Ohm's Law Problems

1. A circuit has a $12\,\text{V}$ battery and a $400\,\Omega$ resistor. Calculate the current through the resistor.

2. If you want $25\,\text{mA}$ of current through a circuit powered by a $9\,\text{V}$ battery, what resistance should you choose?

3. A battery is $6\,\text{V}$ and the circuit has a $220\,\Omega$ resistor. What is the current through the resistor?

Watt's Law (Power Equation) Problems

1. A device operates at $5\,\text{V}$ and draws $0.5\,\text{A}$. What is its power consumption in watts?

2. A robot motor uses $2.5\,\text{W}$ at a supply voltage of $10\,\text{V}$. What is the current?

3. If an LED draws $0.03\,\text{A}$ at $3\,\text{V}$, what is its power usage?

Combination Problems (Ohm's Law and Power)

1. A $24\,\text{V}$ supply powers a resistor so that the circuit draws $0.1\,\text{A}$. Find the resistor value and power consumed.

2. You have a $15\,\text{V}$ supply and a $150\,\Omega$ resistor. Calculate the current and power.

Python Practice

Write Python code to:

- (1) Accept user input for voltage and resistance, and print the current using Ohm's Law.

- (2) Accept user input for voltage and current, and print the power using Watt's Law.

- (3) Calculate the current through a resistor, given voltage and resistance, using user inputs.

Concept Questions

1. What does voltage do in a circuit?

2. What is resistance, and what is its unit?

3. Define electric current and state its unit.

4. What is the relationship between voltage, current, and resistance?

5. What does electrical power measure?

Answer Key

Ohm's Law Answers

1. $I = \frac{12}{400} = 0.03\,A$

2. $R = \frac{9}{0.025} = 360\,\Omega$

3. $I = \frac{6}{220} \approx 0.027\,A = 27\,mA$

Watt's Law Answers

1. $P = 5 \times 0.5 = 2.5\,W$

2. $I = \frac{2.5}{10} = 0.25\,A$

3. $P = 3 \times 0.03 = 0.09\,W$

Combination Problem Answers

1. $R = \frac{24}{0.1} = 240\,\Omega$, $P = 24 \times 0.1 = 2.4\,W$

2. $I = \frac{15}{150} = 0.1\,A$, $P = 15 \times 0.1 = 1.5\,W$

Concept Answers

1. Voltage pushes current through the circuit; it is the driving force.

2. Resistance opposes current; its unit is Ω.

3. Electric current is the flow of charge; its unit is Ampere (A).

4. $V = I \times R$.

5. Electrical power is the rate at which energy is used or converted, measured in Watts (W).