

Magnetic Fields: Making a Compass

Lesson Concept A compass is an instrument that uses a freely moving magnetic needle to indicate direction. Magnets may be man-made.

Link In the last lesson, students used a compass and a magnet to show a magnetic field. In this lesson students make a compass.

Time 45 minutes

Materials Per Group (groups of 2)

1 Small directional compass

1 Bar magnet

1 Square (approximately 2") piece of Styrofoam (cut from a Styrofoam cup)

1 Needle

1 9 oz. Clear plastic cup

7 oz. of Tap water

1" Piece of clear tape

3-4 Staples

3-4 Small paper clips

Individual

Pencil

Science Notebook or a piece of binder paper

Advance Preparation

1. Cut 2" square pieces of Styrofoam for each group of 2.
2. Prepare cups of water and clear tape for each group of 2.

Procedure:

Engage *(10 minutes) With a compass and a magnet, we can demonstrate that invisible magnetic force exists around a magnet. We know this because the compass moves in the proximity of the magnet.*

1. Have students recall what they did in the previous lesson. Have students make a claim about compasses and magnets. Provide the following prompt on the board: "A compass placed near a magnet shows _____. Iron filings placed on a paper over a magnet show _____." Have students write their responses in their science notebooks. [Expected Student Response (ESR): A compass placed near a magnet shows the invisible magnetic force that exists around a magnet. Iron filings

placed on a paper over a magnet show the invisible lines of magnetic force that exists around a magnet.]

Explore (20 minutes) *Students make a compass with a temporarily magnetized needle.*

2. Explain to students that in the last lesson they used a magnet to show the invisible force that exists around a magnet. Point out to students that today they will make a compass.
3. Demonstrate how to magnetize a needle by stroking it against a magnet in one direction.
4. Distribute a magnet and needles to groups of 2 students.

Teacher Note: If students drop their needles, they will need to “re-magnetize” them by stroking the needles against the magnets.

5. Distribute clear tape and 2” square pieces of Styrofoam to each group of 2 students. Demonstrate how tape the needle to the Styrofoam. Have students tape their needles to the Styrofoam.
6. Distribute cups of water to each group. Demonstrate how to gently place the Styrofoam/needle set-up on the surface of the water. Have students place their Styrofoam/needle set-up on the surface of the water.
7. Have students observe what happens. (ESR: The needles point to the north.)
8. Have students use their small directional compass to verify that indeed their compasses are pointing to the north.

Explain (5 minutes) *Compass needles point north.*

9. Have students draw an illustration of their compass in their science notebooks. Be sure to have students label the parts of their compass drawing.
10. Provide the following prompt: “All compasses point _____.” (ESR: All compasses point north.)

Extend (5 minutes) *Magnets may be man-made.*

11. Have students use other materials to make the needle of the compass, e.g., staples and paper clips.

Evaluate (5 minutes) *A compass is an instrument that uses a freely moving magnetic needle to indicate direction.*

12. Display the following question and frame. Ask students to read the question and the frame to themselves:
“Why do compasses point north? “Compasses point north because_____.”
(ESR: “Compasses point north because the compass needle is attracted to Earth’s north pole.”