

1. Convert:

$$5.44 \text{ mL} = \text{_____ L} \quad 3.6 \times 10^4 \text{ kg} = \text{_____ cg} \quad 0.067 \text{ mm} = \text{_____ mm}$$

2. Use factor label to convert (show work): [1 kg=2.205 lbs 1 in = 2.54 cm 1 mi = 1.609 km]

a) 78 m to mi

Ans: \_\_\_\_\_

b) 760.0 lbs/ft<sup>3</sup> to g/mL

Ans: \_\_\_\_\_

3. A box is measured 2.34 cm by 15.14 cm by 6.3 cm. Its volume is \_\_\_\_\_

4. A 926 g cat ate a 12.32 g mouse, and then coughed up a 0.48 g hair ball. The cat now weighs: \_\_\_\_\_

5. Write each of the following in expanded (decimal) notation:

$$2.30 \times 10^{-3} = \text{_____} \quad 1.52 \times 10^5 = \text{_____} \quad 3.00 \times 10^4 = \text{_____}$$

6. Convert: 24.6°C = \_\_\_\_\_ °F      56.8 K = \_\_\_\_\_ °C      324 °F = \_\_\_\_\_ K

The temp of a gas increases by 3.5°C, how much does it increase in °F? \_\_\_\_\_ in K? \_\_\_\_\_

7. a) Acetone has a freezing point of -95.0°C and a boiling point of 56.0°C. These are used as the 0.0 and the 100.0 to define a new temperature scale (\*A). a) Determine what room temperature (22.0°C) would be expressed in \*A.

b) What would 123\*A equal on the Celsius scale? c) Write a general equation that relates \*C and \*A.

a) \_\_\_\_\_ b) \_\_\_\_\_ c) \_\_\_\_\_

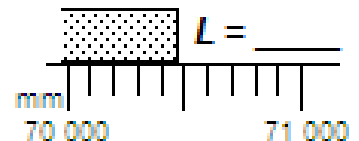
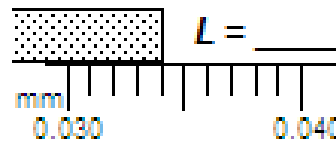
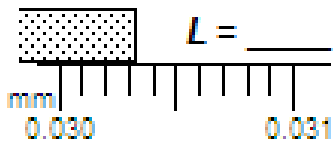
8. In one experiment, it is found that 8.46 g of A reacts with 3.78 g of B. In another experiment, 6.19 g of A reacts with 2.76 g of B. Does this support the Law of Definite Proportions, Multiple Proportions or neither of the two laws? Explain.

9. In one experiment, it is found that 1.54 g of X reacts with 3.97 g of Y. In a second experiment 67.10 g of an XY compound is analyzed and found to contain 11.45 g X. Does this support the Law of Definite Proportions, Multiple Proportions or neither of the two laws? Explain.

10. One PQ substance is to be 27.0% P. Another PQ substance is found to be 42.5% P. Does this support the Law of Definite Proportions, Multiple Proportions or neither of the two laws?

11. How does the Law of Definite Proportions tie in with the whole idea that matter is made up of atoms?

12. Make appropriate measurements:



13. Think metric: Fill in the blanks with an appropriate unit: mm, cm, m, km, mg, g, kg, mL, L, kL

Sarah's mouse weighed 72.5 \_\_\_\_\_, had a 4.5 \_\_\_\_\_ long tail and a brain capacity of 1.2 \_\_\_\_\_

14. Answer the following with "Mass" or "Weight":

\_\_\_\_\_ depends on the gravitational field. \_\_\_\_\_ always depends on amount of matter present

\_\_\_\_\_ is measured by a two pan balance. \_\_\_\_\_ is measured by a spring balance.

15. How many sig figs: 14.0 \_\_\_\_\_ 0.0050 \_\_\_\_\_ 1.8e14 \_\_\_\_\_ -2.00 \_\_\_\_\_ 240 \_\_\_\_\_ 520̄000 \_\_\_\_\_

16. The thermometer had somehow lost some of its mercury. This affected \_\_\_\_\_, but not \_\_\_\_\_, and it represented a \_\_\_\_\_ error whenever it was used. For determination of temperature changes, it affected \_\_\_\_\_

(Choices: its accuracy its precision both a. & p. neither a. nor p. random systematic)

17. A rod has a diameter of 1.16 inches and a length of 1.56 ft. It weighs 13.2 oz. Will it float or sink in water. Show calculations to justify your answer.

Ans: \_\_\_\_\_

18. What volume of mercury would be equal in mass to a block of wood measuring 23.0 cm x 13.5 cm x 4.8 cm? ( $D_{\text{Hg}} = 13.6 \text{ g/mL}$   $D_{\text{wood}} = 0.531 \text{ g/mL}$ ). Use factor label as much as possible:

Ans: \_\_\_\_\_

19. a) What is phlogiston? b) Design an experiment that would disprove the phlogiston theory.

20. The following data were collected concerning the combining masses of the four hypothetical elements P, Q, R & S. Assign the lightest one a mass of 1.00, and assuming all the compounds are in a simple 1:1 ratio, determine the relative masses of the other elements.

P = \_\_\_\_\_ Q = \_\_\_\_\_ R = \_\_\_\_\_ S = \_\_\_\_\_

37.54 g of P combines with 3.62 g of R

4.87 g of P combines with 3.92 g of Q

6.93 g of Q combines with 21.85 g of S.

It turns out that the PQ compound is actually  $P_2Q$ .

What new values does that give for the relative masses: P = \_\_\_\_\_ Q = \_\_\_\_\_ R = \_\_\_\_\_ S = \_\_\_\_\_

21. In ten words or less, explain what each of the following researchers discovered or determined and how they did it.

Priestly

Dalton

Millikan

Rutherford

22. How many neutrons are there in a P-33 atom? \_\_\_\_ How many protons are there in an  $^{58}\text{Fe}^{3+}$  ion? \_\_\_\_  
 How many total particles (p, n & e's) are in an  $^{16}\text{O}$  atom? \_\_\_\_ in a  $^{19}\text{F}^{1-}$  ion? \_\_\_\_ All chromium particles must have the same number of (p, n or e?) \_\_\_\_.

23. Name each of the following:

- $\text{LiClO}_2$  \_\_\_\_\_
- $\text{FeP}$  \_\_\_\_\_
- $\text{NO}_2^{1-}$  \_\_\_\_\_
- $\text{SO}_3$  \_\_\_\_\_
- $\text{H}_3\text{BO}_3(\text{aq})$  \_\_\_\_\_
- $\text{SnCr}_2\text{O}_7$  \_\_\_\_\_
- $\text{CuHCO}_3$  \_\_\_\_\_
- $\text{SF}_6$  \_\_\_\_\_

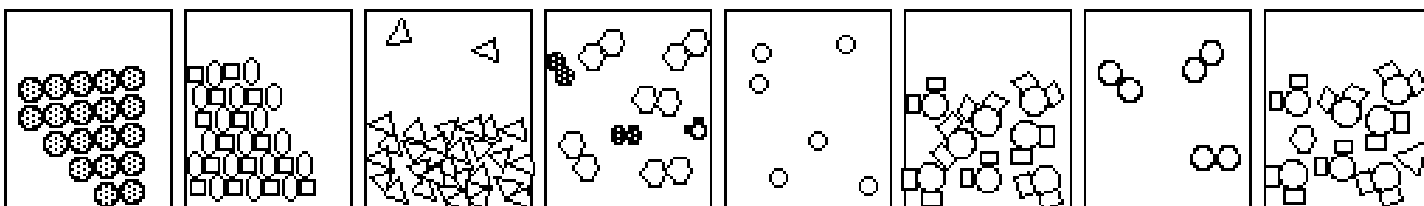
24. Write correct formulas for each of the following:

- zinc acetate \_\_\_\_\_
- gold(III) permanganate \_\_\_\_\_
- bromine pentafluoride \_\_\_\_\_
- aluminum sulfide \_\_\_\_\_
- ammonium thiosulfate \_\_\_\_\_
- nitrous acid \_\_\_\_\_
- aluminum ion \_\_\_\_\_
- mercury(I) cyanide \_\_\_\_\_

25. Double Matching:

- |                              |       |   |
|------------------------------|-------|---|
| ___ noble gas                | A) Na | ___ very reactive nonmetal                  |
| ___ alkali metal             | B) Sn | ___ very nonreactive metal                  |
| ___ halogen                  | C) U  | ___ very reactive metal                     |
| ___ transition element       | D) Au | ___ very nonreactive nonmetal               |
| ___ inner-transition element | E) Ca | ___ large unstable nucleus                  |
| ___ alkaline earth metal     | F) Cl | ___ "wants" to lose either 2 or 4 electrons |
| ___ metalloid                | G) Ar | ___ always reacts with O in a 1:1 ratio     |
|                              | H) As |   |

26. Label each of the following as an element, a compound, or a mixture. Also label each with what it best represents: oxygen, neon, mercury, water, salt water, sugar water, air, copper, salt.



\_\_\_\_\_

\_\_\_\_\_

Answers for problems 1-11, 13-19, 24, 31-33: (IRO+1) -216.3 0.00230 0.00544 0.03032 0.0340 0.048 0.7716 1.00  
 2 2 3 3 3.5 3.846 4 6.3 8.35 10.37 12.18 16.70 18 24 26 26.33 29 40.99 52.66 55 58 67 76.3 77.5  
 90.7 220 435 686 938 30 000 70 470 152 000 3.6E9

Units (IRO+2) g g/mL g/mL g/mL g/mL mL mL \*A \*F \*C K cm<sup>3</sup> mi mm mm mm cm mL sink neither  
 its accuracy its precision A A B C C D D E E F F G G H M M P W W mixture mixture element element  
 element element compound compound oxygen neon mercury water salt water air copper salt  $y = 1.51x - 95$   
 $y = 0.662x + 62.9$