1. How many significant figures are in each of the numbers shown below and what is the absolute uncertainty?
   a.) 0.002030 m ______________
   b.) 34500 kL ______________
   a.u. _______________
   _______________

2. Convert the following numbers to the proper form of scientific notation. Make sure your answer has the correct number of significant figures.
   a.) 0.0000760 ____________
   b.) 2345x10⁻² ______________

3. What is the answer to the equation shown below rounded to the proper number of significant figures?
   \[ 20.00 + 75.000 + 5.00595 = \]

4. How many significant figures should be in the answer to the calculation shown below?
   \[ \frac{22.45 - 3.2 + 93.100}{14.34} = \]

5. A rock has a mass of 2.54 grams. Through chemical analysis, the rock is found to be composed of only one type of element. If the volume of the rock is found to be 1.0405x10⁻⁵ mL, what element is the rock composed of? What information will you need to answer this question? Some useful information may be found at the end of this worksheet.

6. How many significant figures should be in the answer to the calculation shown below?
   \[ \frac{6.251x10⁻⁵ - 590.25x10⁻⁷}{4.311x10⁻⁵} = \]

7. Convert 98.31 mm to km. Report your final answer in scientific notation and place a box around it.

8. Convert 0.334 cg to µg. Report your final answer in scientific notation and place a box around it.

9. Convert 9.81 mL to m³. Report your final answer in scientific notation and place a box around it.

10. A sample of iron has a mass of 2.451x10⁻⁸ ng. If the density of iron is 7.87g/mL, what is the volume of the iron sample (mL)?
   If the sample of iron is placed in 10.00 mL of water, to what volume will the water level rise?

11. Convert 0.092 ft³ to liters.

12. A sample of matter has a mass of 26.085 g and a volume of 23.50 mL. What is the volume of a 30.0 g sample of this matter?

13. a.) A sample of matter has a mass of 0.1251 tons. Using the information on the last page of this exam, calculate the mass of the matter in grams. (3 points)
   b.) The volume of the matter described above is 2.541x10⁻¹² mile³. Using the information on the last page of this exam, calculate the volume of the matter in mL.
   c.) What type of matter is the object? (Is it solid liquid or gas?)

14. Which of the following contains the largest number of oxygen atoms?
   a. 5H₂O    b. 3CO₂    c. O₃    d. H₂SO₄    e. It is impossible to tell.

15. Which particles, when moving, occupy the largest amount of space in an atom?

16. How many neutrons are present in an $^{131}$I atom
17. A neutrally charged atom has 45 neutrons and 36 electrons. What is the elemental notation for the atom?

The diagrams below represent the three physical states of matter we went over in class. Assume that the black and grey balls represent different pieces of matter of identical mass and the boxes represent samples of the matter with the same volume. Use the diagrams below to answer the next two questions.

I. II. III.

18. Which of the diagrams above represents the densest physical state?
   a. I     b. II     c. III
   d. II and III     e. They all have the same density.

19. The matter identified in the boxes would be best classified as a _____________.
   a. pure element     b. pure compound
   c. homogeneous mixture     d. heterogeneous mixture
   e. both a pure element and a pure compound

20. At 20.0°C and 1.00 atm. of pressure (i.e. the same conditions), H₂O exists as a liquid but O₂ exists as a gas. Why does H₂O exist as a liquid and O₂ exist as a gas under the same conditions?
   a. The O₂ particles are moving very fast while the H₂O particles are only vibrating.
   b. The H₂O particles are larger than the O₂ particles and therefore will be more likely to exist in the liquid state.
   c. The strength of attraction between the O₂ particles is greater than the attraction between the H₂O particles.
   d. The strength of attraction between the H₂O particles is greater than the attraction between the O₂ particles.

21. Draw a picture of an oxygen atom with 10 neutrons. Make sure to show the location of the electrons, protons, and neutrons. Point out the location of the nucleus.

22. What is the formula for the compounds formed from the following elements?
   Ba and P     Al and O    Mg and S

**Conversion Factors**
- 1 m = 1.0936 yards
- 1 inch = 2.54 centimeters (exact)
- 12 inches = 1 foot (exact)
- 1 gallon = 3.7854 liters
- 1 mile = 1.6093 kilometers
- 1 pound = 453.59 grams
- 1 ton = 2000 pounds (exact)

<table>
<thead>
<tr>
<th>Element</th>
<th>Density</th>
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<tbody>
<tr>
<td>Pt</td>
<td>24.41 g/mL</td>
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<tr>
<td>Pb</td>
<td>11.34 g/mL</td>
</tr>
<tr>
<td>Au</td>
<td>19.32 g/mL</td>
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</tbody>
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