

SCIENCE
FUSION Physical Science
HOLT McDougal

PowerNotes

Unit 3 Lesson 2 Electric Current

Current Events

What is an electric current?

- *Electrical energy* is the energy of electric charges. In most devices that use electrical energy, the electric charges flow through wires.
- The rate of flow of electric charges is called **electric current**.



How is electric current measured?

- An electric current describes the rate of flow of charges, such as the slow flow of many electrons through a wire. Electric current is the amount of charge that passes a location in the wire every second.
- Electric current is expressed in units called *amperes*, which is often shortened to “amps.” The symbol for ampere is A.
- A wire with a current of 2 A has twice as much charge passing by each second as a wire with a current of 1 A has.



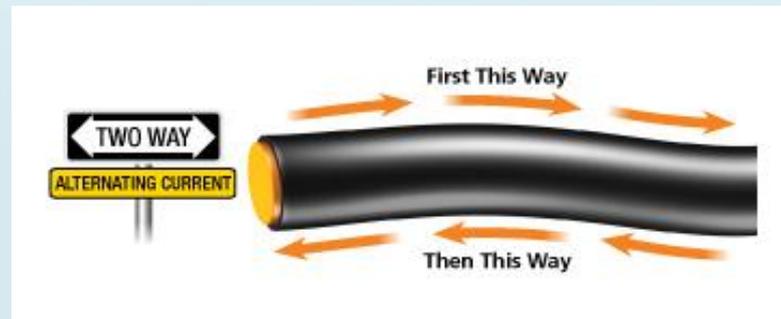
What are two kinds of current?

- Two kinds of electric current are *direct current* (DC) and *alternating current* (AC). Both kinds of current carry electrical energy. They differ in the way that the charges move.
- In direct current, charges always flow in the same direction. The electric current generated by batteries is DC.



What are two kinds of current?

- In alternating current, charges repeatedly shift from flowing in one direction to flowing in the reverse direction. The current *alternates* direction.
- Most household appliances run on alternating current. In the United States, the alternating current reverses direction and then returns back to the original direction 60 times each second.



You've Got Potential

What affects electric current?

- Two factors that can affect the current in a wire are *voltage* and *resistance*.
- **Voltage** is the amount of work required to move each unit of charge between two points. Higher voltage produces a higher rate of flow of electric charges in a given wire.
- Voltage is expressed in units of volts (V).



What affects electric current?

- Voltage is sometimes called *electric potential* because it is a measure of the electric potential energy per unit charge.
- The opposition to the flow of electric charge is called **resistance**. Resistance is expressed in ohms (Ω , the Greek letter *omega*).
- Higher resistance at the same voltage results in lower current.



What affects electrical resistance?

- A material's composition affects its resistance.
- Some metals, such as silver and copper, have low resistance and are very good electrical conductors. Other metals, such as iron and nickel, have a higher resistance.
- Electrical insulators such as plastic have such a high resistance that electric charges cannot flow in them at all.



What affects electrical resistance?

- Other factors that affect the resistance of a wire are thickness, length, and temperature.
- A thin wire has higher resistance than a thicker wire has.
- A long wire has higher resistance than a shorter wire has.
- A hot wire has higher resistance than a cooler wire has.



What affects electrical resistance?

- Conductors with low resistance, such as copper, are used to make wires.
- Conductors with high resistance are also useful. For example, an alloy of nickel and chromium is used in heating coils. Its high resistance causes the wire to heat up when it carries electric current.

