

Name: \_\_\_\_\_

Math and Lab Calculations Remediation  
Video Assignment Solutions

**Significant Digits**

How many significant digits are in the following measurements?

- 1) 0.0067 cm 2                      2) 4.300 dm<sup>3</sup> 4                      3) 11.06 liters 4  
4) 1.0102 grams 5                      5) 0.0087 feet 2                      6) 10000 sec 1  
7) 6.02 x 10<sup>23</sup> atoms 3                      8) -1.0 x 10<sup>-3</sup> sec 2                      9) 0.01010 meters 4

How many significant digits should be represented in the answers to these calculations?

$$\%error = \frac{|meas - acc|}{acc} \times 100$$

$$\%error = \frac{|1.25g - 1.01g|}{1.01g}$$

2

$$\%error = \frac{|meas - acc|}{acc} \times 100$$

$$\%error = \frac{|1.07g/ml - 1.11g/ml|}{1.11g/ml}$$

1

$$Density = \frac{mass}{volume}$$

$$Density = \frac{8.08g}{1.125mL}$$

3

**Estimating Measurements**

For each example, write what measurement would you record and explain your reasoning about the number of decimal places you chose to record.



6.60 mL



0.100g

This graduated cylinder measure in 1/10 of a milliliter (0.1ml). Since this measurement is made by comparing to a scale, it is necessary to estimate 1 decimal place past the scale, so I estimated to 1/100's. Seeing the bottom of the meniscus right on the 6/10's mark, I recorded 6.60mL.

Since this electronic balance uses a digital readout, there is no way to estimate additional decimal places because the measurement is simply read of the display. As such, I only needed to write down the mass displayed.

## Density Lab

A student carries out a procedure similar to the one you did in lab. Using water displacement, she collects the following data while trying to determine the mass and volume of an irregular shaped piece of metal. As you did in your lab write-up, completely represent all the calculations necessary to determine the density of the metal. Then, calculate the percent error of your calculated density assuming the actual density of the metal is 8.10 g/ml.

Mass of Metal: 18.28g

Volume of Water: 15.0 mL

Volume of Water with Metal: 17.3 mL

### Volume of metal

$$\begin{array}{r} \text{Volume of metal and water} \quad 17.3 \text{ mL} \\ \text{-Volume of water} \quad \underline{\quad \quad \quad} \quad -15.0 \text{ mL} \\ \text{Volume of metal} \quad \quad \quad \quad \quad \quad 2.3 \text{ mL} \end{array}$$

### Density of metal

$$\text{Density} = \frac{\text{mass}}{\text{volume}} = \frac{18.28 \text{ g}}{2.3 \text{ mL}} = 7.9 \text{ g/mL}$$

### Percent Error

$$\%error = \frac{|meas - acc|}{acc} \times 100$$

$$\%error = \frac{|7.9 \text{ g/ml} - 8.10 \text{ g/ml}|}{8.10 \text{ g/ml}} \times 100$$

$$\%error = \frac{0.2 \text{ g/ml}}{8.10 \text{ g/ml}} \times 100$$

$$\%error = 2\%$$