



Beginning Orienteering Pre-visit

Classroom Activities

Brief Synopsis

Students will gain basic knowledge of the earth's magnetic force and its influence on a magnetic needle by constructing a simple water compass. Students will then label the different parts of the compass and understand how each aids in navigation.

Ages: Designed for 5th-8th grade.

Time Considerations: 30 minutes per/activity.

Materials:

Needle, Foam, Clear bowl for water, Magnet, Worksheets: "Compass: parts and purpose", and "Mystery Drawing", Compass (optional)

Outcomes:

- Students will understand the connection between the earth's magnetic field and a magnetic needle.
- Students will identify the working parts of a compass and how each part aids in navigation.
- Students will use a compass rose to determine direction.

Vocabulary:

Magnetic North, Compass rose, Index line, Base plate, Compass dial, Magnetic needle, Orienteering lines, Orienteering arrow, Direction of travel arrow.

Minnesota Academic Standards:

Science: 5.I.B.2, 6.I.A.2, 6.II.E.1&2, 7.I.B. 1&2.

Language Arts: 5.1.B.1, 5.III.A.1 &2, 6.III.A.3



Revised April 2009

Activity 1: Make your own compass

Background: It is believed the first compass was invented in China around the first century. A naturally magnetized rock called Lodestone, when floated in water, would always turn in a specific direction. Although this "constant needle" has seen many changes over time, the results are the same. No matter where you stand on earth, a magnetized needle will always point north. The force that attracts the needle of a compass is the magnetism of the earth. The negative or red end of a compass is pulled to *Magnetic North*, an area which lies about 1,400 miles south of true geographical North Pole.

In this activity students will create their own compass to illustrate the magnetism of the earth.

Supplies: Each group will need: *magnet, clear bowl for water, Styrofoam, and needle.*

Procedures:

1. Divide the class into pairs.
2. Provide the students with the background information about the earth's magnetic field and its affect on a compass.
3. Gather the supplies needed for this activity. Each group will need a small bowl filled with water, needle, Styrofoam, and a magnet.
4. Begin by magnetizing the needle. To do this, stroke the magnet across the needle for three minutes. Be sure to always stroke in the same direction.
5. In order for the magnetized needle to be pulled North, it must float freely in water. Place a piece of Styrofoam on the water and carefully place the needle on top.
6. Observe the needle and note its final resting position.
7. Remove the needle and place it on the foam to repeat the exercise. It should rotate to the same position. If not you may need to problem solve: check the magnetism of the needle, be sure the needle is heavy enough to rotate the Styrofoam, look for nearby metal objects that may be attracting the needle.

Extension:

- Make a compass rose using the water compass as a guide. Cut out a circle that is slightly larger than the compass bowl. Fold the circle in 8ths. Draw a line on each fold. Place the circle beneath the bowl of water and turn the paper so that the compass needle aligns with a line on the paper. Once the needle is stabilized, mark that line N for North. Continue by adding the additional 7 cardinal directions on the appropriate line.
Eight Cardinal directions: N,S,E,W,NE,SE,NW,SW.
- Change the experiment by altering the variables. Example: stroke the needle in different directions, try different sized magnets, alter the size of the needle, place the needle on a piece of wood or leaf, change the liquid to change the viscosity. Student should design their own experiment, predict the outcome, and test the results. Give an oral report to share the procedure and its outcome.

Discussion Questions:

Why causes the magnetic needle to rotate?



- What factors may affect the magnetic needle?
- How might a magnetic needle that always points in the same direction help us navigate?

Activity 2: Compass: Parts & Purpose

Background: The students attending Eagle Bluff's orienteering class will be using a Silva Starter compass that looks just like the one illustrated on the worksheet. In this activity students will identify the parts of a compass and understand its navigational purpose.

Supplies: Worksheet: Compass: Parts & Purpose, pencils

Procedures:

1. Distribute a "Compass: Parts & Purpose" worksheet to each student.
2. Read through the glossary words and the description that follows. Clear up any misunderstandings.
3. Complete the worksheet by filling in the blanks. Exchange papers and correct.

Activity 3: Mystery Drawing

Background: Early mariners would draw a compass rose on a map to help orient the map to give relative directions to certain points they wished to travel. The original compass rose resembles a rose flower depicting the direction of the four major winds: North, South, East and West. Later, more points were added until 32 points in total were used. In the following activity students will use an eight point compass rose to draw a line in a specific direction and distance to unveil a hidden picture.

Supplies: Worksheet: Mystery Drawing, pencils

Procedures:

1. Distribute the worksheet, "Mystery Drawing" to each student.
2. Fill in the directions on the compass rose located in the upper right hand corner of the worksheet. Use the abbreviations N, S, E, W, NE, SE, NW, SW.
3. Follow the instructions on the worksheet carefully. You will draw a line for the appropriate distance and direction indicated.
4. Check the drawing with the answer key.

Extension:

- Make eight large directional signs labeled; N, S, E, W, NE, SE, NW, and SW. Hang the signs in the classroom using a compass for accuracy. Use the signs to help students competently locate objects using cardinal points. For example: Who's desk faces NW of Paul's? What chalkboard is N of the pencil sharpener? What direction do the windows face? Etc...
- Divide the students into pairs (A & B). Give each student a copy of a map of your city. As a class, locate the intersection of your school. Mark that location "Start" on the map. Student A will secretly locate a destination on his map and mark the location "End". Using street names and cardinal directions only, student A will give student B oral directions to his "end" destination. Example: turn East on Grand Ave. Turn North on Newman Street, etc...) As the directions are given, student B should follow along, drawing the route on his map. Check answers.

Discussion Questions:

- Why is it important to understand cardinal points?
- What are some situations in which cardinal directions are used?
- What challenges would early mariners face when using only a map and cardinal points for navigation.

Teacher Tips

- Clear deli containers work great when making your own compass.
- In order to get the needle to float, use the Styrofoam from an empty meat tray or packing peanut. If that does not work try a leaf or laminated paper.
- You can use the magnets found on a refrigerator to magnetize the needle, though the stronger the magnet, the better.
- Not all needles are made up of magnetic materials. Use a metal needle.
- Be aware of where your water compass sits. Metal objects, such as a desk, will attract the magnetic needle.
- If you are able to borrow a compass, display the compass for the entire class using an overhead projector. This works great to review the parts of the compass.
- For additional pre and post activities, visit Eagle Bluff's web page and search under the Competitive Orienteering: Pre & Post Activities.

Additional Resources:

Staying Found. 1994. Fleming, June.

Easy to read instructional book on compass navigation and map reading.

Be Expert with Map & Compass. 1955. Kjellstrom, Bjorn.

An excellent comprehensive book to orienteering skills and map reading.

http://www.forestry-suppliers.com/drilldown_pages/view_category.asp?cat=120

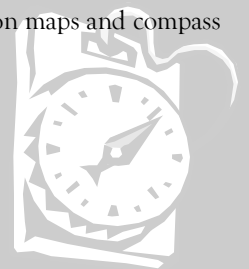
Website to buy orienteering supplies and instructional kits.

<http://www.mnoc.org/links.shtml>

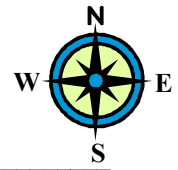
Minnesota's Orienteering Club's website.

<http://classroom.jc-schools.net/basic/ssmaps.html>

This website includes a variety of classroom activities and computer games focusing on maps and compass skills.



Compass: Parts & Purpose



NAME: _____

DATE: _____

Compass Glossary:

Base Plate: A hard, flat surface on which the compass is mounted. The base plate must lie flat in order to get an accurate reading.

Compass Dial: A circular dial which rotates on the base plate. The small hash marks on the dial represent degrees or direction. Each hash mark is in intervals of 2 degrees with a total of 360 degrees in all.

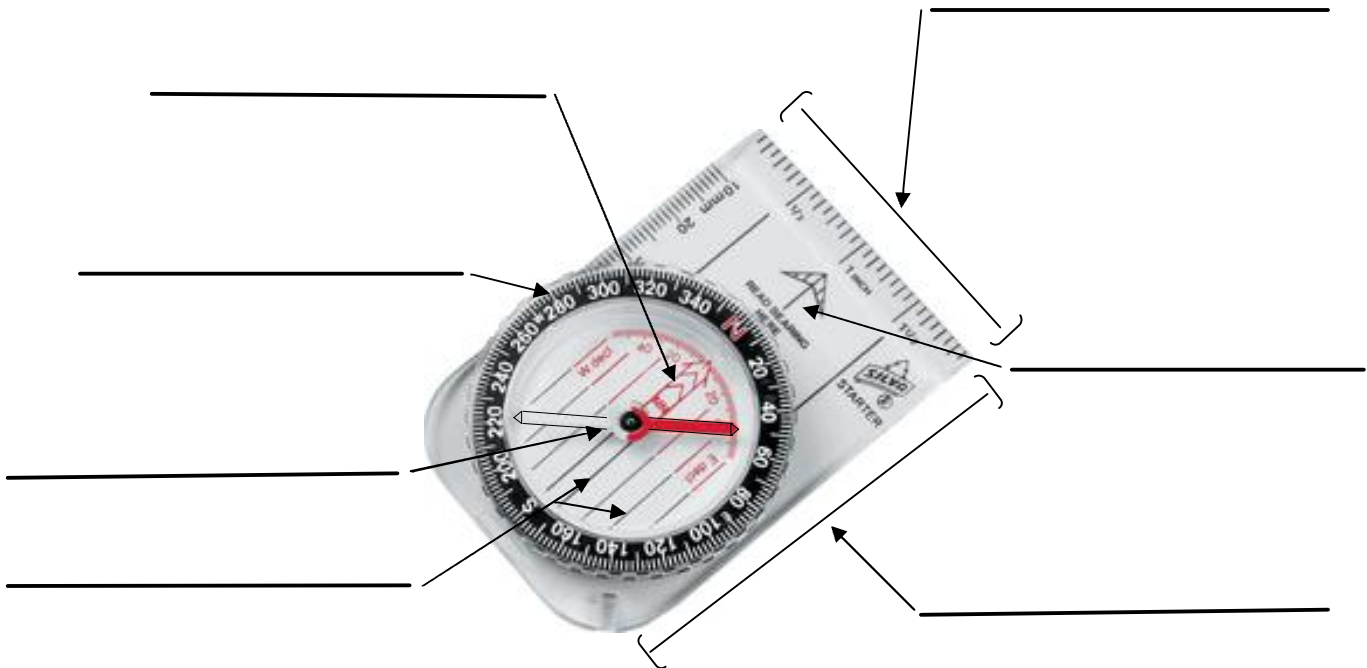
Direction of Travel Arrow: A stationary arrow marked on the base plate and points in the direction you should be traveling.

Magnetic Needle: A magnetized piece of metal which sits in a nearly frictionless substance so it can rotate freely inside the compass dial. This needle will align with the earth's magnetic force with one end pointing towards magnetic north and the other, south.

Orienteering Arrow: This arrow is drawn on the floor of the compass dial and rotates when the dial is turned.

Orienteering Lines: A series of parallel lines marked on the floor of the compass dial. The lines are used to orient a compass to a map.

Scale: Rulers printed on the edge of a compass to help measure distances on a map.



1. How many degrees does each hash mark represent on the dial? _____.
2. The total number of degrees in the dial is _____.
3. The red end of the magnetic needle always points to _____.
4. Which arrow points in the direction in which you should be traveling? _____.
5. What degree is directly WEST? _____.

Compass: Parts & Purpose

Answer Key



Compass Glossary:

Base Plate: A hard, flat surface on which the compass is mounted. The base plate must lie flat in order to get an accurate reading.

Compass Dial: A circular dial which rotates on the base plate. The small hash marks on the dial represent degrees or direction. Each hash mark is in intervals of 2 degrees with a total of 360 degrees in all.

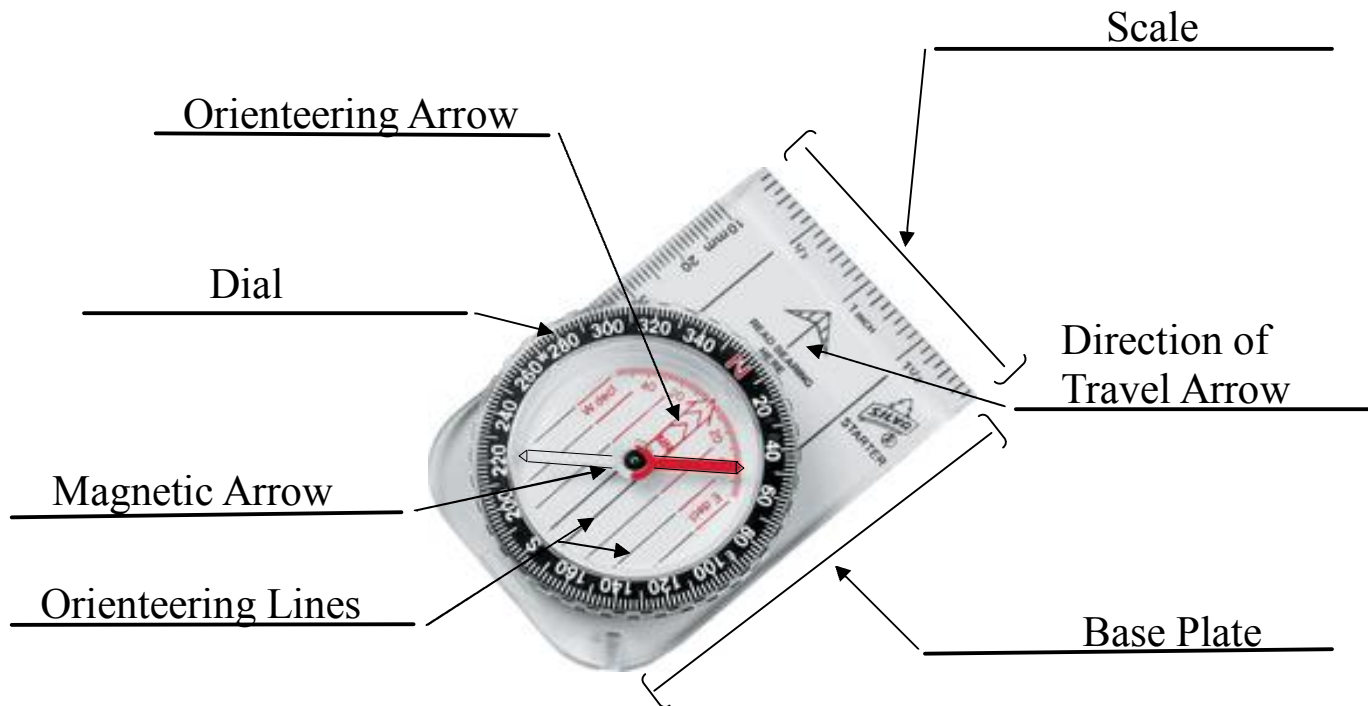
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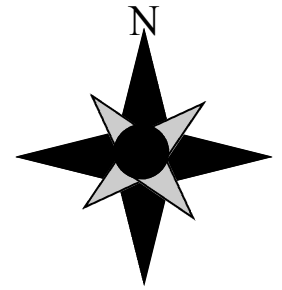
Orienteering Lines: A series of parallel lines marked on the floor of the compass dial. The lines are used to orient a compass to a map.

Scale: Rulers printed on the edge of a compass to help measure distances on a map.



1. How many degrees does each hash mark represent on the dial? 2 Degrees.
2. The total number of degrees in the dial is 360 Degrees.
3. The red end of the magnetic needle always points to Magnetic North.
4. Which arrow points in the direction in which you should be traveling? Direction of Travel Arrow.
5. What degree is directly WEST? 270 Degrees.

Mystery Drawing



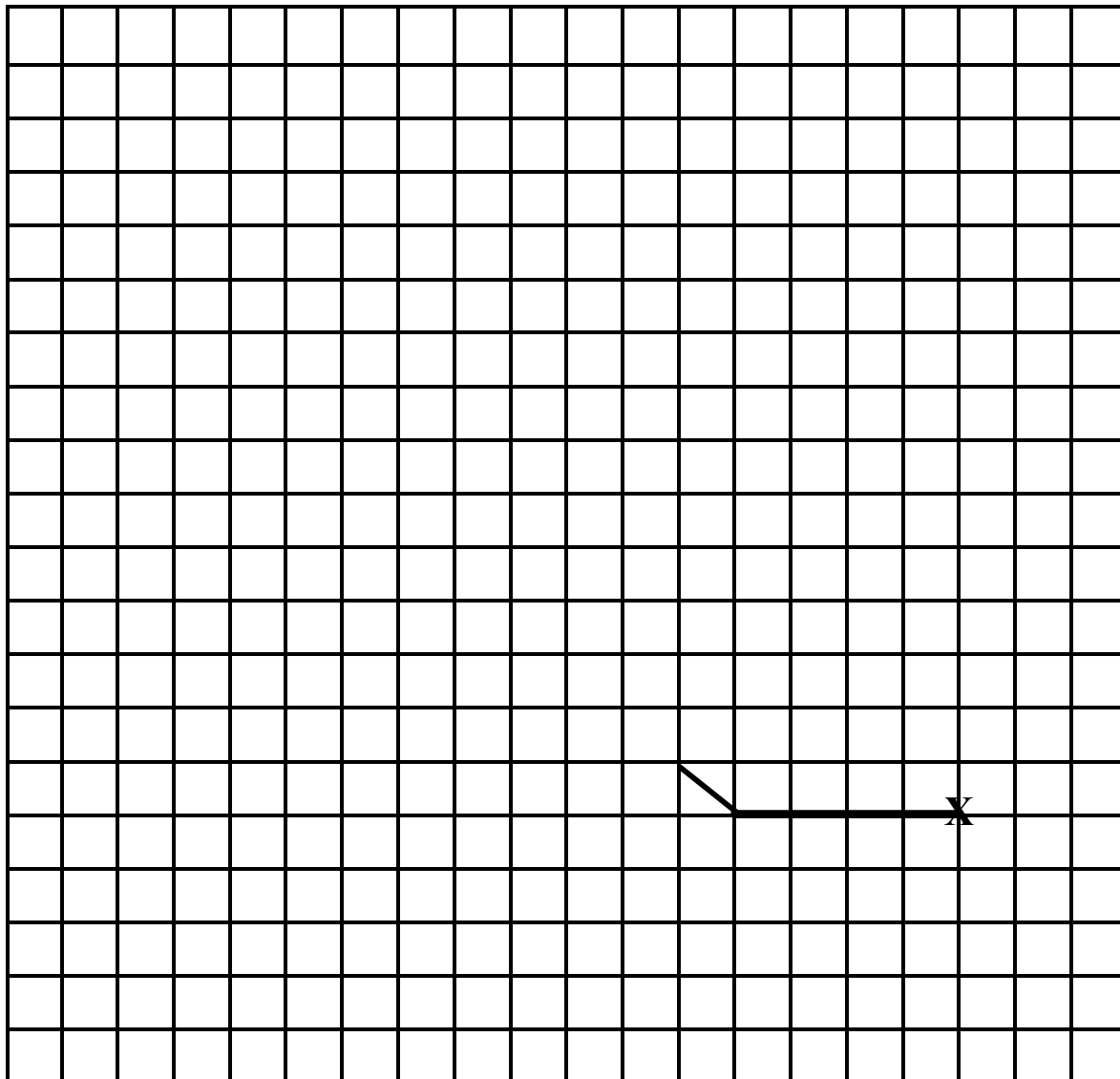
NAME: _____ DATE: _____

Directions: Complete the compass rose above using the following abbreviations: N=North, S=South, E=East, W=West, NE=Northeast, NW=Northwest, SE=Southeast, SW=Southwest.

Begin at the point marked “X” and follow the given distances and direction to reveal a hidden picture.

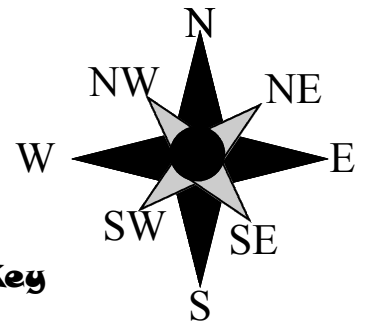
Starting Example: 4W, 1NW

2NE, 2N, 3NE, 1N, 1NE, 1N, 1NE, 1N, 2SW, 1N, 1NE, 1N, 2SW, 1N, 1NE, 1N, 2SW, 1S, 6SW, 2NW, 1W, 2NE, 1N, 2SW, 1N, 1NE, 1N, 2SW, 1N, 2NE, 1N, 3SW, 1N, 2NE, 1N, 4SW, 3S, 4SE, 2W, 1SW, 1S, 1SE, 1N, 1E, 2SE, 1S, 2SW, 1NW, 1S, 1NW, 2S, 1NE, 1S, 1NE, 6E, 1NE, 3E, 2NE



Mystery

Drawing - Answer Key



Directions: Complete the compass rose above using the following abbreviations: N=North, S=South, E=East, W=West, NE=Northeast, NW=Northwest, SE=Southeast, SW=Southwest.

Begin at the point marked "X" and follow the given distances and direction to reveal a hidden picture.

Example: *4W, 1NW*

2NE, 2N, 3NE, 1N, 1NE, 1N, 1NE, 1N, 2SW, 1N, 1NE, 1N, 2SW, 1N, 1NE, 1N, 2SW, 1S, 6SW, 2NW, 1W, 2NE, 1N, 2SW, 1N, 1NE, 1N, 2SW, 1N, 2NE, 1N, 3SW, 1N, 2NE, 1N, 4SW, 3S, 4SE, 2W, 1SW, 1S, 1SE, 1N, 1E, 2SE, 1S, 2SW, 1NW, 1S, 1NW, 2S, 1NE, 1S, 1NE, 6E, 1NE, 3E, 2NE

