stem to Read

Imagine! Design! Make!

Tinker and create with this kit full of activities that explore many concepts such as balance, circuits, and magnetism! This kit is suited for a wide range of learners.

New Mexico State Library

to Read

INVENTORY OF TRUNK

Imagine! Design! Make!

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❑	❑	Noun and adjective descriptors (for Cardboard Building activity; please make copies!)
❑	❑	Parent surveys
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Over →

Books

- ❑ ❑ *Iggy Peck, Architect* by Andrea Beaty
- ❑ ❑ *I Have an Idea!* By Herve Tullet
- ❑ ❑ *Magnets Push, Magnets Pull* by David A. Adler and Anna Raff
- ❑ ❑ *Magnet Max* by Monica Lozano Hughes and Holly Weinstein
- ❑ ❑ *Oscar and the Bird: A Book About Electricity* by Geoff Waring
- ❑ ❑ *Rosie Revere, Engineer* by Andrea Beaty
- ❑ ❑ *Rosie Pioneara, Ingenieria* by Andrea Beaty
- ❑ ❑ *Sandy's Circus: A Story About Alexander Calder* by Tanya Lee Stone and Boris Kulikov
- ❑ ❑ *The Story of Buildings: From the Pyramids to the Sydney Opera House and Beyond* by Patrick Dillon
- ❑ ❑ *The Three Little Pigs: An Architectural Tale* by Steven Guarnaccia

Cardboard Building

- ❑ ❑ Various cardboard cutouts
- ❑ ❑ Laminated noun descriptor cards
- ❑ ❑ Laminated adjective descriptor cards
- ❑ ❑ Container of powdered graphite

Cardboard Circuits

- ❑ ❑ Alligator clips
- ❑ ❑ 20 wires with magnets
- ❑ ❑ Mini generator
- ❑ ❑ Various cardboard-mounted circuit components

Kinetic Sculptures

- ❑ ❑ 3 balancing stands
- ❑ ❑ Set of Tinkertoys
- ❑ ❑ 4 red Tinkertoy pieces with nuts and bolts

Graphite Circuits

- ❑ ❑ 3 squeeze bottles of graphite paint
- ❑ ❑ Small cardboard squares
- ❑ ❑ 2 clear tape dispensers
- ❑ ❑ Funnel
- ❑ ❑ Measuring Cup
- ❑ ❑ Paintbrushes

Magnetic Towers

- ❑ ❑ 8 Magnetic rods
- ❑ ❑ 2 containers of hex nuts
- ❑ ❑ 5 small metallic bases
- ❑ ❑ Large metallic base
- ❑ ❑ Metal pull chains at different lengths

Other Activity Items

- ❑ ❑ Digital Multimeter
- ❑ ❑ Compartment box with various electrical components

To Be Provided by Borrowing Library*

- ❑ ❑ Aluminum foil
- ❑ ❑ Brass fasteners
- ❑ ❑ Binder clips
- ❑ ❑ Cardboard of various sizes
- ❑ ❑ Paper clips
- ❑ ❑ 2oz portion cups
- ❑ ❑ White glue
- ❑ ❑ Clear tape
- ❑ ❑ Batteries (AAA, 9-volt, CR2032)

* Some of these materials are provided in the kit but may be recommended to purchase as they will not be restocked by NMSL in the future.

Checked by ______________________________ Date ______________

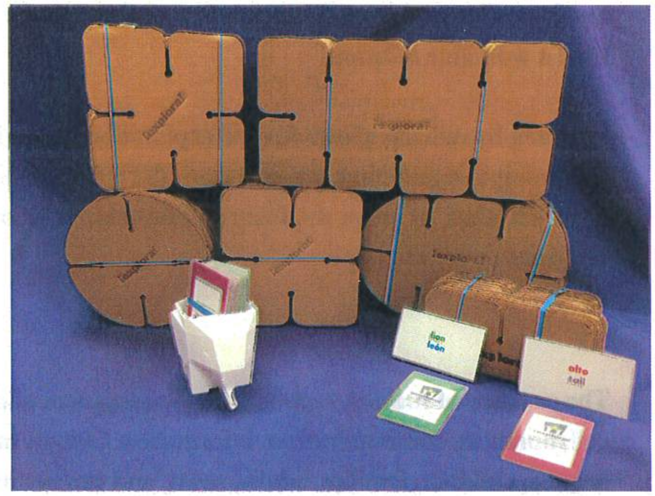
Checked by ______________________________ Date ______________

Cardboard Building

Use your imagination to create, design, and build with cardboard.
Use nouns and adjectives as inspiration to create sculptures out of cardboard.

Beforehand

Check that all pieces are in good shape. Repair/replace as needed.



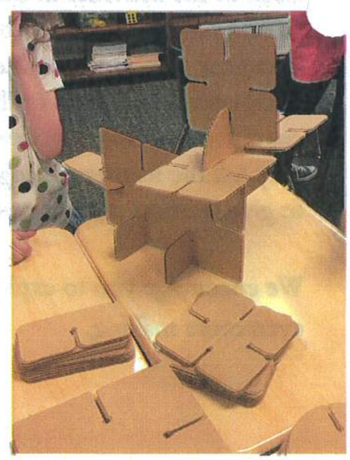
Materials Included

- 150 pieces cardboard cutouts
- 1 pack purple cards with noun descriptors
- 1 pack green cards with adjective descriptors

Setup

Arrange the cardboard cutouts on a table. Create two piles of cards (1 purple stack--marked A for color blind students, 1 green stack--marked N) and arrange face down.

Facilitation Notes



Encourage participants to see how they can connect the cardboard pieces. Feel free to encourage free construction. Learners can also draw one card from each pile and construct that object. For example, someone may draw the cards "happy" and "lobster" and then will have to construct a happy lobster. When possible, use the terms "noun" and "adjective" to describe the cards and make cross-curricular connections between grammar and science. While some learners may struggle with some of the adjective cards, the challenge can be made simpler by only picking up and constructing the green noun cards. Once the learner is more comfortable creating, the purple adjective cards can be reintroduced to create more expressive objects.

If multiple people are building, they can play a game in which they have to guess what the other people have built. Beyond the cards, you can encourage people to build creations based on a particular theme, book, or author to motivate and inspire.

Questions to Extend Discoveries

"Tell me about what you are making."
"What are the most common uses for cardboard? How are these uses similar? How are they different?"
"How do these cardboard pieces fit together?"
"How could you connect cardboard in other ways?"
"After drawing one of each of the two types of cards (items, descriptors), how can you build the described object?"
"Which items and descriptors are easier to construct? Which ones are more challenging?"

Cardboard Circuits

Design electrical circuits using wires with alligator clips and magnets.

Beforehand

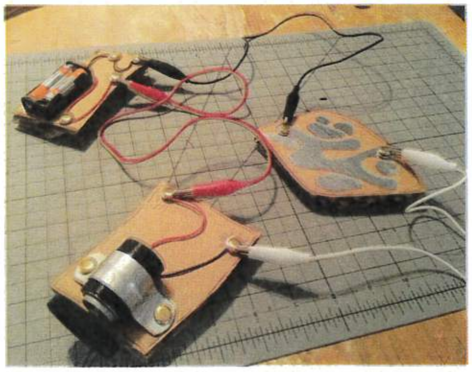
- Check for broken connections and repair.
- Be sure to take out batteries after each program.
- Use the multimeter to check batteries. A good voltage reading is 1.4v or higher.

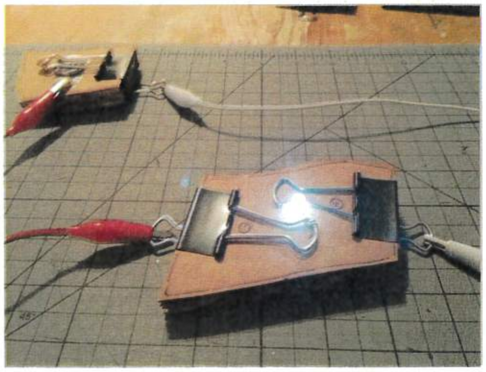
Materials Included

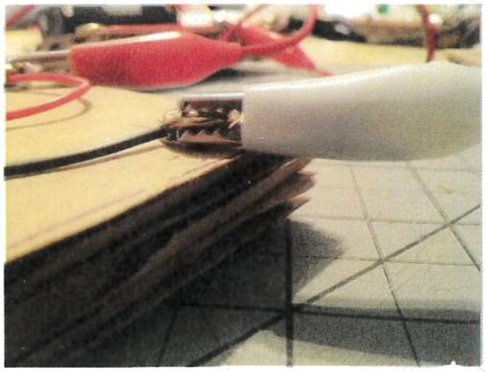
- Cardboard-mounted circuit components
  - 4 Batteries
  - 4 Lights
  - 4 Motors
  - 4 Switches
- Alligator clips
- Spare lights, motors
- Double/triple ply cardboard
- Wire strippers (for repairs only)
- Hand crank generator
- Switch - making tools
  - Cardboard
  - Paper clips
  - Binder clips
  - Brass fasteners
  - Aluminum foil
- Multimeter

Setup

Arrange cardboard components on table with alligator clips attached to some of them.







"How can you continue to build with cardboard at home?"
"What other materials or objects that are often thrown away could be recycled into imaginative building pieces?"
"What is surprising about building with these cardboard pieces?"

Connections to Everyday Life

Many different materials that are used for building! For building structures in a variety of sizes or shapes, smaller modular components can be used. Bricks are an example. These simple and small shapes allow us to construct larger items with a more intentional function. Small-scale examples children may have used are wood or plastic stacking or snap-together blocks.

Cardboard is easy to find and has many possibilities. The corrugation between layers gives cardboard a strong structure, and because it is made of paper it can be cut and manipulated easily. Almost anyone can work with cardboard!

Before full-scale construction begins, architects and other designers often use create *prototypes*, which are small scale models These are often made using materials that are easy to work with, such as cardboard, foamboard, cardstock, and/or balsa wood. In many cases, the exhibits at Explora are first built as a prototype using cardboard material.

Facilitation Notes

Encourage learners to try to make a complete circuit that includes a battery and a light or motor. Next add in a switch and challenge the learner to turn the light motor on/off by using the switch in the circuit. Now challenge the learners to create their own switches using the materials and tools available. Have them try making different circuits with different components and test out different ways to create circuits.

Questions to Extend Discoveries

"It can be tricky… can you get the light bulb to turn on? Can you get both a light and a motor on at the same time?" [Facilitator hint: there are multiple configurations.]

"What have you been able to turn on?"

"I noticed to that you made a circle between the battery and light bulb with the wires. What would happen if we made this circle bigger and included another piece?"

"What things do you know use electricity?"

"Some materials allow electricity to conduct electricity and others do not. How can you find out what materials are conductors of electricity?"

"What is your power source for your circuit? What can you turn on?"

"How can you tell that your circuit is complete and working?"

"What does a switch do? How might you make one?

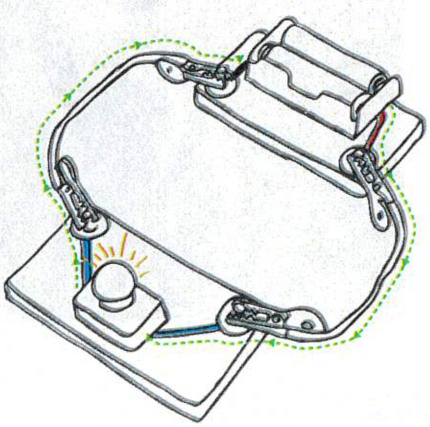
"How can you add a switch so you can turn your circuit on or off?"

Connections to Everyday Life

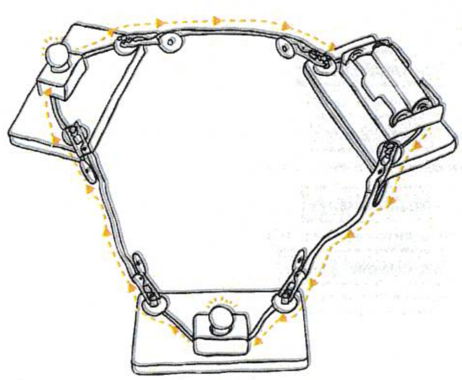
What is a circuit? A circuit is a closed loop (like a circle) where electrons flow from an energy source, such as a battery, to the object being turned on, such as a light bulb, and back again. Switches work by breaking the circuit (loop), thereby breaking (interrupting) the connection so that the electrons cannot flow. See graphics below for basic types of circuits.

Images from CIP Learning Store

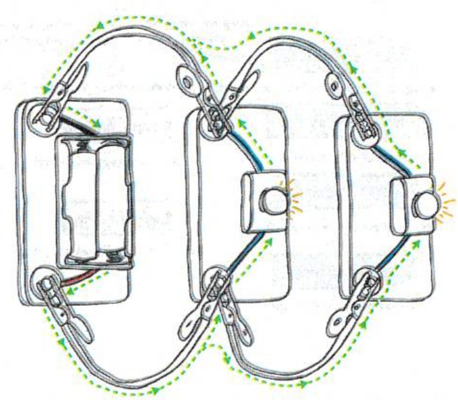
Simple Circuit



Series Circuit



Parallel Circuit



The discovery of electricity is one of the most important discoveries of our modern world. In how many ways have you used electricity today? How is the library using electricity right now? When you use electricity where does that electricity go? How can you create electricity without a battery? We use electricity constantly but may not always think about what is happening beyond the flick of the switch. These circuits use small batteries to power a single light or two, but think about how much power we need for our homes, schools, and places we visit everyday. Try to come up with a list of as many things as you can think of that use electricity.

Now think about this: Electricity isn't just used for power! Did you know that there are tiny versions of the circuits you play with in every cell phone, TV, and computer? These circuits do very complicated math in a fraction of a second so that we see videos, hear music, play a game, or surf the web. Electricity is also used to make magnets! And sometimes magnets are used to make electricity. We use short bursts of electricity to send signals for communication. And did you know that light is made up of both electricity and magnetism? Our ability to make things that can manipulate electricity also help us to manipulate light to send cell phone signals from towers to phones, communicate with satellites in space, and even convert light into electricity to power our homes.
(Source: Wikipedia contributors. (2019, March 8). Electrical network. In *Wikipedia, The Free Encyclopedia.* Retrieved 07:05, April 20, 2019)

Hand Crank Generator

The Cardboard Circuits and Graphite Drawing activities allow you to connect your lights to a power source. The power sources in these activities come in the from of stored chemical energy in batteries. 9 volt, AAA and coin batteries, when connected into a circuit, light up your bulb with electrical energy. The hand crank allows you to provide the mechanical energy as it converts this to electrical energy, to power the lights or motors. Use the magnetic wires or alligator clips to connect the hand crank to the component you want to power.

The crank can be turned in either direction. What happens? How much mechanical energy is needed to turn on the incandescent bulbs? How much energy is needed for the different LEDs? How can you use the hand crank to power the motor?

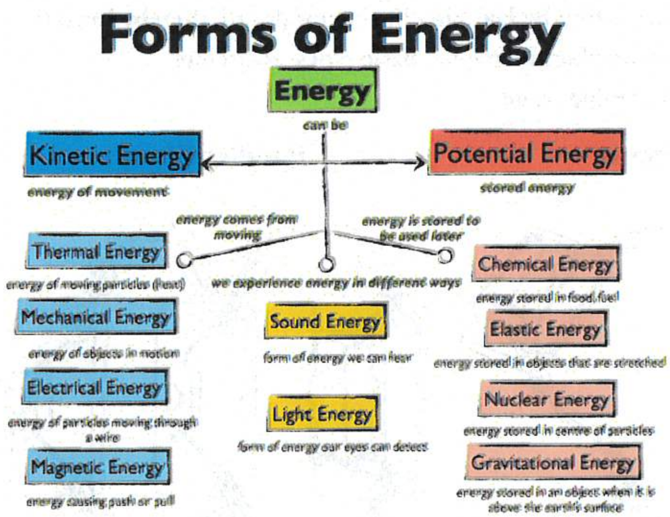


Chart Source: http://www.justscience.in/articles/energy-and-its-types/2017/05/14

Kinetic Sculptures

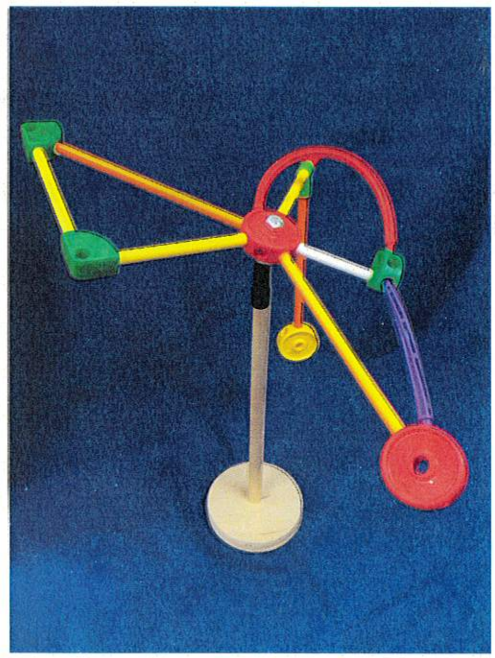
Use your engineering skills to create a sculpture that is balanced and can move without falling. Discover the center of gravity and extend your project by adding more pieces. How big can you go?

Beforehand

Make sure that you have four red pieces with metallic bolts and that all the pieces are in good shape. Repair or replace as needed. Ensure the balancing wooden stands have the magnets secured to the top. Attach the red pieces with the nuts and bolts to the magnetic stand.

Materials Included

- 3 Balancing stands (including cylindrical magnet on top)
- 200 piece set of K'Nex® TinkerToys
- 4 Red tinker toy pieces with nuts and bolts
- Mini fan (not included)



Balancing stand shown above with K'Nex® TinkerToys

Setup

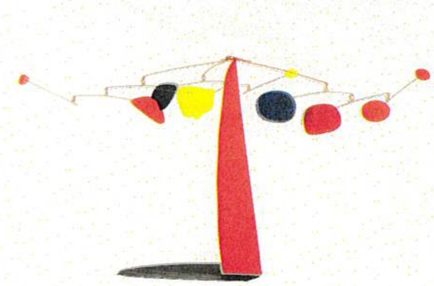
Set up the wood stands with K'Nex® TinkerToys dowels and connective pieces on a table. Connect a few pieces for reference.

Facilitation Notes

Invite learners to explore how the red plastic pieces with the metal bolts and nuts attach to the magnet on the top of the wooden stand. Encourage learners to build off of this piece in different ways. Notice how the weight, size and symmetry of the arrangement of the pieces changes the balance of the overall structure. Prompt learners to notice the sculpture's movement.

Questions to Extend Discoveries

"What is a sculpture? Is it possible for a sculpture to move? How?"
"What is a mobile? What is balance? How does a mobile combine balance and motion?"
"How can you build a moving sculpture atop the stand and spherical magnet? What movements can your sculpture demonstrate?"
"How can you make your sculpture move without touching it and without it collapsing?"
"How does symmetry affect the balance of the sculpture? How does asymmetry affect it?"



"Can you create an asymmetrical sculpture that still balances?"
"Where have you seen objects that move and balance?"

Connections to Everyday Life

We combine balance and movement everyday. When we walk, run or jump, we are constantly moving our bodies in relation to our center of gravity to keep from falling.

Sculpture artists sometimes make works that move too! Alexander Calder's mobiles are famous for their graceful use of shapes, color, and asymmetrical balance in composition. These moving works of art from Calder date back to the 1930s, but mobiles in his tradition can be found in museums, homes and above babies' cribs today. While most sculptures are made from heavy, long-lasting materials, mobiles are more lightweight and can even move in the breeze. (source: http://www.calder.org/life/biography)

Many objects depend on the same principles that a mobile or a kinetic sculpture uses. Scientists and engineers apply similar concepts to build rockets, airplanes, and machines such as a **crane.**

Cranes are a type of machine that can be used both to lift and lower materials and to move them horizontally. There are three major considerations in the design of cranes. First, the crane must be able to lift the weight of the load; second, the crane must not topple; third, the crane must not rupture. It is mainly used for lifting heavy things and transporting them to other places. The first known construction cranes were invented by the Ancient Greeks and were powered by men or beasts of burden, such as donkeys.

(Source: Wikipedia contributors. (2019, April 15). Crane (machine). In *Wikipedia, The Free Encyclopedia.* Retrieved 06:53, April 20, 2019.)

Graphite Circuits

Light up a LED with a circuit of your own design.
Use graphite to create a circuit that is both artistic and functional.

NOTE: This activity requires active facilitation. Suitable for learners 8 years old and up; great for teenagers.

Beforehand

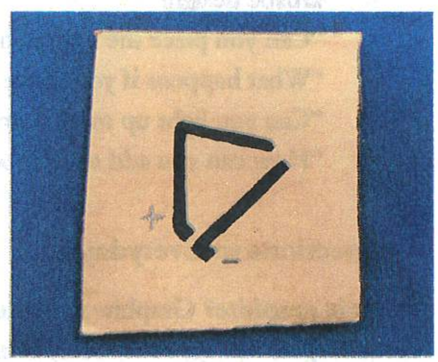
- Check that the graphite "paint" has not dried out.
- Ensure paint brushes are clean and flexible. Revive stiff bristles with a soak in hot water, or replace if needed.
- Check amount of small pieces of cardboard; cut more if needed.
- Use the multimeter to check batteries. A good voltage reading is between 8-9.5v.

Materials Included

- Graphite "paint"
- LEDs
- 9 Volt batteries
- Small pieces of cardboard
- Pencils
- Paint brushes
- Clear tape
- Small portion cups
- White glue
- Powdered graphite
- Funnel

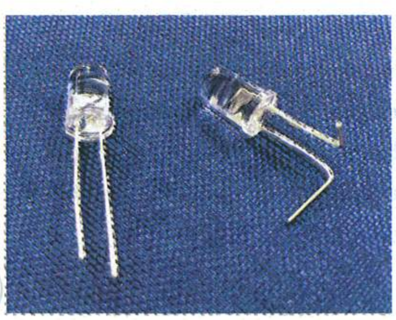
Setup

Squeeze a small amount of graphite "paint" into portion cups. Set out graphite "paint," small pieces of cardboard, LEDs, clear tape, pencils, 9 volt batteries and paintbrushes.



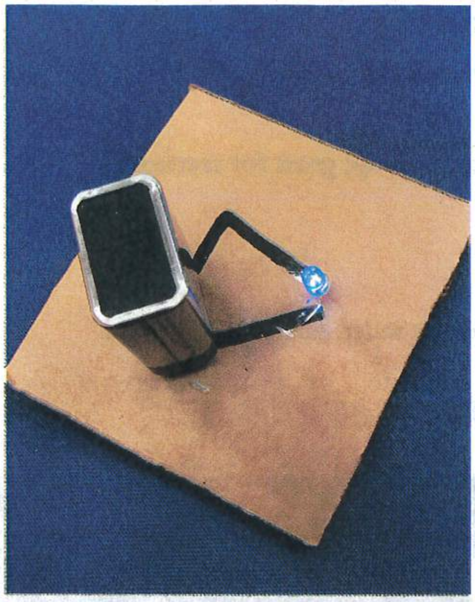
Facilitation Notes

Encourage learners to create a simple design using two solid lines that do **not** touch or overlap. A pencil may be used to sketch ideas. The ends of the lines should be less than 1 cm apart, as they will accommodate the battery terminals and LED wires. Use a paint brush to paint the lines using graphite "paint" and allow to dry fully, about 5-10 minutes. Mark the positive (+) and negative (-) lines.



Bend a LED's wires to stand it upright and tape it across the gap on one side of the lines. Make sure the wires are in contact with the graphite, and matching the positive and negative sides (the longer wire of the LED is the positive).

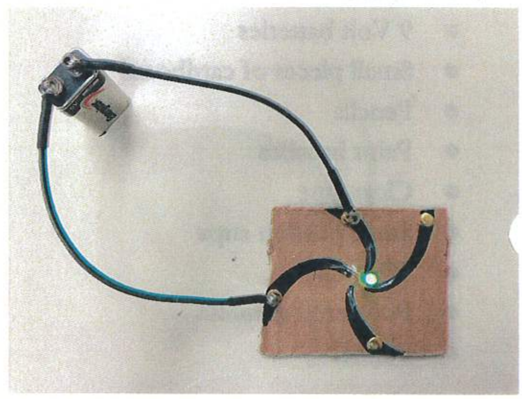
Place a battery across the gap on the other end of the lines, aligning the positive and negative terminals with the corresponding lines. Challenge learners to try making lines of different lengths, thicknesses and complexity. See following pages for design ideas.



If the LED does not light up, first check the connection of the battery and LED wires to the graphite. Ensure the graphite lines are solid, with no thin, broken or overly brushy lines.
Note: Do **not** touch the LED wires directly to the battery terminals as the high voltage will blow out the LED.

Clean paint brushes with soap and warm water after use, or, if using over an extended session, when paint begins to dry on the brush.

To make more graphite "paint," mix equal parts graphite powder, white glue and water; mix very well. The mixture should have a slightly runny consistency. Add more graphite or water to achieve the correct viscosity. Use the funnel to make the mixture directly in the squeeze bottle, or in another container and transfer to the squeeze bottle.



This activity may be used in conjunction with **Cardboard Circuits**. Encourage experimentation with adding brass brads as terminal connections and alligator clips or magnet electrodes to connect other circuit components.

Questions to Extend Discoveries

"What do we typically use graphite for/where have you seen graphite used?" [Facilitator hint: in pencils]
"How can you make an artistic design function as a electrical circuit/how can you make an electrical circuit into an artistic design?"
"Can you place the battery or LED in a different location and still complete the circuit?"
"What happens if you move the LED closer or further away from the battery?"
"Can you light up more than one LED at once?"
"How can you add to or modify your design to create other circuit possibilities?"

Connections to Everyday Life

What is graphite? Graphite is a naturally-occurring form of crystalline carbon and a native element mineral found in metamorphic and igneous rocks. It has the same chemical composition of diamond, which is also pure carbon, but the molecular structures of graphite and diamond are entirely different. It is extremely soft and cleaves with very light pressure into minute, flexible flakes that easily slide over one another. This feature accounts for graphite's distinctive "greasy" feel. It is extremely resistant to heat and nearly inert in contact with almost any other material. It is a conductor of electricity, and is the only non-metal element capable of good conductivity. (Source: https://geology.com/minerals/graphite.shtml, https://mineralseducationcoalition.org/minerals-database/graphite/)

Where is graphite used most commonly?

Writing and Artists' Materials

"Lead" pencil cores are made of a mixture of clay and graphite. Loosely cleaved graphite flakes mark the paper, and the clay acts as a binding material. The higher the graphite content of the core, the softer the pencil and the darker its trace. There is no lead in what are known as lead pencils. The name originated in Europe when graphite was called "plumbago" or "black lead" because of its metallic appearance. Graphite's use as a marker dates from the 16th century in northern England, where local legend states that shepherds used a newly discovered graphite deposit to mark sheep.

Lubricants and Refractories

Graphite reacts with atmospheric water vapor to deposit a thin film over any adjacent surfaces and reduces the friction between them. It forms a suspension in oil and lowers friction between two moving parts. Graphite works in this way as a lubricant up to a temperature of 787 degrees Celsius (1,450 degrees Fahrenheit) and as an anti-seize material at up to 1,315 degrees Celsius (2,399 degrees Fahrenheit)! Graphite is a common refractory material because it withstands high temperatures without changing chemically. It is used in manufacturing processes ranging from steel and glass making to iron processing. It is also an asbestos substitute in automobile brake linings.

Lithium-Ion Batteries

Lithium-ion batteries have a lithium cathode and a graphite anode. As the battery charges, positively charged lithium ions in the electrolyte—a lithium salt solution—accumulate around the graphite anode. A lithium anode would make a more powerful battery, but lithium expands considerably when charged. Over time, the lithium cathode's surface becomes cracked, causing lithium ions to escape. These in turn form growths called dendrites in a process that can short circuit the battery.

Graphene Technology

Rolled single graphene sheets are 10 times lighter, as well as 100 times stronger, than steel. Such a rolled sheet is also referred to as graphene, and this derivative of graphite is the world's strongest identified material and has been used to make super-strength, lightweight sports equipment. Its high electrical conductivity, low light absorbance and chemical resistance make it an ideal material for future applications, including in medical implants such as artificial hearts, flexible electronic devices, and aircraft parts.

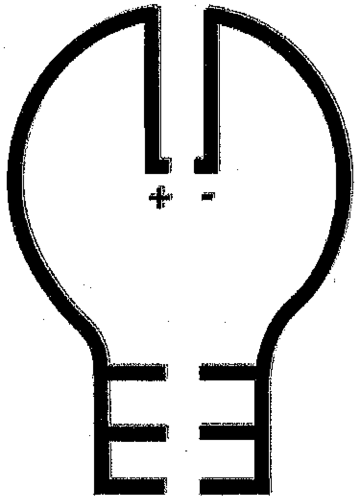
(Source: https://sciencing.com/uses-graphite-5670130.html)

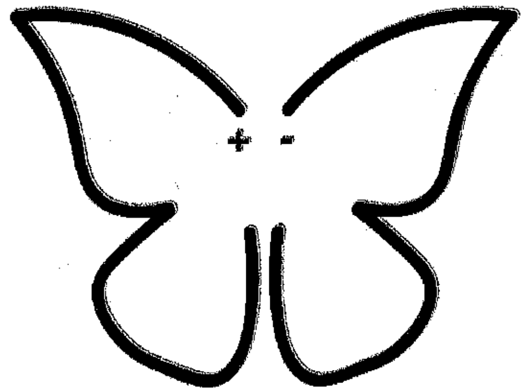
What's a LED? A light-emitting diode is a semiconductor device that produces light from electricity. A LED lights up by using a small semiconductor crystal. When the crystal is energized with electrical current, the crystal emits light. LEDs are one of the most efficient ways to make light currently known. The LED is much more efficient than an incandescent light bulb or a fluorescent light bulb, which give off more heat, wasting energy. The lifespan of an LED surpasses the short life of an incandescent bulb by thousands of hours. The color of the light depends on the chemical composition of the semiconducting material used, and can be near-ultraviolet, visible or infrared. (Source: https://kids.kiddle.co/Light-emitting_diode,

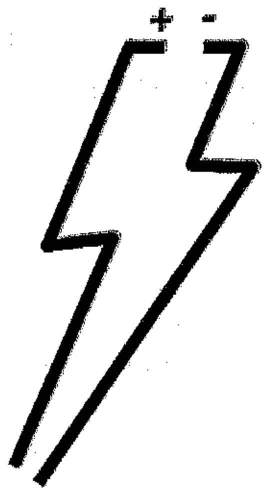
Where are LEDs used? LEDs are used in many common places, from traffic lights, TV screens, smart phones, digital clocks, remote controls, vehicle brake lights, and more recently, light fixtures for lighting homes and businesses. LED applications and possibilities continue to grow and increase in widespread use. The energy efficiency, long lifespan and economic value of LEDs are revolutionizing the ways we illuminate the world.

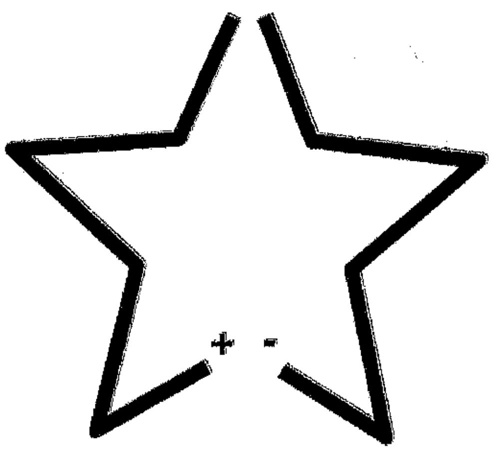
(Source: https://en.wikipedia.org/wiki/Light-emitting_diode#Research_and_development)

Circuit Design Ideas









Magnetic Towers

Discover the force of the invisible magnetic field. Explore the interaction of the poles. Magnetic towers harness the power of magnetic attraction to sculpt, design, and build with hex nuts and ball chains.

Beforehand

Ensure the magnetic wooden towers have the magnets secured to the top. Check the metal plates to confirm that they are well mounted, if they are loose, tighten it with a screwdriver.. Set up dowels with magnets on ends to the mounted metal plates. Provide cups with hex nuts and metal ball chains for building. This activity may require adult supervision with infants.

Materials Included

- 8 Magnetic rods
- Hex nuts ¼ inch 20 - 500 pieces
- 5 Small metallic bases
- 1 Large metallic base
- Metal pull chain but into 4 inch and 8 inch lengths

Setup

Attach the magnetic rods to the metallic bases. Arrange them on the table with a bowl of hex nuts and another with metal pull chain in the middle. This kit is designed to be used with as many or few towers set-up as needed or as the space allows.

Build a structure by attaching the hex nuts to the towers starting from the magnets. This structure will be used to demonstrate the activity and give learners a starting point.

Facilitation Notes

Encourage learners to build structures using the hex nuts and the metal pull chains. Challenge them to connect the nuts to magnets on the same tower, and to connect towers together using metal pull chains. It is very important to encourage learners to try different approaches.

For younger students the ball chains may be easier to manipulate.

To take the activity further, ask the learners questions about where they have seen magnets before and how they've seen them used. You can even ask the learners to come up with new uses for magnets, or how they would use the magnets in new ways.

Finally, mention how magnets are used in many different situations and discuss examples of how the use of magnets has changed the world!

Questions to Extend Discoveries

"How many different structures can you build using a single magnetic tower with the hex nuts? How can you build with more of the towers to connect them?"
"How strong are the magnets? How can you measure this strength?"
"What do the connected hex nuts remind you of?"
"How many nuts can be connected between magnets?"
"What other ways can you connect these materials? "
"How does your creation remind you of buildings or architecture?"

Connections to Everyday Life

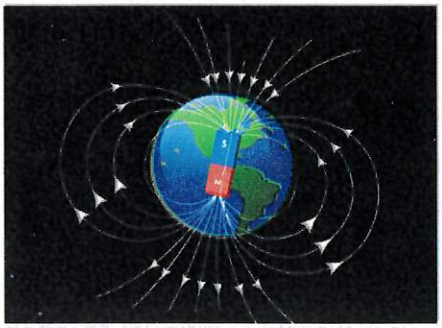
Because magnets repel and attract, magnets are used in all sorts of ways everyday:

- You've seen them hold important documents to the refrigerator, but did you know magnets are used to store information on credit cards and computer hard drives?
- Anti-theft devices in stores use sensors that can find magnets hidden on expensive items like movies, video games, and clothes.
- Doctors uses magnets to scan people for injuries and diseases that can't be picked up by an x-ray machine.
- In many countries, trains are made more efficient by using magnets to levitate and move the train.
- On modern roller coasters, magnets are used to accelerate really quickly and to stop the cars safely!

What ways can you use magnets?
(Source: Wikipedia contributors. (2019, May 2). Magnetism. In *Wikipedia, The Free Encyclopedia.* Retrieved 07:07, May 03, 2019)

Background Information

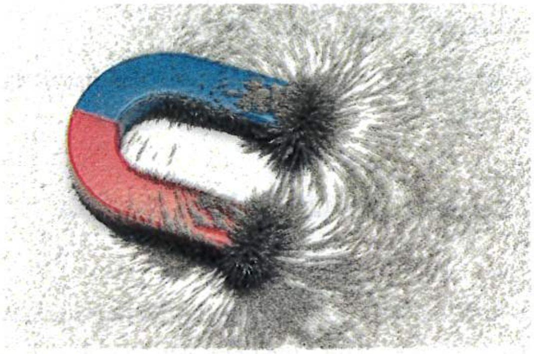
Magnetism



Magnetism was first discovered in the ancient world, when people noticed that naturally magnetized pieces of the mineral magnetite, called lodestones, could attract iron.[1]

The word *magnet* comes from the Greek term μαγνῆτις λίθος *magnētis lithos*,[2

Earth has a magnetic field that is is generated by electric currents due to the motion of convection currents of molten iron in Earth's outer core: these convection currents are caused by heat escaping from the core, a natural process called a geodynamo—something like an enormous electromagnet. Earth's magnetic field serves to deflect most of the solar wind, whose charged particles would otherwise strip away the ozone layer that protects our home planet from harmful ultraviolet radiation.



A **magnet** is a material or object that produces a magnetic field. This magnetic field is invisible but is responsible for the most notable property of a magnet: a force that pulls on other ferromagnetic materials, such as iron, and attracts or repels other magnets.

A **permanent magnet** is an object made from a material that is magnetized and creates its own persistent magnetic field. Materials that can be magnetized, which are also the ones that are strongly attracted to a magnet, are called ferromagnetic or ferrimagnetic. These include the elements iron, nickel and cobalt, some alloys of rare-earth metals, and some naturally occurring minerals such as lodestone.

A **neodymium magnet** (also known as **NdFeB**, **NIB** or **Neo** magnet), the most widely used[1] type of rare-earth magnet, is a permanent magnet made from an alloy of neodymium, iron and boron to form the $Nd_2Fe_{14}B$ tetragonal crystalline structure.[2]

Developed independently in 1982 by General Motors and Sumitomo Special Metals.[3][4][5] neodymium magnets are the strongest type of permanent magnet commercially available.[2][6]

Source: Wikipedia contributors. (2019, April 12). Magnet. In *Wikipedia, The Free Encyclopedia.* Retrieved 12:10, April 15, 2019

How magnetism is used in research

Sandia **Magnetized** Fusion Technique Produces Significant Results Sandia Energy

https://energy.sandia.gov/sandia-magnetized-fusion-technique-produces-significant-results/Sandia **Magnetized** Fusion Technique Produces Significant Results Home Energy...Science Research Capabilities Sandia **Magnetized** Fusion Technique …

Magnetically Stimulated Flow Patterns Offer Strategy for Heat Transfer Problems Sandia Energy

https://energy.sandia.gov/magnetically-stimulated-flow-patterns-offer-strategy-for-heat-transfer-problems/**Magnetically** Stimulated Flow Patterns Offer Strategy for HeatTransfer Problems...of Science Research Capabilities **Magnetically** Stimulated Flow …

Sandia National Laboratories **Magnetic** nanoparticles leap from lab bench to breast cancer clinical trials

https://www.sandia.gov/news/publications/labnews/articles/2018/27-04/nanoparticles.htmlImagion Biosystems will use these **magnetic** nanoparticles for their first breast...Randy Montoya Thursday April 26 2018 **Magnetic** nanoparticles leap …

Sandia National Laboratories **Magnetic** nanoparticles leap from lab bench to breast cancer clinical trials

www.sandia.gov/.../labnews/articles/2018/27-04/nanoparticles.htmlImagion Biosystems will use these **magnetic** nanoparticles for their first breast...Randy Montoya Thursday April 26 2018 **Magnetic** nanoparticles leap …

SandiaUniv of Rochester Win Funding to Demonstrate Fuel **Magnetization** and Laser Heating Tools for LowCost Fusion Energy Sandia Energy

https://energy.sandia.gov/sandia-univ-of-rochester-win-funding-to-demonstrate-fuel-magnetization-and-laser-heating-tools-for-low-cost-fusion-energy/Win Funding to Demonstrate Fuel **Magnetization** and Laser Heating Tools for LowCost...Win Funding to Demonstrate Fuel **Magnetization** and Laser Heating …

Sandia National Laboratories October 31 2003

www.sandia.gov/LabNews/LN10-31-03/key10-31-03_stories.htmlLab News home page **Magnetic** manipulation Complex **magnetic** field processing leads...top postdoc talent **Magnetic** manipulation Complex **magnetic** field …

Sandia National Laboratories Researchers work on new way to image the brain

https://www.sandia.gov/news/publications/labnews/articles/2018/19-01/brain.html...project to develop room temperature **magnetic** sensors for magnetoencephalography...array housed inside a personalized **magnetic** shield that resembles an …

Kinetic Art and Balance

Kinetic art is art from any medium that contains movement perceivable by the viewer or depends on motion for its effect. Canvas paintings that extend the viewer's perspective of the artwork and incorporate multidimensional movement are the earliest examples of kinetic art.[1] More pertinently speaking, kinetic art is a term that today most often refers to three-dimensional sculptures and figures such as mobiles that move naturally or are machine operated

Kinetic (Ancient Greek: κίνησις "kinesis", movement or to move) may refer to: **Kinetic** theory, describing a gas as particles in random motion or **Kinetic** energy, the energy of an object that it possesses due to its motion.

"Kinetic art" as a moniker developed from a number of sources. Kinetic art has its origins in the late 19th century impressionist artists such as Claude Monet, Edgar Degas, and Édouard Manet who originally experimented with accentuating the movement of human figures on canvas. This triumvirate of impressionist painters all sought to create art that was more lifelike than their contemporaries. Degas' dancer and racehorse portraits are examples of what he believed to be "photographic realism";[4] artists such as Degas in the late 19th century felt the need to challenge the movement toward photography with vivid, cadenced landscapes and portraits.

Balance

Balance in a work of art means that all the parts of it work together and no part is emphasized too much.
Dictionary.cambridge.org

Source: Wikipedia contributors. (2019, April 29). Kinetic art. In *Wikipedia, The Free Encyclopedia.* Retrieved 02:12, April 30, 2019.

Consumables and Restocking List

Item	Activity	Source(s)
AAA Batteries	Cardboard Circuits	Discount store such as Walmart or Target Hardware store such as Home Depot or Lowe's Dollar store, Grocery store, Amazon
Alligator Clip leads	Cardboard Circuits	Ada Fruit
Aluminum Foil	Cardboard Circuits	Office supply store Discount store such as Walmart or Target Amazon
3V High Capacity Lithium Button Coin Cell Batteries CR2032	Cardboard circuits	Discount store such as Walmart or Target Hardware store such as Home Depot or Lowe's Amazon
Brass Fasteners	Cardboard Circuits	Office supply store Discount store such as Walmart or Target Amazon
Binder Clips	Cardboard Circuits	Office supply store Discount store such as Walmart or Target Amazon
1.5 Volt Motors	Cardboard Circuits	Amazon
Paper Clips	Cardboard Circuits	Office supply store Discount store such as Walmart or Target Amazon
5mm LED	Cardboard Circuits Graphite Circuits	Amazon
2 Ounce Portion Cups	Graphite Circuits	Restaurant supply or party supply store Discount store such as Walmart or Target Amazon
White Glue	Graphite Circuits	Discount store such as Walmart or Target Hardware store such as Home Depot or Lowe's Dollar store, Grocery store, Amazon
Clear Tape	Graphite Circuits	Discount store such as Walmart or Target Hardware store such as Home Depot or Lowe's Dollar store, Grocery store, Amazon
Metal Pull Chain	Magnetic towers	Hardware store such as Home Depot or Lowe's
Hex Nuts - ¼ inch 20	Magnetic Towers	Hardware store such as Home Depot or Lowe's