B-Day Due Mon., Mar 8
A-Day: Due Tues., Mar 9

2009-10 PreAP Heat 3

This homework gives practice with the Heat problems we did in class. A blank copy and the key are on the website. Rework them. OK—let's try something different. The questions are on the first page. A step-by-step "walk-through" on the second page. If you REALLY want to be ready for the test (and quiz) try to do this WITHOUT the help on the second page.

1. A 45°C, 5 kg iron box is moving 12 m/s across a floor that has a coefficient of kinetic friction of 0.35. The box slows to 3 m/s and 70% of the heat generated is absorbed by the box.
   A. What is the change of temperature of the box?

   B. Challenge (getting ready for the End of Course Exam): How far did the box slide?

2. [Physical heat properties of Nitrogen: boiling point: −196°C; melting point: −210°C; specific heat (g): 1040 J/kg°C; specific heat (l): 2042 J/kg°C; Lv = 199,000 J/kg.] 250g of liquid nitrogen at −205°C is raised to 0°C. How much heat was necessary?

3. A 850 g piece of iron at 340°C and a 525g piece of aluminum at 280°C are placed in an insulated container. How much 20°C water is added if the final temperature of all of the objects is 38°C?

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   A. What is the change of temperature of the box?

      A. Calculate the initial energy of the object.
      B. Calculate the final energy of the object.
      C. Where did the energy go?
      D. Calculate the energy lost.
      E. If the box absorbs 70%, how much did it absorb?
      F. Calculate the change of temperature.

   B. Challenge (getting ready for the End of Course Exam): How far did the box slide?
      This is a challenge problem—figure it out on your own. :)

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   A. If you need to draw the thermometer from the "Total Heat" notes.
   B. Write the properties of nitrogen on the thermometer. Replace each of the water #s with the nitrogen #s.
   C. Put the initial and final temperature on the diagram.
   D. Find ΔT for each phase.
   E. Calculate Q for any temperature change or phase change.
   F. Add all the Q's up.

3. A 850 g piece of iron at 340°C and a 525g piece of aluminum at 280°C are placed in an insulated container. How much 20°C water is added if the final temperature of all of the objects is 38°C?

   A. Put two Q's on the hot side. Be sure they are both negative.
   B. Be sure each convert grams to kilograms.
   C. Just follow the math.