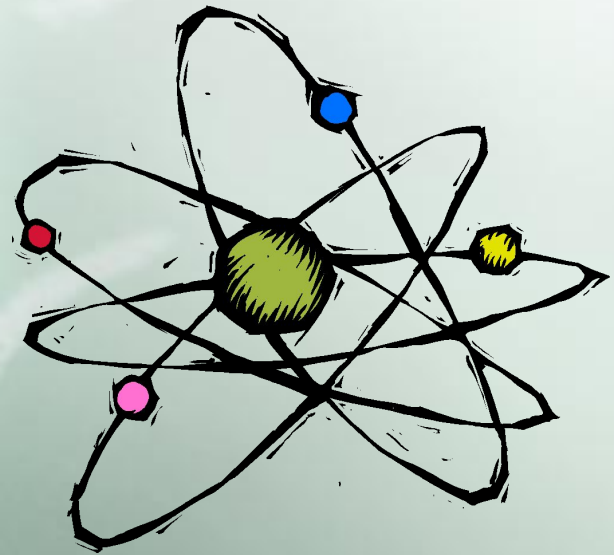


# Elements & Atoms

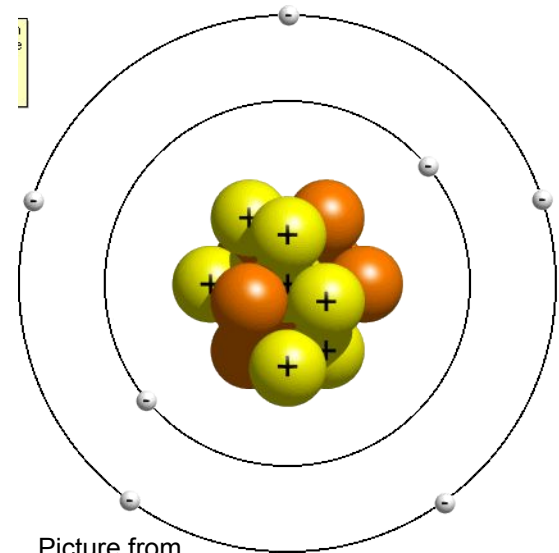


# An atom refresher

- **Matter** is anything that takes up space and has mass.
- All matter is made of atoms
- Atoms are the building blocks of matter, sort of how bricks are the building blocks of houses.

# An atom refresher

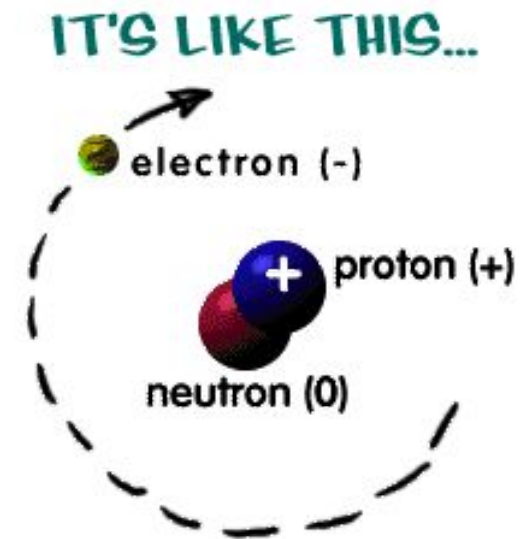
- An atom has three parts:
- **Proton** = positive
- **Neutron** = no charge
- **Electron** = negative
- The proton & neutron are found in the center of the atom, a place called the **nucleus**.
- The electrons orbit the nucleus.



Picture from  
[http://education.jlab.org/qa/atom\\_model\\_03.gif](http://education.jlab.org/qa/atom_model_03.gif)

# What are elements?

- Elements are the alphabet to the language of molecules.
- To make molecules, you must have elements.
- Elements are made of atoms. While the atoms may have different weights and organization, they are all built in the same way.



Information & picture from Chem4kids at  
[http://www.chem4kids.com/files/atom\\_structure.html](http://www.chem4kids.com/files/atom_structure.html)

Created by G.Baker

[www.thesciencequeen.net](http://www.thesciencequeen.net)

Atoms always have as many electrons as protons.  
Atoms usually have about as many neutrons as protons.

Hydrogen



**1 proton**  
**1 electron**  
**0 neutrons**

Helium



**2 protons**  
**2 electrons**  
**2 neutrons**

Carbon



**6 protons**  
**6 electrons**  
**6 neutrons**

Adding a proton makes a new kind of atom!  
Adding a neutron makes an isotope of that atom,  
a heavier version of that atom!

Graphic from <http://education.jlab.org/atomtour/fact2.html>

Created by G.Baker

[www.thesciencequeen.net](http://www.thesciencequeen.net)

# More about Elements..

- **Elements** are the building blocks of all matter.
- The periodic table is a list of all of the elements that can build matter. It's a little like the alphabet of chemistry.
- The periodic table tells us several things...



# Periodic Table

## Atomic Number:

Number of protons and it is also the number of electrons in an atom of an element.



## Element's Symbol:

An abbreviation for the element.



## Elements Name



## Atomic Mass/Weight:

Number of protons + neutrons.



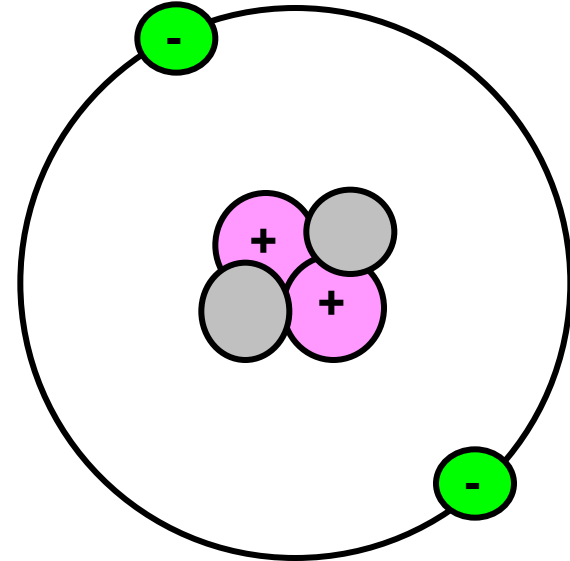
8
O
Oxygen
16

# Atom Models

- There are two models of the atoms we will be using in class.
- Bohr Model
- Lewis Dot Structure

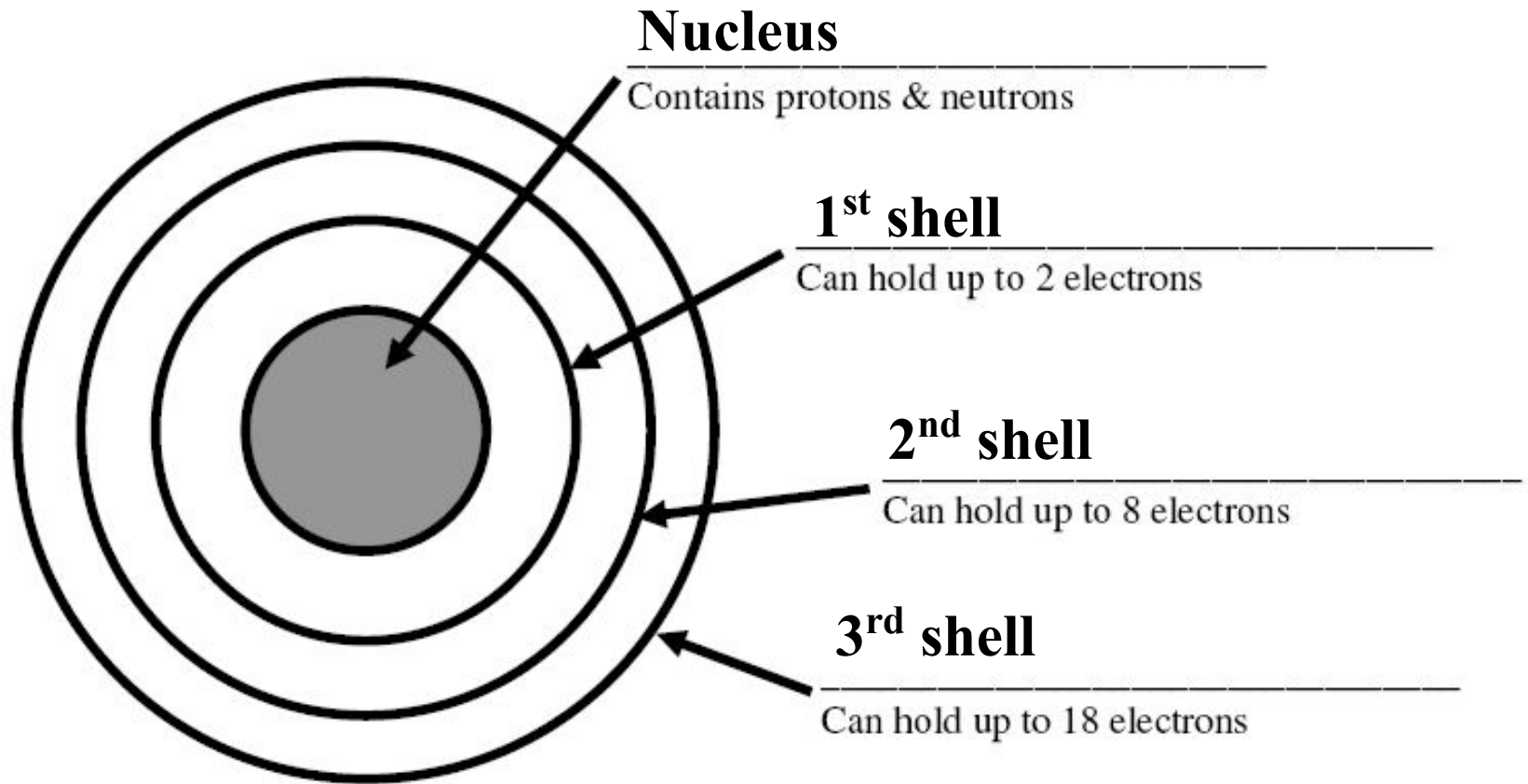
# Bohr Model

- The Bohr Model shows all of the particles in the atom.
  - In the center is circles. Each circle represents a single neutron or proton. Protons should have a plus or P written on them. Neutrons should be blank or have an N.
  - In a circle around the nucleus are the electrons. Electrons should have a minus sign or an e.
- Created by G.Baker



# Electrons have special rules....

- You can't just shove all of the electrons into the first orbit of an electron.
- Electrons live in something called **shells or energy levels**.
- Only so many can be in any certain shell.



Adapted from <http://www.sciencespot.net/Media/atomsfam.pdf>

Created by G.Baker

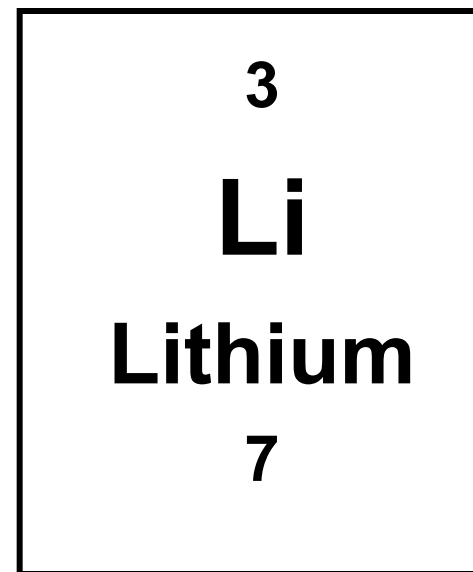
[www.thesciencequeen.net](http://www.thesciencequeen.net)

# Electrons have special rules....

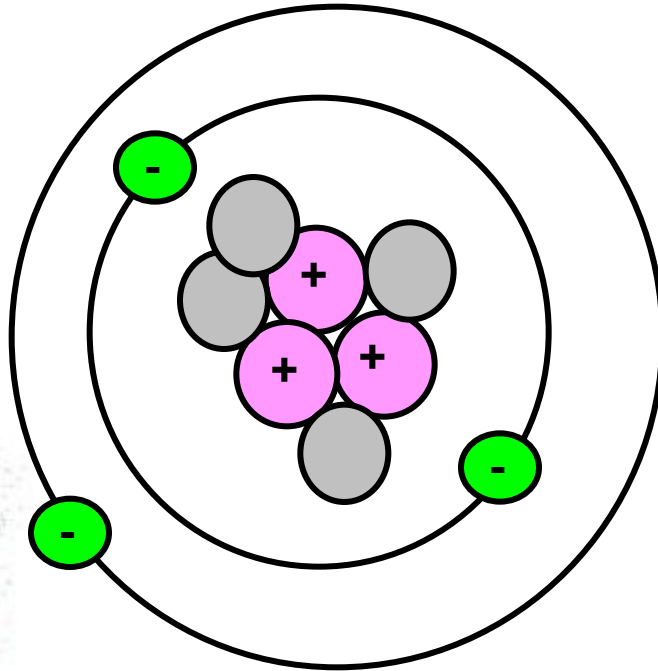
- You can't just shove all of the electrons into the first orbit of an electron.
- Electrons live in something called shells or energy levels.
- Only so many can be in any certain shell.
- The electrons in the outer most shell of any element are called **valance electrons**.

# So let's try it....

- How to draw a Lithium atom
- First, look at the Periodic Table
- Second, determine the number of protons (Look @ the atomic number)
- Then determine the number of neutrons (Atomic mass – atomic number)
- Then determine the number of electrons (Look @ the atomic number)

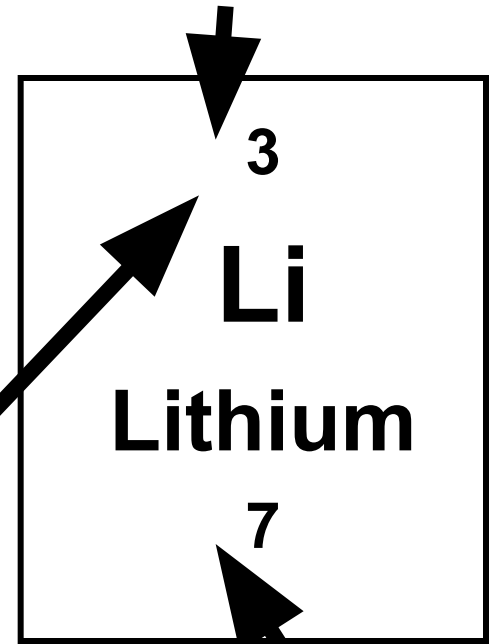


**So let's try it....**



**Electrons = 3**  
**2 in the 1<sup>st</sup> shell, 1 in the 2<sup>nd</sup> shell**

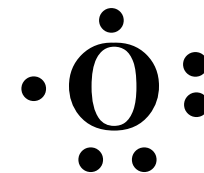
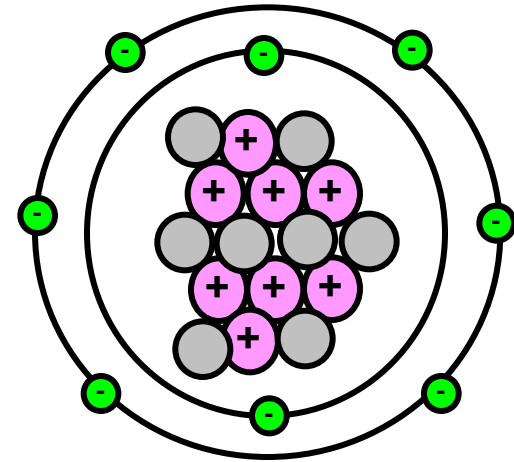
**Protons = 3**



**Neutrons = 4**  
**(7-3=4)**

# Lewis Dot Structure

- The Lewis Dot Structure is a bit different from the Bohr model.
- It only shows the element symbol and its outer most electron shell.



# How to...

1. Write the symbol.
2. Start on the right hand side, working your way clockwise around the symbol.
3. Try Lithium

# Your activity...

- Using the beans (Lentils are electrons, Lima Beans are protons, and kidney beans are neutrons), create a Bohr model , and then a Lewis dot structure model of each of the first 20 elements. After you have created each model, draw each model on your chart.
- Hint to make a chart, use a burrito fold, then fold the top down by 1 ½ inches. Unfold, you now have 3 columns. Label the columns: element, Bohr model, Lewis Dot.