



# CIRCUIT SENSE

## 4-H Electrical Science Lesson

### IDENTIFY CLOSED AND OPEN CIRCUITS



#### Project Skills:

Recognizing closed and open circuits

#### Life Skills:

Solving problems  
WI Academic Standards:  
Science C.4. Science  
Inquiry

#### Time:

20-25 minutes

#### Supplies:

- Wire strippers
- Each pair of youth needs the following materials:
  - 5 pieces of 8-10 inch insulated, solid core, 20, 22 or 24 gauge wire
  - 2 D-cell batteries
  - 2 D-cell battery holders
  - 2 - 1.5 volt light bulbs
  - 2 light bulb holders
  - 1 pencil
  - 1 Open or Closed Circuit Worksheet

#### Getting Ready:

1. Use the wire strippers to remove 1/2 inch of plastic covering from each end of each wire.
2. Helpers should try the activity out before doing it with youth.



Adapted from 4-H CCS  
Electric Excitement project  
series Level 1, Magic of  
Electricity (BU-06848  
Revised), pp. 16-17.

#### WHAT TO DO

*Complete the Open or Closed Circuit Worksheet.*

1. Pair up youth and give each pair an Open or Closed Circuit Worksheet and a pencil.
2. Explain that an electric circuit needs three things:
  - A *power source* to push electrons, such as a battery.
  - A *path* for the electrons to travel along. If this path has a gap in it, then the circuit is open and electricity will not flow. If the path is complete, then the circuit is closed and electricity will flow.
  - *Something* for electrons to *do*, such as light a light bulb.
3. Ask them to examine each diagram closely, decide as a pair whether the circuit is open or closed, and then record their predictions by circling the word *open* or *closed* on the worksheet.

*Build each of the circuits on the worksheet.*

1. Distribute the electrical supplies listed above to each pair of youth.
2. Have youth build each of the circuits and then use the worksheet to record the actual results by circling the word *on* or *off*. If the bulb lights, the circuit is closed. If it does not light, then the circuit is open.

#### ENHANCE

- Have youth build circuit #3 again. Now remove one of the light bulbs from the light bulb holder. This will open the circuit and stop the flow of electrons. Ask the youth why they think the remaining bulb will not light.
- Have youth build circuit #4 again, but this time turn one of the batteries around so that the positive end of one battery is next to the positive end of the other. When similar sides of two batteries face each other in a circuit, they oppose each other and cancel each other out! See if the youth can figure out why the light went out.

#### TALK IT OVER

Try to get each youth to express his or her feelings and experiences.

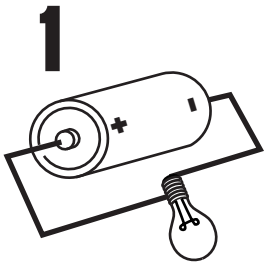
*Reflect:*

- How did you decide if the circuit was open or closed?
- What did you discover about circuits?
- Why is it important to be able to read a wiring diagram?

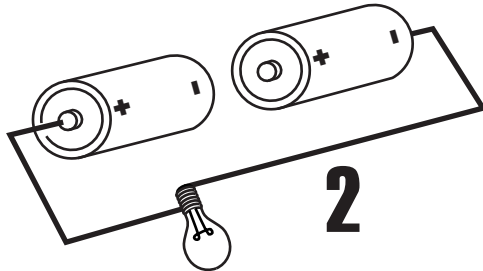
*Apply:*

- What are some electrical circuits in your home that are open? Others that are closed?
- What are some situations where it is important to know if a circuit is open or closed? Why is this important?

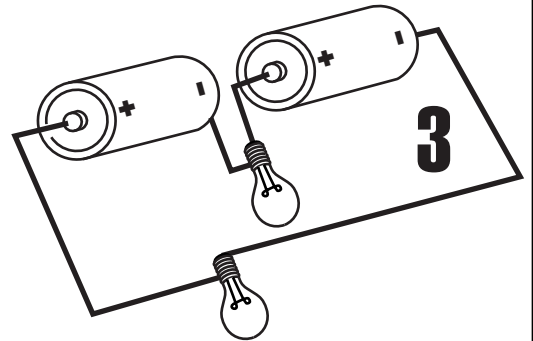
# Open or Closed Circuit Worksheet



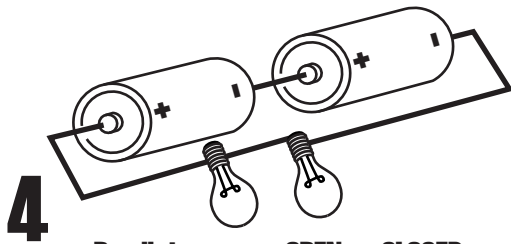
Predict:  OPEN  CLOSED  
Test Results:  ON  OFF



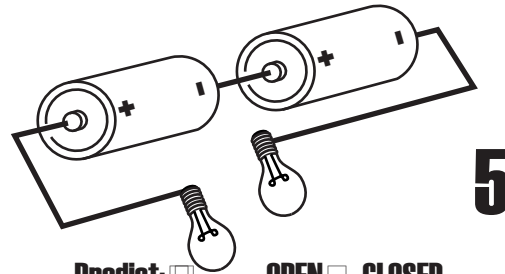
Predict:  OPEN  CLOSED  
Test Results:  ON  OFF



Predict:  OPEN  CLOSED  
Test Results:  ON  OFF

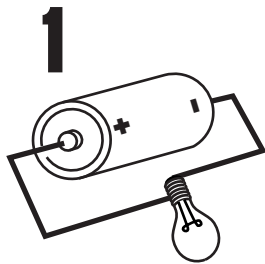


Predict:  OPEN  CLOSED  
Test Results:  ON  OFF

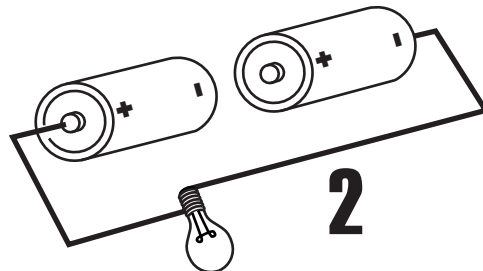


Predict:  OPEN  CLOSED  
Test Results:  ON  OFF

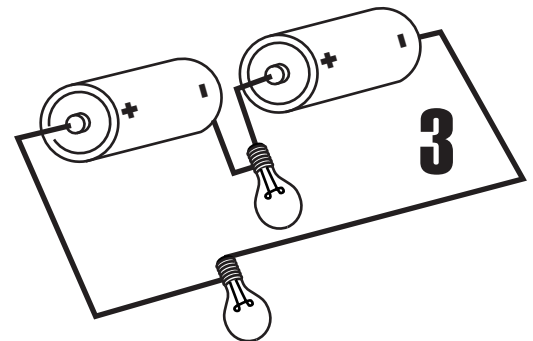
# Open or Closed Circuit Worksheet



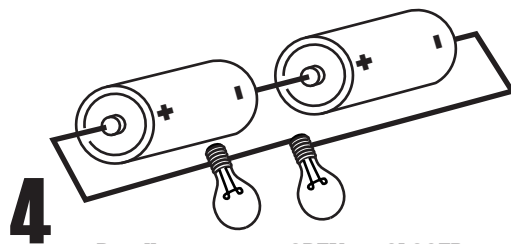
Predict:  OPEN  CLOSED  
Test Results:  ON  OFF



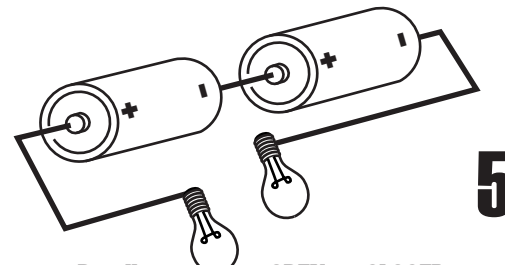
Predict:  OPEN  CLOSED  
Test Results:  ON  OFF



Predict:  OPEN  CLOSED  
Test Results:  ON  OFF



Predict:  OPEN  CLOSED  
Test Results:  ON  OFF



Predict:  OPEN  CLOSED  
Test Results:  ON  OFF