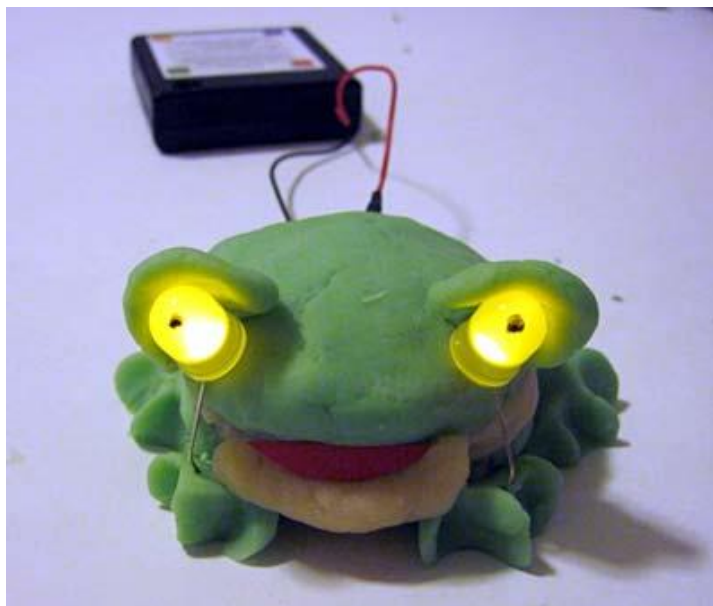




STEM on Site Summer Program

Playdoh Circuits



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Recommended for Grade Levels: K - 2

Content Notice

This activity has been put together as a free, open source resource from the Milwaukee School of Engineering STEM team for self-guided, at home learning. Unless otherwise noted, in person or live instruction is not provided and questions should be directed to stem@msoe.edu.

Curriculum has been adapted from [Science Buddies](#).

Safety Notice

Parents or guardians should review activity materials before students begin the activity. Some activities from MSOE may require cutting, hot gluing, electricity, manipulating sharp objects, and other tasks that may warrant adult supervision. MSOE is not liable or responsible for any injury, property damage, or other incidents that arise from completing these activities at home. If you have questions or concerns about any activities, please contact stem@msoe.edu

Notes

Welcome to your Playdoh Circuit Kit! Below you will find a few links to learn a little bit about Electricity. We encourage you to watch the videos before starting your project.

This activity has been adapted from Science Buddies curriculum. MSOE has added videos and helpful tips to adapt this activity to fit the at-home learning models currently being used during the pandemic.

Goals

- Understand that some materials are conductors of electricity and some are not.
- Assemble a circuit that makes an LED light up.
- Create your own Playdoh creation and incorporate a circuit into it.

Learning at Home

While we have tried to select activities that utilize materials you might have around your home or able to procure without too much difficulty, we know that may not be the case for everyone.

One of our favorite parts of engineering is the problem solving and critical thinking skills required, and we encourage you to consider the following question when looking at the materials list for this activity:

If I don't have a certain material, what is the material being used for in this activity? Is there something else I could substitute that serves the same or a similar purpose? How can I modify this activity with what I have at home?

Materials List

If you are gathering materials at home, feel free to try other materials if you don't have something below. Note that if you ordered a kit from MSOE, all materials with an asterisk (*) will not be included in your kit.

	NAME
	Battery holder with wire leads (holds 4 AA batteries)
	4 Jumbo LEDs
	Play-Doh (or use Conductive Dough Recipe linked below)
	Modeling Clay (or use Insulating Dough Recipe linked below)
	4 AA Batteries

Background Knowledge

What is a circuit?

<https://youtu.be/HOFp8bHTN30>

Playdoh Circuits

<https://youtu.be/gvfT95Q9YqE>

Series and Parallel Circuits

https://www.sciencebuddies.org/science-fair-projects/project-ideas/Elec_p074/electricity-electronics/squishy-circuits-project-2#figure5

If you do not have Playdoh you can make your own conductive dough using the recipe below.

Conductive Dough Recipe: <https://cdn.shopify.com/s/files/1/2640/3158/files/Making-Conductive-Dough.pdf?16645678393520892946>

If you do not have modeling clay you can make your own insulating dough using the recipe below.

Insulating Dough Recipe: <https://cdn.shopify.com/s/files/1/2640/3158/files/Making-Insulating-Dough.pdf?16645678393520892946>

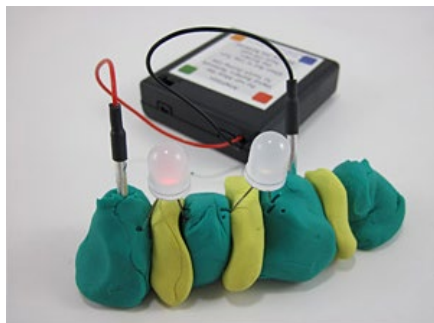
Troubleshooting:

If your LED does not light up take it out and flip it around. LEDs act like a one-way valve and only let electricity flow through in one direction. Refer to Playdoh Circuits video linked above.

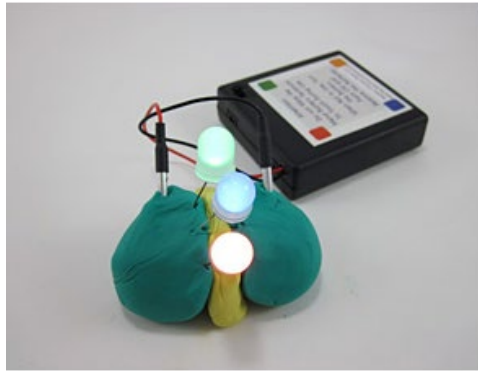
**All images are from [Science Buddies](#).*

Building Your Circuit

1. Make homemade conductive and insulating dough if you are not using Play-Doh and modeling clay.
2. Insert AA batteries into the battery pack that came with your kit. Make sure the "+" signs on the batteries line up with the "+" signs inside the battery pack. Ask an adult if you need help making sure they are in the correct way.
3. Make two lumps of Play-Doh (or homemade conductive dough) and one lump of modeling clay (or homemade insulating dough). Stick them together, with the modeling clay in the middle; make sure the two lumps of Play-Doh are not touching each other.
4. Stick each wire from the battery pack into its own lump of Play-Doh.
5. Pick an LED from your kit. The two pieces of metal sticking off the LED are called "leads" (pronounced "leeds"). Insert one lead into each lump of Play-Doh. **Important:** Electricity can only flow through LEDs in one direction. The LED has one lead that is slightly longer than the other one; this is the **positive** lead, and it should be inserted into the lump of Play-Doh with the *red* wire. The shorter lead should be inserted into the lump of Play-Doh with the *black* wire.
6. You created your first circuit! Now see if you can create a series circuit by adding another ball of modeling clay and then another ball of Play-Doh. Notice that the LEDs are not as bright because there is only one path for the electricity to get to the LED. This won't be a good setup when if you want to use many LEDs when you build your own circuit Play-Doh creation.

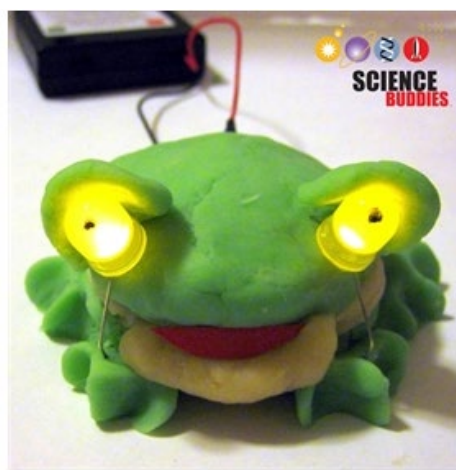


7. Let's explore parallel circuits. Start with the same two lumps of Play-Doh and one lump of modeling clay. Stick them together, with the modeling clay in the middle. Then add one LED at a time. Notice that the LEDs are the same brightness. This means that when you hook lots of lights up to whatever you build, *you need to connect them in parallel*. Now, why does this happen? Because in a series circuit, some electricity is "lost" each time it goes through an LED. So, by the time the electricity has already gone through one or two LEDs, there is not enough energy left to power the rest of them. In a parallel circuit, the electricity goes straight from the battery to each LED without losing energy first. This allows you to light up more LEDs.



8. Now it is time to get creative and design your own Play-Doh circuit! The shape of the Play-Doh lumps does not matter when connecting the LEDs, as long as there is a **closed circuit** for electricity to flow. Start with your original circuit, 2 lumps of Play-Doh with a lump of modeling clay in between. Then add to it or turn it the other way like a sandwich.

Examples:



**All images are from [Science Buddies](https://www.sciencebuddies.org).*

If you want to continue exploring see more at [Science Buddies](https://www.sciencebuddies.org).

