

ORIENTEERING

Fifth Grade - Rahr Memorial School Forest

ENDURING UNDERSTANDING

Human survival requires interdependence and cooperation. Learning how to tell direction using a compass is a life skill that requires specific knowledge.

ASSESSMENT

Students will demonstrate use of a compass. Describe the parts of the compass. Complete all or a section of the School Forest Orienteering Course.

STATE STANDARDS

- D.8.3 Determine measurements directly using standard units with these suggested degrees of accuracy... angles to the nearest degree
- G.8.3 Illustrate the impact that science and technology have had, both good and bad, on careers, systems, society, environment, and quality of life.

CLASS OUTLINE

- I. Set-up
- II. Introduction
- III. Compass
 - A. The basic parts of a compass
 - B. Using a compass
 - C. Sighting points
 - D. Setting a pace (step)
- IV. The Course
- V. Conclusion
- VI. Cleanup

Safety

Additional Information

Resources

MATERIALS

Lesson Plan

Clipboards (one per student)

Compass prop

Compasses (one per student)

Pacing Worksheet (1 per student)

Pencils

Measuring wheel

2 markers/cones

Course Map

Example course marker

Orienteering Course Worksheets (1 per group of 2-3 students)

Whistle

White wet-erase board and marker/ chalkboard

I. Set-up

Take the materials out of the Greene cabin storage closet and set-up wherever you choose. Students should wear pants and sturdy shoes while doing the course due to the juniper bushes and rough terrain.

II. Introduction

Everyone has been lost sometime in their lives. Quickly, have one or two students share what it feels like to be lost. Being lost can be a frightening and even dangerous situation. People traveling on foot without some sort of guidance tend to walk in large circles. There are many factors that cause this: most people have one leg that is longer than the other, we may veer in the direction of our dominant eye, we tend to travel downhill, an uneven load may pull us in one direction, or the sun, wind, snow, or rain could influence our direction of travel.

III. Getting Oriented - Using a Compass

Now, students will have the opportunity to learn the parts of a compass, how to use them, and then to practice using their skills on the orienteering course.

Pass out a compass to each student. Instruct students to immediately hang the compass strings around their necks so the compasses will not be broken or misplaced. Let students examine the compasses to get past the novelty of a new piece of equipment. Tell them to practice turning the dial (many are surprised that it turns).

A. The Basic Parts of a Compass.

There are three main parts to a compass: the plastic base plate with a direction-of-travel arrow ("**Fred**"), the compass dial with numbered degrees, and the red-tipped magnetic needle ("**red**").

1. Plastic Base Plate. This is the base of the orienteering compass. The plate has many functions. The rulers on the sides can be helpful in determining distances on a map. The direction of travel arrow, "Fred," is also on the base plate, and points to the direction you want to go.
2. Dial. The compass dial is divided into the 360° of a circle. These degrees represent all the possible directions of travel. The four Cardinal directions: north, south, east, and west are found at 0°/360°, 90°, 180°, and 270° respectively. Also, located on the base of the dial is the orienteering arrow, the "**shed**." This arrow, or "**shed**," turns when you turn the compass dial and points at the "N" or north.
3. Magnetic Needle. The magnetic needle "**red**" is found inside of the dial. It is suspended in clear oil and is centered atop a sharp point around which it rotates freely. The needle's red end always points to magnetic north when the compass is held flat.

B. Using a compass

"Taking a bearing" is using a compass to find a direction that is stated in degrees. To complete the School Forest orienteering course, students will be given bearings and must use their compass to discover which direction each particular bearing tells them to go. Taking a bearing is an essential skill in orienteering. To accurately determine direction from a bearing, however, students must first learn to correctly hold a compass.

1. Hold the compass in your hand so that the dial is closest to you and the direction of travel arrow, ("**Fred**"), is pointing away.

2. Move the dial until the degrees or direction you want to travel is positioned directly under the direction of travel arrow ("**Fred**"), at 12 o'clock. There is a small white line under the dial that does not move when you turn the dial. Put the degrees on that line.
3. Hold the compass in the palm of your hand so that it is level and parallel with the ground. This will permit the magnetic needle to swing freely. The dial should still be closest to you, with the direction of travel arrow ("**Fred**") pointing away.
4. Imagine that your body is part of the compass. In order to do this, you need to anchor the compass to your body to keep from holding it crooked. Always turn your body and the compass together.
5. Do not stand near iron or steel and be aware of wearing metal such as a belt buckle or watch because it makes the needle jump out of place (called deflection).
6. Turn your ENTIRE BODY until the "**red**" tipped end of the magnetic needle is in the highlighted orienteering arrow on the dial, the "**shed**."
7. From here you can pace out the distance you want to go.

The best way to remember this is to recite the saying, "**Put RED in the SHED and follow FRED**". Have the students practice this several times until you are certain they can enter bearings and correctly put "red" in the "shed" and follow "Fred".

C. Sighting points

Once you are facing the direction you want to travel, as pointed out by the direction of travel arrow "Fred," look straight ahead (the farther the better) and choose a landmark or a spot which is in the exact direction you are facing. The person should keep their body and compass very still and shift their eyes between the landmark and compass several times to assure that everything is in alignment. Explain to the students that once you do that, you can simply walk toward your target point for the specified distance (this will keep you walking in a straight line). Once you have reached the sighted point and if it is not your final destination, take the same bearing, sight another point, and keep going.

Emphasize that when students are sighting points, they are not looking for the marker but a point in that direction. They will not see the markers, but will walk the specified distance and once there, will look for the marker.

D. Setting a Pace

Now that the students are familiar with the compass and its use, they still need to know how to set a pace. Hand out a Pacing worksheet, clipboard, and pencil to each student. Go outside and measure a distance of 50 feet using the measuring wheel.

Setting, or taking, a pace involves counting the number of steps it takes to walk a 50-foot distance. One pace equals two normal steps. Starting with your left foot, count every time your right foot strikes the ground, or vice versa. Emphasize the importance of taking normal steps that are the same size so pacing is as accurate as possible. Have the students

work on the Pacing worksheet to better their understanding of using their pace to measure distances.

IV. The Course

Now that the students understand how the compass works, how to use it, and how to pace a distance, they are ready for the course. The orienteering course is set-up up in the forest. Show the students the example marker. The markers are attached to the trees. The students will be off of the trail.

Split the class up into groups of three or four students. Give each group a clipboard with an Orienteering Course worksheet. The worksheet will tell each group which direction to go and how far to travel. Once they reach the next marker, students should record the “code word” on their worksheet. Look over the worksheets as a group and check that all of the students understand the directions. Discuss the boundaries of the course...

Forest Lane – a fire lane that runs north to south,

North Star Trail – a fire lane that is to the north and runs east to west, and

Hwy V – if you can even see the road you have gone too far)

Lodge area – none of the markers are near the buildings

(The teacher may want to draw a map on the board.)

Rules of the course:

1. Always walk (you will be off of the trail and there are many things to trip on)
2. Stay together (if your group cannot agree on where to go, call and teacher for help)
3. Respect nature
4. Stay in the boundaries, do NOT cross any wide trails (big enough for a truck) ... if you feel like you have walked in one direction “forever” you did not count your paces correctly, go back and try again.
5. When the whistle is blown, everyone should return to the Lodge area.

The students will either start at letter ‘A’ or letter ‘C’ and the teacher will take them to their first spot. The ‘A’ marker, which can be found to the left as you start down Milky Way trail from the lodge, is on a large oak tree. The ‘C’ marker, which can be found to the right further down Milky Way (where you can just see the observatory), is on a large red pine tree.

Each group will go in different directions while doing the course. Watch to make sure each group is using their compass correctly and is headed in the correct direction.

Reminders for instructors

- 1) Stress students will be given two clues to finding the next orienteering marker: DISTANCE and DIRECTION. In the excitement of using the compass many students do not pay attention to pacing.
- 2) Check student pacing worksheets to ensure they understand distance. As a group pace off 150 feet so they see the farthest distance they will need to travel between points.
- 3) All students need to bring their pacing worksheet with them on the course.
- 4) Practice orienting the compass as a large group, give students a bearing and have them put “red” in the “shed,” this will help you detect any students who do not understand how to

use the compass. During this practice make sure to use bearings that are not represented numerically on the compass. Students need to understand that each white mark on the compass perimeter is equal to 2 degrees.

5) If you do not think the group is ready for the orienteering course, one adult should go with each group to assist as needed and supervise.

6) Whistles will be given to each student group to use if they get lost, stress the whistles should only be used if they are LOST and do not know where the group is or where they are. Instruct them to blow the whistle three times in a row to signal they need help, wait a minute, blow three times again. Repeat until the instructor finds them.

V. Conclusion

Gather the students back together. Collect all of the compasses and clipboards. Review what the students have learned. Ask if they saw anything interesting in the woods.

Orienteering has been around for a very long time. Many people use it on a daily basis. Brainstorm about who could use orienteering and what activities you could do with their newly acquired orienteering skills. Orienteering is a life skill. It is used by anglers, hunters, foresters, surveyors, engineers, cross country skiers and runners, people in the armed forces, and even people who are out for a stroll. The ability to use a compass is a valuable outdoor skill that builds self-reliance and confidence in outdoor experiences. This helps develop a sense of stewardship for the outdoors by promoting a sense of safety in the natural environment.

VI. Cleanup

Please return all of the supplies to the Greene Cabin.

SAFETY

While students are participating in Orienteering class, they should wear long pants and sturdy, close-toed shoes. Ask students to always wear the compass string around their neck and never swing it around. As they hike through the woods they should follow these guidelines:

- Walk at all times, no running
- Be careful with branches so that they do not swing back and hit someone
- No rough-housing
- Do not break, harm, or damage any plants or wildlife
- No yelling
- Stay within the set boundaries. If they get off course tell them to turn around or walk west until they come to the lodge area or road.
- Return to the group when you hear the whistle.

If you would like goggles for your students to wear while they are in the woods, they are located in the Greene Cabin storage closet.

ADDITIONAL INFORMATION

- History of the Compass
Around 2500 BC, the Chinese discovered a naturally magnetized rock called magnetite, or lodestone. When floated on a piece of wood in water, it will turn until one end points in the direction of the halfway point between where the sun rises and sets, or south. The other end obviously pointed north, and from that discovery emerged the invention of the magnetic

compass needle. At that point it was simply called the "constant needle" and was eventually introduced to Europe around 1000 AD. Widely used by sailors by the 1300's, it facilitated navigation and consequently expanded trade along the coast of Africa, and even aided in the first voyage to the Americas. It wasn't until this first voyage to the Americas that the "constant needle" was discovered to actually not be constant. As explorers sailed further west, they found that the direction the needle pointed shifted as they traveled. This was because the magnetized "constant needle" points towards magnetic north, which is different from the true north lines that are found on maps.

Since the invention of the "constant needle," the compass has evolved considerably over time. The first revision made was to protect the magnetic needle by enclosing it in a metal case (the "watch case" compass). This was a simple air-filled brass housing in which the needle swung freely. The problem with this model was that the needle often took a long time to come to rest if the compass was moved. The next step was to invent a way of slowing down the swing so that the needle would come to rest quickly. This was done with a few different methods. The most effective however, which is used in most modern compasses, is a liquid-filled compass. The dials of these compasses are filled with clear oil that slows down the wobbling of the needle and brings it to rest quickly. This oil is also resistant to freezing in cold conditions.

In addition to improvements in accuracy and design, a modern compass can be used to find more than just direction. Originally, the dial was marked only with the thirty-two points of the mariner's compass. It was actually comparatively recent that it was suggested to mark the dial with the 360 degrees of a full circle. The conventional "watch case" compass was improved into the modern "Silva" style orienteering compass in which the compass housing revolves on a transparent base plate that acts as a protractor, ruler and direction finder. This type of compass was invented in Sweden in the early 1930's and has taken the guesswork out of direction finding, making the use of map and compass easier and more accurate.

- The force that attracts the magnetized needle of a compass is the magnetism of the Earth. The entire Earth acts like a gigantic magnet. The negative, red end of a compass needle points to the magnetic north pole of the Earth when at rest. It is currently located about 1,400 miles south of the true North Pole near Bathurst Island, off the northern coast of Canada. Because of this, orienteers have to consider two north directions: true, geographic north as it is shown on maps, and magnetic north as you find with the help of your compass. True North is the top of the Earth's axis, the imaginary line that the Earth spins around.
- Declination is the difference between true north and magnetic north. Because of the shifting magnetic currents, declination also changes from year to year. If someone wants to travel in a true north direction, they have to consider the declination. In some areas, magnetic north can differ from true north by as much as 20 degrees east or west. Fortunately, in Manitowoc, Wisconsin the declination is only about 3 degrees (West) and does not create a large margin of error. Many compasses show degrees of declination right on them. When just using a compass declination does not matter. It only matters when a map and compass are combined together. Since we only use a compass in class, students do not need to work with declination, just understand the basics.
- How can you find your way if you were to get lost without a compass? What if you were in the woods and got lost? People find their direction in different ways. Ask the students to brainstorm different strategies for finding your direction. Go through the following ideas with the students.
 1. The sun: travels east to west
 2. The moon: travels east to west
 3. Other stars and constellations: ex. north star

4. Moss on trees: grows on the north or cool side of the tree (unless the entire tree is cool from the surrounding trees)
5. Landmarks: a large stand of trees, a road or trail
6. Nature clues: geese flying south, river flowing to a lake

RESOURCES

Eagle Bluff Environmental Learning Center. "Beginning Orienteering" lesson plan.
Lanesboro, MN.

Witting, Brett and Cathi Burish. School Forest Camp Math – Orienteering Lesson Plan.
MPSD. Manitowoc, WI.

Written by Patty Brodeen Maher, School Forest Coordinator, June 2003. Updated: July 2004, January 2013.

Pacing Worksheet

1. As a group, measure a distance of 50 feet.
2. Start with both feet together. Start walking and count how many paces (2 steps) it takes you to travel 50 feet. (You should get a number between 9 and 13.)
3. Fill in the chart below starting with your answer for 50 feet.
4. To get your answer for 100 feet, add your answer for 50 feet to itself.
5. To get your answer for 150 feet, add your answer for 100 feet to your answer for 50 feet.
6. To get your answer for 200 feet, add your answer for 150 feet to your answer for 50 feet.

Example:

Distance (in feet):	50	100	150
# of Paces:	12	24	36

Distance (in feet):	50	100	150	200
# of Paces:				



7. Use the chart above to answer these questions:
 How many paces would it take you to go 150 feet? _____
 How many paces would it take you to go 250 feet? _____
 How many paces would it take you to go 125 feet? _____

When you go into the forest, you will use this sheet to help estimate how many paces to walk.

Group A
Orienteering Course Worksheet

From	To	Bearing	Distance	Code word
Start at A				
A	B	60°	75 feet	
B	D	138°	125 feet	
D	E	185°	75 feet	
E	K	285°	125 feet	
K	J	210°	100 feet	
J	G	119°	150 feet	
G	F	75°	75 feet	
F	E	350°	100 feet	
E	L	205°	75 feet	

After your last station, head west to the lodge area and find your teacher.

Group B
Orienteering Course Worksheet

From	To	Bearing	Distance	Code word
Start at A				
A	K	155°	100 feet	
K	J	210°	100 feet	
J	G	119°	150 feet	
G	F	75°	75 feet	
F	E	350°	100 feet	
E	D	5°	75 feet	
D	C	40°	50 feet	
C	E	205°	125 feet	
E	L	205°	75 feet	

After your last station, head west to the lodge area and find your teacher.

Group C
Orienteering Course Worksheet

From	To	Bearing	Distance	Code word
Start at A				
A	K	155°	100 feet	
K	L	138°	125 feet	
L	G	195°	50 feet	
G	F	75°	75 feet	
F	E	350°	100 feet	
E	C	25°	125 feet	
C	D	220°	50 feet	
D	E	185°	75 feet	
E	F	170°	100 feet	

After your last station, head west to the lodge area and find your teacher.

Group D
Orienteering Course Worksheet

From	To	Bearing	Distance	Code word
Start at C				
C	E	205°	125 feet	
E	F	170°	100 feet	
F	G	255°	75 feet	
G	J	299°	150 feet	
J	K	30°	100 feet	
K	L	138°	125 feet	
L	G	195°	50 feet	
G	I	265°	100 feet	
I	J	336°	75 feet	

After your last station, head west to the lodge area and find your teacher.

Group E
Orienteering Course Worksheet

From	To	Bearing	Distance	Code word
Start at C				
C	D	220°	50 feet	
D	E	185°	75 feet	
E	K	285°	125 feet	
K	L	138°	125 feet	
L	E	27°	75 feet	
E	F	170°	100 feet	
F	G	255°	75 feet	
G	J	299°	150 feet	
J	I	156°	75 feet	

After your last station, head west to the lodge area and find your teacher.

Group F
Orienteering Course Worksheet

From	To	Bearing	Distance	Code word
Start at C				
C	D	220°	50 feet	
D	B	318°	125 feet	
B	A	240°	75 feet	
A	K	155°	100 feet	
K	E	105°	125 feet	
E	F	170°	100 feet	
F	G	255°	75 feet	
G	L	15°	50 feet	
L	E	27°	75 feet	

After your last station, head west to the lodge area and find your teacher.

Group H
Orienteering Course Worksheet

From	To	Bearing	Distance	Code word
Start at C				
C	E	205°	125 feet	
E	L	205°	75 feet	
L	K	322°	125 feet	
K	A	335°	100 feet	
A	B	60°	75 feet	
B	D	138°	125 feet	
D	E	185°	75 feet	
E	L	205°	75 feet	
L	G	195°	50 feet	

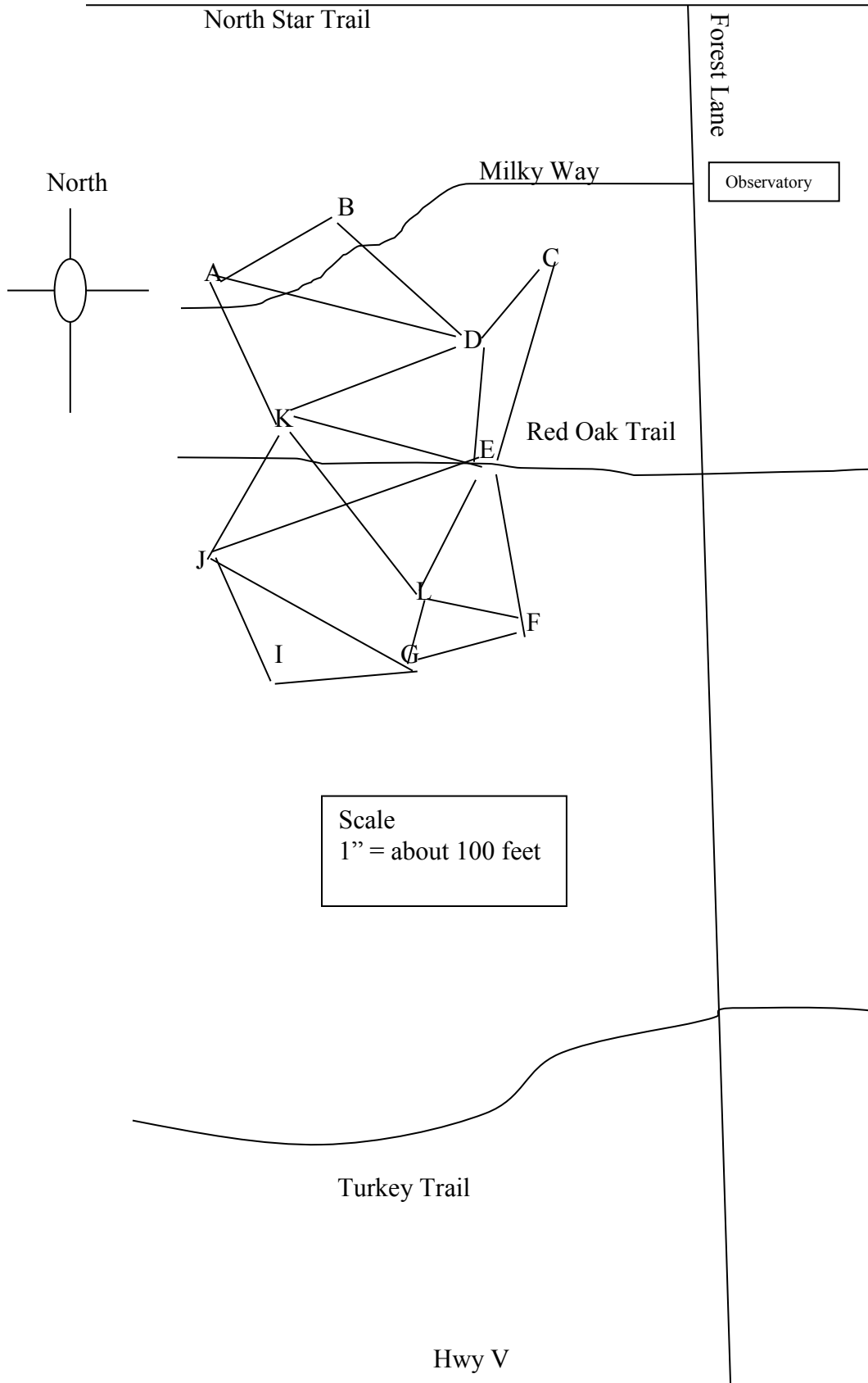
After your last station, head west to the lodge area and find your teacher.

Group G
Orienteering Course Worksheet

From	To	Bearing	Distance	Code word
Start at A				
A	B	60°	75 feet	
B	D	138°	125 feet	
D	C	40°	50 feet	
C	E	205°	125 feet	
E	K	285°	125 feet	
K	L	138°	125 feet	
L	G	195°	50 feet	
G	J	299°	150 feet	
J	K	30°	100 feet	

After your last station, head west to the lodge area and find your teacher.

ORIENTEERING COURSE MAP



Rules of the course

1. Stay in the boundaries; do NOT cross any wide trails, big enough for a truck.
2. If you feel like you have walked in one direction "forever" you did not count your paces correctly, go back and try again.
3. Always walk, you will be off of the trail and there are many things to trip on, as well as ground nesting birds.
4. Stay together, if your group cannot agree on where to go, vocally call the teacher for help.
5. Respect nature.
6. If you get lost blow your whistle three times in a row to signal you need assistance, wait a minute and repeat three blows, repeat until found.
7. When you hear two whistle blows gather back at the lodge area.

Pay attention to DIRECTION and DISTANCE

"Put RED in the SHED and follow FRED"