LESSON MAKER PRO

Current Decisions

Use Ohm's law to predict how circuits behave.

HIGH SCHOOL · PHY.5

PHY.5 "Students will investigate the key components of electricity and magnetism. Analyze and explain electricity and the relationship between electricity and magnetism..."

NAME _____ DATE _____

VOLTAGE, CURRENT, RESISTANCE

Ohm's law connects voltage V, current I, and resistance R: V = IR. Rearrange the equation to find current, I = V/R, or resistance, R = V/I. In a series circuit, resistances add, and the same current passes through each resistor.

WORKED EXAMPLE

A 7-ohm resistor has 35 V across it. What is the current?

1. Start with I = V/R.
2. Substitute: I = 35 V / 7 ohms.
3. Divide: I = 5 A.

Answer: 5 A

PRACTICE 6 problems

1 A 4-ohm resistor has 12 V across it. Find the current.

ANSWER _____

2 A current of 3 A passes through a 9-ohm resistor. Find the voltage across it.

ANSWER _____

3 A component has 16 V across it and carries 8 A. Find its resistance.

ANSWER _____

4 A resistor has 24 V across it and a resistance of 8 ohms. Find the current.

ANSWER _____

5 A component has 30 V across it and carries 10 A. Find its resistance.

ANSWER _____

6 A 10-ohm resistor first has 20 V across it. Find its current. Then find its current if the voltage rises to 40 V.

ANSWER _____

_____

APPLY IT Show your work

1 A portable speaker is tested at 12 V with a 6-ohm resistor, then with a 12-ohm resistor in its place. Find the current in each test. How does increasing the resistance affect the current?

WORK SPACE

ANSWER _____

2 During a test of an electric scooter, 3 A passes through an 8-ohm component. What voltage is across the component?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Two resistors, 6 ohms and 12 ohms, are connected in series to a 36 V source. Find the total resistance, the current through each resistor, and the voltage across each resistor. Show that the two voltages add to the source voltage.

WORK SPACE AND ANSWER

Current Decisions

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A 4-ohm resistor has 12 V across it. Find the current.	**3 A**
2	A current of 3 A passes through a 9-ohm resistor. Find the voltage across it.	**27 V**
3	A component has 16 V across it and carries 8 A. Find its resistance.	**2 ohms**
4	A resistor has 24 V across it and a resistance of 8 ohms. Find the current.	**3 A**
5	A component has 30 V across it and carries 10 A. Find its resistance.	**3 ohms**
6	A 10-ohm resistor first has 20 V across it. Find its current. Then find its current if the voltage rises to 40 V.	**At 20 V: 2 A. At 40 V: 4 A.**

PART 2 · APPLY IT

1. **6-ohm resistor: 2 A. 12-ohm resistor: 1 A. Doubling the resistance halves the current when voltage stays the same.** Use I = V/R for each test: 12/6 = 2 A and 12/12 = 1 A.
2. **24 V** Use V = IR: 3 A × 8 ohms = 24 V.

CHALLENGE

Total resistance: 18 ohms. Current through each resistor: 2 A. Voltage across the 6-ohm resistor: 12 V. Voltage across the 12-ohm resistor: 24 V. Check: 12 V + 24 V = 36 V.

Accept equivalent units such as Ω for ohms. In the challenge, students should use the same current for both series resistors.