Circuitry Overview

Teacher Information

Materials

- (per group)
- (8) 4" x 6" lined index cards
- single-hole punch
- roll cellophane tape
- sheet 12" x 12" aluminum foil
- (4) pairs of scissors
- Mars Fact Sheet
- stapler*
- circuit tester*
    - *These items may be shared among groups.*

Procedure

1) Make circuit testers.
2) Cut sheets of aluminum foil.
3) Copy Lab Instruction Sheets (pages 3 & 4 of this activity)
4) Mars Fact Sheet.

Extension

Have students make their own circuit testers. This will take approximately 15-30 minutes depending on how much preparation is done in advance. This activity should be done prior to the "CIRCUITY" activity. See "MAKING A CIRCUIT TESTER" activity sheet.

Circuitry Overview

Key Concepts

Electricity must travel in a complete circle. A battery creates the movement of *electrons* which travel from the *negative terminal* of a battery through a *metal* wire, through the appliance (when turned on) and back to the positive terminal of the battery in a *circuit*. A *switch* puts a gap or break in the circuit and stops the electron flow when it is turned off.

A good *conductor* of electricity allows electrons to move from one atom to the next quite freely. Some substances resist the transfer of electrons, causing them to heat up – we call these *resistors*. Others allow no transfer of electrons. We call these good *insulators.*

Teacher Background

An atom has a nucleus of protons and neutrons with outer "shells" of orbiting electrons. Metals have electrons in their outermost shell which tend to move from one atom to another quite freely.

One type of battery uses two different metals in one acid solution to produce a movement of electrons from the metal containing more electrons to the metal containing fewer electrons. This can only be accomplished through the use of a metal wire which conducts the electricity (or allows the transfer of electrons through it) from the negative terminal to the positive terminal. This wire allows the flow of electrons to continue in a circle. The electrons traveling through resistors in the circuit create heat and light.

The flow of electrons through a wire also causes a magnetic field around that wire. When this occurs, the wire can be coiled and used with another magnet to turn a motor.

Circuitry Overview

LAB: Circuitry
Student Activity

When building a space probe, we must make sure all the parts are working properly before it can be launched. The parts all have indicator lights. When the parts are assembled and working properly, the lights will come on, indicating that the circuits are complete.

OBJECTIVE

To identify and build a complete electrical circuit.

MATERIALS

- (8) 4" x 6" lined index cards
- single hole punch
- sheet 12" x 12" aluminum foil
- roll cellophane tape
- (4) pairs of scissors
- circuit tester
- stapler
- Mars Fact Sheet

PROCEDURE

1) Create 4 questions and answers from the Mars Fact Sheet. Create 2 wrong answers for each question.
2) On one 4" x 6" index card, write MARS TRIVIA at the top. Starting at the far left first line, write a #1, then punch a single hole next to the number. Then write the first question. Underneath the questions, write the 3 possible answers using A, B, and C with a hole punched next to them. (See diagram.)
3) Repeat step 2 for the other 3 questions.
4) Cut 4 strips of aluminum foil 2 cm x 14 cm or just long enough to reach from the question to the right answer.
5) Tape a small piece of aluminum over the holes (on the back of the card) for each of the incorrect answers, making sure that they are completely covered with tape.

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6) Look at question #1. Find the correct answer, then tape to the back of the card a strip of aluminum so that it covers the hole for the question, goes all the way to the correct answer and completely covers the hole for the answer. Since the wrong answers are already covered with tape, the aluminum for the correct answer should not touch them.

7) Repeat steps 5 and 6 for the other 3 questions.

8) With the questions face up, place a second 4" x 6" card behind the Trivia card, covering the hidden circuits. Tape or staple the cards together.

9) Now use your circuit tester to answer the questions. To do this, place one wire by each answer. The correct answer will complete the circuit and the light bulb should light. Now trade with your classmates, and see if they can find the correct answers.

view of front of card

MARS TRIVIA

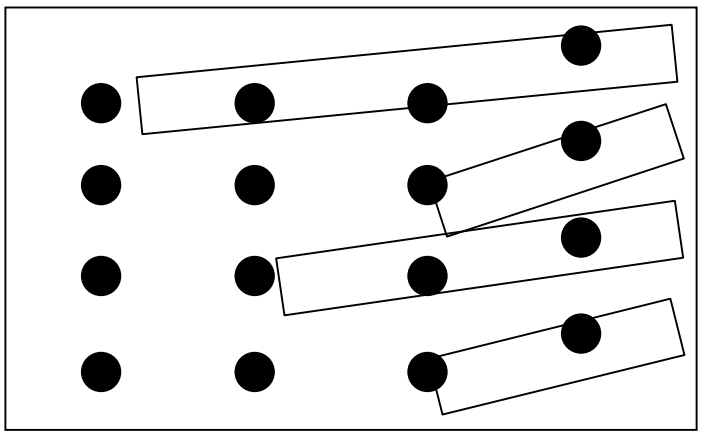
1. ● A Mars day lasts _____ hours.
   ● A. 21.7 ● B. 27.4 ● C. 24.7

2. ● The surface temperature on Mars is _____.
   ● A. cold ● B. hot ● C. moderate

3. ● The name of the great canyon on Mars is _____.
   ● A. Ares ● B. Valles Marineris ● C. Olympus Mons

4. ● Mars is _____ (than) the Earth.
   ● A. smaller ● B. larger ● C. the same size as

smaller view of back of card



(answers: 1-C, 2-A, 3-B, 4-A)

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