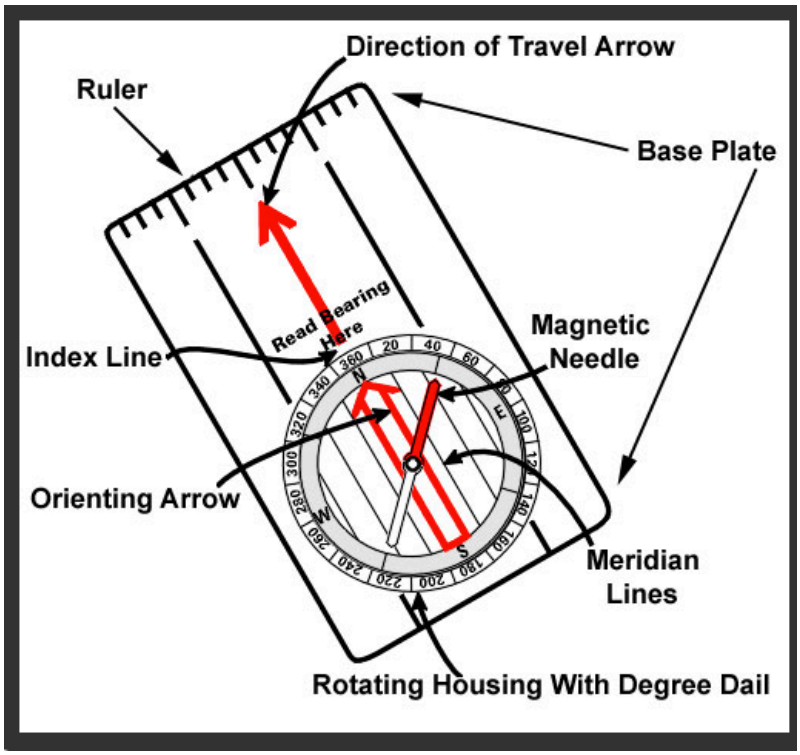
Introduction to Compass and Orienteering Exercise

Name:_____

The basics of compass usage are surprisingly simple and can be mastered quickly; and once learned they will certainly become an invaluable skill for any hiker, mountaineer, back country skier or suchlike outdoor enthusiast. However, if you are anything like most of us, chances are you have been packing a compass around for years, on your outdoor adventures, without fully utilizing it. It's probably time to change that, isn't it?

Essentially a compass is nothing more than a magnetized needle, floating in a liquid, and responding to the Earth's magnetic field consequently revealing directions. Over time compass markers have added features which make compasses work more harmoniously with maps and also more beneficially as stand alone tools. Today, compasses can be classified as one of four types, namely: fixed-dial *(the type that you find on a key chain, or that come out of a gum ball machine)*, floating dial *(the needle is an integrated part of the degree dial)*, cruiser *(professional grade instrument used by foresters)*, and orienteering. **For hiking, mountaineering, back country skiing, canoeing, hunting or the like, the orienteering type** is the most sensible being accurate to with 2 degrees, not requiring a separate protractor nor map or map orientation, and being highly affordable.



Orienteering Compass Parts

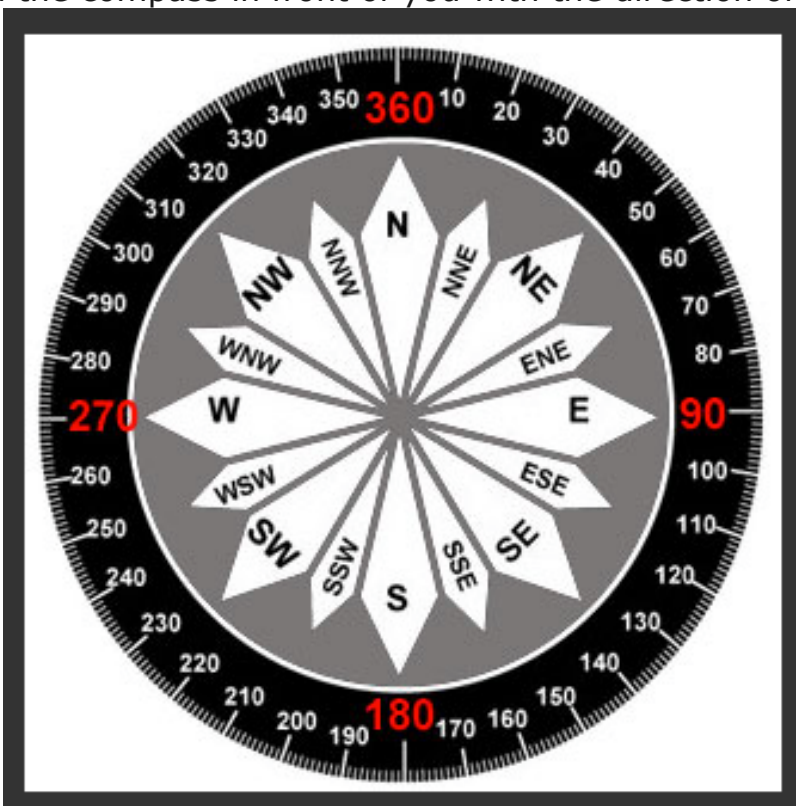
Let's begin our introduction to compasses by taking a look at a standard, modern day, orienteering compass, and identifying its parts. As figure 1 shows an orienteering compass typically consists of three main parts: a magnetic needle, a revolving compass housing, and a transparent base plate. The magnetic needles north end is painted red

and its south end white. The housing is marked with the four cardinal points of north, east, south, and west and further divided into 2 degree graduations indicating the full 360 degrees of a circle. The bottom of the rotating housing is marked with an orienting arrow, and meridian lines. The base plate is marked with a ruler (and/or USGS map scales), an index line (bearing reading line), as well as a direction of travel arrow.

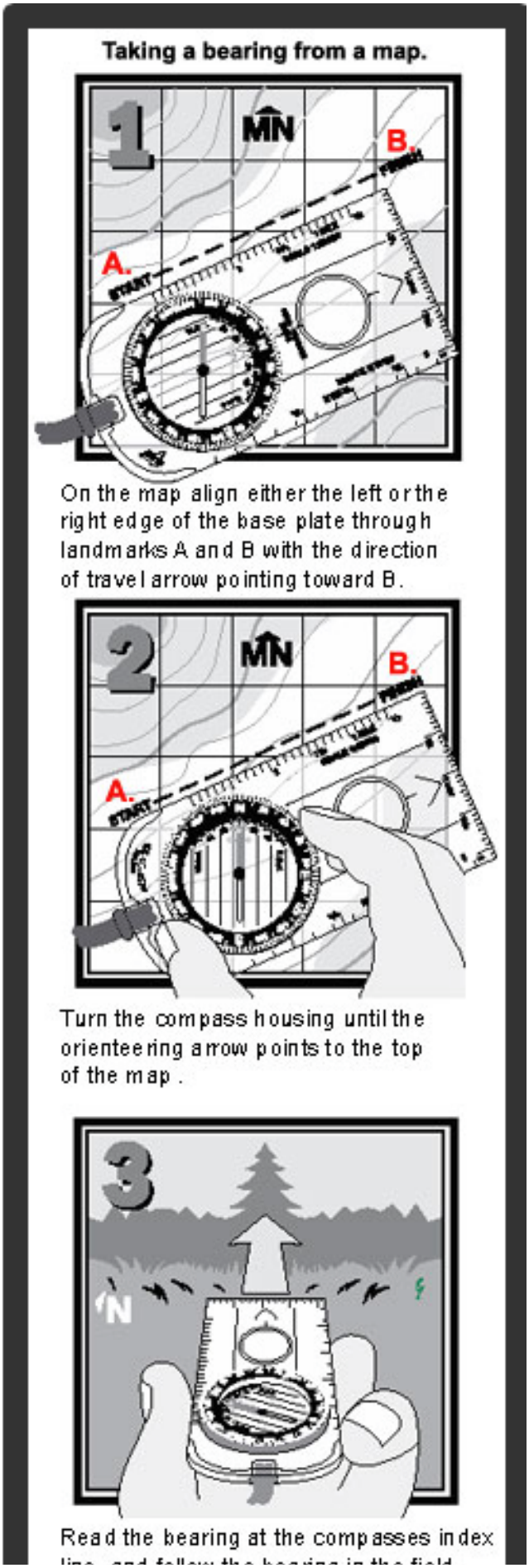
Before beginning to use a compass one should familiarize himself with basic directions and their degree readings. The four cardinal points are all 90 degrees apart, with East being at 90 degrees, South at 180 degrees, West at 270 degrees, and North at 360 degrees (or zero degrees). Identifying the degrees by 45 degree increments gives us the eight principal points of direction namely North (O or 360 degrees), North East (45 degrees), East (90 degrees), South East (135 degrees), South (180 degrees), South West (225 degrees), West (270 degrees), and North West (315 degrees). Memorizing the eight principal points can help one to instinctively associate directions and bearings, and help eliminate errors when taking bears *(bearings are explained in the next section)*. For example if you are told that a landmark is SE of your location, you know that is 135 degrees, or conversely if you know you need to go West but you calculate the bears as 90 degrees you will instinctively realize the bearing is wrong, as West is at 270 degrees *(turn your compass around, you have committed the classic 180 degree error)*. You may have heard directions given in terms like NNW or ESE, those types of directions are a result of distinguishing degrees in 22.5 degree increments resulting in the 16 traditional compass directions. Typically the eight principal points are sufficient to know.

How to take a bearing

One of the most important uses of a compass is taking, and following a bearing. A bearing is the direction from one spot to another, measured in degrees, from the reference line of north; in other words it's one of the 360 degrees of the compass rose. To take a bearing hold the compass in front of you with the direction of travel arrow pointing at the object of interest. Hold the compass level and steady, and rotate the housing dial, until the orienting arrow lines up with the red end (north end) of the magnetic needle, all the while keeping the direction of travel arrow pointed at the object. Read the number indicated at the index line, and that is your bearing. Now to follow that bearing to the object, let's consider an example. Say you want to travel to a large rock outcropping on the horizon, which is currently visible to you, but which may leave your field of vision when you walk into a dip, or when pending clouds come in or the sun sets. Let's say your



bearing on the outcropping measured 315 degrees (or NW). Assuming you still have the direction of travel arrow pointing at the rock outcropping, and have not changed the 315 degree bearing setting on the dial, walk forward keeping the magnetic needle over the orienting arrow (by rotating your body, and not the dial), and the straight line course (as pointed out by the direction of travel arrow), will lead you to the rock outcropping. En route, when the rock outcropping leaves you line of sight pick out an intermediate landmark along the bearing, so you don't have to constantly look down at your compass. Walk to the intermediate landmark, and repeat with another landmark until you reach your destination.



Let's return to the example above where we took a 315 degree (or NW) bearing on a rock outcropping, and lets suppose that enroute to the outcropping we encounter an obstacle which we must go around thus forcing us to deviate from our straight line course. If you are lucky enough to be able to pick out a landmark that's along the bearing, and also on the other side of the obstacle, you have nothing to worry about, just go around the obstacle and get back on course by reaching the landmark and aligning the red end of the magnetic needle over the orienteering arrow, and continue walking.

f you can't see a landmark along your course, there are a couple of other methods you can use to get around the obstacle and get back on your original course. One method is to have a member of your party navigate the obstacle, and then treat him like a landmark. One he has cleared the obstacle talk him into position along your original bearing. Also have him take a back bearing on you to confirm he is in indeed back on course. He can do this by pointing the direction of travel arrow of his compass at himself and then turning his body so as to align the red end of the magnetic needle over the orienteering arrow, and he should notice that you are along the bearing, if not he needs to move left or right.

If the obstacle is too large for the previously

described method, or you are on a solo trip, you can use right-angles to maneuver the obstacle. To do this turn 90 degrees and walk across the front of the obstacle while counting your steps. To make a 90 degree turn without changing the bearing setting on your compass, simply turn your body until the red end (north end) of the magnetic needle points at the West marking (to turn right) or East (to turn left), as opposed to the normal North marking. Once you're past the front of the obstacle turn 90 degrees again, by rotating your body until the red end of the magnetic needle is over the orienting arrow, and walk past the obstacle. Once past the obstacle, turn 90 degrees for a third time (by pointing the red end of the magnetic need at the opposite marking or your first 90 degree turn), and walk the same number of steps you counted to get past the front of the obstacle. Once the steps are up, turn your body to align the magnetic needle back over the orienteering arrow (thus turning 90 degrees for a fourth and final time), and you will be back on course. See figure 3.

Bearings can also be calculated from a topographic map, and then used in the field. Assume you know you are at landmark A in the field, and you want to travel to landmark B, but you can't see it. If you have a topographic map and you can identify both landmarks on the map, you can use you compass with the map to get a bearing thus enabling you to travel accurately to landmark B. On the map align either the left or the right edge of the base plate through landmarks A and B with the direction of travel arrow pointing toward B. If the base plate edge isn't long enough to reach both landmarks simply extend it with any straight edge (for example a piece of paper), or draw a straight line between the points and align the compass edge with the line. Without moving the base plate turn the compass housing until the orienteering arrow points to the top of the map (remember that north is at the top of the map). If you are lucky enough to have one of the maps north/south grid lines visible under the compass housing you can align the meridian lines on you compass with the maps north/south grid line as you turn the housing until the orienteering arrow points to the top of the map. Now, read the bearing at the compasses index line, and follow the bearing in the field! See Figure 4.

A word of caution, map bearings and field bearings can differ in the USA by as much as 30 degrees east and 20 degrees west. This difference and how to deal with it is explained in the next section below on declination. *Figure 4, has a map with magnetic north lines, rather than true meridian lines, and so declination is not a factor.*

Compass and directional Tricks

1. The North Star: In the Northern Hemisphere, Polaris (the North Star) is visible all year round. To find it, locate the Big Dipper and follow the two pointer stars at the end of the cup to the tail of the Little Dipper, Polaris is the last star on its tail, see Figure 7. Roughly the distance to the North Star from the Big Dipper is 5.5 times the distance between the two pointer stars forming the non-handle side of the cup. The Big Dipper rotates around Polaris. The North Star can be used to measure declination. At night, place two sticks in the ground lined up with the North Star, with the taller one to the north of the shorter. Set your compass dial at 360, and point the direction of travel arrow north at the longer stick. Look at the compass needle, and note the difference between its bearing and true north, the difference is declination. In the Northern Hemisphere, latitude is obtained by measuring the altitude of Polaris. At the Equator (0° of latitude) the North Star is on the horizon, making an angle or "altitude" of 0 degrees. Whereas at the North Pole (90° of latitude), Polaris is directly overhead making an angle or "altitude" of 90 degrees. Likewise, at 30°N the star is 30 degrees above the horizon, and so on. In other words, in the Northern Hemisphere, if you know your latitude, you can use that as an angle from the horizon to locate the North Star. To measure your latitude, point a stick at the North Star, then measure the angle the stick makes from a level horizon. Note, some compasses, include an inclination gauge *(not covered in this article)* by which you can easily measure the angle.

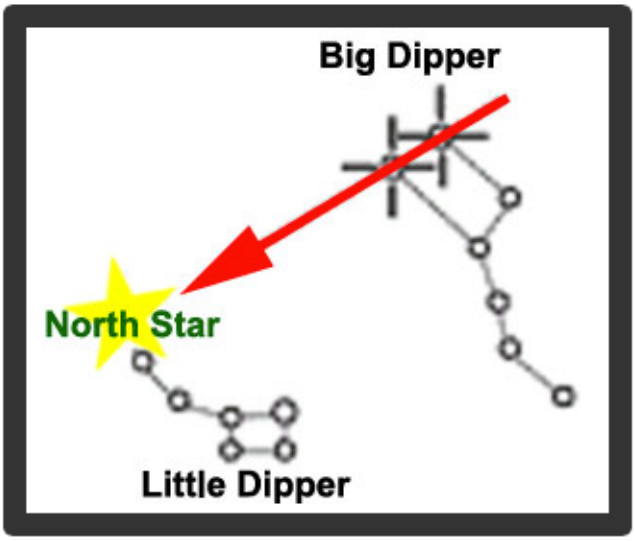


Figure 7: Finding the North Star

2. Determine East and West Via a Shadow: To determine east and west, place a stick in the ground so you can see its shadow (alternatively, you can use the shadow of any fixed object). Ensure the shadow is cast on a level, brush-free spot. Mark the tip of the shadow with a pebble or scratch in the dirt; try to make the mark as small as possible so as to pinpoint the shadow's tip. Wait 10-15 minutes, as the shadow moves from west to east (the opposite side the sun moves on, ie the sun moves from the east to the west -- but both the shadow and the sun move in a clockwise direction). Mark the new position of the shadow's tip with another small object or scratch. Connect the two shadow tip markings with a straight line and you have an east-to-west line approximation. Stand with the first mark on your left, and the second on your right, and you will be facing toward true north. Midday readings give more accurate approximations.

3. Global Positioning System: The U.S. Department of Defense has 24 satellites orbiting the earth, which give off signals that handheld GPS devices can pick up and translate into a user's position and altitude to within roughly 50 feet. These devices are useful, but are not a replacement for knowledge of the basics of orientation and navigation with

a compass and map. Also always remember that a GPS unit is a delicate, battery powered device that can fail or be easily damaged. Never rely solely on, nor allow yourself to become dependant on such a piece of equipment.

4. The tops of pine trees tend to dip to the north.

5. If you do lose your way, keep a cool head - a cool head can accomplish much, a rattle one nothing. Note that lost people tend to wander in circles; as such above all don't run around aimlessly. First stop, relax, and think, then look around for a familiar landmark, or climb a tree or a hill to try to find one. Estimate the time you have been traveling, and the remaining about of daylight - this will help you figure out how far you have traveled. If possible consult your compass, if not possible pay attention to sunset or sunrise which will indicate east and west, or use a wristwatch as a compass. Consider blazing your way by leaving small marks indicating the direction you have taken such as arrows in the dirt or snow, peeled bark on a tree, toilet paper on a tree branch, and/or rock cairns. If it gets dark it may be best to stay put, as such build a rousing fire, making it easier for others to find you and allowing you to stay warm. At night find the North Star and mark that direction on the ground to guide you come daylight.

Other outdoor Tips and Tricks

Figure 8: Estimate Remaining Daylight.

Estimating Remaining Daylight: If you can see the sun and the horizon you can estimate the remaining daylight time. To do so, hold your hand up so it appears that your pointer finger is just touch the bottom of the sun. Then count the number of finger widths to the horizon. Each finger is worth about 15 minutes of time. For example, if you can fit eight fingers (two hands without thumbs) between the bottom of the sun and the top of the horizon there is about two hours of daylight remaining. Note that this trick doesn't really work when one is near either of the poles, as the sun hovers over the horizon longer at those locations. If thirsty and can't find water, suck on a pebble or a button, it will relieve the dryness. Make a sundial from a piece of stick stuck in the ground where the sun's rays can cast a shadow from the stick onto the ground. Refer to a watch to mark the hours, then when the watch goes missing or the owners leaves camp, or the batteries die, you can use the sundial to tell time. To prevent sickness, keep your feet and inner cloths dry, your bowels open, and your head cool. A warm head makes you sweat causing you to remove your hat, and then leaving you open to a cold.

The surest way to stay both fit and healthy is to simple make a point of walking each and every day. Consider this statement by *Soren Kierkegaard a 19th-century Danish philosopher,* "Above all, do not lose your desire to walk. Every day I walk myself into a

state of well-being and walk away from every illness." To dry the inside of wet boots, heat peddles in a frying pan or kettle, or in the fire and place them in the boots, shaking the boots now and then.

Reliable Weather Indicators:

1. "Red at night, campers delight; red in morning campers warning." A red sunset indicates clear weather, whereas a red sunrise indicates rain and wind. Pale Yellow sky at sunset indicates wet weather.
2. "Rain before seven quits before eleven." In other words morning rain often makes clear afternoons. Slow rain tends to last, but sudden rain is typically short in duration.
3. Heavy dew indicates dry weather to follo

Summary

In summary, a compass is an invaluable tool that every outdoors enthusiast should understand how to use. Two of its main uses are to measure bearings, and to pinpoint locations.

When working with bearings one needs to be aware of declination and how that causes map bearings and magnetic (field) bearings to differ. Remember it's simply a matter of subtracting an east declination from a map bearing to convert it to a magnetic (field) bearing, and a matter of adding a west declination. Of course, when converting a magnetic bearing to a map bearing apply the opposite of the rule. Remember, the magnetic needle of a compass is for use in the field, and is never used on a map. Also recall that the top of a map is always north, so when taking map bearings always turn the compass housing to point the orienting arrow at the top of the map.

Of course a compass isn't the only thing that will help you stay oriented in the back country. Always study a map before entering unfamiliar territory. In the field always carry a map and pay attention to the surroundings, as well as make use of natural direction indicators, like shadows, stars, wind, and landmarks.

Short Answer: Introduction to Compass and Orienteering Exercise

Name:

1. Essentially, What is a compass?
2. What activities can a compass be used?
3. What are 6 parts of the compass
    a. Fgjkls
    b. Dfgh
    c. Sfgh
    d. Sfg
    e. Sfg
    f. sfg

4.