Force of Magnets: Attracting Student Scientists

This project allows all students to become successful learners as they explore the world of magnetism.

Curriculum/State Standards

- To formulate and express scientific questions or hypotheses to be investigated.
- Understand fundamental forces, their forms, and their effects on motion.
- Monitor and reflect on the process of mathematical problem solving.
- Organize ideas sequentially or around major points of information through communication.

Overview

Attracting students to mathematics and science requires hand-on activities that engage children’s curiosity of the world around them. During this unit of study, students will become active learners while exploring the world of magnets, researching careers that use navigational tools, and inventing new objects or toys using a magnet with recycled materials.

Objectives

- The student will describe the object’s position and how to affect its movement using magnetic forces.
- The student will, through investigation, discover that magnets push and pull on other magnets with or without touching.
- The student will distinguish between everyday objects and magnets.
- The student will demonstrate that magnetic forces can pass through some materials.
- The student will make observations, express a scientific question or hypotheses based on the observation of magnetic fields.
- The student will plan a simple investigation using a magnet to answer questions and test hypotheses.
- The student will collect, organize, and communicate data from the investigation in his/her scientific notebook.
- The student will use the data collected from the investigation to explain the results and measure the distance an object has traveled using a magnetic force.
- The student will use the language of mathematics to express mathematical ideas and concepts while conducting the investigation.

Materials

- compasses
- lodestones
- magnetic marble tub
- magnetic repulsion wand
- student magnetic wand set
- chrome bar magnets
- Ferrofluid display cell
- variety of magnets
- student lab coat

Readiness Activity

Ask the students to write down at least three I wonder questions about magnets in their scientific journals. Make an Observations, Wonderings, and Learning (OWL) chart with the group. Give students an opportunity to turn and talk with partners about their wonderings. Students will record their wonderings, connect through scientific experiments and observations, and, finally, draw conclusions about their learning.

Show the book, What Makes a Magnet? by Franklyn M. Branley to the class. Ask the students what they think the book might be about. Next read the book aloud. Have the students make connections text-to-self, text-to-text, and
then text-to-world. Record the class discussion on the OWL chart and in their science notebooks.

**Strategies/Activities**
Students will begin this endeavor by exploring different shapes and sizes of magnets. They will identify what materials are/are not attracted to magnets. Students will travel in the school finding objects that are magnetic and nonmagnetic while creating a simple table in their notebooks to illustrate the data collected. They will share their discoveries, gathering as a total group to compile the data and draw conclusions about magnetic objects.

Students will locate a variety of objects and actively investigate magnetic forces that pass through other materials. Forming a hypothesis and conducting an investigation, the learner will use two magnetic wands to measure the thickness in centimeters for each object that is inserted between the magnets. Students will be asked to write simple paragraphs and show evidence through technical drawings to communicate their results and conclusions.

The learners will make simple compasses. Students will magnetize needles and place corks on each end. They will float the needle in a bowl of water, testing to see if it points north while comparing the direction of their modern compasses and their magnetites. Young scientists will document their findings, drawing conclusions as they write about each type of navigational tool.

**Culminating Activity**
In the final activity, students will research items that use magnets. They will create magnetic toys, games, or household items that’s used in every day life. They will generate technical drawings, labeling parts of their designs, then using magnets to make prototypes of their inventions. Wearing lab coats as a scientists, the students will communicate their ideas by presenting their original designs to their peers.

**Evaluation Method**
Formative assessment of student knowledge and organizational skills shall be evaluated through recorded information from observations, experiments, investigations, mapping, and technical drawings in their scientific journals.

A final written assessment will be given from the questions generated by students during the first lesson.

A speaking task will serve as another evaluation tool. The students will demonstrate for their peers their inventions using magnets. The areas of evaluation shall include organization, clear sequencing, and their visuals.