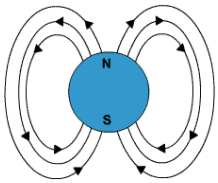
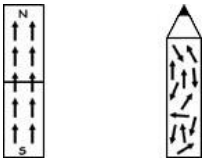
Dear Parent,

Your son's or daughter's science class will soon begin exploring the unit entitled "Electromagnetism." In this unit, students will learn how electricity produces magnetism and how magnetism produces electricity. By the end of the unit, students should demonstrate a clear understanding of the main ideas and be able to discuss the following topics:

1. the force that exists between two magnetic poles
    - *A magnetic field consists of imaginary lines of flux coming from moving or spinning electrically charged particles. Examples include the spin of a proton and the motion of electrons through a wire in an electric circuit.*



2. the reason that some materials are magnetic and some are not
    - *All atoms are magnetic; they have charges moving around within them. For a macroscopic object made of atoms to be a magnet, the atoms' magnetic fields in it have to align with each other. This will create a large scale magnetic field around the object. In order for the atoms' magnetic fields to line up within the material, they have to be able to move freely. In many materials the atoms are held too rigidly in place to be able to line up with any external magnetic field. If the magnetic fields of all those atoms are randomly oriented then they would cancel each other out and the material would have no net magnetic field.*



3. three different categories of magnets
    - *Permanent magnets (always magnetic), temporary magnets (can gain or lose magnetism), electromagnets (magnetism is produced through an electric current*)

4. two examples of the effect of Earth's magnetic field
    - *prevent radiation from reaching Earth from the solar winds (this can be evidenced through the auroras at the poles)*
    - *Allow for compass navigation*

5. the relationship between an electric current and a magnetic field
    - *An electric current will produce a magnetic field, which can be visualized as a series of circular field lines around a wire segment.*

6. the way in which a magnetic field can produce an electric current
    - *Just as we can make magnets from electricity, we can also use magnets to make electricity. A magnetic field pulls and pushes electrons in some objects near them to make them move. Metals, like copper, have electrons that are moved easily and can be readily moved from their orbits. If a magnet is moved quickly*

through a coil of copper wire, electrons move and electricity is made. This is how electromagnetic induction is used in a generator.

7. the involvement of electromagnetism in the operation of electric motors and galvanometers

    - *An electric motor converts electrical energy into physical movement. Electric motors generate magnetic fields with electric current through a coil (see number 6 above). The magnetic field then causes a force with a magnet that causes movement or spinning that runs the motor*.

Questions to Ask Along the Way

You can help your son or daughter learn about these topics by asking interesting questions as he or she progresses through the chapter. For example, you may wish to ask your son or daughter the following questions:

- What is the difference between *a* north pole and *the* North Pole?
- Why do some magnets seem to be stronger than others?
- What are some everyday objects that rely on magnets?

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