BECOMING FAMILIAR WITH MAKEY MAKEY

Makey Makey is designed for quick connections between a computer and a variety of objects. Learners can experiment with various configurations to create a complete circuit.

The Makey Makey kit (see fig. 1) includes the Makey Makey board, a USB cable, seven alligator clips, six connector wires, and an instruction sheet.

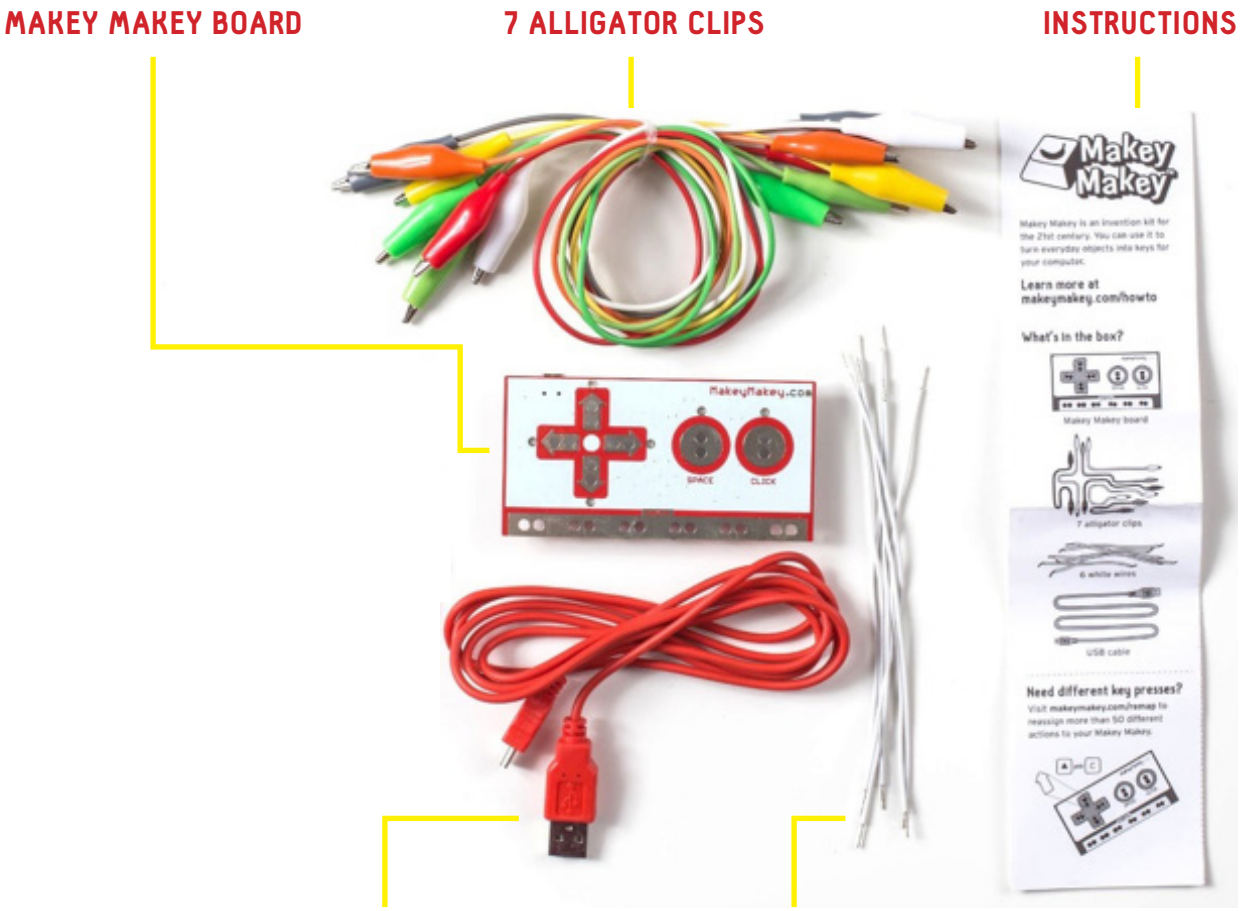
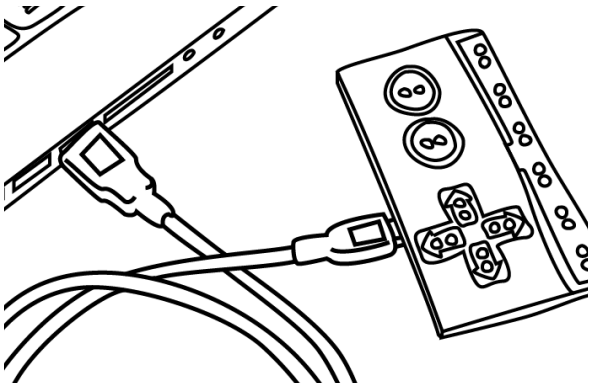


Figure 1. Makey Makey Kit

HOW MAKEY MAKEY WORKS

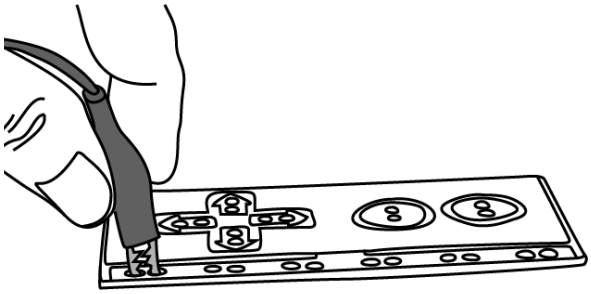


1. Plug in USB

The smaller side of USB cable plugs into Makey Makey, and the larger side plugs into the computer.

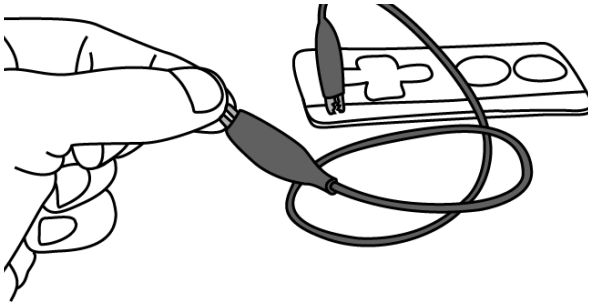
2. Close Pop-Up window

The computer may ask to install drivers or complete another setup. Click cancel or close the window.



3. Connect to Earth

Connect one end of an alligator clip to **EARTH** on the bottom of the front side of Makey Makey.



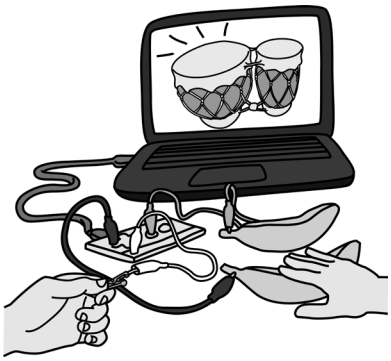
4. Connect to Yourself

Hold the metal part of the other end of the alligator clip between your fingers. You are now **grounded**.

---

5. Connect to "Space" and Try It

While you are still grounded, touch the round **Space** pad on the Makey Makey. A green light should appear on the Makey Makey, and the computer will "think" the spacebar was pressed. Also, complete the circuit by connecting another alligator clip to **Space**.



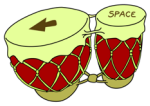
6. Experiment, Innovate, and Invent

Experiment by turning various items, objects, or substances into a computer key. A connection can be made through anything that is even slightly conductive of an electrical current, so be innovative. Create inventions that combine conductive and non-conductive parts to solve real-world challenges.

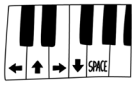
MAKEY MAKEY SOFTWARE

www.MakeyMakey.com/Apps

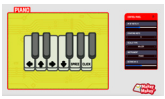
Makey Makey works with any software that uses the keyboard, mouse, and/or arrow keys. Try Makey Makey out by using the device with any web page or computer application where a keyboard and/or mouse is required. Below are just a few of the computer applications that can be used with Makey Makey.



Bongos - Play some bongo drums with the spacebar and left arrow. Turn anything into a drum!



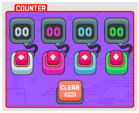
Piano - A piano designed for Makey Makey. Play a melody with the arrow keys and spacebar (and click, too).



Adjustable Piano - Add more keys, change instruments, or octaves in this new plug and play app.

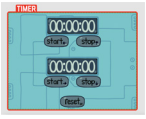
Audio Sampler - Play our samples or record your own to plug and play your musical creations!

Buzzer - Run your own gameshow and Buzz in with Makey Makey!

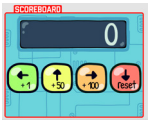


Counter - Use your Makey Makey to tally votes, collect data, and more.

Make a Sketch - Use your Makey Makey to doodle and draw on your computer screen.



Timer - Use your Makey Makey to start and stop a stopwatch or countdown timer. Adjust to time minutes or milliseconds. Add up to 8 timers!



Scoreboard - Use Makey Makey to keep score for your handmade games! Build physical input devices, and keep score with this awesome adjustable app. Each input can be adjusted to add, subtract, or reset the score.

USING MAKEY MAKEY WITH SCRATCH

Scratch is a free programming environment and online community developed at the MIT Media Lab where interactive stories, games, and animations can be created. (Scratch.mit.edu)

WEEK TWO: EXPLORING CONDUCTIVITY!

Lesson Three: What Is Conductive?

Purposes/Objectives

Students will do the following:

- Build a conductivity tester
- Test conductive items
- List conductors and insulator

Use this interactive Google slide in your classroom: https://bit.ly/MakeyClassroomSlides.

LESSON THREE: WHAT IS CONDUCTIVE? (30 MIN.-1 HR.)

Overview of Activity

In this 30 minute lesson, students will make a conductivity testing board to test items for conductivity. They will learn that everything in the world is either conductive or an insulator, and they will start to ideate inventions with everyday things found at home. (If this is in person, the experiment could be as quick as 20 minutes. If students are building their own testing stations at home, you will need to allot more time for this activity.)

Before You Begin

This is one of the most important lessons for understanding how Makey Makey works and for exploring materials for inventing. Before teaching this lesson, build your own conductivity board so students have a model to work from. Make sure to have a plastic ruler or something flat and nonconductive that your students can use to hold different items on their testing board (so that their conductive hands do not accidentally set off the alarm.)

Required Materials

- Makey Makey
- A piece of cardboard
- Conductive base: HVAC tape or kitchen foil
- A ruler (It helps when testing materials, so you don't accidentally complete the circuit with your touch!)
- Lots of items for testing: apples, plants, cotton, stuff around your house!
- Print or create an "Conductive/Nonconductive" chart in your science journal
- Laptop with "Is It Conductive?" Scratch game by jpalles open and loaded

Video Options

- What Is Conductive? : Student Build Guide
- Build Your Own "What Is Conductive?" Testing Station : Student Build Guide

Student Build Guide:
www.MakeyMakey.com/LessonThree
Print this QR code for students to scan:

TEACHING GUIDE FOR LESSON THREE

VOCABULARY COVERED IN THIS LESSON

Conductor: A conductor is any item that allows electrons to flow through it with little effort. If an item has any conductivity, Makey Makey will detect it. Most metals are great conductors! Pure water is actually an insulator, but once water comes in contact with things such as salt, humans, etc., it becomes contaminated. Because of this, free ions in water are what make water conductive. Conductivity is changed by humidity and temperature.

Insulator: An insulator is any item that does not allow electrons to flow through it. Things such as masking tape, hot glue, and paper are insulators that do not allow electrons to flow.

Prototyping: The first step to inventing is prototyping. A prototype is an early or beginning model of an idea (generally an invention). Inventors prototype ideas to test the concept of their invention. If a prototype is still buggy or doesn't work right, an inventor will create another version of their idea.

Iteration: The next step of prototyping is iteration. An inventor will continue to draft and rework their ideas by making more versions or iterations of a design idea. Once you start inventing, you'll want to make multiple versions of your idea to make sure you have a successful prototype or invention idea!

RUNNING THE ACTIVITY:

Main Activity (30-45 min.)

Tell students the following:

> Did you know everything in this world is either a **conductor** or an **insulator**? In this lesson, we experiment with all sorts of objects to find out what is conductive so you can start designing your own inventions. Here is a quick example of the finished experiment you are creating today.

Share your example of a conductivity tester and share how to test items. Model making mistakes by accidentally touching both pieces of foil, and model how you can use a plastic ruler to press an item across both testing strips. Ask students to build a tester and share their builds with you. Look to see if students have placed the foil pieces too close together or too far apart. Once students have built the tester, show how to alligator clip one piece of foil to the **Space** key and the other foil to **EARTH** on the Makey Makey. Show how the Makey Makey will control the "Is It Conductive?" Scratch game by jpalles.

Have students test items for conductivity by laying the item across the conductive tape traces. If an item is conductive, the game will announce it. (They can have a bin of items in the classroom to test, or they can find items from their own room if they are working from home. This can be quite fun—we once had a homeschool student test their pet cat!)

As students test items, they should mark what items are conductive in their science journal. (Print the chart from the material list or create a chart.)

Wrap-Up (10 min.)

Ask students which items were conductive and nonconductive. Ask students to make observations about the items tested today.

Discussion Questions

- What materials can we use with Makey Makey, besides bananas?
- What does it mean for an item to be conductive?
- What does it mean for an item to be an insulator?

Discuss: A Little Science behind Makey Makey

Tell students that Makey Makey is a resistive touch board. This means that it is programmed to sense when an item is conductive. A conductive item is a material that allows electrons to flow, while an insulator is a material that does not allow electrons to flow. The Makey Makey is also programmed to send a signal to your computer that you've pressed a computer key when it detects a complete circuit. Ask students to try using the Makey Makey to be the **Space** key, like in this image! When the circuit is complete, Makey Makey sends a signal to the computer that the **Space** key is pressed.

Knowing what is conductive and what is not conductive is important for a student's journey to inventing! When we learn how things work so we can make new things, we call this **Invention Literacy**. Makey Makey was created to help students see the world as a construction kit! One of the coolest things about Makey Makey is that students can use it to **prototype** new inventions and ideas. What is a prototype? It's like a rough draft of an invention. Since students can use everyday items from around the house to create inventions, Makey Makey is a great way to make a rough draft of an invention idea! Each draft of an invention is called an **iteration**.

Teaching Tips

This build is a little tricky if teaching all students virtually. Because of this, allot 15-20 minutes to build the testing station. If all students are in person, students will build this testing station more quickly.

When helping your students set up their foil testing stations, suggest at least one finger width between the two pieces of foil on their testing station. As kids create their testing cardboard, ask them to show you on their camera what their testing station looks like before they hook it up. Model how to test items and share how they can get a false positive if they accidentally touch the EARTH and key press foil simultaneously with their own hands!

Also model how some items may not bridge both connections. Share an example of something round, such as a lemon. Share how they can hold the lemon with one hand, touching it to one foil piece, and then use their own finger to touch the other strip of foil to see if the lemon (or other round object) is conductive.

MAKE CONNECTIONS AND FIND PROJECT IDEAS

Connect with other educators and share your student projects on social media! Our team is constantly updating and sharing new ideas on our how-to page (makeymakey.com/howto) and hosting webinars with educators just like you! Sign up for our newsletter to learn more ways to go beyond the banana!

- **How-To Page:** https://makeymakey.com/pages/how-to
- **Resources for Beginner and Intermediate Inventors:** https://bit.ly/MakeyAtHomeProjects
- **Information about Webinars and Teacher Projects:** https://makeymakey.com/blogs/blog
- **Sign Up for Our Newsletter:** http://bit.ly/makeysignup
- **Join Our Facebook Educator Group:** https://www.facebook.com/groups/makeymakeyeducators/

EMAIL

Placing an order for your school or classroom?
Education orders: education@joylabz.com

Interested in carrying Makey Makey in your store?
Retail orders: sales@joylabz.com

Have a question about an event? A project you want to bring to life?
General inquiries: info@joylabz.com

Having issues with your board? Have a tricky technical question?
Tech support: support@joylabz.com

Have a question about ordering, or about an existing order?
Orders and shipping: support@joylabz.com

PHONE

You can reach us Monday - Friday, 9:00 - 5:00 (US Pacific Time) at: +1-831-460-6242
If you don't get an answer right away, shoot us an email.

THE INTERNET

We're on social media! We love to see you there and the things you invent. Tag us and send us your students' creations on:

Facebook.com/makeymakeykit

Twitter.com/makeymakey

Instagram.com/makeymakey

Youtube.com/c/makeymakey

