STATION 1: Qualitative and Quantitative Observations et al

Answer the following with complete sentence(s).

1. Define 'quantitative' observation.

2. Define 'qualitative' observation.

3. Make two quantitative observations of chemistry class.

4. Make two qualitative observations of chemistry class.

Perform the following calculations.

5. 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?

6. 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?

STATION 2: Metric System

Write the metric base unit for each type of measurement.

1. Volume
2. Time
3. Temperature
4. Mass
5. Length
6. Amount of substance

Answer the following with complete sentence(s).

7. What is the chief advantage of the metric system over other systems of measurement?

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.

8. Container A
9. Container B
10. Container C

STATION 3: Scientific Notation

Answer the following with complete sentence(s).

1. Why do we use scientific notation in chemistry?
2. What do you do with exponents when adding/subtracting in scientific notation?
3. What do you do with exponents when multiplying/dividing in scientific notation?

Convert the following numbers to scientific notation.

4. 4,500,000,000,000
5. 0.000000000000351
6. 5,000
7. 23,000,210,000
8. 0.0000000087
9. 0.00076

Convert the following numbers to 'expanded' notation.

10. 3.400×10^{-9}
11. 5.07×10^{5}
12. 7.31×10^{-7}
13. 2.345×10^{4}

STATION 4: Accuracy and Precision

Answer the following with complete sentence(s).

1. Define 'accuracy' and 'precision' in the context of a laboratory setting.
2. What is the difference between accuracy and precision?
3. Define a 'significant figure'. What is the 'guess' digit?
4. Why do we need to be concerned about significant figures?
5. How is the number 100.0 different from 100?

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

6. 0.002900
7. 4.00800
8. 5000
9. 7.89×10^{-8}
10. 9,000,000.

STATION 5: Metric System

Perform the following metric unit conversions.

1. 15,050 cg to g

2. 3,264 mL to L

3. 9.2 cK to mK

4. 440 g to mg

5. 15.60 m to cm

6. 3.1 cg to kg

7. 41.0 mL to kL

8. 1.59 kg to mg

9. 9.16×10^{-5} K to mK

10. 25.5 cm to m

STATION 6: Scientific Notation

Perform the following calculations in correct scientific notation.

1. $(2.5 \times 10^{10})(3.2 \times 10^{-7})$

2. $(6.2 \times 10^{24}) \div (2.3 \times 10^{12})$

3. $(3.5 \times 10^{3}) + (6.3 \times 10^{2})$

4. $(7.430 \times 10^{4})(3.0 \times 10^{2})$

5. $(8.03 \times 10^{6}) + (4.0 \times 10^{6})$

6. $(2.22 \times 10^{-12}) \div (4.10 \times 10^{-33})$

7. $(35{,}020)(321.0)$

8. $(8.0 \times 10^{52})(8.9 \times 10^{-79})$

9. $(7.4 \times 10^{38}) \div (1.3 \times 10^{12})$

10. $(6.3 \times 10^{8}) - (3.5 \times 10^{7})$

STATION 7: Accuracy and Precision

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

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