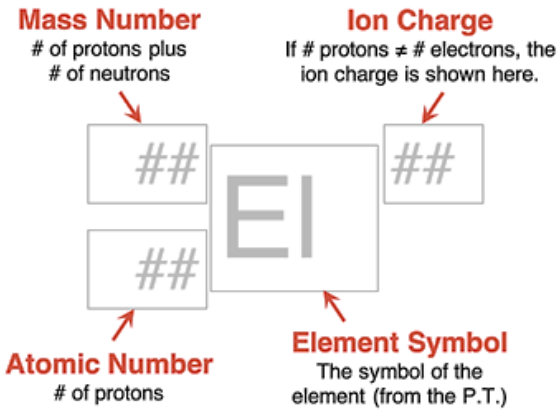
Early Models of the Atom **Name**_____

Subatomic Particles, Isotopes, and Ions

Read from **Lesson 1c, 2c, and 3a** in the **Chemistry Tutorial Section, Chapter 3**: **Elements, Atoms, and Ions** of **The Physics Classroom**:
Part 1c: Subatomic Particles Part 2c: Isotopes and Isotope Symbols Part 3a: Metals, Nonmetals, and Ions

Review these lessons to answer the following questions about the subatomic particles and isotopes.

Part 1: Isotope Symbols



Calcium-40

$^{40}_{20}Ca$

Calcium-42

$^{42}_{20}Ca$

Calcium-44

$^{44}_{20}Ca$

Calcium Ion

$^{40}_{20}Ca^{2+}$

1. Which three subatomic particles make up the calcium atom?

2. Which subatomic particles make up most of the mass of the calcium atom?

3. Which subatomic particles contribute to the charge of a calcium atom and where is each located?

4. What do all calcium atoms and ions have in common?

5. How do calcium-40, calcium-42, and calcium-44 differ? Explain your answer.

6. How do calcium-40 and the calcium ion shown above differ? Explain your answer.

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Part 2: Fill in the missing information on the following chart.

Name of Particle	Element Symbol	Atomic Number	Mass Number	Number of protons	Number of neutrons	Number of electrons	Charge
Calcium-40 atom							
	P				16	15	
				25	30	25	
	U		238			92	
		11	23				+1
	Cu		64			27	

Part 3: Fill in the missing information on the following chart.

Description	Different Elements, Isotopes, or Ions?	Isotope Symbol for "Element A"	Isotope Symbol for "Element B"
Element A has 20 p^+ and 20 n. Element B has 20 p^+ and 22 n.	Different Isotopes	$^{40}_{20}Ca$	$^{42}_{20}Ca$
Element A has 20 p^+ and 20 n. Element B has 22 p^+ and 20 n.			
Element A has 29 p^+ and 28 e^-. Element B has 29 p^+ and 27 e^-.			
Element A has an atomic number of 17 and a mass number of 35. Element B has an atomic number of 17 and a mass number of 36.			
Element A has an atomic number of 92 and a mass number of 235. Element B has 90 p^+ and 143 n.			