

# Electrical Energy



# Electricity -

When electrons quickly flow  
from atom to atom.

If the electrons do not flow, and build up in an object, it is called static electricity.



## STATIC ELECTRICITY

"Yeah, really funny... rub me on the carpet and then put me in the shipping box... You will pay for this!"



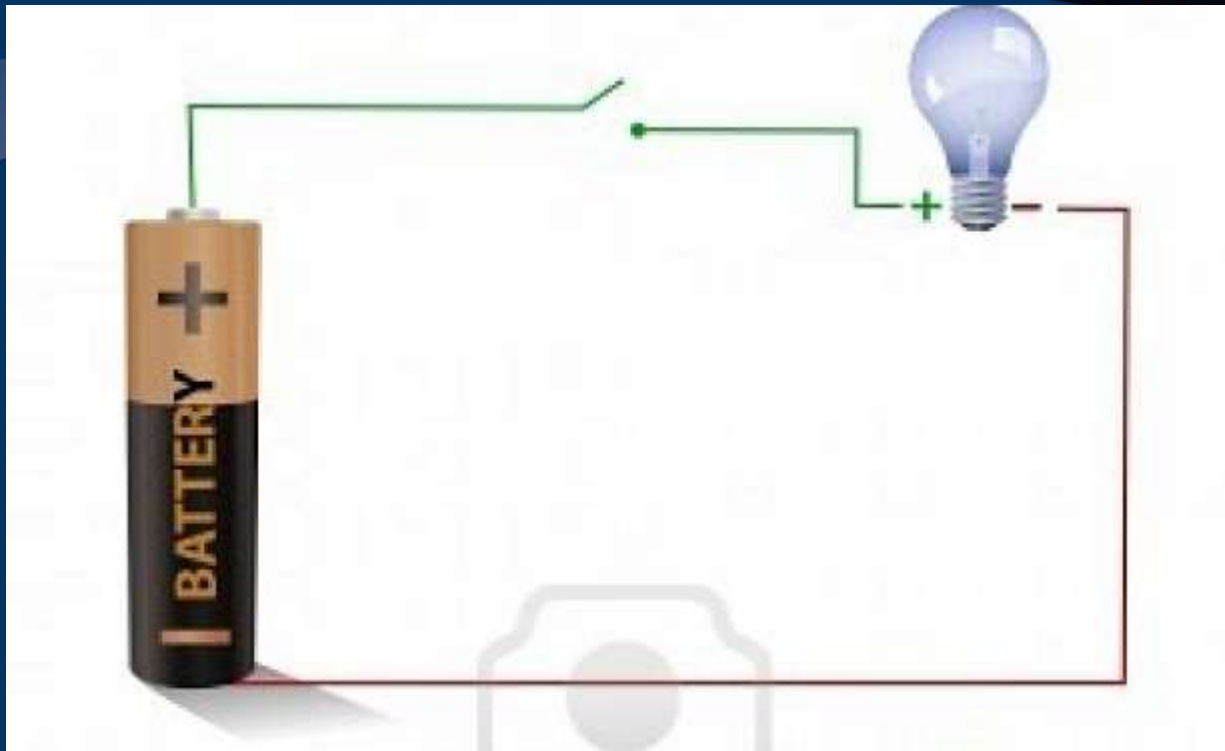
Circuit -

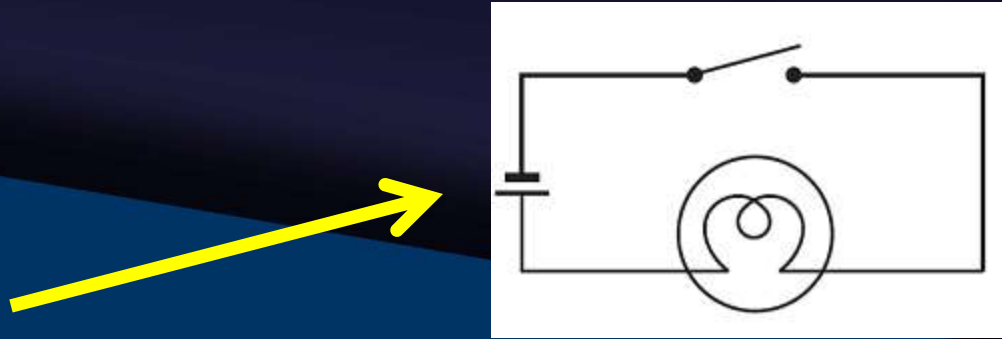
The path where electricity  
flows.



# Open Circuit -

A circuit where the flow of electricity stops.

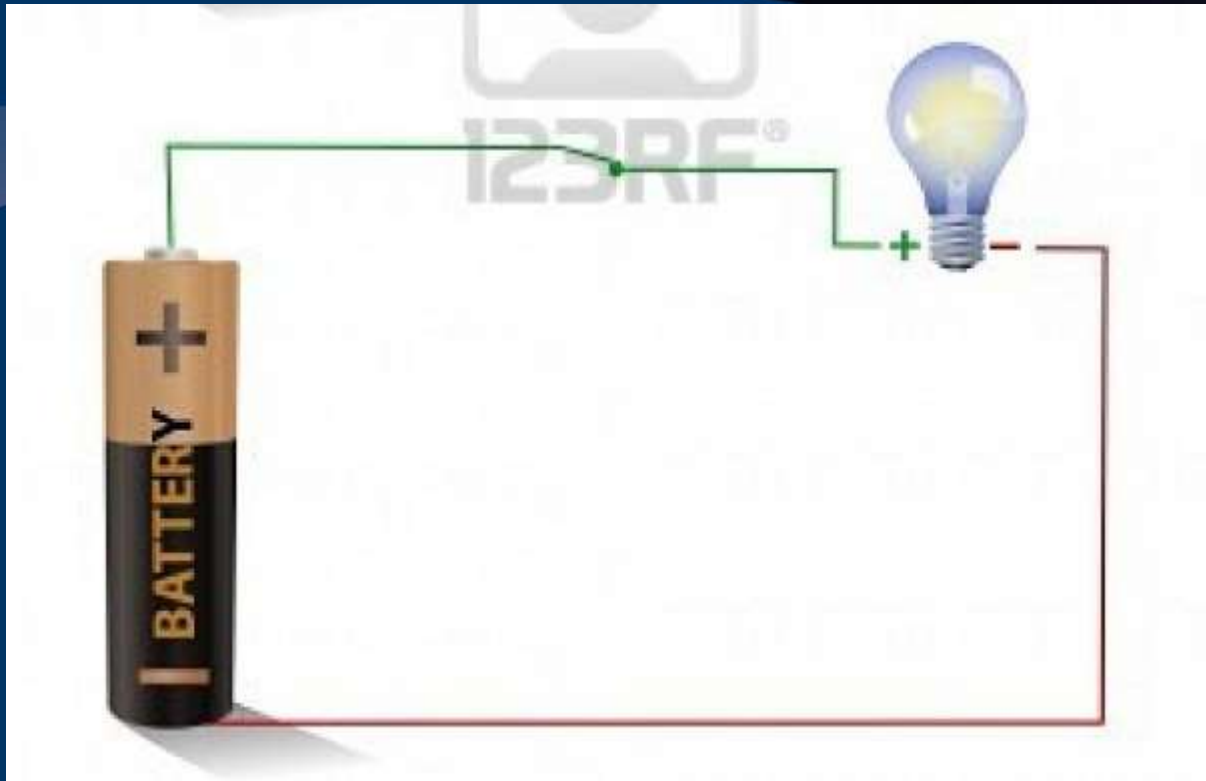


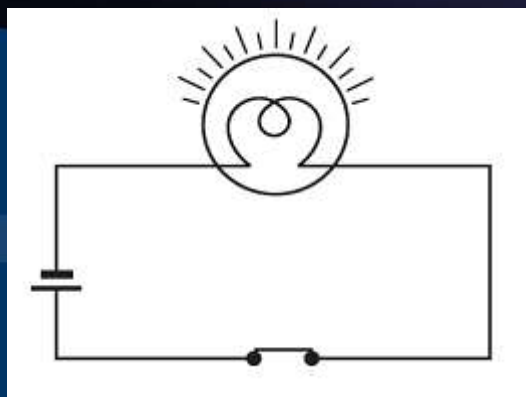


This is the symbol for a battery.

# Closed Circuit -

A circuit where the electricity can flow.





A switch allows a circuit to be open or closed. We use lots of switches in our houses.

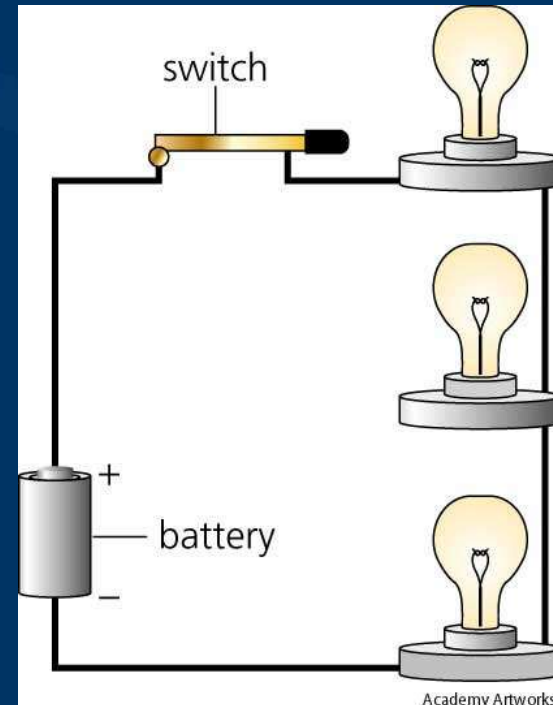
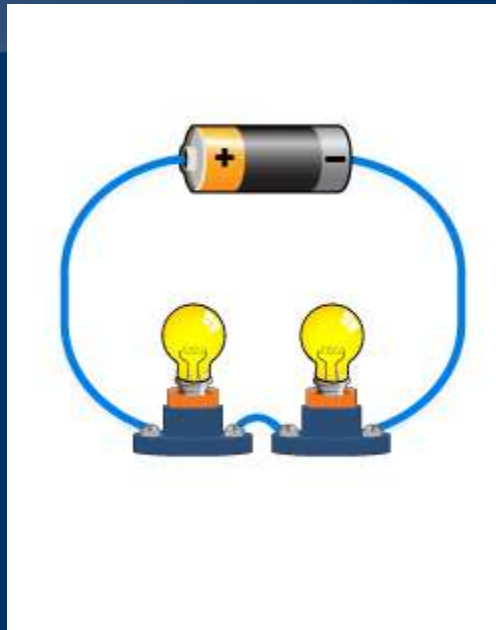




There are two types of  
circuits, series and  
parallel.

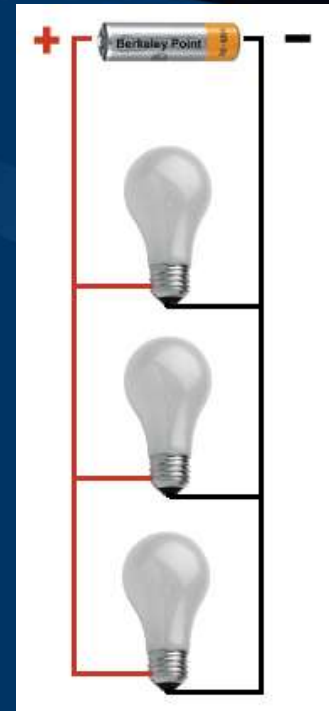
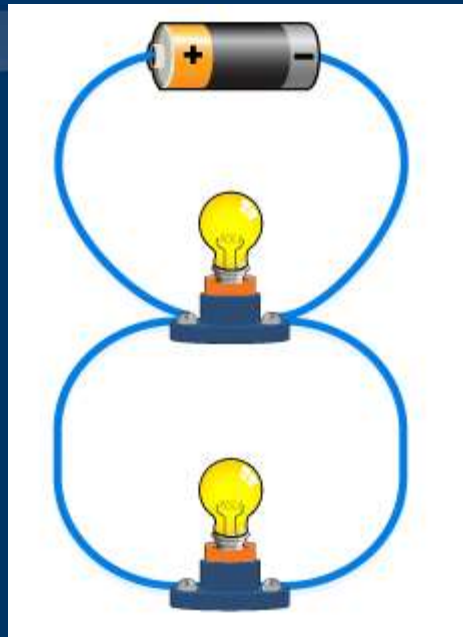
# 1. Series circuit -

A circuit where there is only one path for the current to flow.

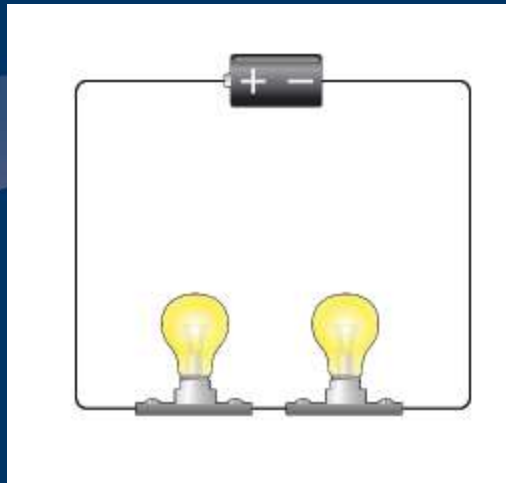


## 2. Parallel circuit -

A circuit where there is more than one path for the current to flow.

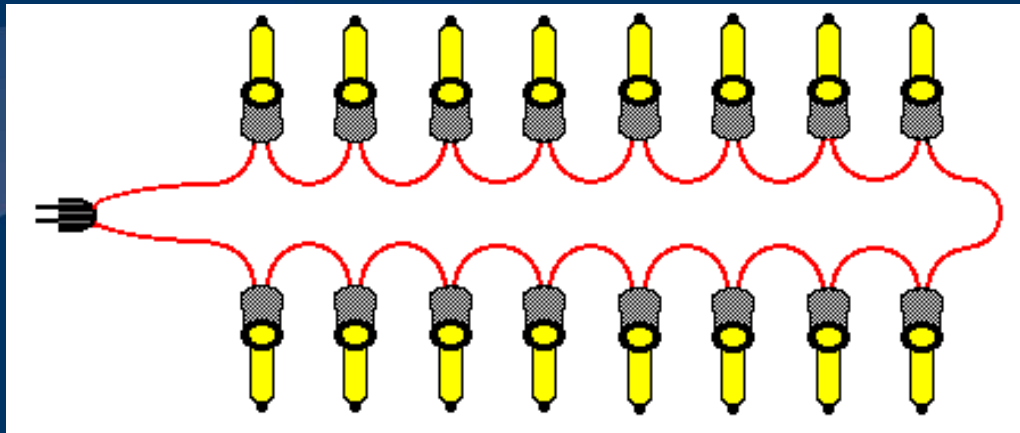


The problem with a series circuit is that, if the current flow gets stopped, the entire thing stops working.



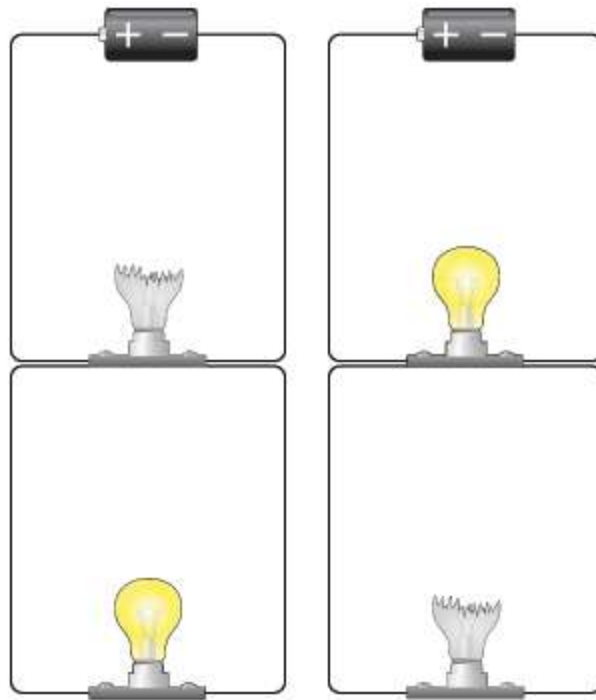


This is the way older Christmas lights were wired. When one bulb went out, the entire string went out. This made people very angry.

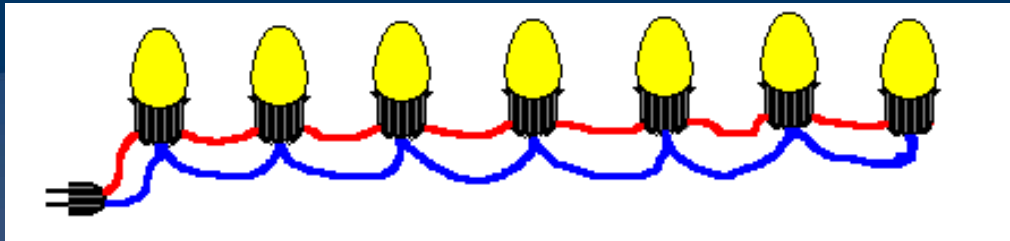




The good thing about a parallel circuit is that, if the current flow gets stopped at one point, it has another route to travel.



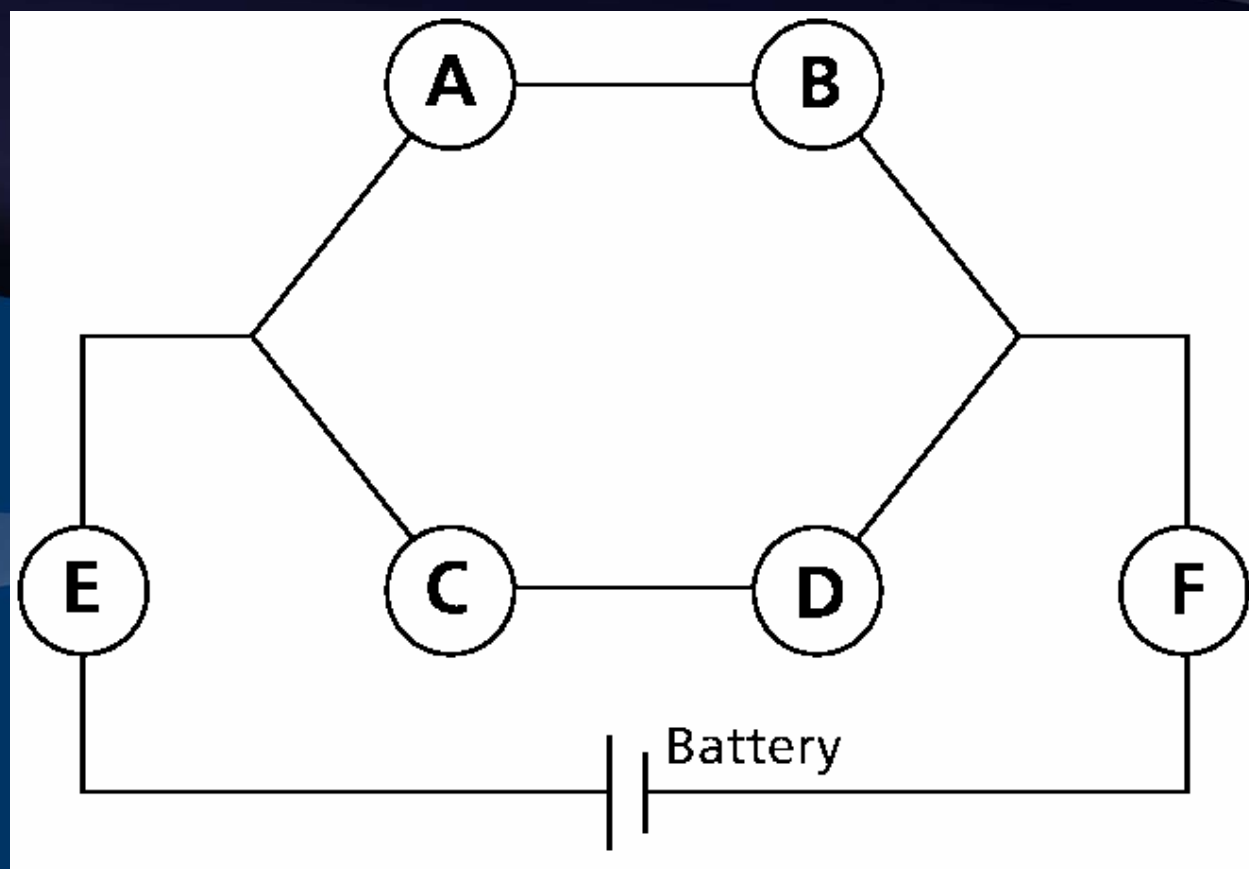
Newer Christmas lights are wired in parallel now, and that makes people happy.



Are the lights in your house wired in series or parallel? How do you know?

They are wired in parallel. If they weren't, every time a bulb went out, all of the lights in your house would go out. That would be really annoying.





# Voltage-

The amount of work needed to move an electric charge.

Voltage is measured with a voltmeter.





# Unit of voltage -

## Volts (V)

# The bigger the voltage, the more current is produced.



1.5 V



9 V



12 V



24 V



The F15 fighter jet needs 24 V to get started.

Let's talk about how the voltage changes when you wire batteries in either series or parallel.

When batteries are wired in series, the voltage of the batteries gets added together. So....



Three 1.5v batteries wired in series makes how many total volts?



4.5v. Things are wired like this to give them more power.

When batteries are wired in parallel, the voltage stays the same. So....

Three 1.5v batteries wired in parallel makes how many total volts?



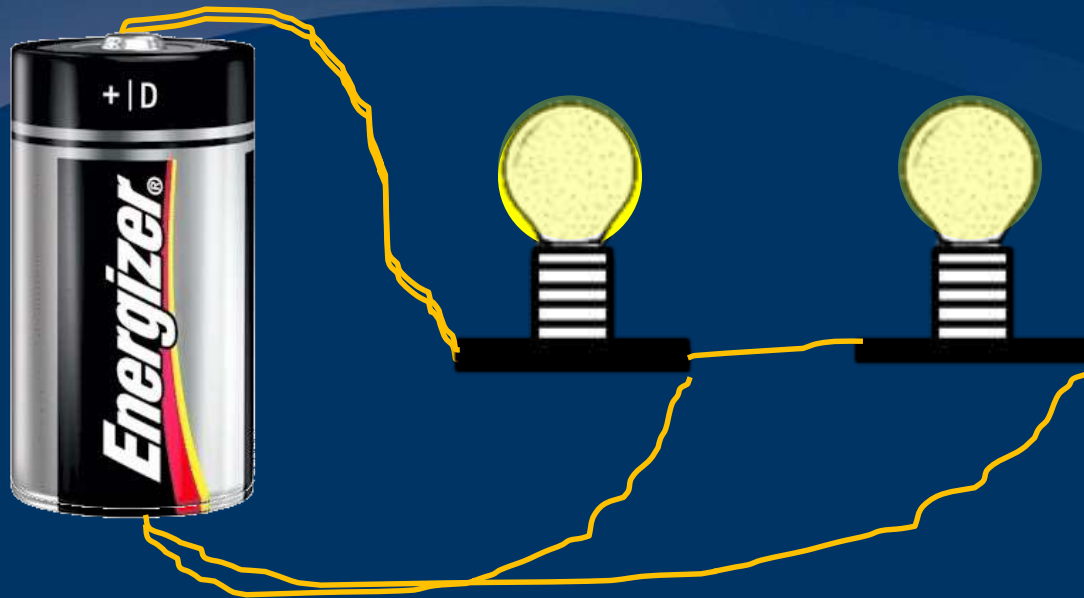
1.5v. Things are wired like this to make them last longer. (Three batteries instead of one.)

Let's talk about how the voltage changes when you wire bulbs in series or parallel.

When bulbs are wired in series, they all share the voltage. So, as each bulb gets added, the amount of current they get drops. The bulbs get dimmer. So....



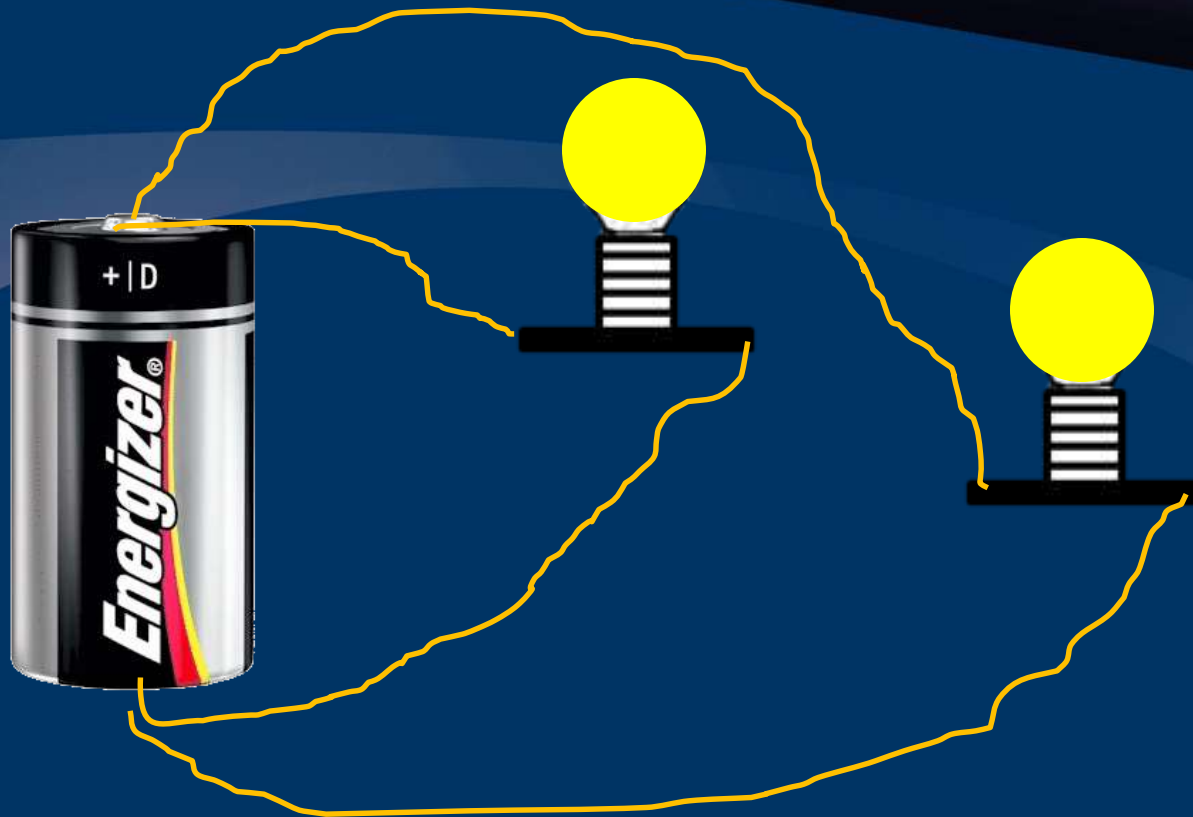
If another bulb gets added, they share the voltage and get dimmer.



When bulbs are wired in parallel, they all get the maximum voltage the battery has. So, as each bulb gets added, the amount of current they get stays the same.

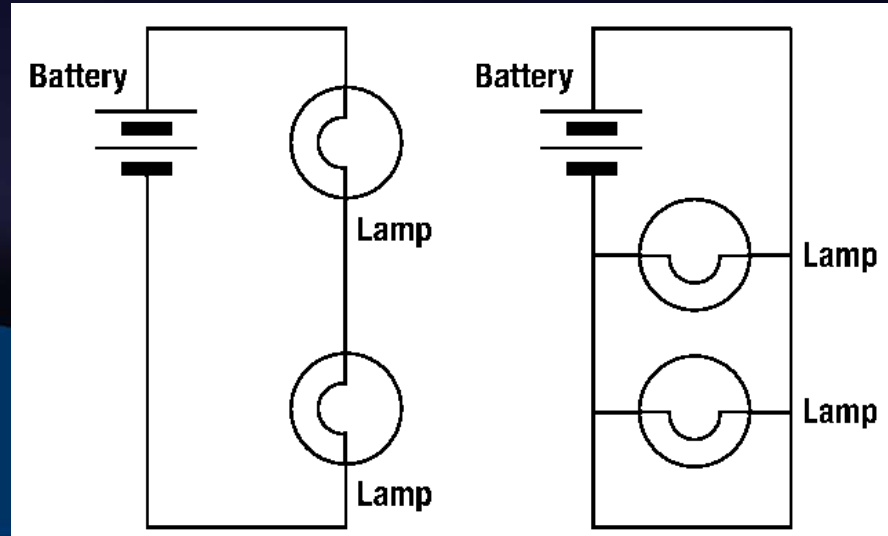
So....

Both bulbs stay just as bright,  
even though there are now two  
of them..



# Circuit1

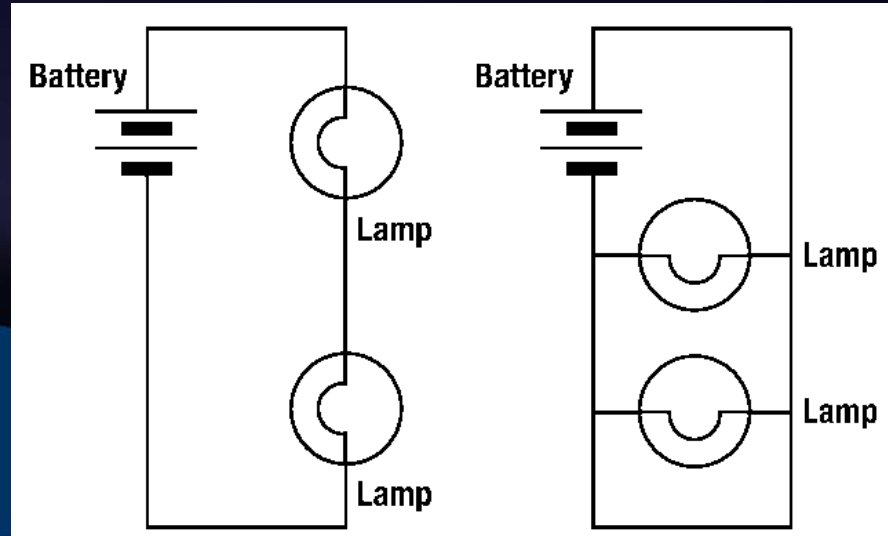
# Circuit2



Circuit 1 is series. Circuit 2 is parallel. What would happen to each, if one bulb were burnt out?

# Circuit1

# Circuit2



How would the current each bulb receives be different for each circuit?



# Resistance -

How difficult it is for the electric current to flow. The more resistance, the less current can flow.

# Unit of resistance -

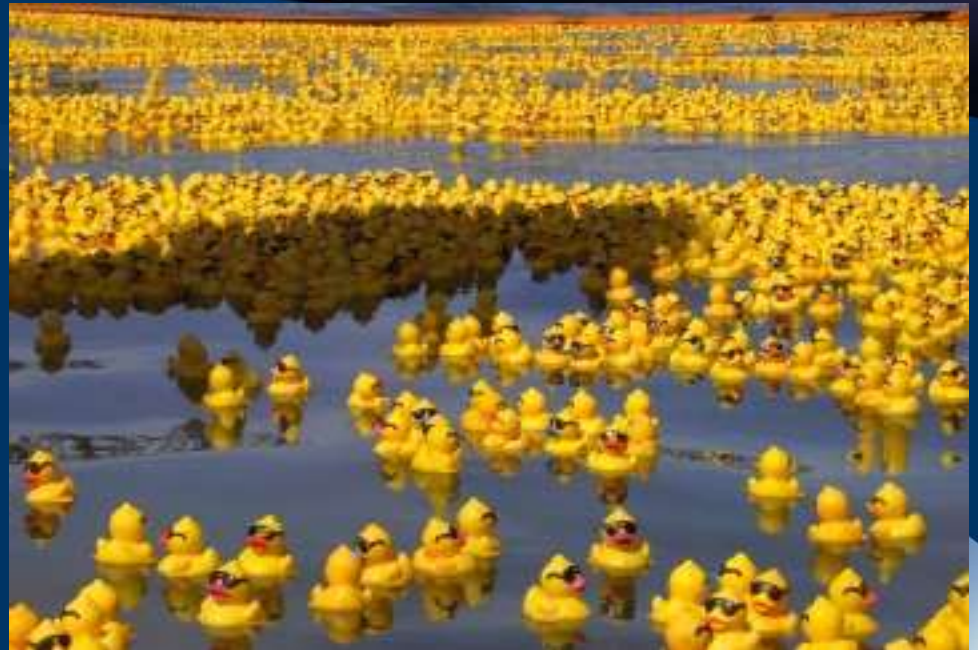
Ohms ( $\Omega$ )

As resistance increases it  
creates more heat.





Which has a greater resistance,  
a conductor like metal, or an  
insulator like rubber?



# Resistance in a wire is determined by three things:

## 1. Type of metal.



Copper has a low resistance.



Nichrome has a high resistance.

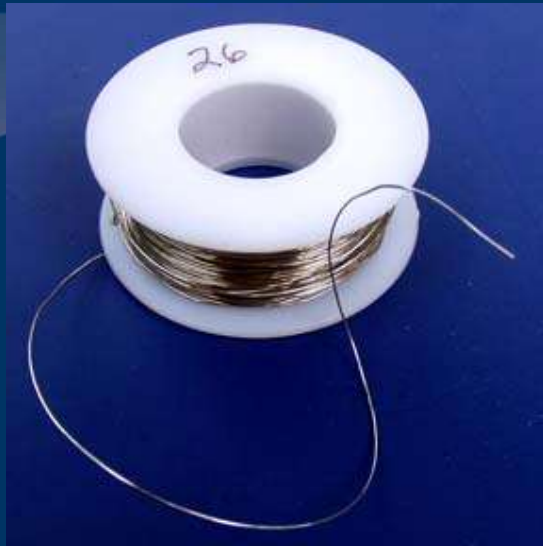


A toaster works because it uses nichrome wires that have a high resistance. This makes friction, which gets the wires hot.



Resistance in a wire is determined by three things:

2. Thickness of wire.



Done



So it's not a good idea to plug a space heater into an extension cord. I'm lucky I didn't burn my... [See More](#)



2 Comments



Thicker wire can carry more electric current, the same way a thick hose can carry more water.







Resistance in a wire is determined by three things:

3. Length of wire.



The longer the wire, the more resistance. This is why power lines need to be so thick.



# Electrical current -

How much electricity flows.  
Current is measured with an  
ammeter.



Unit of electrical current -

Amperes or amps (A)



So, voltage is like your water pressure. Resistance is the thickness of the pipe. Current is the amount of water flowing through the pipe.



voltage



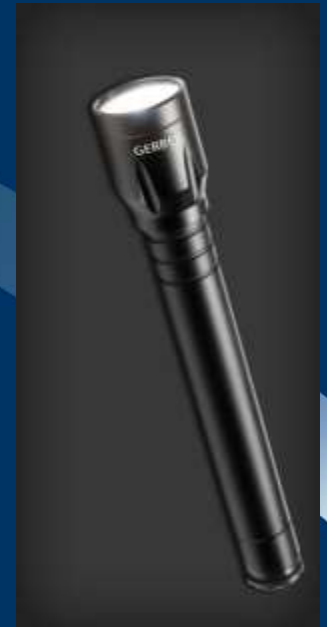
resistance



current

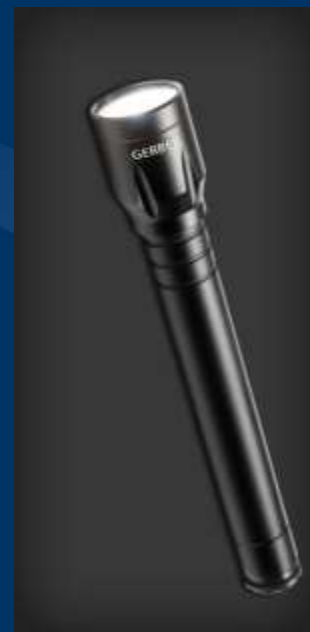


# Devices can either run on direct or alternating current.



# Direct current -

When electrons flow in one direction. Batteries use this type of current.



# Alternating current -

When electrons flow in both directions. Outlets use this type of current.



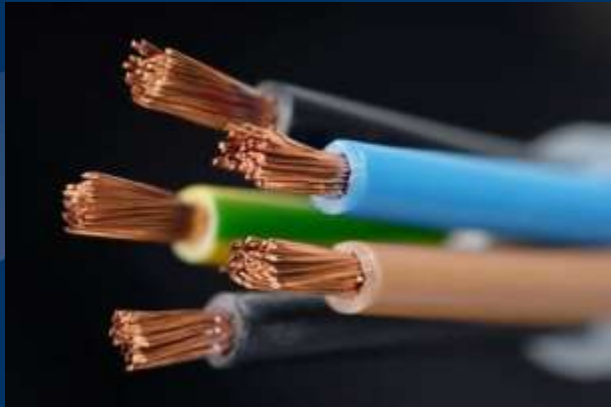
# Electrical conductor -

Anything that allows electricity to pass through it.



# Ex. of an electrical conductor -

## Metal, saltwater.



Copper



Aluminum







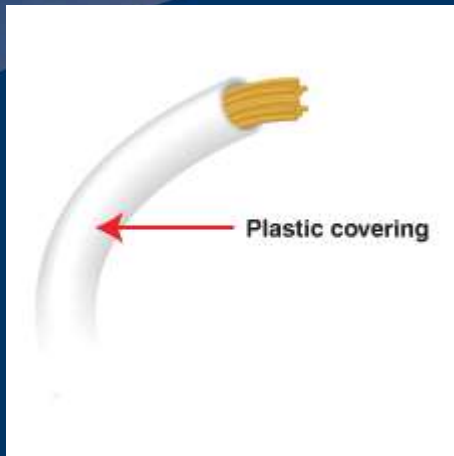
Idiots are also good electrical conductors.

# Electrical insulator (resistor) -

Anything that does not allow electricity to pass through it. These are also called resistors.

# Ex. of an electrical insulator -

Rubber, plastic, wood, pure water.



# Renewable Ways to Generate Electricity



# Renewable resources -

Resources that can be used again and again without being used up. Many renewable resources can be used to create electricity.



# Solar -

## Using the sun to create electricity.



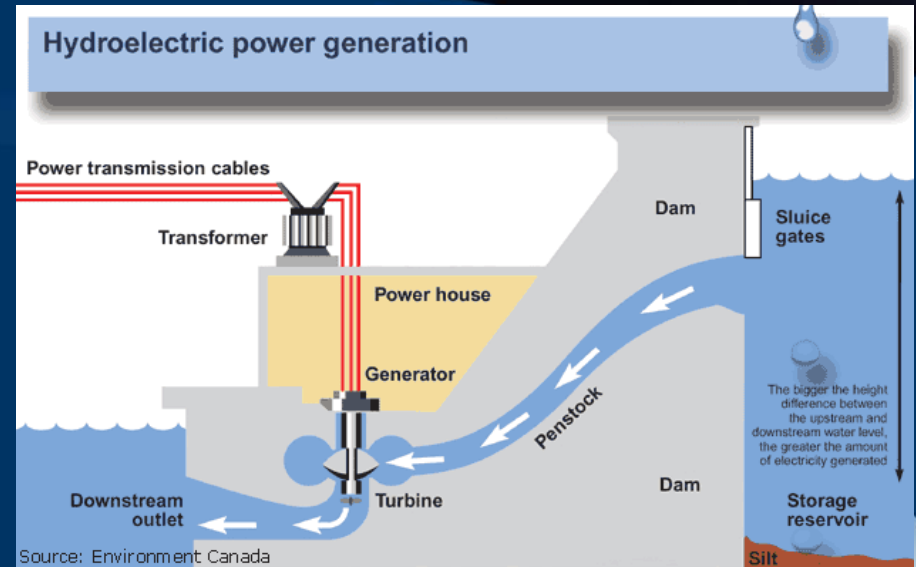
# Wind -

## Using moving air to create electricity.



# Hydroelectric -

Using water to create electricity.





# Geothermal -

Using the heat of the earth to generate electricity.

