Name_____ Date_____ Grade_____

Build An Atom Discovery Activity

Goal: you will be able to

1) Identify an element based on how many protons it has in its nucleus
2) Identify the mass number of an element
3) Determine the properties of the parts that atoms are made out of
4) Determine the factors that make an element stable or unstable (radioactive)
5) Determine how many electrons it takes to make an atom neutral or charged.

Procedure:

1) Log in to your computer and go to http://phet.colorado.edu/en/simulation/build-an-atom. Click on the play button ▸. This will load up the activity.

2) Choose "Symbol" on the build an atom main page.

3) GETTING FAMILIAR WITH THE PROGRAM

A blank periodic table that shows you what element you have.

The pane contains:

Tally of protons, neutrons and electrons

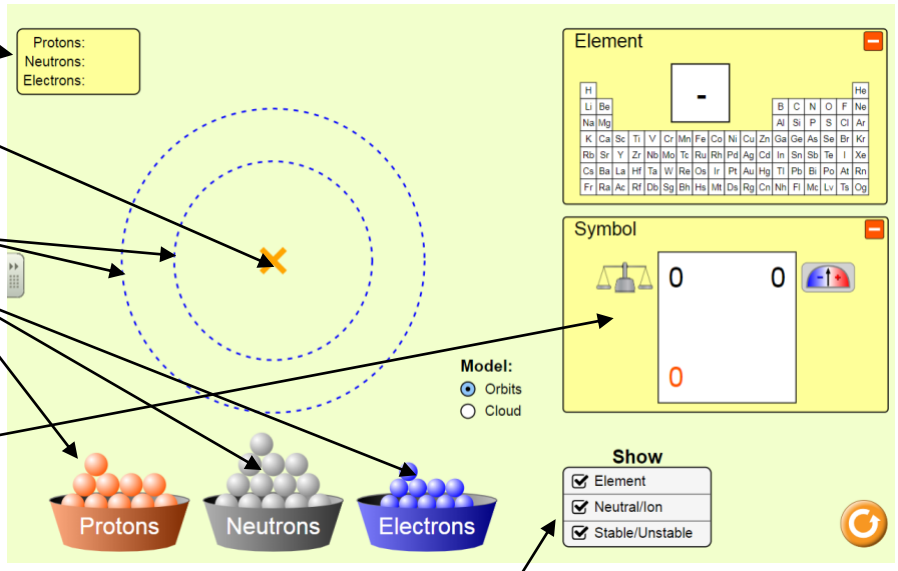
A blank atom diagram with an X to mark the nucleus, where you can drag protons and neutrons

Energy levels you can drag electrons to

Tubs with protons, neutrons and electrons

Model type (keep on "Orbits" the whole time)

Information about the element symbol, mass number and net charge



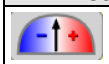
Three check boxes (keep all three checked)

4) BUILD YOUR FIRST ATOM

a) Drag a proton from the Proton bucket over to the X in the center of the atom.

Element Symbol?	Element Name?	+ ion, - ion or Neutral Atom?	Stable or Unstable?

b) Click the orange + sign to the right of Symbol and record their values below.

Net Charge	Mass Number	Symbol
		

c) What did you discover about the proton?

A proton has a mass of _____ atomic mass unit, a charge of _____ and goes in the _____ of the atom.

d) Drag a neutron to the center of the atom where your one proton sits alone. Record the information that shows up:

Element Symbol?	Element Name?	+ ion, - ion or Neutral Atom?	Stable or Unstable?
Net Charge	**Mass Number**	**Symbol**	
			

1. Did adding the neutron change the identity of the element?_____

2. Did adding the neutron change the charge of the element?_____

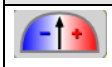
e) What did you discover about the neutron?

A neutron has a mass of _____ atomic mass unit, a charge of _____ and goes in the _____ of the atom.

f) Next, drag an electron to the atom and drop it between the inner and outer ring.

1. Where does the electron immediately go?_____

2. Record the information that shows up:

Element Symbol?	Element Name?	+ ion, - ion or Neutral Atom?	Stable or Unstable?
Net Charge	**Mass Number**	**Symbol**	
			

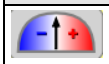
1. Did adding the electron change the identity of the element?_____

2. Did adding the electron change the charge of the element?_____

g) Drag another electron to the atom and let it go.

1. Where does the electron immediately go?_____

2. Record the information that shows up:

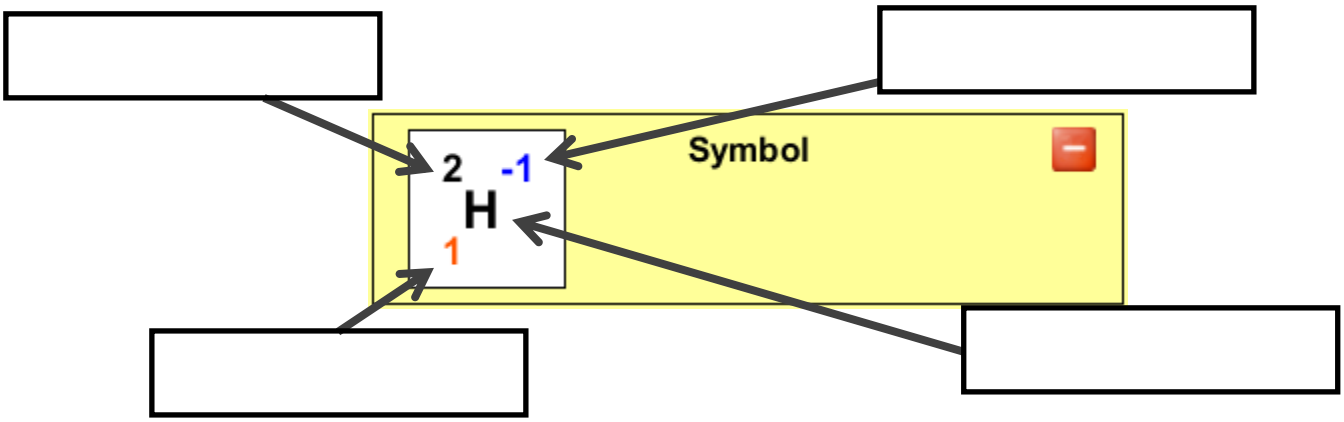
Element Symbol?	Element Name?	+ ion, - ion or Neutral Atom?	Stable or Unstable?
Net Charge	**Mass Number**	**Symbol**	
			

g) What did you discover about the electron?

An electron has a mass of _____ atomic mass unit, a charge of _____ and goes in the _____ of the atom.

h) What has to be true of the number of electrons compared to protons in order for the atom to have no charge?

5) What Does The Symbol Mean? Fill in the blanks and label the diagram below with what each part of the symbol means.



6) Build More Elements – Using your bucket of protons, neutrons and electrons, build the atoms shown below based on their symbol. Fill in the information about the number of protons, neutrons and electrons for each, along with stating if the atom is stable or unstable.

Symbol	Protons	Neutrons	Electrons	Stable or Unstable?
$_{1}^{1}H^{0}$				
$_{3}^{1}H^{0}$				
$_{3}^{2}He^{0}$				
$_{6}^{3}Li^{0}$				
$_{6}^{3}Li^{+1}$				
$_{8}^{4}Be^{0}$				
$_{9}^{4}Be^{+2}$				
$_{10}^{5}B^{0}$				
$_{10}^{5}B^{+3}$				
$_{14}^{7}N^{0}$				
$_{14}^{7}N^{-3}$				
$_{17}^{8}O^{0}$				
$_{16}^{8}O^{-2}$				

7) What particle in the nucleus is responsible for making an atom stable or unstable?_____

8) Make the following atoms and fill in the information:

a) An unstable, neutral atom of oxygen with more neutrons than protons

Symbol	Element Name	Protons	Neutrons	Electrons	Stable or Unstable?

b) A stable, -3 ion of nitrogen with more neutrons than protons

Symbol	Element Name	Protons	Neutrons	Electrons	Stable or Unstable?

c) An unstable, +4 ion of carbon with fewer neutrons than protons

Symbol	Element Name	Protons	Neutrons	Electrons	Stable or Unstable?

d) A stable, -1 ion of hydrogen with fewer neutrons than protons

Symbol	Element Name	Protons	Neutrons	Electrons	Stable or Unstable?

e) An unstable, neutral atom of neon with more neutrons than protons

Symbol	Element Name	Protons	Neutrons	Electrons	Stable or Unstable?

9) Wrapping it up – use the information from the work you did as evidence to support your answers.

a) What does changing the number of protons do to the atom?_____

_____

b) What does changing the number of neutrons do to the atom?_____

_____

c) What does changing the number of electrons do to the atom?_____

_____

d) Under what conditions can an atom be unstable?_____

_____