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Introduction

The activities in this book teach basic concepts of magnetism, static electricity and current electricity through hands-on experiences. The sequential lessons lead to an understanding of the concepts and the relationship among all three areas. Throughout this series of activities, scientific terminology or vocabulary should not be emphasised. Instead, use terms your students can easily understand. For example, when working with magnets or static electricity, the scientific terms of repel and attract may be changed to 'push' and 'pull.'

The study begins with activities in which students use a variety of magnets, such as bar, horseshoe and circular, to discover their properties and reactions to each other. They continue using magnets to test through what material magnetism passes. The invisible magnetic field is outlined using iron filings to show its shape for single magnets and then for combinations of magnets. Finally, the magnetic poles of the earth are explored through the use of a hanging bar magnet to locate their directions from the classroom and finding the magnetic poles on a globe. The culminating activity for these lessons is to create a simple compass.

The study of static electricity follows with the first activity to charge balloons to demonstrate the effects of static electricity. Other static electricity investigations involve using styrofoam pieces, paper circles from a hole punch and flowing water. Students will use the same terms in this study as they did with their magnets. They also see that static electricity reacts just as magnetism does.

The final set of activities applies what students have learned thus far to the study of current electricity, using D cell batteries as a safe source of current. Students first discover how to make a flashlight bulb turn on using only one D battery and a thin wire. This leads to an understanding of the flow of electricity. Next, the light bulb itself is studied to find how this flow of energy from the battery makes the filament in the bulb glow. The logical next step is to create electric circuits and learn about parallel and series circuits. Students investigate what materials are conductors of electricity and discover that it passes through metal and water, just like magnets. However, unlike magnetism, they find electricity passes through different kinds of metals, not just those with iron in them. This study ends with mystery connection boxes that enable students to find the route of electrical current through a maze of wires.

Encourage the students to try the magnet and static electricity activities at home with their families. It may be possible to send home some of the equipment necessary to do the current electricity activities as well. By doing these at home, students learn more and have the delightful experience of teaching others.

What Sticks to a Magnet?

Teacher Information

Magnets will stick only to items which have *iron*, *cobalt*, or *nickel* in them. Cobalt and nickel are rarely used in common metal items; therefore, most objects which stick to magnets contain iron.

Overview: *Students will test various materials to tell what can be picked up by a magnet.*

Materials

- circular magnet with a hole in the centre for each student
- assorted small objects of wood, paper, glass, cork, various metals (including coins)
- *optional:* samples of magnetite and metallic rocks such as galena and pyrite

Lesson Preparation

- Divide the materials into eight containers, each holding samples of the same materials.

Activity

1. Ask students where they have seen magnets used. Let them share these ideas in small groups.
2. Ask what they know about magnets, listing ideas on the board.
3. Divide students into eight groups and provide them with the containers of materials.
4. Have students divide the objects into three piles. One pile should be items which they think will stick to a magnet, a second pile is for those which they think will not, and the third pile is for items about which they are not sure.
5. After students divide all items into the three piles, ask them to tell how they decided which would stick to a magnet. (*Most will say that they chose anything metal for the "yes" pile.*)
6. List the items on the board under the three headings—**Yes**, **No**, and **?**. There will be some disagreement among the groups. List those items in question under more than one heading.
7. Distribute a magnet to each student to check the objects, placing them in new piles.
8. Discuss what they discover and change the objects on the board to classify them correctly.
9. Ask students if all metal objects stick to magnets. (*Very few stick items of gold or silver will not stick to magnets either, even though they are metal.*)

Closure

- Let the students move around the classroom to test as many objects as they can to see if they will stick to their magnets (*most do not*). Do not permit them near computers for this test.
- Have them share some of the unusual items to which their magnets will stick. (If you have a ceramic sink in the classroom and the magnet sticks to it, it is cast iron coated with ceramic.)
- Tell students to find three places in their homes where magnets are in use and report this to the class the next day. Urge them to find magnets which are not very obvious. (Remind students not to place magnets near computers.)

