Electricity

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Electric Charge and Static Electricity

How do electric charges interact?

- Charges that are the same repel each other.
- Charges that are different attract each other.

Electric Charge and Static Electricity

What is an electric field?

- An electric field is a region around a charged object where the object's electric force is exerted on other charged objects.
  - Electric force: the attraction or repulsion between electric charges.
  - Electric field: the region around a charged object where the object's electric force interacts with other charged objects.

Electric Charge and Static Electricity

How does static electricity build up and transfer?

- In static electricity, charges build up on an object, but they do not flow continuously.
  - Static electricity: A buildup of charges on an object.

Electric Charge and Static Electricity

How does static electricity build up and transfer?

- There are three methods by which charges can be transferred to build up static electricity.
  - Friction: A method of charging an object by rubbing the object against another object.
  - Conduction: A method of charging an object by allowing electrons to flow by direct contact from one object to another object.
  - Induction: A method of charging an object by means of the electric field of another object.

Electric Charge and Static Electricity

What is static discharge?

- When a negatively charged object and a positively charged object are brought together, electrons transfer until both objects have the same charge.
  - Static discharge: The loss of static electricity as electric charges transfer from one object to another.

Electric Current

How is an electric current produced?

- To produce electric current, charges must flow continuously from one place to another.
  - Electric current: the continuous flow of electric charges through a material
  - Electric circuit: a complete, unbroken path through which electric charges can flow

Electric Current

How are conductors different from insulators?

- A conductor transfers electric charge well.
  - Conductor: a material through which charges can easily flow

Electric Current

How are conductors different from insulators?

- An insulator does not transfer electric charge well.
  - Insulator: a material through which charges cannot easily flow

Electric Current

What causes electric charges to flow in a circuit?

- Voltage causes a current in an electric circuit.
  - Voltage: the difference in electrical potential energy between two places in a circuit
  - Voltage source: a device that creates an electrical potential energy difference in an electric circuit

Electric Current

How does resistance affect current?

- The greater the resistance, the less current there is for a given voltage.
  - Resistance: the measurement of how difficult it is for charges to flow through a material

Batteries

What was the first battery made of?

- Volta built the first electric battery by layering zinc, paper soaked in salt water, and silver.
  - Chemical energy: the energy stored in chemical compounds
  - Chemical reaction: a process in which substances change into new substances with different properties

Batteries

How does an electrochemical cell work?

- Chemical reactions occur between the electrolyte and the electrodes in an electrochemical cell. These reactions cause one electrode to become negatively charged and the other electrode to become positively charged.

Batteries

How does an electrochemical cell work?

- Electrochemical cell: a device that transforms chemical energy into electrical energy
- Electrodes: a metal part of an electrochemical cell, which gains or loses electrons
- Electrolyte: a liquid or paste that conducts electric current

Batteries

How does an electrochemical cell work?

- Terminal: a convenient attachment point used to connect a cell or battery to a circuit
- Battery: a combination of two or more electrochemical cells in series

Batteries

How does an electrochemical cell work?

- Wet cell: an electrochemical cell in which the electrolyte is a liquid
- Dry cell: an electrochemical cell in which the electrolyte is a paste

Electric Circuits

What is Ohm’s law?

- Ohm’s law says that the resistance is equal to the voltage divided by the current
  - Ohm’s law: the law that states that resistance is equal to voltage divided by current

Electric Circuits

What are the basic features of an electric circuit?

- Circuits have devices that are run by electrical energy.

Electric Circuits

What are the basic features of an electric circuit?

- A circuit has a source of electrical energy.

Electric Circuits

What are the basic features of an electric circuit?

- Electric circuits are connected by conducting wires.

Electric Circuits

How many paths can currents take in series and parallel circuits?

- In a series circuit, there is only one path for the current to take.
  - Series circuit: an electric circuit with a single path
  - Ammeter: a device used to measure current in a circuit

Electric Circuits

How many paths can currents take in series and parallel circuits?

- In a parallel circuit, there are several paths for current to take.
  - Parallel circuit: an electric circuit with multiple paths
  - Voltmeter: a device used to measure voltage, or electrical potential energy difference

Electric Power

How do you calculate electric power?

- You can calculate power by multiplying voltage by current.
  - Power: the rate at which one form of energy is transformed into another; the unit of power is the watt
  - $P = VI$

Electric Power

What factors are used to determine how people pay for electrical energy?

- The total amount of energy used by an appliance is equal to the power of the appliance multiplied by the amount of time the appliance is used.
  - Energy = Power x Time
  - Kilowatt-hours = Kilowatts x Hours

Electrical Safety

What measures help protect people from electrical shocks and short circuits?

- One way to protect people from electric shock and other electrical danger is to provide an alternate path for electric current.

Electrical Safety

What measures help protect people from electrical shocks and short circuits?

- In order to prevent circuits from overheating, devices called fuses and circuit breakers are added to circuits

Electrical Safety

What measures help protect people from electrical shocks and short circuits?

- Short circuit: a connection that allows current to take an unintended path
- Grounded: allowing charges to flow directly from the circuit into Earth in the event of a short circuit
- Third prong:
- Fuse:
- Circuit breaker:

Electrical Safety

What measures help protect people from electrical shocks and short circuits?

- Third prong: the round prong of a plug that connects any metal pieces in an appliance to the safety grounding wire of a building
- Fuse: a safety device with a thin metal strip that will melt if too much current passes through a circuit

Electrical Safety

What measures help protect people from electrical shocks and short circuits?

- Circuit breaker: a reusable safety switch that breaks the circuit when the current becomes too high