Name: _____ Date: _____ Period: _____

POGIL: Atomic Structure and Beginning to read the periodic table

Why?

Atoms make up everything around us—from the food on our plate to the materials that make up buildings. How do we know what to make those substances out of? How do we know what nutrients are in our food? The answer is that we know about the properties of the atoms that make them up. In order to get to that point, we must first understand the composition of atoms and how to determine that based upon the information provided to us on the periodic table.

Model 1: Subatomic Particles

Particle	Symbol	Relative Charge	Absolute Mass	Relative Mass	Location in the atom
Electron	e^-	-1	9.109×10^{-31} kg	0	Electron Cloud
Proton	p^+	+1	1.673×10^{-27} kg	1	Nucleus
Neutron	n^0	0	1.675×10^{-27} kg	1	Nucleus

Memory Clues: Protons: Positive

3 N's for Neutrons: Neutrons, Neutral, Nuclues

1. Draw the quantum model of the atom, labeling the three subatomic particles described above and labeling the name of their location.

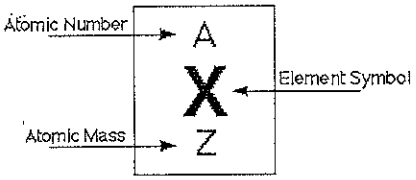
2. What do you notice about the relative mass of the proton and neutron? What about the electron?

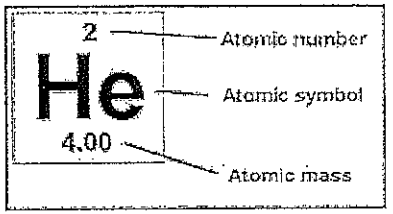
Since the masses of the subatomic particles are so small, we use another unit to discuss their mass: **atomic mass unit (amu).** One amu is the mass of a proton. In this way, we can discuss and use the masses of protons (which, relatively speaking, is the same as the mass of a neutron) to determine the **atomic mass** of a particular atom. The atomic mass is the total number of protons + neutrons in the nucleus of the atom. The atomic mass is the average of all of the masses of the different isotopes of elements (isotopes will be discussed later).

3. Is the mass of an electron taken into account for the atomic mass? Why or why not?

4. 1 amu is equivalent to how many protons?

Model 2: Reading the Periodic Table





The numbers on the periodic table have significance! As pictured above, the periodic table tells you an element's atomic number, atomic mass, and symbol. But what do those all mean?

The **atomic number** tells you the number of protons an element has. Notice how no two elements have the same atomic number. As a result, you can identify an element's identity based upon the number of protons it contains. If an element is neutral, meaning it has no charge, then the atomic number can tell you the number of electrons as well. However, the atomic number can only tell you the number of protons 100% of the time.

Mass number is not represented on the periodic table. However, it tells us the number of protons plus neutrons for a particular atom of an element.

The **atomic mass** is the average of the mass numbers of all isotopes (isotopes have the same number of protons, but a different number of neutrons) of an element found in nature. The unit for atomic mass is amu.

5. What can knowing the number of protons allow you to do?

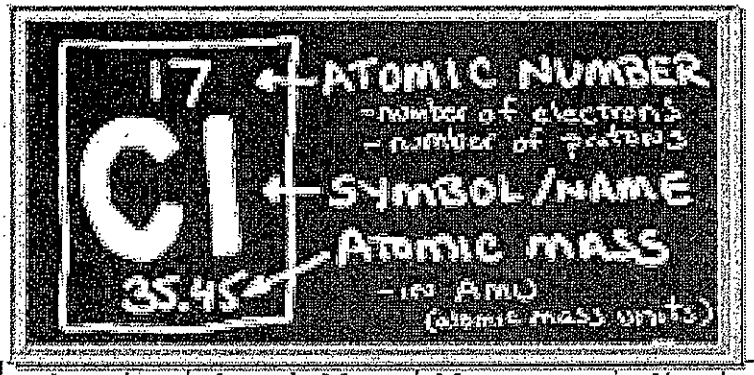
6. An unknown element has an atomic number of 8. What element is it?

7. Neon has an atomic mass of 20.18 amu. How many neutrons does it have?

8. What can the atomic number ALWAYS tell you? What conditions allow it to tell you the number of electrons as well?

Model 3: Calculating Protons, Electrons, and Neutrons from the Atomic Mass and Atomic Number

Directions: Locate each element on the periodic table and write down the atomic number and atomic mass. Use that information to determine the number of protons, electrons, and neutrons in an atom of that element. When calculating the number of neutrons, round the atomic mass to the nearest whole number (which is the mass number). Assume all are neutral atoms.



Element Name	Symbol	Atomic Number	Atomic Mass	Mass Number	Number of Protons	Number of Electrons	Number of Neutrons
Chlorine	Cl	17	35.45	35	17	17	18
	C						
	Al						
				24	12		
Potassium							
	Zn						
	Mn						
	B						