

TEKS-Based Activity for Grade 5
Scouting for Circuits

Description:

In this activity, students construct a circuit and a conductivity tester to determine if various materials are conductors of electric current.

Time Frame:

1 lesson (45 minutes)

Correlation to Texas Essential Knowledge and Skills:

During this activity, students will be exposed to the following Texas Essential Knowledge and Skills:

Note: Some TEKS statements below end with a ; or *and* and nothing thereafter—this indicates that further TEKS statements follow but are not included here.

(5.7) Science concepts. The student knows that matter has physical properties. The student is expected to:

- (A) classify matter based on its physical properties including magnetism, physical state, and the ability to conduct or insulate heat, electricity, and sound;

(5.8) Science concepts. The student knows that energy occurs in many forms. The student is expected to:

- (C) demonstrate that electricity can flow in a circuit and can produce heat, light, sound, and magnetic effects; and

Note: The TEKS listed here are the main content TEKS for this activity; however, this activity may also cover additional content and process skills included in other TEKS.

Materials:

Nametag (1 per student group)
Yarn (3 meters per student group)
D-cell battery (1 per student group)
Flashlight bulb (1 per student group)
Thin insulated copper wire (two 15-cm pieces per student group)
Electrical tape (1 roll per student group)
Penny (1 per student group)
Aluminum foil (small strip per student group)
Paper (small strip per student group)
Glass microscope slide (1 per student group)
Plastic ruler (1 per student group)
Plastic paper clips (1 large clip per student group)
Candle (1 per student group)
Wooden pencil (1 per student group)

Wire strippers (1 for the teacher)

Scouting for Circuits student investigation pages (included at the end of this activity)

Advance Preparation:

1. Prepare a nametag with “Source” written on it for each group.
2. For each group, cut a piece of yarn about three meters in length.
3. Cut two 15-cm pieces of thin insulated copper wire for each group. Strip about 1 cm of insulation from each end using the wire strippers.
4. Prepare copies of the Scouting for Circuits student investigation pages for each group.

Procedures:

SAFETY: Caution students that they should not experiment with electricity at home unless adult supervision is available.

1. Divide the class into groups and then have each group select a student to be the “Source.” Give that student the nametag with “Source” written on it.
2. Have students in each group join hands to form a circle. The student with the “Source” nametag squeezes the hand of the student to the right. That student passes the squeeze on to the next student and so on until it returns to the student with the nametag. Ask students to describe what happened as the hand squeeze traveled around the group. Tell students that passing the hand squeeze around the circle is a model for how electricity passes through a circuit. Ask students to describe the limitations of this model of electricity passing through a circuit.
3. Give the student wearing the source nametag the piece of yarn. That student holds one of the cut ends of the yarn and passes the other end of the yarn to the right. Each member of the group holds a piece of the yarn until the other cut end comes back to the “Source.” Ask students to describe how the yarn traveled around the group. Tell students that the yarn is also model for how electricity passes through a circuit.
4. Give each group a D-cell battery, a flashlight bulb, and two 15-cm pieces of copper wire and ask them to use the materials to light the flashlight bulb. Allow time for students to manipulate the materials. As soon as the first group lights the flashlight bulb, have that group show the rest of the class how they created their circuit. Have all groups demonstrate they can light the flashlight bulb. Distribute the investigation pages and have students describe, draw, and label the arrangement on it. Then have students complete the rest of the Scouting for Circuits investigation pages.
5. After the students have made the conductivity tester and have tested the different items, lead students in a discussion of the investigation pages.

- How is passing the hand squeeze like creating the circuit to light the flashlight bulb?
- How is creating the circuit to light the flashlight bulb like using the conductivity tester?
- What are the parts of a circuit? The conductivity tester?
- What would happen if a part were removed? Added?
- What function do conductors and nonconductors play in a circuit?
- How is a circuit a system?
- What properties of an object can help you predict whether it can act as a conductor of electric current?

Scouting for Circuits

Student Investigation Pages

Materials:

Yarn
D-cell battery
Flashlight bulb
2 pieces of thin insulated copper wire
Electrical tape
Penny
Aluminum foil
Strip of paper
Glass microscope slide
Plastic ruler
Plastic paper clip
Candle
Wooden pencil

Procedures:

1. Describe, draw, and label the circuit that resulted in your being able to light the flashlight bulb.

2. Some materials conduct electricity and some do not. Examine the types of materials that make up the objects listed in the chart below. Predict whether or not each object could conduct an electric current to create a circuit and light the bulb. Write "yes" if you think the object will conduct a current, and "no" if you think it won't.

Object	Prediction	Results
Penny		
Aluminum foil		
Glass microscope slide		
Paper strip		
Plastic ruler		
Plastic paper clip		
Birthday candle		
Wooden pencil		

3. Construct a conductivity tester by taping one end of a wire to the positive end of the D-cell battery and the other end of the wire to the base of the flashlight bulb.
4. Test each material by touching one part of it to the negative end of the battery and another part to the metal base of the bulb. Complete the chart with your results. Write "yes" if the object conducts current and "no" if it does not conduct current.
5. Which materials conducted an electric current? What properties do these conductors have in common?

8. Based on your test results, classify the following objects as conductors or nonconductors of electric current: staples, crayons, bicycle spokes, a soda can, bicycle tires, popsicle sticks, a drinking glass, a baseball, hair ribbons, keys, and a milk carton. Fill in the following chart, checking off the appropriate column and briefly explaining your prediction.

Object	Conductor	Nonconductor	Explain your Predictions
Staples			
Crayons			
Bicycle spokes			
Soda can			
Bicycle tires			
Popsicle sticks			
Drinking glass			
Baseball			
Hair ribbons			
Keys			
Milk carton			

9. Why are electrical wires wrapped with nonconductors?