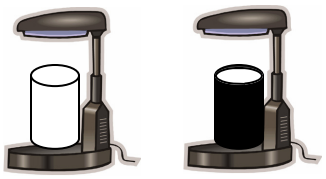
7) The grid at the right shows you looking down from the sky onto a large area of land. The sun is shining from behind you. All the sectors have clouds over them except square "J". So only J heats up.
A) What kind of thermodynamic transfer heats "J"?
B) Which direction would "J's" air move? Choices: towards square I, F, N, K or into the page, or out of the page?

C) Using arrows, draw the direction of the winds in the adjacent squares. (squares next to "J").

(This is how "winds" are created and how weather reporters can predict wind directions.)

8) From your book.
A) What is Newton's 2nd Law of Cooling?

Two cans of water under heat lamps



B) Read about the color of an object changes the rate that an object absorbs and emits energy.
i. Which can's water will raise temperature fastest?
ii. If they are taken away from the lamp and begin at the same initial temperature, which can will drop temperature fastest?

C) Read about water freezing.
i. What happens to water when it freezes?
ii. Which is a better insulator ice or water?
iii. So, when a lake freezes, will the fish underneath be more or less protected?

9) A) Does water change temperature easily?
B) If there is one day of really cold weather, will a lake freeze?
C) Why do cities near oceans not experience radical shifts of temperature?

10) Think about water on your skin.
A) Does water have to be at 100°C to turn to a gas?
B) Evaporation is a _____ process. So the area around evaporating water (or any other liquid) will _____ down.

11) 22 kg of Aluminum at 15°C is dropped into 30 kg of water at 95°C. At what temperature will they come to thermal equilibrium? (*See ex at right.)*

Ex. 25 kg of iron at 80°C is placed in 12 kg of water at 10°C. What will be their final temperature when they both come to thermal equilibrium.

$$-Q_{hot} = Q\ cold$$
$$-m_h c_p (T_f - T_i)_h = m_c c_p (T_f - T_i)_c$$
$$-25(448)(T_f - 80) = 12(4186)(T_f - 10)$$
$$-11200(T_f - 80) = 50232(T_f - 10)$$
$$-11200T_f + 896000 = 50232T_f - 502320$$
$$1398320 = 61432T_f$$
$$T_f = 22.8°C$$