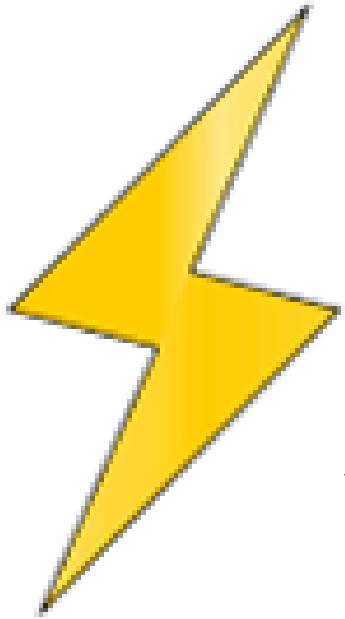
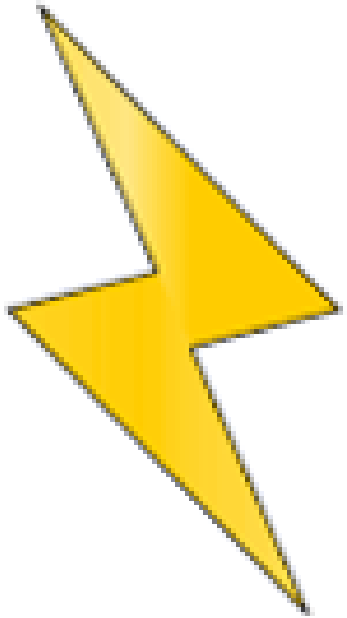
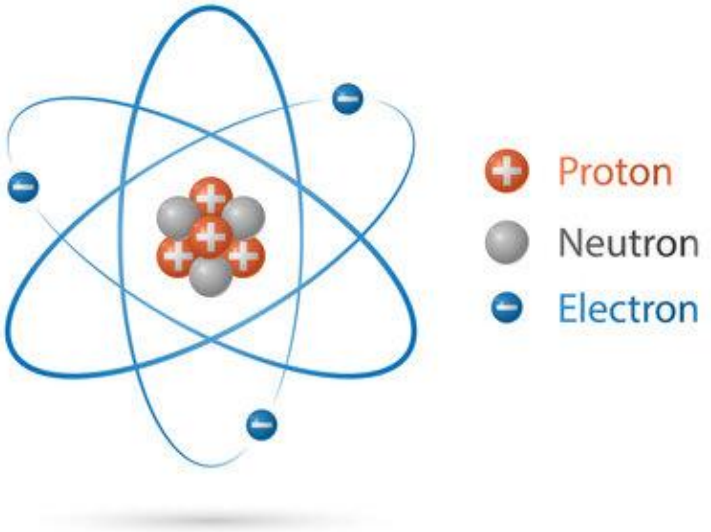


Intro to Electricity: Static and Charge



The atom:

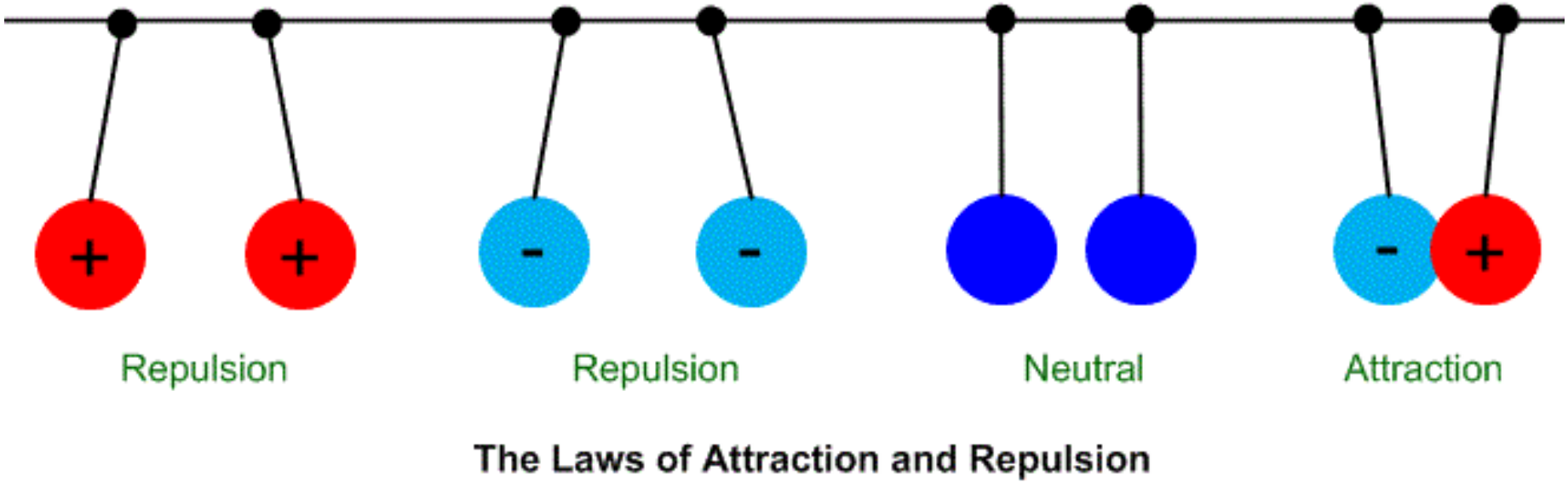
- _____ orbit the nucleus
- They have a _____ charge
- Electrons can _____ move around



Charge

- If an atom has a different number of protons and electrons, it has a charge
- Charged atoms are called ions
- If there are more electrons than protons, there is a _____
- If there are more protons than electrons, there is a _____
- If there are equal amounts of protons and electrons, there is a _____

Like charges repel, opposite charges attract



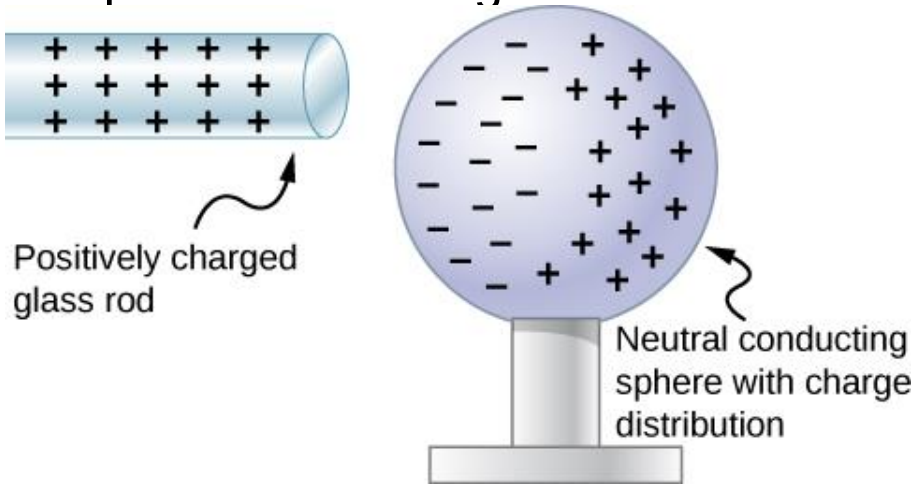
The Laws of Attraction and Repulsion

Static Electricity

- Static electricity is from the _____ of these charges when two objects touch each other
- For example, touching the door knob and getting shocked is from an imbalance of charges between your hand and the metal door knob
- Static means _____
- This is because compared to current electricity, the electrons don’t move as much
- They still do move however, just not as much

Induced Charge Separation

- If two neutral objects are brought together, **they aren't attracted or repelled**
- If a neutral object and a charged object touch, the **like** charges will _____ and the **opposite** will move _____ the charged object
- This creates a separation of charges and causes the neutral object to be attracted



Charging by Contact

- When two object of _____ **material** are rubbed together, electric charges can jump from one object to the other
- This is called _____
- After these two neutral objects separate, they will be charged
- _____
- To determine which is which, we can use the electrostatic series

- This is the Electrostatic series
- This goes from the least likely to gain electrons to the most
- To use this, pick 2 materials
- Whichever is lower will be negatively charged
- Whichever is higher will be positively charged
- Ex: Human hair and Balloon
    - Human hair is higher than the balloon so it will be positively charged while the balloon will be negatively

Table 1 Electrostatic Series

Material	Charge tendency
human skin	+ (weaker tendency to gain electrons)
rabbit fur	
acetate	
glass	
human hair	
nylon	
wool	
cat fur	
silk	
paper	
cotton	
wood	
amber	
rubber balloon	(stronger tendency to gain electrons)
vinyl	
polyester	
ebonite	−

Grounding

- _____ electrons in an object can be removed by grounding
- This is when we touch a _____ like the earth to release the excess electrons
- These large bodies can hold _____ electrons because they are so large
- If grounded, the object will lose electrons

Conductors and Insulators

- _____ have _____ bound electrons
  - This means electrons can travel through them easily
  - Examples: Metal (copper, silver, gold), water, graphite

- _____ have _____ bound electrons
  - They do not let electrons travel through them easily
  - Useful for us to protect us from electricity
  - Examples: Rubber, plastic, pure water

Electric Discharge

- When two objects with a charge imbalance are brought close together, they can have a transfer of electrons
- This _____ can cause a _____
- This is called _____
- This is what happens when you rub your feet on the carpet and touch a door knob
- The electrons from the door knob jump onto you

Lightning

- Lightning is a large scale _____ electric discharge
- This is due to a charge **imbalance between clouds and the ground**
- Lightning can travel **down or up or even between clouds**