

## MAGNA-TILES® LESSON PLAN #6: Exploring Magnets: Do Opposites Attract?

### Objectives:

Students will experiment with the poles of bar magnets to find out how they work.

Students will:

- Discover which poles of magnets repel each other and which ones attract each other.

### Materials:

- Bar magnets (at least 2 per student)
- Paper clips
- Chart paper or a whiteboard
- Marker to write on chart paper or whiteboard
- String
- Magna-Tiles® (at least 2 tiles per student)
- Magna-Qubix™ (at least 2 shapes per student)

### Directions:

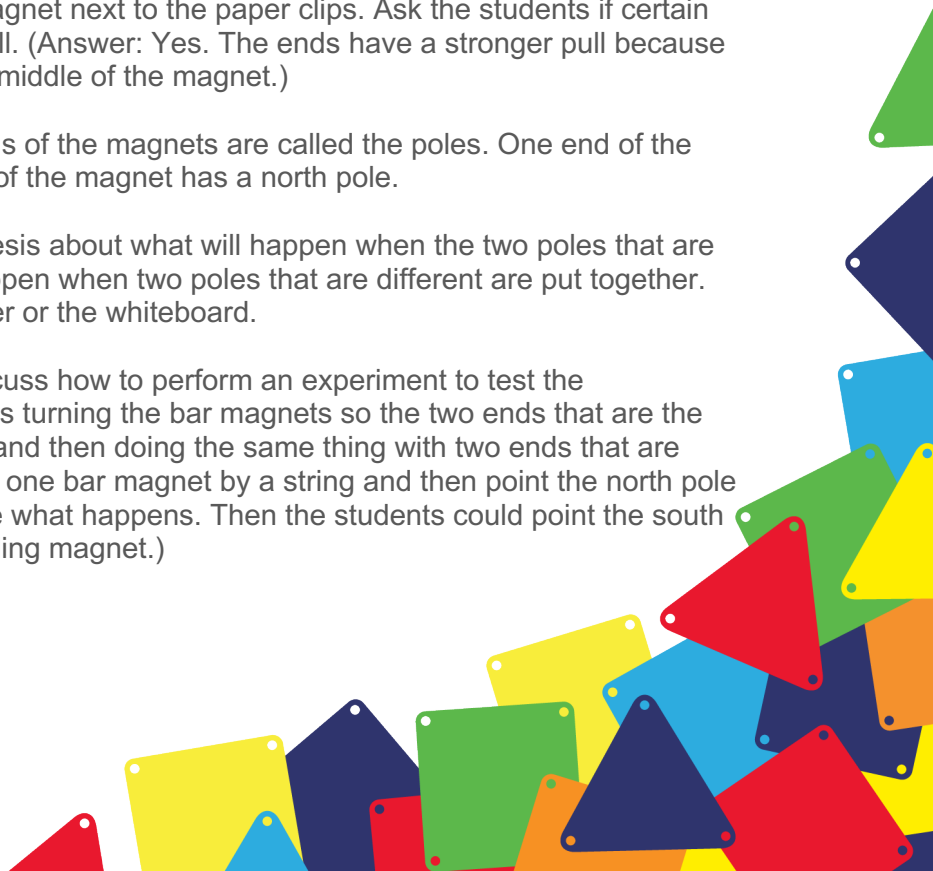
**#1.** Give each student two bar magnets and a handful of paper clips.

**#2.** Have the students place the bar magnet next to the paper clips. Ask the students if certain parts of the magnet have a stronger pull. (Answer: Yes. The ends have a stronger pull because they pick up more paper clips than the middle of the magnet.)

**#3.** Explain to the students that the ends of the magnets are called the poles. One end of the magnet has a south pole and one end of the magnet has a north pole.

**#4.** Have the students create a hypothesis about what will happen when the two poles that are alike are put together and what will happen when two poles that are different are put together. Write the hypotheses on the chart paper or the whiteboard.

**#5.** Together, allow the students to discuss how to perform an experiment to test the hypotheses. (This could be as simple as turning the bar magnets so the two ends that are the same are pointing towards each other and then doing the same thing with two ends that are different. Or, the students could dangle one bar magnet by a string and then point the north pole of another bar magnet towards it to see what happens. Then the students could point the south pole of a bar magnet towards the dangling magnet.)





**#6.** Discuss what happened during the experiment with the students. Discuss if their hypotheses were correct and come up with conclusions. (Answer: Unlike poles attract and like poles repel.)

**#7.** Give each student two Magna-Tiles®. Discuss with the students what they just learned about magnets. Ask the students why they think that the Magna-Tiles® always stick together. Explain that if they have magnets inside of them, the magnets should repel each other when you try to connect two south poles or two north poles. However, with Magna-Tiles® this never seems to happen.

**#8.** Allow the students to explore with the Magna-Tiles®. Encourage students to try to connect the Magna-Tiles® while they are misaligned (try to attaching the top half of one Magna-Tile® to the bottom half of the other). Discuss why the two Magna-Tiles® won't connect in that case. Help the students understand that it is because each edge of the tile has a north pole magnet and a south pole magnet. Therefore, when you connect the Magna-Tiles® together, one set of the is always correctly aligned and this is why Magna-Tiles® always connect.

**#9.** Next, give each student two Magna-Qubix®. Discuss why the magnets in the Magna-Qubix® never repel. Review what the students just learned about magnets and how since each magnet has a north pole and a south pole, at some point the Magna-Qubix® should repel away from each other.

**#10.** Allow the students to explore with the Magna-Qubix®. Encourage the students to look inside the Magna-Qubix®. Lead the students to see that the magnet inside the Magna-Qubix® has room to rotate. This is what allows Magna-Qubix® to attach, no matter which way you put them together. The magnet rotates to align correctly with the magnet it is connecting to.

