



Activity: Electricity by Don



Grade Level(s)	Timeframe
6-8	60 min

ABSTRACT

This series of classes covers the topics: Static electricity and current, circuits, conductors and insulators, voltage, current, resistance, direct and alternating current, series and parallel circuits, power supply and load, simulation of electric power grid, electromagnets, electric motors. These lessons have been taught in grade 6 since 2013, with enhancements..


009 - Electricity by Don - Rev 1


Alternate search terms: Static electricity and current, circuits, conductors and insulators, voltage, current, resistance, direct and alternating current, series and parallel circuits, simulation of electric power grid, electromagnets, electric motors.

Series: Electricity

Time: 3 lessons of 60 minutes each.

EXTRA FILES

 009_2.pdf

 009_3.docx

SUPPLIES AND EQUIPMENT

- Balloon, multimeter, energy balls, banana, potato, lemon, cup of vinegar, two pieces of metal of different types, equipment to simulate electric power grid, electric motor, electromagnet.

For the optional project, each team of students requires:

- a. Wires
- b. Brass fasteners
- c. Box
- d. Electrical tape to connect the wires
- e. Battery box and 2 AA batteries
- f. LED – either one for the quiz or one for each question
- g. 100 ohm resistor.

GETTING READY

This is a series of 3 or 4 lessons as follows:

A. Protons, electrons and charge; static electricity and current, circuits, conductors and insulators, measuring voltage of batteries

You can show the WORD file on the screen.

On page 3, the students can rub a balloon against their hair or clothing. If hair stands up, it is because the rubber balloon has stripped some electrons from the hair. So the hair is positively charged, and the balloon is negatively charged. The hair is repelled by other hair, and attracted to the balloon.

On page 5, if you have energy balls, run this experiment. First make a human chain and use the energy ball to show that human bodies are conductors. This is because our bodies have so much water (60 – 80% water, depending on age). You can test human hair and find that it is an insulator. Pencil lead is a conductor but wood is an insulator.

If you do not have energy balls, visit

https://drive.google.com/file/d/1NnUV1kt8x2911VKzyKnpG-26kAz_57Ma/view?usp=sharing

and watch the video.

Finish with types of bulbs and energy required for each.

B. Energy (Optional)

If the grade 6 class did not see my Energy class when they were in grade 5, the Energy class fits very well in here.

C. Analogy between Water and Electricity, Voltage/current/resistance/power, Direct and Alternating Current, Series and Parallel Circuits

Follow the WORD file. We show the analogy or comparison between height above water above a hydroelectric generating station (gravitational potential energy) and voltage (electric potential difference); then current of water and current of electrons; then resistance slowing the flow of water in a river and resistance slowing the electric current in a circuit.

Then we explain the terms voltage, current, resistance and (electric) power. This page is advanced for grade 6, so do not dwell on it. It shows the units volts, amperes, ohms and watts.

Then explain direct and alternating current.

Then explain series and parallel circuits. On following page, the circuit only works if connected in series. So the connections are important!

Then watch the video about series and parallel circuits and discuss it.

D. Show the video with the power supply and load.

Then it shows how these devices can simulate electricity generating stations (power supplies) and villages which use electricity (loads).

Then show the video with the electromagnet and the electric motor. Discuss and answer questions.

E. If the teacher is interested, a project is proposed for the students.

Students can work in pairs. They can make a quiz of 4 – 6 multiple choice questions. The student chooses the answer by touching a long wire to one of the terminals (one terminal for each answer). If the terminal he/she touches corresponds to the right answer, an LED lights up! The students start with a box of cereal or similar box. They can wire the box so that either there is one LED for all the answers, or there is one LED for each answer. They must wire the LED properly, since it only works if the anode (longer leg) is attached to the positive side of the battery. If it wired the opposite way, the LED will not work. Brass fasteners are used for the terminals. The attached file shows 2 versions of the wiring, depending on whether there is one LED or one per question. A resistor is required to protect the LED from too much current.