

What is voltage?

Explained using a pressure analogy

This is an electron.

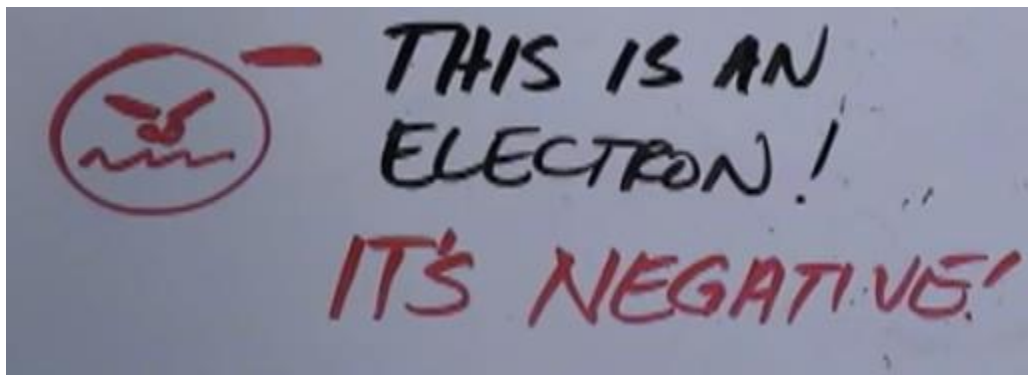


We know that an electron is the electrically negatively charged part that spins around the outside of an atom.

Electrons are what actually move through wires and what makes electricity work.

Think: Electron, electricity.

We like to think of electrons as negative because they have a negative attitude and a negative charge.

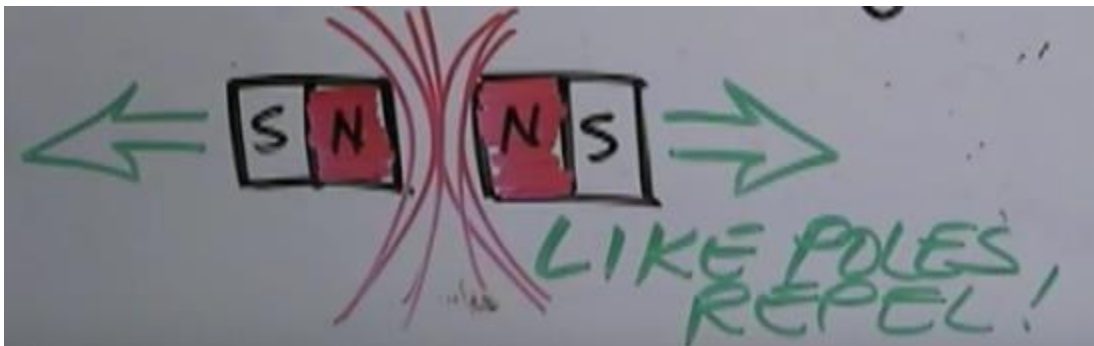


Hence, the grumpy face.

It also helps to think about magnets.

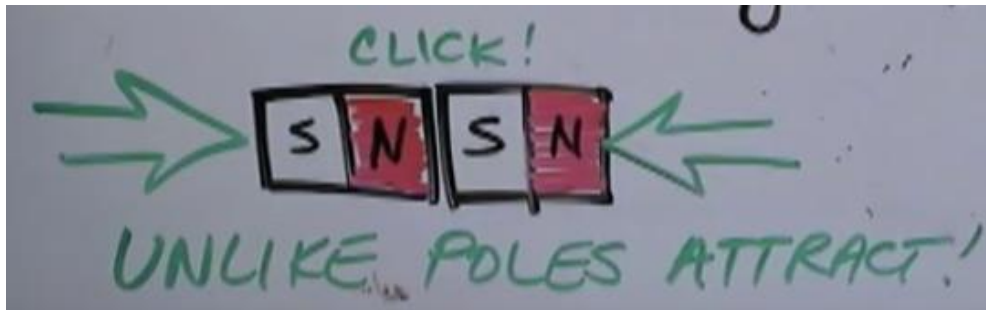
Everyone understands what a magnet is and how a magnet works.

If you take two magnets and you put the two north poles together then the magnets repel each other.



Like poles repel!

However, we all know that if you take magnets and you put them together with the north and south pole together or the south and north pole together, then they attract.



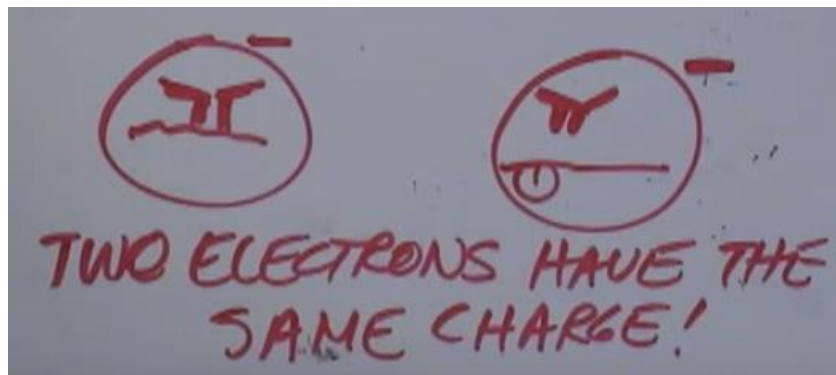
Unlike poles attract!

There's a force that actually pulls the magnets together.

This force is called magnetic force.

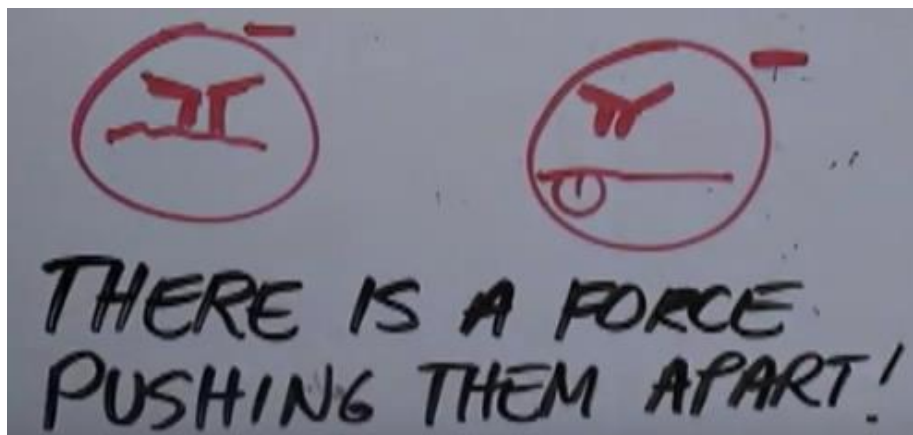
Like poles repel and unlike poles attract.

So let's take our electrons which both have negative charges.



If you put them together, they will repel because they have the same charge.

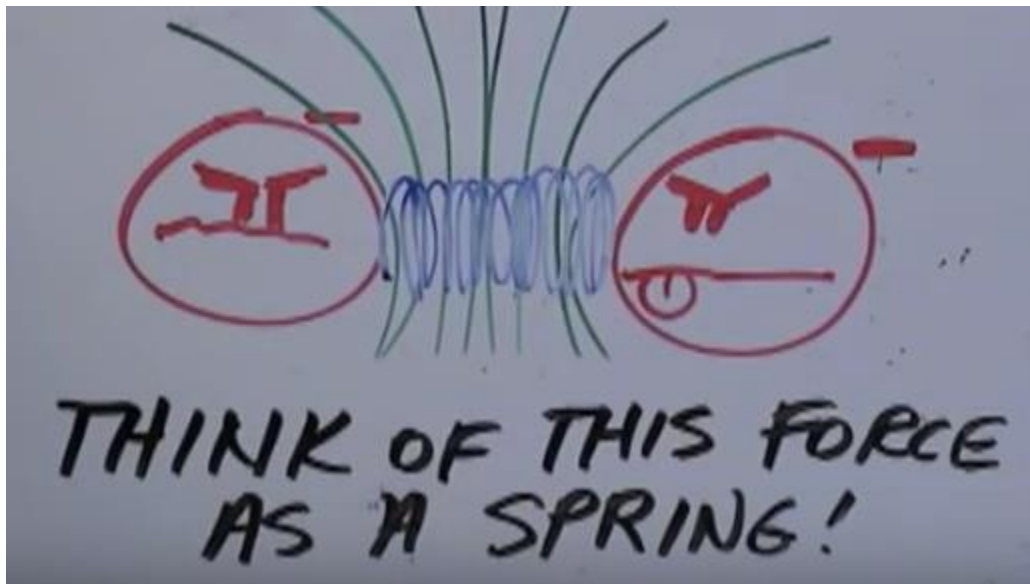
If you apply the magnet example, there is a force that's trying to push the electrons apart.



The force can be very powerful.

A strong force makes our components run, this makes electricity work.

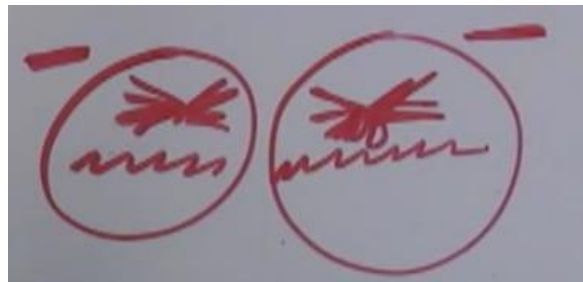
Visualize force as being a spring between two pool balls pushed together on a pool table.



What happens if you let go of the balls?

The balls are going to move apart because there is pressure in between them.

Now we will examine some more angry electrons.



These are angry because they are being forced closer together

When you push these guys (electrons) closer together, the pressure (force) between the guys (electrons) increases and this creates tension.

Electrical tension. High tension electricity.

PUSH THESE GUYS CLOSER
TOGETHER... AND IT
CREATES LOTS OF TENSION

The spring between these two pool balls is compressed more in this example.



In this analogy, higher compression means higher voltage!

So, why is this important?

This is important because voltage is what we measure.

Knowing how voltage works helps when you measure voltage so you understand what voltage is doing or not doing.

Put a bunch of these guys (electrons) together in a box and you have a battery.



So all of the guys (electrons) in here all have negative charges and are all trying really hard to get far away from each other.

These guys are under a lot of pressure!

This pressure is what makes everything happen.

You can't have flow without a difference in pressure.

So if we take the battery and we connect the battery into a circuit, the electrons will flow.

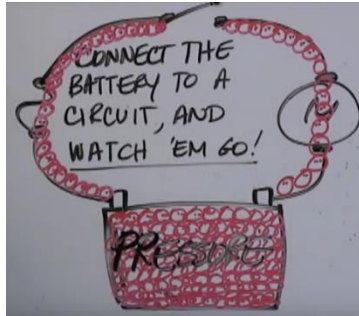
By the way the circuit is called a circuit because it is a circle.

The electrons do not move at the speed of light, but the effect is felt.

With the switch open , there will be charges to the left and charges to the right.

The polarity is difficult to explain but effectively electricity is waiting at the switch.

Sitting there, stable and not moving. This is called static voltage.



As soon as the switch closes, now things start to happen.

The electrons start moving really fast.



If you put a motor in the way, the moving electrons will work to create motion.

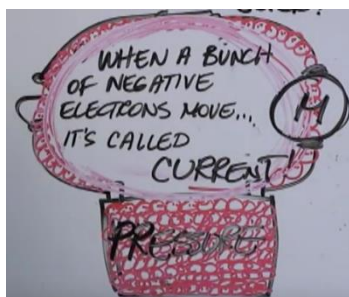
So the motor goes zoom!

What is current?

Remember,

A bunch of these negative guys (electrons) in a box sitting there waiting to go is called voltage.

So this makes its easy to understand what current is.



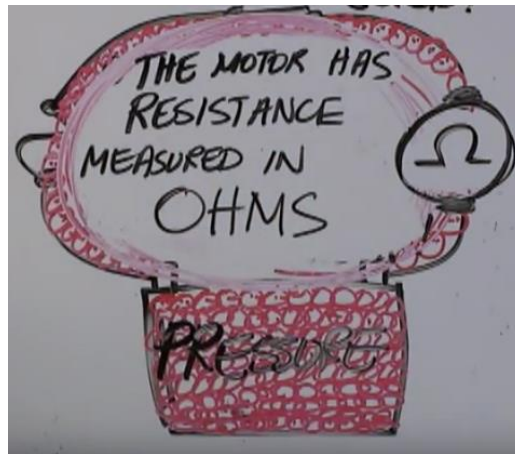
Current is the negative guys (electrons) moving and getting way from eachother in a circuit.

We use current to do work.

What is resistance?

Every load has resistance.

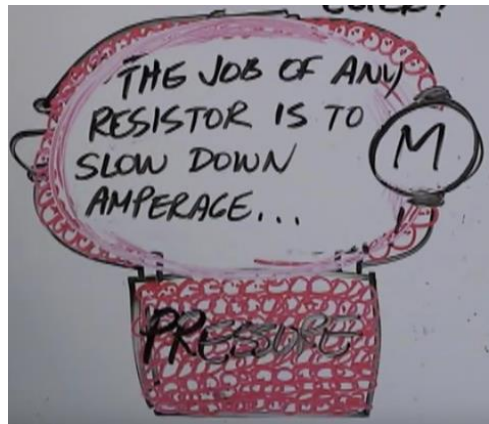
Lightbulbs, coils, resistors and the resistance is measured in ohm's.



Ohm's are named after George Simon Ohm.

So what's is the job of any resistor? What is resistance?

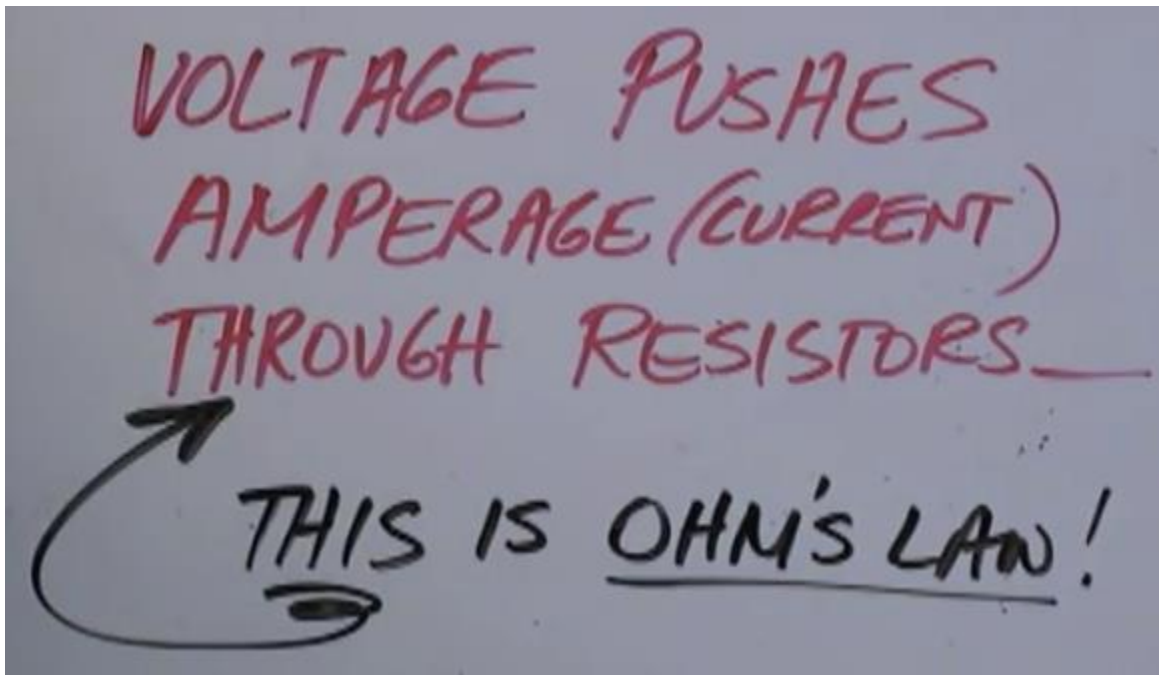
The simplest way to understand is resistance is that the job of resistance is to keep the fuse from blowing.



The reason that things don't blow when you turn things on is because the thing that you are turning on has resistance.



How do we summarize this analogy?



Voltage pushes amperage (current) through resistance!

This is Ohm's law.

Ohm's law is a concept.

Ohm's law is a principle.

Ohm's law is not math.



You can use math to demonstrate the concept of Ohm's law.

So...

Voltage, which is pressure, current and resistance work together to make our machines go.

