

## What Are Atoms?

All the matter in the universe is composed of basic building blocks called atoms.

An atom is the smallest indivisible and indestructable unit of matter.



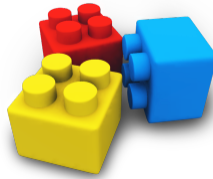
Atoms are really small!

If you made a tiny dot with the tip of a sharp graphite pencil, that little dot would have about four billion billion carbon atoms in it.

## What Are Atoms?

Atoms are the basic unit of matter.

How are atoms like legos? Discuss with your classmates?



## What Are Atoms?

Atoms are the basic units of matter and indivisible.

You can break the lego house into individual lego pieces, but individual legos cannot be broken down further and still be functional legos.

Similarly, matter can be broken down into atoms, but atoms cannot be further divided and maintain their properties and function.



## Atoms and Elements

Like the lego house below is made up of different types of legos, matter is made up of different types of atoms called elements.



Amazingly, all of the matter in the Universe is made up of only around 100 different elements in various combinations.

Almost 99% of the human body is made up of just 6 different elements!

## Atoms and Elements

Elements are pure substances made from only one type of atom.



Gold



Silver



Graphite  
(Carbon)



Neon Gas

Remember, one tiny dot  
of this contains about  
4 billion billion atoms of  
the element carbon.

## Atoms and Elements

Some pure substances, called compounds, are made up of combinations of different types of elements.

Water



Elements:  
hydrogen &  
oxygen

Salt



Elements:  
sodium &  
chlorine

Chalk



Elements:  
calcium,  
carbon &  
oxygen

Bronze



Elements:  
copper & tin

1 Which of the following would NOT be classified as matter?

A air

B water

C water vapor

D wood

E all are examples of matter

Answer

2 All matter is made up of individual units called \_\_\_\_\_.

A compounds

B atoms

C pure substances

Answer



3 \_\_\_\_\_ are pure substances made up of one specific type of \_\_\_\_\_.

- A atoms, element
- B atoms, compound
- C elements, compound
- D elements, atom

Answer

## The Makeup of Atoms

Atoms are made up of 3 parts, known as subatomic particles .  
Each particle has a different *charge*.

Proton - Positive Charge

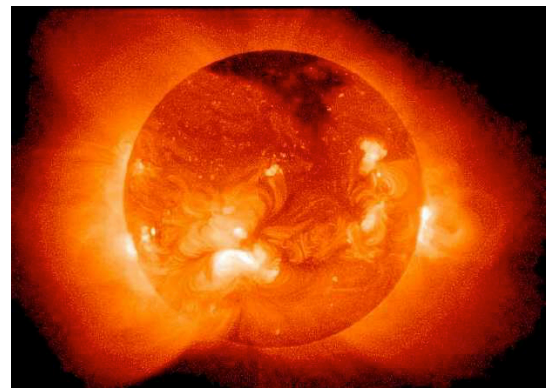
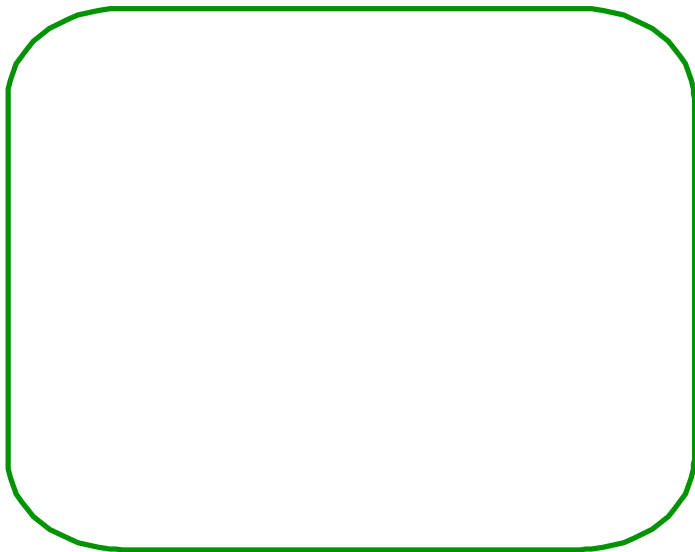
Neutron - Neutral Charge

Electron - Negative Charge

Memory tricks have been underlined for you!

## How Did We Get the First Atoms?

We have talked about the Big Bang in years past as well. Take a few minutes to review what you know about the Big Bang. Write down some ideas here.



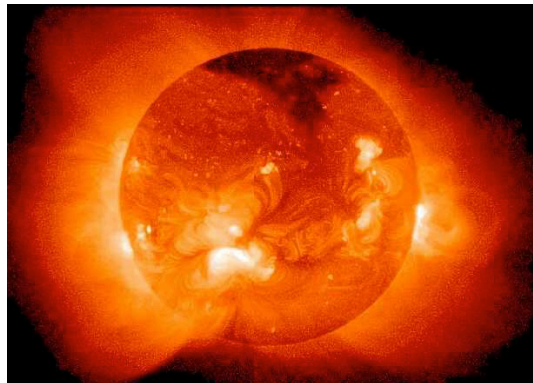
## How Did We Get the First Atoms?

When the **Big Bang** first happened, the universe was very hot.

(20,000,000,000,000,000,000,000,000\* times hotter than our Sun!)

\*That number is 20 *octillion*!

[Click here to learn more!](#)



After a few minutes, it cooled down to the point that **protons** and **neutrons** were able to join together.

## How Did We Get the First Atoms?

Soon after the Big Bang, these particles captured objects called electrons .  
*This is because opposite charges are attracted to each other.*

When this happened, the first two elements (and consequently the first atoms) were formed.

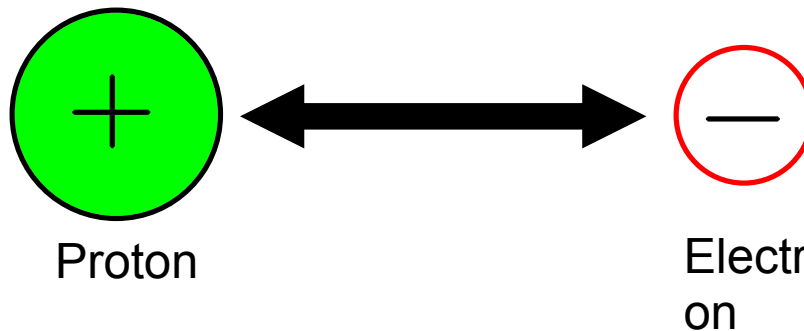
Does anyone have an idea what the first two elements formed were?

Hint: think about the periodic table.  
Move this box for the answer once you have your idea.

## Opposites Attract

Because you will need this information later, keep in mind this old phrase:

"Opposites Attract"

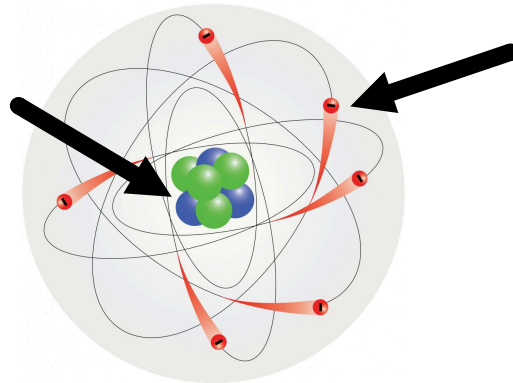


What this means is that, just like a magnet, the positive proton and the negative electron attract each other!

## How are Atoms Arranged?

We now know that an atom is made up of protons, neutrons, and electrons... but how are these 3 particles arranged in the atom?

The center of the atom is called the nucleus. Protons and neutrons are found there.

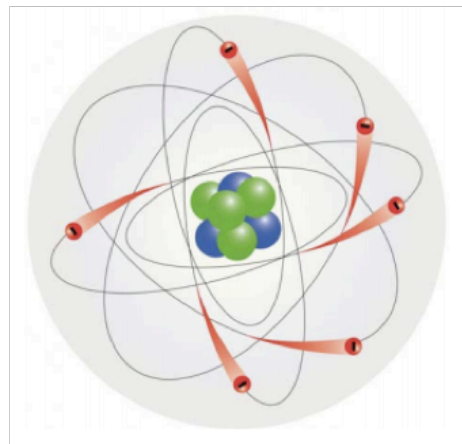
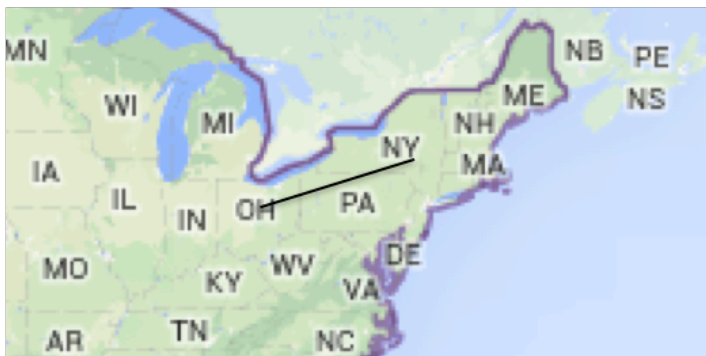


Electrons move around the nucleus in the electron shell .

The space between the nucleus and the electron shell is empty.

## Relative size of Atomic particles

Lets imagine an atom filled the distance from New York to Ohio.  
That is about 1030km.



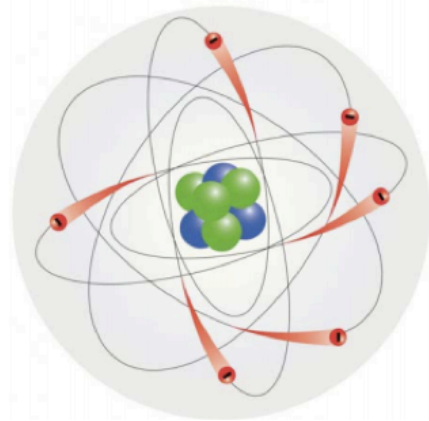
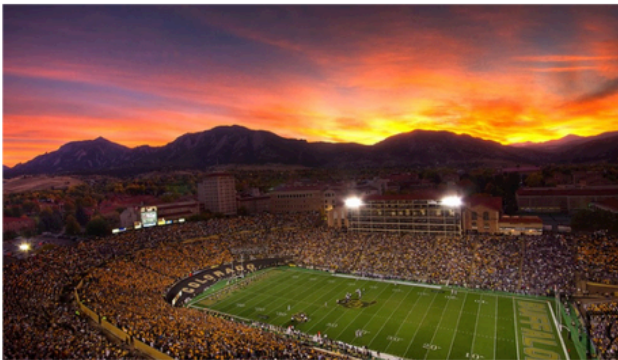


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## Relative size of Atomic particles

Lets imagine an atom filled the distance from New York to Ohio.  
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At this scale, the nucleus would only be about the length of a football field.  
A football field is only 100m.

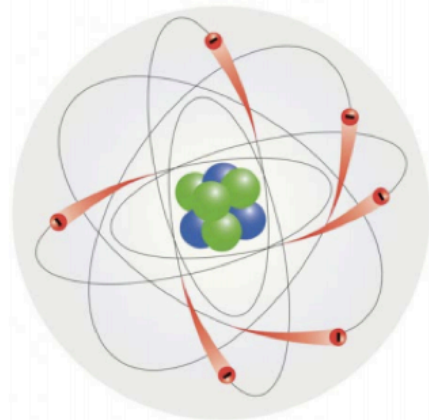


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A proton would be about the height of a three-story apartment building!  
That is about 9m.



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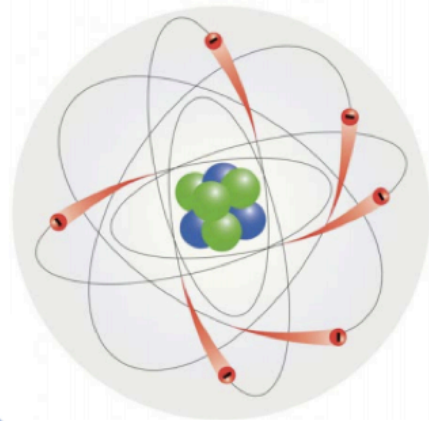
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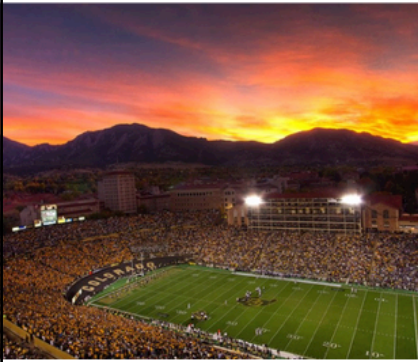
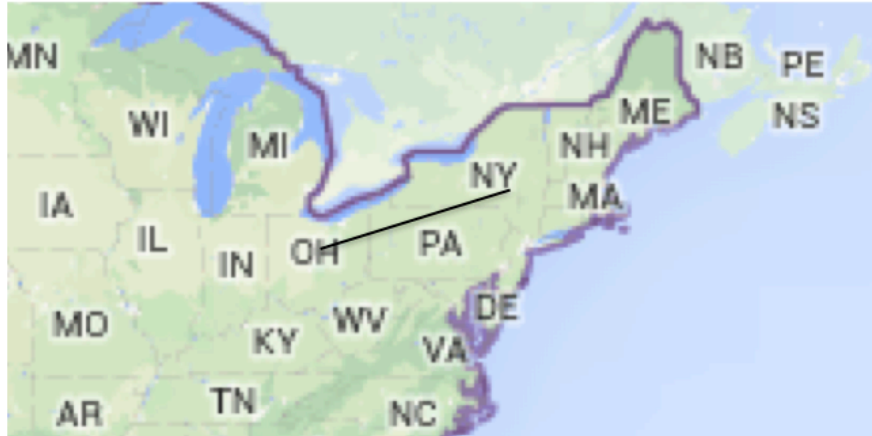
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A proton would be about the height of a three-story apartment building! That is about 9m.

And an electron would be about the width of a blueberry. A blueberry is only 1cm.





## Relative Size of Atomic Particles

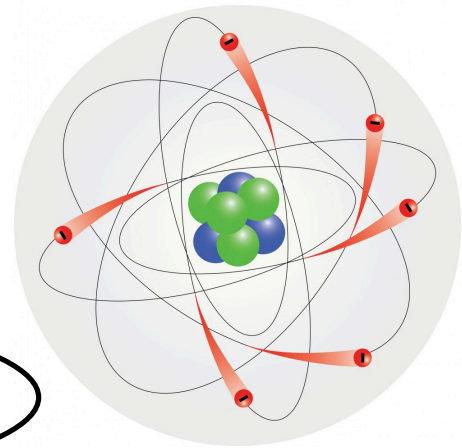
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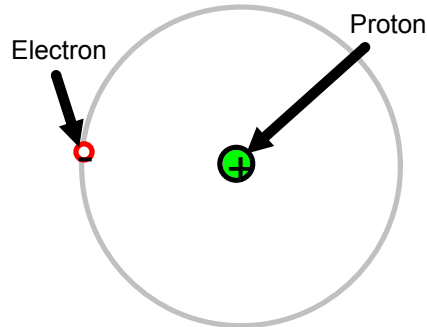
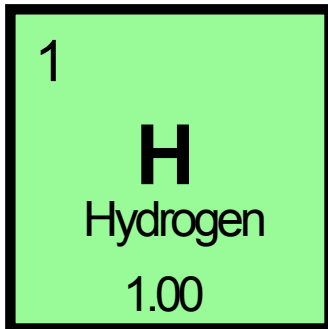
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What does that tell us about this drawing of an atom? Is it accurate?

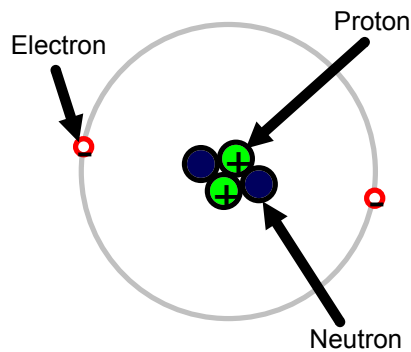
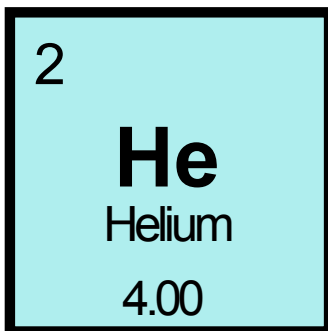


[Click here to watch a TedEd video on the size of an atom.](#)

## The First Two Elements



Hydrogen atom



Helium atom

More Info.

Pull the tab to the left for more information!

We will go into more detail about the elements when we talk about the Periodic Table.

4 Which subatomic particle has a neutral charge?

A Proton

B Neutron

C Electron

Answer

5 Which of the following subatomic particles are found in the nucleus of an atom?

- A Proton
- B Neutron
- C Electron
- D Both A and B

Answer



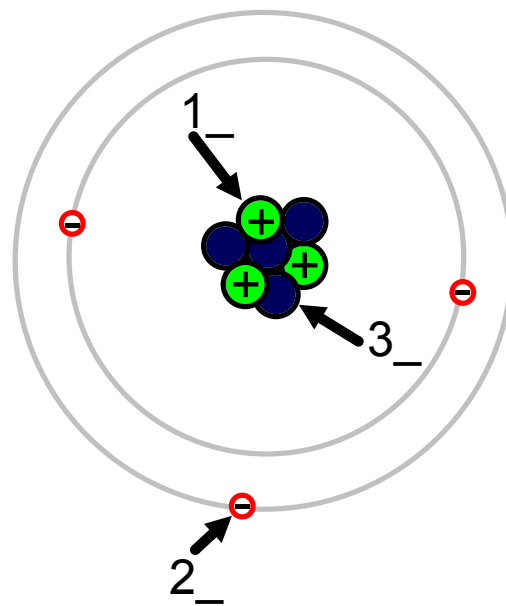
6 Label the parts of the atom.

A 1. Proton  
2. Electron  
3. Neutron

B 1. Electron  
2. Neutron  
3. Proton

C 1. Neutron  
2. Proton  
3. Electron

D 1. Electron  
2. Proton  
3. Neutron



Answer