

Name \_\_\_\_\_ Date \_\_\_\_\_

### I. Lighting a Light Bulb

**Objective:** We will explore electricity and determine what makes a light bulb light by testing different electric pathways.

1. **Explore:** Take 5 minutes to explore the sim.
2. **Turn and Talk:** Talk about your findings with a partner.



3. Try to create different pathways that will light the light bulb.

Components (parts) I used to make a pathway:	Did the bulb light?		Observations
	<small>(circle Y or N)</small>		
3 wires, 1 lightbulb, and a battery	Yes	No	
	Yes	No	
	Yes	No	
	Yes	No	

4. Draw one of the working pathways here:

5. **Turn and Talk:** Share some of your findings with your partner.

- Is there more than one way to create a working pathway?
- What did you notice about successful pathways?



6. Complete the table below.

How can you...	What did you do? <small>(write or draw)</small>	What other changes do you notice?
..make the bulb brighter?		

How can you...	What did you do?	What other changes do you notice?
...change the direction of the electrical current?		
...turn off the bulb without pushing pause?		

7. **Turn and Talk:** Share your findings with your partner.

- In order for the bulb to light, what needs to happen?
- What components did every working pathway have?



8. In the box below, use your understanding to explain how a light bulb turns on. You can use words or pictures to help show what you know.

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## II. Exploring Kinds of Circuits

**Objective:** We will use our knowledge of electric circuits to create and analyze different pathways that can light several bulbs at once.

1. **Explore:** Take 5 minutes to explore the sim and build a working circuit. Draw your successful circuit below and label the electricity source and receiver.

2. **Turn and Talk:** Share your working circuit with your partner.

- Is there more than one way to create a working circuit?
- What do working circuits require?



**Inquiry Question:** Can you light several bulbs brightly with one battery?

3. Complete the following table by creating, drawing, and observing circuits that meet the criteria.

Create a circuit using...	Drawing of your circuit:	Did the bulb or bulbs light?		Observations brightness? speed of electrons?
		Yes	No	
1 bulb, 1 battery, 3 wires		Yes	No	
2 bulbs, 1 battery, 3 wires		Yes	No	
2 bulbs, 1 battery, 4 wires		Yes	No	
Try that one again: Make a <i>different</i> circuit using 2 bulbs, 1 battery, 4 wires		Yes	No	

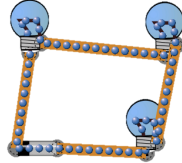


4. **Turn and Talk:**

- Were you able to create a circuit that lights 2 bulbs brightly?
- How is this kind of circuit different from circuits with 2 dimly lit bulbs or 1 bulb?

5. Circuit A is a working circuit that uses 3 bulbs and 1 battery. The electrons flow throughout the circuit, but the bulbs do not light brightly. They're so dim you can hardly tell that they are lit!

Circuit A:



Without the sim, design a circuit that lights 3 bulbs brightly using only 1 battery. Draw your circuit below.

6. **Turn and Talk:** In Circuit A, what would happen if one of the light bulbs burned out or broke? What about in the circuit you designed?



7.

Type of Circuit	What it is	What it looks like
_____ Circuit	a circuit that has one pathway for electricity to flow from the source to all receivers	
_____ Circuit	a circuit that has individual pathways from the source to each receiver	

8. Imagine you work for a company that designs strings of Christmas lights. Which type of circuit would be the best design to use? Why? Use evidence from your investigation to support your choice.

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### III. Using Objects to Complete a Circuit

Objective: We will use our knowledge of electric circuits to identify common objects that complete a circuit.

1. **Explore:** Take 5 minutes to explore the sim. Make several different circuits that light 4 light bulbs. Draw one working circuit below.



2. **Turn and Talk:** Share your working circuit with your partner.

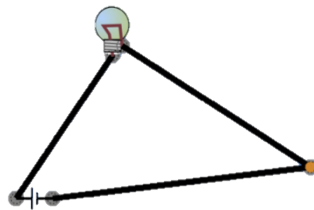
- What type of circuit did you make?
- Is there more than one way to design a circuit that will light several bulbs?



3. **Predict:** What will happen if you split the junction between 2 wires in a working circuit?

**Inquiry Question:** Can common objects be used to complete a circuit?

4. **Let's test it!** Using 3 wires, a battery, and a bulb, create the following series circuit:



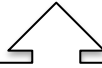
5. Open your circuit by disconnecting two of the components. Click on "Grab Bag." Try to close the circuit using each item and complete the table below.

Grab Bag Item	Did the bulb light?	
Dollar	Yes	No
Paper Clip	Yes	No
Penny	Yes	No
Eraser	Yes	No
Dog	Yes	No
Hand	Yes	No
Pencil Lead	Yes	No

6. What do the materials that were able to light the bulb have in common?



7. What other objects would complete the circuit?



These objects are called **conductors** because they conduct electricity by allowing it to flow through them. Objects that do not allow electricity to flow through them are called **insulators**.

\*8. Look around our classroom. What objects do you see that you are **conductors**?

9. Using our classroom circuit materials, design a circuit that would allow you to test these classroom objects. (Think about how you tested the grab bag objects!)

My Design:

10. Build the circuit and test the classroom objects that you predicted!

**Conductors:**

**Insulators:**