Magnetism

Grades K-4

Science as Inquiry

Abilities necessary to do scientific inquiry

- Ask a question about objects, organisms, and events in the environment.
- Plan and conduct a simple investigation.
- Employ simple equipment and tools to gather data and extend the senses.

Understandings about scientific inquiry

- Simple instruments, such as magnifiers, thermometers, and rulers, provide more information than scientists obtain using only their senses.

Physical Science

Properties of objects and materials

- Objects have many observable properties, including size, weight, shape, color, temperature, and the ability to react with other substances. Those properties can be measured using tools, such as rulers, balances, and thermometers.
- Objects are made of one or more materials, such as paper, wood, and metal. Objects can be described by the properties of the materials from which they are made, and those properties can be used to separate or sort a group of objects or materials.

Light, heat, electricity, and magnetism

- Electricity in circuits can produce light, heat, sound, and magnetic effects. Electrical circuits require a complete loop through which an electrical current can pass.
- Magnets attract and repel each other and certain kinds of other materials.

Earth and Space Science

Properties of earth materials

- Earth materials are solid rocks and soils, water, and the gases of the atmosphere. The varied materials have different physical and chemical properties, which make them useful in different ways, for example, as building materials, as sources of fuel, or for growing the plants we use as food. Earth materials provide many of the resources that humans use.

Grades 5-8

Science as Inquiry

Abilities necessary to do scientific inquiry

- Design and conduct a scientific investigation.
- Use appropriate tools and techniques to gather, analyze, and interpret data.

Physical Science

Properties and changes of properties in matter

- A substance has characteristic properties, such as density, a boiling point, and solubility, all of which are independent of the amount of the sample. A mixture of substances often can be separated into the original substances using one or more of the characteristic properties.

Transfer of energy

- Electrical circuits provide a means of transferring electrical energy when heat, light, sound, and chemical changes are produced.

Earth and Space Science

Structure of the earth system

- The solid earth is layered with a lithosphere; hot, convecting mantle; and dense, metallic core.

Earth in the solar system

- The sun is the major source of energy for phenomena on the earth's surface, such as growth of plants, winds, ocean currents, and the water cycle. Seasons result from

variations in the amount of the sun's energy hitting the surface, due to the tilt of the earth's rotation on its axis and the length of the day.

Grades 9-12

Science as Inquiry

Abilities necessary to do scientific inquiry

- Design and conduct scientific investigations.

Physical Science

Structure of atoms

- Matter is made of minute particles called atoms, and atoms are composed of even smaller components. These components have measurable properties, such as mass and electrical charge. Each atom has a positively charged nucleus surrounded by negatively charged electrons. The electric force between the nucleus and electrons holds the atom together.

Motions and forces

- The electric force is a universal force that exists between any two charged objects. Opposite charges attract while like charges repel. The strength of the force is proportional to the charges, and, as with gravitation, inversely proportional to the square of the distance between them.
- Electricity and magnetism are two aspects of a single electromagnetic force. Moving electric charges produce magnetic forces, and moving magnets produce electric forces. These effects help students to understand electric motors and generators.