

Fundamentals of Electronics and Electrical

Introduction to -

- Series connection
- Parallel connection
- Calculation of series-parallel
- Types of switches



What is the difference between series and parallels?

How do you find voltage in a parallel circuit?

What is a series-parallel combination circuit?

In a series circuit, the same amount of current flows through all the components placed in it. On the other hand, in parallel circuits, the components are placed in parallel with each other due to which the circuit splits the current flow.

Lesson Aims:

1. Classify series and parallel connection
2. Difference between series and parallel
3. Categorized types of switches



Calculate numeric examples of Series and Parallel connections and watch the circuit animation at home. Compare and contrast the different types of switches in-house and list them in the template given by the teacher.



Recap Electrical Circuits

What is Electric Current?

Electrical Resistance: electrical resistance—is a force that counteracts the flow of current. In this way, it serves as an indicator of how difficult it is for current to flow. Resistance values are expressed in ohms (Ω).



What is Electric Power?

Ohm's Law: a law stating that electric current is proportional to voltage and inversely proportional to resistance.

Brainstorming

Draw a diagram of a series and parallel circuit

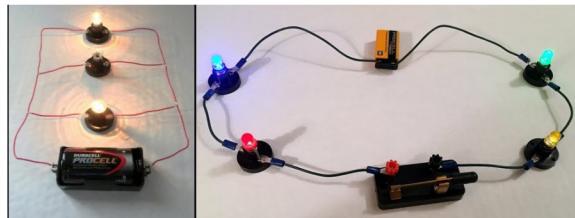
Open the Circuit Construction Kit: DC sim and familiarize yourself with the controls and features.

Construct a simple circuit with batteries, a light bulb, and voltage sources.

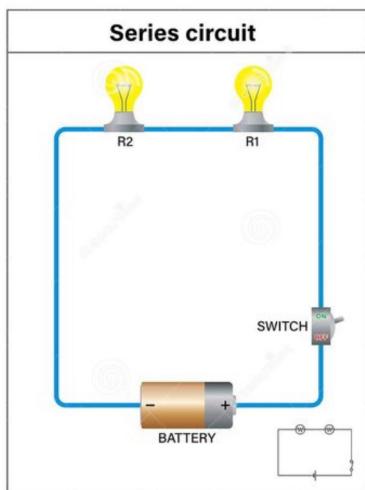
Draw the circuits.



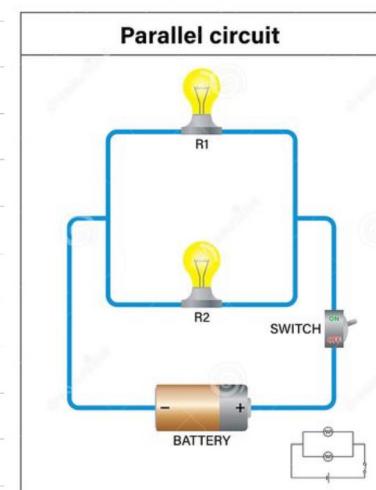
Series and Parallel Connection of Circuit



A series circuit has only one path through which its current can flow. Opening or breaking a series circuit at any point causes the entire circuit to "open" or stop operating. For example, if even one of the light bulbs in an older-style string of Christmas tree lights burns out or is removed, the entire string becomes inoperable until the bulb is replaced.



In Parallel if two or more components are connected in parallel, they have the same potential (voltage) difference across their ends. The potential differences across the components are the same in magnitude, and they also have identical polarities. The same voltage is applied to all circuit components connected in parallel. The total current is the sum of the currents through the individual components, by Kirchhoff's current law.



Types of Switches



Mechanical Switches

Single Pole Single Throw Switch (SPST)
Single Pole Double Throw Switch (SPDT)
Double Pole Single Throw Switch (DPST)
Double Pole Double Throw Switch (DPDT)
Push Button Switch, Toggle Switch, Limit Switch
Float Switches, Flow Switches
Pressure Switches, Temperature Switches
Joystick Switch, Rotary Switches



Electronic Switches

Bipolar Transistors, Power Diode, MOSFET, IGBT, SCR
TRIAC, DIAC,
Gate Turn-Off Thyristor



What are the two types of circuit connections?

The two types of circuit connections are: Series connection and Parallel connection

What is a parallel circuit?

A circuit is said to be parallel when the electric current has multiple paths to flow through.

How is the total resistance of any series circuit calculated?

The total resistance in a series circuit equals the sum of the individual resistances.



Activity

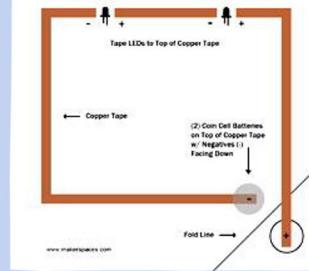
Series and Parallel switch

Series circuit

Material requirement -

- a) Copper tape/ Aluminum tape (1/4")
- b) Battery- CR2032-3v
- c) Transparent Tape
- d) LED – 5mm or 10mm
- e) Paper clip or binder clip
- f) Circle Institute Tax (Optional)
- g) Buzzer (Optional A)

Series Circuit



Procedure -

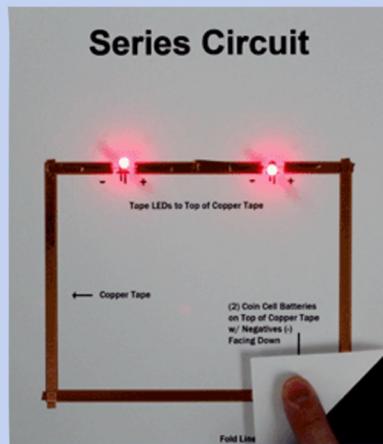
Step 1 – Apply copper tape to all trace lines on the template. Leave a gap in the copper tape to mount the LED.

Step 2 – Fold all the corners of copper tape Try to maintain a continuous strip without any cuts.

Step 3 – Take 2 batteries and place at the top of the copper tape with negative facing down.

Step 4 – Try folding the corner of a template along with the line. To secure corner use paper clip

Step 5 – Bend both legs of the LED at a 90° angle and then tape the legs down to secure the LED. Make sure that the long leg of the LED goes to the positive (+) side of the copper tape. This image shows how to tell which leg of the LED is positive (+)





Activity

Series and Parallel switch



Parallel circuit

Material requirement -

- a) Copper tape/ Aluminum tape (1/4")
- b) Battery- CR2032-3v
- c) Transparent Tape
- d) LED – 5mm or 10mm
- e) Paper clip or binder clip
- f) Circle Institute Tax (Optional)
- g) Buzzer (Optional)

Procedure -

Step 1 – Apply copper tape to all trace lines on the template. Leave a gap in the copper tape to mount the LED.

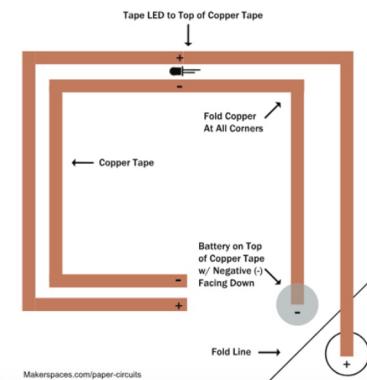
Step 2 – Fold all the corners of copper tape Try to maintain a continuous strip without any cuts.

Step 3 – Take batteries and place them at the top of the copper tape with negative (-) facing down.

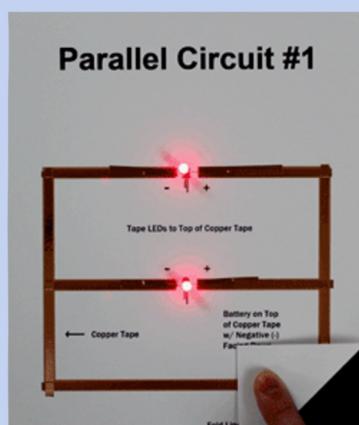
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Step 5 – Bend both legs of the LED at a 90' angle and then tape the legs down to secure the LED. Make sure that the long leg of the LED goes to the positive (+) side of the copper tape. This image shows how to tell which leg of the LED is positive (+)

Parallel Circuit

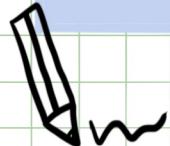
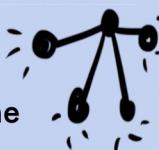


Makerspaces.com/paper-circuits



Reflection

- 1) In which type of circuit connection, do the same number of currents flow through all the components?
- 2) What is a Series Circuit?
- 3) What is a Parallel Circuit?
- 4) Difference Between Series and Parallel Circuits



For more information
scan the qr code

