

## Engagement:

Activate student's prior knowledge about electricity and discuss what was learned during The Discovery lab.

## Exploration:

Tell students that they will act out models of electricity flowing through circuits by passing tennis balls (electrons) to one another. Explain that all circuits have some basic components, three of which are; an energy source, a conductive pathway, and a load. An energy source, like a battery, supplies the electric current. The conductive pathway, typically metal wire, provides a path on which the current travels. And the load, like a light bulb, consumes the electricity that flows to it along the closed pathway.

**Step one:** Model a closed circuit. Have students form a complete circle and explain that as each tennis ball moves around the circle it represents an electron. Assign the student next to you (the one to whom the tennis balls will take the longest to reach) the role of the "load." Explain that he or she should yell out or sing each time a tennis ball reaches him or her.

**Step two:** Model an open circuit. Ask students to predict what will happen if two or more students are removed from the circle. Then, tap two or more students who are next to each other out of the circle; the idea is to create a sizable gap that will prevent balls from reaching the student who is playing the "load." Be sure to have the remaining students stay in their original positions. Repeat the exercise of passing the balls around the circle. At the gap, there should be a buildup of tennis balls because the tennis balls cannot cross the empty space. If students attempt to pass tennis balls over the gap, remind them that they can only pass the tennis balls to a neighbor whose shoulder they are "connected" to. Ask: Why can't the tennis balls cross the empty space? Explain that they have formed an open circuit—a broken path that electricity cannot flow through continuously.

## Explanation:

Discuss the difference between a closed circuit, where everyone is close enough in the circle to pass the balls from one to another, and an open circuit, when there is a large enough gap somewhere in the circle that the balls can no longer be passed. Remind students that all circuits have some basic components, three of which are: an energy source, a conducting pathway, and a load. Remind students of the definitions of each of these parts from the beginning of the activity.

## Adapted From:

Circuits with Friends, National Geographic Society <http://nationalgeographic.org/activity/circuits-friends/>

## Next Generation Science Standards

4-PS3-2. Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.

## What You Will Need:

- At least six tennis balls
- Optional: You can use balled up pieces of paper if you do not have tennis balls.