Name_____ Period_____

# CHEMISTRY UNIT 1 REVIEW – SCIENTIFIC MEASUREMENTS

1. Contrast accuracy and precision.
accuracy – correctness, how close you are to the true value.
precision – repeatability / consistency
2. Quantities have two parts, a number and a unit.

*Determine the amount of significant figures for each problem*

3. 1 600
4. 3 600.
5. 2 0.00060
6. 4 $6.000 \times 10^{12}$

*Express 0.0032065614 in scientific notation with the following number of sig figs **below**:*

7. 2 sig figs $3.2 \times 10^{-3}$
8. 4 sig figs $3.207 \times 10^{-3}$
9. 6 sig figs $3.20656 \times 10^{-3}$

*Convert the following scientific notation back into standard notations below with appropriate sigfigs:*

10. $4.66 \times 10^{5}$ 466,000
11. $8.604 \times 10^{-4}$ 0.0008604

12. State the significant figure rule for *multiplying and dividing*, and then solve the problem.
**Rule:** Least amout of sig figs.

$$\frac{(0.042)}{(1.278)(1.4267)} = \frac{0.023}{2 \text{ S.F.}}$$

S.F. = sig figs

13. State the significant figure rule for *adding and subtracting*, and then solve the problem.
**Rule:** Least past the decimal point.

$50.23 + 23.7 + 14.678 =$ 88.6

14. Define a derived unit and give an example.
2 or more units combined. ex = m/s, g/mL, $\frac{kg \cdot m}{s^2}$

15. The SI base unit for time is sec, length is m, and mass is kg.

16. Which conversion factor would be used to convert **feet to inches**: 1 foot / 12 inches or (12 inches / 1 foot)?
$\frac{ft}{1} \cdot \frac{12 \text{ in}}{1 ft}$

17. Use dimensional analysis to convert 15 liters to $cm^3$. $1mL = 1cm^3$

$$15L \cdot \frac{1000mL}{1L} \cdot \frac{1cm^3}{1mL} = \boxed{15{,}000\ cm^3}$$ 2 S.F.

18. 5.0 miles = _____ mm (0.621 mi = 1 km)
mi → km → m → mm

$$5.0\ mi \cdot \frac{1km}{0.621\ mi} \cdot \frac{1000m}{1km} \cdot \frac{1000mm}{1m} = 8{,}051{,}529.79$$

$\boxed{8.0 \times 10^{6}\ mm}$ 2 S.F.

gal → L → mL → $cm^3$

19. 15.78 gallons = _____ $cm^3$ (1 gallon = 3.7854 L)

$15.78\,gal \cdot \frac{3.7854\,L}{1\,gal} \cdot \frac{1000\,mL}{1\,L} \cdot \frac{1\,cm^3}{1\,mL} = 59{,}733.6$

$59{,}730$ 4 S.F.

20. 0.334 g/cL = _____ kg/L

$\frac{0.334\,g}{cL} \cdot \frac{1\,kg}{1000\,g} \cdot \frac{100\,cL}{1\,L} = 0.0334\,\frac{kg}{L}$ 3 S.F.

21. A student measured the temperature of boiling water and got a reading of 97.5°C. We know the actual boiling point of water is 100°C. What is the percentage error?

a → 100°C, te → 97.5°C

$$\%\ Error = \frac{|accepted - experimental|}{accepted} \times 100$$

$\%\ error = \frac{|100°C - 97.5°C|}{100°C} \cdot 100 = 2.50\%$

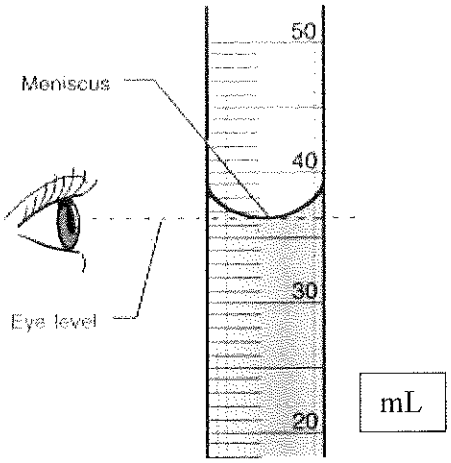
22. When making a graph, which axis does the ***independent variable*** go on? _____

Which axis does the ***dependent variable*** go on? _____

23. Record the measurement on the right to the correct number of significant figures which includes all the known values, one estimated value, and units:

36.5 mL

6 = known values, 5 = estimated digit




24. Calculate the mass, in grams, of iron with a given volume of 3.50 $cm^3$. Iron has a density of 7.87 g/$cm^3$.

D, V

$D = \frac{m}{V} \rightarrow 7.87\,\frac{g}{cm^3} = \frac{m}{3.50\,cm^3} \rightarrow m = 27.5\,g$

25. An unknown substance that has a mass of 15.6 grams. A graduated cylinder was filled initially with 30.0 mL of water but once the substance was dropped into the graduated cylinder, the water rose to 37.5 mL. Calculate the density, in g/mL, of this unknown substance.

$m = 15.6\,g$

$V_i = 30.0\,mL$

$V_f = 37.5\,mL$

$D = ?$

$V = V_f - V_i$

$= 37.5\,mL - 30.0\,mL$

$= 7.5\,mL$

$D = \frac{m}{V} \rightarrow D = \frac{15.6\,g}{7.5\,mL}$

$D = 2.1\,g/mL$

***Review your lab safety rules and the NFPA safety diamond!***

***Remember: Exact numbers have an infinite number of significant figures! They will not affect the precision of your equipment. Conversion factors are all exact numbers.***