North, South, East & West

Environmental Education Lesson
EDWARDS CAMP AND CONFERENCE CENTER

SUMMARY
In the North, South, East & West lesson the students will familiarize themselves with the parts of compass, read bearings, and determine their pace. After completing these tasks the students will navigate themselves around an Edwards Orienteering course.

USAGE
This lesson is appropriate for grades 5-12. The intensity and amount of math skills used in the lesson can vary depending on your goals for the activity.

OBJECTIVES
Upon completion of this lesson students will…
- Recognize the identifying parts of a simple compass
- List the four cardinal directions (N,S,E &W)
- Describe steps to use a compass
- Find compass bearings
- Utilize their knowledge to complete the Edwards orienteering course

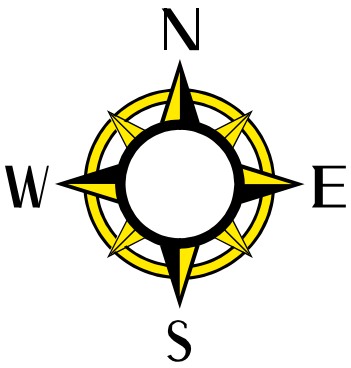
In addition students could…
- Determine their pace
- Create their own orienteering course
- Practice their math skills to convert their pace to distance

MATERIALS
- Demonstration compass
- 15 Compasses
- Compass course directions, 5 sets with Dry erase markers
- Bearing Cards
- Measuring tape (if you wish to determine pace)

INTRODUCTION
Orienteering is the navigation across a terrain with the use of a map and/or compass. The Chinese are credited with the discovery of the compass. The compass has been around for a millennium. The first known compass is from China about a thousand years ago. Europe began using them about 300 years later. It was invented when travelers noticed that a magnetized needle floating on a chip of wood always swung around to point north.

Some other first magnets were made by using a piece of lodestone, a naturally magnetic material, suspended by a thread. The lodestone pointed north. In the beginning people believed the needle or lodestone was being moved by magic or a great magician. They knew no scientific reason for it to spin around and point north.

Today we know that the Earth is a huge magnet. The earth has two poles one on the top and one on the bottom of the earth. But the north geographic pole and the north magnetic pole are not one and the same on the earth. The magnetic north pole is 1400 miles away from the geographic North pole. The magnetic North pole is in northern Canada. One end of every compass needle is drawn towards it.



The 4 Cardinal Directions:
North, **E**ast, **S**outh, **W**est

Begin the lesson by explaining the origin of the compass and by discussing that a compass is used for finding directions. Let them know that orienteering is a sport using a map and a compass. In this activity, however, they will only learn about the compass.

Show them how to hold the compass properly. Start by holding the compass parallel to the ground with the flat edge and "the direction of travel" arrow pointing straight-ahead and away from your body. Do not allow the students to twirl the compass on their fingers! **This will cause air bubbles in the housing and render the compass useless.**

Discuss parts of the compass (see diagram): the compass needle (where the red part is always pointing towards the earth's magnetic NORTH pole), orienteering arrow, direction of travel arrow, and the compass housing which is the turnable dial that divides the 360° into 2° increments.

Tricks to help students find directions:
Give the red magnetic needle the name *"Red"* and explain that the orienteering arrow is his *shed*. Any name game can be given, but Red will be used for the remainder of the lesson. Remember that the red arrow always points north. Set your reading at the "read bearing here" mark and follow the direction of travel arrow, not the red North arrow! Remember the phrase: "Put Red in the Shed and follow Fred"

WARM-UP ACTIVITIES

Can You Walk a Straight Line? (Optional, if time is short)
This activity is to help the students understand the importance of a compass. When people get lost, they try to walk in a straight line or direction. They end up getting lost even more. Have the students pair off and make two straight lines, standing across from their partner. The partners should be about 30 feet apart. Have the lines spread out a bit. Pick one line to go first. The first line is blindfolded. On your go, have the blindfolded students try walking in a straight line toward their partners. When they are about ½ way to ¾ of the way have them stop. Please remind the partners that they can't talk to each other. How far off were the students from their partners? Have the partners switch roles. Repeat. Were the students surprised how far off they were from a straight line?

Using a Compass
Explain to the students the importance of accuracy with the setting mark. Talk about the degrees in a circle. Have the students identify how many degrees each little "tick mark" represents on the dial of a compass (2°). Point out that the compasses have N, E, S, W on the dial and talk about what value in degrees each of these represent. For example,
N = 0° or 360°, E = 90°, S=180° and W = 270°

Now explain how to find a direction on the compass. Hold compass horizontal (flat) with "Direction of Travel Arrow" pointing straight ahead and away from body. Select any bearing and ask all students to rotate the "Compass Housing" until the selected bearing lines up with the "Direction of Travel Arrow". While standing in one place the students should turn their body slowly in a circle until Red Fred stays in his Shed. Note to the students that Red Fred ALWAYS points north, *not* always the same way the Direction of Travel Arrow points. Ask the students to point in the direction they should walk (this should be straight ahead and the way the "Direction of Travel Arrow" is pointing if Red Fred is in his Shed and the compass housing is rotated to the selected bearing).

Once you have solved any misunderstanding and answered questions, have them do 2-3 more trial runs following these simple steps:

1) Choose a bearing.
2) Set the dial to the chosen bearing.
3) Hold the base plate to your chest (level with the ground, arrow outward)
4) Turn your body until Red Fred is in his Shed
5) Look at the direction of travel arrow and take a step in the correct direction. (Students often think they are supposed to walk in the direction of the red magnetic north needle instead of the direction of travel arrow. Make sure they understand the difference.)

Have the students practice different bearings until they are comfortable.

Pacing
Your pace helps determine how far you will walk to reach a marker on the orienteering course. A pace is actually 2 steps that are of natural size for that individual. If you start walking with your left foot, you will count 1 pace every time your right foot hits the ground. Be sure to take normal steps, looking straight ahead. Everyone will have varying pace length (in feet) of their pace.

To Determine Pacing (Heavier Math Option)
Using a tape measure have the students count how many paces it takes to walk 100 feet. Make sure they take normal steps, looking straight ahead, and don't worry if their pace is longer or shorter than someone else's. By dividing this number into 100, they can determine how many feet their pace is. Have them round this number off. It should be between 3 and 6.

If you know what your pace is for 100 feet, you can determine the number of paces it takes to go any distance using simple math. For example, if it takes 30 paces to go 100 feet, it would take 15 paces to go 50 feet. How many paces would it take to go 150 feet?

ACTIVITY

Edwards Orienteering Course
Divide the students into 5 groups and give each group a sheet of directions and dry erase marker. Each group will be a type of common wild flower or bird found at Camp Edwards. The direction sheet will have the group name on it. Have them start at the course beginning. The white course begins at the marker located on the edge of the center of the prairie. The white course is to be used by groups staying in the Cabins. The black course begins at the black marker located between Hoffer parking lot and volleyball court. The black course is to be used by the groups staying in Hoffer and Runge lodges.

There are two sets of cards to chose from for each course. One set uses feet so students can determine there own pace. This makes for a more realistic simulation of trying to find something with a compass and lets them work on math skills. The other set of cards is already figured into paces based on the average stride for a fifth grade student. This set can save some time because it takes away the math skills, but is also less accurate because they are averaged.

On each card are degree readings, or bearings, the number of feet they must walk, and a line to write a part of a quote on the marker they end up at. The group must write down the piece of quote that corresponds with their group name. In order to determine how many paces they should walk to reach each marker, they need to divide their pace (the number determined earlier) into the number of feet written on each card. The students are looking for markers just like the one at the starting point. Each is different and may be found on trees, sheds, posts, etc. When they complete the course, they should check the answers to see if they found the markers in the right order. The groups should each have a different environmental quote. Have them read them out loud to the rest of the group. If time, discuss what quotes mean. The answer key and orienteering course map can be found at the back of this lesson.

TIPS FOR FINDING YOUR WAY

1) Don't worry about what anyone else is doing. Each group is going to different places. If you see a marker in the direction your compass is pointing, don't assume it's the one you are looking for! Count your paces to make sure yours isn't farther away.

2) Once a bearing is set, sight an object on the horizon that is in line with that bearing and walk towards it counting paces instead of staring at the compass. Do look down at the compass occasionally but do not focus on it!

3) You cannot or should not walk through trees, buildings, thorns, or other groups of students having class. You may need to go in some taller grasses. However, as long as you sight an object on the horizon, you should be able to walk around obstacles without a problem. Use common sense when counting paces if you need to move around something!

4) It is very rare that you will land exactly at a marker. Once you reach the destination look around the nearby area. They are all on trees, posts or buildings. They may be on the backside of these objects also. You may need to take a step or two into the woods to find a marker.

* When finished please return ALL 15 compasses and wipe off the cards.

Optional Activity

- Divide the students into half. Have each group create their own course. Making sure to write down the coordinates for each point and then have them navigate through the other group's course.

PRE-ACTIVITY

Indoor or rainy day activity: This experiment uses the same technique used by the Chinese hundreds of years ago.

Materials: Steel sewing needle
Magnet
Thin slice of cork
Bowl of water

Procedure: 1. Magnetize the needle by "stroking" it 20-30 times in only one direction on a magnet.
2. Place the needle in the center of the cork and float in the water.

Results: The cork and needle will rotate, then flip-flop back and forth, eventually the needle will point North and South.

POST ACTIVITIES

- Do an activity that involves the use of topographic maps and compasses to find particular locations
- In the classroom hang letters on the walls, have students stand under the letter and spell out a key vocabulary word using the letters on the walls and the compass to navigate to those letters.
- Have the students draw a map on how they get to school. They may use the ruler measurements or compass coordinates to write the directions to get home from school.

OTHER RESOURCES

www.uio.no/~kjetikj/compass/lesson1.html and other Internet sites
Girl and Boys Scouts
4-H Clubs

revised 10/2005 tmoore

N, S, E, W Black Orienteering Course
(start in field in front of Hoffer Lodge at the post with a black marker)

Answer key & directions in ***paces***

Cardinal Group
1. start at black marker go 120° for 90 paces. Marker is light blue.
2. 255 for 96 paces – blue
3. 120 for 46 paces – silver
4. 4 for 122 ½ paces – brown
5. 260 for 57 ½ paces – green
6. 137 for 79 paces – red
7. 282 for 53 paces – white
8. 10 for 87 ½ paces – orange
9. 183 for 50 paces – black

Red-winged Blackbird Group
1. 310 for 24 paces – green
2. 156 for 110 paces – silver
3. 300 for 46 paces – blue
4. 31 for 97 ½ paces – brown
5. 312 for 39 paces – orange
6. 190 for 80 paces – white
7. 98 for 77 ½ paces – light blue
8. 244 for 29 paces – red
9. 316 for 66 paces – black

Black-capped Chickadee Group
1. 52 for 37 ½ paces – brown
2. 205 for 96 paces – blue
3. 77 for 60 paces – red
4. 316 for 99 paces – green
5. 120 for 97 ½ paces – light blue
6. 272 for 80 paces – white
7. 10 for 79 paces – orange
8. 176 for 137 ½ paces – sliver
9. 340 for 91 paces – black

White-breasted Nuthatch Group
1. 136 for 66 paces – red
2. 66 for 29 paces – light blue
3. 272 for 77 ½ paces – white
4. 10 for 80 paces – orange
5. 132 for 39 paces – brown
6. 205 for 97 ½ paces – blue
7. 120 for 42 paces – silver
8. 338 for 110 paces – green
9. 130 for 24 paces – black

Downy Woodpecker Group
1. 1 for 50 paces – orange
2. 188 for 80 paces – white
3. 108 for 66 paces – red
4. 316 for 99 paces – green
5. 78 for 57 ½ paces – brown
6. 180 for 122 ½ paces – silver
7. 300 for 46 paces – blue
8. 75 for 96 paces – light blue
9. 300 for 90 paces – black

Answer key & directions in ***feet***

Cardinal Group
1. Start at black marker go 120° for 360 ft. Marker is light blue.
2. 255 for 385 ft – blue
3. 120 for 185 ft – silver
4. 4 for 490 ft – brown
5. 260 for 230 ft – green
6. 137 for 395 ft – red
7. 282 for 265 ft – white
8. 10 for 350 ft – orange
9. 183 for 200 ft – black

Red-winged Blackbird Group
1. 310 for 95 ft – green
2. 156 for 440 ft – silver
3. 300 for 185 ft – blue
4. 32 for 390 ft – brown
5. 312 for 155 ft – orange
6. 190 for 320 ft – white
7. 98 for 310 ft – light blue
8. 244 for 115 ft – red
9. 316 for 265 ft – black

Black-capped Chickadee Group
1. 52 for 150 ft – brown
2. 205 for 385 ft – blue
3. 77 for 240 ft – red
4. 316 for 395 ft – green
5. 120 for 390 ft – light blue
6. 272 for 320 ft – white
7. 10 for 315 ft – orange
8. 176 for 550 ft – sliver
9. 340 for 365 ft – black

White-breasted Nuthatch Group
1. 136 for 265 ft – red
2. 68 for 115 ft – light blue
3. 272 for 310 ft – white
4. 10 for 320 ft – orange
5. 132 for 155 ft – brown
6. 205 for 390 ft – blue
7. 120 for 168 ft – silver
8. 338 for 440 ft – green
9. 130 for 95 ft – black

Downy Woodpecker Group
1. 1 for 200 ft – orange
2. 188 for 320 ft – white
3. 108 for 265 ft – red
4. 316 for 395 ft – green
5. 78 for 230 ft – brown
6. 180 for 490 ft – silver
7. 300 for 185 ft – blue
8. 73 for 385 ft – light blue
9. 300 for 360 ft – black

N, S, E, W
White Orienteering Course
(start in at white maker along the prairie**)**

Answer key & directions in ***feet***

May Apple Group
1. Start at white marker go 320° for 104 ft. Marker is light blue.
2. 38 for 276 ft – yellow
3. 234 for 393 ft – red
4. 68 for 542 ft – purple
5. 312 for 109 ft – black
6. 183 for 400 ft – silver
7. 35 for 287 ft – blue
8. 312 for 501 ft – pink
9. 180 for 429 ft – white

Spring Beauty Group
1. 18 for 331 ft – yellow
2. 90 for 98 ft – black
3. 139 for 109 ft – purple
4. 195 for 343 ft – silver
5. 305 for 352 ft – light blue
6. 84 for 495 ft – blue
7. 260 for 612 ft – red
8. 20 for 415 ft – pink
9. 180 for 429 ft – white

Black-Eyed Susan Group
1. 04 for 429 ft – pink
2. 208 for 415 ft – red
3. 50 for 393 ft – yellow
4. 170 for 400 ft – silver
5. 2 for 400 ft – black
6. 140 for 276 ft – blue
7. 264 for 485 ft – light blue
8. 66 for 420 ft – purple
9. 240 for 410 ft – white

Aster Group
1. 38 for 400 ft – black
2. 260 for 98 ft – yellow
3. 225 for 276 ft – light blue
4. 12 for 325 ft – pink
5. 155 for 549 ft – silver
6. 13 for 343 ft – purple
7. 248 for 542 ft – red
8. 78 for 612 ft – blue
9. 250 for 451 ft – white

Goldenrod Group
1. 50 for 410 ft – purple
2. 287 for 182 ft – yellow
3. 170 for 400 ft – silver
4. 335 for 549 ft – pink
5. 208 for 415 ft – red
6. 78 for 612 ft – blue
7. 264 for 495 ft – light blue
8. 49 for 376 ft – black
9. 220 for 400 ft – white

Answer key & directions in ***paces***
(paces based on average stride for 5th grader)

May Apple Group
1. Start at white marker go 320° for 37 paces. Marker is light blue.
2. 38 for 106 paces – yellow
3. 234 for 147 paces – red
4. 68 for 180 paces– purple
5. 312 for 40 paces – black
6. 183 for 142 paces – silver
7. 35 for 99 paces – blue
8. 312 for 176 paces – pink
9. 180 for 147 paces – white

Spring Beauty Group
1. 18 for 106 paces– yellow
2. 90 for 31 paces – black
3. 139 for 44 paces – purple
4. 195 for 153 paces – silver
5. 305 for 88 paces – light blue
6. 84 for 213 paces – blue
7. 260 for 225 paces – red
8. 20 for 144 paces – pink
9. 180 for 147 paces – white

Black-Eyed Susan Group
1. 04 for 176 paces – pink
2. 208 for 144 paces – red
3. 50 for 147 paces – yellow
4. 170 for 150 paces – silver
5. 2 for 148 paces – black
6. 140 for 100 paces – blue
7. 264 for 213 paces– light blue
8. 66 for 165 paces – purple
9. 240 for 145 paces – white

Aster Group
1. 38 for 157 paces – black
2. 260 for 41 paces – yellow
3. 225 for 117 paces – light blue
4. 12 for 140 paces – pink
5. 155 for 206 paces – silver
6. 13 for 138 paces – purple
7. 248 for 210 paces – red
8. 78 for 231 paces – blue
9. 250 for 145 paces – white

Goldenrod Group
1. 50 for 145 paces – purple
2. 287 for 75 paces – yellow
3. 170 for 150 paces – silver
4. 335 for 206 paces – pink
5. 208 for 144 paces – red
6. 78 for 231paces – blue
7. 264 for 213 paces – light blue
8. 49 for 140 paces – black
9. 220 for 157 paces – white

Orienteering Course Map

Marker for the black course
(Lodge Groups)

All students start at the black marker near the athletic field. All students will eventually proceed to the following markers:

white (by Hoffer parking lot)
blue (near Hoffer lodge)
silver (near archery backstop)
red
light blue
brown
orange
green

Markers for white course
(Cabin Groups)

All students start at the white marker near the prairie. All students will eventually proceed to the following markers:

silver (at prairie edge near pines)
blue (in first row of pines)
purple
black (tree on edge of meadow)
pink
yellow (astronomy shed)
red
light blue

* please note that the red marker is shared by both courses