

Science Toolkit: Grade k Objective 5.C.3.a

Standard 5.0 Physics

Topic C. Electricity and Magnetism

Indicator 3. Observe and gather information from the explorations to describe how magnets affect some objects.

Objective a. Observe and describe what happens when magnets are placed on or near objects made of different materials.

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Introduction

Science Grade K Standard 5

The study of physics enables students to investigate and predict the outcome of certain interactions that occur between matter and energy. The challenge of developing effective teaching units around the topics included in the physics curriculum is providing sufficient learning experiences within each topic and at each grade level to assure a foundation of knowledge that students can use to construct progressively more complex concepts about motion, energy, force, and the relationships among them.

Motion is as essential to understanding the physical world as matter and energy are. In early grades, concepts about motion are developed as students observe, describe and discuss all kinds of moving things by keeping notes, drawing pictures, and raising questions. They investigate the many ways that objects move, including vibrating motions that produce sound in some objects, and they describe the motion observed. Students also have experiences in getting things to move or not move and in changing the direction or speed of things already in motion. In the intermediate grades students can be more experimental and quantitative as they continue describing motion. They develop an understanding of some of the general relationships between force and change in motion. They also investigate examples of repeating patterns of motion such as periodic motions and vibrations. Students in the intermediate grades also have opportunities to share their ideas about light by considering where it comes from, where it goes and how it interacts with objects—causing shadows, reflection, and bending among other behaviors. In middle school, the force/motion relationship is more fully developed. Based on observable phenomena created in water tables, springs and ropes, students describe properties of waves and describe how interacting waves behave. They also investigate the difficult ideas of inertia and learn about the electromagnetic spectrum, including the assertion that it consists of wavelike radiations. Understanding that vibrations in materials set up wavelike disturbances that spread from the source, students explain varied phenomena such as earthquakes and sound. They relate the wavelike behavior of light to explanations of how objects are seen.

Energy affects everything in the universe and developing accurate ideas about what energy is and how it behaves is among the most important study in science. In the early grades it is enough for children to think and talk about energy as something that is somehow related to making things go, giving them pep, and that 'energy' can be 'saved' by turning off lights, battery operated toys or engines. In the intermediate grades, students focus on concepts of energy transfer from one material to another, energy transformation from one form to another and heat as a form of energy that moves in predictable ways. In middle school, students explain that energy is conserved, that there are many ways in which heat energy can be transferred and that heat is a product of most energy transformations.

In helping students to broaden their understanding of energy at all grade levels, students consider the fundamental forces of nature with emphasis on gravitational and electromagnetic forces. In the early grades, students connect force with motion as they observe when and how things seem to move or not move. They recognize that things fall to the ground if not held up and that magnets move some things without touching them. In the intermediate grades, students focus on forces that act at a distance. They investigate the pushes and pulls of magnets and static electricity and represent the phenomena observed with drawings, diagrams or verbal descriptions. They take their understanding of the force of gravity beyond that of a 'natural motion' of objects toward the Earth to include the idea that the Earth pulls on any object. In middle school, each of the natural forces is more thoroughly investigated. The idea of gravity is now generalized to all matter

everywhere in the universe and that idea is supported with data gathered from demonstrations, videos and in the laboratory. Students also expand their ideas about magnetic and electric forces by making devices to observe the magnetic effect of current and the electric effect of moving magnets.