Circle the answer that is correct for questions 1-4. (3 points for each question)

1. A substance that can be broken down into simpler substances is called ___________.
   a. homogeneous mixture   b. heterogeneous mixture  c. solution  
   d. element                e. compound

2. Which of the following is NOT a compound?
   a. Milk  b. water  c. carbon dioxide  d. sodium chloride  
   e. none of the above  f. all of the above

3. Which of the following is different from the rest?
   a. $2.16 \times 10^{-7}$ mm  b. 0.216 nm  c. $2.16 \times 10^{-4}$ µm
   d. $2.16 \times 10^{-10}$ m  e. 21.6 pm

4. A concise verbal statement or mathematical expression that can be used for prediction is called a:
   a. theory  b. law  c. hypothesis  
   d. fact                  e. deduction

Solve the following problems. Show all your work, always show your units, and express your answers in the proper number of significant figures. (point values as indicated)

(15 points)

5. a. Copper (Cu) has a density of 8.93 g/cm³. Calculate the mass of a block of copper that has dimensions $0.0400$ m $\times$ $0.0200$ m $\times$ $0.0250$ m.

b. What is the thickness (in mm) of a sheet of copper that is made by rolling the block of copper described in part “a” into a sheet that is 40.0 cm $\times$ 200.0 cm?
c. If a copper atom is about 0.125 nm in diameter, what is the minimum number of atomic layers of copper present in the sheet described in part “b”?

6. Complete the following chart for the isotopes listed? (8 pts, 1 point per blank, you must have all the blanks correct for an isotope to earn credit . . .. no partial credit)

<table>
<thead>
<tr>
<th>Isotope</th>
<th>Mass #</th>
<th>#n</th>
<th>#p</th>
<th>#e</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cu-61</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Full Isotopic Symbol</td>
<td>Mass #</td>
<td>#n</td>
<td>#p</td>
<td>#e</td>
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<td></td>
<td>81</td>
<td>35</td>
<td>35</td>
<td></td>
</tr>
</tbody>
</table>

(15 points)

7. Sulfur and fluorine (S and F) react with one another to form three compounds with the formulas: SF₂, SF₄, and SF₆. Find the mass ratio of fluorine to sulfur in each of these compounds and use the results to demonstrate the law of multiple proportions. Use: mass of a single sulfur atom = 32 amu and mass of a single fluorine = 19 amu

Hint: you need to find the ratios of the mass ratios.