

This packet contains review material from Pre-AP Chemistry. Be prepared to take a quiz over this material during the first week of school.

How many significant figures (digits) are represented by each measurement?			Round off the following Measurements to 3 sig figs		
1	22.40 mL		11	3986 cm	
2	450 000 000 g		12	201.5 cm	
3	0.05 cm		13	0.044692 mL	
4	0.0050 kg		14	436,669 °C	
5	1.0050kg		15	1.5238 L	
6	10050 mL		16	0.05016 g	
7	105,000 km		17	5000.0 kg	
8	1000 mL		18	4999.23 mm	
9	0.0001 L		19	3.0001 km	
10	0.200 mg		20	0.200 mg	

1. How many significant figures are there in each if the following measurements?

- | | |
|---------------------|-------------------------------|
| a. 307 g | f. 350,000cm |
| b. 1.40082 cm | g. 180.00 s |
| c. 0.00058900 g | h. 3.50 X10 ³ cm |
| d. 0.00300900870 mm | i. 1.604 X 10 ⁻⁴ m |
| e. 4,500 km | j. 0.0459 X10 ³ g |

2. Express the answer to each of the following calculations with the correct number of significant figures.

- | | |
|---|---|
| a. 80 cm + 13.0 cm = | f. 750. cm – 677.4 cm = |
| b. 72.60 m + 0.0950 m = | g. 10,000 m – 940 m = |
| c. 13.89 cm + 6.8932 cm = | h. 0.0890 cm – 0.0666 cm = |
| d. 1.30 x 10 ⁻² cm + 2.4 X 10 ⁻⁴ cm = | i. 0.340 x 10 ⁻¹ g – 1.20 x 10 ⁻² g = |
| e. 8.99 x 10 ³ m + 1.400 x 10 ⁴ m = | j. 4.5 x 10 ⁵ km – 3.00 x 10 ³ km = |

3. Express the answer to each of the following calculations with the correct number of significant figures.

- | | |
|------------------------|---------------------------------------|
| a. 3.0 cm x 4.000 cm = | f. 0.0045 mm ² ÷ 0.90 mm = |
| b. 2.005 cm x 5.0 cm = | g. 120 km ² ÷ 8.56 km = |
| c. 400 m x 87,488 m = | h. 0.7600 mm ³ ÷ 1.50 mm = |

d. $2.3 \times 10^{-6} \text{ m} \times 1.45 \times 10^{-2} \text{ m} =$

i. $4.80 \times 10^5 \text{ m}^2 \div 8.5 \times 10^3 \text{ m} =$

e. $8.70 \times 10^{-2} \text{ mm} \times 40. \times 10^{-1} \text{ mm} =$

j. $0.630 \times 10^{-1} \text{ m}^3 \div 0.0804 \times 10^2 \text{ m} =$

4. Show all work and report your answer to correct number of significant digits

(a) Calculate the density of mercury if $1.00 \times 10^2 \text{ g}$ occupies a volume of 7.36 cm^3 .

(b) Calculate the mass of 65.0 cm^3 of mercury.

(c) What is the mass, in kg, of 3.75 liters of the liquid glycerol, which has a density of 1.26 g/mL ?

Dimensional analysis 5-7 Show all work and give answers to correct number of significant figures.

5. Assume the following equivalencies: $1.00 \text{ ogre} = 7.00 \text{ scraggs}$; $1.50 \text{ scraggs} = 22.0 \text{ drists}$; and $1.00 \text{ drist} = 6.20 \times 10^3 \text{ ughs}$. Convert 3.50 ogres to milliughes.

6. Chemists have determined that 18.0 g of water at 4°C consist of 6.02×10^{23} molecules. Assuming that a teaspoon holds 3.70 mL of water, determine the number of water molecules of water the teaspoon can hold.

7. A gold bar has the following dimensions: $2.50 \text{ cm} \times 2.00 \text{ cm} \times 1.50 \text{ cm}$. Assuming that gold can be sold for $\$1360.00$ per ounce, what is the value of the gold bar? The density of gold is 19.32 g/cm^3 , $1.00 \text{ lb.} = 453.6 \text{ g}$, and $16.0 \text{ oz.} = 1.00 \text{ lb.}$

8. What is the relative abundance (% occurrence) of Nitrogen-14 if the only two nitrogen isotopes are Nitrogen-14 and Nitrogen-15 are the only isotopes of nitrogen and the average atomic mass of nitrogen is 14.007 amu ?

9. Determine the # of protons, neutrons, and electrons and determine the mass number.

a) bromine-79 _____ b) ${}^{40}_{19}\text{K}$ _____

10. Give the complete chemical symbols for the following ions:

a) The ion with 26 protons, 30 neutrons and 24 electrons

b) the phosphorus ion with 16 neutrons and 18 electrons

11. Write the formulas for these ions:

1. ammonium _____
2. phosphate _____
3. sulfide _____
4. nitrate _____
5. permanganate _____
6. cyanide _____
7. cobalt II _____
8. sulfate _____
9. oxalate _____
10. hydroxide _____

11. hypochlorite _____
12. stannous _____
13. nitrite _____
14. sulfite _____
15. chromate _____
16. perchlorate _____
17. acetate _____
18. dichromate _____
19. bromide _____
20. peroxide _____

Write the formulas for these compounds:

dihydrogen monoxide		stannic fluoride	
cupric dichromate		tin II oxide	
magnesium chloride		ferric hydroxide	
carbon monoxide		ammonium bromide	
plumbic bromate		sodium acetate	
zinc cyanide		copper II chlorite	
titanium IV oxide		sulfuric acid	

Complete the following table:

compound	formula	mass - g	molar mass	moles
chlorine gas		160.5		
	CaCO ₃	200.66		
sodium sulfate				2.18
	Fe ₂ O ₃	43.458		

12. Write a balanced chemical equation for the following reactions:
- a) Combination reaction that occurs when lithium metal and fluorine gas react.
 - b) Decomposition reaction that occurs when solid barium carbonate is heated (2 products, one solid one gas)
 - c) Mercury II oxide decomposes by heating it in a Bunsen burner
 - d) Aqueous solutions of silver nitrate and sodium chloride are mixed; the silver compound precipitates
13. Calculate the number of C atoms in .350 mol of $C_6H_{12}O_6$
14. Calculate the mass, in grams, of .433 mol of Calcium nitrate?
15. Ascorbic acid (vitamin C) contains 40.92 percent C, 4.58 percent H, and 54.50 percent O by mass. What is the empirical formula of ascorbic acid.?
16. Mesitylene, a hydrocarbon that occurs in small amounts in crude oil, has an empirical formula of C_3H_4 . The experimentally determined molecular weight of this substance is 121 amu. What is the molecular formula of mesitylene?
17. How many grams of water are produced in the combustion of 1.00 g of glucose, $C_6H_{12}O_6$:
18. A chemist reacts 50.0 g of ferric sulfate and 100.0 g of barium chloride. Calculate the mass of each product

19. For the following **two** reactions below (A & B):
- write the correctly balanced equation
 - calculate the mass of product formed. If there is more than one product you must calculate the mass of each one.
 - Name the excess reagent
 - Calculate the number of grams of excess reagent that remain
- a. 500.0 g of glycerol ($\text{C}_3\text{H}_8\text{O}_3$) react with 1000.0 g of oxygen in a complete combustion reaction.
- b. 205.8 g of hydrocyanic acid reacts with 341.6 g of zinc hydroxide.
20. What is the actual mass (actual yield) of magnesium oxide which can be produced when carbon dioxide reacts with 42.8 grams of magnesium metal. Carbon is also a product in this reaction. The percent yield for this reaction is 81.7%.