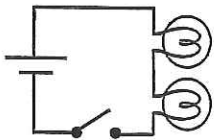


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Types of Circuits and Ohm's Law

Types of Circuits

Series circuits have only one path for the electricity to flow.

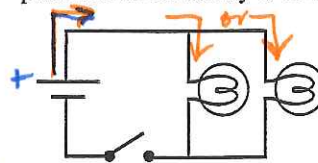


If any part of a series circuit is broken the circuit fail. If either light is unscrew both lights will turn off.

Two lightbulbs in series. Each light is dependant on the other.

Your house is wired in parallel so that each light and appliance can be turned on and off independently.

Parallel circuits have multiple paths for the electricity to flow.



The branches (paths) of a parallel circuit are independent. If either light is unscrew the other will remain on.

Two lightbulbs in parallel. Each light is independant of each other.

Ohm's Law

$$V = IR$$

$I = \frac{V}{R}$

Current (in amps) →

← Voltage (in volts)

← Resistance (in ohms)

Current equals the voltage applied across (divided by) the resistance.

Also, $V = IR$ and $R = V/I$

Abbreviations:

- A - Amps - current
- v - volts - voltage
- Ω - ohms - resistance

Increasing voltage = $\uparrow I$

Increasing resistance = $\downarrow I$

Decreasing voltage = $\downarrow I$

Decreasing resistance = $\uparrow I$

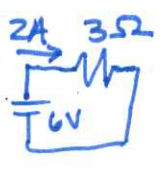
Ex. How much current does a 12 v battery push through a 3 Ω resistor?

$V = 12 \text{ v}$	$V = IR$	$I = \frac{V}{R}$
$R = 3 \Omega$		$I = \frac{12}{3}$
$I = ?$		$I = 4 \text{ A}$



Ex. How strong a battery produces I 2 A through a 3 Ω resistor?

$V = ? \text{ v}$	$V = IR$
$R = 3 \Omega$	$V = 2 \cdot 3 = 6 \text{ V}$
$I = 2 \text{ A}$	



Current

Current is moving e⁻ moving charge.

can build charge = no current
until move charge = current
 current causes more electricity to move through a device.

Increasing electricity through a device causes it to work faster (in a motor) or be brighter (in a lightbulb).

Using Ohm's Law: $I = V/R$

$I = \frac{3}{3}$

$I = 1 \text{ A}$

Using Ohm's Law: $I = \frac{V}{R} = \frac{6}{3}$

$I = 2 \text{ A}$

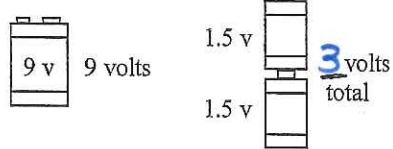
More current = brighter light.

Voltage

Voltage is electrical potential: how much work a battery can do.

Voltage is linked to energy: 1 volt of voltage = 1 joule of energy per Coulomb of charge

To increase voltage you could use a stronger battery OR more batteries.



More voltage is like a stronger push giving more force and more current

Light is off

No current

The lightbulb doesn't light here, because the two batteries are pushing opp dir. To add together, batteries must be facing the same direction.

Resistance

Resistance slow down current.

Think of resistance like a dam holding back water.

Adding devices in a circuit ↑ resistance.

Bright light

$I = V/R$

$I = \frac{6}{3} = 2 \text{ A}$

The light is bright because the 6V volts only have 1 light to run.

Both lights are dim because the 6V volts have 2 lights to run.

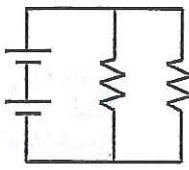
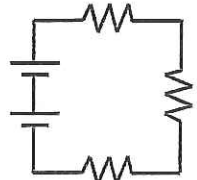
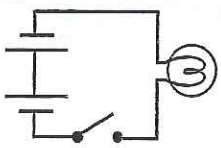
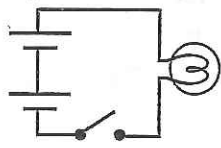
$I = V/R$

$I = \frac{6}{3+3} = \frac{6}{6} = 1 \text{ A}$

More resistance = ↓ current
 Less current = dim light

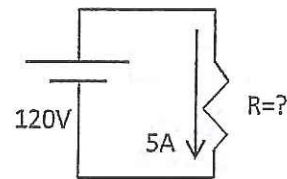
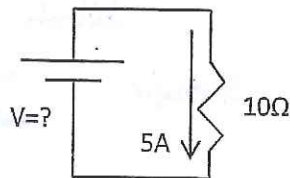
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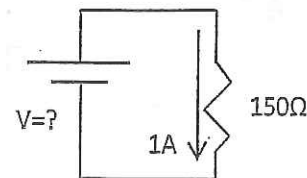
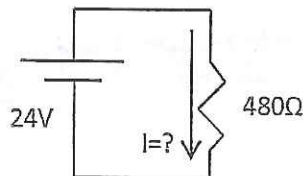
1. I = _____ 2. V = _____ 3. R = _____ 4. E = _____ 5. P = _____ 6. F = _____	4 newtons 4 amps 4 joules 4 watts 4 ohms (Ω) 4 volts	Label the diagrams as parallel or series circuits. <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  A. _____ </div> <div style="text-align: center;">  B. _____ </div> </div>
The units for current is _____; the abbreviation is _____. The units of voltage is _____; the abbreviation is _____. The units of resistance is _____; the abbreviation is _____.		Series or Parallel Circuits?
If you increase voltage, the current will increase or decrease? If you decrease resistance, the current will increase or decrease? If the current increases, the resistance increased or decreased? If voltage is decreased, the current will increase or decrease? If the current decreases, the voltage increased or decreased? If there is more current will a light bulb be brighter or dimmer?		<input type="checkbox"/> Only one path for the electricity. <input type="checkbox"/> Can turn off one light without others turning off. <input type="checkbox"/> Dependent paths. <input type="checkbox"/> If you turn off one light, all the lights turn off. <input type="checkbox"/> How your house is wired. <input type="checkbox"/> Independent current paths. <input type="checkbox"/> More than one path for the electricity to flow.
Will the lights turn on or not? And why? <div style="display: flex; justify-content: space-around; align-items: center;">   </div>		How much current goes through a circuit with a 12 v battery and a 3 Ω resistor? Find the current in circuit with 6 v battery and 2 resistor: How much voltage gives 5 amps of current through a 3 Ω light bulb?

Solve for the unknown in each of these circuits

A subwoofer needs a household voltage of 110 V to push a current of 5.5 A through its coil. What is the resistance of the subwoofer?



A walkman uses a standard 1.5 V battery. How much resistance is in the circuit if it uses a current of 0.01A?



How much voltage would be necessary to generate 10 amps of current in a circuit that has 5 ohms of resistance?