

## Lesson 9: Exploring Circuit Components

### OPENER

- ❖ Examine the batteries set out by your teacher and identify the positive and negative ends (called terminals). How can you tell which end is positive and which is negative?
- ❖ What do you think the 2 terminals do when a battery is connected in a circuit?
- ❖ Look for the voltage on each battery. (1.5 V, 9 V, etc.) What do you think this means?



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### Investigating Circuit Components

1. Record your investigations into how multiple batteries, bulbs, and motors affect how a circuit works overall. Add voltages together for batteries connected in series. Describe relative bulb brightness, and relative motor speed. Fill out one row for each circuit configuration.

# batteries (and total voltage)	# bulbs (and voltage ratings)	# motors (and voltage ratings)	Circuit drawing	Observations

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2. How does the brightness of a bulb change with 1 versus 2 in series?
3. How does the speed of a motor change when it is alone in the circuit versus in series with a bulb or another motor?
4. If you want 2 bulbs to be as bright as possible, how would you set up your circuit? Draw the circuit, and label the components.
5. If you want to run a light and a fan (motor) at the same time, how would you arrange them in a circuit to have the quietest fan possible?
6. What else you can use a motor for, besides a fan?
7. How many 1.5 V batteries do you need to line up to be equivalent to a 4.5 V battery?
8. What kinds of energy are in the circuits you built?
9. What 2 kinds of energy are the source for all of these types of energy?

#### Electrical Power and the Energy Bill

10. In your home, your energy bill is based on how much electric power you use total, or power times time:  $E = PT$ . Energy from the energy company is provided at set voltage (110 V in the U.S.). Based on the formula, what are 2 ways you can think of to reduce your energy bill?

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### EXIT CARD

- ❖ Can you light up a bulb if you only have a battery and 1 wire? If so, how?
- ❖ Draw the simplest circuit that can light up a bulb. Label the parts. Explain in 1–2 sentences what kinds of energy are in the system.

### HOMEWORK

- ❖ Solar panels can turn light energy from the sun into electrical energy. A wind turbine can turn kinetic energy—created when the turbine moves in the wind—into electrical energy.
  - How are these energy sources different from a battery?
  - How are they similar?
- ❖ Read Lesson 9 READING: What is a Volt?