Marietta City Schools

2023–2024 District Unit Planner

Grade 5 Science

Theme	*Unit 4 Energy Transfer through Electricity and Magnetism*	**Unit duration**	*7 weeks*

Mastering Content and Skills through INQUIRY (Establishing the purpose of the Unit): *What will students learn?*

GaDoE Standards/3D Science Elements
Georgia Standards: **S5P2. Obtain, evaluate, and communicate information to investigate electricity.** a. Obtain and combine information from multiple sources to explain the difference between naturally occurring electricity (static) and human-harnessed electricity. b. Design a complete, simple electric circuit, and explain all necessary components. c. Plan and carry out investigations on common materials to determine if they are insulators or conductors of electricity. **S5P3. Obtain, evaluate, and communicate information about magnetism and its relationship to electricity.** a. Construct an argument based on experimental evidence to communicate the differences in function and purpose of an electromagnet and a magnet. (Clarification statement: Function is limited to understanding temporary and permanent magnetism.) b. Plan and carry out an investigation to observe the interaction between a magnetic field and a magnetic object. (Clarification statement: The interaction should include placing materials of various types (wood, paper, glass, metal, and rocks) and thickness between the magnet and the magnetic object.) **Unit Objectives:** Electric and magnetic forces between a pair of objects do not require that the objects be in contact, for example, magnets push or pull at a distance. The sizes of the forces in each situation depend on the properties of the objects and their distances apart and, for forces between two magnets, or their orientation relative to each other. Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat or light. The currents produced may have been produced to begin with by transforming the energy of motion into electrical energy. (e.g., moving water driving a spinning turbine which generates electric currents.) Magnets can exert forces on other magnets or on magnetizable materials, causing energy transfer between them (e.g., leading to changes in motion) even when objects are not touching. *** *This unit connects to Physical and Chemical Changes.*

Unit Phenomena:
Van de Graff & Tins
Van de Graff Generator (Hair) (MUTE THIS ONE)

Beginning of Unit:
Have students document what they notice in the videos. Have students provide an explanation for why they think the objects behave the way they do in the videos.

End of Unit:
Show the videos once again (still muted). Have students revisit their initial thoughts. Students should modify their explanations based upon what they now know about static electricity. Students could also write a script for the Van de Graff Generator (Hair) & Hair video before play. Play the Van de Graff & Students should compare their explanations for what is happening in the video to the explanation provided.

Page Keeley Probes: Click here for an introduction to Page Keeley Probes
Page Keeley probes can be used as phenomena. They are intended to elicit student understanding about science concepts. Starting a unit or lesson with a probe will help you uncover misconceptions and see what students already know about a topic. Using a probe at the beginning of a lesson and then at the end of the lesson serves the purposes of pretesting and then formatively evaluating student thinking. Below is a list of probes from Page Keeley's book Uncovering Student Ideas in Primary Science, that are appropriate for this unit. This book has been purchased for your grade level by the Office of Academic Achievement and can be found in your media center.

- **Batteries, Bulbs, and Wires** (Volume 4)

Science & Engineering Practices:	**Disciplinary Core Ideas:**	**Crosscutting Concepts:**
• Asking questions • Developing and using models • Plan and carry out investigations • Engage in Argument from Evidence	● Static Electricity ● Current Electricity (Human Harnessed) ● Energy Transfer ● Simple Electric Circuit ● Magnetic Field and Force ● Release of Stored Energy ● Insulators and Conductors of Electricity	• Systems and System Models • Energy and Matter

Misconceptions:
Electricity is a form of energy.
The electric energy in a circuit flows in a circle.
Two kinds of electricity are "static" and "current."
The stuff that flows through wires is called "electric current."
Static electricity is caused by friction.
Insulators and conductors do the same job.
An electromagnet must have an iron nail.
Batteries have electricity inside.

Math/ELA Connections/STEM Connections
ELAGSE5SL4 Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.
ELAGSE5SL5 Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes.
ELAGSE5SL6 Adapt speech to a variety of contexts and tasks, using formal English when appropriate to task and situation. (See grade 5 Language Standards 1 and 3 for specific expectations.)

MGSE5.MD.5 Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.
a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.
b. Apply the formulas V = l × w × h and V = b × h for rectangular prisms to find volumes of right rectangular prisms with whole number edge lengths in the context of solving real world and mathematical problems.
c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.

STEM
Curiosity Machine Engineering Design Challenges – this website has a bank of ideas for design challenges.
Design Squad – Engineering design challenges with teacher guide EEI – An Alarming Idea: Designing Alarm Circuits (check your STEM lab or Teacher Resource Room for this resource)
Discovery Education Science Techbook STEM Starters

Discovery Education Science Techbook (Log into your DE account using your Google credentials before accessing the DE resources) You will find station rotation activities such as leveled reading passages, interactives, hands-on labs, virtual labs, video clips, and more on the Explore page of each Techbook unit.
About Electricity
Static Electricity
Magnets & Electricity
Electric Circuits
Electric Current
Electricity and Magnetism
Make Some Static Electricity

Discovery Education Hands-On Activities
Hands-On Activity: Creating an Electromagnet
Hands-On Activity: Making a Compass
Hands-On Activity: Magnets and Electricity
Hands-On Activity: Create a Circuit
Hands-On Activity: Make It Light
Hands-On Lab: A Clean Sweep with Magnets
Hands-On Activity: Transferring Electrons

More Hands-on Activities

Creating Static!
Put a Spark in It! Electricity!
Electric Circuits
Creating an Electromagnet
Investigating Magnetic Force Field
Attraction with Static Electricity
Iron Filings and Magnetic Field Lines
Static Cling

Use the AIMS 5th grade Earth Science Book to access the following lessons for more student-centered lessons. Contact your Instructional Coach or Science Coordinator if AIMS books are not available in your Media Center or Workroom.

Page #	Lesson Title	Lesson Description
140	Static Sensations	Students explore and experience static electricity using their senses.
150	Static Strokes	Students explore static electricity and observe the effects of positive and negative charges.
156	Different Strokes	Students experiment with static electricity and discover some of its properties.
173	Sparky's Light Kit *	Students make a complete circuit that lights a bulb.
179	Path Finder's *	Students learn about complete and incomplete circuits.
187	Circuit Quiz Boards	Students use their knowledge of circuits to construct a model of a quiz board.
222	Conductor or Insulator? *	Students test a variety of materials to determine if they are conductors or insulators.
236	Electromagnetic Explorations *	Students build a simple electromagnet, test its properties, and use a directional compass to determine the orientation of the electromagnet's poles.
244	Make an Electromagnet *	Students build a simple electromagnet and investigate ways to make it stronger.
252	Blade Spinners	Students construct a blade spinner and find other ways to make it spin.

Essential Questions	
Factual— What is the difference between naturally occurring electricity (static) and human-harnessed electricity? What determines whether or not an object is an insulator? **Inferential—** What are the differences in function and purpose of an electromagnet and a magnet? Which model is best to describe static electricity? Why? **Critical Thinking-** How would you teach others to design a simple electric circuit?	
Tier II Words- High Frequency Multiple Meaning	**Tier III Words-** Subject/ Content Related Words
Flow, direction, motion, circuit, force, push, pull, gravity, speed, slow, fast, attract, magnet	electricity, electrons, flow, conductor, electrical energy, electric current, electric charge, magnetic fields, static electricity, electric force, charged, neutral, electric circuit, power source, switch, insulators, magnetism, attract, repel, electromagnet, temporary magnet, permanent magnet, temporary magnet, attract, repel, mechanical energy, energy of motion
Assessments	
You will find all Unit Summative Assessments in the AMP 5th Grade Science Assessment Team group.  	

Objective or Content	Learning Experiences	Differentiation Considerations
CLE 1-3: S5P2. Obtain, evaluate, and communicate information to investigate electricity. S5P3. Obtain, evaluate, and communicate information about magnetism and its relationship to electricity.	GaDOE Electricity and Magnetism Instructional Segment In this unit students will: ● Investigate conductors and insulators of electricity using various materials and a simple circuit. ● Make electromagnets and investigate how they are similar and different from permanent magnets. ● Use magnets to determine strength by using different materials that are attracted to magnets (magnetic objects). ● Use magnets to show attraction through various materials of different thicknesses such as wood, paper, glass, metal, and rocks.	Student Choice Performance Tasks Reflection and Goal Setting Learning Stations Choice Boards Formative Probes Science Journaling Multi-sensory activities Assistive Technology Flexible Grouping Multiple Means of Representation
Recommended High Quality Complex Text By Lexile Band		
What is Electricity? By Ronald Monroe *Electricity and Magnetism Fundamentals* By Robert Wood *What are Electrical Circuits?* By Ronald Monroe *Real World Science: Electricity and Magnetism* By Dana Meachen *What is Electromagnetism?* By Lionel Sandner *Investigating Magnetism By* Sally M. Walker		