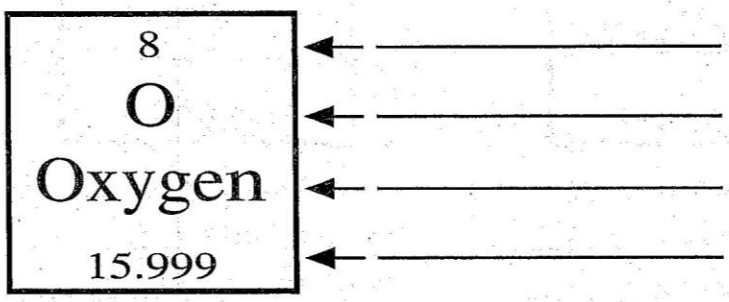
NAME _____ PER_____ DUE DATE _____ MAIL BOX_____

ATOMS and THE PERIODIC TABLE

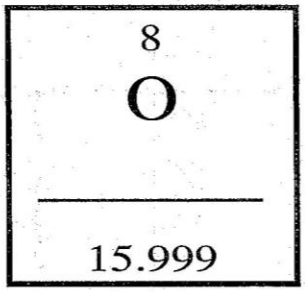


Atomic number equals the number of

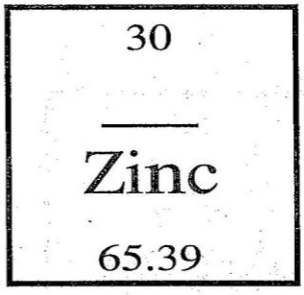
_____ **or** _____

Atomic mass equals the number of

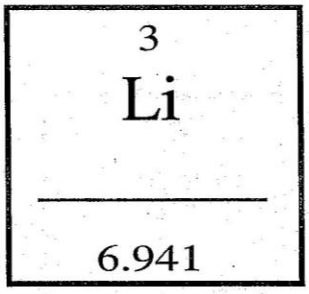
_____ + _____



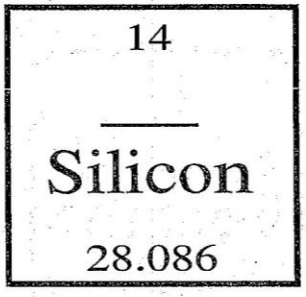
Atomic # = _____
Atomic Mass = _____
# of Protons = _____
# of Neutrons = _____
# of Electrons = _____



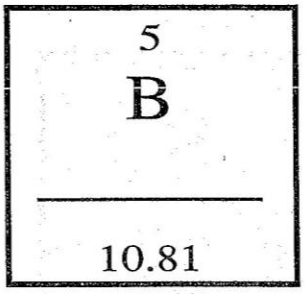
Atomic # = _____
Atomic Mass = _____
# of Protons = _____
# of Neutrons = _____
# of Electrons = _____



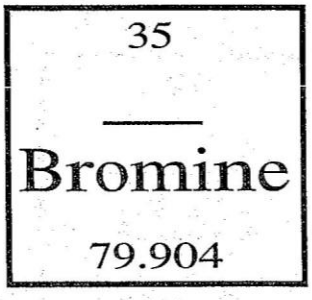
Atomic # = _____
Atomic Mass = _____
# of Protons = _____
# of Neutrons = _____
# of Electrons = _____



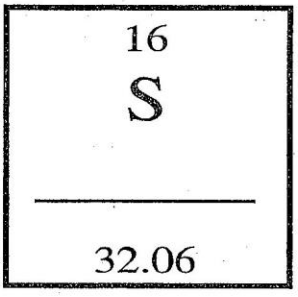
Atomic # = _____
Atomic Mass = _____
# of Protons = _____
# of Neutrons = _____
# of Electrons = _____



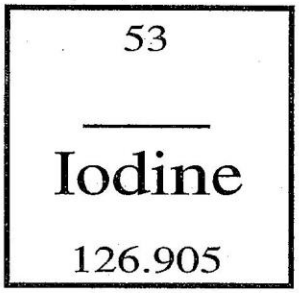
Atomic # = _____
Atomic Mass = _____
# of Protons = _____
# of Neutrons = _____
# of Electrons = _____



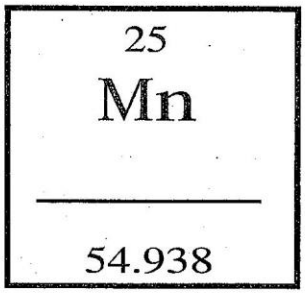
Atomic # = _____
Atomic Mass = _____
# of Protons = _____
# of Neutrons = _____
# of Electrons = _____



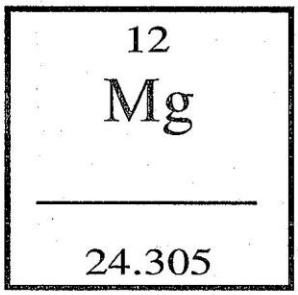
Atomic # = _____
Atomic Mass = _____
# of Protons = _____
# of Neutrons = _____
# of Electrons = _____



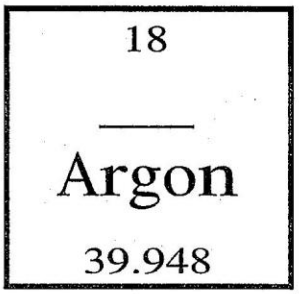
Atomic # = _____
Atomic Mass = _____
# of Protons = _____
# of Neutrons = _____
# of Electrons = _____



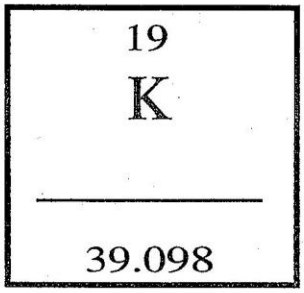
Atomic # = _____
Atomic Mass = _____
# of Protons = _____
# of Neutrons = _____
# of Electrons = _____



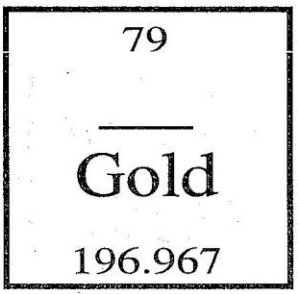
Atomic # = _____
Atomic Mass = _____
# of Protons = _____
# of Neutrons = _____
# of Electrons = _____



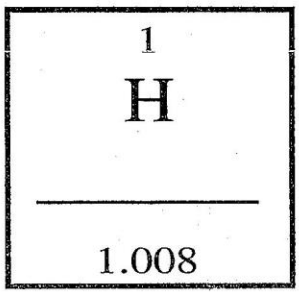
Atomic # = _____
Atomic Mass = _____
# of Protons = _____
# of Neutrons = _____
# of Electrons = _____



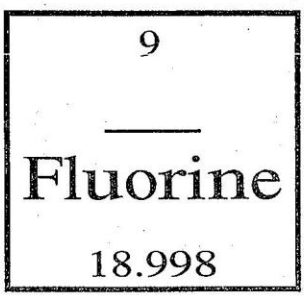
Atomic # = _____
Atomic Mass = _____
# of Protons = _____
# of Neutrons = _____
# of Electrons = _____



Atomic # = _____
Atomic Mass = _____
# of Protons = _____
# of Neutrons = _____
# of Electrons = _____



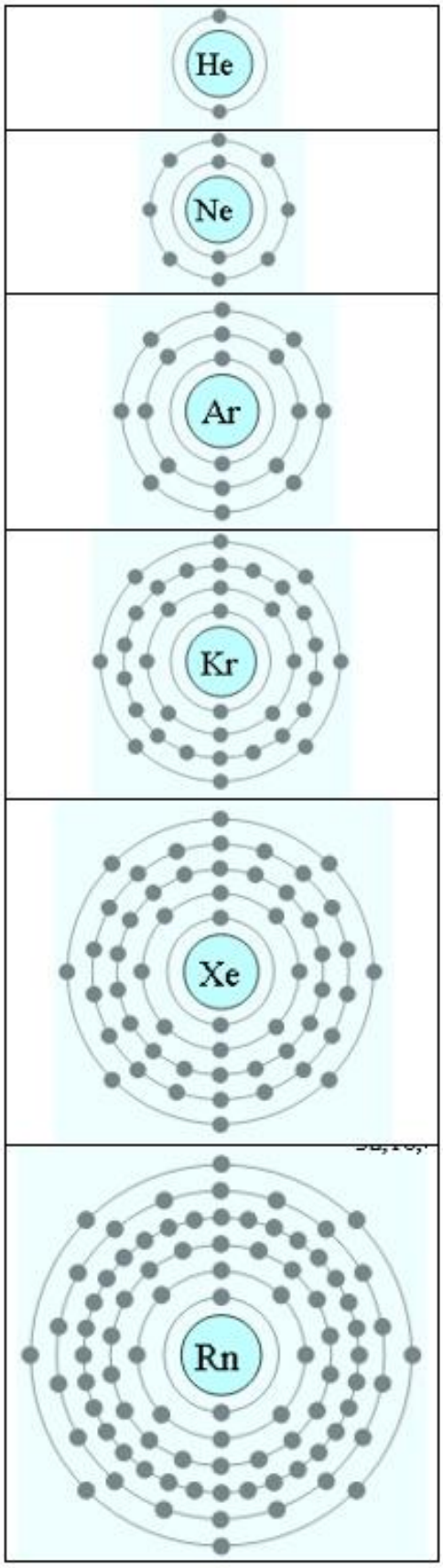
Atomic # = _____
Atomic Mass = _____
# of Protons = _____
# of Neutrons = _____
# of Electrons = _____



Atomic # = _____
Atomic Mass = _____
# of Protons = _____
# of Neutrons = _____
# of Electrons = _____

Noble gas, any of the seven chemical elements that make up Group 18 (VIIIa) of the periodic table. The elements are helium (He), neon (Ne), argon (Ar), krypton (Kr), xenon (Xe), radon (Rn), and oganesson (Og). The **noble gases** are colorless, odorless, tasteless, nonflammable **gases**.

Count and record the electrons in each of the separate electron shells around these Noble Gases.



_____

_____ _____

_____ _____ _____

_____ _____ _____ _____

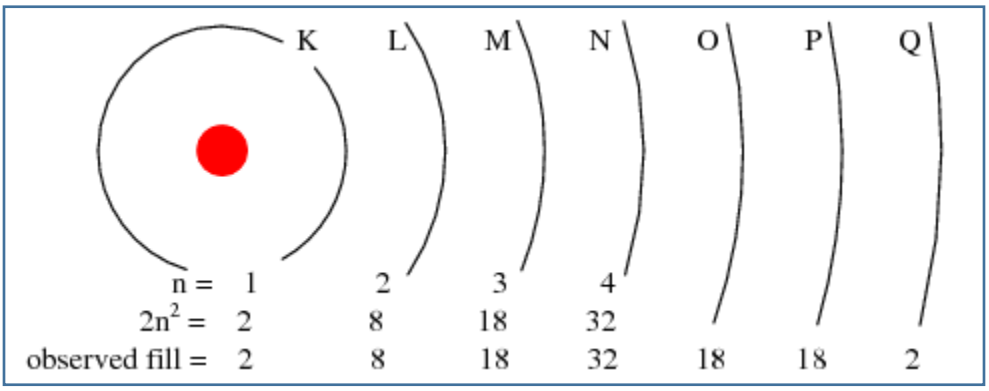
_____ _____ _____ _____ _____

_____ _____ _____ _____ _____ _____

Compare class data. Do you notice any particular trends?

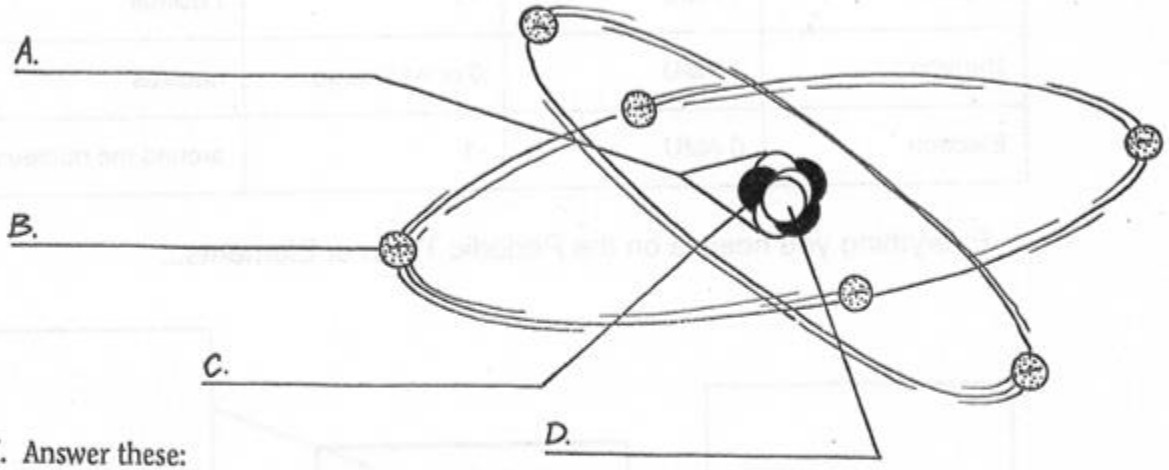
_____

_____



A Greek philosopher called Democritus, who lived over 2000 years ago, taught people that all things were made of grains which could not be divided. He called these grains *atoms* because in Greek *atom* means *indivisible*. Today, *atom* is the common name for the tiny particles of matter that cannot be further divided (and still be the same substance). If you could look inside an atom, you'd find that it looks like a miniature solar system, with something in the center and other things orbiting around it.

I. Label the parts of this atom (nucleus, protons, electrons, neutrons).



II. Answer these:

_____ 1. the part of the atom that carries no electric charge

_____ 2. the part of the atom that carries a positive charge

_____ 3. the part of the atom that carries a negative charge

_____ 4. the number of electrons that can be held in the first orbit (closest to the nucleus)

_____ 5. the number of electrons that can be held in the second orbit

_____ 6. the number of electrons that can be held in the third orbit

_____ 7. there are the same number of these two particles in an atom

_____ 8. the atomic number is the same as the number of these particles

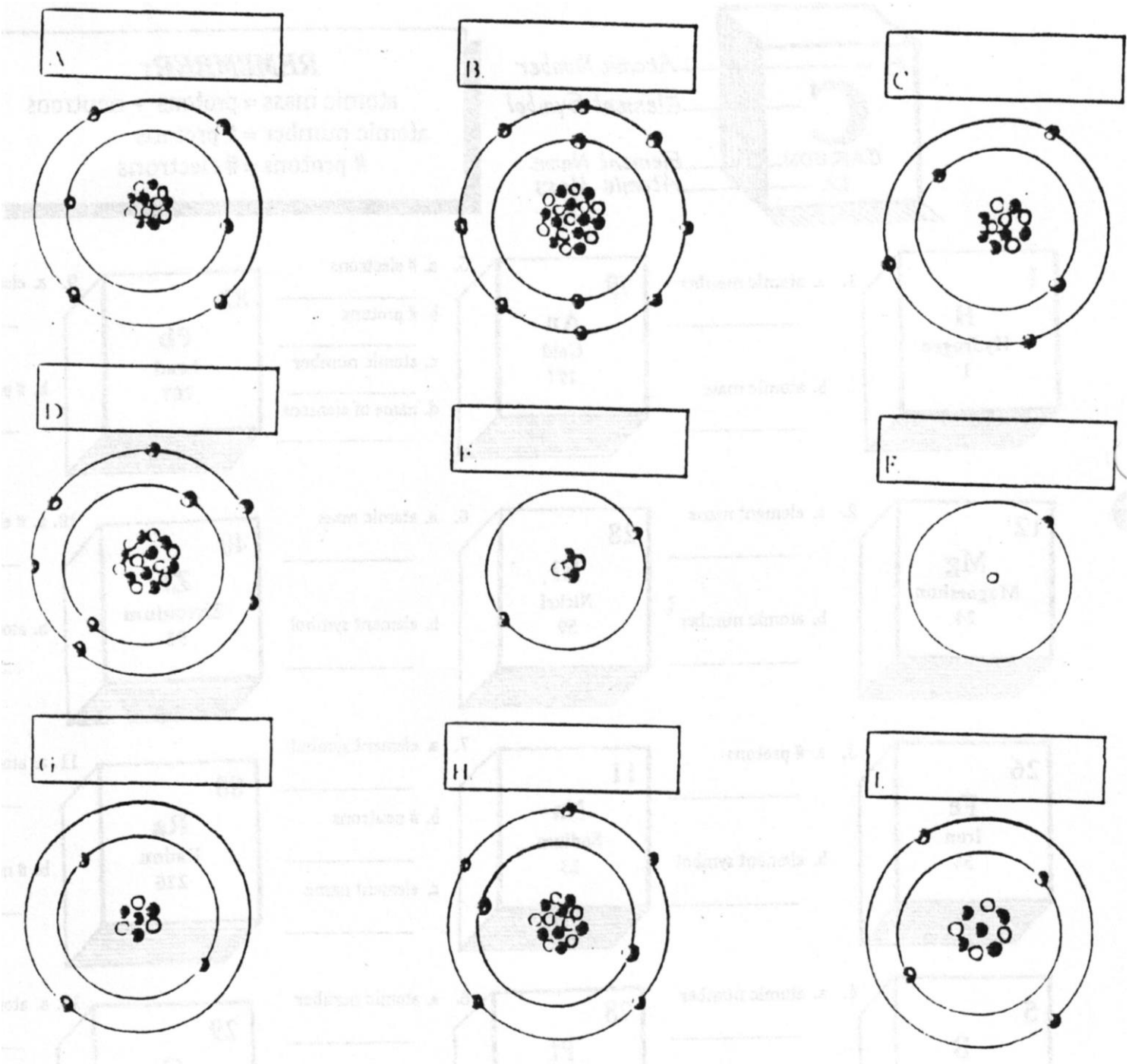
Which Atom is it Investigation? Reviewing basic Bohr Model's of some common elements.

First count the number of electrons and/or protons (darker dots) around each nucleus.

Second utilize a Periodic Table and correctly identify the atom by element. **Write down Group Number in box too.**

Note the number electron's in each shell.

What number is typically in the first electron shell? _____ What is the exception? _____



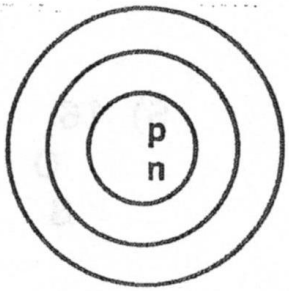
Count the Valence Electrons in each shell. What do they correspond with? What does the Group number match?

_____ **← WRITE**

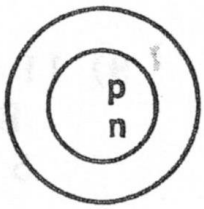
Atomic Structure

Use the information provided for each element to complete the diagrams. Draw the electrons in their proper shells, and place the correct numbers in the nucleus to indicate the number of protons and the number of neutrons.

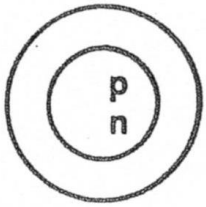
1. Sulfur: atomic number 16
   atomic mass 32



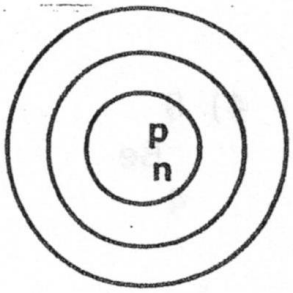
2. Beryllium: atomic number 4
   atomic mass 9



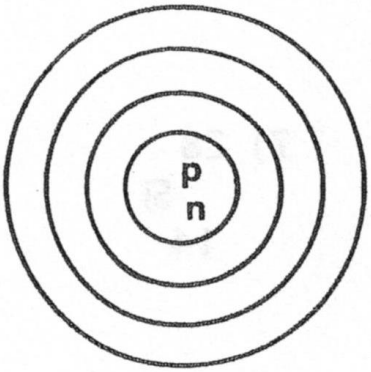
3. Nitrogen: atomic number 7
   atomic mass 14



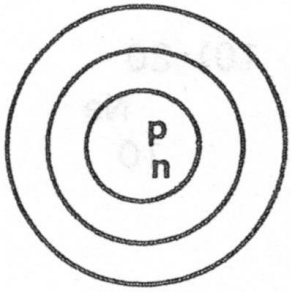
4. Sodium: atomic number 11
   atomic mass 23



5. Potassium: atomic number 19
   atomic mass 39



6. Argon: atomic number 18
   atomic mass 40



Constructing Bohr Diagrams

Utilize the Atomic Number of each of the following to construct Bohr Diagrams of the following elements. Find Atomic # on the bottom of each symbol. Recall the number electrons that are typically found in each shell K, L, M, N – 1st 2nd 3rd 4th (2,8,18,32) or (2,8,8,18). Then sketch models with proper number of electron shells and electron counts.

1) 39
K
19

2) 23
Na
11

3) 7
Li
3

4) 9
Be
4

5) 14
N
7

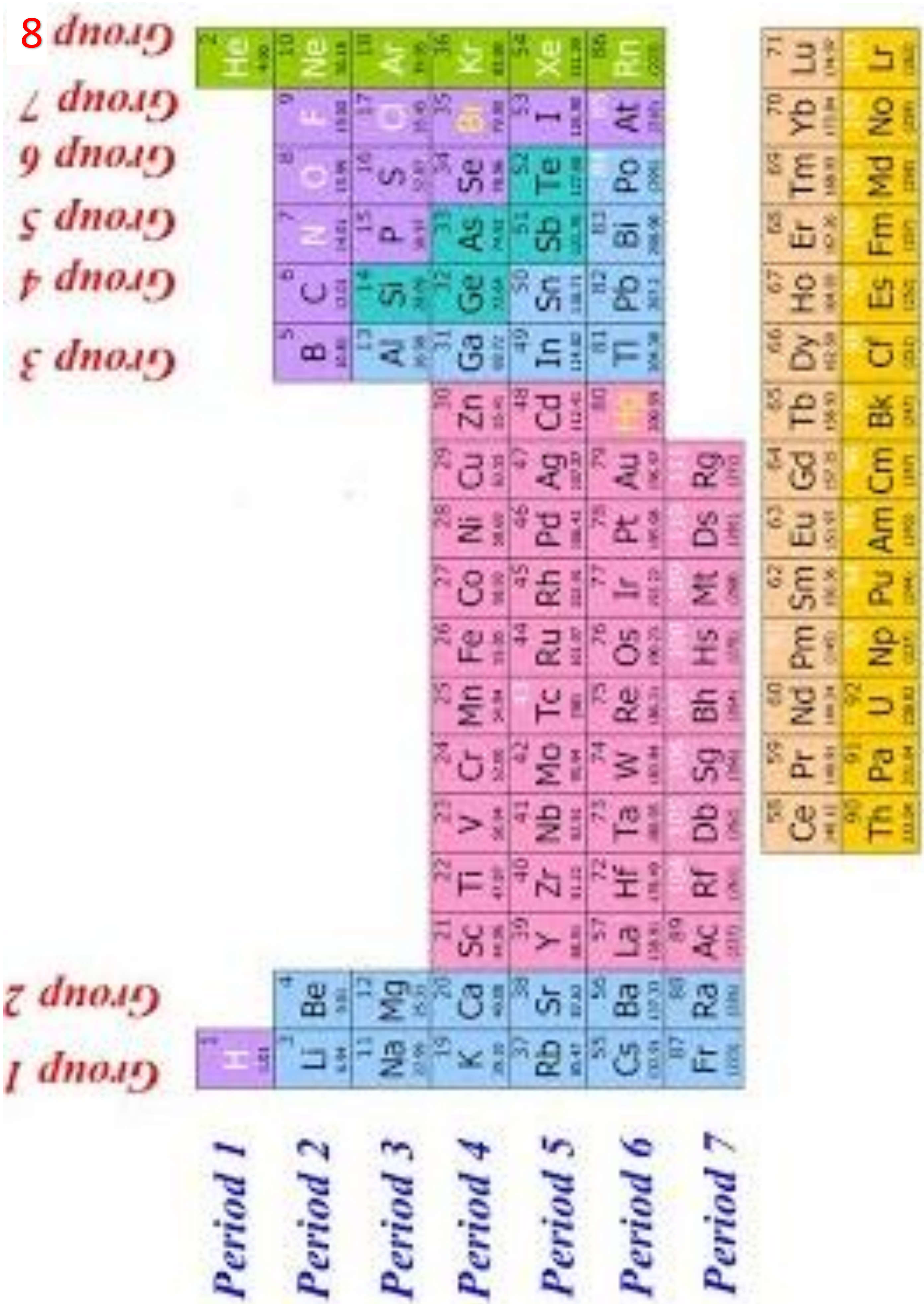
6) 16
O
8

7) 28
Si
14

8) 4
He
2

9) 11
B
5

10) 20
Ne
10


Group 1
Group 2
Group 3
Group 4
Group 5
Group 6
Group 7
Group 8
Period 1
Period 2
Period 3
Period 4
Period 5
Period 6
Period 7
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
Rb Sr Y Zr Nb Mo Tc Ru Rh Pd Ag Cd In Sn Sb Te I Xe
Cs Ba La Hf Ta W Re Os Ir Pt Au Hg Tl Pb Bi Po At Rn
Fr Ra Ac Rf Db Sg Bh Hs Mt Ds Rg
Ce Pr Nd Pm Sm Eu Gd Tb Dy Ho Er Tm Yb Lu
Th Pa U Np Pu Am Cm Bk Cf Es Fm Md No Lr

NAME Key PER ____ DUE DATE 2019 MAIL BOX ____

ATOMS and THE PERIODIC TABLE

?Why decimal if { 1 Proton = 1 AMU / 1 Neutron = 1 AMU

Theorems

8	← Atomic #
O	← Symbol
Oxygen	← name
15.999	← Atomic mass

Atomic number equals the number of protons (+) or electrons (−) (if neutral)

Atomic mass equals the number of protons + neutrons

AMU - Atomic mass units

Isotopes

Neutrons = ? Neutron Count = (Atomic mass (rounded)) − (Proton #)

8	30	3
O	Zn	Li
Oxygen	Zinc	Lithium
15.999	65.39	6.941
Atomic # = 8	Atomic # = 30	Atomic # = 3
Atomic Mass = 15.9 (16)	Atomic Mass = 65.39 (65)	Atomic Mass = 6.941 (7)
# of Protons = 8	# of Protons = 30	# of Protons = 3
# of Neutrons = 8	# of Neutrons = 35	# of Neutrons = 4
# of Electrons = 8	# of Electrons = 30	# of Electrons = 3

Round

14	5	35
Si	B	Br
Silicon	Boron	Bromine
28.086	10.81	79.904
Atomic # = 14 (28)	Atomic # = 5 (11)	Atomic # = 35 (80)
Atomic Mass = 28.086	Atomic Mass = 10.81	Atomic Mass = 79.904
# of Protons = 14	# of Protons = 5	# of Protons = 35
# of Neutrons = 14	# of Neutrons = 6	# of Neutrons = 45
# of Electrons = 14	# of Electrons = 5	# of Electrons = 35

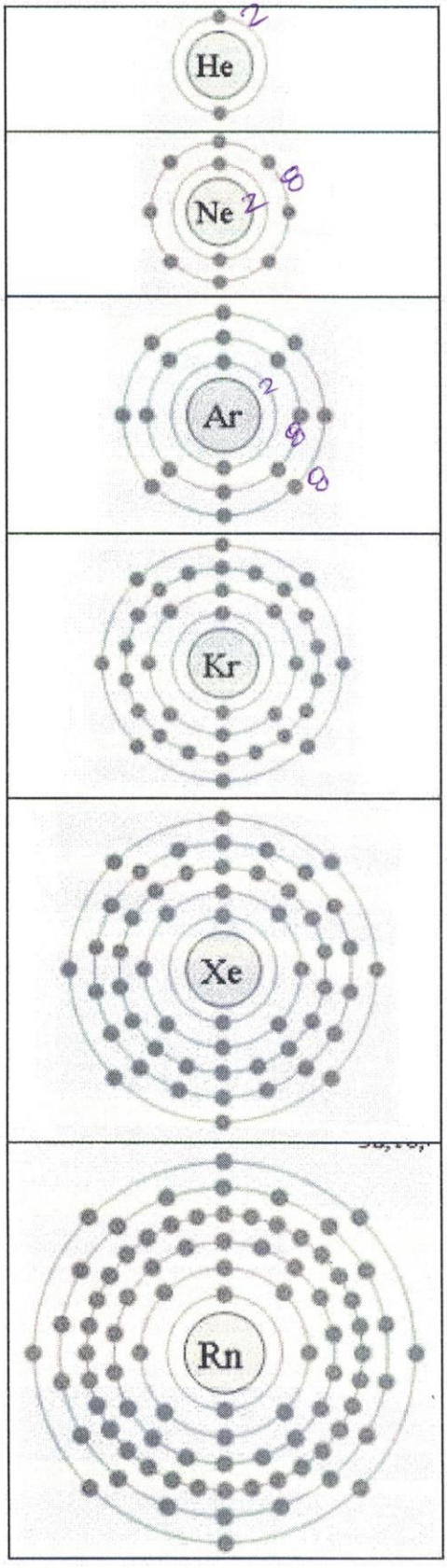
16 S Sulfur 32.06	53 I Iodine 126.905	25 Mn Manganese 54.938
Atomic # = 16	Atomic # = 53	Atomic # = 25
Atomic Mass = 32.06	Atomic Mass = 126.9	Atomic Mass = 54.938
# of Protons = 16	# of Protons = 53	# of Protons = 25
# of Neutrons = 16	# of Neutrons = 74	# of Neutrons = 30
# of Electrons = 16	# of Electrons = 53	# of Electrons = 25

12 Mg Magnesium 24.305	18 Ar Argon 39.948	19 K Potassium 39.098
Atomic # = 12	Atomic # = 18	Atomic # = 19
Atomic Mass = 24.3	Atomic Mass = 39.9	Atomic Mass = 39.09
# of Protons = 12	# of Protons = 18	# of Protons = 19
# of Neutrons = 12	# of Neutrons = 22	# of Neutrons = 20
# of Electrons = 12	# of Electrons = 18	# of Electrons = 19

79 Au Gold 196.967	1 H Hydrogen 1.008	9 F Fluorine 18.998
Atomic # = 79	Atomic # = 1	Atomic # = 9
Atomic Mass = 196.967	Atomic Mass = 1.008	Atomic Mass = 18.99
# of Protons = 17	# of Protons = 1	# of Protons = 9
# of Neutrons = 118	# of Neutrons = Ø	# of Neutrons = 10
# of Electrons = 79	# of Electrons = 1	# of Electrons = 9

Noble gas, any of the seven chemical elements that make up Group 18 (VIIIa) of the periodic table. The elements are helium (He), neon (Ne), argon (Ar), krypton (Kr), xenon (Xe), radon (Rn), and oganesson (Og). The **noble gases** are colorless, odorless, tasteless, nonflammable **gases**.

Count and record the electrons in each of the separate electron shells around these Noble Gases.



2

2 8

2 8 8

Group 8 or 18

The Noble Gases provide the electron shell counts moving across the Periodic Table

2 8 18 8

Krypton - not only does it hurt Superman it also tells you the electron fill order when building a Bohr model as you look across the 4th Period on Periodic Table

2 8 18 18 8

Electron fill order for the 5th Period on Periodic Table

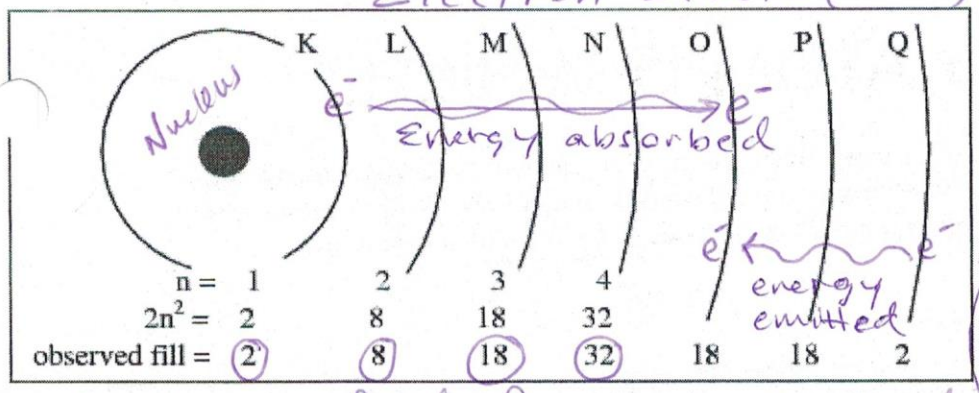
2 8 18 32 18 8

Compare class data. Do you notice any particular trends?

Shell K - 1st - 2 | Shell L - 2nd - 8 e⁻

Shell M - 3rd - 18 e⁻

Electron Levels (shells)



Shells are filled from inside → outward

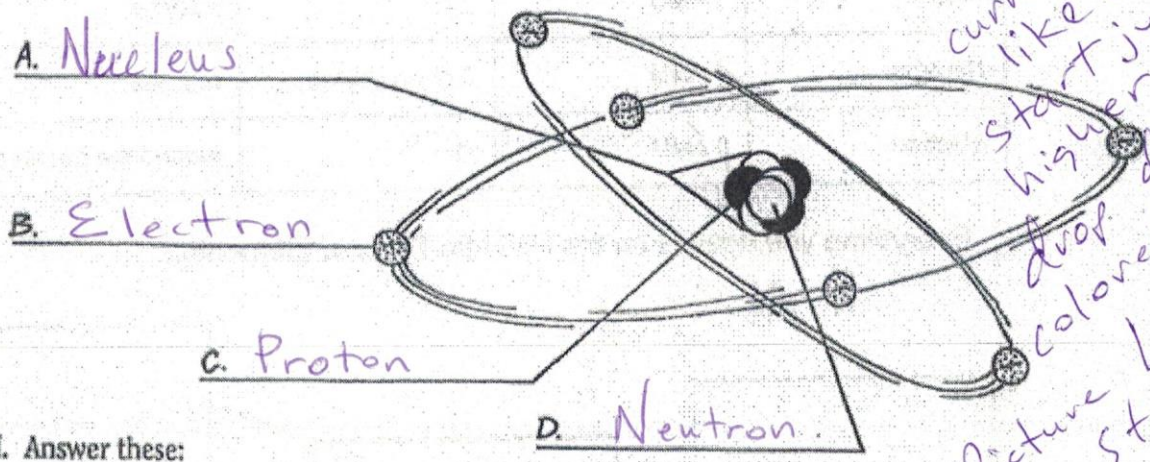
Electrons jump from shell to shell.

Atoms absorb energy → e⁻ jump higher

(Atoms release (emit light) energy → e⁻ drop down toward nucleus)

A Greek philosopher called Democritus, who lived over 2000 years ago, taught people that all things were made of grains which could not be divided. He called these grains *atoms* because in Greek *atom* means *indivisible*. Today, *atom* is the common name for the tiny particles of matter that cannot be further divided (and still be the same substance). If you could look inside an atom, you'd find that it looks like a miniature solar system, with something in the center and other things orbiting around it.

I. Label the parts of this atom (nucleus, protons, electrons, neutrons).



Send an electrical current through a gas like Neon & e⁻ start jumping to higher shells then drop down emit colored light.

Picture Los Vegas Strip

II. Answer these:

neutron 1. the part of the atom that carries no electric charge

proton 2. the part of the atom that carries a positive charge

electron 3. the part of the atom that carries a negative charge

two 4. the number of electrons that can be held in the first orbit (closest to the nucleus)

eight 5. the number of electrons that can be held in the second orbit

eighteen 6. the number of electrons that can be held in the third orbit

p+ & e⁻ 7. there are the same number of these two particles in an atom

proton 8. the atomic number is the same as the number of these particles

Which Atom is it Investigation? Reviewing basic Bohr Model's of some common elements.

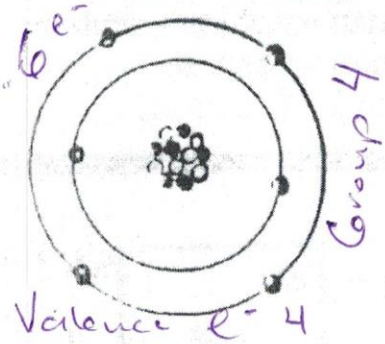
First count the number of electrons and/or protons (darker dots) around each nucleus.

Second utilize a Periodic Table and correctly identify the atom by element. **Write down Group Number in box too.**

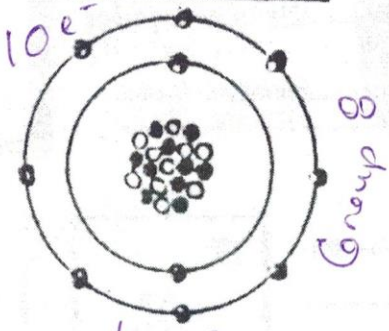
Note the number electron's in each shell.

What number is typically in the first electron shell? 2 What is the exception? Hydrogen

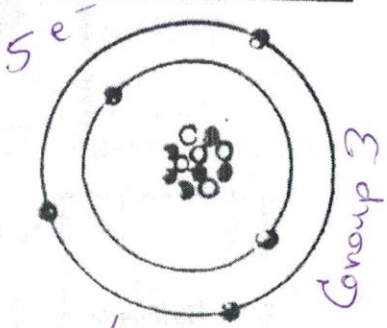
A. Carbon



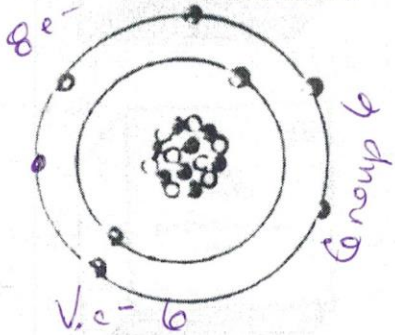
B. Neon



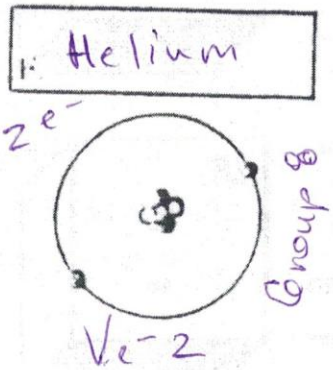
C. Boron



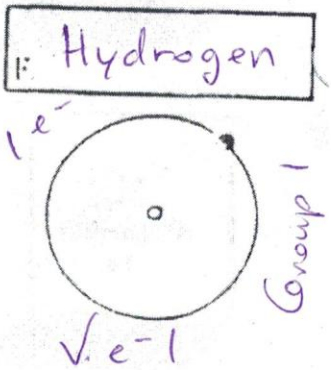
D. Oxygen



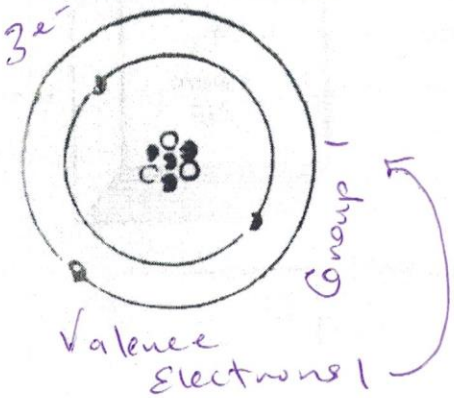
E. Helium



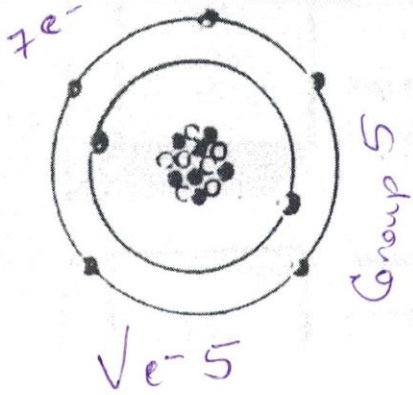
F. Hydrogen



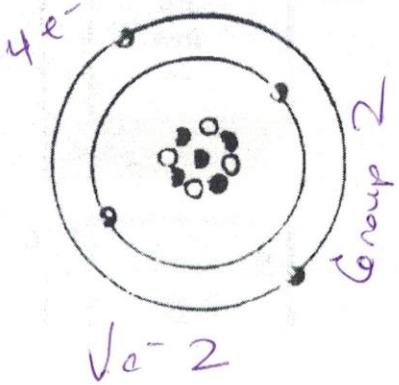
G. Lithium



H. Nitrogen



I. Beryllium



Count the Valence Electrons in each shell. What do they correspond with? What does the Group number match?

Valence E⁻ equal Group # ← **WRITE**
from the Periodic Table

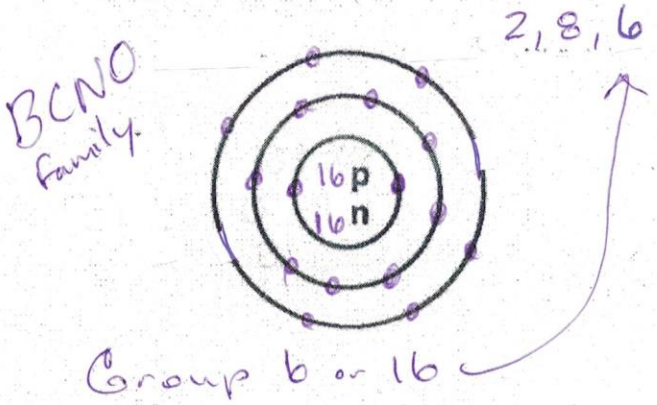
Atomic Structure

2 8 8 18

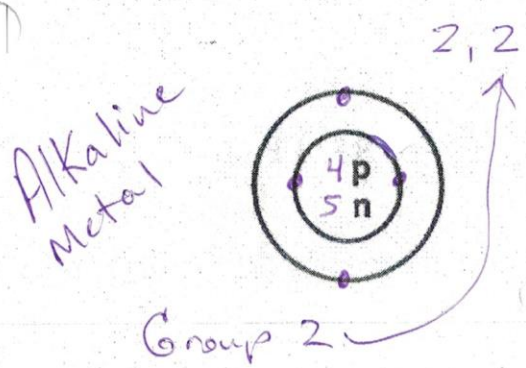
Use the information provided for each element to complete the diagrams. Draw the electrons in their proper shells, and place the correct numbers in the nucleus to indicate the number of protons and the number of neutrons.

Na

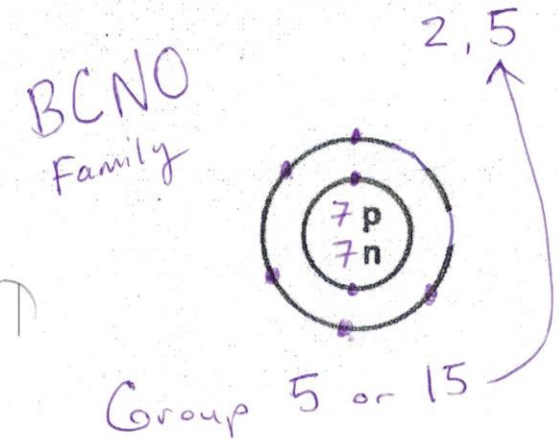
1. Sulfur: atomic number 16
   atomic mass 32



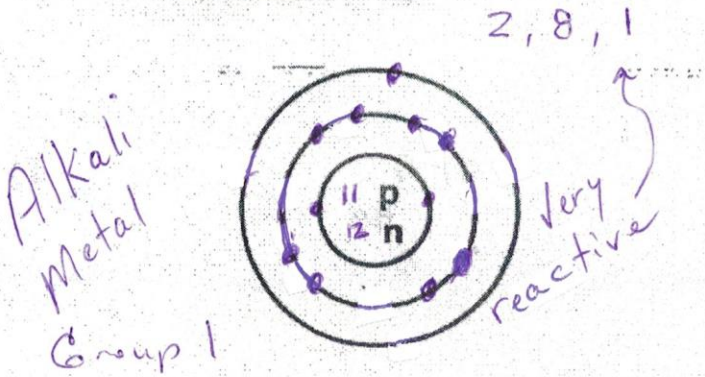
2. Beryllium: atomic number 4
   atomic mass 9



3. Nitrogen: atomic number 7
   atomic mass 14



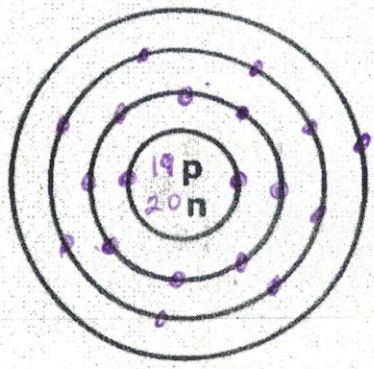
4. Sodium: atomic number 11
   atomic mass 23



5. Potassium: atomic number 19
   atomic mass 39

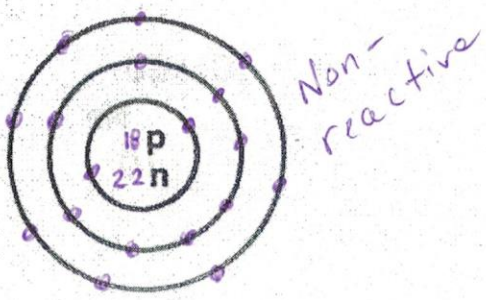
K

2 = (n-1)
8 = (n-2)
8 = (n-3)
1 = (n-4)



6. Argon: atomic number 18
   atomic mass 40

Noble Gas
(complete valence shell)

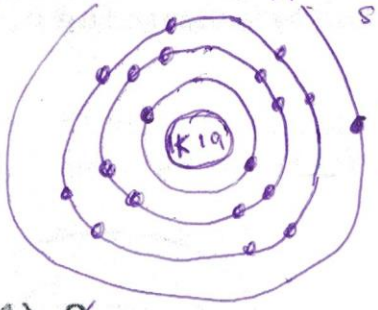


Constructing Bohr Diagrams

Utilize the Atomic Number of each of the following to construct Bohr Diagrams of the following elements. Find Atomic # on the bottom of each symbol. Recall the number electrons that are typically found in each shell K, L, M, N – 1st 2nd 3rd 4th (2,8,18,32) or (2,8,8,18). Then sketch models with proper number of electron shells and electron counts.

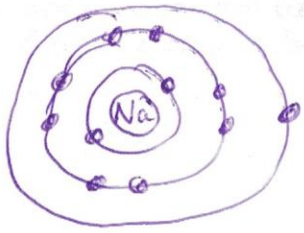
1) ~~39~~ ← Atomic Mass
K ← Group 1
19 ← Atomic #

4th Period see krypton for shell #

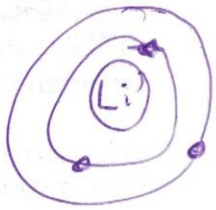


Alkali metal 1 Valence e⁻

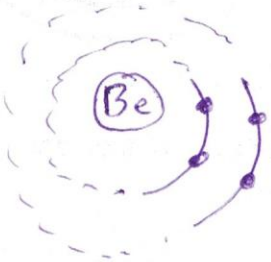
2) 23
Na ← Group 1
11



3) 7
Li ← Group 1
3

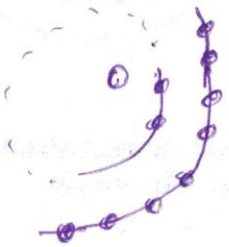


4) ~~9~~
Be ← Group 2
4 ← # of electrons

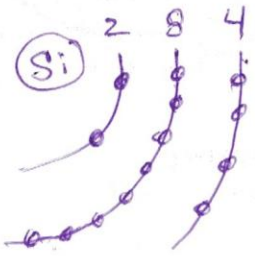


5) 14
N ← Group 5
7

6) 16
O ← Group 6
8



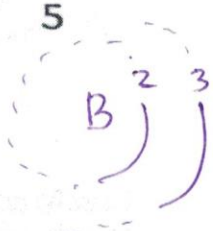
7) 28
Si ← Group 4
14



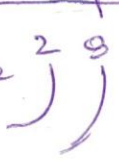
8) 4
He ← Group 8
2

Helium is an exception to rule like hydrogen

9) 11
B ← Group 3
5

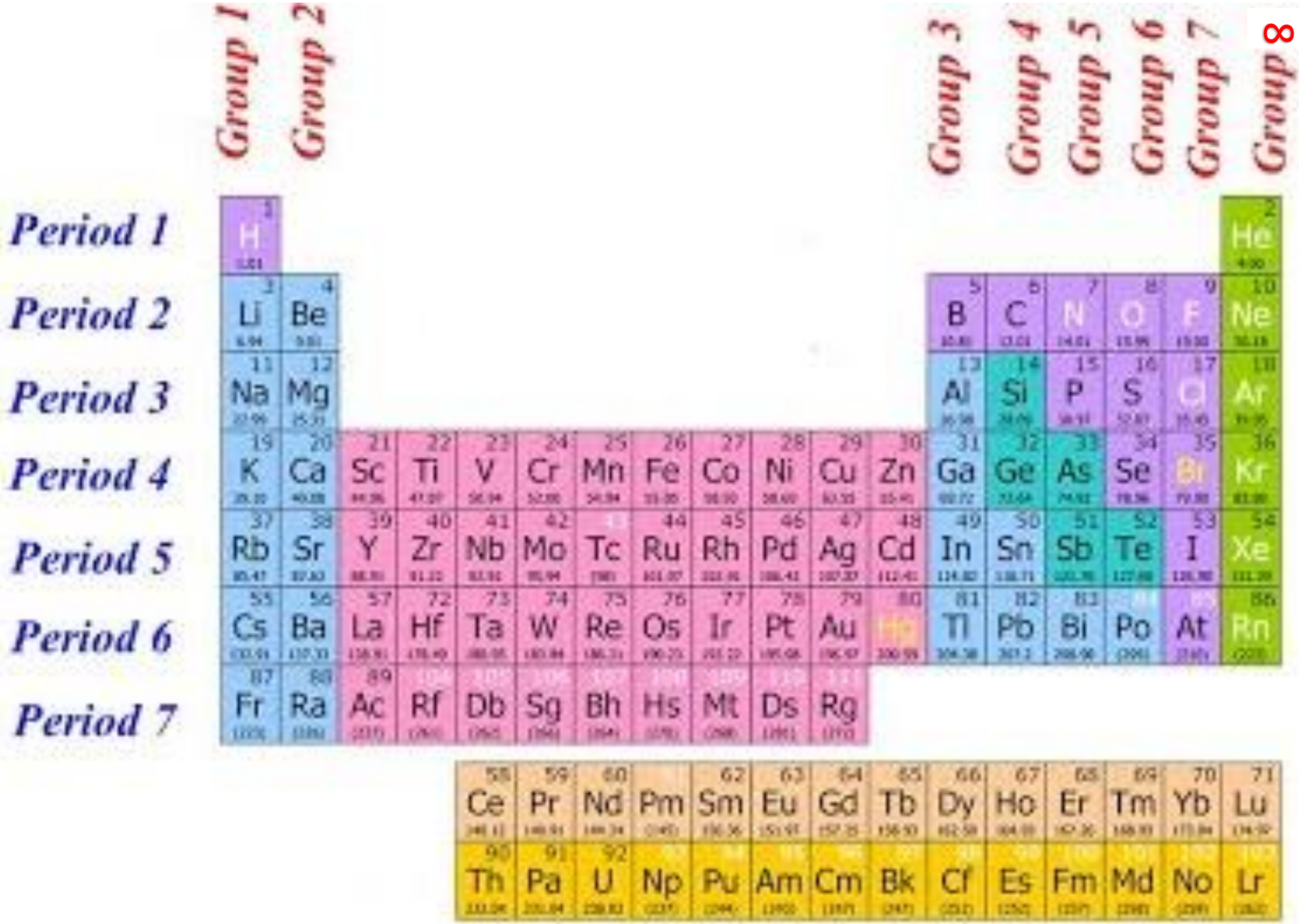


10) 20
Ne ← Group 8
10



Notes:

- Noble Gases - tells you number of shells by Period
- Groups: tells you number of Valence Electrons


Group 1
Group 2
Group 3
Group 4
Group 5
Group 6
Group 7
Group 8
Period 1
Period 2
Period 3
Period 4
Period 5
Period 6
Period 7
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
Rb
Sr
Y
Zr
Nb
Mo
Tc
Ru
Rh
Pd
Ag
Cd
In
Sn
Sb
Te
I
Xe
Cs
Ba
La
Hf
Ta
W
Re
Os
Ir
Pt
Au
Hg
Tl
Pb
Bi
Po
At
Rn
Fr
Ra
Ac
Rf
Db
Sg
Bh
Hs
Mt
Ds
Rg
Ce
Pr
Nd
Pm
Sm
Eu
Gd
Tb
Dy
Ho
Er
Tm
Yb
Lu
Th
Pa
U
Np
Pu
Am
Cm
Bk
Cf
Es
Fm
Md
No
Lr