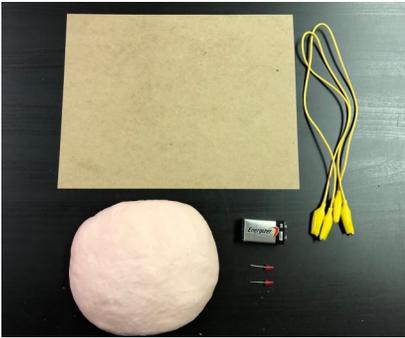


Squishy Circuits

Can you create a working circuit using conductive dough?

MATERIALS



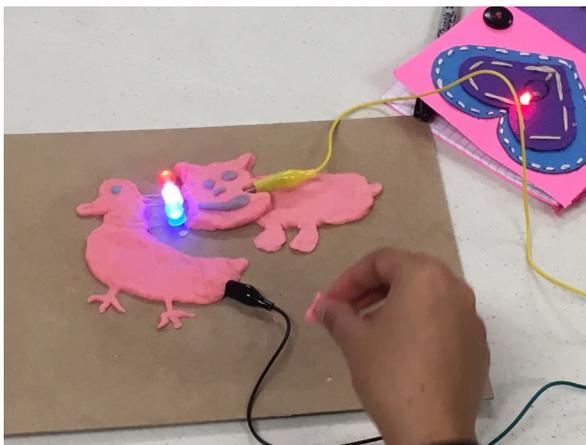
- ❖ Water
- ❖ Food Coloring
- ❖ Flour
- ❖ Salt
- ❖ Vegetable Oil
- ❖ Measuring Cup
- ❖ Measuring Spoon
- ❖ Mixing Bowl
- ❖ Spoons
- ❖ Sifter
- ❖ 9 Volt Battery
- ❖ Alligator Clips
- ❖ Chipboard
- ❖ LEDs

Do the Experiment!

1. First, you are going to make conductive dough. In a bowl mix 1 cup of water, 5-10 drops of food coloring, 1/2 cup of salt and 2 tablespoons of vegetable oil. Measure the salt first so that it doesn't stick to the water. Dry your measuring cup and measure 2 cups of flour. Slowly sift the flour into the mixture. Stir it all together with a spoon. After awhile you'll need to use your hands and knead the dough.
2. The dough has to have a similar consistency to Play-Doh. If your dough is too dry, wet your hands slightly and keep kneading. If it is too wet, add small amounts of flour.
3. Pull out two clumps of dough and roll into balls.
4. Grab two alligator clips and a 9 volt battery. Connect one end of the alligator clip to a terminal on the battery. Take your second alligator clip and connect it to the other terminal on the battery. Stick the other end of the first alligator clip into one piece of dough and the second clip into the other piece of dough.
5. To test the conductivity of your circuit, take an LED and put each leg in your different pieces of dough. You have just created a simple circuit. Does your LED light up? If not, switch the legs. If there are persistent problems, use your engineering mind to solve the problem.
6. Now stick both balls of dough together and try to light up the LED. Why do you think it causes the LED to short circuit? What could you place between the two doughs that would act as an insulator to enable the light to turn on?
7. Can you now make a series circuit and a parallel circuit?

DID YOU KNOW...

A circuit is the path electricity travels through. In order for electrons to move successfully through the path of the circuit, the circuit must be closed. If the circuit is open, the electrons have nowhere to go and we witness what is known as a short circuit. If you turn a light switch on and nothing happens, there is a short in the path of the light's circuitry. The circuit that you created using conductive dough has three parts—The **load** is the device using the electricity for power. In this case the load is the LED bulb. The **power source** is what provides the electricity to the load. You used a 9 volt battery as a power source. The **conductors** are what provides the path of electricity from the power source to the load. You actually have two conductors: the alligator clips and the conductive dough. When you put everything together, you create a **simple circuit**. Now what if your paths between the power source and load were sticks of wood? Would the LED turn on? It would not. This is because wood is an **insulator**, a material that cannot conduct electricity. If you put a craft stick between the two pieces of dough, the insulation of the wood keeps the circuit from shorting out. Simple circuits are not the only types of circuits. There are also **series circuits** and **parallel circuits**. A series circuit is a type of closed circuit that follows one path to generate power to more than one load. A parallel circuit is a type of closed circuit that follows two or more paths to generate power to more than one load. Circuits are a great way to learn about the basics of electricity!



CHALLENGE

1. What is the difference between an insulator and a conductor? List examples of each.
2. Try to make a series circuit. After you have created a series circuit, create a parallel circuit.
3. If you have time and the ability to make more dough, create a work of art out of the dough and create a circuit within the dough that lights up an LED.

STEAM CHALLENGE: Electricity flowing through a circuit travels about 1,860 miles per second. How many miles does it travel in one minute? One hour? One day? Light travels much faster—about 186,000 miles per second. How many miles does light travel in one minute? One hour? One Day? One year?