



WAYNE STATE UNIVERSITY

STEM Day Lesson Plan

Title: Electromagnetism Demo

Subject Area: Electromagnetism; Science

Learning Activity Description:

Magnetism, and by extension, electromagnetism can be an interesting and tangible way to generate interest in the sciences. Due to this presumption, we will cover the basics of magnetism and electricity, followed by their culmination in electromagnetism.

Permanent magnets are objects with permanent magnetic fields, granting them forces of attraction and repulsion. Electric currents generate a magnetic field when passed through a conductor. Electromagnets are only magnetic when a current is being channeled by the object. The strength of an electromagnet can be variable: based on the number of coils in the wire, the material of the conductor, and the strength of the current being some of the most apparent.

Lesson Activity Objective:

Give the students an interest and crash course in physical science, through the building and use of electromagnets.

Lesson Activity Outcomes:

- Students should be able to explain and demonstrate how electricity can turn a wire and nail into an electromagnet.
- Be able to build an electromagnet.
- Understand the inherent difference between a permanent magnet and an electromagnet.

Materials/Supplies Listed:

- D-Cell Battery
- 24G Copper Wire
- Iron nails
- Compass
- Ferrofluid
- Any other necessary, or requested items for demonstration.

Teacher Procedures:

1. Gather students in the workspace of the library.
2. Have lecture/discussion with students about their pre-existing knowledge of subject to assess necessary depth.
3. Demonstrate electromagnetism: using a compass, bowl of ferrofluid, and other relevant metal items from the environment.

4. Answer any and all questions. Include warning of potential hazards, such as heat generated from the electric current.
5. Begin construction of electromagnet. (Volunteers will assist staff with supervising)
6. As groups finish their constructs, have them test its strength using the demonstration materials.

Group Strategies (example, group size, expected time for groups, etc.)

15 groups of 2. The whole group of students will be given a quick (10 minute lecture) on magnetism, electricity, and their culmination in electromagnetism. Experiment will then be demonstrated and groups will be free to build under supervision.