

Completing the Circuit



Carlos

Making circuits are so much fun! I wonder what type of materials we could put between the wires to complete the circuit and make the light bulb light. I think we need to put something that is a conductor between the wires.



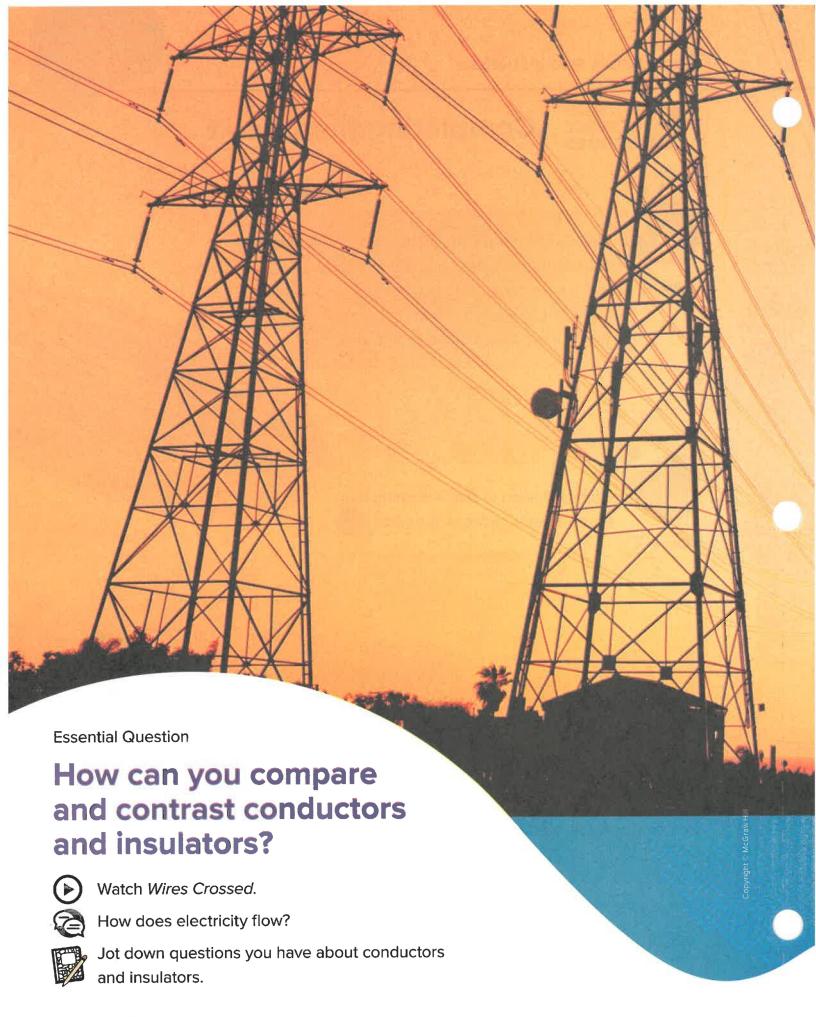
Oscar

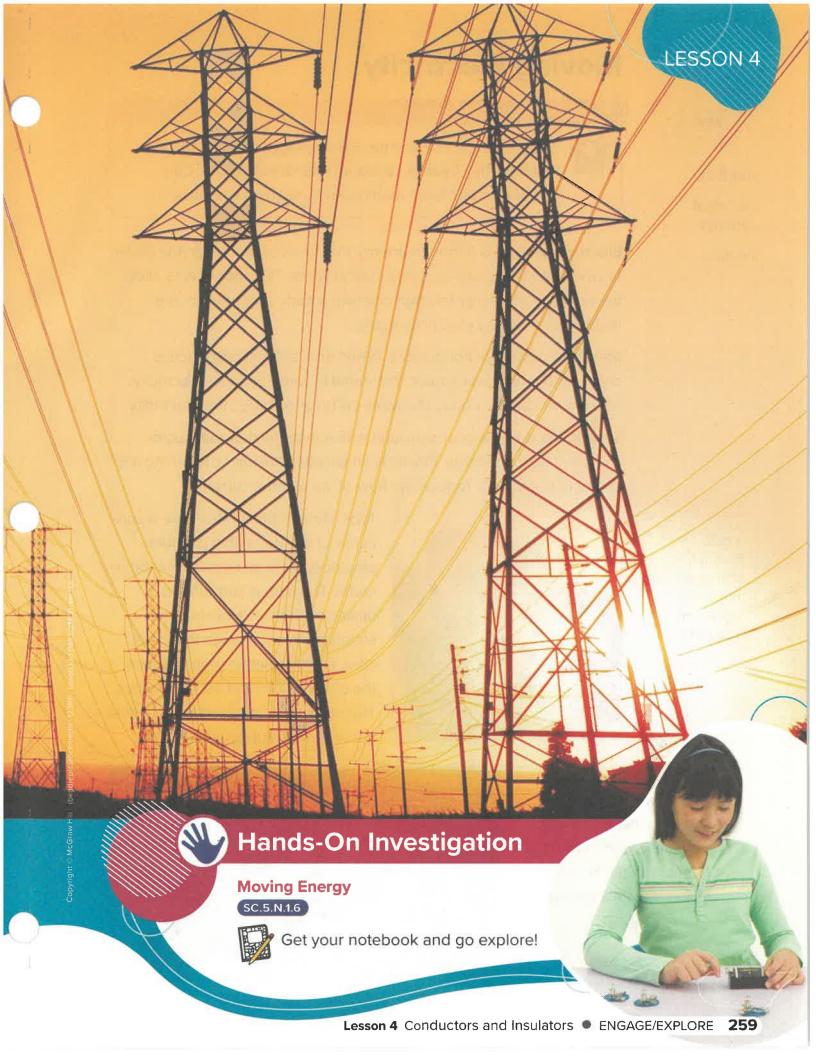
I think we need to put something that is an insulator between the wires.

I think both conductors and insulators would work.



Who do you agree with? Explain your thinking.





Moving Electricity



Claim, Evidence, Reasoning



Which materials closed the circuit to light the light bulb? What do they have in common? Check your claim. Can you back it up? Keep reading and underline evidence.

Electrical energy is a form of energy that gives some things the power to work. Electricity can be conducted in wires. To conduct is to allow the passage of energy through or along a path. A conductor is a material that carries electricity easily.

Metals are excellent conductors. When an electrical appliance is connected to a power source, the metal in wires conduct electricity. Like a river carries a boat, the wires carry, or conduct, the electricity.

To **insulate** is to cover or surround with a material that reduces or stops the flow of energy. Plastic is an excellent insulator, meaning it is useful to insulate, or reduce the flow of, an electric current.

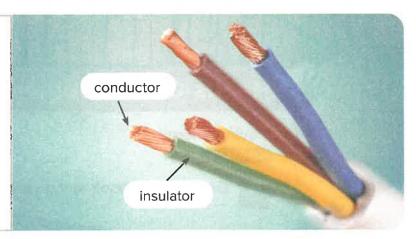
Inside the smartphone, thin wires carry electricity to lights and speakers.



Typically, electrical wires have a core made of a material that conducts electricity, such as copper or another metal. The core is surrounded by plastic or another insulator. The electricity flows through the metal core, and the plastic coating keeps the electricity contained in the wires. The insulator also allows us to handle the wires without getting a shock.



Compare and contrast the materials that make up these wires. Why is each material important? Discuss with a partner.



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What material found in a tablet is a conductor? Check the box.

- ☐ metal wires
- rubber pads
- ☐ glass screen
- ☐ plastic buttons

Electrical Energy

Conductors	Insulators
steel	plastic
copper	glass
aluminum	wood
gold	paper products
most other metals	air

Compare and contrast the list of conductors and insulators in the table. Scientists test whether a material is a conductor or insulator by passing electricity through it. If the flow of electricity is slowed, the material is an insulator. If the electricity flows easily through the material, it is a conductor.

Both conductors and insulators are a part of any device that runs on electricity. They work together to keep electricity flowing to and from the parts that need it. In addition, insulators prevent electricity from escaping to the outside parts of the device. Without the insulation, the user could get a dangerous shock.



Investigation Connection



Think back to the investigation. Which materials lit the light bulb? Can you now explain why? Identify other materials that work to complete a circuit.

Uses for Electricity

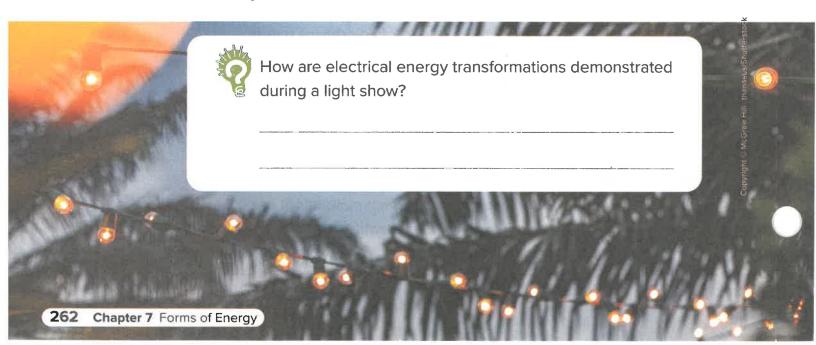
Electricity provides the energy for a wide variety of devices. Why is electricity so useful? Electricity can be carried across long distances to wherever energy is needed. Then devices can easily transform electric energy into other forms.

Light: Thomas Edison invented the first practical light bulb that transformed electricity into light, but it lost lots of energy in the form of heat. Some new light bulbs run on light-emitting diodes (LEDs). Compared with older light bulbs, LEDs transform much more of the electric energy they receive into light. So, they waste much less electricity.

Energy of Motion: A motor is a machine that uses energy and magnetism to generate motion. Motors that run on electricity provide energy of motion, or energy that results in movement. Motors are part of many household appliances, including fans, blenders, and electric toothbrushes.

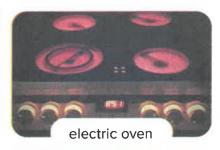
Sound: All sounds begin when an object vibrates or moves back and forth quickly. Electrical energy can be transformed into vibrations in various objects, such as speakers in radios, telephones, or electrical musical instruments.

Heat: Have you observed that an electrical appliance can become hot with use? Edison's light bulbs are just one example. For some appliances, releasing thermal energy is the purpose of the appliance. In a pop-up toaster, generating thermal energy is the main use for the electricity.



Read the Photo Look at the devices in each photo. For each device, electricity is the energy source. Write a caption to identify how the electric energy is transformed.











Do you need practice?

Interactive

Word

Wall

Remember to update your graphic organizer!



How does electrical energy behave through conductors and insulators? Watch Everyday Energy.



Claim, Evidence, Reasoning



Now add your reasoning. I think my claim is valid because

Build Your Skill

Does it conduct or does it insulate? SC.5.N.1.6

Scientists identify and classify materials that can conduct electricity.

Apply It

Identify each material and classify whether it is a conductor or insulator.















Write About It! (ELA.K12.EE.1.1)

Create a Venn diagram to compare and contrast conductors and insulators. Why is it important to be able to identify the differences between conductors and insulators?