

# Mystery Card 2

## Task Information

**Grade:** 4th Grade

**Content:**

Physical Science

- **IIC-2.2** Electricity can flow from one object to another, through materials and through space.
- **IID-3** When energy interacts with objects the properties of the object may be changed. Electricity may cause a wire to become warm and glow.

**Format:** Manipulative

**Purpose:**

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

**Skills:**

**Primary:** Interpreting data, Generalizing/Inferring  
**Secondary** Observing, Recording data

**Time:** 10 minutes

**Materials:**

**Teacher**

- 4" X 6" index cards
- heavy duty foil
- hole punch
- masking tape
- permanent black marker
- heavy duty, clear packing tape

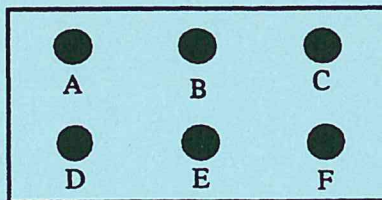
**Per Student**

- 1 D-cell battery
- 1 battery holder
- 3 - 6" wires with alligator clips
- 1 flashlight bulb (1 or 1.5 volts)
- 1 bulb holder
- 1 circuit card

**Preparation:**

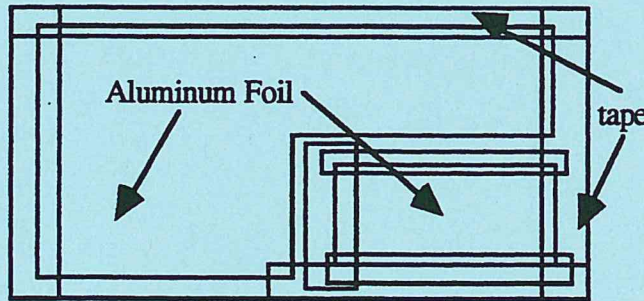
Constructing a circuit card:

- The circuit card can be made by taping aluminum foil (heavy duty) between two 4" x 6" or 5" X 8" index cards or between pieces of thin cardboard. 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.



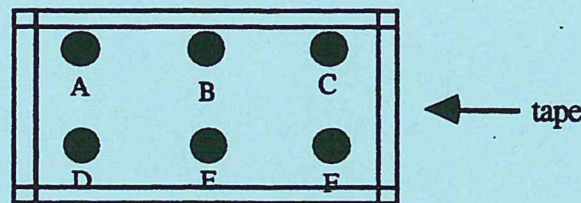
Index card #1

- Cut a piece of aluminum foil large enough to fit over the top of the six terminals. Heavy duty aluminum foil works the best.
- Cut out the bottom corner of the aluminum foil so that terminal "D" is not connected to the other terminals.
- Tape the foil securely to the index card.
- 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. Heavy duty packing tape works really well for this.



**Simple Circuit:**

- 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.
- It may be necessary to use two (2) batteries in order for the bulbs to light sufficiently.

**Extensions and Modifications:**

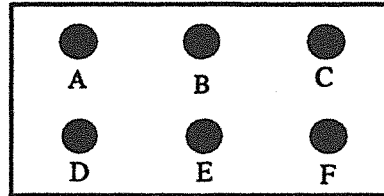
Mystery Card 1 and Mystery Card 3

## Mystery Card 2

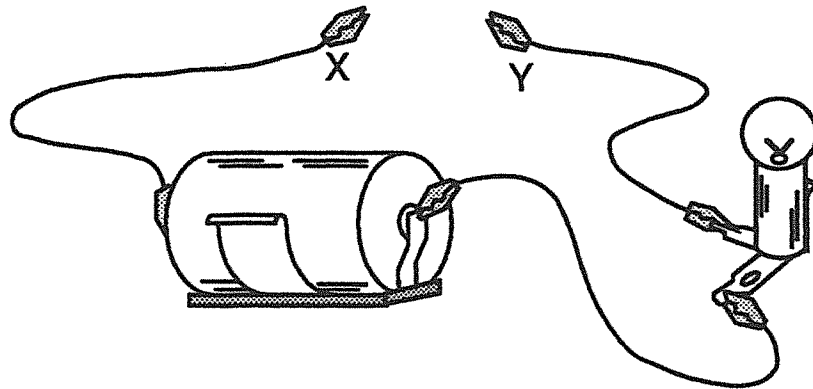
**Task:** At This Station, you will be using an electrical tester to determine where electricity flows between circles on a mystery card.

### Materials

- 1 electrical tester
- 1 mystery card



The diagram below represents an electrical tester.



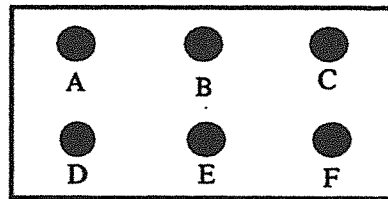
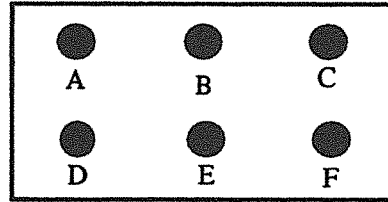
### Directions

1. Look at the electrical tester in front of you and make sure that it looks like the electrical 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. Next touch circle A on the mystery card with one wire clip and **AT THE SAME TIME**, touch circle B with the other wire clip. If the bulb lights, put a check in the **YES** column in the chart on page two. If the bulb does not light, put a check in the **NO** column in the chart.
4. Do the same for all of the other pairs of circles on the mystery card. Be sure to record **all** of your results in the chart.

Please Continue on the Next Page

Touching		Bulb Lights		
		YES	NO	
A	→	B		
A	→	C		
A	→	D		
A	→	E		
A	→	F		
B	→	C		
B	→	D		
B	→	E		
B	→	F		
C	→	D		
C	→	E		
C	→	F		
D	→	E		
D	→	F		
E	→	F		

5. On the basis of your findings, draw two diagrams which show possible ways the circles on your card could be connected. Use lines to show where the electricity travels.



6. Explain how your data chart helped you to draw your diagrams in question 5.

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# Scoring Rubric - Mystery Card 2

Maximum score - 4 points

## 4. Data Table

Total 1 point

**Standard:** The student tests the circles on the mystery card and correctly indicates which connections made the bulb light or not light.

**Criteria:**

- 1 point if the whole data table is filled in.
- \*\*\* Credit should be given even if some check marks are incorrect.
- \*\*\* No credit is given if the table is incomplete.

Example of completed data table

Touching		YES	NO
A	→ B	✓	
A	→ C	✓	
A	→ D		✓
A	→ E	✓	
A	→ F	✓	
B	→ C	✓	
B	→ D		✓
B	→ E	✓	
B	→ F	✓	
C	→ D		✓
C	→ E	✓	
C	→ F	✓	
D	→ E		✓
D	→ F		✓
E	→ F	✓	

**5. Diagrams****2 points total**

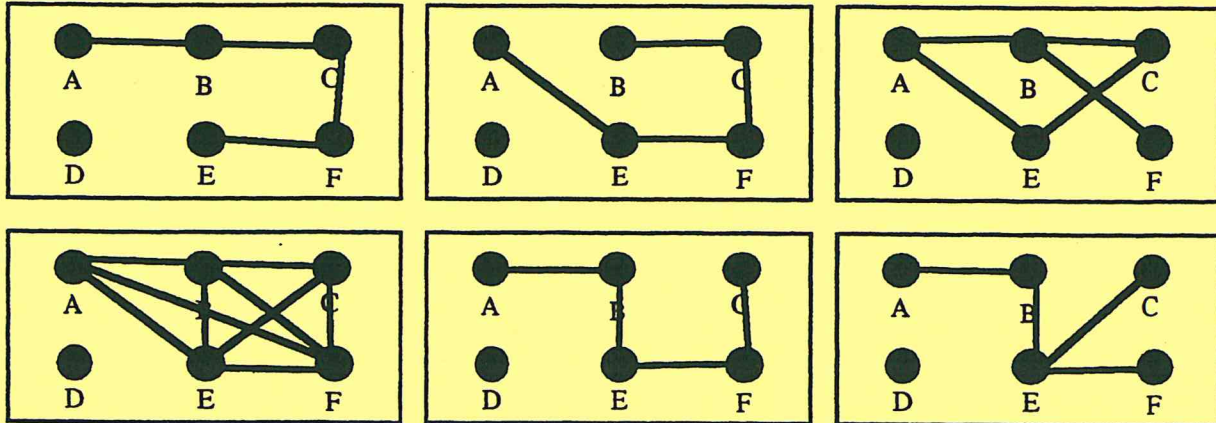
**Standard:** The student makes two (2) valid drawings based on his/her data from question #4.

**Criteria:**

- 1 point for each drawing that correlates correctly to the student's data table.

Students should be given credit if their drawing correlates with their data table even if the data in their table are incorrect.

\*\*\* Some example drawings are shown below. Obviously there are others. The rater will have to be sure that the data table and the drawings correlate with one another.

**6. Explain use of data table to draw diagrams****1 point total**

**Standard:** The student explains how their chart helped them to make their drawings.

**Criteria:**

- 1 point for a reasonable explanation telling that the student used their test data from the table to draw the diagram.

**Highest possible score - 4 points**

Student ID \_\_\_\_\_

Scoring Form - Mystery Card 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.

- |                                     |   |   |   |
|-------------------------------------|---|---|---|
| 4. Data Table                       | 0 | 1 |   |
| 5. Diagrams                         | 0 | 1 | 2 |
| 6. Explanation of use of data table | 0 | 1 |   |

Total Score \_\_\_\_\_  
Total possible score - 4 points

Student ID \_\_\_\_\_

Scoring Form - Mystery Card 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.

- |                                     |   |   |   |
|-------------------------------------|---|---|---|
| 4. Data Table                       | 0 | 1 |   |
| 5. Diagrams                         | 0 | 1 | 2 |
| 6. Explanation of use of data table | 0 | 1 |   |

Total Score \_\_\_\_\_  
Total possible score - 4 points

Student ID \_\_\_\_\_

Scoring Form - Mystery Card 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.

- |                                     |   |   |   |
|-------------------------------------|---|---|---|
| 4. Data Table                       | 0 | 1 |   |
| 5. Diagrams                         | 0 | 1 | 2 |
| 6. Explanation of use of data table | 0 | 1 |   |

Total Score \_\_\_\_\_  
Total possible score - 4 points

#1 Student ID 4A-DE-3 Scoring Form - Mystery Card 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.

4. Data Table 0 (1)
5. Diagrams (0) 1 2
6. Explanation of use of data table (0) 1

Total Score 1 pt.  
Total possible score - 4 points

#2 Student ID 4A-DE-7 Scoring Form - Mystery Card 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.

4. Data Table 0 (1)
5. Diagrams 0 1 (2)
6. Explanation of use of data table (0) 1

Total Score 3 pts.  
Total possible score - 4 points

#3 Student ID 4A-DE-1 Scoring Form - Mystery Card 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.

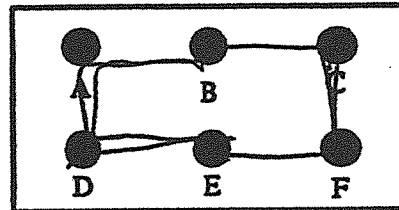
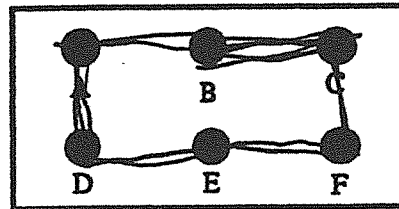
4. Data Table 0 (1)
5. Diagrams 0 1 (2)
6. Explanation of use of data table 0 (1)

Total Score 4 pts  
Total possible score - 4 points



			Bulb Lights	
Touching			YES	NO
A	→	B	✓	
A	→	C	✓	
A	→	D		✓
A	→	E	✓	
A	→	F	✓	
B	→	C	✓	
B	→	D		✓
B	→	E	✓	
B	→	F	✓	
C	→	D		✓
C	→	E	✓	
C	→	F	✓	
D	→	E		✓
D	→	F		✓
E	→	F	✓	

5. On the basis of your findings, draw two diagrams which show possible ways the circles on your card could be connected. Use lines to show where the electricity travels.

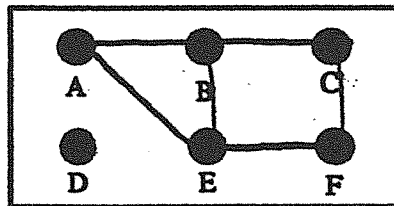
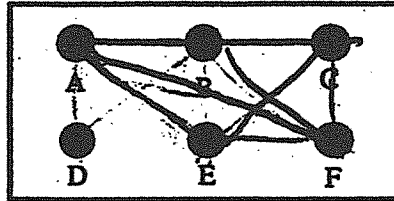


6. Explain how you used your data from the chart to draw your diagrams in question 5.

i think there are more than one places for electricity to flow throu  
 ON the chart A & F and i think  
 there might be tape on the other  
 side to help the light bulb light

		Bulb Lights	
Touching		YES	NO
A	→ B	✓	
A	→ C	✓	
A	→ D		✓
A	→ E	✓	
A	→ F	✓	
B	→ C	✓	
B	→ D		✓
B	→ E	✓	
B	→ F	✓	
C	→ D		✓
C	→ E	✓	
C	→ F	✓	
D	→ E		✓
D	→ F		✓
E	→ F	✓	

5. On the basis of your findings, draw two diagrams which show possible ways the circles on your card could be connected. Use lines to show where the electricity travels.

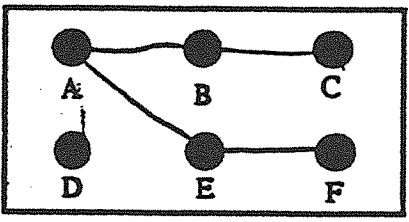
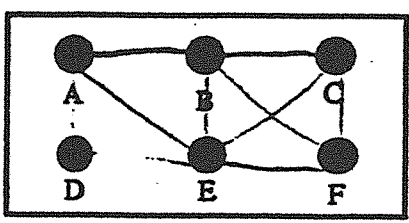


6. Explain how you used your data from the chart to draw your diagrams in question 5.

I connected the letter to the other letters.

Touching		Dual Lights		
		YES	NO	
A	→	B	✓	
A	→	C	✓	
A	→	D		✓
A	→	E	✓	
A	→	F	✓	
B	→	C	✓	
B	→	D		✓
B	→	E	✓	
B	→	F	✓	
C	→	D		✓
C	→	E	✓	
C	→	F	✓	
D	→	E		✓
D	→	F		✓
E	→	F	✓	

5. On the basis of your findings, draw two diagrams which show possible ways the circles on your card could be connected. Use lines to show where the electricity travels.



6. Explain how you used your data from the chart to draw your diagrams in question 5.

I looked at all the ones that lighted and I put lines that connected the ones that lighted. I drew a line to A to B because it lighted.