



**Title:** “Makey Makey - Insulators & Conductors”

Using a Makey Makey board, students will apply their knowledge of electrical circuits and use various materials to explore those that can be insulators and conductors.

**Student Objectives**

- Using a Makey Makey board, students will apply their knowledge of electrical circuits and use various materials to explore those that can be insulators and conductors.
- Students will use a Scratch Project to play a sound when the circuit is successful.

**Teacher Technology Skills Needed**

- Simple coding with blocks from Scratch <http://scratch.mit.edu>
- Recording sound with Scratch
- Making a simple circuit with a Makey Makey board, conductive material and alligator clips
- Sharing a Google Doc assignment to students as a handout

**Materials**

- Makey Makey board with alligator clips
- Conductive material to try including foil, marshmallows, gummy bears, fruit
- Student Worksheet “Insulators & Conductors”
  - [Google Doc version](#)
  - [Pdf version](#)
- Computer with Scratch Program open <http://scratch.mit.edu>

**Standards**

- **3-PS2-3:** Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.
- **4-PS3-2:** Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.
- **HS-PS3-3:** Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.
- **ISTE Standard for “Innovative Designer”**
  - 4c --- Students develop, test, and refine prototypes as part of a cyclical design process.

**Procedure**

1. Review the idea of a simple electrical circuit, and the concepts of current, grounding and making a complete circuit.
2. Discuss (review) how to plug in a Makey Makey. It gets its power from the computer through the USB cable. Grounding is done with the Earth connection and one hand/fingers touching it. The circuit is complete through the human body as you touch



- an alligator clip coming from one of the output connections (this example uses the Click).
3. Attach one alligator clip to Earth, which is the ground. Hold the other end of this one by your fingers in your left hand.
  4. Attach another clip to the "Click" input on the Makey Makey and lay the other end down in front of you. Explain how touching this end completes the circuit, which "fools" your computer into thinking that you have done a mouse click. What happened? Repeat this several times.
  5. Go to the Scratch website <http://scratch.mit.edu> and open the "Is it Conductive - Remix" Project. Press the spacebar on the computer to play the sound.
    - a. Here is the original file: <https://scratch.mit.edu/projects/199905945> (Make your own Remix version)
  6. Open the Google Doc or pdf version of the student worksheet:
    - a. [Google Doc version](#)
    - b. [Pdf version](#)
  7. Now it is time to try some other ways to complete this circuit using various types of conductive materials. Attach the Click clip to these objects and then touch the objects with your right hand to do the clicking:
    - a. banana
    - b. Play Doh
    - c. foil strips
    - d. other fruit
    - e. anything you can think of that is not on the worksheet list

### **Extension Activities**

- In a class discussion, point out that it is obvious that wood is an insulator. Have students debate, write about or discuss how they can get wood to be a part of a Makey Makey circuit. Can they experiment to prove their design?
- Is there a limit to conductivity? Have students experiment to see how many coins or conductive materials connected by wires can be strung together and still make their circuit work.