Circuit Simulation

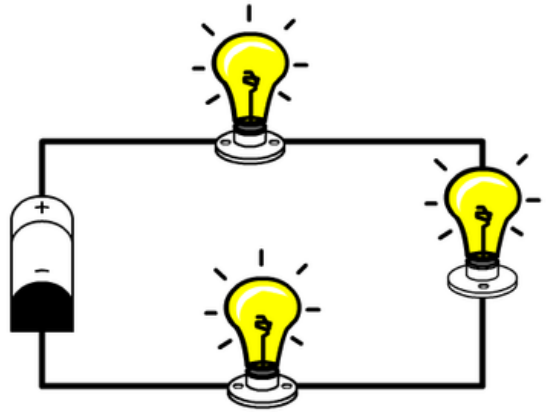
Start your trip with circuits here!

Experiments ***Materials***

Learn About Circuits:

1, Series Circuits

In a series circuit, components are connected in a single path, so current flows through each one in turn. If one component fails, the entire circuit stops working. The lights in classrooms always use series circuits.



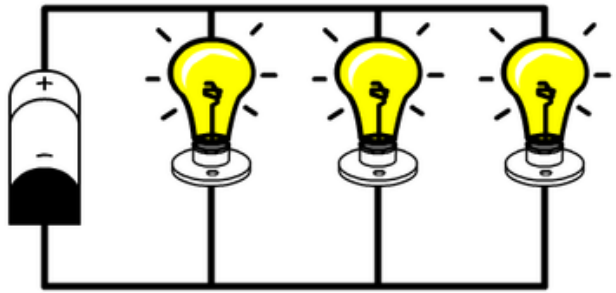
All the bulbs light up

Build One Yourself

Learn About Circuits:

2, Parallel Circuits

In a parallel circuit, components are connected across the same voltage source, creating multiple paths for current. If one component fails, others can still operate. Home lighting systems are mostly parallel circuits



Every bulb is independent.

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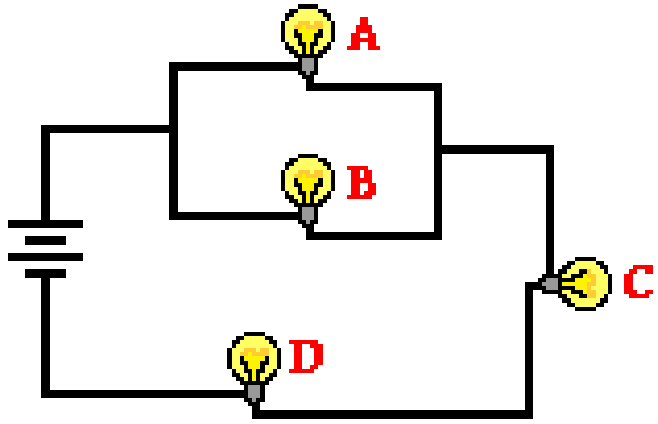
Learn About Circuits:

3. Combination Circuits

A combination circuit (also called a series-parallel circuit) includes parts that are connected in series and others in parallel. These circuits are common in more complex systems and require step-by-step analysis.



A and B are independent of each other and both are related to C and D

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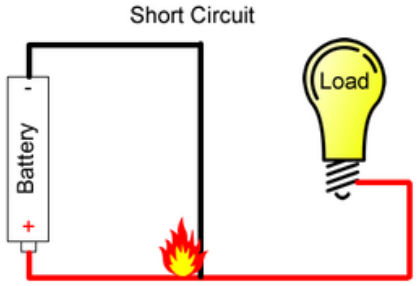
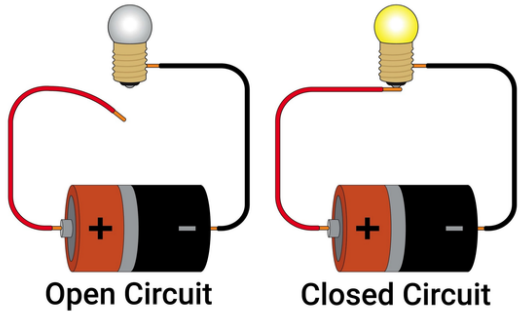
Learn About Circuits:

4, Common Circuit Errors: Short Circuit & Open Circuit

A **short circuit** happens when there is a very low resistance path that allows too much current to flow. This can overheat wires, damage components, or drain the battery quickly.
An **open circuit** occurs when the path is broken, so no current can flow.



No resistor in the path



The wire is broken

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Learn About Circuits:

5, Basic Calculation

Ohm's Law is the foundation of all circuit calculations:

$V = I \times R$

From this formula, you can derive:

- $I = V / R$
- $R = V / I$

	Series Circuits	Parallel Circuits
Voltage	Shared amongst components $V_{total} = V_1 + V_2 + V_3$	All components get the full voltage $V_{total} = V_1 = V_2 = V_3$
Current	The current is constant in all parts $I_1 = I_2 = I_3$	The current is split between branches based on resistance $I_{total} = I_1 + I_2 + I_3$
Resistance	Total resistance is the sum of the individual resistances of components $R_{total} = R_1 + R_2 + R_3$	Reciprocal of total resistance is the sum of the reciprocals of the individual resistances

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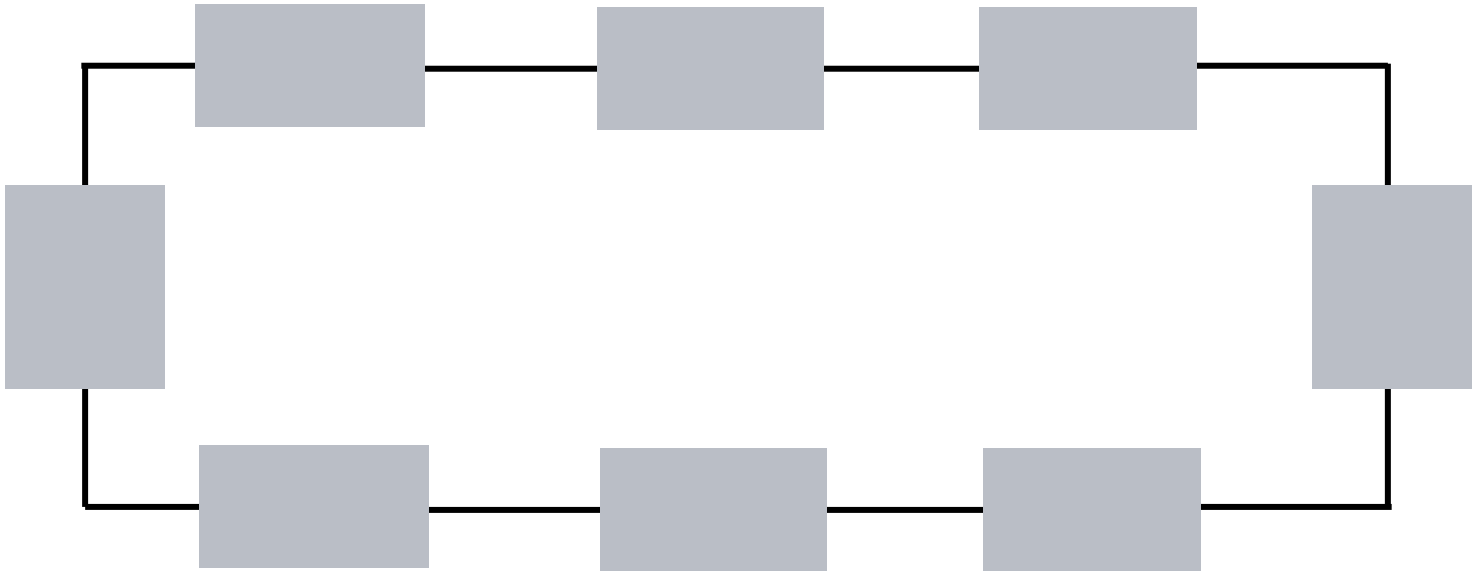
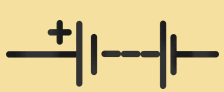


WARNING

The circuit is not complete!

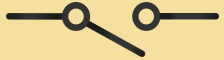
Current: xx A

Components:



Battery

Bulb

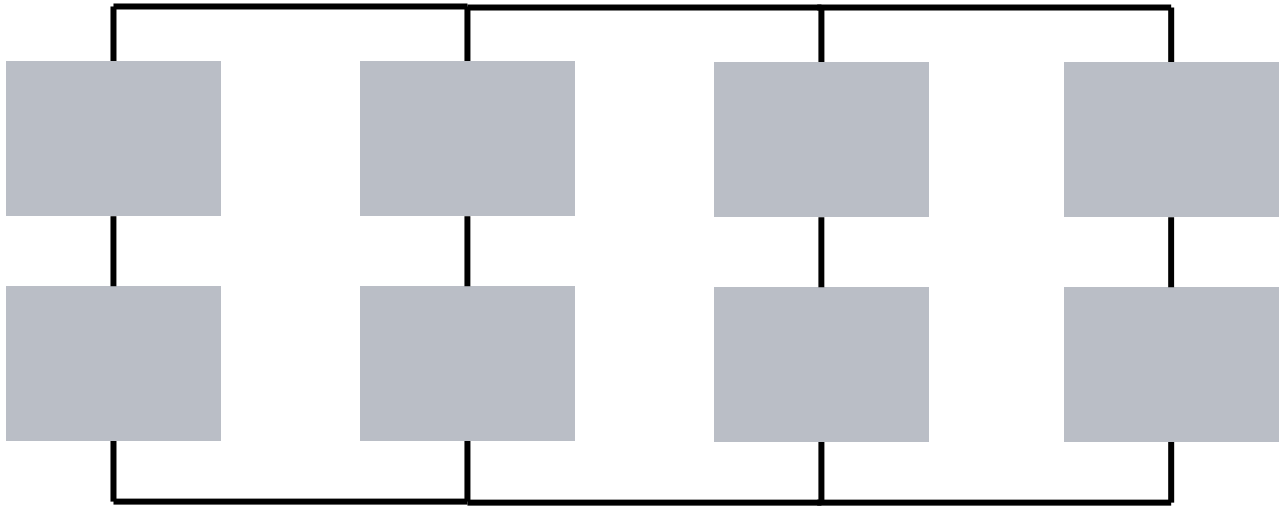


Switch

Resistor

Buzzer

Wire

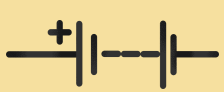


✅ **READY**

Click the switch to run!

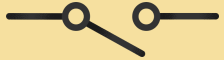
Voltage: xx V

Components:



Battery

Bulb

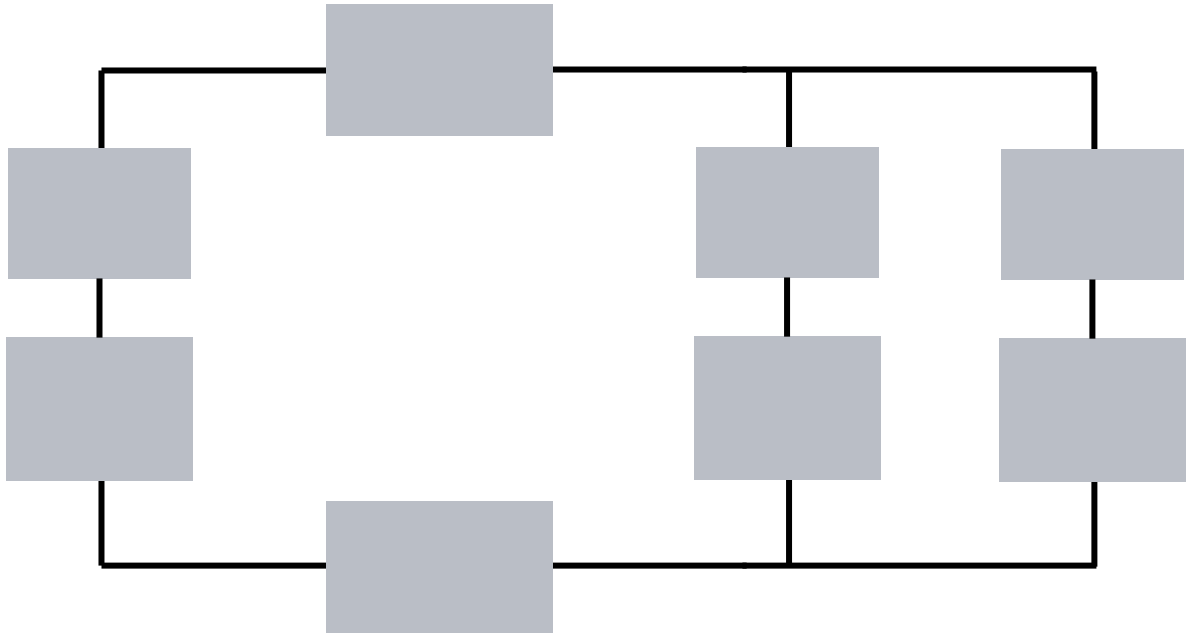


Switch

Resistor

Buzzer

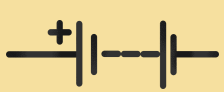
Wire



WARNING

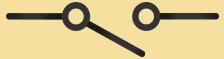
The circuit is too dangerous!

Components:



Battery

Bulb



Switch

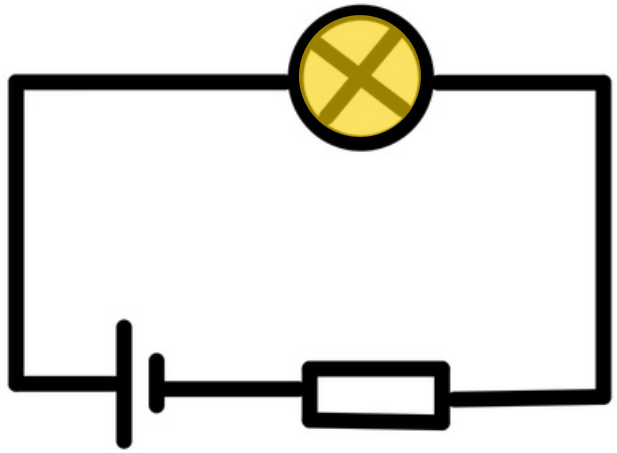
Resistor

Buzzer

Wire

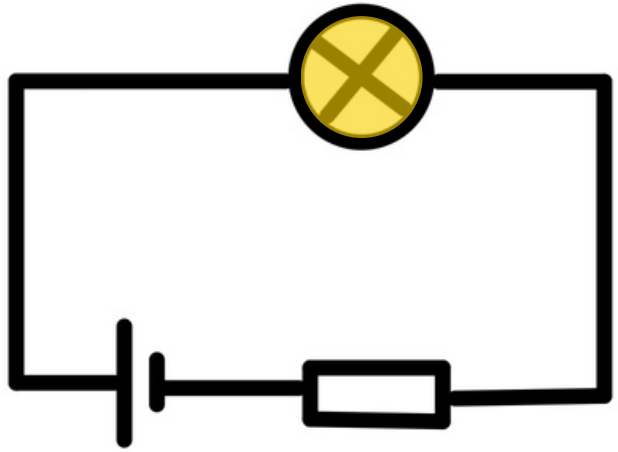
Electrical Conductivity of Different Materials

Comparison



Material of Resistor: Silver v

Current in circuit: xx A



Material of Resistor: Silver v

Current in circuit: xx A

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