

Name: _____ Date: _____

Learning Objectives:

1. Draw models that show atoms or ions.
2. Use information about the number of protons, neutrons, and electrons to
 - Identify an element and its position on the periodic table
 - Draw models of atoms
 - Determine if the model is for a atom or an ion.
3. Predict how changing the number protons, neutrons, or electrons will change the element, the charge, and the mass of an atom or ion.

Directions:

1. Explore the **Build an Atom** simulation with your partner (about 5 minutes). As you explore, talk about what you find with your partner.
2. Using **Build an Atom**, talk with your partner as you play with the parts of atoms to find:
 - A. What parts go in the center of the atom? _____
 - B. You can call the center of the atom, the **nucleus**. Most atoms in our environment have a **stable** nucleus.
 - C. Play around, and write down three examples of atoms that have a **stable nucleus** and include a drawing of your nucleus.

	Number of particles in your nucleus:	Draw your nucleus	What <u>element</u> is it?
1.	Protons: _____ Neutrons: _____		
2.	Protons: _____ Neutrons: _____		
3.	Protons: _____ Neutrons: _____		

- D. Everything around us is made up of different elements. The air has Oxygen (**O**) and Nitrogen (**N**). Plants and people have lots of Carbon (**C**). Helium (**He**) is in balloons. Hydrogen (**H**) is in water.

Play until you discover which **particle (or particles)** determines the name of the **element** you build. What did you discover?

- E. Test your idea by identifying the element for the 3 cases.

	Particles	What element?	What determines the element?	Circle the element																																																																								
1.	Protons: 6 Neutrons: 6 Electrons: 6		Proton neutron Electron	<table><tr><td>H</td><td colspan="16"></td><td>He</td></tr><tr><td>Li</td><td>Be</td><td colspan="10"></td><td>B</td><td>C</td><td>N</td><td>O</td><td>F</td><td>Ne</td></tr><tr><td>Na</td><td>Mg</td><td colspan="10"></td><td>Al</td><td>Si</td><td>P</td><td>S</td><td>Cl</td><td>Ar</td></tr><tr><td>K</td><td>Ca</td><td>Sc</td><td>Ti</td><td>V</td><td>Cr</td><td>Mn</td><td>Fe</td><td>Co</td><td>Ni</td><td>Cu</td><td>Zn</td><td>Ga</td><td>Ge</td><td>As</td><td>Se</td><td>Br</td><td>Kr</td></tr></table>	H																	He	Li	Be											B	C	N	O	F	Ne	Na	Mg											Al	Si	P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
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3. Play until you discover what affects the **charge** of your atom or ion.
What is a rule for making...

A. A atom **neutral** (one with 0 extra charge)?

B. A **+ion** (positive ion, one with extra positive charge)?

C. A **- ion** (negative ion, one with extra negative charge)?

4. Show a neutral atom, a positive ion, and a negative ion. (These examples should be consistent with the rules you discovered.) All of your examples should also have a **stable nucleus**.

	Number of Particles?	Draw Your Atom or Ion	What is the Charge?
Neutral	Protons: __ Neutrons: __ Electrons: __		
+ Ion	Protons: __ Neutrons: __ Electrons: __		
- Ion	Protons: __ Neutrons: __ Electrons: __		

5. Play until you discover what affects the **mass** of your atom or ion.
Which particles are heavy and which particles are light?

6. What is a rule for determining the mass?

7. Using all of your rules, figure out what changes for each of these actions to an atom or ion. You can test your ideas with the simulation. If you have new ideas, rewrite your rules.

Action	What Changes?	How Does it Change?
Add a Proton	<input type="checkbox"/> Element	
	<input type="checkbox"/> Charge	
	<input type="checkbox"/> Mass	

Action	What Changes?	How Does it Change?
Remove a Neutron	<input type="checkbox"/> Element	
	<input type="checkbox"/> Charge	
	<input type="checkbox"/> Mass	

Action	What Changes?	How Does it Change?
Remove an Electron	<input type="checkbox"/> Element	
	<input type="checkbox"/> Charge	
	<input type="checkbox"/> Mass	

Action	What Changes?	How Does it Change?
Add an Electron	<input type="checkbox"/> Element	
	<input type="checkbox"/> Charge	
	<input type="checkbox"/> Mass	

8. Challenges!

Design a positive ion with a charge of +2:

	Particles	Properties
	Protons: __	element:
	Neutrons: __	mass:
	Electrons: __	charge:
		Stable nucleus:
	Yes	No

Design a neutral, atom with a mass of 8:

	Particles	Properties
	Protons: __	element:
	Neutrons: __	mass:
	Electrons: __	charge:
		Stable nucleus:
	Yes	No

Questions:

Which particles contribute to the mass number and which do not? Why?

Which particle contribute to the atomic number and why?

Which particles contribute to the net charge and how does each change the net charge?

9. Complete the following table:

DATA						
Symbol	Name	Atomic Number	Mass Number	Number of Protons	Number of Neutrons	Number of Electrons
H						
He						
Li						
Be						
B						
C						
N						
O						
F						
Ne						