

Current and circuits · supported focus

Supported focus · HL

Supported scope

- Supported HL focus. First assessment 2025; full Physics guide acquired (84 PDF pages). Remaining guide, assessment and practical requirements retain their recorded holds.
- State model conditions and distinguish fictional data from measurements.

Circuits · 1.1

Reasoning

A lamp becomes dimmer when another is added in series. Current and energy transfer depend on the whole circuit, not only one lamp. Start with a prediction. State the quantities or features you would compare, then decide what evidence could distinguish two explanations.

Circuits · 2.1

Reasoning

Current is charge passing per time. Potential difference is energy transferred per charge. Resistance is potential difference divided by current for a stated operating point. current: Rate of flow of charge; potential difference: Energy transferred per unit charge.

Circuits · 3.1

Reasoning

Current is the same through components in series. Potential differences add around the series path. In parallel, branches share the same potential difference, while branch currents sum at a junction. Place an ammeter in series and a voltmeter in parallel. For an I-V investigation, change voltage in steps, reverse polarity when appropriate and limit current to reduce heating.

Circuits · 4.1

Reasoning

State the known values and their units. Choose the relation because its assumptions fit this case, then rearrange before substitution. Known: a resistor has 6.0 V across it and carries 0.30 A. Use $R = V/I$. $R = 6.0/0.30 = 20$ ohms. Power = VI . Power = $6.0 \times 0.30 = 1.8$ W. These quantities describe the same operating point.

Circuits · 4.2

Reasoning

A component has 12 V across it and carries 0.40 A. Find resistance. Use the same sequence: known quantities $\rightarrow$ model $\rightarrow$ relation $\rightarrow$ substitution $\rightarrow$ unit and interpretation.

Circuits · 5.1

Reasoning

Current is not used up by a lamp. A filament heats up, so its resistance need not remain constant as voltage changes. Return to the original observation. Explain what the result supports, which conditions it assumes, and one way to test a competing explanation.

Circuits · 5.2

Reasoning

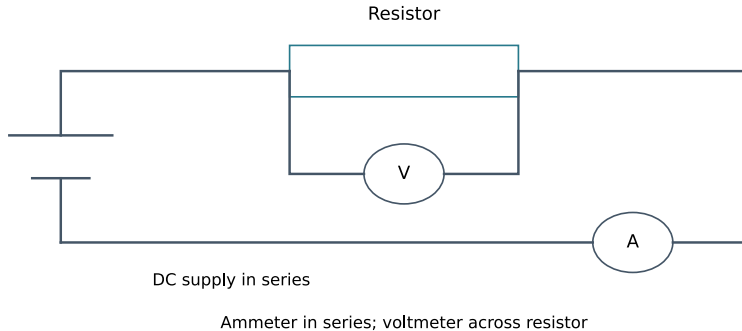
A lamp uses up electric current as charge passes through it. This claim is false: Current is not used up by a lamp. A filament heats up, so its resistance need not remain constant as voltage changes.

Circuits · 5.3

Reasoning

Current, potential difference and resistance: Current is the same through components in series. Potential differences add around the series path. In parallel, branches share the same potential difference, while branch currents sum at a junction.

Circuits · diagram



- Original teaching diagram: Current , potential difference and resistance
- Use the labels and the stated model together.

Circuits · original transfer

Your turn

Connect two $30\ \Omega$ resistors in parallel across 12 V. Find total resistance, total current and power; compare one resistor alone.

Circuits · transfer reasoning

Method and interpretation

$R=15\ \Omega$, $I=0.80\ \text{A}$, $P=9.6\ \text{W}$. Each branch draws $0.40\ \text{A}$ and $4.8\ \text{W}$. One resistor alone draws $0.40\ \text{A}$ and $4.8\ \text{W}$; the same voltage does not imply the same total current.

Check yourself

- Explain current using the stated model.
- Explain potential difference using the stated model.
- Change one value in the original transfer; explain which assumption still matters.