

Module 12: DC circuits

Keywords: resistor, in series, parallel, current, voltage, circuit

Formulas:

$$\bullet I = \frac{V}{R} \text{ (Ohm's law)} ; I = \frac{\Delta Q}{\Delta t} \text{ (flow of charges)}$$

$$\bullet P = IV = I^2 R = \frac{V^2}{R} \text{ (power)}$$

Key points:

Formal definition: series circuit has one complete conducting pathway.

$$V_b = \sum V_i ; I_b = I_i ; R_{\text{tot}} = \sum R_i$$

Parallel circuit has more than one complete conducting pathway.

$$V_b = V_i ; I_b = \sum I_i ; \frac{1}{R_{\text{tot}}} = \sum \frac{1}{R_i}$$

General approach:

- Identify what type of circuit it is. If it consists of several different parts, clearly mark them.
- If two resistors are connected directly to each other only from one side - they are in series.
- If two resistors are connected to each other from both sides - they are in parallel.
- Try to reduce the system of resistors by replacing two nearby resistors with one with relevant resistance depending on connection type.
- Tip: series circuits are easier to deal with rather than parallel, so try to get rid of all resistors connected in parallel first.
- Finally, apply Ohm's law.