Student directions ***Build an Atom*** activity

Learning Goals: Students will be able to

1. Make atom models that show stable atoms or ions.
2. Use given information about subatomic particles to
   - Identify an element and its position on the periodic table
   - Draw models of atoms
   - Determine if the model is for a neutral atom or an ion.
3. Predict how addition or subtraction of a proton, neutron, or electron will change the element, the charge, and the mass of their atom or ion.
4. Describe all vocabulary words needed to meet the goals.
5. Use a periodic symbol to tell the number of protons, neutrons, and electrons in an atom or ion.
6. Draw the symbol for the element as you would see on the periodic table

Directions:

1. Explore the ***Build an Atom*** simulation with your partner for a few minutes.

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? What is the center called?
   B. Play until you discover a good rule for making the center of the atom "stable". What seems to make the center of the atom "unstable"?
   C. Make a table like the one below to identify three examples – at least 1 stable and at least 1 unstable – that shows your rules **for stablility** work and include a drawing of your nucleus.

	What is in your nucleus?	**Draw your nucleus**	**Is it stable or unstable?**	**What Element is it?**
1				
2				
3				

3. Everything around us is made up of different elements. The air has Oxygen and Nitrogen. Plants and people have lots of Carbon. Helium is in balloons. Hydrogen is in water.
   - Play until you discover a rule for what determines the name of the **element** you build. What did you find determines the element?
   - Test your idea by identifying the element for the 3 cases. Write down the information you use to determine the element.

example	**Atom or Ion has**	**What Element is it?**
1	# of protons: 6 # of neutrons: 6 # of electrons: 6	
2	# of protons: 7 # of neutrons: 6 # of electrons: 6	
3	# of protons: 6 # of neutrons: 7 # of electrons: 7	

4. Play until you discover some good rules about the **charge** of your atom or ion.
   - What is a rule for making:
     1) A neutral atom which has no charge.
     2) A positive ion which has positive charge?
     3) A negative ion which has negative charge?

   - Talk about how you used the tools in the sim helped you decide if the atom had a positive, negative, or 0 charge.

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- Make a table like the one below to identify three examples of atoms and ions (1 with neutral charge, 1 with a positive charge, and 1 with a negative charge) that show your rules **for charge** work and include a drawing of your atom. **(All of your examples should also have a stable nucleus.)**

	What is in your atom or ions?	Draw your atom or ion	What is the charge?	Is it a neutral atom, positive ion, or negative ion?
1	# of protons: # of neutrons: # of electrons:			
2	# of protons: # of neutrons: # of electrons:			
3	# of protons: # of neutrons: # of electrons:			

5. Play until you discover some good rules about the **mass** of your atom or ion.
   - What is a rule for determining the mass?

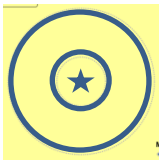
6. **Using all of your rules**, figure out what changes for each of these changes to an atom or ion. Copy this table and make predictions, then test your ideas with the simulation. If you have new ideas, rewrite your rules.

Make the change:	What changes also? Element name, charge, mass?
Add a proton	
Remove a neutron	
Remove an electron	
Add an electron	

7. Design challenges: Try these with your partner. There is nothing you need to record.

Design a positive ion with a charge of +2 include a drawing:

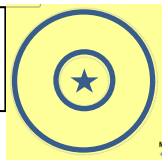
Number of protons __
Number of neutrons__
Number of electrons__



What element is your ion? _____
What mass is your ion? _____
Is the nucleus of your ion stable or unstable?

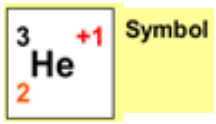
Design neutral, stable atom with a mass of 9 include a drawing:

Number of protons __
Number of neutrons__
Number of electrons__



What element is your atom? _____
What is the charge of you atom?_____

8. What does the tool called **Symbol** tell you about what parts are in an atom or ion?



   - What rules can you use to tell how many protons, neutrons and electrons make up an atom or ion?
   - Check your ideas and write down two examples that show your rules work and include a drawing for each.

9. **Partner Discussion.** Make sure you know working definitions for:
nucleus, proton, neutron, electron, atom, ion, charge, neutral, atomic mass, and element.