

# FORCES OF MAGNETS

## Lesson Plan

### WHAT YOU NEED:

- Magnetic marbles
- Paper clips
- Ring magnets and a pencil
- White board and markers

**ENGAGE:** Before class begins, put a magnetic marble in your pocket. Put a second magnetic marble and a magazine or thin notebook on your desk. Show the students a magnet magic trick! Hold up the magnetic marble (not the one from your pocket), and say that you can move it however you want—even through a book. Carefully put the marble from your pocket into your hand, without allowing students to see it. Set the magazine over your hand that contains the marble, balancing it over your palm. Next, carefully place the other magnetic marble directly over the first. Hold the book steady with your free hand, and slowly move the hand that contains the magnetic marble underneath the magazine, so that the magnet on top rolls along with it. After the students see the “magic,” show them the magnet you had in your hand and tell them that they will get a chance to experiment with the magnetic marbles for themselves.

**EXPLORE and EXPLAIN:** Give magnetic marbles to students, so they can experience the forces of magnetism on their own. Walk around the classroom, giving suggestions on experiments to try, or pointing out how the magnets are attracted to each other. After a few minutes of exploration, have students get into small groups of three or four. Have students show each other the tricks they found to do with their magnets. Encourage them to talk about why they think that happened. Come back as a class and have one or two students from each group share what they learned about magnets. Write observations on the board. Explain principles of magnetism using what your students wrote as a springboard. For example, if someone says “My magnet moved towards another magnet without me even touching them!” you could write: “Magnets move without something touching them” on the board. Then talk about the magnetic field that surrounds each magnet and causes other magnetic objects to be pulled together. If they are close enough, two magnets will jump towards each other! This is called magnetic attraction. Magnets that don’t want to touch are being repelled. Demonstrate this with several ring magnets and a pencil. Hold the pencil near the eraser with the tip pointing straight up. Put a ring magnet onto the pencil, then put a second ring magnet on. The second ring magnet will either stick to the first or be suspended in the air by the magnetic force repelling it. If the second magnet sticks to the first, try lifting it off, flipping it over, then placing it on the pencil again. Be sure to talk about the two sides (or poles) a magnet has—a north pole and a south pole, which are on opposite ends, just like the North and South poles on the globe. Two south poles will never stick together, and neither will two north poles, because they are being repelled. A north pole will stick to the south pole of another magnet, because they are attracted to each other. Write “opposites attract and same sides repel” on the board so all students can see. Magnetism is made up of two forces: attracting and repelling.



**ELABORATE:** Have students make predictions about magnets based on what they learned in the previous section. For example, “I think this magnet will stick to this paper clip because it is made of metal.” Have each student write down their prediction (or hypothesis) at the top of a piece of notebook paper. Below that have them draw what actually happened and their explanation of why their prediction was correct or incorrect. Should they try it again? Why might the result be the same or different?

**EVALUATE:** Use one of these worksheets to evaluate what your students understand. The first is for early elementary students and reinforces knowing which objects are magnetic and which are not. The second worksheet is for slightly more advanced students, and lets them work out which direction the magnets are pulling or pushing on each other.

**FOR FURTHER STUDY:** find more detailed information about magnets and magnetism. You can also find other experiment ideas using magnets with elementary students.

**IDEAS FOR ASSESSMENT:** Ongoing assessment should be made for this lesson by observing each student and taking notes. Pay attention to what each student does during the Explore and Elaborate sections. How has the student progressed? During the Elaborate section, check to see that each student is participating by writing a prediction followed by an illustration and writing about what actually happened. If you like, the paper from the Elaborate section can be turned in and graded. The worksheet from the Evaluate section can also be graded and given back to the student.

### A NOTE TO THE TEACHER:

Learn about the forces of magnets, and what makes them push each other away or pull towards each other. What else do magnets stick to? How are magnets made? This lesson covers key vocabulary words such as magnetic field, magnetic pole, attract, and repel.

After this lesson, students will be able to:

1. Determine which objects are magnetic and which are not.
2. Observe that magnets have two sides—north and south.
3. Predict the motion of magnets, based on knowledge that they repel and attract.

Prior Knowledge:

No extended prior knowledge is needed for this lesson. Though some students may be more familiar with magnetism than others all students will get an equal chance to explore and experiment with magnets in this lesson.