Name:	Ariane	Period:	3 <sup>?</sup>

### Pre-lab for Build an Atom

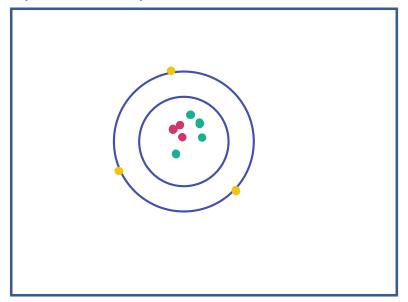
1. You build an atom that has the following components:

3 protons (P)

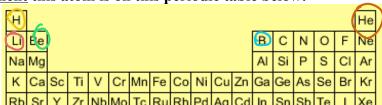
4 neutrons (N)

3 electrons (E)

### Draw a picture of how you would build your atom below:



Circle which element this atom is on this periodic table below:



### The mass of this atom is:

3 mass units

4 mass units

6 mass units

d 7 mass units

11 mass units

## Explain what ideas you used to choose an answer:

Vacally + apes up in adumte

## The charge of this atom is:

a. 0, this is a neutral atom

b. -3

c. -1 +1

A=d

2. You start with your atom: 3 protons 4 neutrons

3 electrons

You want to change your atom's properties. Mark YES if a change will work, and mark NO if it will not work.

A. Hydrogen, Helium, Lithium, Beryllium, Boron, Carbon are all different elements.

If you want to **change the type of element** your atom is, you can either:

Add a proton
or Add a neutron
or Add an electron

(circle)
Yes or No
Yes or No
Yes or No

B. If you want to **change the charge** of your atom, you can either:

Add a proton
or Add a neutron
or Add an electron

(circle)
Yes or No
Yes or Wo
Yes or Wo

C. If you want to **change the mass** of your atom, you can either:

(circle)

Add a proton
or Add a neutron
or Add an electron

Yes or No
Yes or No
Yes or No
Yes or No

Name: /	Period:	3
	_	

#### **Build an Atom**

### **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:**

- 3. Explore the *Build an Atom* simulation with your partner (about 5 minutes). As you explore, talk about what you find with your partner.
- 4. 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? Protes + Neutrons
  - 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: 2 • Neutrons: 0		helium
2.	Protons: <u>3</u> Neutrons: <u>2</u>		Lithium
3.	Protons: <mark>Ч</mark> Neutrons: <mark>Ч</mark>		Beryllium

D.	Everything around us is made up of different elements. The air has Oxygen ( <b>O</b> ) and Nitrogen ( <b>N</b> )
	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?
	M- XP 10 N IC P

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

	Particles	What Element?	What Determines the Element?	Circle the Element
	Protons: 6	Liement:	2 Proton	Н
1.	Neutrons: 6	Courbon	2 Neutron	Li Be B D O F Ne Na Mg
	Electrons: 6		2 Electron	K Ca Sc Ti V Cr Mn Fe Co Ni Cu Zn Ga Ge As Se Br Kr
	Protons: 7	NII ~.	2 Proton	Н
2.	Neutrons: 6	Mithal	2 Neutron	Li Be B C N O F Ne Na Mg Al Si P S CI Ar
	Electrons: 6		2 Electron	K Ca Sc Ti V Cr Mn Fe Co Ni Cu Zn Ga Ge As Se Br Kr
	Protons: 6		2 Proton	Н
3.	Neutrons: 7	Lorbon	2 Neutron	Li Be Na Mq Al Si P S Cl Ar
	Electrons: 7		2 Electron	K Ca Sc Ti V Cr Mn Fe Co Ni Cu Zn Ga Ge As Se Br Kr

5. 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)?
В.	A +ion (positive ion, one with extra positive charge)?
C.	A-ion (negative ion, one with extra negative charge)?

6. 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: 1 Neutrons: 1 Electrons: 1		0
+ Ion	Protons: 4 Neutrons: 3 Electrons: 3		+
- Ion	Protons: 3 Neutrons: 4 Electrons: 4		-1

7. Play until you discover what affects the **mass** of your atom or ion.

Which particles are heavy and which particles are light?

8. 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?
0 -1 -1 -	2 Element	Hydragen into Helicm
Add a Proton	2 Charge	+1
	2 Mass	+1

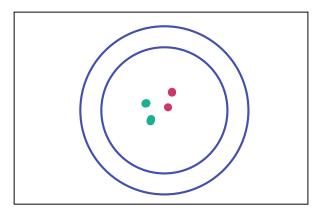
Action	What Changes?	How Does it Change?
Remove a Neutron	2 Element	Same
	2 Charge	Same
	2 Mass	

Action	What Changes?	How Does it Change?
Remove an Electron	2 Element	Same
	2 Charge	↑ l
	2 Mass	Same

Action	What Changes?	How Does it Change?
Add a Electron	2 Element	Same
	2 Charge	~1
	2 Mass	Same

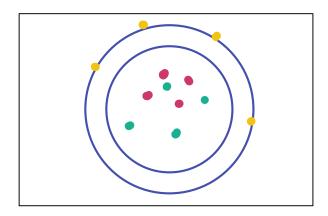
# 9. Challenges!

# Design a positive ion with a charge of +2:



Particles	Properties
Protons: 2 Neutrons: 2 Electrons: 5	Element: Le l'un He Mass: L'Albert M

# Design a neutral, atom with a mass of 8:



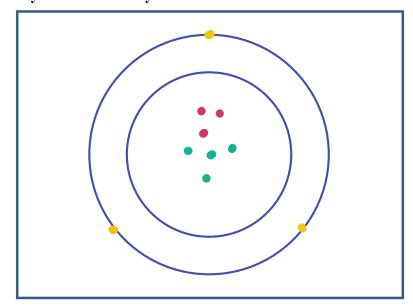
Particles	Properties
Protons: 4 Neutrons: 4 Electrons: 4	Element: Decy live Be Mass: Charge: Charge: Yes No

Name: Ariane.	Period: 3

### Post-lab for Build an Atom

- 10. You build an atom that has the following components:
  - 3 protons (P)
  - 4 neutrons (N)
    - 3 electrons (E)

Draw a picture of how you would build your atom below:



Circle which <u>element</u> this atom is on this periodic table below:

H																	Не	
Li	Ве											В	С	Ν	0	F	Ne	
Na	Mg											Αl	Si	Р	S	CI	Ar	
K	Ca	Sc	Ti	٧	Cr	Mn	Fe	Со	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr	
Rh	Sr	Υ	7r	Nh	Mο	To	Ru	Rh	Рd	Aα	Cd	In	Sn	Sh	Tρ	_	Χe	

#### The mass of this atom is:

- f. 3 mass units
- g. 4 mass units
- h. 6 mass units
- (i.) 7 mass units
- 1. 11 mass units

## Explain what ideas you used to choose an answer:

neutrons equal 7.

### The charge of this atom is:

- (f.) 0, this is a neutral atom
- g. -3
- h. -1
- i. +1
- j. +3

11. You st	art with your atom:  3 protons 4 neutrons 3 electrons
	vant to change your atom's properties. <u>YES</u> if a change will work, and mark <u>NO</u> if it will not work.
A.	Hydrogen, Helium, Lithium, Beryllium, Boron, Carbon are all different elements.
	If you want to <b>change the type of element</b> your atom is, you can either:
	(circle)
	Add a proton Yes or No
	or Add a neutron Yes of No
	or Add an electron Yes or No
	Explain the ideas you used to choose your answer:    is
	If you want to change the charge of your atom, you can either:  Add a proton Or Add a neutron Or Add an electron  Explain the ideas you used to choose your answer:  Prokens increase charge, the brans lower.  If you want to change the mass of your atom by 1 or more mass units, you can either:
	(circle)
	Add a proton  Or Add a neutron  Yes or No  Yes or No
	or Add a neutron or Add an electron  Yes or No  Yes or No
	Explain the ideas you used to choose your answer:  Electrons are light, while Pros New add weight.
D.	If you add 1 proton and 1 neutron to your atom
	Will the element change? If so, circle the new element?
	Will the mass change?  Will the charge change?  Will the charge change?  Will the new charge of the atom?
	U Company of the Comp