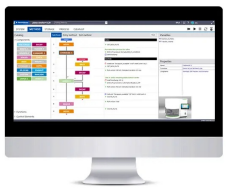
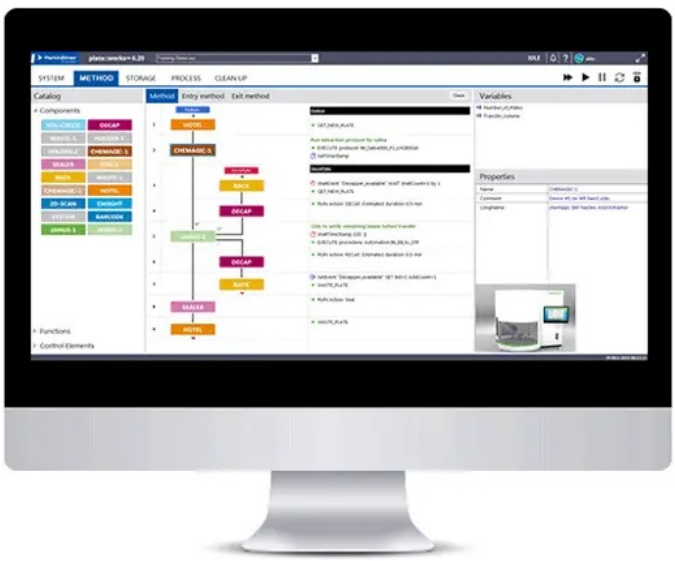


Verizon Innovative Learning Lab Program Smart Solutions User Guide

Contents

Verizon Innovative Learning Lab Program Smart Solutions



Overview

This lesson should take about 2 class period, or about 100 minutes to complete. During the lesson, students will learn about speakers and integrated circuits. See Additional Resources for ideas to complete this lesson with common household items.

Lesson objectives
Students will be able to:

- Use Snap Circuits to wire a speaker and alarm integrated circuit.
- Send and receive morse-code signals using your sound circuit.

Materials

To complete this Lesson, students will need:

- This lesson's activity worksheet
- Student worksheet

Snap Circuit components

- 1 Battery Holder (B1)
- 2 AA Batteries
- 1 Green Press Switch (S2)
- 1 Red Speaker (SP)
- 1 Red Alarm IC (U2)
- 1 Blue 5-snap wire (5)
- 3 Blue 3-snap wires (3)
- 3 Blue 2-snap wires (2)

Standards

- Common Core State Standards (CCSS) – ELA Anchors: R.10, SL.2, L.6
- Common Core State Standards (CCSS) – Mathematical Practice: N/A
- Next Generation Science Standards (NGSS) – Science and Engineering Practices: 6, 8
- International Society for Technology in Education (ISTE): 1
- National Content Standards for Entrepreneurship Education (NCEE): N/A

Key vocabulary

Speakers: a magnet surrounded by coils of wire. When electricity runs through the coils, it vibrates the magnet back and forth, creating sound!
Integrated Circuits: An integrated circuit is a complex circuit that has been shrunk down and put into a simple package

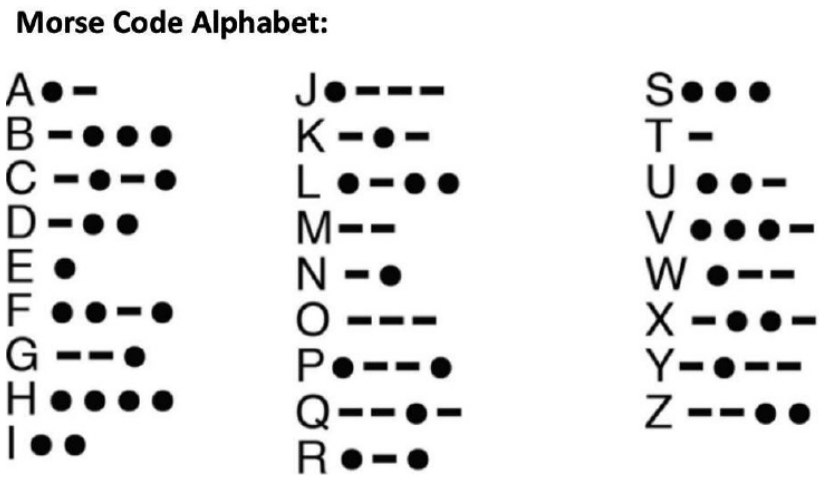
Before you begin

- Gather necessary materials (or ensure remote students can access needed materials)
- If students do not have access to Snap Circuits, review the additional resources for ways to create a series circuit and a parallel circuit with common household items.
- Digitally distribute or print out this lesson's activity worksheet (digital distribution works best)
- Familiarize yourself with this lesson's presentation or student guide.
- Watch this lesson's tutorial video to familiarize yourself with wiring speakers using Snap Circuits. Lesson Procedures.

Welcome and Introductions (10 mins)
Welcome students to class. If utilizing an LMS, remind students how to login and access the lessons. If presenting in person, ensure students have all materials.

Next, direct students to the student module in the LMS or move along in the presentation. Review the warm-up, objectives, and materials as a class. Students will be learning about speakers and **integrated circuits** and building a telegraph machine that integrate these components.

For the warmup, students will be asked to decode the message below using more code.
The secret message is: "Hey"



Alternatively, students can read these sections independently or with a partner.

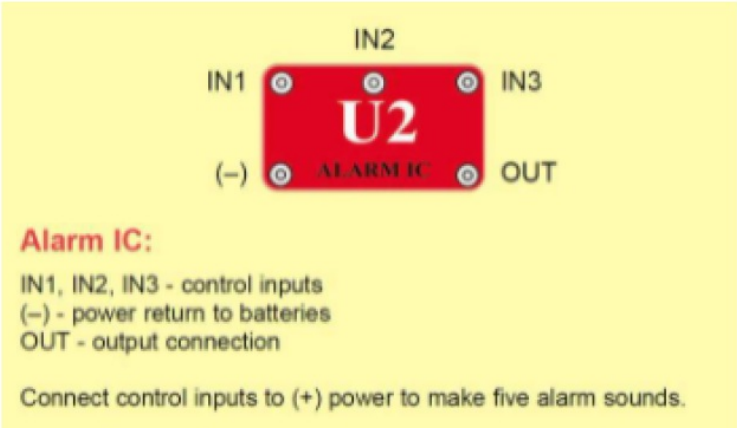
Video: Morse Code (3 Minutes)
Discuss with students that Morse Code is a language invented by Samuel Morse. It was created to send messages long distances before we ever had telephones. Each letter is represented by dots

and dashes A dot is a short burst of sound. A dash is a long burst of sound. Watch the video below to see how it works!
Video: **https://youtu.be/L6gxfX4GrbI**

Speakers and Integrated Circuits! (5 Minutes)
Discuss with students that specialized components can help speed up the creation of the complex circuits and "machines". The speaker and integrated circuit are two types of specialized components that will help make designing a solution easier.

Speakers
Did you know that electricity can be converted into sound? That's exactly how a speaker works! A speaker is a magnet surrounded by coils of wire. When electricity runs through the coils, it vibrates the magnet back and forth, creating sound

Integrated Circuit
For this lesson, you will be using the alarm integrated circuit. An integrated circuit is a complex circuit that has been shrunk down and put into a simple package! The alarm integrated circuit specializes in making high-pitched alarm-like noises



Activity: Electronic Sounds and Morse Code (20-30 Minutes)
Have students complete this lesson's activity worksheet to guide them through building and sending a message with their own Morse Code machine. Students can follow along with this video on their own, or you may choose to follow the video as a class: **https://youtu.be/fnGjrkPj-PM**

Wrap up, deliverable, and assessment (5 mins)

- **Wrap up:** If time permits, allow students to share and discuss their challenges and successes in building the Morse Code machine. Did any students complete the lights and sound challenge?
- **Deliverable:** Students should submit their worksheet. You may also want students to submit a picture or a

video of their completed machine if using an LMS.

- **Assessment:** The worksheet and completed circuit will be used to assess student learning. You may choose to use this lesson's checkpoint as an exit ticket or assessment.

Differentiation

- **Additional Support #1**: have students work together with a partner.
- **Additional Support #2:** have partially completed circuits (one missing a battery, one missing a switch, one missing a light, one missing conductors) that students just need to add the missing component.
- Extension: Allow students to experiment with different configurations of the integrated circuit and observe how it affects speaker sounds.

Additional resources

Creating a morse code device:

- https://youtu.be/yvd9zZWHSww
- https://www.energizer.com/science-center/how-to-make-a-simple-telegraph-set

Creating a circuit with common, household items:

- https://www.weirdunsocializedhomeschoolers.com/how-to-make-a-simple-circuit/
- https://www.instructables.com/Simple-Circuits-With-Tinfoil-an-LED-Tape-and-Batte/

Documents / Resources

	Verizon Verizon Innovative Learning Lab Program Smart Solutions [pdf] User Guide Verizon Innovative Learning Lab Program Smart Solutions, Verizon, Innovative Learning Lab Program Smart Solutions, Learning Lab Program Smart Solutions, Program Smart Solutions, Smart Solutions, Solutions

References

- How to Make a Simple Telegraph Set | Energizer
- Simple Circuits With Tinfoil, an LED, Tape and Batteries : 5 Steps - Instructables
- Discovering Electricity! How to make a simple circuit - Weird, Unsocialized Homeschoolers