Edgenuity

Warm-Up | Ohm's Law

Lesson Question

How do voltage, current, and resistance affect one another?

Lesson Goals

Examine the concepts of current, voltage, and resistance.

Define Ohm's law.

Solve problems using current, voltage, and resistance.

Words to Know

Write the letter of the definition next to the matching word as you work through the lesson. You may use the glossary to help you.

B electric potential energy	A. the SI unit of electric current
D resistance	B. the potential energy an electric charge has due to its location in an electric field
A ampere	C. the measurement of electric potential difference in volts
C voltage	D. the tendency of a material to oppose the flow of charges
H electric circuit	E. the flow of electric charge
G ohm	F. the law stating that current is equal to voltage divided by resistance
F Ohm's law	G. the SI unit of resistance
E current	H. a path through which electric charges can travel

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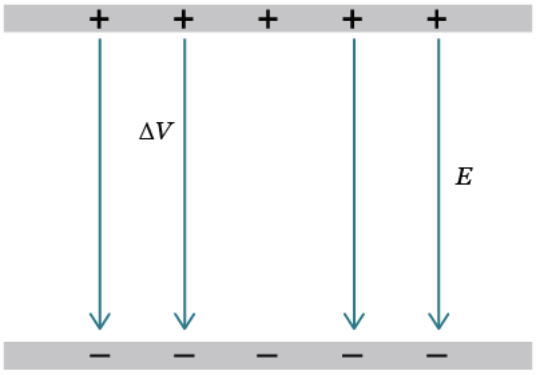
Electric Potential Difference

- For electrical [charges] to flow, an electric potential difference has to exist.
- Electric potential difference (ΔV) is the difference in electric potential (V) between two [positions].
- The unit for both electric potential and electric [potential difference] is the volt (V).



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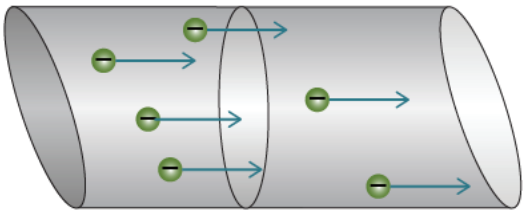
Electric Current

- Charge flows only when there is a difference in electric potential.
- Electrons flow from places with higher [electric potential energy] to places with lower electric potential energy.
- The continuous [flow] of electric charge is known as **current**.

- Quantitatively, current can be described as the rate at which a charge moves through a [cross section] of a conductor.



$$I = \frac{\Delta q}{t}$$

- A [coulomb] of charge through an area in one second is one **ampere** (A) of current.
- Current is the change in charge divided by the change in time.

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Electric Circuits

- An **electric circuit** is a path through which electric charges, or [current], can travel.
- Electric circuits contain a [power] source and devices that are run by electrical energy.

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Voltage

- **Voltage** (ΔV) is the difference in electric potential (V) between two positions.
  - The SI unit for voltage is the volt (V).
- Current always flows from [higher] electric potential to lower electric potential.
- The greater the voltage (difference in electric potential) is, the more [current] will flow.

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Resistance

- The tendency of a material to [oppose] the flow of charges is known as **resistance**.
  - The SI unit for resistance is the **ohm** (Ω).
- The greater the resistance is, the [less] current will flow.
- Resistance in a wire depends on the wire's thickness, length, and [temperature].
- Any device that uses electrical energy provides resistance in a circuit.

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Ohm's Law

- **Ohm's law** states that current is equal to voltage (V) divided by resistance (R).
  - I = current, measured in amperes (A)
  - V = voltage, measured in volts (V)
  - R = resistance, measured in ohms (Ω)

$$I = \frac{\Delta V}{R}$$

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Relationships between Current, Voltage, and Resistance

- According to Ohm's law, electric current is directly proportional to voltage and inversely proportional to resistance.
  - As voltage increases, current increases. As voltage decreases, current decreases.
  - As resistance increases, current decreases. As resistance decreases, current increases.

Summary | Ohm's Law

Lesson Question

How do voltage, current, and resistance affect one another?

Answer

(Sample answer) Current is inversely proportional to resistance and directly proportional to the voltage.

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Review: Key Concepts

- The rate at which electric charge flows is known as [current].
  - $I = \frac{\Delta q}{t}$
- Voltage, or difference in electric potential, is required for current to flow.
  - Current is directly proportional to voltage.
- [Resistance] slows the flow of current.
  - Current is inversely proportional to resistance.
- Ohm's law states that current is equal to voltage divided by resistance.
  - $I = \frac{\Delta V}{R}$

Summary | Ohm's Law

Use this space to write any questions or thoughts about this lesson.