

Essential Question

How are current, voltage, and resistance connected?

Ohm's Law

$$V = IR$$

V

voltage (V)

I

current (A)

R

resistance (Ω)

More Voltage, More Current

- Same resistor, more voltage
- Double V , double I
- Current is proportional to voltage

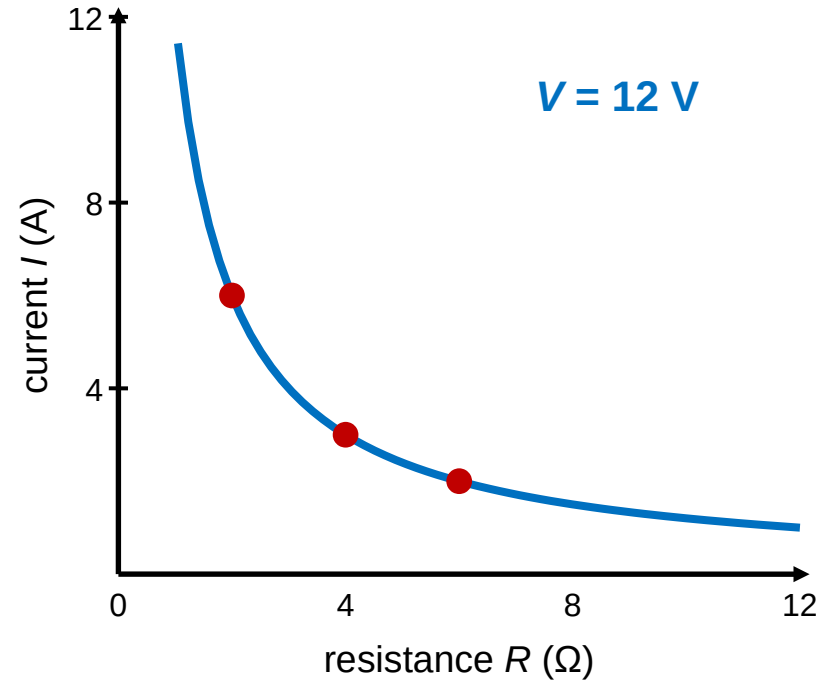
$$R = 3\ \Omega$$

V	I
3 V	1 A
6 V	2 A
12 V	4 A

double the voltage, double the current

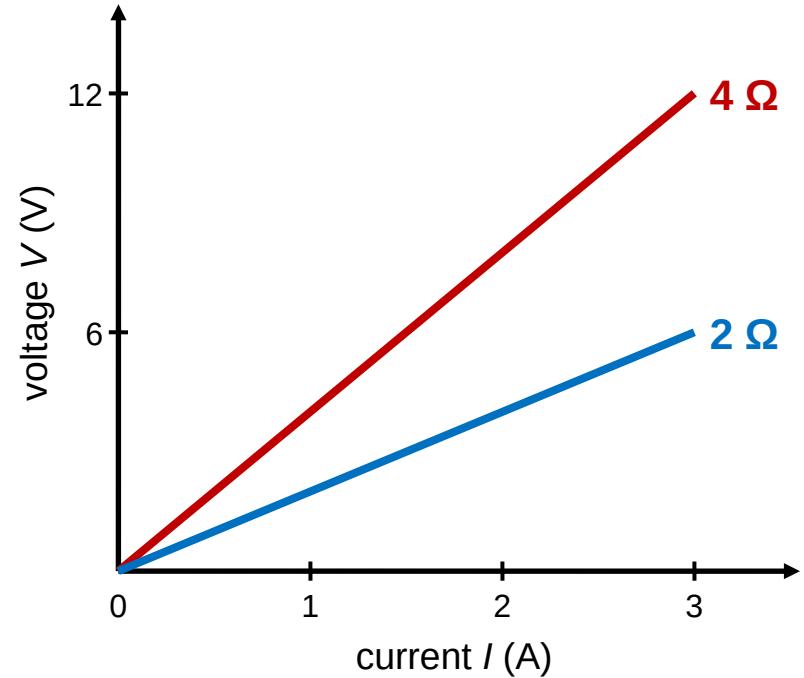
More Resistance, Less Current

- Same voltage, more resistance
- Double R , half the I
- $I = V/R$



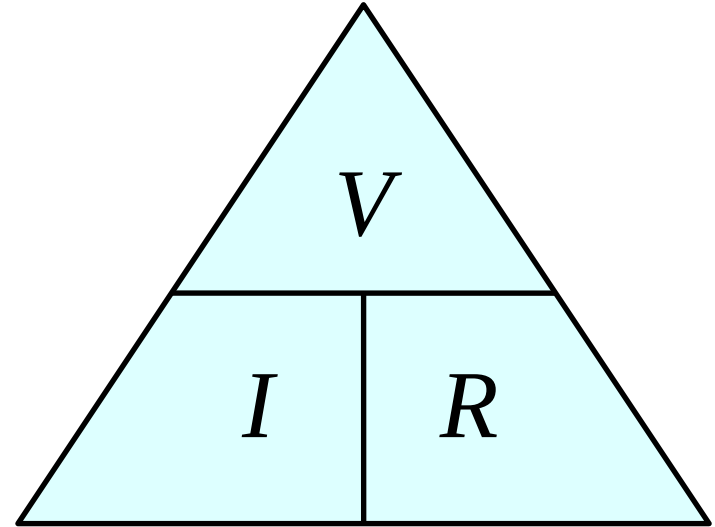
Graph of V vs. I

- Straight line through the origin
- Slope = R
- Steeper line: bigger R



Solving for Any Variable

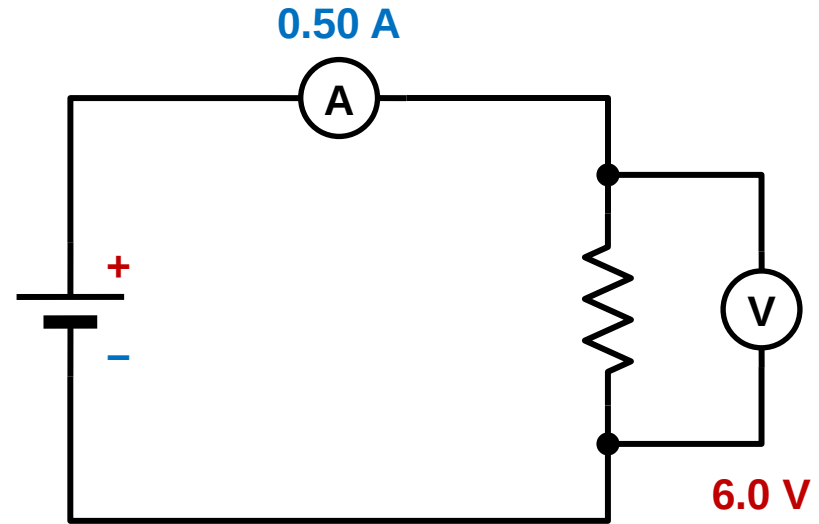
- Find voltage: $V = IR$
- Find current: $I = V/R$
- Find resistance: $R = V/I$



cover the one you want

Measuring Resistance

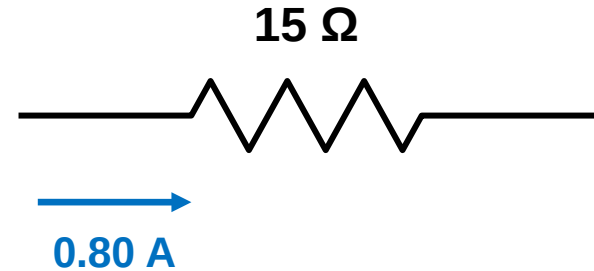
- Ammeter reads current I
- Voltmeter reads voltage V
- Then $R = V/I$



$$R = 6.0 \text{ V} \div 0.50 \text{ A} = 12 \Omega$$

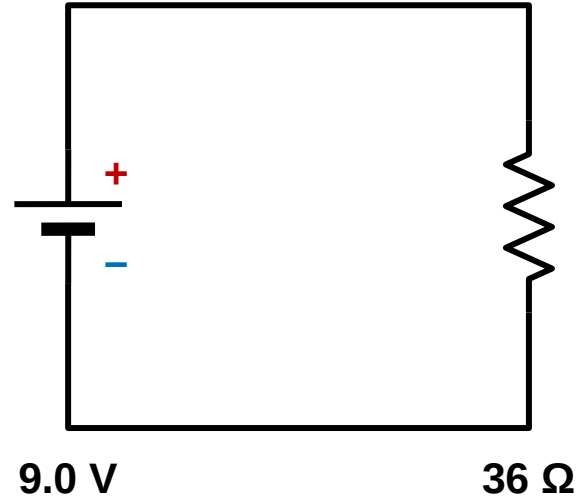
Example: Finding Voltage

A $15\ \Omega$ resistor has a current of 0.80 A through it. What is the voltage across the resistor?



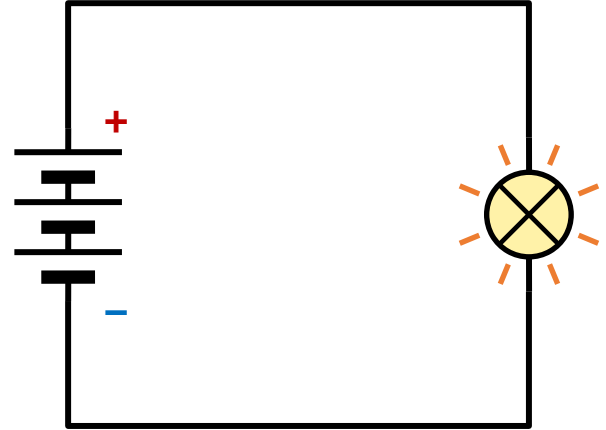
Example: Finding Current

A 9.0 V battery is connected to a $36\ \Omega$ resistor. What is the current in the circuit?



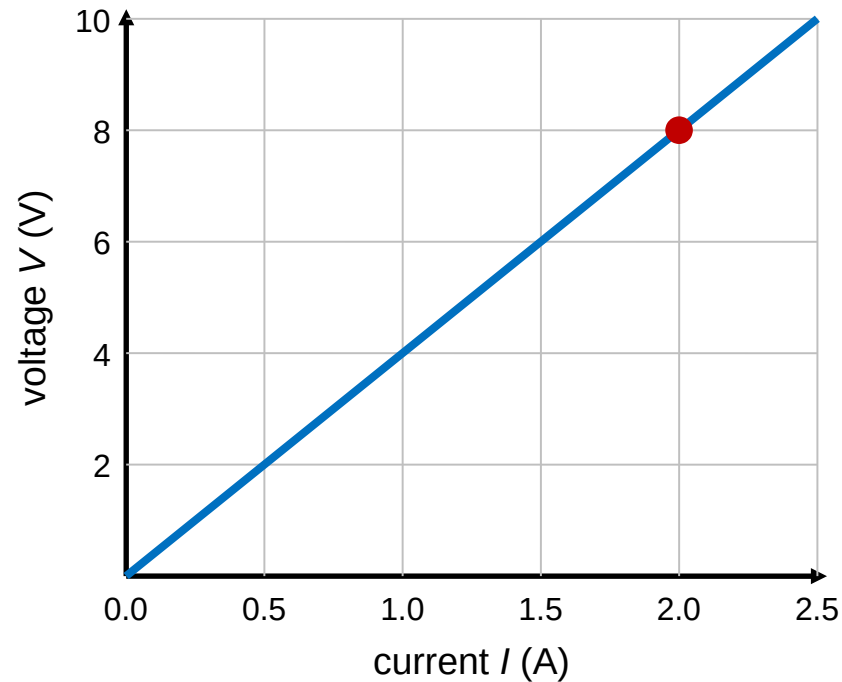
Example: Finding Resistance

A flashlight bulb draws 0.30 A from a 4.5 V battery pack. What is the resistance of the bulb?



Example: Reading a Graph

The graph shows voltage vs. current for a resistor. What is its resistance?



Big Ideas

- Ohm's law: $V = IR$
- More voltage, more current
- More resistance, less current
- V vs. I graph: slope = R