

MAP AND COMPASS

Here is a common layout and level of detail for a lesson plan. The techniques and content are common to many outdoor educational settings.

Purpose

This lesson plan is designed for 8th graders to adults. It is necessary to learn the current knowledge of the participants to adapt the lesson to meet their needs. Greater or lesser content can be presented based on the audience skill level.

Goals

1. Learn how to read a topographic map.
2. Explore the compass and using it to take and follow a bearing.
3. Discover ways to deal with getting lost in the woods.

Objectives

Students will be able to do the following:

- Define components of a map and their use (including topographic lines, symbols, colors, scale, and direction).
- Describe how a compass relates to the map and the real landscape.
- Practice compass use, including taking a bearing, following a bearing, dealing with declination, and causes for error.

Time

2 hours

Audience

20 or fewer members; 8th grade to adult; beginner level

Materials

- At least one compass for every two students
- Demonstration compass
- 100-foot (30.5-meter) tape measure
- Topographical maps of the area (7.5-minute series) for every two or three people
- Highway maps that everyone can see
- Maps of the site where lesson is taught
- Copies of the Silva System handout (one per student)
- Basic course laid out beforehand

I. Lesson Preparation

Organizing materials and a course beforehand is crucial. Make sure there are enough compasses, handouts, and maps for everyone. The classroom and orienteering course need to be near each other to minimize travel time.

II. Introduction

Methods: lecture, inquiry.

Here is where your quality lesson gets its start. Welcome everyone, explain who you are, and go around the group to find out student names, knowledge level of map and compass work, and what they hope to learn today. Finish with your expectations as an instructor and the plan for the workshop.

III. Content: General Navigation Concept

Method: lecture.

Navigation means knowing where you are, where you have been, and where you are going. How do you learn these things? By using a map and compass to ensure that you always know where you are. Both are aids to help you to see on paper (the map) where you are actually on the ground. The compass is a tool to show you where you are in relation to direction (i.e., north, south, east, west). Being able to travel efficiently in unfamiliar terrain using a map and compass is called navigation.



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Students can work in pairs to practice skills.

IV. Using the Map

Methods: lecture, guided discovery, problem solving, inquiry, games, storytelling, scenarios.

If you become an effective map reader, you may not need your compass—maps are the primary tool for finding your way. There are different kinds of maps. One of the most common is a highway map. Think about a time when you have used a highway map. This will help us determine what we learn from a map and how we use it:

- What can you find on a map? Some things include way points and control points, roads, directions, where to turn, or where landmarks such as a park or museum are located.
- How do you use a road map? When you come to a known intersection (or town or lake or other noted feature), you know where you are.
- People use road maps all the time. Ask your students to share stories of their navigation using a road map, including stories where people get lost. (Ask them to explain why they got lost so you can gain an understanding of their knowledge of maps.)
- How is a topographic map different from a road map? Explain the following symbols and terms: contour lines, contour intervals, cultural features, latitude, longitude, cultural and natural symbols, true north versus magnetic north, and scale.
- Practice map reading by asking students to find various features on the map (hills, rivers, cliffs, trails, forests, swamps, and so on).

(continued)

Map and Compass (continued)

- More practice reading the map—Quiz students on different scenarios (for example, What would you see if you were standing at the edge of _____?).
- If available, use a different map and quiz students on contour intervals, land features, directions, distances, and so on.

V. Using the Compass

Methods: lecture, physical skills development, physical manipulation, games, guided discovery, inquiry.

The compass is actually a simple tool with a magnetized needle that responds to the magnetic field of the earth. The red end of the compass is polarized so that it points to magnetic north, which means the compass is showing which way you are facing in relation to north. This is called direction. For total navigation ability, you need to be able to use a map and compass together.

Use a demonstration compass to go over the parts of a compass, including base plate, needle (“red”), dial and degree markings, orienting (north) arrow (“shed”), orienting lines, and direction-of-travel arrow (“fred”). Red, fred, and shed are catch phrases or mnemonics to help the students remember the function of the parts of the compass. They also help students learn how to set a bearing.

Next, teach students how to use the compass. Using the big compass, set a bearing of 120°. Have your students place the magnetic needle (red) in the orienting arrow (shed) by holding the compass at their navel, with the direction-of-travel arrow pointing away from them. They should turn until the magnetic needle is directly over the shed. This is called setting a bearing. Here are the steps for setting a bearing of 120°:

- Hold the compass in the palm of your hand at the level of your navel. Be sure that the direction-of-travel arrow is pointing away from you.
- Turn the dial until your bearing (120°) is positioned at the direction of travel arrow.
- Put red in the shed and follow fred. As explained previously, this means turning your body with the compass in hand until the magnetic needle lies over the orienting arrow.

VI. Pacing

Methods: physical skills development, activity.

Pacing is a valuable tool to help you determine how much distance you have traveled. To determine each student’s pace, do the following:

- Lay out a 100-foot (30.5-meter) straight line.
- Have everyone determine how many paces it takes them to cover the 100 feet. (A pace is every other step, or every time your right foot touches the ground.)
- Explain that their pace will tend to shorten when traveling over different types of terrain (thick forest, swamp, fields, hills, and so on). Estimate the difference accordingly such as reducing your pace length by 1 foot. Practice pacing in different terrain to allow students to become familiar with their average pace. Have them verify their pace distances with distances on the map.

Do a bearing activity for practice following a bearing.

Bearing Activity

1. Spread students out in a field in groups of three. Be sure they are not too crowded.
2. Have everyone set a bearing of 360°. (They should all be facing north.)
3. Set a bearing of 90°. Have the person who is holding the compass stay in one spot. Set an object such as a pencil at their feet. A second person should walk 10 paces at 90° and stop at 10 paces, with all three group members now joining them.
4. Set a bearing of 180°. Repeat step 3 (second member walks 10 paces and stops).
5. Set a bearing of 270°. Repeat step 4.

6. Set a bearing of 360° . Repeat step 5.
7. Each group should now be standing at the object they left on the ground at the start. The group has now navigated 40 paces in a square.
8. Repeat the same exercise using bearings of 120° , 240° , and 360° .

Your class has now learned how to set and follow a bearing and how to use pacing for a simple navigation.

VII. Using the Map and Compass Together

Methods: physical skill development, guided discovery, problem solving, scenarios.

Follow these steps to demonstrate how to take a bearing and distance off the map.

1. Align the edge of the baseplate with the current location of the class and your predetermined destination. Be sure that everyone is using the same points. Also be sure that everyone has the direction-of-travel arrow (fred) pointing to the destination.
2. Turn the dial until orienting lines are parallel with north–south lines on the map (north portion of dial needs to point north). This is called setting, or taking, a bearing.
3. Remove the compass and follow the bearing.

Distances can be measured in many ways. One common technique is to use the ruler on the edge of the compass and use scrap paper to mark the distance. Then compare the space marked on the scrap paper to determine the distance by placing it along the map's scale. Remember that straight-line distances, or as the crow flies, as read off a map are often different than in the field because of terrain such as hills, valleys, and wetlands.

Practice taking bearings and distances off the map by giving scenarios of where students are located and their destination. Make sure some scenarios have destinations other than north. Also, choose some southerly routes to ensure students are watching the correct end of the magnetic needle (red end points north).

VIII. Basic Course in Pairs

Methods: Activity, games, problem solving.

Set up a course in a site that has three or four control stations where students need to answer a question about what they see at the location. If you have many students, space groups out and have them start at different control sites.

IX. Conclusion

Comment on skills the students need to further their understanding. For example, introduce them to the concept of declination. Ask them how they would navigate around a lake or a wetland. What would they do to maintain their line of travel if they came upon a cliff?

Explain that practice is the key to understanding navigation because the same principles are used in many different terrains. Also, with each successful practice, students' confidence to travel in unfamiliar terrain will grow.

Future Lessons

If your group will be able to do a further sequence of learning from this basic lesson (for example, if they will be with you for multiple days), the following concepts are the next steps to teach:

- Magnetic declination—Learning how to adjust from true north to magnetic north.
- Getting lost—How to triangulate and take multiple bearings to confirm your location on the ground.
- Navigating a more complicated course.
- On-water navigation.
- GPS navigation—Using global positioning system (GPS) electronics as a navigational aid.