in the lowest energy level

4. An electron would be most attracted to the nucleus of which element?
   a. lithium (3 p^+) c. potassium (19 p^+)
   b. sodium (11 p^+) (d.) rubidium (37 p^+)

5. A proton would be least repulsed by the nucleus of which element?
   (a.) helium (2 p^+) c. argon (18 p^+)
   b. neon (10 p^+) d. krypton (36 p^+)

Isotopes! Complete the chart below.

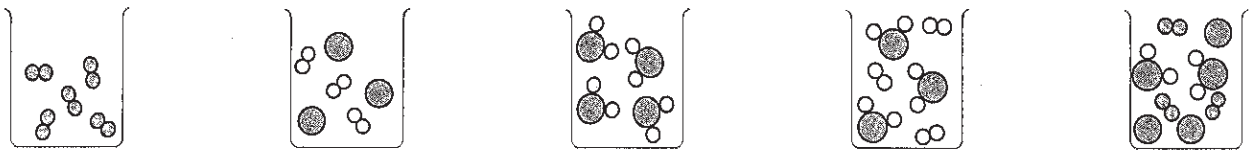
Hyphen notation	Isotope Notation	Mass #	Atomic #	Protons	Neutrons	Electrons
boron-10	$^{10}_{5}B$	10	5	5	5	5
phosphorus–30	$^{30}_{15}P$	30	15	15	15	15
zinc-66	$^{66}_{30}Zn$	66	30	30	36	30
cobalt-59	$^{59}_{27}Co$	59	27	27	32	27

Types of Matter

Directions: Identify the following as: element (E), compound (C), heterogeneous mix (He) or homogeneous mix (Ho).

a. Table salt C b. Nitric acid (HNO_3) C c. Sugar (Glucose) C
d. Carbon Dioxide (CO_2) C e. Milk Ho f. Air Ho
g. Nitrogen gas (N_2) E h. Zinc (Zn) E i. Pulpy orange juice He

Directions: Use the particle representations below to answer #1-5. **Answer choices may be used more than once!**



A B C D E

1. Compound C 2. Nitrogen, N_2 A 3. Mixture of two elements B
4. Element A 5. Mixture of water, H_2O, and hydrogen H_2 D

Jigsaw: All Together Practice!

1. A halide is a binary compound, of which one part is a halogen atom and the other part is an element or radical that is less electronegative than the halogen, to make a fluoride, chloride, bromide, iodide or astatide compound. What is the general formula for alkali metal halides?

   alkali metal = +1 → halogens = −1

   (a.) MX b. M_2X c. MX_2 d. MX_3

2. Which electrons account for many of the chemical and physical properties of elements?

   a. Innermost b. Intermediate (c.) Outermost d. Transition

3. Which of the following elements is not correctly paired with its group (family) name?

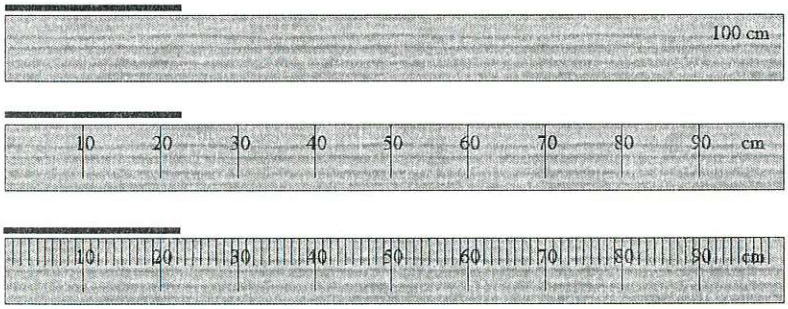
   (a.) Bismuth (Bi), halogens
   c. Lithium (Li), alkali metals
   b. Strontium (Sr), alkaline earth metals
   d. Radon (Rn), noble gases

4. The inertness of noble gases is due to:

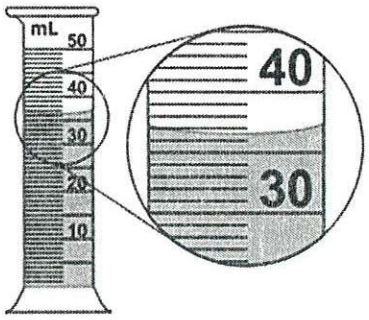
   (a.) The number and arrangement of their electrons
   b. The unique structure of their nuclei
   c. The special number of protons and neutrons
   d. The bonds they form with other elements

Sig Fig Practice

Directions: Measure the following to the correct number of significant figures.



1. 20 cm
2. 22 cm
3. 22.5 cm



4. 36.6 mL

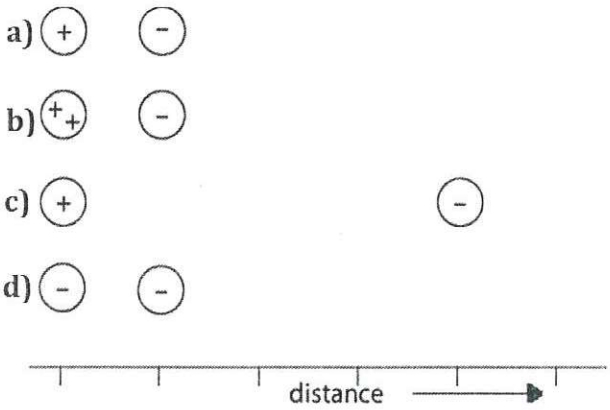
Directions: Determine the number of significant figures.

1. 0.02 1	**2.** 142 3	**3.** 0.02020 4	**4.** 0.073 2
5. 501 3	**6.** 1.071 4	**7.** 501.0 4	**8.** 10810 4
5000 1	**10.** 5.00 3	**11.** 5000. 4	**12.** 1.20×10^3 3

Directions: Round your answer to the correct number of sig figs.

	Calculator Answer	Rounded Answer (with Correct # of Sig Figs)
1. 140 cm × 35 cm (2, 2)	4900	4900 (2)
2. 0.0003 L + 0.0048 L + 0.100 L	0.1078	0.108
3. 67.35 cm^2 ÷ (1.401 cm − 0.399 cm) (4; 1.002 (4))	67.2156	67.22 (4)
4. (6.23 cm + 3.111 cm − 0.05 cm) × 14.99 cm (4; 9.291 (3))	139.27	139 (3)
5. 3.14159 m × (4.17 m + 2.150 m) (6; 6.32 (3))	19.855	19.9 (3)

Coulomb's Law



1. Which set of particles shown the left will experience:
   a. the greatest attraction to each other? b
   b. the greatest repulsion from each other? d

2. The particles in (a) will experience _____ attraction to each other than the particles in (c) because:
   a. greater, the distance between them is less.
   b. smaller, the distance between them is less.
   c. the same, distance is irrelevant to force of attraction.

3. The particles shown above in (a) will experience _____ attraction to each other than the particles in (b) because:
   a. greater, the nucleus has one proton instead of two.
   b. smaller, the nucleus has one proton instead of two.
   c. the same, charge is irrelevant to force of attraction.

Directions: Choose the best possible answer for each question.

1. A forensic technician is examining a fine white powder found at a crime scene. It appears to be of uniform texture and consistency. He finds that upon heating, the substance decomposes, releasing a colorless gas and leaving a black residue. Based on these observations, the substance is:

   A a homogeneous mixture
   B a heterogeneous mixture
   (C) either a homogeneous mixture or a compound
   D a compound

2. An example of a heterogeneous mixture is

   A bronze. (B) concrete. C brass. D water.

3. How is a mixture different from a compound?

   A Particles of a mixture are combined chemically.
   B Components of a mixture can only be separated chemically.
   (C) Components of a mixture can be separated by physical means.
   D Composition of a mixture may be constant.

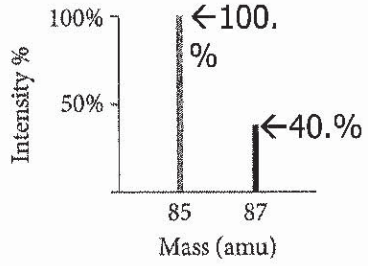
4. A transparent liquid has uniform color. Under a microscope, no difference in uniformity is apparent. The liquid all boils away at the same temperature. Based on this information, it can be concluded that the liquid is:

   A an element
   B a homogeneous mixture
   C either a pure substance or a homogeneous mixture
   (D) a pure substance

Average Atomic Mass and Mass Spec

1. Consider the mass spectrum shown below.

   a. Determine the average atomic mass of the element using the mass spec shown below.



$aam = (85)\left(\frac{100.}{140.}\right) + (87)\left(\frac{40.}{140.}\right)$

$= 85(0.7143) + 87(0.2857)$

$= 85.5714\ amu = (86\ w/\ sf\ \ddot{n})$

Since $x + y = 100\%$

$y = 100\% - x$

$= 1 - x$

Substitute for y!

   b. Which element is most likely shown here? Rb

   c. How did you identify the element? on PT, Rb's $aam = 85.47\ amu$

2. There are two stable isotopes of calcium: Ca-40 (39.96) and Ca-46 (45.95). Using the average atomic mass of calcium from the periodic table, calculate the % abundance of each isotope of calcium. (Yum, algebra.)

$40.08 = 39.96y + 45.95x$

$= 39.96(1-x) + 45.95x$

$= 39.96 - 39.96x + 45.95x$

$0.12 = 5.99x$

$x = 0.020 \Rightarrow 20\% \Rightarrow$

$\%\ Ab\ ^{46}Ca = 2.0\%$

$\%\ Ab\ ^{40}Ca = 98.0\%$

3. Silver consists of two stable isotopes, one with a mass of 106.905 and an abundance of 51.84%.

a. What is the abundance and mass of the other isotope? P.T.

$100 - 51.84 = 48.16\%$

$107.87 = (106.905)(0.5184) + x(0.4816)$

$= 55.42 + 0.4816x$

$52.45 = 0.4812x \Rightarrow x =$ **109.0 amu, 48.16% Ab.**

b. How many silver-107 atoms are present in a 2.00 gram sample of pure silver?

$$2.00\ g\ Ag \times \frac{1\ mol\ Ag}{107.87\ g\ Ag} \times \frac{6.022E23\ atoms\ Ag}{1\ mol\ Ag} \times \underbrace{0.5184}_{51.84\%} = 5.79 \times 10^{21}\ Ag\ atoms$$

4. There are three naturally occurring isotopes of carbon: carbon–12, carbon–13, and carbon–14. In a natural sample of carbon, which is most likely to be the most abundant isotope? (No math needed! ☺)

^{12}C will be most abundant, b/c the average atomic mass of C on the PT (12.01 amu) is closest to the mass of the carbon-12 isotope.

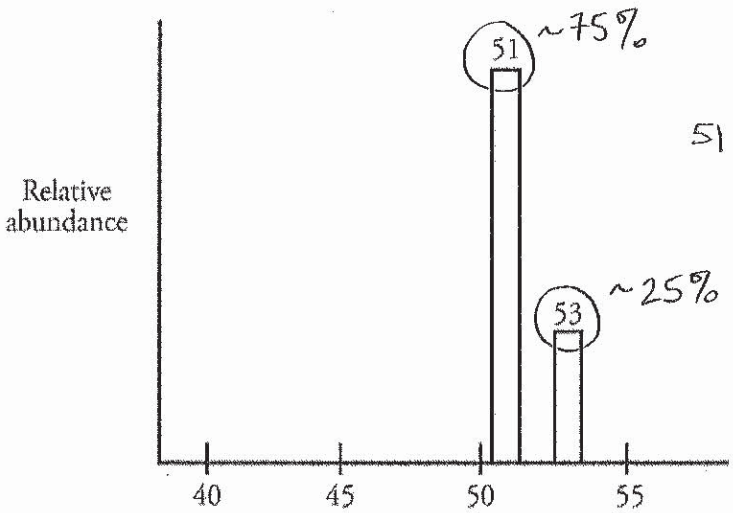
5. Lithium and bromine each have two naturally occurring isotopes. Each is described in the table below.

79+6 = 85
79+7 = 86
82+6 = 88
82+7 = 89
4 diff. masses!

Isotope	Mass (amu)	Abundance
lithium–6	6.015	7.59%
lithium–7	7.016	92.41%
bromine–79	78.918	50.69%
bromine–82	81.916	49.31%

Lithium and bromine combine to form lithium bromide (LiBr). How many peaks will be present in the mass spectrum of LiBr?

a. 1 peak b. 2 peaks c. 3 peaks (d.) 4 peaks



$51(0.75) + 53(0.25) = 51.5$

6. The above mass spectrum is for the hypochlorite ion, ClO^-. Oxygen has only one stable isotope, which has a mass of 16 amu. Using the spectrum, calculate the average mass of a hypochlorite ion.

~~a.~~ 52.5 amu ~~b.~~ 52.0 amu (c.) 51.5 amu d. 51.1 amu

7. The table below shows the atomic mass and natural abundance of the two naturally occurring isotopes of lithium.

Naturally Occurring Isotopes of Lithium

Isotope	Atomic Mass (u)	Natural Abundance (%)
Li-6	6.015	7.6
Li-7	7.016	92.4

Which numerical setup can be used to determine the atomic mass of naturally occurring lithium?

a. (7.6)(6.015 amu) + (92.4)(7.016 amu)

(b.) (0.076)(6.015 amu) + (0.924)(7.016 amu)

c. $\frac{(7.6)(6.015\ amu) + (92.4)(7.016\ amu)}{2}$

d. $\frac{(0.076)(6.015\ amu) + (0.924)(7.016\ amu)}{2}$

8. The average atomic mass of naturally occurring neon is 20.18 amu. There are two common isotopes of naturally occurring neon as indicated in the table below. Using the information provided, calculate the percent abundance of each isotope.

Isotope	Mass (amu)
Ne-20	19.99
Ne-22	21.99

(a.) 90.5% ^{20}Ne and 9.5% ^{22}Ne

b. 98.2% ^{20}Ne and 1.2% ^{22}Ne

c. 10.5% ^{20}Ne and 89.5% ^{22}Ne

d. 56.4% ^{20}Ne and 43.6% ^{22}Ne

$20.18 = (1-x)(20) + 22x$

$= 20 - 2x + 22x$

$0.18 = 20x$

$x = 0.009 \Rightarrow$ 9% Ab ^{22}Ne