



Electricity

Grade: 1st grade

Category: Physical Science

NGSS: ETS1.A: Defining and Delimiting Engineering Problems

Description: In this lesson, the students will learn that some objects need electricity to work. Then they will be introduced to simple circuits where they can experiment what happens when different components are added. They also learn about sources of electricity and how it gets to our home.

Learning objectives:

- Understand that some objects around us need electricity to work.
- Understand that some objects need batteries to work.
- Know that batteries come in different shapes and sizes.
- Identify the different parts of a circuit.
- Understand that both electrical and battery-operated appliances have circuits.
- Construct a simple electrical circuit using batteries, bulbs, wires and buzzers.
- Understand how electricity gets to our home.

Key words: electricity, light bulb, buzzer, wire, battery, outlet, metal, circuit, switch



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Engage (E1)

Purpose: To assess students' prior knowledge of electricity and understand that some objects around us need electricity to work.

Background information for teachers:

Electricity is a form of energy. Some objects need electricity to work. They get electrical energy from batteries or from electrical outlets. Electricity can also be generated from sunlight, which is captured using solar panels. The solar cells in the panels will convert the sun light into electricity to use in homes and buildings.



Classroom Q&A

Bring pictures of electrical appliances to the classroom like a toaster, microwave, Television, alarm clock, laptop, a flashlight and a hair dryer. Start a group discussion and ask these questions:

- Do you have any of these appliances at home? What do you use these things for?
- How do these appliances work? Do you need to turn them on? *Yes. You need to turn on the switch. Put the plug into the outlet or put batteries into them.*
- Have you ever heard of electricity? What is electricity? *Electricity is a form of energy. It provides energy for some objects to work, just like food gives us energy to play.*
- Do you use electricity at home? *Yes, many household appliances need electricity to work.*
- Can you name other objects that work with electricity? *Some examples are the refrigerator, washer and dryer machine, a fan, TV remote control, cell phone, an iPad, a camera, a table lamp, a watch, and some toys that work with battery.*
- From where do these objects get the electricity? *Either from the outlet or from the battery.*
- Discuss the sources of electricity in different appliances. For example the refrigerator, toaster, washer and dryer machine, fan, cell phone, iPad, camera and table lamp get the electricity from the outlet. To make them work, we need to put the plug into the outlet and then turn on the switch. TV remote control, flashlight, watch, wall clock and toys get the electricity from the batteries.
- Bring a flashlight to the classroom. Take the batteries out and try to turn it on. Ask the students why is it not working? *Because flashlight needs electricity to work. Batteries are the source of electricity for flashlight.*
- Now insert the batteries back and switch it on. Explain that without electricity, these things cannot work. Teach students the correct way of slotting batteries into electrical gadgets. Guide them to look at the "+" and "-" signs.

- Do you think batteries can last forever? *No, batteries contain stored chemical energy. Once the chemical energy is used up in a battery, it needs to be replaced.*
- How to use electricity safely? *Never put anything other than a plug into an outlet. Do not touch the outlet with wet hand.*
- Electricity is very important in our daily life and we have to save it. How can we save electricity? *Always turn off the lights when you leave the room.* Turn off the appliances (TV, radio, hair dryer, etc.) when you are done using them.



Digital Activity

Login to Koantum classroom and find the "Electricity" lesson. Open the following page. There are many objects in this room that need electricity to work. Can you find them?



- Nice job! The vacuum cleaner uses electricity to pull dirt from the carpet. See how the vacuum is plugged into the outlet.
- Yes! Batteries inside the flashlight give it the energy it needs to shine brightly. Batteries lose energy over time, so be sure to turn the flashlight off again before you move on.
- Nicely done! Televisions use electricity to bring movies, cartoons, and television shows into our homes. Now, can you find the battery-operated gadget that helps us control the television?

- Awesome! The batteries inside the TV remote provide the power needed to change channels.
- Yes! This toy robot uses electricity from batteries to move around and make noise.
- Correct! the lamp uses electricity from the wall outlet to brighten the room. Electricity cost money, so you should turn lights off at home when you don't need them.
- Tick, tock, tick, tock goes the clock—but only when it has electricity to make it work. Most wall clocks, like this one, use batteries. Some clocks, though, have cords that plug into an outlet.



Printable Activity

Have students complete the printable activity "Electric Household Items" by naming and drawing pictures of objects that use electricity in the house.

Answers will vary.



Examples of possible answers:

- Bedroom: clock, flash light, lamp, toy, flashlight, laptop, iPad, cell phone, iron
- Bathroom: electric toothbrush, lamp, night lamp
- Family room: telephone, fan, clock, TV, Radio, computer, lamp, vacuum cleaner
- Kitchen: Oven, Refrigerator, toaster, blender, light, microwave



Printable Activity

Have students complete the printable activity "Things that Need Electricity 1" by circling the items that need electricity to work.



Answer key:

1. Laptop needs to be plugged into the outlet.
2. Cell phone needs electricity through outlet.
3. Wall clock needs battery.
4. Hair dryer need to be plugged into the outlet.
5. Refrigerator works with electricity.
6. Remote control needs battery to work.
7. TV needs to be plugged into the outlet.
8. Computer works with electricity.



Printable Activity

Have students complete the printable activity "Things that Need Electricity 2" by circling the items that need electricity to work.



Answer key:

- Row1: Laptop
- Row2: Wall clock
- Row3: Hair dryer
- Row4: Washing machine
- Row5: Toy robot



Video

The Sticky Balloon Trick | SciShow Kids

<https://youtu.be/5TAIUCYMIHQ>



Classroom Activity

Hair Color & Static Electricity

Materials needed:

- 12 lightly colored balloons, all the same size
- Students with differently colored hair (brunette, blonde, redhead, black hair)
- Permanent markers
- Timer

Ask the students: Has anyone rubbed a balloon across their hair so that it stands on its end? Does anyone know why that happens? Explain that those are effects of static electricity. Everyone's hair is different: long or short, thick or thin, straight or curly, and all different colors. Does anyone think that hair color affects static electricity? Why or why not? Which color do you think causes the most static electricity?

Have students with different hair colors volunteer. Using the marker, label the balloons with the different hair colors (three of each: brown, blonde, red, black). The class will test each hair color three times.

To test the static electricity, rub the balloon marked with the appropriate color against the matching hair color for a few seconds. Then, once the hair is standing up, stick the balloon to a wall. Time how long that the balloon sticks to the wall; stop the timer when the balloon begins to fall. Be sure to record how long each balloon sticks to the wall.

When you've completed all 12 trials, look at the chart of recorded times. Ask the students what the results tell you. The balloons should have stuck to the wall for a similar amount of time because hair color does not affect the amount of static electricity caused by rubbing a balloon in someone's hair.

Explore (E2)

Purpose: To explore the different parts of a circuit.

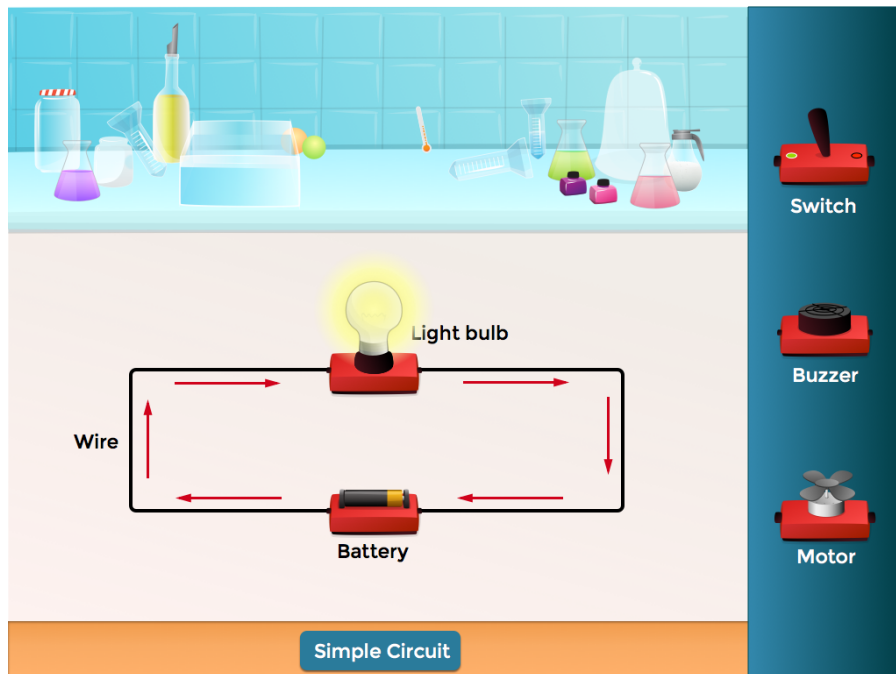
Background information for teachers:

In every electrical gadget, there is a circuit that allows electricity to flow from the source to the gadget. The switch controls the flow through the circuit. When the switch is turned off, the circuit is open, thus the electricity will stop flowing. When the switch is turned on, it forms a closed circuit that allows electricity to flow through the circuit.



Digital Activity

Login to Koantum classroom and find the "Electricity" lesson. Open the following page. This is a simple circuit. A simple circuit includes a battery, wires, and an object that needs electricity to work, such as a light bulb. The battery makes the electricity and moves it through the wires. If there is a break, or gap, in the wire, the electricity stops, and the object will not work. Let's explore this simple circuit. Your job is to add more parts to the circuit and see what happens. You will learn what each part is as you go.



Switch

This is a switch. The switch can be on or off. There is a break, or gap, in the circuit because the switch is off and the electricity cannot flow to the light bulb. Click on the switch to close it.

Buzzer

This is a buzzer. What do you think will happen when you add it to the circuit? Click on the switch to close it.

Listen! The motor makes a continuous noise, and the bulb gets dimmer. But why is the bulb less bright? This is because the bulb and the buzzer have to share the energy from the battery.

Motor

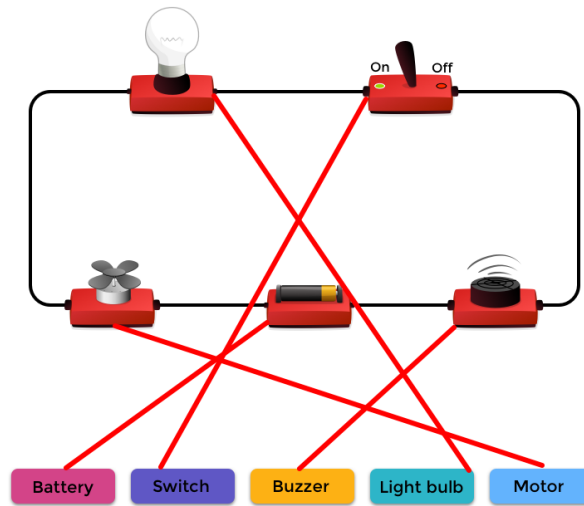
This is a motor. What happens if you add a motor to the circuit? Right now there is a break in the circuit because the switch is off. Click on the switch to close it.

Yes! The motor is now in motion. Did you notice what happened to the bulb? It is dimmer because it is now sharing energy from the battery with the motor.



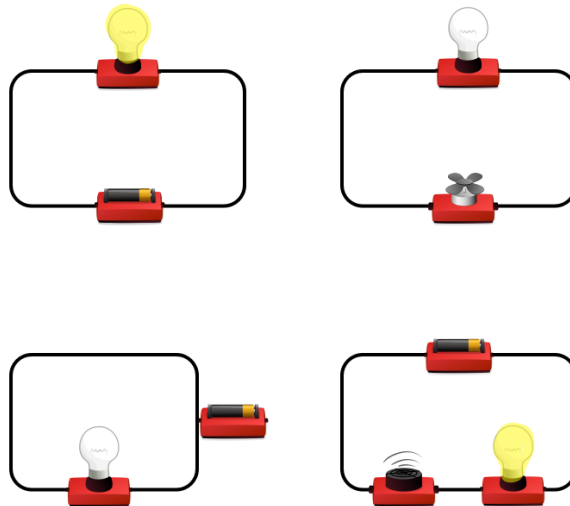
[Printable Activity](#)

Have students complete the printable activity "Electric Circuits 1" by labeling the parts of the circuit.



Printable Activity

Have students complete the printable activity "Electric Circuits 2" by coloring the bulb if the circuit is complete.



Answer key:

- Top left: The bulb will light up because this is a simple circuit and battery is the source of electricity.
- Top right: The bulb will not light because there is no source of electricity in this circuit. Motor is not the source of electricity.
- Bottom left: The bulb will be off because the wire needs to be connected in both side of battery.
- Bottom right: The bulb will light because the circuit has no gap and the battery is the source of electricity.



Classroom Activity

Make a Simple Circuit

Materials needed:

- 1-2 D-size batteries (you can use just one but will get more impressive results with two)
- Aluminum foil
- Electrical tape
- A small light bulb

Cut the aluminum foil in long strips, and fold it into thin strips (smushing and pinching is fine, you'll only need two for the experiment). Attach one foil strip to the metal base of the light bulb with the electrical tape. Tape the other end of the foil to the negative end of the battery. Tape the end of another piece of foil to the positive end of the battery. Finally, complete the circuit by touching the remaining free end of the strip to the base of the light bulb, making sure not to touch the other taped foil strip.

What do you see? The foil strips act as the wires to bring electricity from the power source (the battery) to the light bulb. Both the foil and the battery are weak, so they can only power a small bulb.

Explain (E3)



Digital Activity

Login to Koantum classroom and find the "Electricity" lesson. Open the following page and go over the slides to make sure they understand the subject.



1. Some objects need electricity to work. They get electrical energy from batteries or from electrical outlets. Can you name some objects in your home or at school that run on electricity?
2. A simple circuit includes a battery, wires, and an object that needs electricity to work, such as a light bulb. The battery makes the electricity and moves it through the wires. If there is a break, or gap, in the wire, the electricity stops, and the object will not work. Do you know who invented the first light bulb? If you guessed Thomas Edison, you are correct!
3. 1 battery + 2 bulb - What happens when you add an extra bulb to the circuit? Did you see that? Both bulbs are now dimmer. Can you guess why? That is because the bulbs have to share the energy from the battery, so each bulb is less bright.
4. 2 batteries + 1 bulb - What happens when you add another battery to the circuit? Yes! The bulb gets brighter. But why? That is because two batteries provide more energy, and an increase in energy makes the bulb brighter.
5. 2 batteries + 2 bulbs - What happens when you have two bulbs and two batteries to the circuit? There is one battery for each of the bulbs, so they do not have to share energy. They are as bright as one bulb would be with one battery.

Elaborate (E4)

Purpose: To understand how electricity gets to your home.

Background information for teachers:

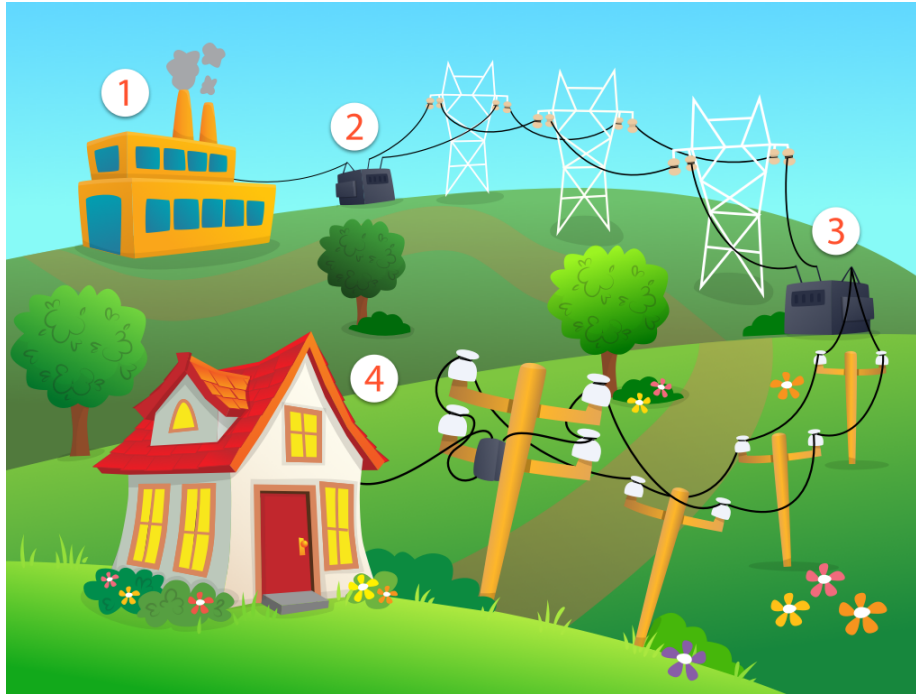
In most buildings, electricity is readily available. All you have to do is flip a switch or press a button, and objects start to work. It's almost like magic, but now you know it's really electricity!



Digital Activity

Login to Koantum classroom and find the "Electricity" lesson. Open the following page. Did you ever wonder how electricity gets to your house? Have you ever noticed the poles and wires that are along the streets? These poles and wires deliver electricity to your homes, schools, and businesses. Let's find out how the process works. Select each number to hear how electricity is made and delivered.

1. First, the electricity needs to be made somewhere. Power plants make electricity with a device called a generator. How? A generator uses coal, wind, water, or natural gas to make, or generate, electricity.
2. Next the power plant sends the electricity it makes through a transformer. The transformer is a huge metal box that allows the energy to travel long distances.



3. From the transformer, the electricity travels through enormous power lines. These power lines run many miles to bring electricity from the power plant to cities and towns.
4. When the electricity gets closer to homes and buildings, it goes through a substation. The substation sends the electricity to smaller power lines that run to homes, schools, and businesses.
5. Finally, the electricity enters a building through a panel in the basement or garage. This panel uses breakers, or fuses, that help make the electricity safe to use. The electricity then moves through the wires in your home to the outlets. And that is how there is always electricity for you when you need it!



Video

How Power Gets to Your Home | ActOnEnergy

<https://youtu.be/pXasvq1ivnw>



Fun Facts

- People first started using electricity in the 1880's. Can you imagine life before electricity?
- Did you know that lightning is a form of electricity? So is static!
- Birds do not get shocked by electricity when they are sitting on a power line because they are not completing a circuit. However, they can get very hurt if they touch more than one power line at one time!
- Electric eels can produce strong electric shocks of around 500 volts for both self-defense and hunting.

Evaluate (E5)

Purpose: To assess students' understanding of the lesson

- 1- Which of these objects does **not** run on electricity?
 - a) Cell phone
 - b) Computer
 - c) **Bicycle**
 - d) Washing machine

- 2- Which object uses electricity from batteries?
 - a) **TV remote control**
 - b) Television
 - c) Electric oven
 - d) Refrigerator

- 3- How does a vacuum cleaner get its electricity?
 - a) From batteries
 - b) **From an electric outlet**
 - c) From heat
 - d) From water

- 4- Which part of a circuit provides electricity?
 - a) Light bulb
 - b) Buzzer
 - c) **Battery**
 - d) Switch

- 5- Which part of a circuit makes a sound when electricity passes through it?
 - a) Switch
 - b) Battery
 - c) Wires
 - d) **Buzzer**

- 6- What connects the parts of a circuit?
 - a) **Wires**
 - b) Rays
 - c) String
 - d) Yarn

- 7- In a circuit with one bulb and one battery, what happens when another battery is added?
 - a) **The bulb gets brighter**
 - b) The bulb gets dimmer

- c) The bulb stops working
- d) The bulb makes a noise

8- For a circuit to work, it must have no _____.

- a) wires
- b) battery
- c) gaps
- d) electricity

9- How does electricity travel to a house, school, or business?

- a) By car
- b) Through power lines
- c) With batteries
- d) By bicycle

10- What part can you add to a circuit, so you can turn the bulb on and off?

- a) A switch
- b) A battery
- c) A buzzer
- d) More wires