Magnet Investigations (K-2nd grades)
Pre-Visit Activities

Vocabulary List and Student Definitions (early elementary level)

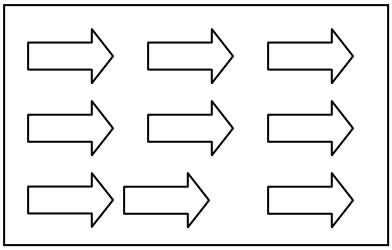
- **Magnet:** metal that repels or attracts other metals that contain iron.
- **Pole:** either end of a magnet (where the lines of force are most concentrated).
- **Push:** to press against somebody or something in order to move that person or object away.
- **Pull:** to apply a force to somebody or something in order to bring it closer (to the origin of force).
- **Energy:** ability to do things, work, or make an effort
- **Magnetic field:** the invisible area surrounding a magnet that pushes or pulls other magnetic objects.
- **Attract:** to pull toward
- **Repel:** to push away

Teacher Background and Supporting Information

1. What is a magnet?
    a. A **magnet** is a metal that attracts or repels other metals that contain iron.
    b. Magnets are objects that produce **magnetic fields**, or invisible force fields, and attract metals like iron, steel, nickel, and cobalt.
    c. The magnetic field's lines of force exit the magnet from its **north pole** and enter its **south pole**.
    d. Types of magnets:
        i. Ceramic magnets: include ones used in refrigerator magnets and elementary-school science experiments, contain iron oxide in a ceramic composite. Most ceramic magnets, sometimes known as ferric magnets, aren't particularly strong.
        ii. Alnico magnets: made from aluminum, nickel and cobalt. They're stronger than ceramic magnets, but not as strong as the ones that incorporate a class of elements known as *rare-earth metals*.
        iii. Neodymium magnets: a rare earth metal that is combined with iron and boron to make very strong magnets.
        iv. Samarium cobalt magnets: combine cobalt with the rare-earth element samarium.
        v. In the past few years, scientists have also discovered magnetic polymers, or plastic magnets. Some of these are flexible and moldable. However, some work only at extremely low temperatures, and others pick up only very lightweight materials, like iron filings.
2. How does a Magnet Work?
    a. All matter is made of **atoms**, which made of even smaller particles. One of these particles is called an **electron.** These electrons are so tiny, that we cannot see them with our eyes. Electrons are not living, but they have **energy**.
    b. The arrangement, or order, of electrons in some metals causes

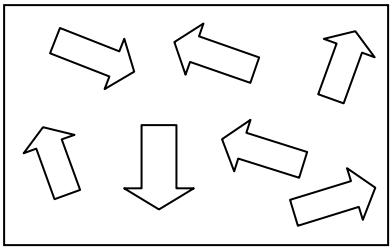
them to be magnetic.

Magnetic



In a magnet, most or all of the domains point in the same direction.

Non-magnetic



In an unmagnetized material, the domains point in random directions.

c. In a metal that is magnetic, the electrons are all arranged in the same direction. When the electrons pull in the same direction, magnetic objects will move.
d. This creates a **magnetic field**, or invisible force field around the magnet that **attracts** or **repels** other magnetic objects. An object must be inside the magnetic field to be **pulled toward** or **pushed away** from the magnet.

Student Activities

1. Read: What Magnets Can Do by Allan Fowler
2. Read: What Make a Magnet? by Franklyn Branley
3. Go Fish: Students will create paper fish to add to the "pond". A kid pool or large bin/box makes a great "pond".
    a. Have students decorate and cut-out their paper fish (see template on the following pages).
    b. Have students cut two fish templates and staple or glue the two halves, leaving one area open.
    c. Stuff the fish with paper or cotton to create a three dimensional fish.
    d. Seal the opening after stuffing.
    e. Attach a paperclip to a fin or the tail of each fish by punching a hole near the edge.
    f. Prior to the activity, tie a ceramic magnet (ring magnets work well) to the end of a fishing rod.
        i. If you do not have fishing rods available you can easily make one with a wooden dowel, string, and a ring magnet.
    g. Challenge students to go fish in pond. Can they catch a blue fish? Red fish? One, two, or three fish?
4. Sorting Activity: Provide different items to sort into groups that are magnetic and non-magnetic.
    a. Ask: what makes an object magnetic? What is so special about magnets? Allow students to share their ideas in a class discussion.
    b. Send students in pairs to investigate the classroom to locate magnets and how they are being used. Challenge students to do the same in their own homes. Make a list of their discoveries.