

The interactive learning object, *Circuit simulator*, will help you understand relationships between current, potential difference and resistance, in simple series and parallel circuits. As number and value of resistors in a circuit are varied, the simulator will calculate and display current and potential difference for each resistor. Use these values to explore relationships between potential difference, current and resistance.

### Part 1: Series circuits

- Locate and open *Circuit simulator*, then select **Start**. Read the introduction, then select **Simulator**.
- Select any component to see the potential difference across it and the current flowing through it. Choose different numbers and values for resistors, and observe resulting values for current at different places in the circuit. Record your observations.

1. Does size of current (amperes) depend upon where it is measured in a series circuit?

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- Select different numbers and values for resistors in series and observe resulting values for individual potentials across resistors and lamp. Record your observations and suggest answers to questions 2-4.

2. What is the relationship between total potential difference of the circuit (12 V) and individual potentials across each resistor and lamp?

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3. What is the resistance of the lamp? Does it depend upon number and value of other resistors in the circuit?

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4. Do you expect brightness of the lamp to vary as number and size of resistors in the circuit is changed? Explain your answer.

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## Part 2: Parallel circuits

- Choose **Parallel** circuit.
  - Select different numbers and values for resistors in parallel, and observe resulting values for current in each resistor and lamp. Record your observations.
5. Does size of current depend upon where it is measured in a parallel circuit? Explain your answer.

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6. What is the relationship between total potential difference of the circuit (12 V) and individual potentials across each resistor and lamp?

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7. Does current in a resistor depend upon value of the resistor? Explain your answer.

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8. What is the relationship between current in individual resistors in parallel, and total current entering and leaving the junction of resistors in parallel?

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9. Do you expect brightness of the lamp to vary as number and size of parallel resistors in a circuit is changed? Explain your answer.

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### Part 3: Extension questions

10. What combination of resistors in *series* (number and values) produces the lowest power output by the lamp?

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11. What combination of resistors in parallel (number and values) produces the highest power output by the lamp?

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