



# TeachEngineering

*Ignite STEM learning in K-12*

## Forms of Energy and Electrical Circuits



Subscribe to our newsletter at [TeachEngineering.org](https://www.TeachEngineering.org) to stay up-to-date on everything TE!

Brought to you by



# Forms of Energy

# Energy

Energy is the ability to do **work**.

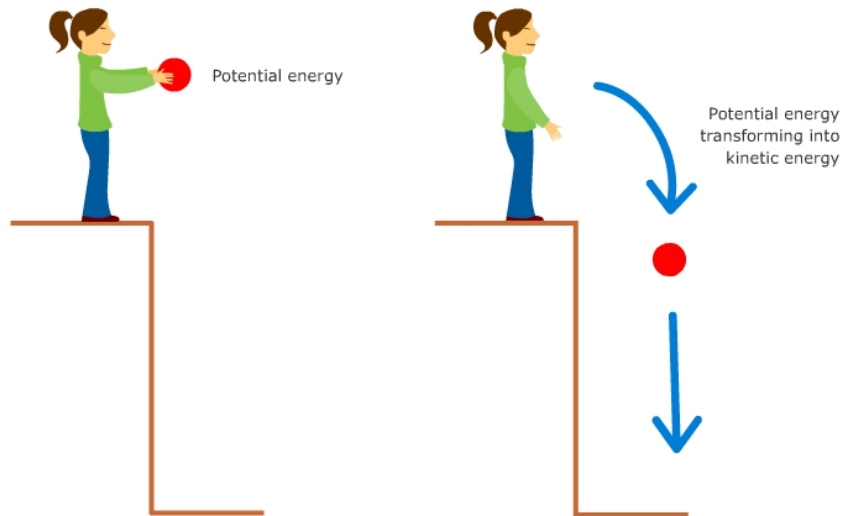
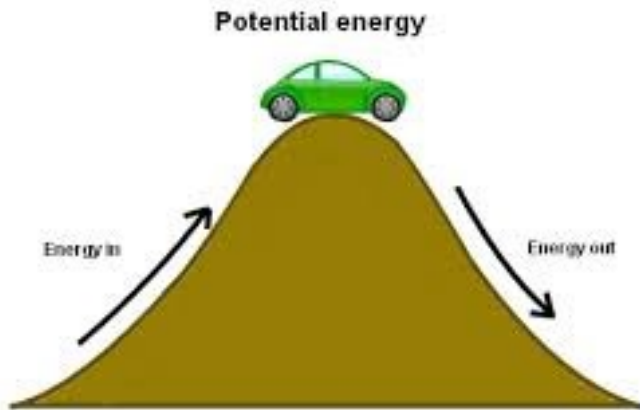
Energy exists in various forms: kinetic (mechanical), potential, thermal, chemical, electrical, light, sound, and nuclear. Energy cannot be created or destroyed – only converted from one form to another.



# Potential energy

→ the energy an object has because of its **position** or condition.

→ It is **STORED** energy



# Kinetic energy

→ the energy an object has due to its **motion, position, or condition.**

It is energy in **MOTION.**

Anything moving has kinetic energy.



# Mechanical energy

→ the total energy of an object due to its **motion PLUS its position**

→ Energy that **does work**.

Energy that is moving.





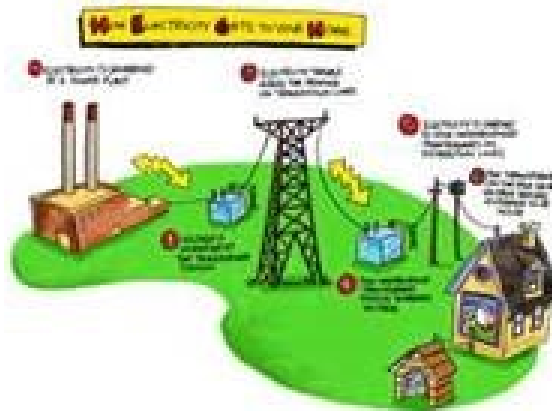
# Electrical energy



→ energy that comes from the **flow of electricity** through a conductor.

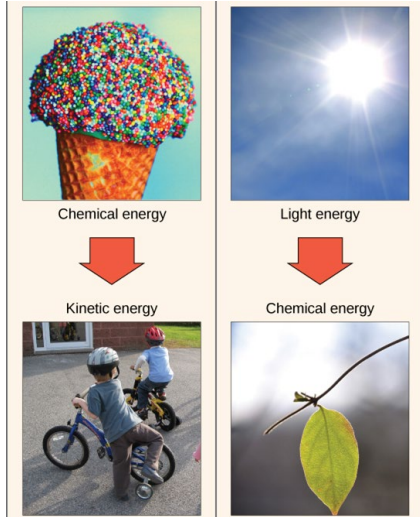
Use electricity by:

- plugging a cord into an outlet
- using a battery
- lightning



# Chemical energy

→ energy stored in matter that can be released by chemical reactions





# Light energy

- energy that
- can be **seen**
  - travels in a **straight line**
  - move through empty space where there is no air.



# Thermal energy

- the energy from **heat**
- The energy created by the movement of molecules causing an object to get **hot** and release heat.

*Also known as heat energy*



# Sound energy

- the energy of vibrations carried in waves by air, water, or other matter.
- energy you can **hear** caused by vibrations (rapid back and forth movement).



# Electrical Circuits

# Current

A flow of water, air, or electricity.



Air current



Water current

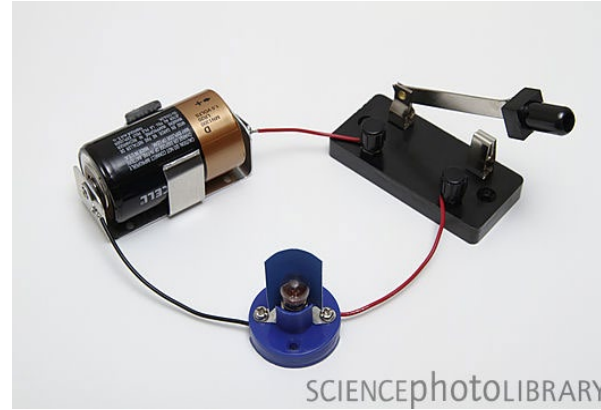


Lightning

# Open circuit (incomplete or broken)

An open circuit has a gap in the loop.

→ When a circuit is open, the device will not work.

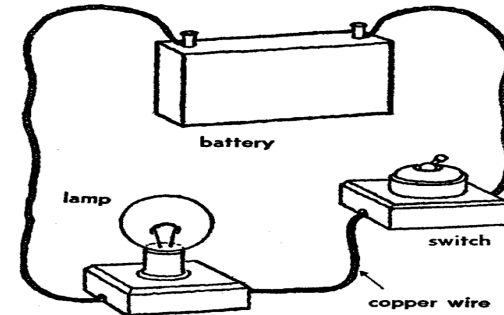
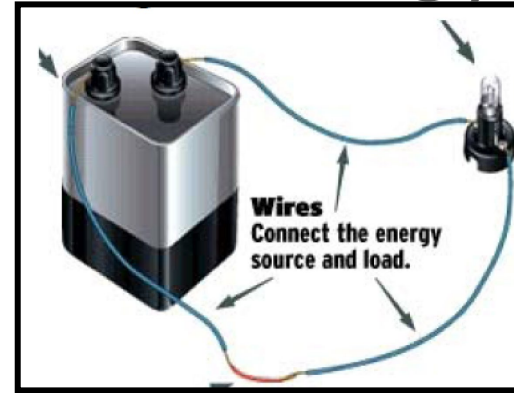


# Closed circuit (complete or working)

A closed circuit is a path that allows an uninterrupted, endless path for flow of electricity.

A closed circuit is a continuous loop.

When a circuit is closed, the device works.

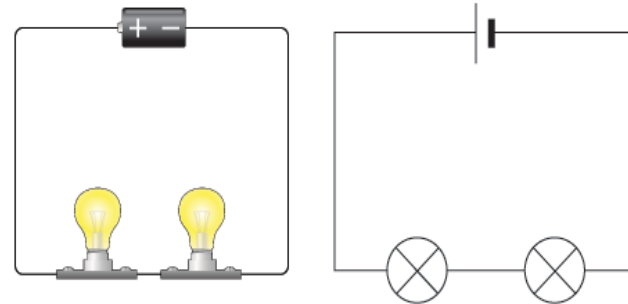
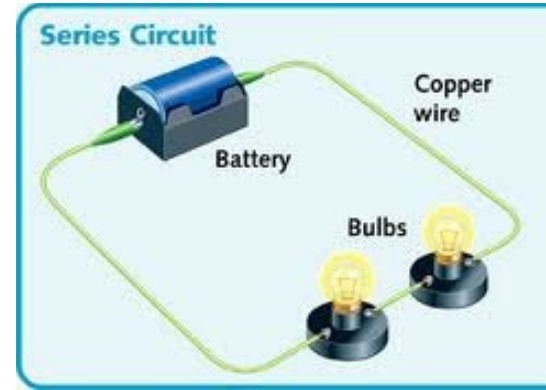


# Series circuit

All parts of a circuit in a single continuous path

Only **ONE** path for electric current.

If one part breaks, the circuit is broken.



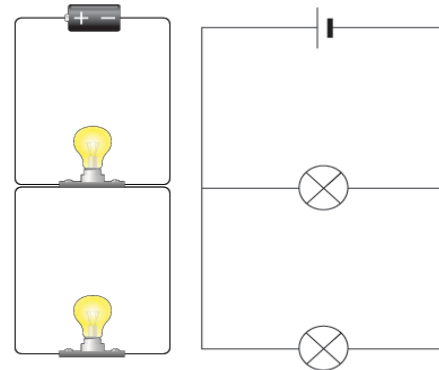
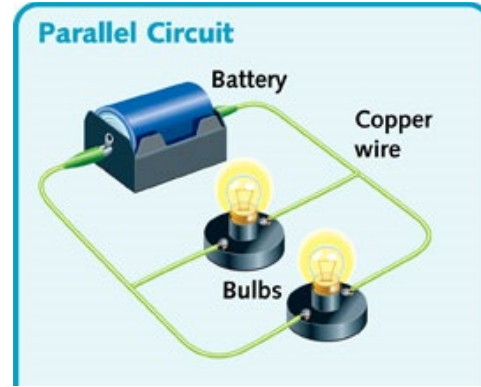


# Parallel circuit

All parts of a circuit in multiple paths

Two or more paths for electric current

If one part breaks, the circuit **still works**.



# Light Energy

# Light energy

A form of energy that

- can be **seen**
- travels in a **straight line**
- move through empty space where there is no air.



# Medium

→ a substance/material that a force acts on or energy is carried (passed) through

3 light mediums:

Transparent: all light passes

Translucent: some light passes

Opaque: no light passes (absorbed)

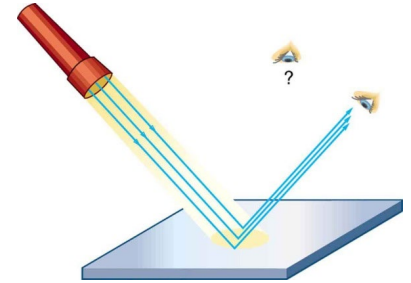
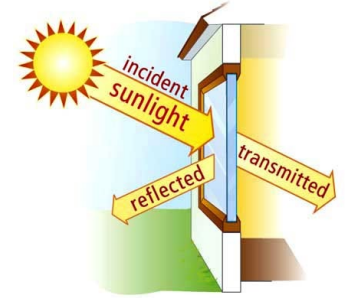
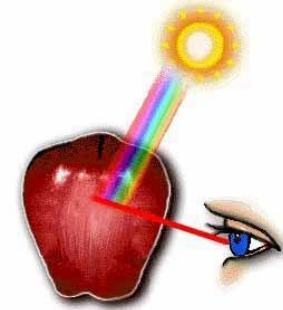


# Interaction

What happens to light when it interacts with a medium?

Light can:

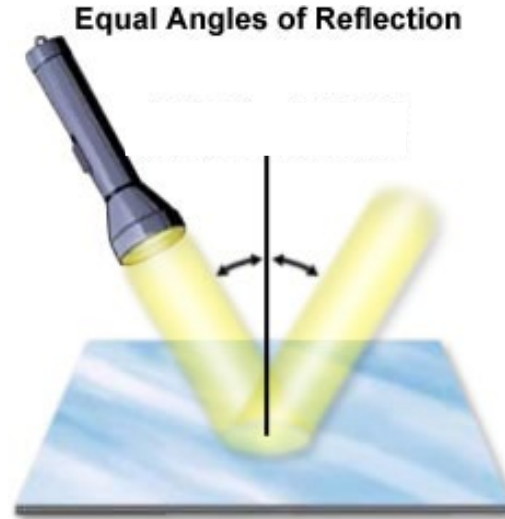
- Transmit
- Reflect
- Refract
- Absorb



# Reflect

Light energy that bounces off a surface.

Example: mirror, water surface, tinted windows/glass



# Refract

The bending or breaking of light rays as they pass from one substance to another.

Light slows down and changes direction when it enters a medium.

Example: lens



# Transmit

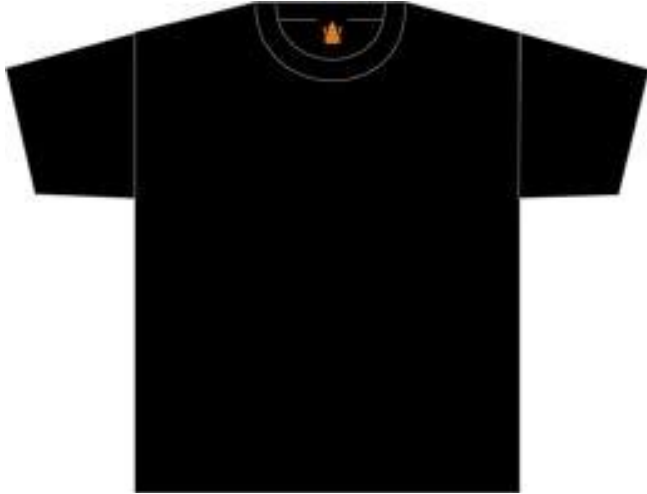
- All light passes through
- Light interaction
- When light comes into contact with a transparent medium

Example: window





# Absorb



- Stops or blocks light from passing
- Turns energy into heat
- Happens with opaque mediums
- Example: the color black