OHM'S LAW

Ohm's Law is the relationship between voltage, current and resistance applied circuit.

Circuit is a complete path of current, consist of the following component.

Source

AC- Alternating Current – Current flows alternately

Example: Power generated from the different sources like, solar, wind, hydro, fossils fuel and other.

DC - Direct Current – current flows in one direction only

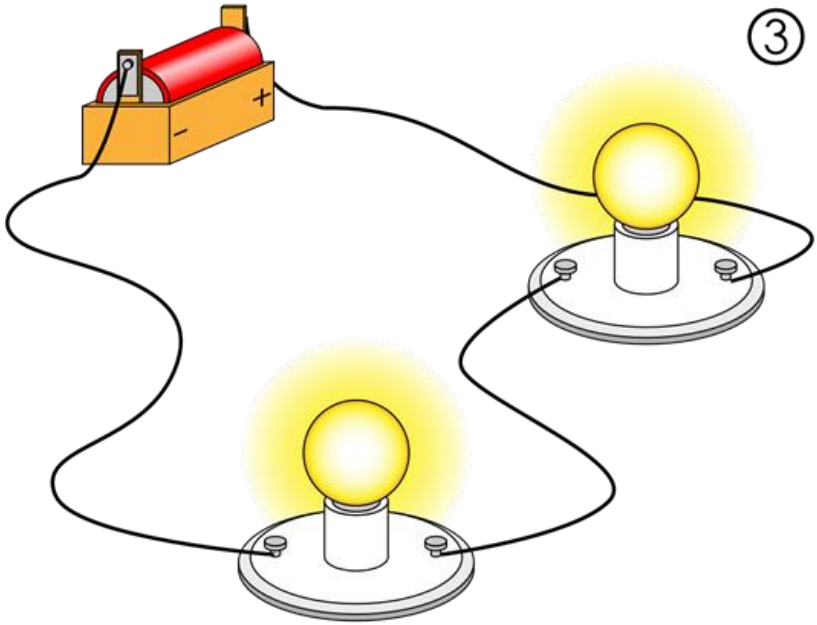
Example: Battery

Load – These are materials considered as current consuming device.

Example: TV, Refrigerator, oven, and others.

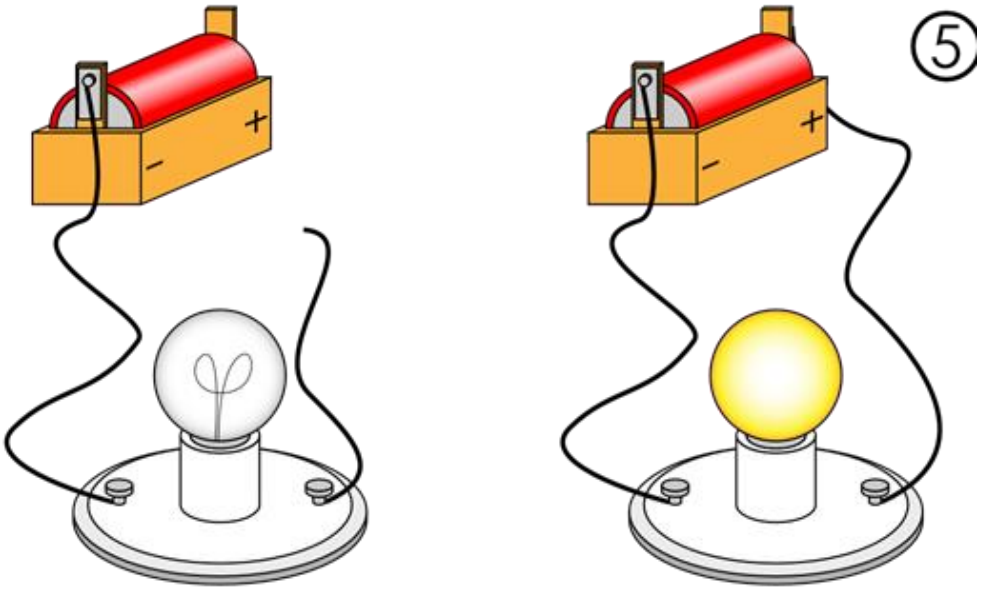
Switch - These are materials which connect and disconnect the flow of current in the circuit.

Wire/Conductor - this component serves as the passageway of the current to pass all throughout the circuit.

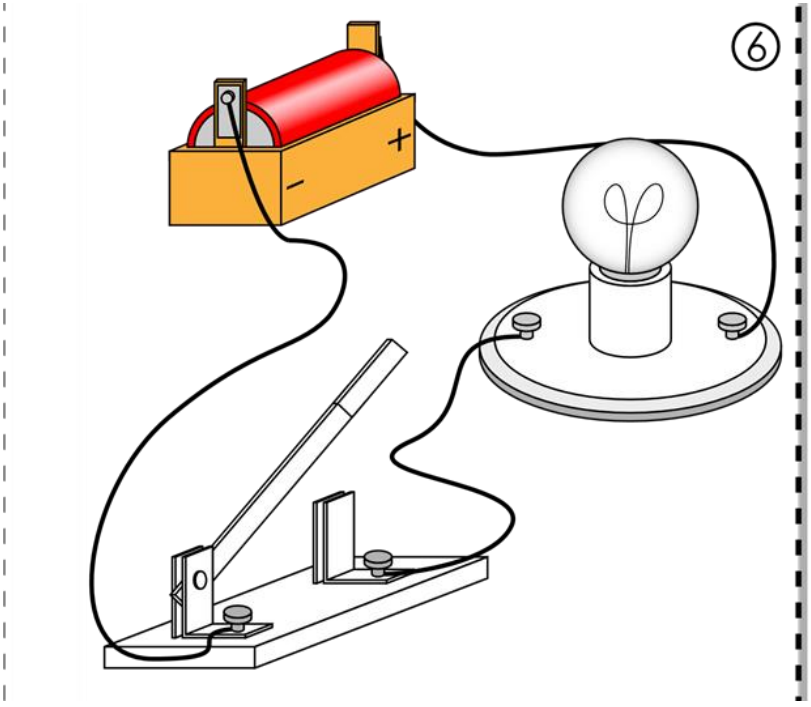


The picture shows a circuit. Electricity flows from the source or the battery, from the negative side of a battery through the wires and lights the bulb. The electricity continues to travel around to the positive side of the battery.

A circuit can be open or closed. When a circuit is closed, it is complete and there is no break in the path that the charges must follow. When a circuit is open, it is incomplete, and the charges cannot flow through.

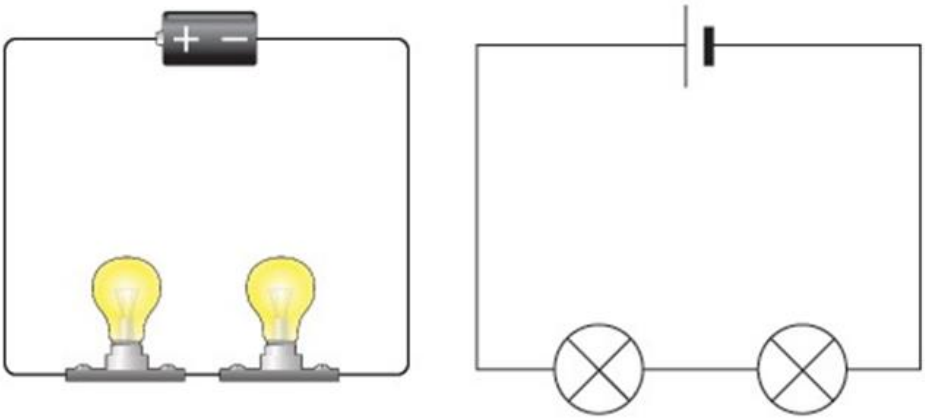


Switch is sometimes added to the circuit to close and open the circuit.



Series circuits

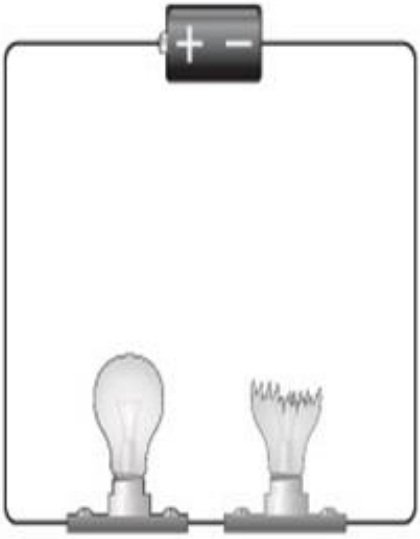
In a television series, you get several episodes, one after the other. A series circuit is similar. You get several components one after the other. If you follow the circuit diagram from one side of the cell to the other, you should pass through all the different components, one after the other, without any branches.



If you put more lamps into a series circuit, the lamps will be dimmer than before.

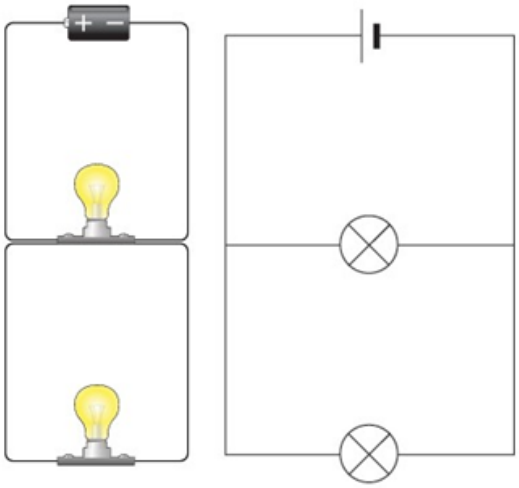
In a series circuit, if a lamp breaks or a component is disconnected, the circuit is broken, and all the components stop working.

Series circuits are useful if you want a warning that one of the components in the circuit has failed. They also use less wiring than parallel circuits.

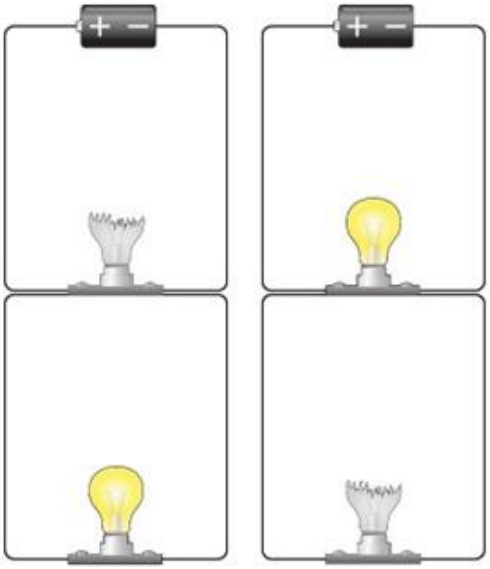


Parallel circuits

In parallel circuits different components are connected on different branches of the wire. If you follow the circuit diagram from one side of the cell to the other, you can only pass through all the different components if you follow all the branches.



In a parallel circuit, if a lamp breaks or a component is disconnected from one parallel wire, the components on different branches keep working. And, unlike a series circuit, the lamps stay bright if you add more lamps in parallel.



Parallel circuits are useful if you want everything to work, even if one component has failed. Therefore, our homes are wired up with parallel circuits.

Ohms Law Applied in Series Circuit

In series circuit, since the current flows in only on path, current is equally distributed to all the load in the entire circuit.

I represent Intensity of Current.

Total current in series circuit is equal to the current of every load in the entire circuit.

IT = I1= I2= I3 ….

E reparents Electromotive force of Voltage

Total Voltage in series circuit is the sum of all the voltage drop in the entire circuit.

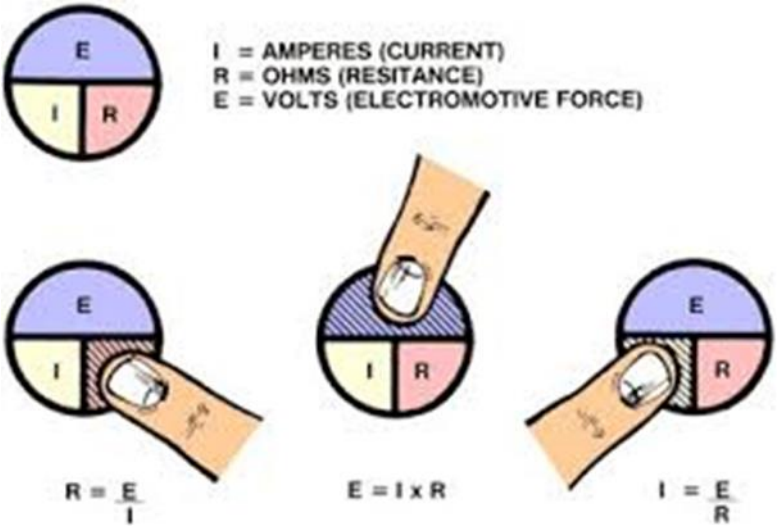
ET= E1+ E2+ E3…

R represents Resistance

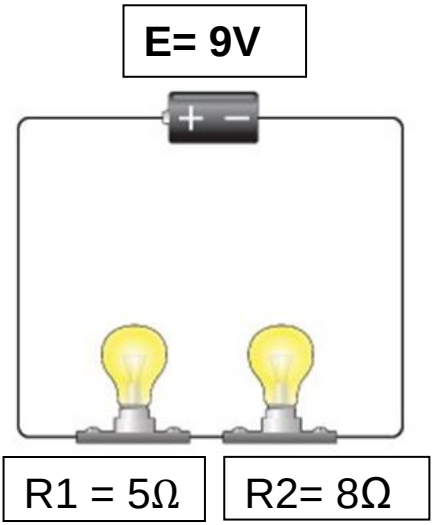
The total resistance of the resistances of every load in the circuit.

RT= R1+ R2+ R3…

Remember the Ohm's Law Formula:



Example:



Find the Following:

ET = 9V	IT = ?	RT=?
E1 = ?	I1= ?	R1 = 5Ω
E2 = ?	I2 = ?	R2 = 8Ω

RT = R1 + R2 IT = ET/ RT ET = 9V

RT = 5Ω + 8Ω IT = 9V/ 13Ω

RT= 13 Ω IT = 0.69A

E1= I1 x R1 E2 = I2 X 2R

E1 = 0.69 A x 5 Ω E2= 0.69A X 8Ω

E1 = 3.45 V E2= 5.52V

Thus, I1 = 0.69A and A2 = 0.69 A

Ohm's Applied in Parallel Circuit

In **parallel circuit**, current flows in two or more path of current.

The current flow individually through the individual path of current so no need to divide the amount of current among the loads. Total amount of current is the sum of all the current of the load in the entire circuit.

$$\mathbf{IT = I1 + I2 + I3 \ldots.}$$

Voltage drop of every load is equal since every load is connected individually to the source.

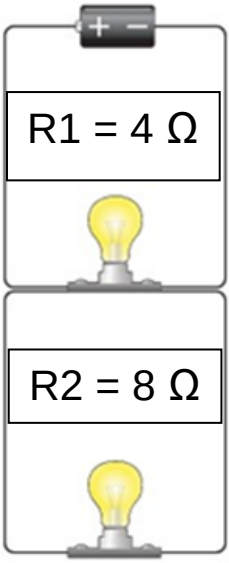
$$\mathbf{ET = E1 = E2 = E3 \ldots.}$$

Total Resistance in Parallel circuit is the sum of all the reciprocals of resistances in the circuit.

$$RT = \frac{1}{\frac{1}{R1} + \frac{1}{R2} + \frac{1}{R3}}$$

Example:

ET = 12 V



Find the Following:

RT= ?	IT= ?	ET = 12 V
R1 = 4Ω	I1 = ?	E1 = ?
R2 = 8Ω	I2 = ?	E2= ?

$$RT = \frac{1}{\frac{1}{R1} + \frac{1}{R2}}$$

$$= \frac{1}{1/4\Omega + 1/8\Omega}$$

$$= \frac{1}{0.25 + 0.125}$$

$$= \frac{1}{0.375}$$

$R_T = 2.66\ \Omega$

$I_T = E_T / R_T$ $E_1 = 12V$ ($E_T = E_1 = E_2$)

$I_T = 12V / 2.66\Omega$ $E_2 = 12V$ ($E_T = E_1 = E_2$)

$I_T = 4.5A$

$I_1 = E_1/R_1$ $I_2 = E_2/R_2$

$I_1 = 12V/4.\Omega$ $I_2 = 12V/8\Omega$

$I_1 = 3$ $I_2 = 1.5$