

1st Lesson: Light in the Corners

Motivation

A letter from Hoseli arrives from Supraland.



Hello, scientists!

My name is Hoseli the Robot.

I would like to tell you about something strange that just happened to me. One evening I was in my workshop when I noticed something glimmering in the corner. I went over to take a closer look, but as soon as I approached, the light disappeared under the sofa. I peeked under the sofa, and saw a group of the funniest-looking creatures.

Wow, I've found some great pets, I thought to myself. But how do they work? What makes them shine like that?

Could you help me figure out what kind of critters these are?

**Greetings
Hoseli the Robot**





Experiment: Electric Dough

Objectives:

- To practise making observations and interpretations about the substances in the experiment.
- To practise measuring substances and to prepare a dough that conducts electricity.





Experiment: Electric Dough

Supplies

Supplies for one scientist:

- a deep dish or bowl for mixing
- a tablespoon
- a 4 cl measuring cup

Shared supplies:

- flour (for example wheat flour) on several plates
- salt on several plates
- cooking oil (e.g. canola oil) in several clear containers
- lemon juice in several clear containers
- several clear containers for water
- picture cards of the substances
- warm water (in a big thermos)





Experiment: Electric Dough

Supplies

Preparations on-site:

Set out flour, salt, lemon juice and the oil containers and plates so that you have enough for everyone in your group. Aim for one substance per two scientists. This will keep the experiment moving and allow you to avoid unnecessary waiting among the scientists.





Experiment: Electric Dough

How to proceed

“Let’s study what substances these flashing creatures are made of. Hoseli has sent us the substances so we can study them.”



1. **Observe** each substance one at a time. What does the substance look, smell, and feel like? You can let the scientists taste the substances as well.



2. **Interpret** what the substances might be. Name the substances together and connect the picture card to the substance it represents.

“So these are the substances the creatures are made of. Let’s see if we can make a dough that will allow us to make our own electric creatures!”



3. **Measure** a full shot glass and then half a shot glass of flour into a mixing bowl.



4. **Measure** a shot glass full of salt into the flour. Explain that salt is a substance that easily conducts electricity.



5. Mix the ingredients together and **observe** the mixture. What does it look and feel like?





6. **Measure** a small spoonful of oil and two spoonfuls of lemon juice into the mixture.



7. Mix it together with a spoon and **observe**. What does the mixture look and feel like? How does it change?



8. **Measure** in two spoonfuls of warm water and stir the mixture again.



9. **Observe**: how does the mixture change?

10. Try forming the dough into a ball. The idea is to give the dough the consistency of playdough. Guide the scientists **a conclusion** about what they will need to add if the dough is too runny or lumpy.

11. Ask the scientists to take their dough to the next research station.

Scientific explanation:

The ingredients in the dough conduct electricity well, especially salt and lemon juice increase its conductivity. Oil and water will make the dough looser, while adding flour will make the dough more firm.





Experiment: Electric Critter

Objectives:

- To make electric creatures using the dough from the previous experiment.
- To practise motor skills by building an electric circuit.
- To study how an electric circuit works: the lights only come on when the circuit is complete and electricity can flow through it.
- Practise making conclusions, for example, if the light doesn't come on, how should you fix the problem.





Experiment: Electric Critter

Supplies

Supplies for one scientist:

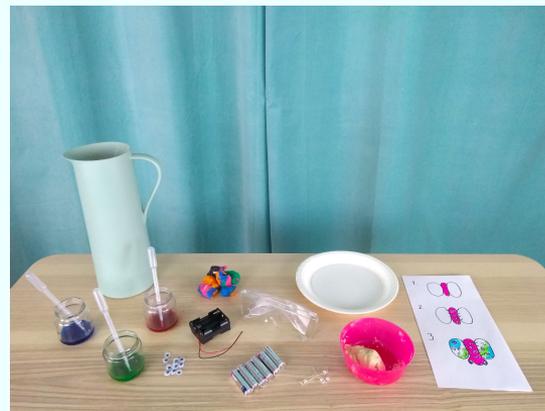
- the dough from the previous experiment
- 4 x 1,8V LED-lights
- store-bought playdough
- safety glasses
- (cardboard plate to build the critter on)

Shared for a group (3-4 scientists):

- a battery compartment with 2 electrical wires
- 6 x 1,5V batteries that fit into the compartment
- pieces of store-bought playdough to decorate the creatures
- other items for decorating: buttons, googly eyes, beads, cake decorations
- a few printouts with visual instructions for making the creatures (printouts)

Shared supplies:

- food colouring in a few clear jars
- pipettes for the food colouring



Please note! If you have 3V LED-lights, you will only need three of them. Remember to calculate the total voltage relative to the battery size! Please also note that you will need 1,8V LED-lights for the fourth meeting in any case. The other sizes won't work with button cell batteries.



Experiment: Electric Critter

Supplies

Preparations:

Before the session, make one creature to serve as a model.

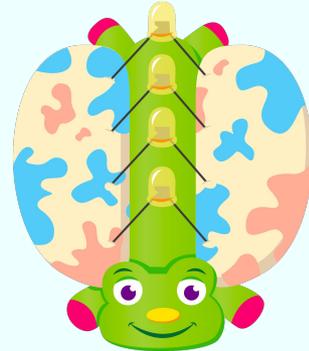
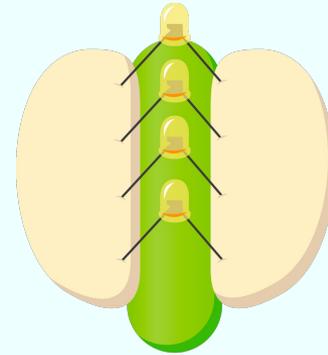
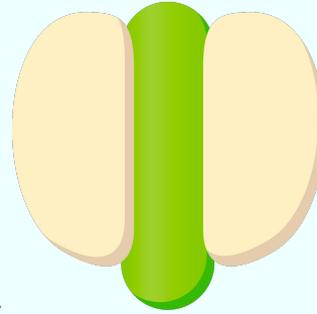
Don't put the batteries into the battery compartment until just before the session starts. Store the batteries in a dry place.

Preparations on-site:

It's a good idea to conduct this experiment in small groups to keep things moving along. In this case, prepare one battery compartment for each group. You can use **pictures** that show the process for building the creature step-by-step.

Portion out the food colouring and dilute the colours as needed. Go ahead and tear off pieces of playdough that the scientists can use to decorate their creatures ahead of time.

Video: <https://youtu.be/hQyuKmpqng8>





Experiment: Electric Critter

How to proceed

“Let’s make our very own electric creatures!”



1. **Observe** the store-bought playdough and the dough the scientists have made and compare them to each other. What do they look like and feel like? What similarities and differences do you notice?
2. Explain to the scientists that the dough they’ve made conducts electricity while the store-bought playdough does not.



3. Study the picture of the creature that conducts electricity and the picture of the model in the instructions. **Observe** the different parts that the creature has. Think about what supplies you will need to build the different parts of the creature.
4. Start by dividing the dough into two equally large pieces and roll each into a ball or an oval shape. Put them down, but make sure they don’t touch each other. **If the balls touch each other, the creature’s electricity can go haywire and cause a short circuit!**
5. Make a narrow roll from the store-bought dough, and place it between the balls to work as an insulator.

6. There is a row of lights on the creature's back. Arrange 3-4 LED-lights on the creature's back so that the other leg of the light touches one of the dough balls and the other leg touches the other dough ball. **To avoid a short circuit, have an adult check to make sure that the balls of dough don't touch each other.**

7. Demonstrate how to attach the wires using your model creature: attach one wire from the battery container to the other ball, and the other to the other ball. Make sure that each scientist uses safety glasses and let the scientists proceed in small groups according to your instructions and with guidance from an adult as needed. **To avoid a short circuit, check that the wires won't touch each other.**

8. If the bulbs don't light up or burn poorly, you can switch the placement of the wires. Another option is to detach the wires from the creature and change the position of the lights so that the legs of the lamp change sides. Then reattach the wires again.

9.  Tell the scientists that the batteries, wires, and the creature form an electric circuit. **Make interpretations** about how the circuit works. Why did the lights come on? Where does the creature get its electricity from? What does the electricity travel through to get to the lights?

10.  Guess what will happen if you detach one of the wires from the creature. Try it and **observe** what happens.



11. **Interpret** what causes the lights to go out. State that the lights go out when the wires are detached. Tell the scientists that when the wires are removed, the circuit is cut and the electricity has nowhere to go.
12. Continue with the experiment until every scientist has managed to make the bulbs on their creature light up.
13. While they are waiting, the scientists can for example make a face and antennae to decorate their creature. They can also colour their balls of dough by pipetting food colouring on them.
14. Admire all of the amazing creatures. State that the creatures will make great friends with Hoseli's critters. Gather together in a circle for the final report and to show your creations to Hoseli.

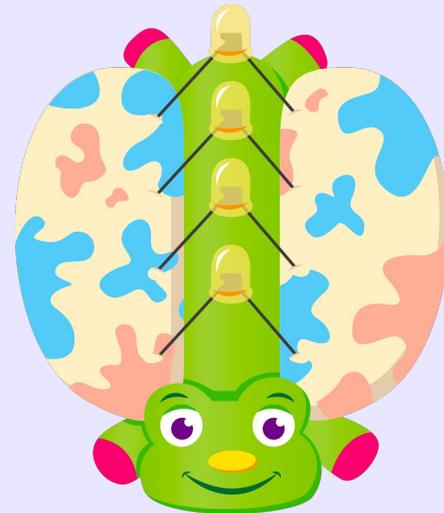
Please note! Store the battery compartment and batteries separately and ensure, that the wires of the compartment do not touch each other.

Otherwise there may be a short-circuit, which may result in a fire.

Please note! If you decide to use liquid food colouring, be extra careful to avoid spilling. Detach all wires from the critter while you add the colours.

Scientific explanation:

The batteries, wires, light bulbs and balls of dough form an electric circuit. An electric circuit is a path through which an electric current flows from the battery in a closed loop back to the battery. At the light bulb, some of the electricity is converted into light. The playdough between the balls of dough serves as an insulator that guides the electricity to flow through the bulbs. Without the playdough, the creature's electricity can go haywire, and the bulbs can break.





Final report:

Report to Hoseli:

Hoseli was wondering how the little creatures worked and what caused them to flash. Now it's time to show Hoseli the creatures the scientists have made and to tell him how they work!

You can put the creatures in the middle of the circle.

- What did we use to make the creatures?
- How did we get their lights to come on?
- How did we get them to go off?





Home experiment

HOME EXPERIMENT

KiDE
SCIENCE



Balloon Battery

What was it we studied before?

We made dough that conducts electricity.

We studied how an electric circuit works with the help of a creature that conducts electricity.

You will need:

a balloon
a faucet



1. Blow up a balloon, or ask an adult to blow one up for you. Tie the balloon closed so that no air can escape.
2. Bring the balloon next to water flowing from a faucet (the stream of water should be as narrow as possible), but don't let the balloon touch the water. **Observe** what happens to the water.
3. Rub the balloon against your own or an adult's hair.
4. Put the balloon next to water flowing from a faucet again. **Observe** what happens to the water. Did the same thing happen?
5. **Interpret:** what causes the phenomenon?
6. **Report the results** of your experiment by drawing or writing down your observations.



When you rub a balloon against your hair, the balloon picks up static electricity. Electricity has the ability to pull water towards it, which you can observe when the stream of water bends towards the balloon.

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