

Mystery Card I

Task Information

Grade: 4th Grade

Content:

Physical Science

- **IIC2.2** Electricity can flow from one object to another, through materials and through space.

Format: Manipulative

Purpose:

- To determine the student's knowledge of electrical conductors and circuits

Skills:

Primary: Observing, Recording Data

Secondary Interpreting Data, Generalizing/Inferring

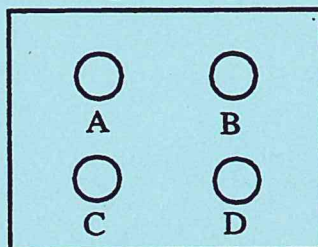
Time: 5 - 8 minutes

Materials:

- 1 D-cell battery
- 1 battery holder
- 3 6" wires with alligator clips at each end
- 1 flashlight bulb
- 1 bulb holder
- 1 circuit card

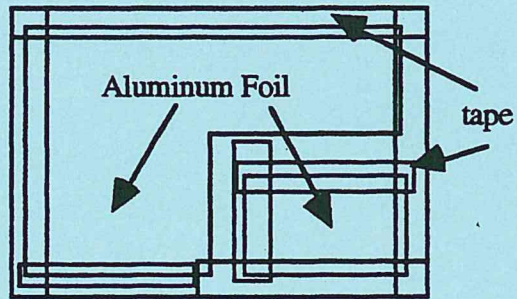
Preparation:

- The circuit card can be made by taping aluminum foil (heavy duty) between two 4" x 6" or 5" X 8" index cards. You can use old folders or poster board too. It is better to use colored index cards rather than white because they are not as see through.
- Punch holes for the terminals and label on one of the index cards. A standard size hole punch is large enough.



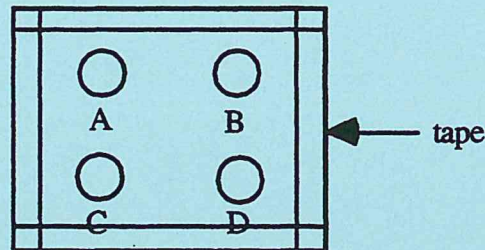
- Cut a piece of aluminum foil large enough to fit over the top of the four terminals. Heavy duty aluminum foil works the best.
- Cut out the bottom corner of the aluminum foil so that terminal "C" is not connected to the other terminals.

- Tape the foil securely to the back of the index card with holes in it.
- It is important to put foil over all of the terminals because it is visible in each of the holes
- Be sure that you do not put tape over the top of the terminals or the test card will not work properly.



Index card #2

- Tape the two index cards together on all four sides so that it cannot be taken apart easily.



- Connect wires, bulb, and battery to form an electrical tester. (see diagram on student task sheet)
- Be sure that all of the electrical testers and mystery cards are in good working condition before students begin the task.

Extensions and

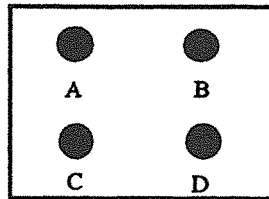
Modifications: Mystery Card 2 and Mystery Card 3

Mystery Card

Task: At this station, you will be using an electric tester to determine where electricity flows between circles on a mystery card.

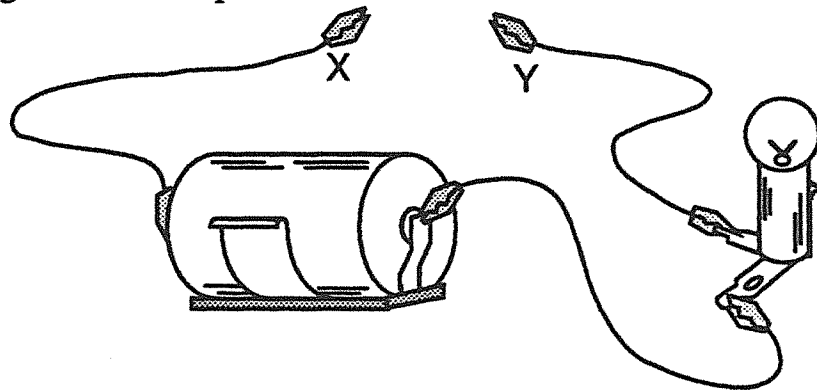
Materials

- 1 electrical tester
- 1 mystery card



Mystery Card

The diagram below represents an electrical tester.



Directions

1. Look at the electric tester in front of you and make sure that it looks like the electric tester shown in the diagram above.
2. Touch the free ends of the wire clips together to see if your bulb will light up. If it doesn't, please raise your hand to let the teacher know right away.
3. Touch circle A on the mystery card with one wire clip. **AT THE SAME TIME**, touch circle B with the other wire clip.
4. Record your observations on the answer sheet.
5. Repeat steps 3 and 4 for circles A to C and circles A to D.
6. Answer questions 2 and 3 on the answer sheet.

Answer Sheet

1. Describe what happened to the bulb when the circles were touched.

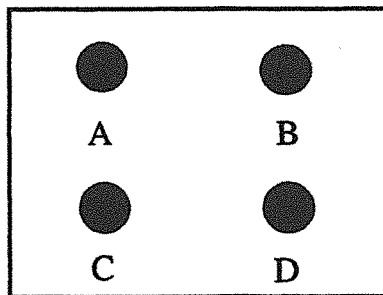
A to B _____

A to C _____

A to D _____

2. Write a sentence that tells why the bulb acted the way it did when both circle A and circle C were touched.

3. Using the data you have collected, draw what you think the connections look like inside the mystery card.



Mystery Card 1 - Scoring Rubric

Maximum score - 10 points

1. Testing Mystery Card

6 points total

Standard: The student describes what happened to the bulb when each connection is made.

Criteria:

A to B and A to D

- 2 points if the student makes a statement describing that the bulb lit or glowed

OR

The student makes a valid statement about complete circuits

- it is a closed circuit/not an open circuit
- the foil (wire) is connected/attached
- 1 point if the student states "it worked."
- 0 points if the student states that the bulb did not light or nothing happened.

A to C

- 2 points if the student makes a statement describing that the bulb did not light or glow

OR

The student makes a valid statement about incomplete circuits

- it is an open circuit or the foil (wire) is not connected/attached
- 1 point if the student states "it didn't work" or "nothing happened."
- 0 points if the student states that the bulb lit.

2. Explanation for outcome of tests

2 points total

Standard: The student explains why the bulb did not light when A and C were connected.

Criteria:

- 2 points for any valid generalization about incomplete circuits.
 - A and C are not connected by foil (wire) under the card
 - It is an open circuit
 - The foil (wire) is not touching/attached between A and C.
- 1 point if the student makes an incomplete or partial statement about the mystery card.
 - It is not a circuit
 - There is no foil (wire)
 - It is not complete
- 0 points if the student only restates observations made in question 1.

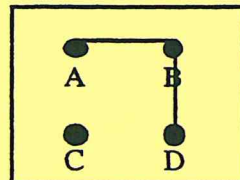
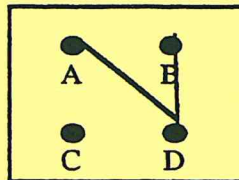
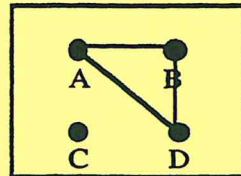
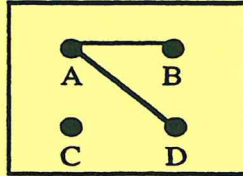
3. Diagram

2 points total

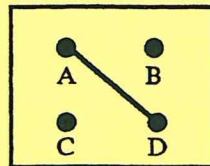
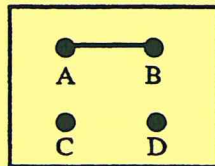
Standard: The student makes a valid drawing based on his / her data from question 1.

Criteria:

- 2 points for a drawing with 2 correct connections



- 1 point for a drawing with one correct connection



- 0 points if the drawing is not based on student's data or is illogical or inappropriate

*** Evaluate the student's answer to item 3 in relation to the data recorded in item 1. If the drawing is correct based on these data (even if the data are not correct), credit should be given.

*** No points should be given if the student connects any terminal with terminal "C" and his/her data states that the bulb did not light up.

Highest possible score - 10 points

1. Describe what happened to the bulb when the circles were touched.

A to B the bulbs lit up

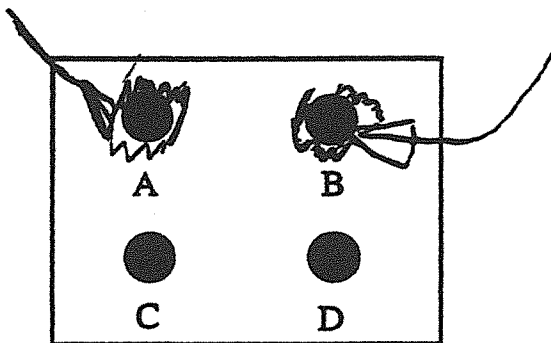
A to C maybe because it ~~was~~ was
two different metals

A to D because they are the same
metal

2. Write a sentence that best describes why the bulb acted the way it did when both circle A and circle C were touched.

because when metal touches metal
it makes sparks

3. Using the data you have collected, draw what you think the connections look like inside the mystery card.



Student ID IDE - 49

Scoring Form - Mystery Card 1 #2

Male / Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

1. Observation of bulb based on connection

| | | | |
|--------|---|---|---|
| A to B | 0 | 1 | ② |
| A to C | 0 | 1 | ② |
| A to D | 0 | 1 | ② |

2. Reason why A to C did not light

① 1 2

3. Mystery card drawing

① 1 2

Total Score 6 pts
Total possible score - 10 points

Student ID _____

Scoring Form - Mystery Card 1

Male / Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

1. Observation of bulb based on connection

| | | | |
|--------|---|---|---|
| A to B | 0 | 1 | 2 |
| A to C | 0 | 1 | 2 |
| A to D | 0 | 1 | 2 |

2. Reason why A to C did not light

0 1 2

3. Mystery card drawing

0 1 2

Total Score _____
Total possible score - 10 points

1. Describe what happened to the bulb when the circles were touched.

A to B The bulb lite up

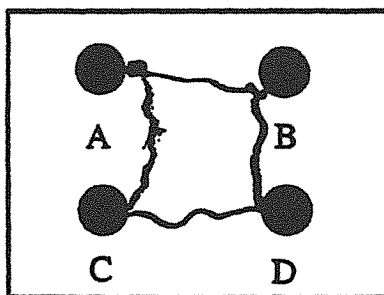
A to C The bulb didnt lite up

A to D bulb lite up

2. Write a sentence that best describes why the bulb acted the way it did when both circle A and circle C were touched.

because there both on the same side

3. Using the data you have collected, draw what you think the connections look like inside the mystery card.



1. Describe what happened to the bulb when the circles were touched.

A to B The light lit up!

A to C There was no light

A to D The light lit up

2. Write a sentence that best describes why the bulb acted the way it did when both circle A and circle C were touched.

A had no wire going to C.

3. Using the data you have collected, draw what you think the connections look like inside the mystery card.

