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Physics 160

Lab Time _____

Final Exam - Prep

December 7, 2010

- This is a closed book examination.
- You may use a 3x5 index card that you have made with any information on it that you would like. You must have your name, lab section and the date on your index card.
- There is extra scratch paper available.
- Please fill out the Scantron sheet completely
 - Include your test code.
 - Include your Dragon ID
 - Include your name
- Mark your exam and include explanations where needed. This will help you learn from your exam as well as provide any verification of your scantron sheet.
- Please make sure to fill out each “Problem Solving Sheet” completely
 - Include your test code
 - Include your Dragon ID
 - Include your name
 - Include your lab time
- Your explanation/work for the worked problems is worth $\frac{3}{4}$ of the points. You must use a separate “Problem Solving Sheet” for each problem.

A general reminder about problem solving:

1. Visualize - draw a picture
2. Pick a coordinate frame
3. Create a simplified picture – schematic with vectors describing motion
 - a. 2D Motion: separate vectors into components
 - b. Force Problem: create a simplified free body diagram
 - c. Energy Problem: create energy level diagram(s)
4. Write down what you know – create separate columns for different directions
5. Write down what you don't know and/or what you want to know
6. List mathematical relationships
7. Combine mathematical formulas, Simplify and Solve
8. Check your answer – Is it reasonable? Are the units correct?
 - Show all work!

1. A gas is compressed by an adiabatic process that decreases its volume by a factor of 2. In this process, the pressure
 - A. increases by a factor of 2.
 - B. increases by a factor of more than 2.
 - C. increases by a factor of less than 2.
 - D. does not change.
2. An object has a mass of 40 g and a volume of 50 ml. What is the object's density?
3. If you were to take 20 cm³ of the object above, what would be its mass?
4. A gas is compressed by an isothermal process that decreases its volume by a factor of 2. In this process, the pressure
 - A. increases by a factor of 2.
 - B. increases by a factor of more than 2.
 - C. increases by a factor of less than 2.
 - D. does not change.
5. In a well insulated container you mix 100 g of ice at 0° C and 100 g of steam at 100° C. After the inside reaches thermal equilibrium (a uniform temperature) the container contains
 - A. water and steam at 100° C
 - B. water at exactly 50° C
 - C. water above 50° C
 - D. water below 50° C
 - E. water and ice at 0° C
6. How much heat is needed to raise the temperature of 0.5 kg of aluminum by 150° C?
7. How much heat is needed to create 5 kg of ice from tap water ($T_i=28^\circ\text{C}$)?
8. How much mass needs to be added to a 10 cm diameter hollow sphere so that it floats half way in water? The sphere is made of Al ($\rho=2.7\text{ g/cm}^3$) and has a mass of 83 g.
 - A. 179 g
 - B. 27 g
 - C. 108 g
 - D. 358 g
 - E. 262 g

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9. Fluid is flowing. When the pipe narrows the pressure in the narrow section
- A. increases
 - B. decreases
 - C. stays the same
10. A 40 m tall damn is built to hold back a volume of water. If the height of the damn remains constant but the body of water behind the damn doubles, what happens to the pressure at the base of the damn?
- A. The pressure increases by 4
 - B. The pressure increases by 2
 - C. The pressure does not change
 - D. The pressure decreases by 2
 - E. The pressure decreases by 4