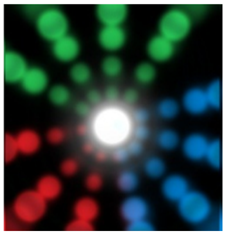
PHYSICAL SCIENCE: LIGHT, ELECTRICITY, & MAGNETISM FLIP CARD

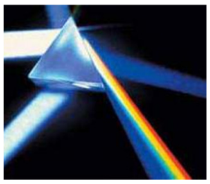
Big Idea: We rely on light to see the world around us. When light strikes an object, it is reflected, refracted, or absorbed by materials that are transparent, translucent, or opaque.



Brightness-- The intensity of light or ***brightness*** of light is related to the **amount of light** being received by the eye. The closer the source of the light is, the greater the brightness.

Visibility -In order for an object to be visible, it must either be a **source** (**give off its own light)** or it must **reflect light**. The Sun, a candle flame, or a flashlight gives off visible light; the Moon and many objects around us must **reflect** light in order to be seen.

Colors -- ***primaries for light are red, blue, and green, NOT yellow, which is a primary for pigments (paints and dyes).*** The different colors of light are revealed when white light is passed through a

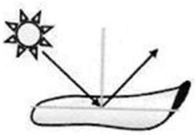


prism (a wedge of transparent glass or plastic) and separated into the different colors of the rainbow, called the ***spectrum***.

People commonly remember the colors in order, from lowest to highest frequency with the name

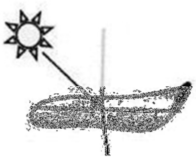
ROY G BIV--RED ORANGE YELLOW GREEN BLUE INDIGO VIOLET

Light with a slightly lower frequency than red is called **infrared** and light with a slightly higher frequency than violet is called **ultraviolet**.



Reflection: light **bounces back** from a surface.

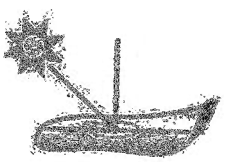
- **Reflection allows objects to be seen that do not produce their own light**.
- ***The color of the light that is reflected from an object is the color that the object appears***. For example, an object that reflects only red light will appear red.



Refraction: light passes through **transparent material** and **changes direction.**

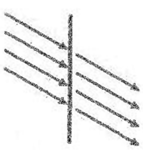
--For example, when light travels through a convex magnifying glass, it changes direction and spreads out, and we see a larger, magnified view of the object.

-- When a straw is viewed in water, light passes from the water to the air causing the path of the light to bend. When the light bends, the straw appears bent or broken

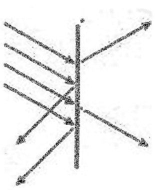


Absorption: **light does not pass through or reflect from a material.** It remains in the material as another form of energy.

- The colors of objects are determined by the light that is not absorbed but is reflected by the objects. All other colors of light striking the object are absorbed by the object. A red object, for example, reflects red colors of light and absorbs all other colors.



Transparent**--allows light to pass through** it because it is not absorbed or reflected. Objects can be seen clearly when viewed through transparent materials. **Air, glass, and water** are examples of transparent materials.



Translucent**--scatters or absorbs some of the light** that strikes it and allows some of the light to pass through it. Objects appear as blurry shapes when viewed through translucent materials. **Waxed paper and frosted glass** are examples of translucent materials.

Opaque**--does not allow light to pass through**; light is either reflected from or absorbed by an opaque material. **Wood, metals, and thick paper** are examples of opaque materials.

Big Idea: Electricity, electrons in motion, can be transformed into other forms of energy by creating circuits that conduct electricity in a closed loop.

Energy is the ability to make something move, happen, or change.

Motion—Electrical energy can be changed to motion energy with motors or generators.

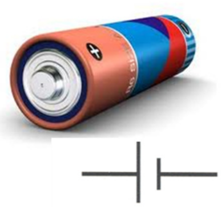
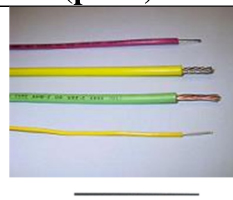
Light -- Electrical energy can be changed to *light energy* with bulbs or computer monitors.

Heat -- Electrical energy can be changed to *heat energy* in stoves, toasters, and ovens.

Sound -- Electrical energy can be changed to *sound energy* with radios and televisions.

***Conductors* allow electric current to flow** through them in an electric circuit. If a bulb stays lit when an object is added to an electric circuit, the material is conducting the current. Metals are conductors of electricity
***Insulators* do not allow electric current to flow** through them in an electric circuit. If a bulb does not stay lit when an object is added to an electric circuit, the material does not conduct current, and it is an insulator. Plastics, glass and rubber are examples of insulators.

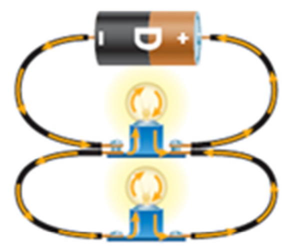
Components (parts) and Symbols of Simple Complete Circuits

			
The ***battery*** provides the electric current for the circuit with a chemical reaction of acids and metals	The ***wire*** conducts the electric ***current*** (the flow of electricity). The rubber or plastic covering insulates the wire.	The ***light bulb*** is the object in the circuit that changes electrical energy to light energy	The ***switch*** completes the circuit and allows current to flow if closed and stops the current if open

Series circuit

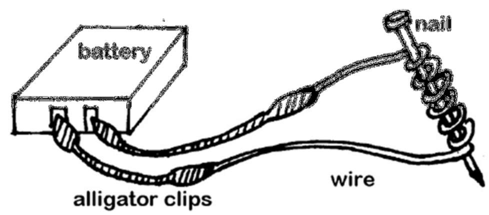
- ***One complete path*** from the source of the current through one or more devices that change electrical energy to another form of energy (light bulbs).
- If one light bulb in a series goes out, all the other light bulbs in the circuit go out too because the circuit is no longer complete.

Parallel circuit

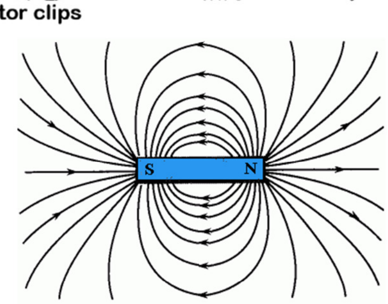


- ***The current branches into several loops,*** creating more than one path through which the electric current flows to devices that change electrical energy to other forms of energy.
- If a light bulb goes out in one of the loops or paths of a parallel circuit, the lights in other loops stay on because the electric current flows in multiple paths.

Big Idea: Some metal objects are sources of magnetic force (related to electric force). Their molecules are aligned so electrons orbit in the same direction to create force fields that attract or repel other metal objects from a distance.



Electromagnets – British scientist Michael Faraday experimented with the relationship between magnetism and electricity in the early 1800s to create electromagnets, **metal bars with wire coiled around them that create a temporary magnetic field when he applied current to the wire**. Electromagnets form parts of many modern technologies.
Polarit*y*--magnets and electromagnets have areas on their ends that are called *poles*. The magnetic pull or attraction is strongest at these poles. Every magnet has a *North* pole and a *South* pole, which scientists label based on their reaction to Earth's magnetic field.



Attraction - magnets and electromagnets *attract* or tend to move toward each other (if unlike poles are near each other) and certain types of metals (mainly iron or steel).
Repulsion - Magnets and electromagnets can *repel* or move away from each other if their like poles (North-North or South-South) are brought near each other.
Strength - The attractive *strength* of a magnet or electromagnet is greatest at its poles. Some natural magnets have a greater attraction for magnetic materials than others. Electromagnetic strength depends on the current passing through the coiled wire (more coils will create a stronger force.