Name: _____

Date: _____ Per: _____

Chemistry

Accuracy, Precision & Error WS

I. *Answer the following questions about accuracy, precision & error in complete sentences:*

1. What is the difference between accuracy and precision?

2. How is error calculated? How is this useful information for scientists?

3. Describe each of the following sets of measurements in terms of precision:
   a. 458.43 m, 458.41 m, and 458.40 m
   b. 462.78 m, 451.33 m, and 475.89 m
   c. 468.49 m, 468.51 m, and 468.52 m

4. When measuring the density of chloroform ($CHCl_3$) at 20°C, one chemist obtained values of 1.495 g/mL, 1.476 g/mL and 1.485 g/mL. Another chemist performed the same experiment and obtained values of 1.487 g/mL, 1.490 g/mL and 1.488 g/mL. The accepted density of chloroform at 20°C is 1.489 g/mL. How would you compare the accuracy and precision of the first chemist's measurements to those of the second chemist?

5. Which situation is easier to resolve: measurements that are precise but not accurate, or measurements that are accurate but not precise? Explain.

II. *Calculate the following percent errors, showing all work:*

6. During the SI Scavenger Hunt Lab, a student measured her foot length using a meter stick and recorded it as 25 cm. However, at the shoe store, the sales staff measured the length of her foot to be 23.7 cm. If the shoe store's measurement is accepted as correct, what is the percent error of her meter stick measurement?

7. A chemical reaction is performed between calcium fluoride and sulfuric acid that is expected to yield 3.07 kg of hydrofluoric acid, but instead only yields 2.86 kg. What is the percent error of this reaction?

8. A pair of chemistry students perform a lab to measure the boiling point of ethanol (C_2H_5OH) and record values of 78.1°C, 78.3°C and 77.8°C. The accepted boiling point of ethanol is 78.4°C. What is their percent error for this lab?

9. A student estimated the volume of a solution in a flask to be 125 mL. When it was poured into a large graduated cylinder, the student measured the volume to be 127.3 mL. If we accept the volume from the graduated cylinder as correct, what is the percent error of the estimated volume from the flask?

10. A block of wood has the dimensions 50.00 cm X 10.00 cm X 5.00 cm. A student determined its volume to be 2490 cm^3 by measuring the volume of water displaced by the block when it was immersed in water. What is the percent error of this student's determination of the volume?