**STATION 1: Qualitative and Quantitative Observations et al**

*Answer the following with complete sentence(s).*

1. Define ‘quantitative’ observation. **Gives a definite**
2. Define ‘qualitative’ observation. **Gives a description**
3. Make two quantitative observations of chemistry class.

* **There are 7 lab stations in this room**
* **There are 4 doors in the classroom**

1. Make two qualitative observations of chemistry class.

* **This room is big**
* **The room smells like roses**

*Perform the following calculations.*

1. Mrs. Miller operates a crane that can pick up 3.0 tons of excavated earth an hour. Mrs. Miller’s wages are $125 per hour. What is the cost of picking up 85 kg of excavated earth? **$3.54**
2. How many miles could you drive for $7.90 if the gas mileage of your car is 14 km per liter and the price is $2.15 per gallon? **121 mi**

**STATION 2: Metric System**

*Write the metric base unit for each type of measurement.*

1. Volume **Liter (L)**
2. Time **Second (s)**
3. Temperature **Kelvin (K)**
4. Mass **Gram (g)**
5. Length **Meter (m)**
6. Amount of substance **Mole (mol)**

*Answer the following with complete sentence(s).*

1. What is the chief advantage of the metric system over other systems of measurement? **The metric system is in multiples of 10, this makes conversions easy**

*For the following containers report the name of the lab equipment and the amount of liquid in each container. Be sure to have the correct number of significant figures in your measurement.*

1. Container A **Graduated cylinder; 9.20 mL**
2. Container B **Graduated cylinder; 23.1 mL**
3. Container C **Beaker; 180 mL**

**STATION 3: Scientific Notation**

*Answer the following with complete sentence(s).*

1. Why do we use scientific notation in chemistry? **To make using really big numbers easier to deal with**
2. What do you do with exponents when adding/subtracting in scientific notation? **Make the exponents the same**
3. What do you do with exponents when multiplying/dividing in scientific notation?

* **Add the exponents (multiplication)**
* **Subtract the exponents (division)**

*Convert the following numbers to scientific notation.*

1. 4,500,000,000,000 **4.5 x 1012**
2. 0.000000000000351 **3.51 x 10-13**
3. 5,000 **5 x 103**
4. 23,000,210,000 **2.300021 x 1010**
5. 0.0000000087 **8.7 x 10-9**
6. 0.00076 **7.6 x 10-4**

*Convert the following numbers to ‘expanded’ notation.*

1. 3.400 x 10-9 **0.000000003400**
2. 5.07 x 105 **507,000**
3. 7.31 x 10-7 **0.000000731**
4. 2.345 x 104 **23,450**

**STATION 4: Accuracy and Precision**

*Answer the following with complete sentence(s).*

1. Define ‘accuracy’ and ‘precision’ in the context of a laboratory setting.

* **Accuracy: Getting close to the actual value**
* **Precision: Getting consistent results**

1. What is the difference between accuracy and precision? **Accuracy has to be “on the bull’s-eye” while precision does not**
2. Define a ‘significant figure’. What is the ‘guess’ digit?

* **Sig Fig: Measurement plus one guess digit**
* **Guess Digit: One place value *beyond* what the measurement tool tells**

1. Why do we need to be concerned about significant figures? **To represent how precise our measurements were**
2. How is the number 100.0 different from 100? **100.0 (4 sig figs) is more precise than 100 (1 sig fig)**

*Determine the number of sig figs in each of the following measurements.*

1. 0.002900 **4**
2. 4.00800 **6**
3. 5000 **1**
4. 7.89 x 10-8 **3**
5. 9,000,000. **10**

**STATION 5: Metric System**

*Perform the following metric unit conversions.*

1. 15,050 cg to g **150.5 g**
2. 3,264 mL to L **3.264 L**
3. 9.2 cK to mK **92 mK**
4. 440 g to mg **440,000 mg**
5. 15.60 m to cm **1,560 cm**
6. 3.1 cg to kg **0.000031 kg**
7. 41.0 mL to kL **0.000041 kL**
8. 1.59 kg to mg **1,590,000 mg**
9. 9.16 x 10-5 K to mK **9.16 x 10-8 mK or 0.0000000916 mL**
10. 25.5 cm to m **0.255 m**

**STATION 6: Scientific Notation**

*Perform the following calculations in correct scientific notation.*

1. (2.5 x 1010)(3.2 x 10-7) **8.0 x 103**
2. (6.2 x 1024)÷(2.3 x 1012) **2.7 x 1012**
3. (3.5 x 103)+(6.3 x 102) **4.13 x 103**
4. (7.430 x 104)(3.0 x 102) **2.229 x 107**
5. (8.03 x 106)+(4.0 x 106) **1.203 x 107**
6. (2.22 x 10-12)÷(4.10x10-33) **5.41 x 1022**
7. (35,020)(321.0) **1.12 x 107**
8. (8.0 x 1052)(8.9 x 10-79) **7.12 x 10-26**
9. (7.4 x 1038)÷(1.3 x 1012) **5.69 x 1026**
10. (6.3 x 108)-(3.5 x 107) **5.95 x 108**

**STATION 7: Accuracy and Precision**

*Perform the following calculations and give the answers with the correct number of sig figs.*

**\*Note the use of decimals in answers**

1. 2001 – 1.125 **2000.**
2. 20 – 10.5 **10**
3. 20,000 + 100 **20,000**
4. 410.006 + 9.99 **420.00**
5. 105 x 2 **200**
6. 1011 x 3.21 **3,250**
7. 80 ÷ 5.7 **10**
8. 604 ÷ 32 **19**