

Conductor

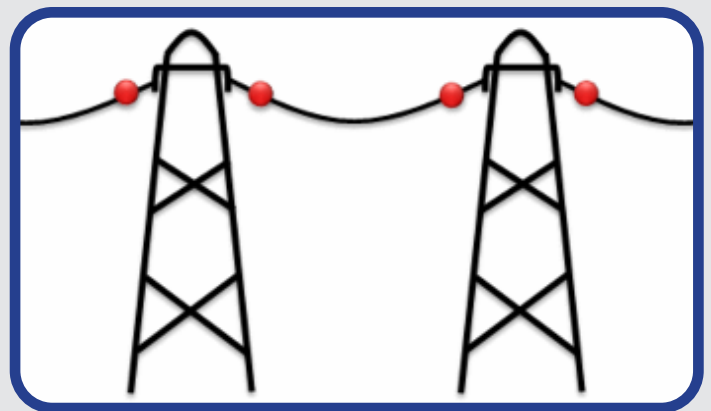


Conductor

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The conduction of electricity is an important property of some materials. Take the following brief quiz to see how much you already know about the conductivity of electrical charge. See the bottom of page 4 to check your answers.

1. Who is credited with first stating that electricity had positive and negative elements and that current flowed between these two elements?
 - a. Galileo
 - b. Aristotle
 - c. Ben Franklin
 - d. Thomas Edison
2. About how long ago were the first electrical batteries made?
 - a. 100 years ago
 - b. 500 years ago
 - c. 1,000 years ago
 - d. 2,000 years ago
3. Who patented the first electric light bulb?
 - a. Nikola Tesla
 - b. Thomas Edison
 - c. Ben Franklin
 - d. General Electric
4. In which country was the earliest “battery” ever found discovered?
 - a. Greece
 - b. Iraq
 - c. United States
 - d. Germany
5. About how volts were produced by the earliest battery ever found?
 - a. 1.1 volts
 - b. 11 volts
 - c. 111 volts
 - d. 1,111 volts



Conducting Dominoes

Analogies are helpful in bridging the world between things that cannot be seen by humans and the actual working of those unseen things. Since the inner workings of electrical conductors are not visible to humans, the use of a set of dominoes can help people understand what's happening in the movement of electrical charge from one point to another point in an electrical circuit.

Materials Required

1 – pack of standard dominoes (28)

1 – whiteboard marker

Procedure

1. Stand the dominoes up on a flat surface in a straight line, spacing the dominoes out so as one domino falls it strikes the next domino in the line.
2. Stand the whiteboard marker on its end at the end of the domino line so that when the last domino falls it will strike the marker.
3. Move to the other end of the domino line and apply a soft push to the first domino.
4. Observe and record in Table 1 what happens.
5. Repeat steps 1 – 3, however, this time apply a harder push to the first domino in the line.
6. Observe and record in Table 1 what happens.

Table 1. Domino Observations

Condition	Observations
Soft push on the first domino	
Harder push on the first domino	

Questions

1. In this investigation, what represented the conductor?
2. Did the conductors move from one end of the line to the other line or did something else move? If so, what?
3. What did the two different pushes represent in this investigation?
4. How did your different pushes affect the results of the investigation?
5. Describe how the results would have changed if you repeated the investigation with an even harder push on the first domino?
6. Was all the energy associated with your push on the first domino transmitted through the line of dominoes? Provide evidence to support your response.

Conductor

Super Conductors

A few materials have the property known as superconductivity. This property allows the materials to conduct direct current electricity without energy loss. While most conductors convert some electrical energy moving through a circuit to be lost in the form of heat, superconductors do not experience this heat loss of energy.

In a typical conductor, heat is produced when the vibrating electrons passing the electrical current collide with atoms that make up the conductor. The more electrons, the greater the number of collisions and the greater the amount of electrical energy converted to waste heat energy. While this conversion of electrical energy to heat energy appears to be an unwanted energy transformation, it is the basis for many heaters and incandescent light bulbs.

The use of superconducting materials has been widely investigated for several applications. Some current applications include the efficient transportation of electrical power, trains that ride on magnetic fields reducing the friction between the train wheels and a track, increasing the speed of computer chips, investigating subatomic particles, and in magnetic resonance imaging (MRI). MRI's allow doctors to view inside a human body with directly performing surgery that opens the body.

The main problem with applying superconductor technologies is the limitations of temperature on the conductors. The development of room temperature superconducting materials has been extremely slow. Current research focuses on making superconductors that do not require super low temperatures.



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Answers: Page 2 Answers: 1) c, 2) d, 3) b, 4) b, 5) a. Page 3 Answers: 1) The dominoes. 2) No, energy moved from one end to the other. 3) Two different voltage sources. 4) Harder push caused the energy to move faster to the other end and applied a greater push on the marker. 5) The dominoes would have fallen over faster and the marker would have been pushed harder. 6) No, some of the energy was converted to sound and heat.

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