

Parallel Circuits

Lesson Concept A parallel circuit has multiple pathways for electricity to follow. If one light bulb goes out in a parallel circuit, the remaining light bulbs will stay lit because there are multiple paths for the electricity to follow.

Link In the previous lesson student learned that in a series circuit if one light bulb goes out, all of the bulbs will go out because there is only one path for the electricity to follow.

Time 85 minutes

Materials

Whole class

10 Tennis balls or 10 markers (something that is easily passed from student to student)

1 Bucket

Classroom chalkboard/ white board with writing utensil

Document camera or a way to display student models and diagrams

Per Group (groups of 2)

2 Small bulbs

1 D-Cell battery

1 Battery holder

4-5 Insulated wires with alligator clips

Individual

1 Copy of the exit card.

Student Notebook and pencil

Advance Preparation

1. Copy the exit card.

Procedure:

Engage *(15 minutes) Parallel circuits have more than one path for electricity to follow.*

1. Have a set of 11 students stand in a circle. Have students number themselves, 1-11. The 11th student represents the battery or power source and all the balls must go through #11. Hand each student a tennis ball except for 11 who gets a bucket.

2. Start with the power source. Have students pass the tennis balls so that number 1 passes to number 2, 2 to 3, 3 to 4, etc. until number 10 passes the ball to the power source and the power source returns it to number 1. This represents a series circuit. Ask the students to think-pair-share why this model represents a series circuit. [Expected Student Response (ESR): This model represented a series circuit because there is just one path for the electricity to follow.]

Explore ***(20 minutes) A parallel circuit has more than one path for the electricity to follow. If one light bulb goes out in a parallel circuit, the remaining light bulbs will stay lit because there are multiple paths for the electricity to follow. There is more than one way to create a parallel circuit.***

3. Distribute materials for circuit building to each group of 2 students. Have students investigate how to make a parallel circuit. Facilitate inquiry by having students test different designs. Remind students that in a parallel circuit if one light bulb goes out the other bulbs will stay lit.

Explain ***(10 minutes) A parallel circuit has more than one path for the electricity to follow. If one light bulb goes out in a parallel circuit, the remaining light bulbs will stay lit because there are multiple paths for the electricity to follow. There is more than one way to create a parallel circuit.***

4. Have students draw a diagram of their parallel circuit in their science notebooks. Have students trace the multiple paths for electricity to follow with a different colored pencil.
5. Have student display their diagrams via the document camera. Allow time for students to ask questions of each other's diagrams.

Extend ***(20 minutes) A parallel circuit has more than one path for the electricity to follow. If one light bulb goes out in a parallel circuit, the remaining light bulbs will stay lit because there are multiple paths for the electricity to follow. There is more than one way to create a parallel circuit.***

6. Have a set of 11 students stand in a circle. Have students number themselves, 1-11. The 11th student represents the battery or power source and all the balls must go through #11. Hand each student a tennis ball except for 11 who gets a bucket.
7. Have students arrange themselves in the following way:
 - a. If your number is 2, stand in front of number 1.
 - b. If your number is 4, stand in front of number 3.
 - c. If your number is 6, stand in front of number 5.

- d. If your number is 8, stand in front of number 7.
 - e. If your number is 10, stand in front of number 9.
 - f. Even number can only pass the tennis ball to the next even number. Odd numbers can only pass the tennis ball to the next odd number.
 - g. All the tennis balls must go through the battery and the battery will send the energy out equally between one and two.
8. Instruct students to begin passing the tennis balls. Have students pause. Ask students what they notice about the circuit now. (ESR): There is more than one path going on. Each is independent. This is a parallel circuit.
 9. Instruct students to begin passing the ball again. After a few rounds, have the even numbered balls stop passing the balls. Ask students what they notice about the circuit now. (ESR): Even if one path has stopped the flow of electricity, the other path continues the flow of electricity and the lights stay on!

Evaluate

(20 minutes) A parallel circuit has more than one path for the electricity to follow. If one light bulb goes out in a parallel circuit, the remaining light bulbs will stay lit because there are multiple paths for the electricity to follow. A series circuit has one path for electricity to follow. If one light goes in a series circuit the other light will also go out.

10. Distribute an Exit Card to each student. Have students label one circle series circuit and one circle parallel. Have students describe the characteristics of each circuit in the appropriate circle. Have students also describe what the circuits have in common.

Exit Card

