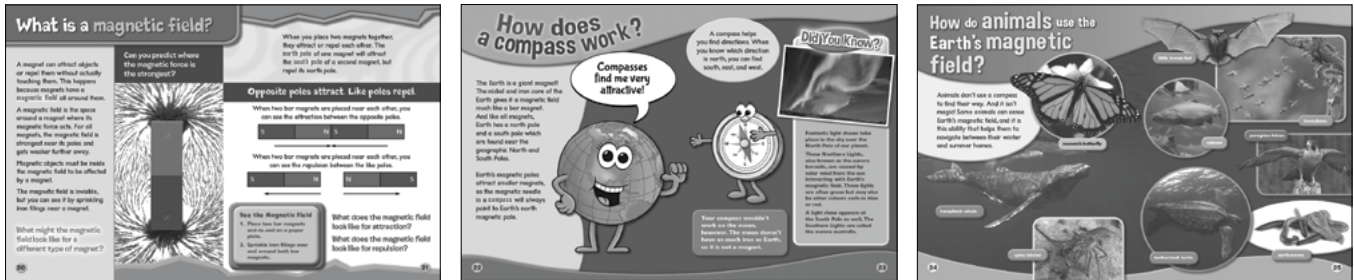


What Happens When Two Magnets Meet?



Focus: Students will discover that magnets have a north pole and a south pole, and that opposite poles attract each other while like poles repel. Students will also use iron filings to explore magnetic fields, and discover how a compass helps them find directions.

Specific Curriculum Outcomes

Students will be expected to:

- 44.0 investigate the polarity of a magnet, determine the orientation of its poles, and demonstrate that opposite poles attract and like poles repel [GCO 1/3]
- 2.0 communicate using scientific terminology [GCO 2]

Performance Indicators

Students who achieve these outcomes will be able to:

- determine the polarity of an unlabelled magnet using a labelled bar magnet
- use iron filings to identify magnetic fields

NOTES:

Attitude Outcome Statements

Encourage students to:

- recognize the role and contribution of science in their understanding of the world [GCO 4]

Cross-Curricular Connections

English Language Arts

Students will be expected to:

- interpret, select, and combine information using a variety of strategies, resources, and technologies [GCO 5]
- create texts collaboratively and independently, using a variety of forms for a range of audiences and purposes [GCO 9]

Social Studies

Students will be expected to:

- demonstrate an understanding of the geographic location of Newfoundland and Labrador—use the concept of location (cardinal directions) [SCO 1.10]

Getting Organized

Components	Materials	Before You Begin	Vocabulary
• IWB Activity 7 • Student Magazine, pages 20–25 • IWB Activity 8	• variety of magnets of different shapes and sizes (e.g., bar, horseshoe, donut, ring) • pieces of cardboard or paper plates • iron filings in a shaker • protective goggles • students' Science Journals • blunt sewing needles or unbent paper clips • containers of water • paper and wax crayons	• Set up stations with differently shaped magnets (with poles marked) at each station. • Prepare badges, half indicating north pole and half indicating south pole (one badge per student).	• polarity • poles • north pole • south pole • attraction • repulsion • compass • magnetic field

Safety

- Ensure students wear protective goggles and take precautions when working with iron filings.

Science Background

- All magnets have a north and south pole. If a bar magnet were broken in half, each half would have a north and south pole, and so on. No matter how small a magnet is, it has a north pole and a south pole.
- The space around a magnet is called the magnetic field. It's the area where the force of a magnet acts or can be felt.

- A magnet's shape determines the area where the magnetic force is the strongest. The greatest force is at the poles of the magnet.
- Earth can be compared to a giant magnet because the Earth has two poles and a magnetic field. Earth's magnetic north pole attracts the magnetic needle of a compass.
- Earth's magnetic north pole and its geographic North Pole are not at the same spot. They are currently approximately 1600 kilometres apart and the location of the magnetic north pole shifts over time.

Possible Misconceptions

- Students equate north and south poles with positive and negative charges because attraction and repulsion can be seen with both. Like poles and like charges will both repel. Unlike poles and unlike charges will both attract. However, students should be made to understand that these are different processes and they are not interchangeable.

ACTIVATE



Exploration Stations

Set up several stations with differently shaped magnets (with the poles marked) at each station. Students can explore the properties of the various types of magnets by bringing two magnets together in as many ways as they can (e.g., end to end, side by side, perpendicular). Have students draw the magnets in each case in their Science Journals and indicate the attraction or repulsion observed (or felt).

Students can rotate through the stations to note the similarities and differences among the different types of magnets. Hold a class discussion and encourage students to share their observations. Prompts for discussion might include:

- **Did all the magnet shapes behave the same way?**
- **How were the magnets the same? How were they different?**
- **What did you notice about the north (or red) ends and the south (or blue) ends of the magnets?**



Ensure students understand that opposite poles attract and like poles repel. Introduce and reinforce unit vocabulary with the students as appropriate including: north pole, south pole, attraction, repulsion. Add these terms to the Word Wall.

IWB Activity:

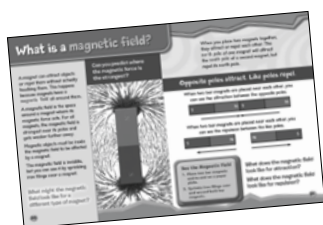
- Have students use
- Activity 7: *Attract or repel?* (see the Teacher's Website) to identify
- whether two magnets will attract or repel on another.



North or South?

Take students outside or to the gym and provide half the students with a badge identifying them as a north pole and the other half with a badge identifying them as a south pole. Students should mingle and interact appropriately with each student they meet, either attracting to an opposite pole or repelling from a like pole.

CONNECT



Magnetic Fields

Introduce pages 20–21 of the Student Magazine to the class. Provide time for students to examine this spread and read the question: *What is a magnetic field?* Read the text with the students and reinforce that a magnetic field is strongest at the poles of a magnet. This is true for all shapes and sizes of magnets. Ask students to suggest what the magnetic field would look like for a horseshoe magnet. Add the term “magnetic field” to the Word Wall.

Direct students to examine the diagrams showing how the magnets react when two bar magnets are placed near each other, and reinforce the fact that opposite poles attract and like poles repel.

Making It Visible

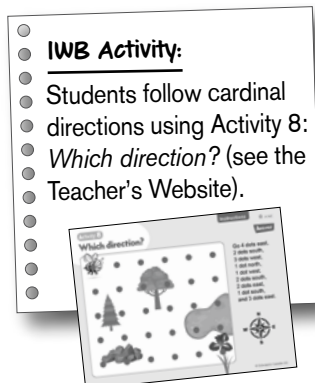
Tell students that they will be exploring a magnet’s magnetic field by using iron filings to make the invisible force around a magnet visible. Provide small groups with a piece of cardboard or paper plate, iron filings in a shaker (or you may pour the filings for each group), and different types and shapes of magnets (e.g., bar, horseshoe, donut). Have students place the magnet on the cardboard or paper plate and then carefully sprinkle the iron filings over and around the magnet. Students can draw what they observe in their Science Journals. Then have students explore to answer the following questions:

- **What do you call the pattern made by the iron filings?** (the magnetic field)
- **How does the magnetic field change when you place the north and south poles of two magnets together?** (lines flow toward each other)
- **What is this showing?** (attraction)
- **What about when you place the north and north poles together or south and south poles together?** (lines flow away from each other)
- **What is this showing?** (repulsion)

How a Compass Works

Share pages 22–23 of the Student Magazine with students. Explain that the Earth acts as though it has a giant bar magnet at its core—it has a north magnetic pole and a south magnetic pole. Give students time to read the text





and then discuss how we can use this knowledge to help us always know where we are going.

Display a compass and explain that the needle of the compass is a small magnet that always points north to Earth's north magnetic pole. Add the word "compass" to the Word Wall.

Make a Compass

Students can make a compass by magnetizing a blunt sewing needle or unbent paper clip and floating it on the surface of the water in a container. The needle will rotate to point north. To make the rotation of the needle more obvious, the magnetized needle or paper clip can be used as a tail for a paper turtle (or other animal). Have students draw, cut out, and colour their turtle with wax crayons to make it water resistant. The "tail" can be attached to the paper turtle and floated in the water. The magnetized needle or paper clip will turn to point north, making the turtle rotate in the water.

CONSOLIDATE



Determining Polarity

Using their knowledge of magnetic poles, challenge students to design a process to determine the orientation of unmarked magnets and/or of homemade temporary magnets. Students can create diagrams in their Science Journals during their investigation. When finished, they can label the diagrams and write a brief description of what is happening in each instance.

Magnetism Foldable

Students can create a foldable for magnetism terms.

EXPLORE MORE



Animal Navigation

Have students turn to pages 24–25 of the Student Magazine. Discuss the various animals shown and ask:

- **Why do some animals migrate (move) between winter and summer homes?** (for more favourable living conditions, to breed, to find food sources)
- **How might the Earth's magnetic field help them to navigate?**

Explain that some other animals, like earthworms, don't migrate but use the Earth's magnetic field to navigate underground to help them find food sources.

Invite students to research one of these animals that uses the Earth's magnetic field to navigate and to create a report of their findings.