

Topic:	Introduction to Electricity	
Date:		
Teacher:	Stansberry	
Class:	Introduction to STEM	

Materials:

PHET Simulations Mag-Lev Track Foam Bases Magnets Power Grid sim exploration activities.
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TN Science Standards
 Embedded Inquiry Grade 6

Conceptual Strand	Understandings about scientific inquiry and the ability to conduct inquiry are essential for living in the 21st century.
Guiding Question	What tools, skills, knowledge, and dispositions are needed to conduct scientific inquiry?

GLE 0607.Inq.1	Design and conduct open ended scientific investigations.
GLE 0607.Inq.2	Use appropriate tools and techniques to gather, organize, analyze, and interpret data.
GLE 0607.Inq.3	Synthesize information to determine cause and effect relationships between evidence and explanations.
GLE 0607.Inq.4	Recognize possible sources of bias and error, alternative explanations, and questions for further exploration.
GLE 0607.Inq.5	Communicate scientific understanding using descriptions, explanations, and models.

Standard 12 - Forces in Nature

Conceptual Strand 12	Everything in the universe exerts a gravitational force on everything else; there is an interplay between magnetic fields and electrical currents.
Guiding Question 12	What are the scientific principles that explain gravity and electromagnetism?
GLE 0607.12.1	Describe how simple circuits are associated with the transfer of electrical energy.

First Principles of Engineering

x	1.0	The Meaning of Engineering
x	2.0	Problem Solving
x	3.0	Creative Thinking
x	4.0	Engineering Design Process
	5.0	Teaming
x	6.0	Applied Mathematics and Science Knowledge
	7.0	Computer Tools
x	8.0	Modeling
	9.0	Technical and Engineering Communications
	10	Graphics
	11	Ethics
	12	Time Management
	13	Project Management
x	14	Role of Engineers and Engineering in Society

ITEEA:

	1.0	Students will develop an understanding of the characteristics and scope of
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		technology.
	2.0	Students will develop an understanding of the core concepts of technology.
	3.0	Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study.
	4.0	Students will develop an understanding of the cultural, social, economic, and political effects of technology.
	5.0	Students will develop an understanding of the effects of technology on the environment.
x	6.0	Students will develop an understanding of the role of society in the development and use of technology.
x	7.0	Students will develop an understanding of the influence of technology on history.
	8.0	Students will develop an understanding of the attributes of design.
x	9.0	Students will develop an understanding of engineering design.
	10.0	Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.
	11.0	Students will develop the abilities to apply the design process.
x	12.0	Students will develop the abilities to use and maintain technological products and systems.
	13.0	Students will develop the abilities to assess the impact of products and systems.
	14.0	Students will develop an understanding of and be able to select and use medical technologies.

	15.0	Students will develop an understanding of and be able to select and use agricultural and related biotechnologies.
x	16.0	Students will develop an understanding of and be able to select and use energy and power technologies.
	17.0	Students will develop an understanding of and be able to select and use information and communication technologies.
	18.0	Students will develop an understanding of and be able to select and use transportation technologies.
	19.0	Students will develop an understanding of and be able to select and use manufacturing technologies
	20.0	Students will develop an understanding of and be able to select and use construction technologies.

LAB 1:

Faraday's Law!!

During this lab activity, you will learn to

- a) Predict the **direction** of the magnetic field at different locations around a bar magnet and an electromagnet.
- b) Compare and contrast bar magnets and electromagnets.
- c) Identify the characteristics of electromagnets that are variable and what effects each variable has on the magnetic field's strength and direction.

Go to http://phet.colorado.edu/simulations/sims.php?sim=Faradays_Electromagnetic_Lab

Lab Manual Questions

Questions

1. Using diagrams and written explanation, explain the magnetic field **direction** and **strength** around a bar magnet, and an electromagnet. (40 points)
2. Explain the **similarities** and **differences** of a bar magnet and an electromagnet. (30 points)
3. Identify the characteristics of electromagnets that are variable (can be changed) and what effects each variable has on the magnetic field's strength and direction. (30 points)

Ask: Define the problem and understand what to work on.

Imagine: Brainstorm to come up with a wide range of ideas or solutions to their problem.

Plan: Pick one promising idea and then develop a plan.

Create: Emphasize teamwork and follow the plan.

Experiment: Do the experiments, measure, record and ask how to improve their design.

Improve: Changes are made to the original model to come up with the best solution.

Procedures: