

What's a Resistor?

Grades: 3-5

Objective: Students will learn the purpose of a resistor and build simple parallel circuits with them.

Time: 20 minutes

Materials:

For each group of 4 students, have one set of:

- 1 Battery (AA, 9 Volt, etc, but low voltage so nobody gets hurt)
- Alligator clip wires
- Small lamp (can be found on physics floor)
- Resistor (~1 Ohm)
- 3 way switch

Overview:

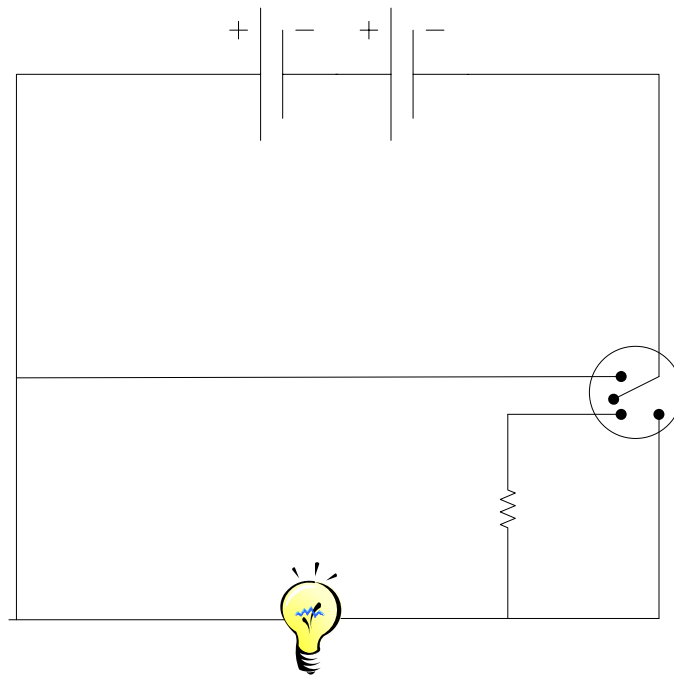
You will receive an explanation of what each component is. You must now construct a circuit so that you can switch the lamp off, dim, full. Compare your circuit to other students. Next, answer the following questions with your mentor to learn about how this circuit works!

Scientific Background:

Ask the students what knowledge they have of electricity, and if they have ever had any basic electronics experience, in particular switches and resistors. Explain how we can use switches to make decisions in a circuit. Talk to them about parallel circuits. Explain the 3 way switch especially carefully and show how it operates.

Procedure:

1. Hold up each material, and explain what each one is, and what it does. This should be relatively easy, as kids have all seen these components.
2. Divide the kids into groups of 4. Give each group a set of components. Ask each group to discuss how they variably turn the lamp on, dim, or off, and then ask them to try and build the following circuit (without showing it to them).



3. Ask each group to discuss why their circuit works or doesn't work? (Let them think about it even if they are wrong, don't stop them) Now let each group question each other group.
4. Explain how the circuit works. Now ask the kids what they think the purpose of a resistor is. *A resistor is designed to alter the current to voltage ratio. By inserting a resistor before the lamp, they are decreasing the voltage by an amount $I \times R$ and thus decreasing the voltage that crosses the lamp.*

Additional Questions/Discussion Points:

What happens when you put two resistors in series? *You get an equivalent resistance of $R_1 + R_2$ for two resistors of value R_1 and R_2 .*

What happens when you put two resistors in parallel? *You get an equivalent resistance of $\frac{R_1 \cdot R_2}{R_1 + R_2}$.*

Generate some resistance values and ask them to compute their equivalent series and parallel resistances. Don't allow the use of a calculator (for arithmetic practice).