Generator

Overview:

The aurora is often compared to a generator. In this lesson, students build a simple generator, then develop and carry out an experiment that tests an aspect of the generator.

Objectives:

The student will:

- create a generator; and
- develop an experiment that illustrates how different components play a part in power generation.

Materials:

- Compasses
- Insulated copper magnet wire – assorted small gauges
- Scissors
- Fine-grit sandpaper
- Protractors
- Volt meter
- Magnets (assorted)
- STUDENT WORKSHEET: "Generator"

Activity Preparation:

Follow the directions on the STUDENT WORKSHEET: "Generator" to create a model generator.

Activity Procedure:

1. Explain that the aurora is often described as a generator. Inform students they will make a simple generator.
2. Distribute STUDENT WORKSHEET: "Generator." Discuss the information and steps referring to the model.
3. Group students in pairs and have the materials available for each pair to make a generator. Each pair should develop their own test and use the scientific method to investigate an aspect of the generator. Circulate to give necessary guidance.
4. Have each pair present their findings to the class.

Answers to Student Worksheet:

Tests should reflect that the voltage increases as the number of coils increase. Also, the voltage increases as the strength of the magnetic field increases.

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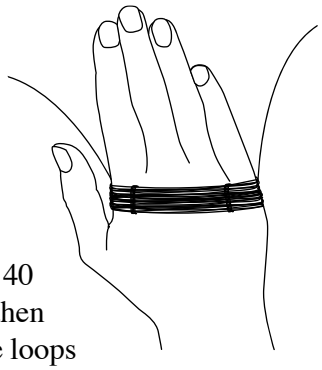
Directions: Create a simple generator following the steps below.

The aurora is often compared to a generator. What is a generator?

> A generator is a machine that converts mechanical energy into electricity. For a generator to work, two things are needed: a magnetic field and a conductor. What is a conductor? A conductor is a material that transmits electricity. Everyday, people are surrounded by appliances that use electricity. The electricity is sent to these appliances and around communities through wires. Wires are conductors. Electricity is produced when a conductor and a magnetic field move across each other continuously.

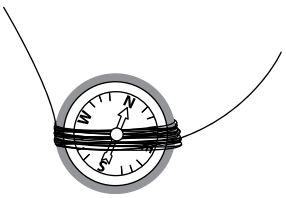
Materials:

- Compass
- Insulated copper magnet wire – small gauge
- Scissors
- Fine grit sandpaper
- Magnet (assorted)
- Volt meter
- Protractor

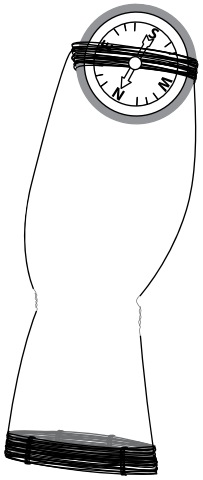


Activity Procedure:

1. Leave excess wire of three to five inches at the start then wrap the wire 40 times around the hand. Leave excess wire of three to five inches at the end then cut the wire from the spool. Cut small pieces of wire to wrap and secure the loops together.



2. Leave excess wire of three to five inches at the start then wrap the wire 25 times around the compass. Leave excess wire of three to five inches at the end then cut the wire from the spool.
3. Use the sandpaper to remove insulation from the ends of the wire then connect them together.



4. Pass a magnet through the 40 loops of wire and observe the compass needle. As the magnet moves through the loops of wire, electrons move in the wire. The electrons move through the wire around the compass, and cause the magnetic field to surround the compass. This magnetic field causes the compass needle to move.
5. With a partner, develop an experiment. Following are some suggested questions to test different aspects of how the generator operates: Does the number of magnets affect how the generator work? Does the type of magnet affect how the generator works? If so, are some stronger than others? Does the type of wire matter? How does thick wire compare to thinner wire? Does the tightness of the coil matter? Does the number of turns on the wire coil matter? How does the data gathered with a volt meter compare to the data gathered by observing the movement on the compass? Which is more accurate?

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6. For collecting data, use a protractor to measure the movement of the compass needle or attach a volt meter to the ends of the wires.
7. Before carrying out the experiment, think about the various components. Complete questions 1-4 below. Also, think about what data to collect and start making a table for number 5.
8. Carry out the experiment.

Testable Question:

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Hypothesis:

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Experiment:

Materials:

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Procedure:

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Data:

Make a table to record the types of data needed to test the hypothesis.

Analysis of Data:

Create a graph. Make sure it includes a title, labeled x-axis, and labeled y-axis.

Conclusion:

Does the data support the hypothesis? If not, what is a possible reason for the difference? How could you improve this experiment? Write your conclusion in complete sentences.

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