

# Science Rules

## Sound

Sounds are everywhere and they all have one thing in common. All sounds are created by objects vibrating back and forth. The vibrations cause sound waves to travel. As sound waves travel they bounce and reflect off of objects. Soft surfaces absorb sound. Sound bouncing off of a hard surface causes an echo. Some animals, like bats, use echoes to help them hunt.

Sounds travel through solids, liquids, and gases differently. A solid transmits sound the best because it's molecules are tightly packed and in neat rows. Glass, brick, and wood are good conductors of sound. Pillows and blankets are not good conductors of sound because they're soft and their molecules are spaced far apart.



In the experiment *Traveling Sounds*, sounds travel differently through solids, liquids, and gases.

One of the activities on sound was called *Phone a Friend*. The telephones that were used in the experiment were made out of two styrofoam cups and a string. The first experiment was talking through the telephone when the string had slack. Slack means the string is not pulled tight. When the string had slack there was little or no noise. When the string was pulled tight the sound was able to be heard because when the string had slack it wasn't vibrating like it was when it was pulled tight.



In the experiment *Phone a Friend* sounds travel through the string when the string is pulled tight.

What is pitch? Pitch is the highness or lowness of a sound. If a low pitch is made it's vibrations are slow. To make a high pitch the vibrations have to be fast. When a rubber band is plucked it has a low pitch. If the tension is increased it will become a higher pitch. Sound is an amazing thing and it helps us do lots of things.

## Light

Light is an important source of energy. When light hits an object it can be reflected, absorbed, or it can pass through. It is able to travel through solids, liquids, or gases. An object that transmits light can be transparent, translucent, or opaque.



In this picture it shows how a straw looks broken when it is placed in the cup of water.

If light is being reflected it is bouncing light off the same angle that it struck. When light is absorbed it does not travel through the object. The light rays can also pass through objects .An example of an object that allows light to pass through is a window. Objects are either transparent, translucent, or opaque. If an object is transparent it allows all light to pass through and if it is translucent it only allows some light to pass through. Objects that are opaque don't allow any light to pass through.

Light always travels in straight lines. In the experiment *Flashlight Findings* the procedure was to use rubber bands to

hook a toilet paper tube to a flashlight. When the tube is looked through when it is on the flashlight straight it is possible to see the beam of light. If it is looked through while the tube is on an angle it is not possible to see the beam of light because light travels in straight lines.



In this picture it shows what the flashlight looks like when the tube is on straight.

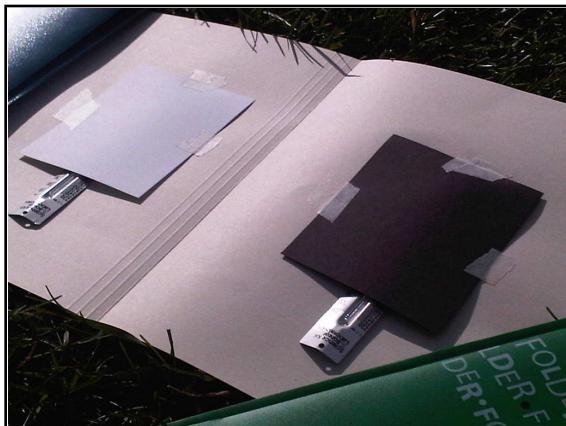
Light can be refracted (bent). When light is refracted it is traveling from one transparent material to another. If a pencil is placed in a cup of water then looked at from the side the pencil looks broken. The pencil looks like that because light rays are slowing down when they hit the water.

Sir Isaac Newton lived in the 1700's and did lots of experiments with light. Newton discovered that white light is every color in the world mixed together. He also found out that a red apple looks red because it reflects the red light the most. A green leaf looks green because it reflects green light the best. Light is an amazing thing and can be greatly appreciated (especially in the dark).

Student Name

## Heat

Are heat and energy the same thing? No, heat is the motion of molecules measured by temperature. Heat is measured with a thermometer. Most temperatures are filled with mercury or alcohol which rises when the temperature gets warmer and lowers when it gets cooler. When molecules get warmer they move much faster. Molecules at a cool temperature move slow.



This picture shows what the folder looked like when it was being used.

Heat tends to move from warmer to cooler things. If a leg of a chair and a pencil are touched the leg of the chair feels cooler but it really isn't. The chair feels cooler because it is a good conductor of heat. Most metals are good conductors of heat. The pencil is a good insulator. Wood and tile are good insulators too.

One of the experiments done in class was *Hot pockets*. In the experiment a black and a white pocket were taped inside of a folder. The pockets were set outside in the shade and their

temperature was taken. After that the folders were set in the grass and their temperature was taken every five minutes for thirty minutes. In the end the black pocket stayed warmer than the white one because black absorbs more light than white.

In class an experiment called *Hot Chocolate* was done. During *Hot Chocolate* a tin foil bridge was made and put across two cans with four chocolate chips lined up across it. When a candle was put under the bridge next to a can the chocolate chips melted from the one closest to the candle to the one farthest away from it. This happened because heat likes to travel from warmer to cooler.

Another experiment done in class was called *Cool Down*. In this experiment different types of fabrics were brought in and wrapped around cups with only the tops exposed. Thermometers and lids were put on the cups after warm water was poured in them. Every ten minutes for forty minutes their temperature was taken. The fabric that let the most heat escape was cotton.



These are some of the fabrics used in the experiment *Cool Down*.

What is conduction, convection, and radiation? Conduction is the movement of molecules through solids. The experiment *Hot Chocolate* is an example

of conduction. Another example of conduction is a pot of boiling water. Convection is the movement of liquids from a cooler spot to a warmer one. An example of convection is when hot air rises. Radiation is the movement of heat through space. For example the sun heating the earth is an example of radiation.

Normally the United States of America uses fahrenheit to take temperatures. If you are a scientist you would use celsius. Celsius is much colder than fahrenheit. Heat is amazing and is loved by many people (especially in the winter).

## Electricity

Electricity powers many things. Some things that electricity powers are TVs, computers, and refrigerators. What is a current? A current is a steady flow of electrons. What are circuits? Circuits are complete loops of electricity. What is a closed circuit? A closed circuit is a complete loop with a power source (like a battery), an appliance, and wires to connect them. What are open circuits? Open circuits are circuits that are incomplete.

Static electricity is not a useful power source. Why? It's not useful because all of the electricity is released at once.

Switches are used a lot, but what are they? A switch is a device that opens and closes a circuit. Usually switches are seen on walls, lights, and fans. Switches are important parts of some circuits because if it were a lamp the lightbulb would go out a lot faster without a switch.

In the experiment *Sparky's Light Kit* a Dcell, a lightbulb, and a paperclip were

used. With these materials a way had to be found to light the lightbulb. For the experiment *Pathfinders* the procedure was to look at different pictures of circuits and test them to see if that circuit actually got the lightbulb to light. After that a "repair manual" was made to show how to fix the circuits that didn't work. One fix that was made was putting in a wire so that the metal part of the lightbulb was touching the positive terminal and the other end of the wire was touching the negative terminal.

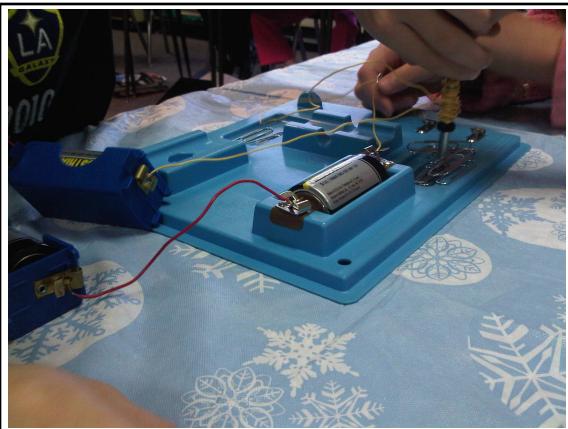


In this picture it shows one of the many ways to light the lightbulb.

What is a conductor? What is an insulator? A conductor is an object that lets electricity pass through easily. An insulator is an object that doesn't let much electricity pass through. In the experiment *Conductor or Insulator* different materials were tested to see if they were good conductors or good insulators of electricity. Some materials that were used were a paperclip and a pencil.

What are energy transformations? They are when energy transforms into a different kind of energy. One example of an energy transformation is when a telephone is being used the sound energy from the person's voice transforms into

electricity that flows through the telephone wires and turns back into sound energy again.



This picture shows the setup of the electromagnet demonstration.

What is an electromagnet? An electromagnet is a magnet created by an electric force. Electromagnets are very important because they help run washers, driers, and other appliances. In the electromagnet demonstration a battery and a nail were used to pick up paperclips. Two ways to increase the strength of an electromagnet are to increase the voltage or to coil the wire. Electricity powers lots of things. Without it life would be a lot harder and not as fun.

Student Name

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