Chapter 1 Test Review (Gen) Name: _____

Accuracy, Precision, & Percent Error

1) A student measured the temperature of a boiling solution and found it to be 56.0°C. The theoretical temperature of that boiling solution is 55°C. What is the percent error in the student's measurement?

1.8%

2) The density of a nickel was determined in an experiment to be:

Trial 1: 7.25 g/mL Trial 2: 7.23 g/mL Trial 3: 7.28 g/mL

The theoretical density of a nickel is 8.91 g/mL.

A) What is the percent error of the measurements collected in the experiment?

average = 7.25 g/mL

18.59%

B) Is the data precise, accurate, neither, or both? Explain your answer.

- The data is precise b/c all of the data values are close to each other.
- The data is NOT accurate because the data values are not close to the true value and the percent error is rather large at 18%

3) The density of brass was tested in an experiment using water displacement in three trials. The data collected is given below. The theoretical density of brass is **8.40 g/mL**.

	Mass	Starting Volume	Final Volume
Trial 1	8.68 g	15.2 mL	16.6 mL
Trial 2	14.52 g	18.9 mL	21.5 mL
Trial 3	13.11 g	13.4 mL	15.6 mL

Displacement	Density
1.4 mL	6.2 g/mL
2.6 mL	5.58 g/mL
2.2 mL	5.96 g/mL

Average = 5.91 g/mL

(a) Is the data precise? not really, the density values are not close to each other.

(b) Calculate the percent error.

-29.6%

(c) Based on the percent error, is the data accurate? no, the percent error is large

Measurement

Put in scientific notation:

4) 504,000 5.04×10^5

5) 0.003079 3.079×10^{-3}

6) 0.040 4×10^{-2}

7) 1,405,000,000 1.405×10^9

Take out of scientific notation:

8) 5.12×10^{-3} 0.00512

10) 8.6×10^5 860,000

9) 4.20×10^4 42000

11) 3.0×10^{-4} 0.0003

12) Circle the estimated digit in each measurement: 54.39 g 31.571 mL 70.0°C

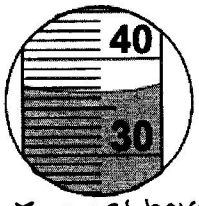
(the last decimal place) is always estimated, such as estimating the position of the meniscus b/w tick marks

13) Measure the following using the correct number of significant figures.

A) 2.67 cm

* must have two decimal places in answer
* Examples: 2.68, 2.69, 2.70

B) 36.7 mL



* must have 1 decimal place in answer
* Examples: 36.6, 36.8, 36.5, 36.9

C) 6.39 mL

* must have 2 decimal places in answer
* Examples! 6.40, 6.38

Significant Figures

How many significant figures are in the following?

14) 70.0 g 3

15) 0.0069 mg 2

16) 5.60×10^4 km 3
do NOT take out of scientific notation

17) 0.0400 mL 3

18) 6200 cm 2

19) 200 mi 1

20) 2.0×10^{-3} kL 2

21) 403.00 g 5

22) 0.24 mm 2

Solve each problem using the correct number of significant figures in your answer.

23) 28.21 g + 3.829 g + 45.8 g * least # decimal places = 1
77.8

24) 2.36 m x 17.00 m x 0.088 m * least # sig figs = 2
3.5

25) 24.00 cm/6.00 cm * least # sig figs = 3
4.00 ← must ensure 3 sig figs

26) 65.344 mL – 18.67 mL * least # decimal places = 2
46.67

Experimental Design

Steven wanted to determine how the amount of sugar that is soluble in water changes with the temperature of the water. He bought a large bag of sugar from the grocery store to make sure the sugar was the same throughout the experiment. Steven also decided to test each temperature of water four times in beakers of the same size filled with 100 mL of distilled water. He tested room temperature (18°C), 25°C, and 30°C samples of water. When adding the sugar, he made sure to only stir until the sugar dissolved. He discovered that the greatest amount of sugar dissolved in the water that was 30°C.

Independent Variable: temperature

Levels of IV *(label the control)*	18°C (control, room temp.)	25°C	30°C	
# of Trials	4	4	4	

Dependent Variable: amount of sugar dissolved

Constants: *(list as many as possible)*

same bag of sugar (brand, type)
amount of water (100mL)
type of water (distilled)
amount of stirring (until dissolved)
size of beaker