

Merry Squishmas: play-dough circuits

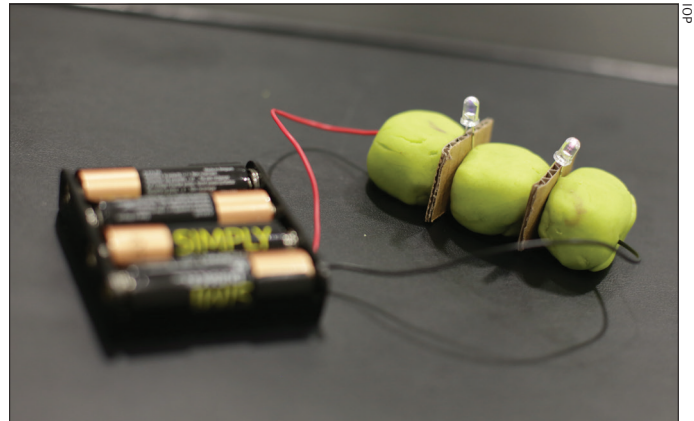
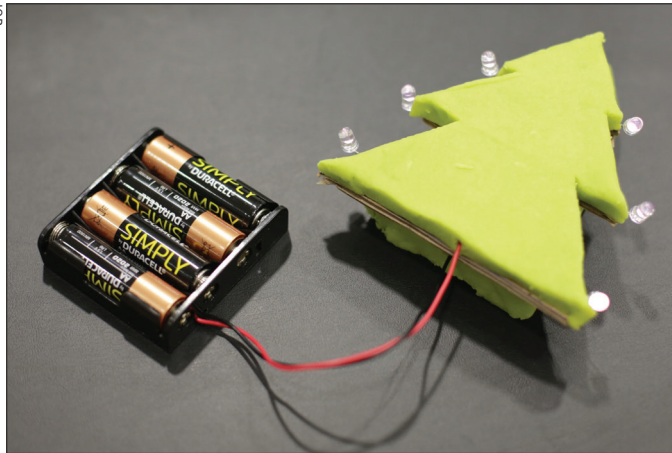


Figure 1. Series circuit with two LEDs.

To celebrate the end of term, why not get your class to build a festive circuit out of conductive play dough? Although commercially available, it is cheaper to make your own dough before the lesson. This teaching tip is about building a Christmas-tree circuit, but challenge your students to think about making conducting circuits in other seasonal shapes or using other circuit components. There is a related worksheet on page 7.

Materials required per group

- A ball of conductive dough (approx. 175 g)
- Four AA batteries
- One battery pack to hold four AA batteries
- Six or more LEDs
- Cardboard (approximately 10 cm × 10 cm)
- Scissors

The activity

Divide the class into groups. The number of groups will depend on how much dough you have prepared. Introduce the activity by explaining that the added salt makes the green dough an electrical conductor. For older students you may also want to add that this is because sodium-chloride dissociates into charged sodium (Na^+) and chlorine (Cl^-) ions, meaning that the dough contains charged particles that are free to move.

Give each group two LEDs and ask them to investigate both series and parallel circuits. Discuss why an insulator (either cardboard or air) is needed between the layers of dough. Remind students that the LEDs will only light up if they are connected the right way around (i.e. the long arm of the LED is connected to positive).

Once they have familiarised themselves with building simple play-dough circuits, they should design and build their own Christmas tree with six or more working LED lights. Encourage them to think about which type of circuit is best (series or parallel) and how they will use the cardboard as an insulator to ensure that the LEDs will all work.

Acknowledgements

With thanks to the Squishy Circuits Project at St Thomas University, Minnesota, for permission to adapt their worksheet and reproduce their dough recipe. Visit stthomas.edu/squishycircuits for more classroom activities.

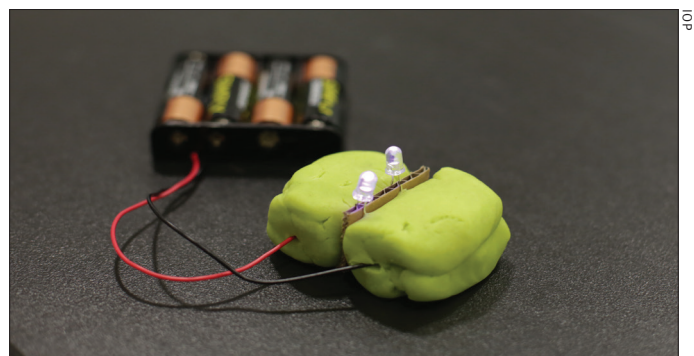


Figure 2. Parallel circuit with two LEDs.

Making your own conducting dough

The following recipe is quick and easy to make. It will produce 350 g of dough, enough for two groups to make a Christmas tree. You may need to make several batches.

- One cup of water
- One cup of flour (plus extra for dusting)
- $\frac{1}{4}$ cup of salt
- Nine tbsp. lemon juice
- One tbsp. vegetable oil
- Green food colouring

1. Combine the water, flour, salt, lemon juice, vegetable oil and food colouring in a medium-sized saucepan, and whisk to ensure a smooth consistency.
2. Cook over a medium heat, stirring continuously to ensure it doesn't burn. The mixture will begin to boil and start to thicken.
3. Keep stirring until the mixture forms a ball in the centre of the pot.
4. Once a ball forms, place on a floured surface and knead until the desired consistency is reached.

The dough will keep for several weeks when stored in an airtight container or plastic bag.

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