

## Lesson for Signal Circuit : Brief Inquiry activity

This includes ideas for Battery Voltage, Ohm's Law, Battery-Resistance Circuit, and Resistance in a Wire

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**Learning Goals:** Students will be able to:

- Explain a model of what happens when you turn on a light switch.
- Use evidence to defend their ideas.

### **Lesson:**

**Ask:** Why do you think the lights turn on in a room as soon as you flip a switch?

Then, have the students play with the sim and tell them to write their ideas about the learning goals and encourage them to use illustrations. Or you could assign different sims to different groups and have them make an oral presentation for the class.

**Post-Lesson:** Have a class discussion, then ask them to investigate more electricity sims like Ohm's Law, Resistance in a Wire, and Battery Voltage. Ask them to use the learning goals on the sims' page to do more inquiry and model explanation.

### Battery Voltage: Learning Goals

- Do the small blue spheres represent positive or negative charges?
- Which side of the battery is labeled positive, and which side is negative?
- How can you determine which side of the battery is positive and negative just by the location of the blue charges?

### Resistance in a Wire: Learning Goals

- What characteristics of a resistor are variable in this model?
- How does each affect the resistance? (Will increasing or decreasing each make the resistance correspondingly increase or decrease?)
- Explain your ideas about why they change the resistance.

### Ohm's Law: Learning Goals

- As you change the value of the battery voltage, how does this change the current through the circuit and the resistance of the resistor? If the current or resistance remains constant, why do you think?
- As you change the value of the resistance of the resistor, how does this change the current through the circuit and the battery voltage? If the current or voltage remains constant, why do you think?

### Battery-Resistance Circuit: Learning goals

- Are the blue spheres moving through the circuit positive or negative charges? How can you tell?
- What happens when you increase the resistance of the resistor? How does the current through the circuit, the speed of the blue spheres, the voltage across the battery, the temperature of the resistor, and the green particles in the resistor change? Why (or why not) does each of these change as they do?
- What happens when you increase the voltage across the battery? How does the current through the circuit, the speed of the blue spheres, the resistance of the resistor, the temperature of the resistor, and the green particles in the resistor change? Why (or why not) does each of these change as they do?

**Follow-up sims:** Circuit Construction Kit, Conductivity (energy level model makes this higher level).