TEACHER INFORMATION

Exploring Magnetism

1. Editable Microsoft Word versions of the student pages and pre-configured TI-Nspire files can be found on the CD that accompanies this book. See *Appendix A* for more information.

2. Demonstrate magnetic field lines by placing a bar magnet on an overhead. Position clear compasses around the magnet and discuss the position of the needles. Another alternative is to provide small compasses for each group. Have them position compasses around the magnet and discuss the position of the needles. Small compasses are available in bags of 10 from Scientifics, www.scientificsonline.com.

3. Another good demonstration is to put some iron filings in a jar with a small mouth. Place a cow magnet in a test tube and place it in the mouth of the jar. Tape the test tube to the mouth of the jar so that no iron filings can escape. Shake the iron filings so that they become aligned along the magnetic field lines. (Be careful not to break the test tube when shaking.) Soda bottle performs or commercially made magnet tubes are available from science equipment suppliers.

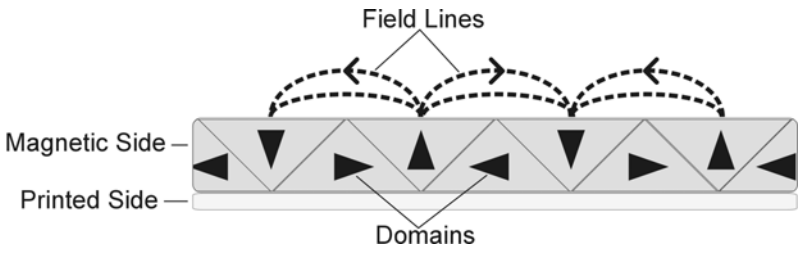
4. Make one copy of the degree wheel and pointer for each group.

5. Always store magnets north to south in the packaging in which they came to preserve magnetic field strength. Magnets should never be thrown randomly into a box. Magnets that have lost magnetic field strength due to improper storage, heating, or dropping may not work well for this experiment.

6. Always keep magnets away from computers, monitors, TVs, watches, computer discs, VCRs, audio and video tapes, and credit cards. Storing magnets near compasses may result in permanent damage to the compasses.

7. Readings may fluctuate due to deviation, the influence of the immediate environment upon your sensor, caused by things such as electrical currents, computer monitors, or metal brackets. Try to avoid these influences.

8. Avoid using refrigerator magnet sheets for this experiment. These flexible magnetic sheets have a complex magnetic structure in which the magnetic field lines are U-shaped with most of the magnetic field extending out the back of the magnetic sheet. The resulting magnetic field is a 1–2 mm stripe of alternating north and south poles. An interesting demonstration can be done by passing the Magnetic Field Sensor over the magnetic sheet and comparing the results to those obtained by passing the sensor over a bar magnet.



9. If unmarked magnets are not available cover the labels on the magnet with tape.

10. Bar magnets or cow magnets work well for this experiment. Cow magnets are also called Alnico cylindrical magnets.

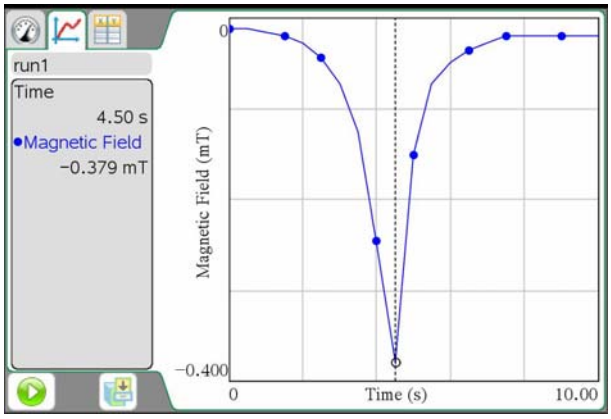
11. Bar magnets are often mislabeled. Check your magnet for correct labeling by suspending it from a string. The north end of the magnet should align itself with magnetic north.

12. It is important to understand the orientation of the Earth's magnetic field. Many texts liken the magnetic field of Earth to that of a bar magnet with the north end pointing toward a point in the Northern Hemisphere. They label the point to which the north end of the magnet points as magnetic north. Remember, unlike magnetic poles attract. If the north end of a suspended magnet points toward the point labeled magnetic north then that point must be a south magnetic pole. Therefore, the pole labeled magnetic north behaves like a south magnetic pole.

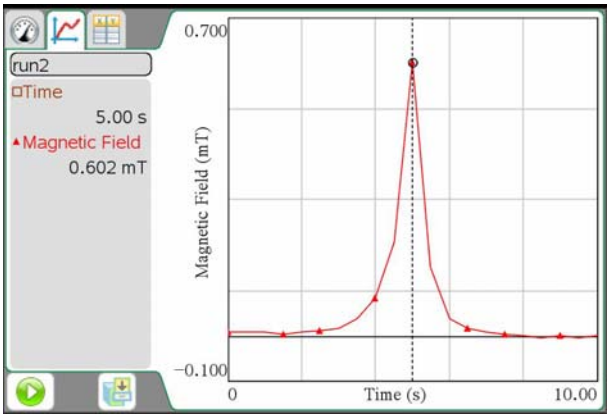
SAMPLE RESULTS

Part I

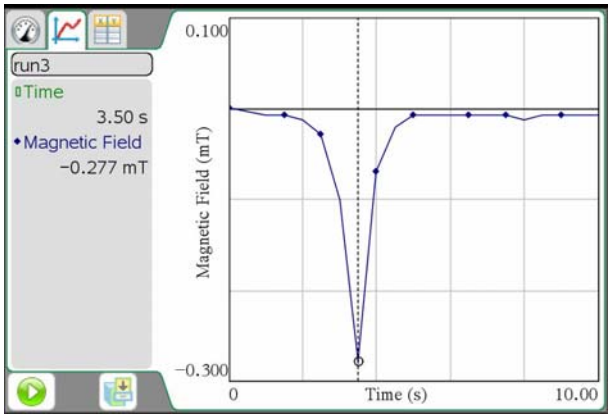
Results for Trials 1 and 2 may be the opposite of those below depending on the orientation of the magnet.



Trial 1



Trial 2



Trial 3

Part II

Greatest magnetic field intensity position 90^o

ANSWERS TO QUESTIONS

1. When two like poles are brought together there is a force of repulsion. When two unlike poles are brought together there is a force of attraction.

2. Magnetic field lines extend out from the north pole into the south pole of a magnet. When the north end of a magnet is brought near the sensor the magnetic field lines enter the front of the white dot on the Magnetic Field Sensor. This produces a negative magnetic field reading. When the sensor is turned around the magnetic field lines enter the back of the sensor and produce a positive magnetic field reading.

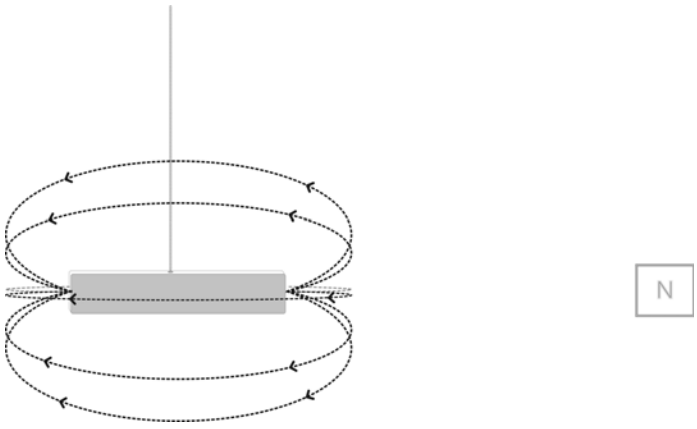
3. The white dot points toward 90^o, directly at the magnet, when it reads the greatest magnetic field intensity.

4. You could hold the Magnetic Field Sensor vertically and rotate it around until it reads the greatest magnetic field intensity. You could also determine which end of an unmarked magnet has a negative magnetic field reading (making it the north end of the magnet), suspend the magnet from a string, and note in which direction that end of the magnet points.

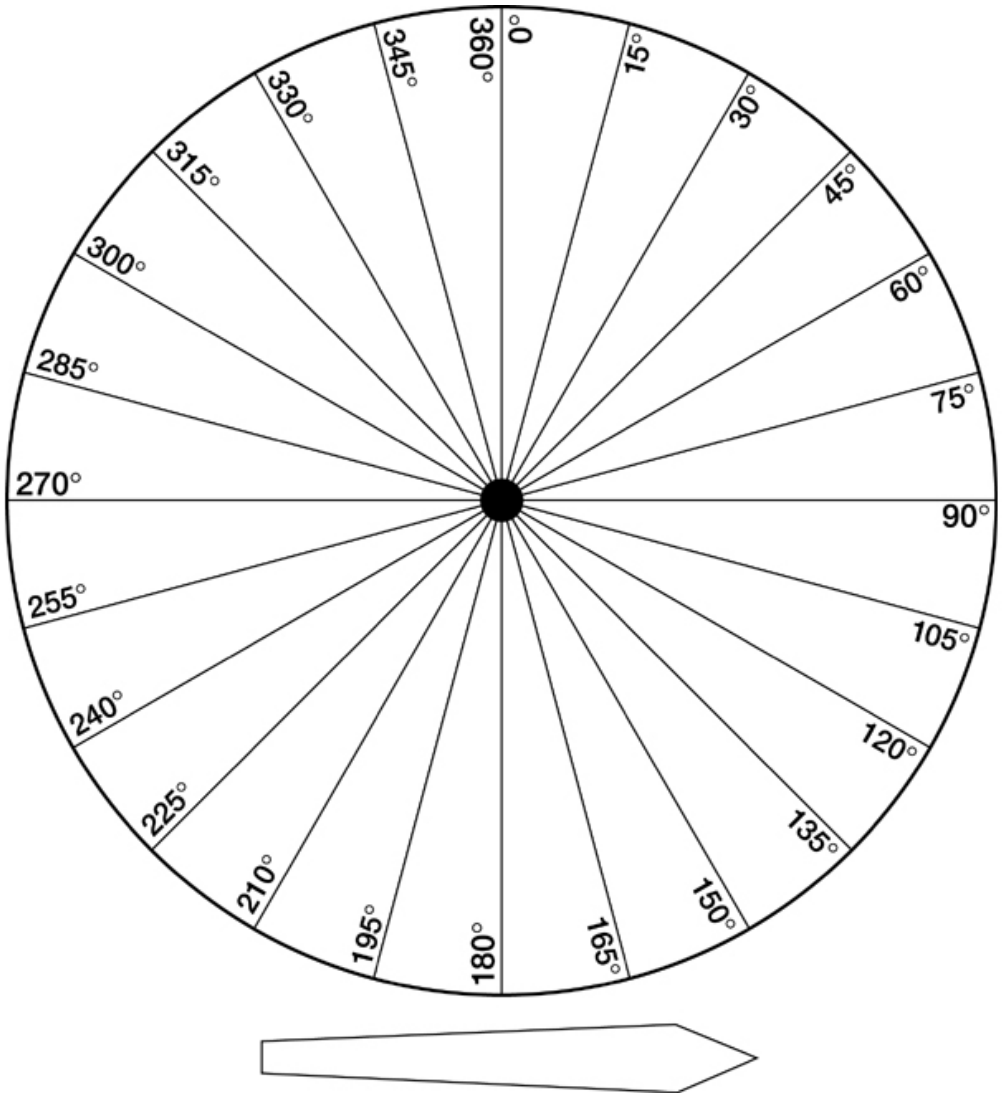
EXTENSION

1. The end that points toward north gives a negative magnetic field reading.

2.



3. The magnetic pole in the Northern Hemisphere behaves like a south magnetic pole.


0°
15°
30°
45°
60°
75°
90°
105°
120°
135°
150°
165°
180°
195°
210°
225°
240°
255°
270°
285°
300°
315°
330°
345°
360°