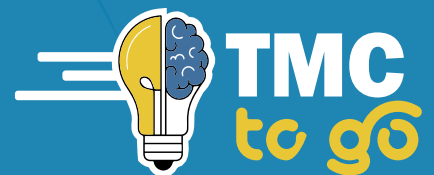


GETTING ELECTRIC



A STEM activity guide
provided by SDAN



Will it Conduct?

Activity Description: Students explore the properties of materials that make them conductive. Using a variety of common materials, students use a conductivity tester to see if the materials are conductive and cause the light to glow.

Time: 45 minutes (adjustable based on whether you do the prep work yourself or with the students)

Grade: K - 5

Introduction Video: [Will It Conduct? - YouTube](#)

Lesson URL: [Will It Conduct? - Informal Learning Activity - TeachEngineering](#)

Materials Needed:

Each group needs:

- 1 AA battery
- 2" x 2" (5 cm x 5 cm) piece of sandpaper
- 2" x 12" (5 cm x 30 cm) strip of aluminum foil
- [Will It Conduct? Worksheet](#)
- 1 D battery
- light bulb holder with bulb
- wire cutters
- 3 6" (15 cm) pieces of wire

For the class to share (for testing solutions prepared by the instructor):

- assortment of solid test objects: nails or screws (of various metals), wooden dowel, cardboard, rubber eraser, rubber shoe sole, plastic utensil, old metal utensil, brass key, cork, copper wire, chalk, aluminum foil, graphite (from a mechanical pencil), plastic pen, feathers, Styrofoam, etc.
- 4 plastic ~12 oz. cups
- access to warm water (~24 oz.)
- 1/4 cup each of salt, sugar, baking soda
- masking tape
- 1 cup vinegar
- marker

Order materials using the following link (excludes test objects, water, cups, and markers):
<https://share-a-cart.com/get/81D7Y>



This activity aligns with the following South Dakota Science Standards:

2-PS1-1 Plan and carry out an investigation to describe and classify different kinds of materials by their observable properties. (SEP: 3; DCI: PS1.A ; CCC: Patterns)

2-PS1-2 Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.* (SEP: 4; DCI: PS1.A; CCC: Cause/Effect, Technology)

4-PS3-4 Design, test, and refine a device that converts energy from one form to another.* (SEP: 6; DCI: PS3.B, PS3.D, ETS1.A ; CCC: Energy/Matter)

Extensions:

- Allow students to brainstorm other materials that could be tested and form a hypothesis for why they might be conductive.
- Expand the circuit to connect a voltmeter. Test materials a second time and create a chart or graph to show the strength of conductivity for each material.

Penny Battery

Activity Description: Students use pennies to create a simple battery capable of lighting up an LED. By utilizing the chemical properties of various metals in the pennies, students create a flow of electrons through the battery. Alterations to the battery can be made to create enough energy to light up different colors of LEDs.

Time: 45 - 60 minutes

Grade: 3 - 8

Lesson URL: [Penny Battery: Chemistry & Electricity Science Activity | Exploratorium Teacher Institute Project](#)

Materials Needed:

- Five or more post-1982 U.S. pennies (pennies before 1982 have a different composition of metals)
- Piece of 100-grit sandpaper
- Matboard or thick cardboard
- Salt
- Vinegar
- A red LED; high-intensity ones are easier to see
- Electrical tape
- A voltmeter
- Scissors
- Cup with water
- Paper towel
- Optional: other LEDs of different colors, such as yellow and blue



Order materials using the following link (excludes pennies, cardboard, scissors, water and paper towels): <https://share-a-cart.com/get/81D7Y>

This activity aligns with the following South Dakota Science Standards:

4-PS3-2 Make observations to provide evidence for how energy can be transferred from place to place by sound, light, heat, and electric currents. (SEP: 3; DCI: PS3.A, PS3.B; CCC: Energy/Matter)

4-PS3-4 Design, test, and refine a device that converts energy from one form to another.* (SEP: 6; DCI: PS3.B, PS3.D, ETS1.A ; CCC: Energy/Matter)

MS-PS2-3 Ask questions about data to determine the factors that affect the strength of electric and magnetic forces. (SEP: 1; DCI: PS2.B; CCC: Cause/Effect)

Extensions:

- Use different colors of LEDs to determine what voltage is required to make them light up. Certain colors produce higher frequency light waves and require a higher voltage to produce them. Experiment with larger “batteries” by adding more pennies to determine which colors require greater voltage.
- Use a voltmeter to test the voltage of your battery. Use this information to use the battery for other purposes, such as powering a small fan or a DC motor.

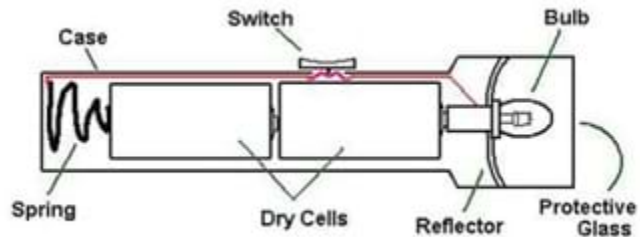
Light Your Way: Design-Build a Series Circuit Flashlight

Activity Description: Students use their knowledge about electronics and circuitry to create a series circuit flashlight. Using the engineering design process, students optimize their designs, build and troubleshoot their prototypes, and ultimately design a functional flashlight.

Time: 60 minutes

Grade: 3 - 8

Introduction Video: [Light Your Way - YouTube](#)



Lesson URL: [Light Your Way: Design-Build a Series Circuit Flashlight - Informal Learning Activity - TeachEngineering](#)

Materials Needed:

Each group needs:

- 2 D-cell batteries
- 1 bulb holder
- 1 #40 light bulb
- 2 paper clips
- 1 cardboard tube
- reflective material/foil
- 2-3 rubber bands
- thumb tacks
- 12" (30 cm) length of masking tape
- sandpaper
- wire cutters
- scissors
- 5 pieces insulated copper wire
- bubble wrap
- 1 sheet of paper

For your convenience, place your materials order using the following link:

<https://share-a-cart.com/get/81D7Y>

This activity aligns with the following South Dakota Science Standards:

4-PS3-4 Design, test, and refine a device that converts energy from one form to another.* (SEP: 6; DCI: PS3.B, PS3.D, ETS1.A ; CCC: Energy/Matter)

MS-PS3-5 Engage in argument from evidence to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object. (SEP: 7; DCI: PS3.B; CCC: Energy/Matter)

NGSS:

4-PS3-2. Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.

Extensions:

- Have students present their findings or have a class competition for best design
- Extend the lesson by utilizing curriculum from our TMC Electricity Unit