Unit 2
Finding Out About Magnets

Objectives:

- Discovering materials that are attracted to magnets
- Investigating the practical use of magnets
- Using a magnet as a metal detector
- Discovering the strength of magnets
- Developing design skills
- Demonstrating a knowledge of magnets and what they can do

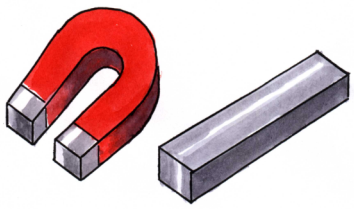
Horseshoe and bar magnets

Magnets are interesting to young students. Toyshops usually sell them, and many students have one from an early age. Most young students will already know that magnets attract metal objects before their school days begin.

Choice of magnets

It is best to experiment with both types of magnets, horseshoe magnets and bar magnets, if you can. Horseshoe magnets are good to start with, because they attract iron and steel with both ends, called poles.

Bar magnets are simpler than horseshoe magnets. It is easy to understand the two poles, because they are at each end of the bar. Magnets are often painted, usually red. This does not have any particular significance, as the paint is put there to stop the magnet from rusting.



Horseshoe magnet **Bar magnet**

The following tasks are designed for students to experiment with magnets, to find out about magnets, and to learn the basic properties of magnets.

Teacher Background/Information

Unit 2 – Activity 1 - *(page 9)*

It will soon become obvious to all students that metal is the common factor. But magnets are NOT attracted to all metals. They are mainly attracted to ferrous ones, those containing iron. Other metals that are attracted to magnets are: nickel, cobalt, and barium ferrite. Further experimentation will demonstrate that iron and steel provide the strongest attraction to magnets.

When iron or steel has been used with a magnet a number of times, it, too, will become magnetized. Steel pins, when stroked gently along the surface of a magnet a number of times, will become magnetized. The magnetized pins can be used to pick up non-magnetized pins as a demonstration.

Magnetic energy can be put into iron and steel, except in the case of a few stainless steel alloys. Some iron alloys, containing smaller proportions of other metals, such as aluminum, nickel, and cobalt, make stronger magnets than steel alone. An example of this is Alnico, iron with aluminum, nickel, and cobalt.

Magnets are attracted to nickel, although nickel coins are not always good indicators. US coins contain less nickel than Canadian ones. Experiment and see if you can find coins with the greatest nickel content. They are the ones that are more magnetic than the others. Modern methods have made it possible to make non-magnet materials, such as plastic, become magnetic. This is done by adding magnetized metal compounds in powder form to the plastic during processing. Plastic strips around freezer doors are often magnetized in this way. Magnetic plastics form the recording film for tape recording, videotapes, and the magnetized strip on bankcards.

Unit 2 - Activity 2 *(page 10)*

Remember to hide some metal objects in the prepared search area to allow the students to see what happens. Prepare the search area by hiding metal objects in or under various mediums such as strips of paper or sand.

Unit 2 – Challenge *(page 14)*

A copy of the Engineering/Technology Design Loop is provided in the Appendix. Provide students with a copy to help guide them through the design process.

Unit 2 - Activity 1
Exploring Materials and Their Attraction to Magnets

Materials you will need:

- magnets

A range of different materials such as small pieces of:

- wood
- plastic
- rubber
- aluminum
- cotton
- iron
- steel
- copper
- string

Directions:

1) Collect a number of objects: metal, plastic, wood, wool, cotton, string, etc.

2) Make two lists, one for materials that are attracted to the magnet, and another list for those that are not.

3) Next, combine materials. Examples:

- Bind some string around a metal object,
- Wrap plastic in cotton material,
- Knock nails into a piece of wood, or
- Place a metal key in a plastic bag.

4) Test to see which combinations are attracted to the magnet and which are not. Is there a common factor?

5) Make a record of the materials that are present within the combinations that are attracted to the magnet.

⇒ Portfolio

Draw and make notes of your experiments. Record the materials that are attracted to the magnet and those that are not attracted to it.
Reproducible portfolio pages are provided in the Appendix.