



Lab Summary

The Tech Science Labs: Simplicity of Electricity

Students discover how to make electricity work. They learn about switches and circuits as they tinker with electricity to light up the world and make some noise.

Grade Levels:

4–8

Learning Outcomes:

- Students will understand the requirements of making an electrical circuit.
- Students will design a switch to control a circuit.
- Students will learn the difference between series and parallel circuits.

Estimated Time:

1.5 hours

- Light a Bulb: 10 minutes
- Circuits and Switches Instruction and Demonstration: 15 minutes
- Design a Switch: 15 minutes
- Series and Parallel Circuits Instruction: 20 minutes
- Series and Parallel Circuits Design: 15 minutes
- Presentations and Operation: 10 minutes
- Clean-up: 5 minutes

California Science Content Standards Connections:

- Grade 4: Physical Sciences: 1a, 1g
- Grade 5: Physical Sciences: 1c
- Grade 6: Physical Sciences: 3a, 3b, 3c
- All Grades: Investigation and Experimentation: Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other 3 strands, students should develop their own questions and perform investigations.

The Tech Museum™ Gallery Connections:

The Tech Silicon Valley Innovation Gallery:

- “Silicon Workshop”: Students design a circuit to connect sensors and toys. They use logic statements to program Mr. Potato Head to perform different tasks and connect inputs and outputs to control a toy car.
- “Microchips”: Students make the connection to the electricity that powers computers.

The Tech Energy Gallery:

- “Harnessing Energy”: Students work together to “power the tower” using electricity generated by renewable resources such as wind, water, and solar power.
- “Green Garage”: Students can pull into the garage and learn about many different electric vehicles.

The Tech Museum™ Gallery Connections (continued):*The Tech Exploration Gallery:*

- “Seismometer”: Students learn how an electrical current is created in a seismometer to measure how far and how fast the earth moves during an earthquake.

The Tech Challenge Gallery:

- “Electrical Circuit Station”: Students explore electricity with snap circuits and start to imagine how they might use circuits and other science principles to solve this year’s challenge.

Outside the Group Entrance on Park Avenue:

- “Science on a Roll” (kinetic ball machine): Students can study the principles of a closed circuit by watching the machine’s balls travel through the machine repeatedly.

Pre-Visit Vocabulary:

These are words and concepts that we will discuss in the lab. Your students’ lab experience will be enhanced if they are familiar with these terms prior to your visit.

- Current: The flow of moving electric charge in a closed path. The flow of current is from positive to negative. Looking at a battery the electricity goes from the plus sign to the minus sign.
- Circuit: The complete/closed path that allows the flow of electric current.
- Short Circuit: A path in the circuit that has no element (very low resistance) between 2 different voltage potentials. Example: the positive and negative terminals of a battery with no resistive element in between.
- Open circuit: A circuit that is interrupted, or physically disconnected, with no current flowing through it. There is no closed path for the flow of electricity.
- Series circuit: A circuit with only 1 path for a current to take between components.
- Parallel circuit: A closed circuit with 2 or more paths for the current to travel between components.

Teacher Resources:

- University of Colorado—The Electric Force
A great tool for visualizing the electric force exerted on an electron.
http://www.colorado.edu/physics/2000/waves_particles/wavpart2.html
- Internet for Classrooms
A list of many links to electricity websites and experiments.
http://www.internet4classrooms.com/science_elem_electricity.htm
- Need.org
Comprehensive information about electricity.
http://www.need.org/needpdf/infobook_activities/IntInfo/Elec11.pdf
- Galaxy.net—Electricity and Magnetism
Several different experiments, including building a battery holder.
<http://www.galaxy.net/~k12/electric/>
- BBC School’s Pod’s Mission
A circuit builder game and a lemon battery experiment.
<http://www.bbc.co.uk/schools/podsmission/electricity/>

Post-Lab Activity—Electrical Zapper:

Handout available in The Tech Science Labs

Estimated Time: 20 minutes

Zap! Using simple materials found around your home, create an “electrophorus” device, which will produce a spark that you can feel, hear, and see.

Learning Outcomes:

- Students will be able to observe the static electricity phenomena from this activity.
- Students will be able to describe how electrons flow and behave during static electricity.

Post-Lab Activity—Make Your Own Electricity:

Handout available in The Tech Science Labs

Estimated Time: 15 minutes

Light the way! By using static electricity from ones’ body, a small fluorescent light bulb can be powered.

Learning Outcomes:

- Students will be able to observe the static electricity phenomena from this activity.
- Students will be able to describe how electrons flow and behave during static electricity.

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