

ESTEM WATERLOO

Batteries and Bulbs Science Thinking Log

by _____



ESTEM WATERLOO

Batteries and Bulbs Table of Contents

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Batteries and Bulbs: What Do You Know?

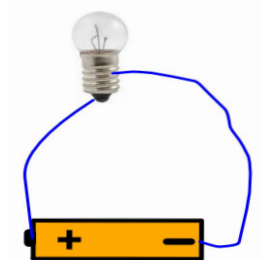
1. **CIRCLE** the items below that will **conduct electricity**.
2. **CROSS OUT** the items below that are **insulators**.



3. Name **two** different ways you could turn off this bulb.

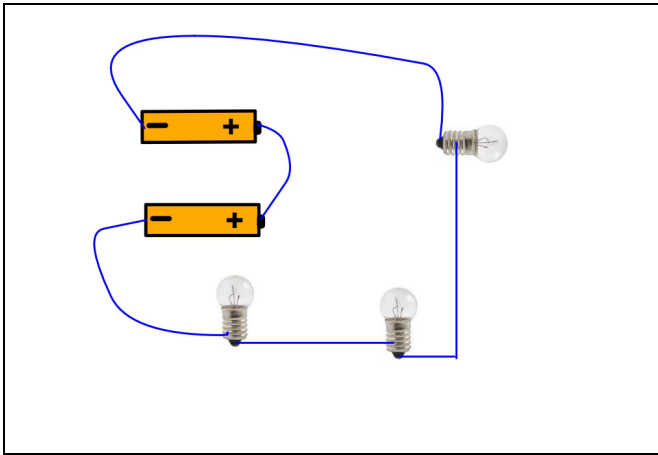
1) _____

2) _____



Look at the circuits below. Decide if each one will light or not.

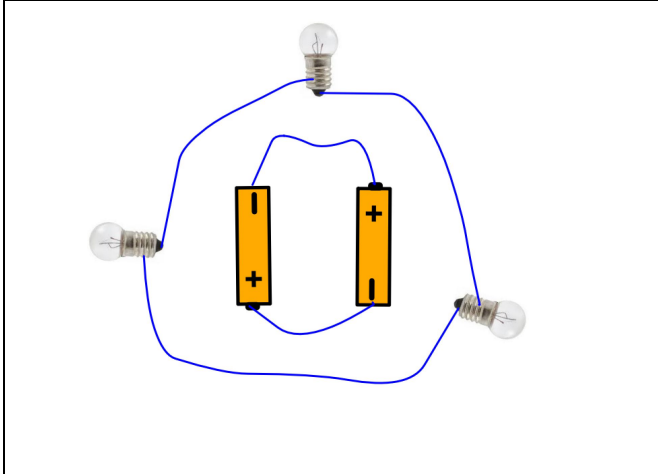
<p>The diagram shows a circuit with two batteries and two light bulbs. The top battery is on the left, and the bottom battery is on the right. A light bulb is connected to the top wire between the two batteries. Another light bulb is connected to the bottom wire between the two batteries. The circuit is a single loop.</p>	<p>4. Will this circuit light both bulbs?</p> <p>___ YES</p> <p>___ NO</p>
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5. Will this circuit light all 3 bulbs?

___ YES

___ NO



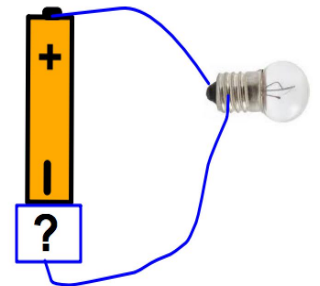
6. Will this circuit light all 3 bulbs?

___ YES

___ NO

7. Think of one object you could put in the ? space in the circuit diagram to get the bulb to light. _____

Which vocabulary word **from the box** below best describes your object? _____



8. Think of one object you could put in the ? space in the circuit diagram that would keep the bulb from lighting. _____

Which vocabulary word **from the box** below best describes your object.

Vocabulary Box

electricity	battery	conductor	insulator	circuit
parallel circuit	series circuit	open circuit	light	switch

Electricity & Light Bulbs

I think I know . . .	I want to know . . .	I now know . . .

4th Grade Batteries and Bulbs
Activity 1

Make It Light Data Sheet

Challenge Questions

Challenge #1: Light that Bulb

Experiment with the materials. Find a way to get the bulb to light. Make a drawing to show the arrangement of parts that works. Label all the parts. When you find one way to light the bulb, do more experimenting to find as many ways as you can to get the bulb to light. Draw them here.

Drawing of the first way I got the bulb to light:

Another way I got the bulb to light:

Another way I got the bulb to light:

Challenge #2: Which Part?

Make a detailed drawing of the outside of the light bulb and what you can see inside the bulb.

Test different parts of the light bulb. Which part does the wire or battery have to touch for the bulb to light? Add this into your drawing.

Challenge 3: The Fewest Parts

What is the absolute fewest parts you can use to light the bulb? You might be surprised. Make a drawing of what you figure out.

4th Grade Batteries and Bulbs
Activity 2

Conductor or Insulator

1. Use your batteries and bulbs items to create a device that will test objects to see if they are conductors or insulators. Remember, electricity will pass through conductors but will not go through insulators. Make a drawing of your device. Be sure to mark where you will add the test objects into your circuit.

Drawing of your Conductor Tester:

How will you be able to tell if your test object is a conductor or an insulator?

2. Test each object in your “Test Items” bag. Record whether each object in your bag is a conductor or an insulator.

Names of items that are Insulators	Names of items that are Conductors

3. Get 4 sticky notes from your teachers. Label 2 notes with “Conductor” and 2 notes with “Insulator.” Use your Conductor Tester to test different objects around the classroom. Place sticky notes on two of the conductors you find and on two of the insulators you find. There can only be one note on each classroom item. If a classmate has already placed a note on something in the room, you will have to find a different object it label.

4. Based on what you learned, make a claim about what types of materials are conductors.

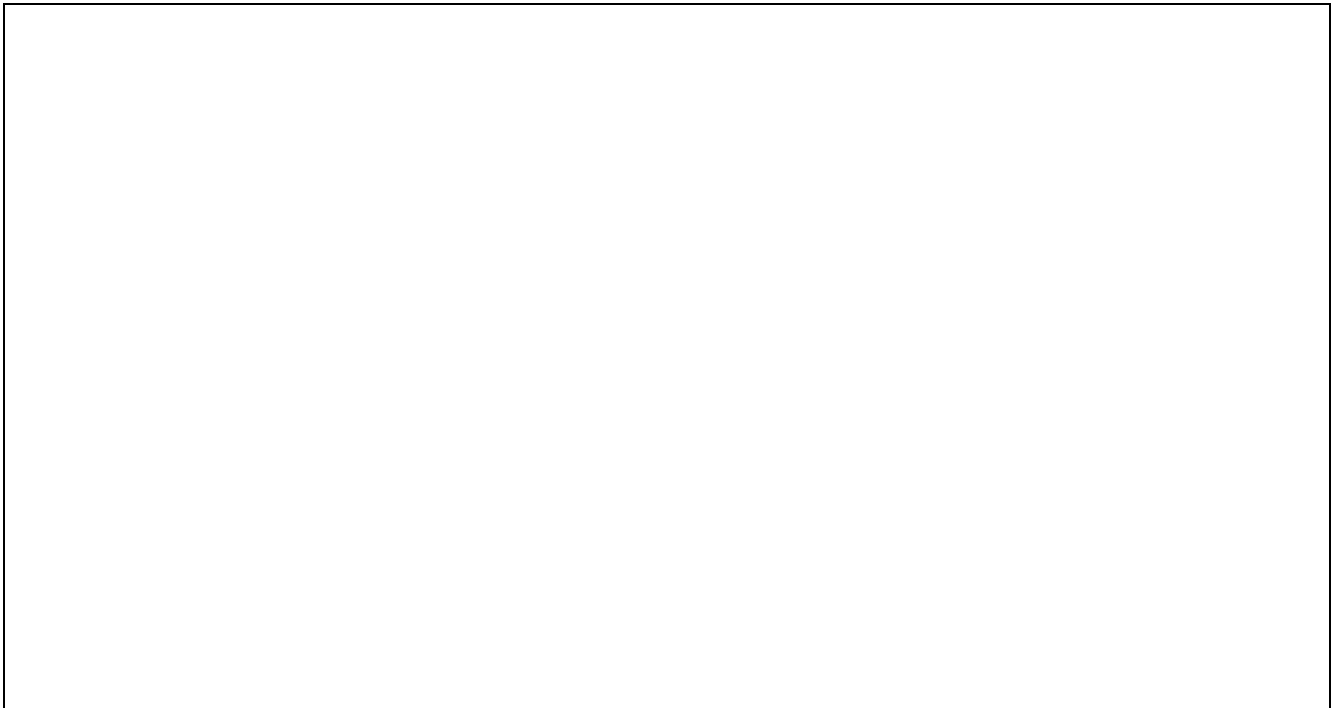
5. Based on what you learned, make a claim about what types of objects are insulators.

4th Grade Batteries and Bulbs
Activity 3

Series or Parallel?

Challenge 1: Are two bulbs brighter than one?

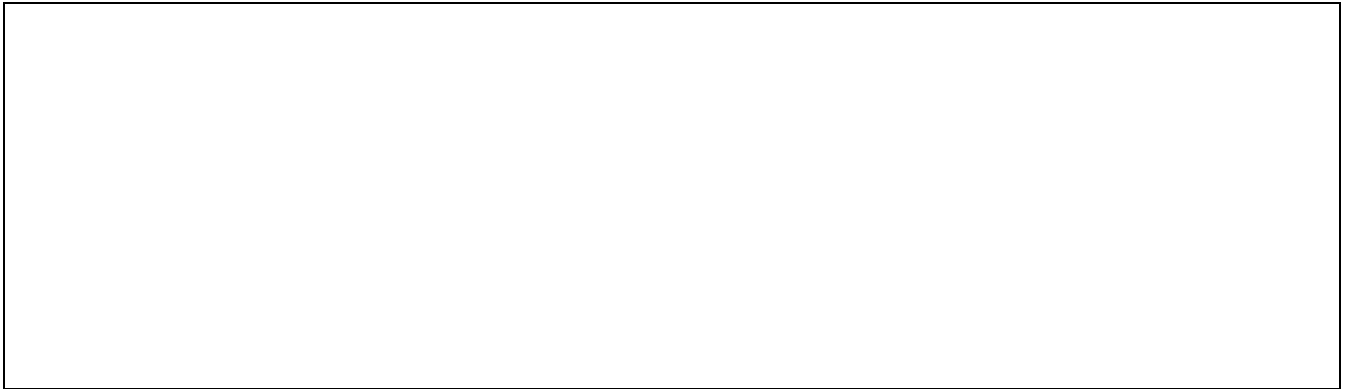
Experiment with the materials and discover a way to get two bulbs to light using one battery. When you get that to work, sketch a drawing of your 2-bulb circuit.



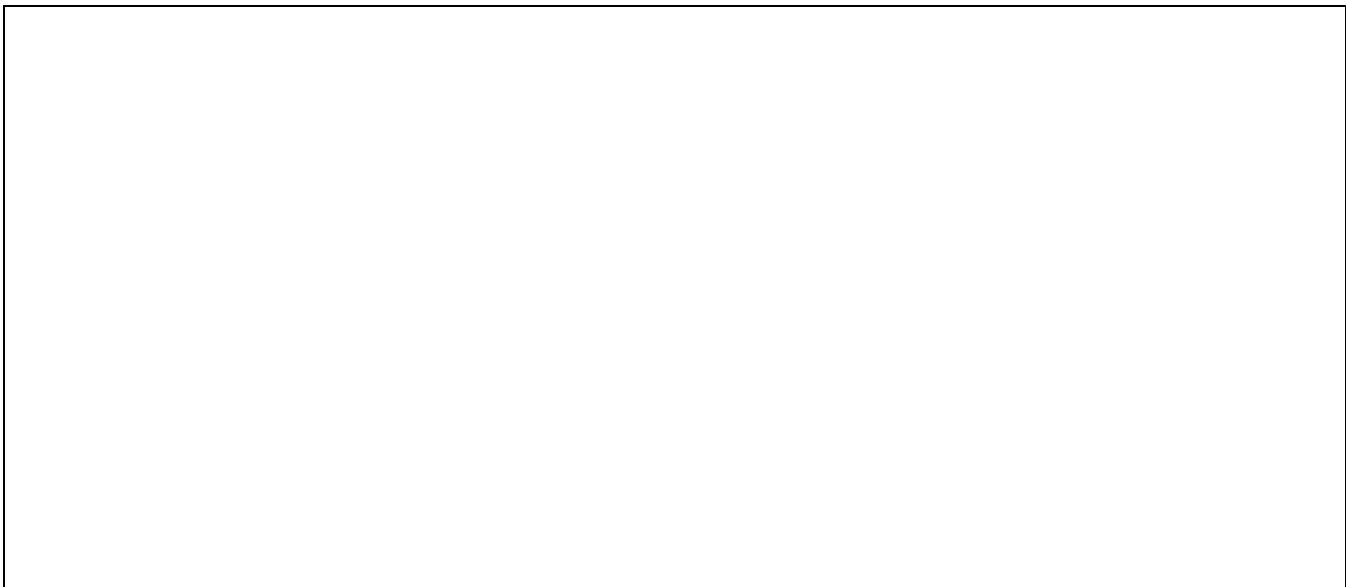
Describe the brightness of the 2 bulbs compared to when only 1 bulb was lit.

Challenge 2: Do light bulbs shine brighter if you use more batteries?

Using one light bulb and two batteries, connect all items to see if this makes the light bulb shine brighter. Make a drawing in the box below showing how you have everything connected.



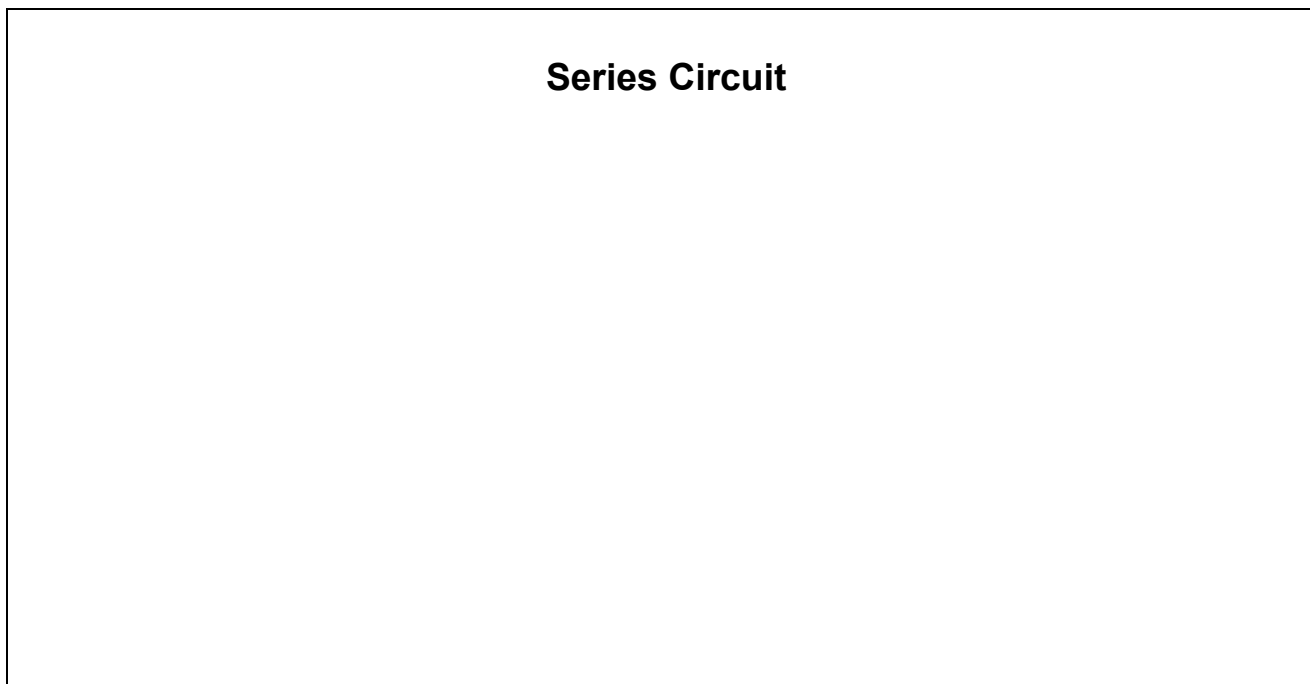
Notice the ends of each battery are labeled + and -. Is the direction of the two batteries important? Using two batteries, experiment with the direction the two batteries are pointing. Make a drawing of the way the batteries must be hooked together to work. Be sure to mark the ends in your drawing with a + (plus) or - (minus) sign.



Challenge 3: Creating a Series Circuit

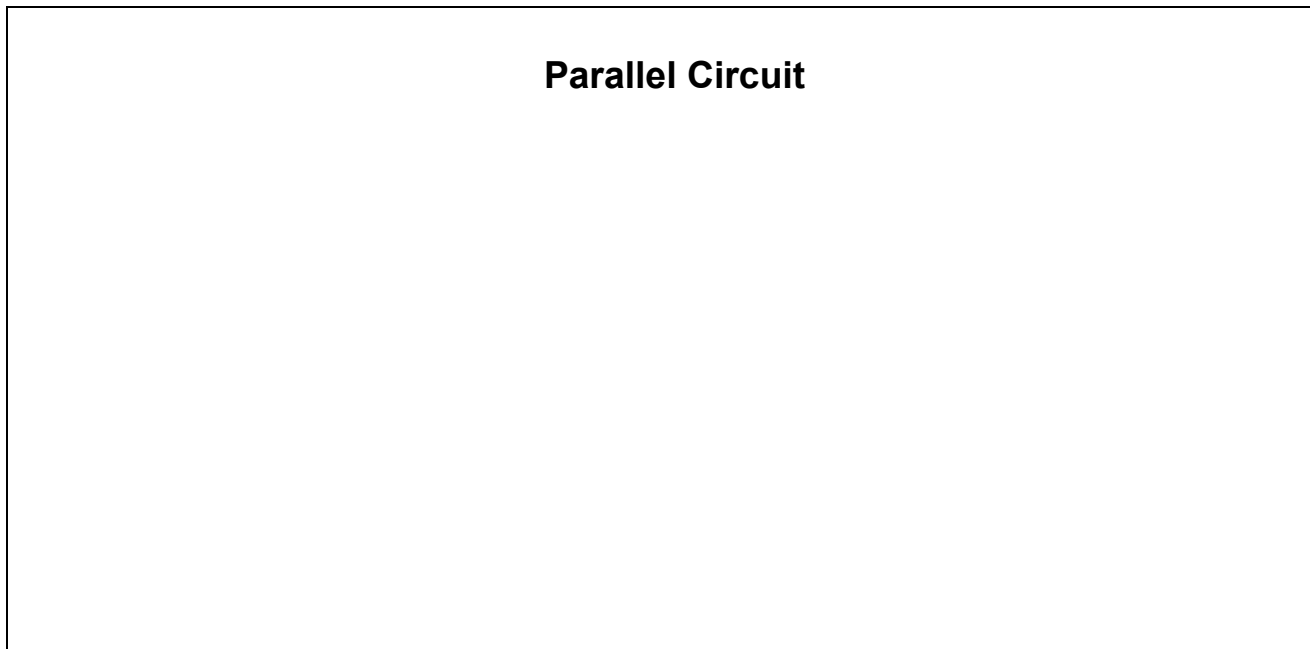
Build a working circuit using two bulbs and one or two batteries. Make the circuit so when you disconnect one bulb, the other bulb goes out too. When this happens, you have created a **series circuit**. Draw your series circuit in the box below.

Series Circuit



Creating a Parallel Circuit: Now rewire your system so when you disconnect one bulb the other bulb stays lit. You may need extra wires to get this to work. When one bulb stays lit even though the other bulb goes out, you have created a **parallel circuit**. Make a drawing below of your wiring of your parallel circuit.

Parallel Circuit



Quick Write: Series vs. Parallel Comparison

Before Writing: Take some time to reflect on the similarities and differences between a series and a parallel circuit.

Series Circuit	Both	Parallel Circuit

4th Grade Batteries and Bulbs
Engineering Design Activity

Switch on Engineering

Think It

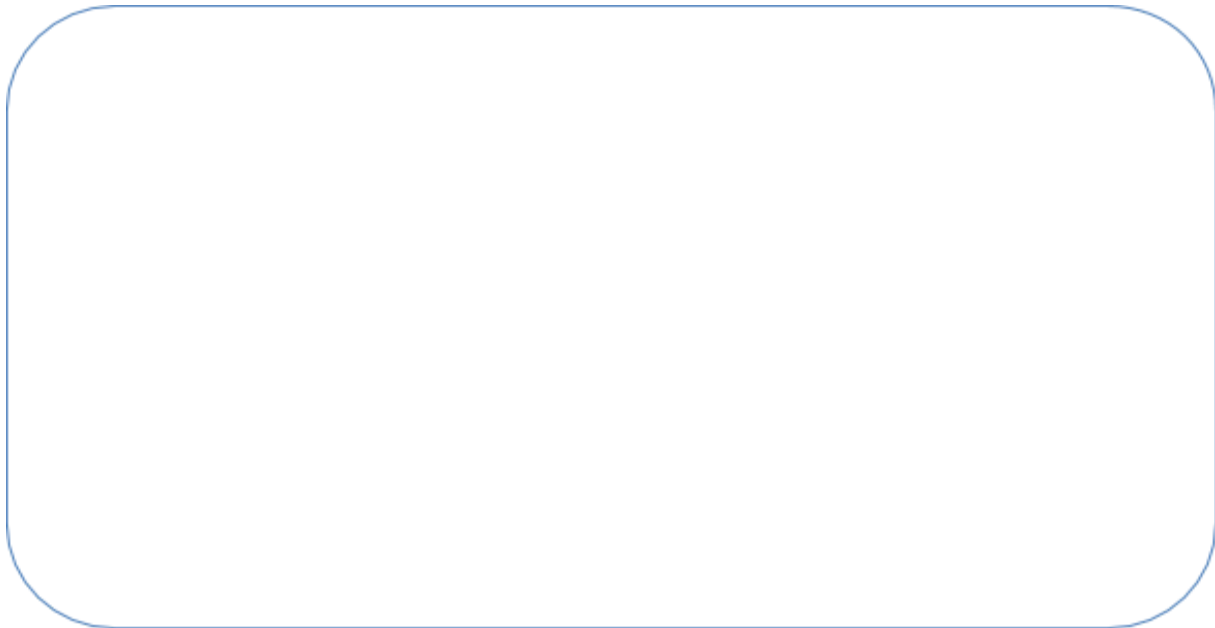
What is the problem you are trying to solve? _____

What are your constraints? _____

Brainstorm some possible solutions.

Make a drawing of the idea you will build. Label all the parts

Design It



List all of the materials you will need.

Gather all of your materials and build your circuit and switch. Try it.

Test It

What works well? _____

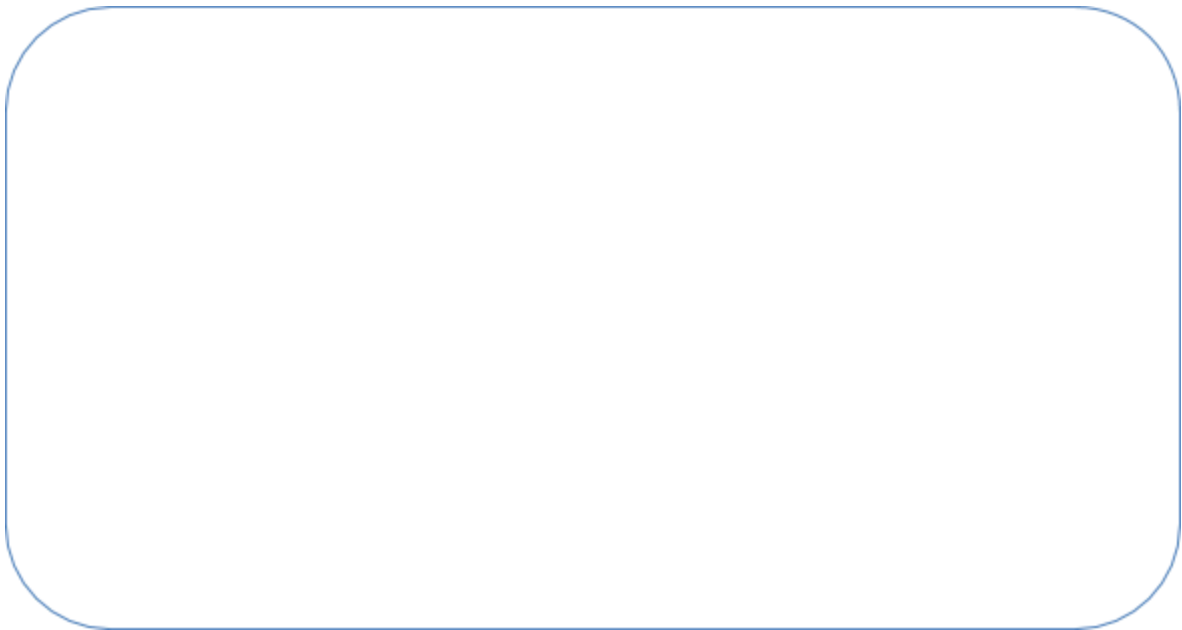
What does not work well? _____

What could be made better? _____

Make changes to your switch, then test it again.

Make a final drawing of your improved switch.

Refine It



Vocabulary

Throughout our Batteries and Bulbs Unit, use the graphic organizers below to record vocabulary.

The image shows two identical graphic organizers arranged vertically. Each organizer is a large rectangle divided into four quadrants by a vertical and a horizontal line. In the center of each organizer is a large oval, also divided by a vertical and a horizontal line. The lines connecting the central oval to the four quadrants are thin and extend to the inner edges of the quadrant boxes. This layout is designed for students to write a central concept in the oval and related vocabulary or definitions in the surrounding boxes.

A graphic organizer template consisting of a central oval and four surrounding rectangular boxes. The oval is positioned in the center, and the four boxes are arranged in a 2x2 grid around it, with lines connecting the corners of the boxes to the oval.

A second identical graphic organizer template consisting of a central oval and four surrounding rectangular boxes. The oval is positioned in the center, and the four boxes are arranged in a 2x2 grid around it, with lines connecting the corners of the boxes to the oval.

A diagram template for a science thinking log. It consists of a large rectangle divided into four quadrants by a vertical and a horizontal line. In the center, where the lines intersect, is a large oval shape with a double-line border. The entire diagram is empty, intended for students to write their thoughts and observations.

A second identical diagram template for a science thinking log, consisting of a 2x2 grid of rectangles with a central double-lined oval.

A diagram template for a science thinking log. It consists of a central oval shape with a double-line border, positioned in the middle of a larger rectangle. This rectangle is divided into four quadrants by a vertical line and a horizontal line that intersect at the center of the oval. The oval and the four quadrants are all empty, intended for student input.

A second identical diagram template for a science thinking log, identical to the one above, consisting of a central oval and four surrounding quadrants.

Glossary

Once you have all of our vocabulary words filled out in the graphic organizers, record our vocabulary words and their definitions below **in alphabetical order**.

_____ : _____

_____ : _____

_____ : _____

_____ : _____

_____ : _____

•
•

•
•

•
•

•
•

•
•

Index

Number the pages in your science journal. Record your vocabulary words below **in alphabetical order**. After each word, list the pages in your journal where you can find more information about that topic.

Vocabulary Words

page numbers

_____ :

_____ :

_____ :

_____ :

_____ :

_____ :

_____ :

_____ :

_____ :

_____ :

_____ :

4th Grade Batteries & Bulbs Unit
Final Assessment

Batteries and Bulbs: Now What Do You Know?

1. **CIRCLE** the items below that **will conduct electricity**.
2. **CROSS OUT** the items below that are **insulators**.

penny



paper



fry pan



wooden chopsticks



foil



plastic spoon



eraser



keys



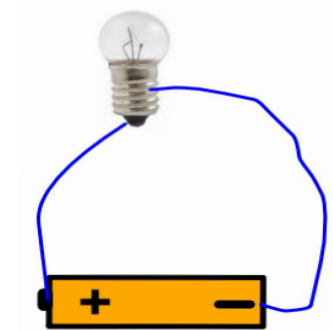
cloth



3. Name two different ways you could turn off this bulb.

1) _____

2) _____

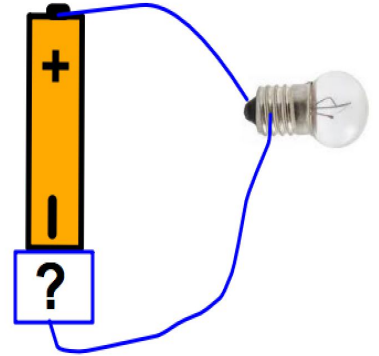


Vocabulary Box

electricity	battery	conductor	insulator	circuit
parallel circuit	series circuit	open circuit	light	switch

4. Name one object you could put in the space in the circuit diagram to get the bulb to light.

Which vocabulary word from the box best describes your object. _____



5. Name one object you could put in the space in the circuit diagram that would keep the bulb from lighting. _____

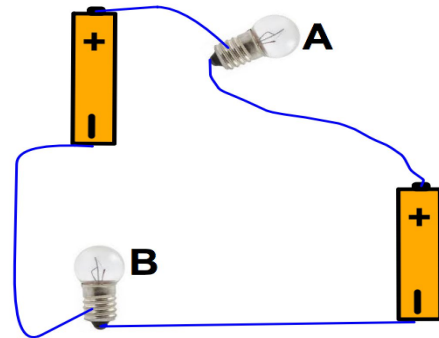
Which vocabulary word from the box best describes your object. _____

6. The circuit shown has wires, 2 batteries and 2 bulbs.

Will Bulb A light? _____

Will Bulb B light? _____

Use your pencil to FIX the circuit in the diagram so both bulbs will light.



7. The circuit shown has wires, 2 batteries and 3 bulbs.

Will Bulb A light? _____

Will Bulb B light? _____

Will Bulb C light? _____

Use your pencil to FIX the wires in the diagram so all 3 bulbs will light.

