

Date: _____

Your Name: _____

Name(s) of Partner(s): _____



**NEW ENGLAND
COMMON ASSESSMENT PROGRAM**

Released Science Inquiry Task

Conductors and Insulators

2012

Grade 4

Inquiry Booklet

Science

Directions:

You will read a story about students in a science class investigating the flow of electricity. You and a partner will do the same scientific investigation as the class in the story.

Word Bank

| | |
|--------------------|--|
| Circuit | a closed loop that electricity flows through |
| Conductor | a material that allows electricity to easily flow through it |
| Insulator | a material that prevents electricity from flowing through it |
| Material | what an object is made of |
| Metallic | an object that has properties of a metal |
| Nonmetallic | an object that has properties of a nonmetal |
| Prediction | what you think will happen in an investigation |
| Procedure | directions or steps in an investigation |
| Properties | characteristics of materials |

Movement of Electricity Story

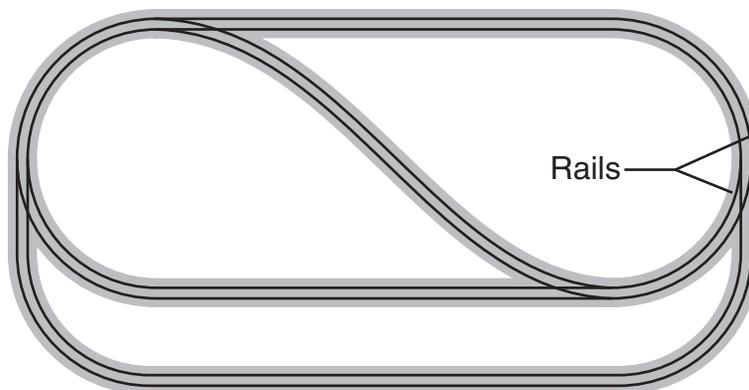
Students in a science class decided to investigate the transfer of energy. They wanted to learn how electrical energy moves from one place to another. They also wondered whether electricity can travel through some materials more easily than through others.

The teacher used the electric model train shown below to demonstrate how electricity flows. With real trains, he explained, “conductors” are the people in charge. But with model trains and with science, “conductors” are something different.



The teacher went on to say that, in science, **conductors** are materials that allow electricity to flow easily through a circuit. Nonconductors are called **insulators**. They are materials that do not allow electricity to flow through a circuit.

The teacher showed the students how the electric model train goes around the loop of track shown below. The electricity flows through the rails and then through the motor in the train engine. The complete loop of track forms a circuit because the rails conduct electricity. The complete circuit allows the train to go around the track.



The teacher explained that all materials have properties that make them either conductors or insulators. The students decided to investigate the following research question:

What types of materials make good conductors of electricity?

For their investigation, the students tested eight different objects. Each object was made of a different material.

The students observed the different objects and recorded the properties of the material each object was made of. They then tested the materials by placing each object between two wires to complete a simple circuit. They observed which materials allowed a lightbulb to light and recorded this data in a table.

You will do the same investigation.

Making a Prediction—What Do You Think?

Make a prediction **on your own** about the research question below.

Research Question:

What types of materials make good conductors of electricity?

Use what you know about electricity and simple circuits to make a prediction about the research question.

I predict

because

DO NOT GO ON.



Materials for the Investigation:

1 circuit test box with wires
1 penny
1 small piece of foil
1 small piece of paper
1 paper clip
1 yellow chip
1 toothpick
1 small piece of a straw
1 washer

Safety:

Use scientific equipment only as directed in this investigation.

Procedure:

- You and your partner will work together to do the investigation.
- You will each record all of the data you collect in your own Inquiry Booklet in the data tables on pages 5 and 6.

Part A: Observe the Materials.

1. Examine each of the eight objects. Record what material you think the object is made of in the “Material” column of Data Table 1 below.
2. Describe the properties of **each** material. Record the properties in the “Properties of the Material” column of Data Table 1. Some words that could be used to describe the properties might be metallic, nonmetallic, hard, soft, shiny, dull, flexible or stiff. These words are examples. You can use them or use different words.

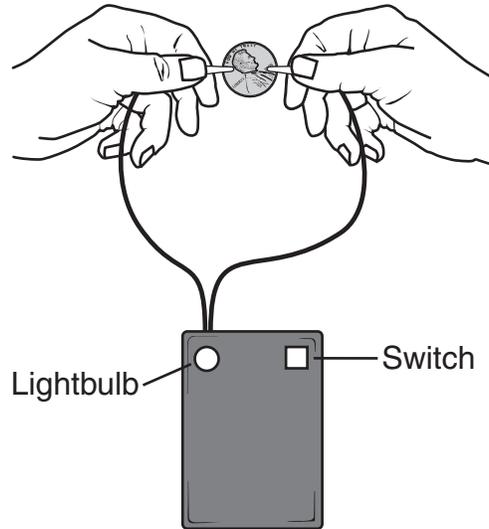
Data Table 1: Materials and Their Properties

| Object | Material | Properties of the Material |
|-------------|----------|----------------------------|
| Penny | | |
| Foil | | |
| Paper | | |
| Paper clip | | |
| Yellow chip | | |
| Toothpick | | |
| Straw | | |
| Washer | | |

Part B: Test the Conductors.

1. Turn the switch on the circuit test box to “on” by moving the switch away from the lightbulb.
2. Hold one wire in each hand.
3. Touch the end of one wire to the end of the other wire. Observe that the lightbulb on the circuit test box lights up.

4. **Touch** one end of the wire to one end of the penny. **Touch** the other end of the wire to the other end of the penny, as shown below.



5. Write “Yes” in Data Table 2 below if the lightbulb lights up when the wire ends are touching the penny. Write “No” in the data table if the lightbulb does not light up when the wire ends are touching the penny.
6. Repeat steps 4 and 5 with each of the other seven objects.

**Data Table 2:
Results of Lightbulb Test**

| Object | The bulb lights? (Yes/No) |
|-------------|------------------------------|
| Penny | |
| Foil | |
| Paper | |
| Paper clip | |
| Yellow chip | |
| Toothpick | |
| Straw | |
| Washer | |

7. When you are finished, turn the switch on the circuit test box to “off” by moving the switch toward the lightbulb.

