

Creating Clean Energy	Grade 6 - Electricity & Electrical Devices
------------------------------	---

<h2 style="margin: 0;">Lesson Plan</h2>	Assessment	Assessment AS/OF, Lab report
	Cross-curricular	Languages

<p>Big Ideas</p> <ul style="list-style-type: none"> Electrical energy can be transformed into other forms of energy. Other forms of energy can be transformed into electrical energy. <p>Overall Expectations</p> <ul style="list-style-type: none"> Investigate the characteristics of static and current electricity, and conduct simple circuits; Demonstrate an understanding of the principles of electrical energy and its transformation into and from other forms of energy. <p>Learning Goals</p> <ul style="list-style-type: none"> Design an electrical device to determine whether the juice of certain fruits and vegetables are good electrolytes. Understand the magnitude of electricity that is used to power a home, neighbourhood, or city, etc. 	<p>Specific Expectations</p> <p>2.4 design, build, and test a device that produces electricity</p> <p>2.5 use technological problem-solving skills (see page 16) to design, build, and test a device that transforms electrical energy into another form of energy in order to perform a function.</p> <p>2.6 use appropriate science and technology vocabulary, including current, battery, circuit, transform, static, electrostatic, and energy, in oral and written communication</p> <p>2.7 use a variety of forms (e.g., oral, written, graphic, multimedia) to communicate with different audiences and for a variety of purposes.</p> <p>3.3 identify materials that are good conductors of electricity (e.g., copper, gold, silver, aluminum, water [when it has a high mineral content]) and good insulators (e.g., glass, plastic, rubber, ceramics)</p>
--	---

Description

In this lesson, students will create and test a simple electrical circuit using a fruit or vegetable as the battery. In doing so, they will learn about the properties of conductors and become familiar with appropriate science and technology vocabulary such as electrolyte, conductor, and electrode.

Materials

- Lemons
- Extra fruit (grapefruit, oranges, tomatoes, kiwis, etc.)
- Alligator clips
- LED battery
- Multi-meter
- Zinc and copper nails

Safety Notes

- The fruit used in this project should not be eaten.
 - Care should be taken when handling the metal electrodes, LED and alligator clip leads.
 - Wear goggles when conducting the experiment in case the acid from the fruit squirts.
-

Introduction

The goal of the laboratory is for students to understand how wet cells function. By having the opportunity to create their own wet cells using a variety of different fruit or vegetables, students will begin to understand the properties of a conductor that allow the flow of electricity.

Part A:

In a learning circle:

- Discuss the principles of static electricity and the flow of electrons
- Discuss the differences between insulators and conductors
- Determine why some materials are better conductors than others

Part B:

Before beginning the lab, review the *Fruit Battery - Student Handout* document with the students to ensure they are familiarized with the challenge, previously taught concepts and what a wet cell resembles.

To allow students the opportunity to create their own experiment, complete the POEO (Action, Part A) as well as the lab overview the day before conduction the actual experiment (Action, Part B). This will allow the students to begin thinking about wet cells and decide which fruit they would like to conduct the experiment. Ask the students to bring the three fruit they'd like to test from home. Have extra fruit such as lemons, grapefruit, oranges, tomatoes, kiwis, available.

Action

Part A:

To begin, use a lemon to complete a POEO that demonstrates the set-up being used for the laboratory. Ask students to indicate under *predictions*, what they think the LED and multi-meter will do. Complete the circuit and ask the students to complete the *observation* portion of the POEO. Students will then use the explanation portion to provide their theory as to what happened. To complete the POEO, repeat the experiment so that students can make new *observations* that will either prove or disprove their explanations.

Part B:

Students will complete the experiment themselves using their own lemon and the three additional fruit they brought from home. Using the observation chart in the student handout, students will record the current (in milliamps) for three separate trials with each fruit and observe what happens to the LED. Once they have carried out the experiment, students can complete the experimental questions either in class or for homework.

To complete the language component, students can create a presentation (oral, powerpoint, or poster) to share their findings with a hydro company.

Consolidation/Extension

Ask groups of students to share their findings. Have a group discussion based on the experimental questions and discuss the properties of electrolytes that make them good conductors. Teachers can also ask probing questions around the types of electrodes that were used and their properties that allow them to be good conductors of electricity. This is a good time to show the types of metals that batteries are made up of (cadmium, nickel etc) for students to make connections that electricity is best conducted through metals, whose properties make them excellent conductors of electricity.

Resources

This experiment is based on Ontario grade 6 curriculum expectations:

<http://www.edu.gov.on.ca/eng/curriculum/elementary/scientec18currb.pdf>

Retrieved on January 19, 2018

The experiment was adapted from:

<https://www.education.com/science-fair/article/which-fruit-produce-electricity/>

Retrieved on January 18, 2018

[Sciencenorth.ca/schools](https://sciencenorth.ca/schools)

Science North is an agency of the Government of Ontario and
a registered charity #10796 2979 RR0001.