NAME: _____

MODS: _____

UNIT 3 - ATOMIC THEORY

Date	Agenda	Homework
Thurs 10/9	Unit 3 PPT - History of Atoms and First 20 Elements (slides 1-25) Introduce Poster Project (instructions on Page 3) Unit 3 PPT - Start Parts of an Atom if time permitted	• Read p 107-112 • Do # 1-3 p 108 and #4-6 p 112 • Poster Project (due 10/14)
Fri 10/10	Unit 3 PPT –Parts of an Atom, Valence Electrons/Dot Diagrams, and Atomic Structure (slides 26-41) If time, work on Poster Projects	• Work on Posters (due 10/14) • Read p 113-119 • Worksheet #1 – Atomic Structure History
Mon 10/13	Guidance Visits – prep for PSATs	• Work on Posters (due 10/14) • Worksheet #2 - Atomic Structure • Quiz tomorrow – Symbols 1-20
Tues 10/14	Quiz – Symbols 1-20 Review HW Worksheet #2 (Atomic Structure) Unit 3 PPT – Rest of elements (slides 42-72)	• Finish Rest of Elements, if needed
Wed 10/15 2.5 Hr Delay	Poster presentations Make Atomic Structure Cards (Elements #1-20), instructions pg 7 (pkt)	• Quiz – All Elements tomorrow
Thurs 10/16	Quiz – All Elements on List If time, continue working on Atomic Structure Cards	• Finish Atomic Structure Cards • Quiz – Atomic Structure tomorrow
Fri 10/17	Quiz - Atomic Structure Unit 3 PPT – Ions (slides 73-79)	• Worksheet #3 – Ions • Quiz – Ions tomorrow
Mon 10/20	Go over HW Worksheet #3 Quiz – Ions Prelab – Flame Test (Ions)	• Add ions to Element Cards • Finish Prelab, if needed
Tues 10/21	Lab – Flame Test (Ions)	• Finish conclusion
Wed 10/22	Unit 3 PPT – Isotopes (slides 80-89) Worksheet #4: Isotopes	• Read p 115-120 • Problem # 18-26 p 121
Thurs 10/23	Lab - Beanium	• Study for test • Finish lab after school if needed
Fri 10/24	Go over lab Weighted average atomic mass calculations (reference slides 85-89) Review for test	• Study for the test • Finish Worksheet #5 – Review for Test
Mon 10/27	Go over HW Worksheet #5 Questions?	• Study for the test
Tues 10/28	Test - Chapter 3	

CHEMISTRY SYMBOLS TO KNOW

ALUMINUM

ANTIMONY

ARGON

ARSENIC

BARIUM

BISMUTH

BORON

BROMINE

CADMIUM

CALCIUM

CARBON

CESIUM

CHLORINE

CHROMIUM

COBALT

COPPER

FLUORINE

FRANCIUM

GOLD

HELIUM

HYDROGEN

IODINE

IRON

KRYPTON

LEAD

LITHIUM

MAGNESIUM

MANGANESE

MERCURY

NEON

NICKEL

NITROGEN

OXYGEN

PHOSPHORUS

PLATINUM

POTASSIUM

RADIUM

RADON

SILICON

SILVER

SODIUM

STRONTIUM

SULFUR

TIN

TITANIUM

TUNGSTEN

URANIUM

XENON

ZINC

BERYLLIUM

SYMBOLS POSTER

Each student will be assigned an element to research. The posters will be due on _____ and will be presented to the class on that day. The posters will count as a lab grade.

Make sure to include the following:

- Name of element
- Symbol of element
- Atomic number of element
- Atomic mass of element
  - Number of protons
  - Number of electrons
  - Number of neutrons
- **Five** interesting facts about the element – you must be able to explain these!
- On colored 8 ½ by 11 paper
- Use at least 3 different colors
- Name on BACK of poster
- Neatness and creativity count!!

These posters will be displayed around the room for everyone to view…do an awesome job!!!

Rubric:

Category		Points Possible		
Name of element ……	0	3		
Symbol of element……	0	3		
Atomic number of element……	0	3		
Atomic mass of element……	0	3		
Five interesting facts about the element……	0	# x 2=	___	
On colored 8 ½ by 11 paper……	0	3		
Use at least 3 different colors……	0	2	4	6
Name on BACK of poster……	0	2		
Neatness and creativity count!!.....	0	4	7	10

Total Points Earned: _____

Total Points Available: 43

WORKSHEET #1:
ATOMIC HISTORY WORKSHEET

Watch the following YouTube Videos and answer the questions below:

The Discovery of the Electron: https://www.youtube.com/watch?v=IdTxGJjA4Jw

1. In 1896, J.J. Thompson got his hands on a kit, which was essentially a _____
2. What did J.J. Thompson do after he varied the voltage across the plate? _____
    a. What did this allow him to calculate? _____
3. Thompson found that the particles in the beam are almost _____ times lighter than hydrogen atoms.
    a. Thompson discovered the first _____ _____, the electron.
4. We can use _____ to probe materials and look at the structure in the electron microscopes or in big machines like particle accelerators.
5. How do electrons fit inside an atom, according to J.J. Thompson? _____

    _____
    a. Was Thompson correct? _____

The Discovery of the Atomic Nucleus: https://www.youtube.com/watch?v=wzALbzTdnc8&list=TLRGi-Zrv3hVEOpxuTvtRWutY2xi09HrDK

1. Ernest Rutherford was one of the first _____
2. Rutherford used beams of particles to explore the _____
3. What did Rutherford use to produce beams of particles? _____
4. What did Rutherford and team expect to happen if the structure of the atom was as Thompson suggested? _____

    _____
    a. What actually happened? _____
5. What analogy can be used to describe what Rutherford suggests the structure of the atom to be:

    _____
    a. Is he correct? _____
6. Electrons are now know to "hang out" in _____
7. Rutherford determined most of the atom is _____
8. Rutherford and _____ found that the nucleus is made of two kinds of particles:

    _____ and _____ .

Rutherford's Experiment: https://www.youtube.com/watch?v=5pZj0u_XMbc

**More details of Rutherford's experiment

(**note: alpha particle = 2 protons + 2 neutrons bound together into a particle)

1. In 1911, _____ and his partners were studying the angle that which alpha particles were scattered as they pass through a thin gold foil.
2. Most alpha particles traveled _____ through the gold undeflected, but some _____ at large angles.
    a. What did this mean? _____

       _____
3. Draw what is happening with the gold atoms and the alpha particles. Label everything you draw:

    a. Most of the atom is occupied by what? _____
    b. When the alpha particle encounters a nucleus, what happens?

       _____

Atomic Theory Song: https://www.youtube.com/watch?v=07yDiELe83Y

Write down 5 things you learned from this song in the space below:

1.
2.
3.
4.
5.

WORKSHEET #2:
ATOMIC STRUCTURE

DEFINITIONS

Atomic Number

Atomic Mass

Mass Number

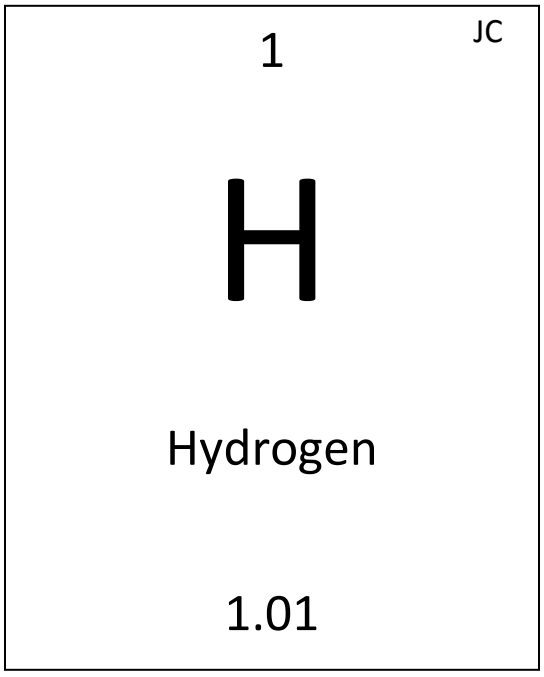
FILL IN THE TABLE BELOW

Element	Atomic Number	Atomic Mass	Mass Number	# of Protons	# of Electrons	# of Neutrons
Aluminum			27			
	9		19			
			20	10		
Calcium			40			
	5		11			
			35	17		
Iodine			127			
	12		24			
			65	30		

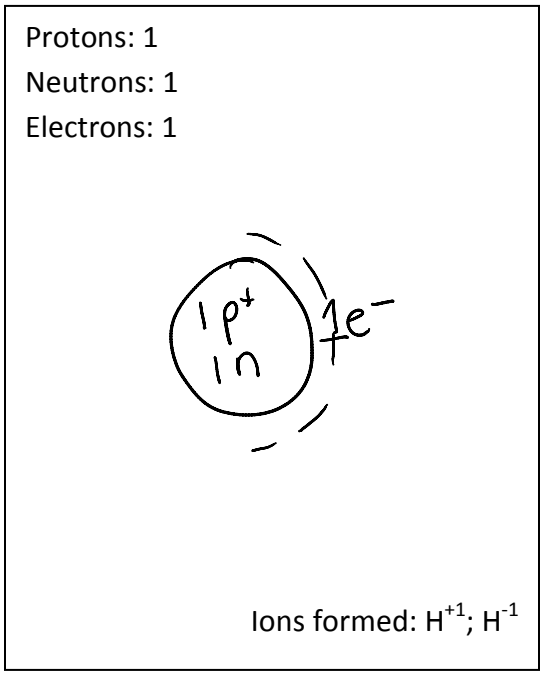
INSTRUCTIONS FOR ELEMENT CARDS

For elements #1-20, make an element card for each, following the instructions below.

Front:



Back:



WORKSHEET #3:
IONS

Name	Symbol	Atomic Mass	Atomic Number	Mass Number	Charge	Protons	Neutrons	Electrons
	Na^{+1}						12	
			17	36	-1			
				39		19		18
Argon				40				18
						5	5	2
Aluminum								

WORKSHEET #4:
ISOTOPES

Fill in the blank:

1. _____ and _____ are the same for different isotopes of the same element.

2. _____ is different for different isotopes of the same element.

Match the name with the appropriate isotope:

3. $^{1}_{1}H$ _____ a. Tritium

4. $^{2}_{1}H$ _____ b. Deuterium

5. $^{3}_{1}H$ _____ c. Hydrogen

Determine the number of protons, electrons, and neutrons for the following isotopes:

	Protons	**Neutrons**	**Electrons**
$^{35}_{17}Cl$			
$^{37}_{17}Cl$			
$^{12}_{6}C$			
$^{13}_{6}C$			
$^{14}_{6}C$			

****Continued on the next page****

Percent abundance

1. The mass of element X has a 78.99% abundance for isotope 23.9850, 10.00% for isotope 24.9858, and 11.01% for isotope 25.9826 . What is the atomic mass of the element? What element is it?

2. Natural samples of copper contain two isotopes. Cu-63 has a mass of 62.930 amu and Cu-65 has a mass of 64.928 amu. The percent abundance of Cu-63 is 69.09%. Calculate the atomic mass of copper.

LAB: BEANIUM

Terminology:

Define ELEMENT-

Define ISOTOPE-

LAB:

Problem: How is the average mass of isotopes determined?

Introduction:
Imagine a new element has been discovered, and has been given the name "beanium". Students at local high schools have been given the job of determining the number of isotopes of this new element, the mass of each isotope, the abundance of each isotope and the "atomic weight" of the new element. Fortunately, beanium atoms are very large, so you will be able to sort and weigh them easily. In this laboratory investigation, you will determine the abundance of each "isotope" of beanium, and determine the average mass (atomic weight) of the element in much the same way the average mass of other elements is determined. Then you will compare your result to a standard measurement of average mass.

Materials (*per group*): a sample of atoms of the new element, a weigh boat, balance

Procedure:

1. Determine the number of isotopes of beanium based upon the appearance (size, color, etc.).
2. Sort the beanium atoms into groups based on appearance. Each group represents a different isotope. Count the total number of atoms of each isotope and record the result in column (a) of the data table, Method 1, on the next page. Add those numbers to get the total number of atoms in your sample. Record the total in the data table.
3. Determine the abundance of each isotope using the formula below:

$$\textbf{Abundance} = \frac{\textbf{number of atoms of each isotope}}{\textbf{total number of atoms}}$$

Record the results in column (b) of the data table, Method 1, on the next page.

4. Using a balance, measure the total mass of **all** the atoms of each isotope individually. Record the total mass in column (c) of the data table.
5. Find the typical mass of **ONE** atom of each isotope by dividing the total mass by the number of atoms ((c) ÷ (a)). Record the result in column (d) of the data table, Method 1, on the next page.
6. Multiply the abundance of each isotope by its mass to find the product ((b) x (d)), and record the result in the last column of the data table.
7. Add the products in the last column to find the "atomic mass" of the element beanium. Record the result in the data table, Method 1, on the next page.

Observations:

Beanium Isotope	(a) Number of atoms (beans)	(b) Abundance	(c) Total mass (grams)	(d) Mass of Isotope (grams)	(e) Product of mass x abundance
1					
2					
3					
				Atomic Mass of "Beanium"	

Conclusion:

1. What do the three kinds of beans represent in this exercise?

2. Why isn't the atomic mass of most of the elements on the Periodic Table an integer (why do they contain decimals)?

3. What do isotopes have in common? How do isotopes differ?

4. What is the difference between mass number and atomic number?

WORKSHEET #5:
REVIEW ATOMIC STRUCTURE

You may use the following answers more than once:

a. isotope	b. atomic number	c. atomic mass number	d. proton
e. electron	f. neutron	g. nucleus	h. ion

_____1. Has a positive charge

_____2. Where the proton is found

_____3. Is the sum of the neutrons and the protons

_____4. An element with different number of neutrons

_____5. Has no charge

_____6. Where the neutron is found

_____7. Is the lightest particle

_____8. Has a charge of –1

_____9. Elements with different number of electrons

_____10. The number of protons in an element

_____11. Particle that distinguishes the elements from one another

_____12. Particle found outside the nucleus

Fill in the table:

Name	Symbol	Protons	Neutrons	Electrons	Charge	Atomic Mass Number	Atomic Number
					-3	31	15
		5		5		11	
Nitrogen				10		14	
		19	20	18			
	Mg^{+2}		12				

Representing Atomic Structure:
Draw the picture that represents the atom ^{39}K.

Atomic number =
Atomic mass =
Mass number =
# of protons =
# of electrons =
# of neutrons =

Draw the dot diagram:

Would you expect ^{39}K to be stable or reactive? Give reasons why and explain the octet rule.

Would you expect ^{39}K to become ion? Why?

If you expect ^{39}K to become an ion, would it become positive or negative? Why?

Calculate the average atomic mass for oxygen to the thousandth place:

	O-16	**O-17**	**O-18**
Average mass of isotope	15.995	16.995	17.999
% abundance	99.759 %	0.037%	.207%

What is the average atomic mass for oxygen? _____