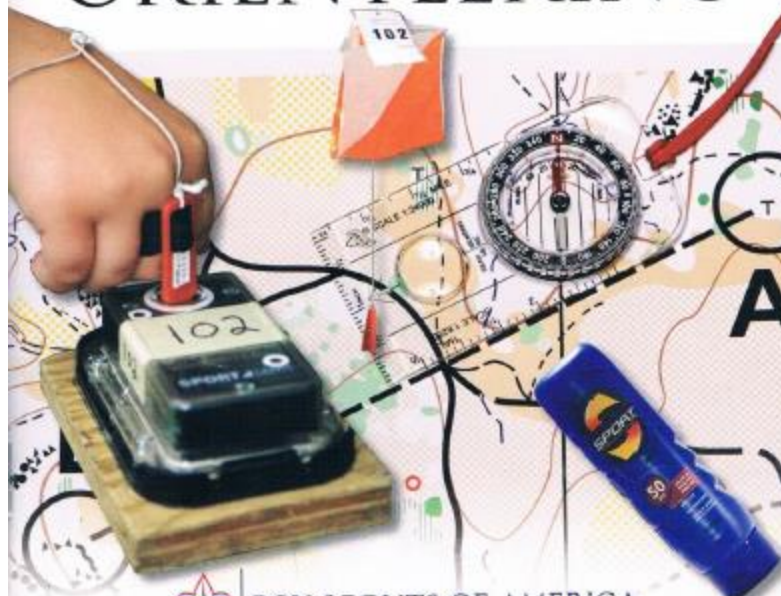


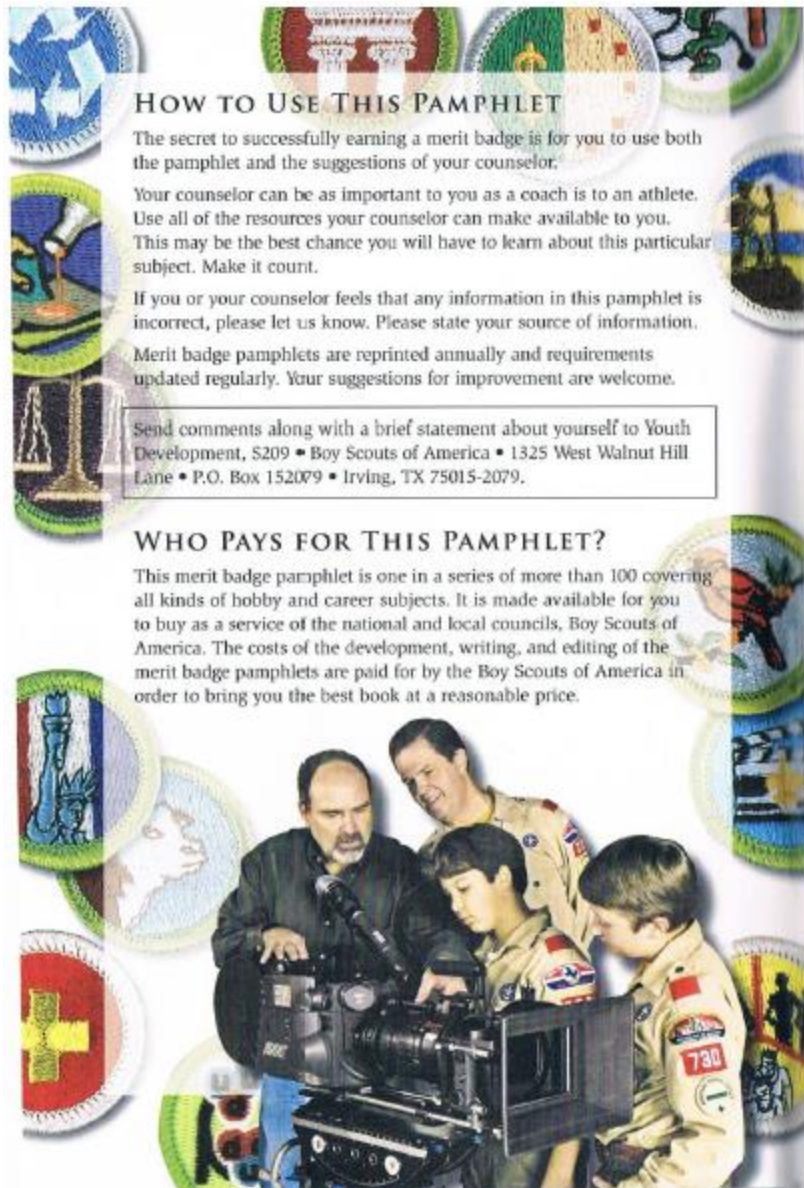
MERIT BADGE SERIES



ORIENTEERING



BOY SCOUTS OF AMERICA.



HOW TO USE THIS PAMPHLET

The secret to successfully earning a merit badge is for you to use both the pamphlet and the suggestions of your counselor.

Your counselor can be as important to you as a coach is to an athlete. Use all of the resources your counselor can make available to you. This may be the best chance you will have to learn about this particular subject. Make it count.

If you or your counselor feels that any information in this pamphlet is incorrect, please let us know. Please state your source of information.

Merit badge pamphlets are reprinted annually and requirements updated regularly. Your suggestions for improvement are welcome.

Send comments along with a brief statement about yourself to Youth Development, S209 • Boy Scouts of America • 1325 West Walnut Hill Lane • P.O. Box 152079 • Irving, TX 75015-2079.

WHO PAYS FOR THIS PAMPHLET?

This merit badge pamphlet is one in a series of more than 100 covering all kinds of hobby and career subjects. It is made available for you to buy as a service of the national and local councils, Boy Scouts of America. The costs of the development, writing, and editing of the merit badge pamphlets are paid for by the Boy Scouts of America in order to bring you the best book at a reasonable price.



BOY SCOUTS OF AMERICA
MERIT BADGE SERIES

ORIENTEERING



BOY SCOUTS OF AMERICA.

Requirements

1. Show that you know first aid for the types of injuries that could occur while orienteering, including cuts, scratches, blisters, snakebite, insect stings, tick bites, heat and cold reactions (sunburn, heatstroke, heat exhaustion, hypothermia), and dehydration. Explain to your counselor why you should be able to identify poisonous plants and poisonous animals that are found in your area.
2. Explain what orienteering is.
3. Do the following:
 - a. Explain how a compass works. Describe the features of an orienteering compass.
 - b. In the field, show how to take a compass bearing and follow it.
4. Do the following:
 - a. Explain how a topographic map shows terrain features. Point out and name five terrain features on a map and in the field.
 - b. Point out and name 10 symbols on a topographic map.
 - c. Explain the meaning of *declination*. Tell why you must consider declination when using map and compass together.
 - d. Show a topographic map with magnetic north-south lines.
 - e. Show how to measure distances on a map using an orienteering compass.
 - f. Show how to orient a map using a compass.
5. Set up a 100-meter pace course. Determine your walking and running pace for 100 meters. Tell why it is important to pace-count.
6. Do the following:
 - a. Identify 20 international control description symbols. Tell the meaning of each symbol.
 - b. Show a control description sheet and explain the information provided.
 - c. Explain the following terms and tell when you would use them: attack point, collecting feature, aiming off, contouring, reading ahead, handrail, relocation, rough versus fine orienteering.
7. Do the following:
 - a. Take part in three orienteering events. One of these must be a cross-country course.
 - b. After each event, write a report with (1) a copy of the master map and control description sheet, (2) a copy of the route you took on the course, (3) a discussion of how you could improve your time between control points, and (4) a list of your major weaknesses on this course. Describe what you could do to improve.
8. Do ONE of the following:
 - a. Set up a cross-country course that is at least 2,000 meters long with at least five control markers. Prepare the master map and control description sheet.
 - b. Set up a score orienteering course with at least 12 control points and a time limit of at least 60 minutes. Set point values for each control. Prepare the master map and control description sheet.
9. Act as an official during an orienteering event. This may be during the running of the course you set up for requirement 8.
10. Teach orienteering techniques to your patrol, troop, or crew.

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Note to the Counselor

While orienteering is primarily an individual sport, BSA Youth Protection procedures call for using the buddy system. Requirement 7a can be completed by pairs or groups of Scouts.

What Is Orienteering?

Since ancient times, rough maps of the Earth and simple compasses have guided explorers, warriors, and pioneers like Lewis and Clark, Marco Polo, Christopher Columbus, and Amelia Earhart. Often, their skills with map and compass were all that kept these men and women from disaster.

What has been a vital skill for humans for thousands of years is now a sport—orienteering. In 1919, a Swedish Scout leader, Major Ernst Killander, decided that compasses and maps could be used for fun as well as survival and navigation. Sport orienteering was born on that day, as 155 contestants fanned out around Stockholm with compasses and maps.

The sport's popularity has grown steadily. The International Orienteering Federation was formed in 1961, and the United States Orienteering Federation followed in 1971. Orienteering is now a recognized sport at the Olympic Games, and thousands of people participate in the sport each year in local clubs and competitions. There are more than 60 clubs in the United States alone. The Boy Scouts of America has long included

orienteering in its program, from local patrol events to national Boy Scout orienteering contests drawing more than 1,000 participants. The Orienteering merit badge is your invitation to explore this exciting activity.



By definition, *orienteering* is a cross-country race in which participants use a highly detailed map and a compass to navigate their way between checkpoints along an unfamiliar course.



Using a Compass

Earth is a giant magnet with two ends, a north magnetic pole and a south magnetic pole. The poles are areas where the lines of magnetic force come together and are strongest. Even at distances of thousands of miles, the poles exert a pull on magnetized minerals. The Chinese were probably the first to discover this between 4,000 and 5,000 years ago when they noticed that lodestone or magnetite, if allowed to swing freely, would always point in a north-south direction. By carving a small pointer of this mineral and then floating it on a liquid, they invented the first compass. Once they added a *compass card*, showing the major directions, they could follow those directions relative to the Earth's magnetic field.

Today's compass has not changed much from those early models. Basic compasses combine a compass card showing 16 or 32 points of the compass or 360 degrees of a circle, and a magnetized metal needle that is colored on the north end.





The compass rose has appeared on maps since the 14th century. A Portuguese mapmaker drew the first 32-point compass rose with a fleur-de-lis—familiar to all Scouts—indicating north and a cross indicating east toward the Holy Land.

The baseplate compass, a magnetic needle within a 360-degree bezel that rotates on a clear plastic base (allowing maps to be read beneath it), provides a convenient and accurate platform for working with bearings.



The thumb compass rides on the thumb and simplifies map orientation and direction finding while you are on the move. It suffers a bit in accuracy, however, especially in the hands of a novice.

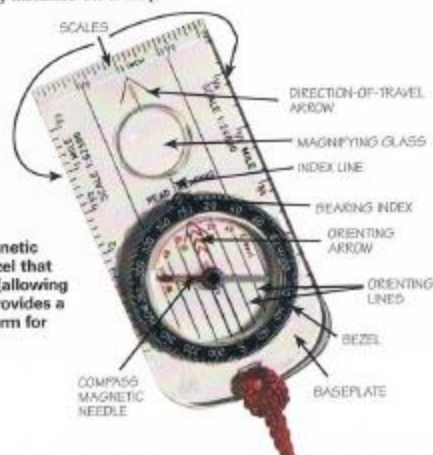
Types of Orienteering Compasses

Orienteering compasses fall into two categories: *thumb compasses* and *baseplate or protractor compasses*.

Special Features of Orienteering Compasses

The *bearing index* and *direction-of-travel arrow* are located on the baseplate. Degrees on a rotating 360-degree bezel are read against the *index line*. The *direction-of-travel arrow*, found at the far end of the index line, indicates which way to go after you have taken a bearing.

Map scales, such as the 1:15,000 scale commonly found on orienteering maps or the 1:24,000 and 1:62,500 scales found on U.S. Geological Survey topographic maps, may be marked along the edges of the compass's baseplate. *Inch and millimeter scales* may appear as well. These scales simplify measuring distance on a map.

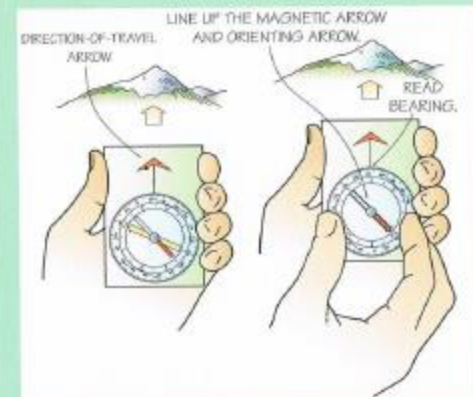


An *orienting arrow* is embossed on the transparent base of the circular compass housing. You use the orienting arrow by aligning it with the needle so that you can take a bearing or establish your direction of travel when a bearing is known. When used along with a map, it allows you to orient the map and take a bearing from the map.

North-south or *orienting lines* lie parallel to the orienting arrow on the base of the compass housing. You use these lines when taking a bearing from a map and when identifying landmarks using a compass and a map.

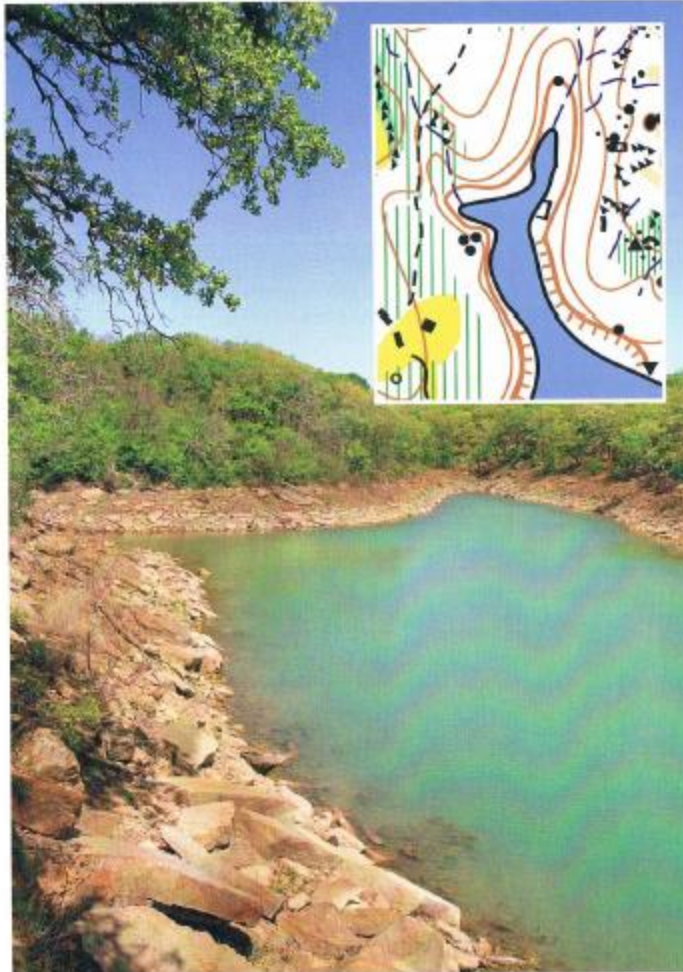
Taking a Bearing

Taking a bearing is simply measuring a direction from one point on the ground to another. Hold the compass in one hand, centered on your body. Rotate your body and the compass until the direction-of-travel arrow points in the direction you want to go. Rotate the bezel of the compass until the north end of the magnetic arrow (usually red) lines up with the north end of the orienting arrow. Determine the bearing by reading the number on the bezel directly opposite the bearing index.



The bearing to the landmark in this example is 225 degrees.

The *magnetic needle* of an orienteering compass is fast setting so that the orienteer wastes no time waiting for the needle to come to rest.



Using a Topographic Map

A map is a two-dimensional representation of a three-dimensional space. It strives to reproduce on a sheet of paper, by using symbols, all the features of a piece of land or water.

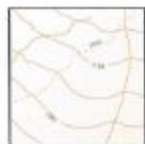
If you walk all the way around the base of a mountain and always stay at the exact same elevation, you are contouring around it. The line you follow is called a *contour line*. Now do it again, only walk a line 20 feet higher in elevation. You have walked a second contour line. The *contour interval* between the two lines is 20 feet.

The contour interval varies from map to map. The contour interval for most USGS maps is 20 or 40 feet, while for most orienteering maps it is 3 or 5 meters. The amount of the interval is usually shown on the map. Find the contour interval on the lower right-hand corner of the full-color centerfold map of Sid Richardson Scout Ranch in this pamphlet.

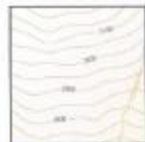
You also can figure out the contour interval. Here's how. Determine the number of contour lines between the two adjacent index contours; add 1 to this figure, then divide by the elevation difference. Usually, an *index contour* occurs every fifth line. It is a bolder brown than the other contour lines, and on most

To understand how relief can be represented by a flat map, imagine a hilly island in the middle of a lake. The shoreline is its lowest contour line. If the water rises 20 feet in the lake, the shoreline will be higher up the hill. If you were to draw these two lines on a sheet of paper, the upper line would lie inside the lower one. Each rise in water level will result in a line that you could draw inside the preceding one. These rings represent a topographic or contour map of the hill.

A *topographic map* tries to show the form of the land including relief, or elevation, by the use of contour lines.



GENTLE SLOPE



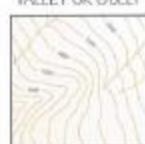
STEEP SLOPE



CLIFFS



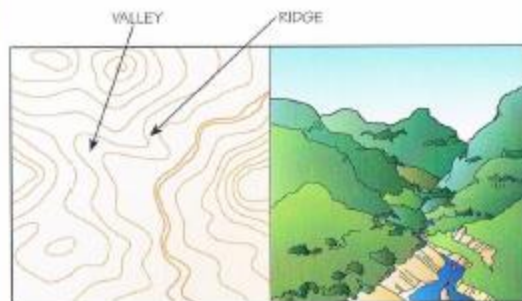
VALLEY OR GULLY



RIDGE

maps you will find a number on it that tells its elevation above sea level. On orienteering maps, the index contour line does not have an elevation number, but is thicker than the others and is used as a guide for the eye.

You can also “see” the shape of the terrain from the profile of the lines on the paper. If a mountain is perfectly conical like a wizard’s hat, the contour lines depicting the mountain will look like a bull’s-eye. Each contour line will be perfectly circular, and all will be the same distance apart. More likely, however, the mountain is irregular. At one part of the mountain, the contour line may intersect a valley or a depression. If the contour line ran into the valley, it would lose elevation and would no longer be considered the same contour line. In order to continue indicating the same elevation on the mountain, the line goes up slightly and then drops back down at the other side of the valley, creating an upward-pointing V shape. When a higher point like a ridge is encountered, the contour line will “V” downward.



Upward “V’s” on a topographical map are valleys, and downward “V’s” represent ridges.

The illustrations here show some important elements. If two contour lines are far apart, it would take a long horizontal distance to climb that distance on the map—the land is relatively flat at that point or just a gentle slope. If they are close together (steep), or almost touching (a cliff), getting up the next few feet will be hard!

Map Features

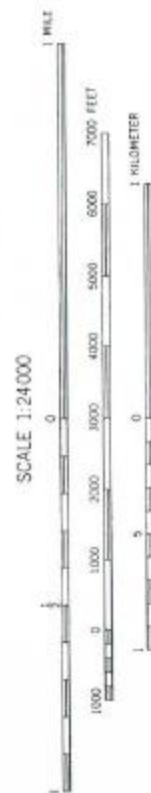
Most maps include a scale relating distance on the map to distances on the actual terrain, and symbols representing features on the ground. The scale is represented as a ratio. Common scales on orienteering maps are 1:5,000, 1:7,500, 1:10,000, and 1:15,000, while scales of 1:24,000, 1:62,500, and 1:250,000 are used for other types of maps. The fraction means that one unit of measurement on the map is equal to a certain number of like units on the actual terrain. So on a map with a scale of 1:24,000, 1 inch on the map equals 24,000 inches on the ground, or 2,000 feet. On a map with a 1:62,500 scale, 1 inch equals 62,500 inches, or approximately 1 mile.

The smaller the second number in the ratio, the smaller the area covered, and the more detail the map will show.

Accompanying the fractional scale of the map are distance rulers—visual representations of the map’s scale. Three rulers are common: one in miles, one in thousands of feet, and for orienteering maps, one in meters and kilometers. These are used to convert a distance between two places on the map to a distance between the same two places on the ground.

Find the scale and the distance ruler on the Sid Richardson Scout Ranch map in this pamphlet.

Maps are artistic representations of reality. All land features on maps are represented by symbols, which may represent the same features from map to map. But symbols can vary, depending on the mapmaker’s preference, the map’s intended purpose, and the country of origin. Therefore, a map usually will have a legend to help identify the symbols. For example, the legend of the Sid Richardson Scout Ranch map shows symbols defined for terrain features such as earthbanks, cliffs, boulders, lakes, power lines, and buildings.



Colors on Maps

Color is used to further define map symbols. Orienteering maps are five-color maps, using black, brown, blue, green, and yellow printed on white. The descriptions below apply only to orienteering maps. Refer to the legends of other maps for identification of symbols and colors.

	Index contour		Open land, open land with scattered trees
	Contour line		Semi-open land, semi-open land with scattered trees
	Form line		Semi-open w/scattered light woods w/scattered light
	Gully		Semi-open slow run (acacia), semi-open noncrossable
	Earth bank		Open forest (white), slow-running forest
	Earth wall		Difficult run forest, light
	Knoll, small knoll		Undergrowth or cactus, single trees, special vegetation
	Pit, rocky pit		Roads: paved, unpaved, vehicle track
	Passable rock face		Trails: large, small, indistinct
	Impassable cliff		Power line
	Boulders		Pipeline
	Boulder clusters		Stone walls
	Boulder field		Fence, broken fence, uncrossable fence
	Rocky ground		Shooting range, crossing point
	Well, spring		Building, small building
	Lake		Special features (man made)
	Seasonal marsh		Fire ring
	Seasonal stream, less distinct seasonal (usually dry)		
	Hunter stand, tower		

Black: Anything constructed by people, including roads, trails, houses, buildings, railroads, power lines, dams, bridges, and boundaries. Paved roads and improved gravel roads are solid black lines. Unimproved roads (jeep trails) are represented by broken black lines. Trails are thinner broken lines. Solid black squares, rectangles, and varying shapes represent buildings. Ruins are outlined. Rock features also will be shown in black.

Brown: Natural land features, such as earthbanks, gullies, depressions, dry ditches, pits, and knolls. Contour lines and form lines also are shown in brown.

Blue: Water features, including streams, rivers, ponds, lakes, oceans, springs, and swamps. Larger patches are ponds or lakes. A thin blue band is a stream, and a broader band is a river. A broken blue line means that a stream flows only some of the time. Swamps and marshes are shown with hatched blue lines.

Green: Vegetation. The shade of green may vary depending on the density of the ground cover under the trees: The darker the shade of green, the denser the ground vegetation. Dark green may reflect nearly impenetrable vegetation, and medium and light green shading could indicate vegetation that you could walk or slowly run through.

Yellow: Open terrain, where you can easily see the sun by looking up. Dark yellow is grass that is fairly short, lighter yellow is rough open terrain, and white dots on yellow is semiopen terrain with scattered trees and bushes throughout.

White: Open forest canopy with minimal ground vegetation. You can run fast through this terrain.

Red or purple: Indicates the layout of the orienteering course.

Two factors are important when considering artificial features. First, they come and go. Don't depend on artificial features to find your way because they are the most likely to change with time. Many maps provide the date of compilation or revision. More recent maps are more likely to truly represent what is present. Second, artificial features may be represented on the map larger than they actually would be on the ground. Therefore, when measuring from a symbol that is exaggerated in size on a map, measure from the center of the symbol for the greatest accuracy.

The International Orienteering Federation has adopted standard symbols to be used for orienteering maps, and these are used in the United States as well as the rest of the world.

Using a Map and Compass Together

In orienteering, you use the map and compass together as a unit, but the map is most important. You can navigate the course without a compass but not without a map.

Declination

The maps you are most likely to use on Scouting hikes or backpacking trips are drawn with their tops aimed at *true north*. Extend a map's boundaries far enough upward, and those lines will reach the north pole. You could say that these maps are made to speak the language of true north. However, compass needles do not point to true north. They are pulled toward *magnetic north*, an area in Canada more than a thousand miles away from the north pole. Compasses "speak" magnetic north, which is a different language from what most maps use.

Arrows drawn in the bottom margin of many maps show the difference between true north and magnetic north. The true-north arrow points toward the north pole. The magnetic north arrow points toward magnetic north. The difference between true north and magnetic north, measured in degrees, is called *declination*. Because of declination, the compass needle will lie to the east or west of true north by as much as 20 degrees westerly in Maine and more than 30 degrees easterly in Alaska. Only in a thin strip from Lake Superior to Florida is there zero declination.



If you do not compensate for declination, you will not be able to find the actual direction between two points as related to the north and south of the landscape. The simplest solution is to convert the language of the map into the language of the compass. Do this by drawing magnetic north-south lines on the map by lining up a ruler against the magnetic north arrow and extending this line with a pencil to the top of the map. Draw parallel lines to this one, a ruler's width apart. This has already been done on all orienteering maps. Because they are drawn with tops aimed at magnetic north, compass readings can be obtained from or applied directly to these maps.



The difference between true north and magnetic north is called declination.

Magnetic Declination Map of the Continental United States



The map shown here is marked with lines along which compasses will show the same declination.

You can take a bearing from a map with magnetic north-south lines drawn on it by aligning the edge of the compass baseplate along the route of travel, making sure that the direction-of-travel arrow is pointing in the direction you intend to go. Rotate the bezel until the orienting arrow or north-south lines lie parallel to and in the same direction as the magnetic north-south lines on the map. Read the bearing directly opposite of the bearing index.

If the magnetic north-south lines are not drawn on the map, convert the language of the compass to that of the map. When you take a bearing from the map or apply it to the map, you must add or subtract the declination to the compass reading depending on whether the declination is easterly or westerly. Always add the number of degrees of error for west declination and subtract for east declination.



On the Sid Richardson Scout Ranch map, the compass edge is laid alongside the line from the hunter's stand at "A" and the northwest end of the cliff at "B." The bezel is turned until the north-south lines within the ring line up with the north arrow of the compass. Read the bearing from the index. The bearing is 244 degrees from "A" to "B." (Points "A" and "B" can be seen in the top photo on page 21.)

Orienting a Map With a Compass

Orienting a map means aligning it with the terrain. You can do this visually, but it is easier to make errors that way. A more accurate way of aligning the map and terrain is to use a compass. First, rotate the compass bezel until N or 360 degrees is lined up with the direction-of-travel arrow. Next, set the compass down on the map, with the compass edge along one of the north-south magnetic lines and the direction-of-travel arrow pointing north. Rotate the map and the compass until the compass needle matches the direction-of-travel arrow. The map is now oriented.



A quick field method of orienting the map is to hold the compass on the map and turn the map and compass so that the compass needle parallels or lines up with the north-south magnetic lines, with the north end of the needle toward the top of the map. Check the terrain around you to ensure that it matches what you see on the map. You can do this almost constantly while on a course and even when moving.

Measuring Distance on a Map

You can measure distance on a map by using a compass scale, a ruled compass edge, or any straight edge.

Using a Compass

Depending on the type of compass, a variety of scales may be marked along the edge of the baseplate. Ideally, one scale on the compass is the same as that on your map. For example, if your map has a scale of 1:24,000 and your compass has that scale on its baseplate, measuring distance is simple. Take the edge of the compass with the proper scale on it and connect the points for which the distance is desired. Simply read the distance directly from the scale. It is fairly common to find orienteering compasses with scales of 1:15,000, 1:24,000, or 1:62,500.

Sometimes you might want to use the edge of the compass as a ruler, with inches on one side and millimeters on the other side of the baseplate. Measure the distance on the map with either scale and compare those distances with the distance rulers on the margin of the map. Read off the ground distance. Distance rulers on maps are generally in miles, kilometers, and feet.

Orienteering uses metric measurements, so you usually will use the kilometer/meter distance bar on the map.

On a 1:15,000 scale, 1 inch on a map is approximately 1,300 feet or 1/4 mile on the ground; on a 1:24,000 scale, 1 inch on a map is equal to 2,000 feet on the ground; and on a map with a scale of 1:62,500, 1 inch on the map is equal to 5,280 feet or about 1 mile on the ground.

Identifying Landmarks

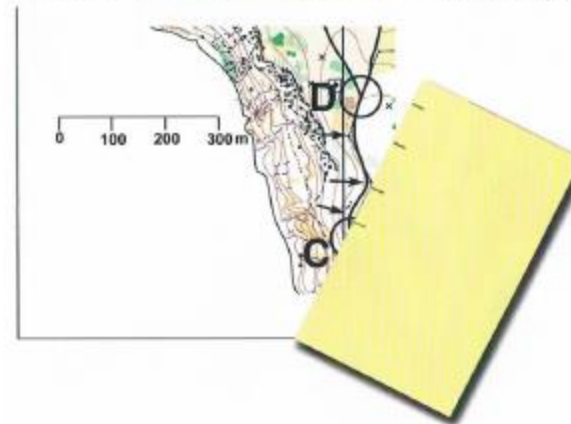
With a compass and a map, you can identify a landmark that you can see from the ground if you know where you are on the map. Take a bearing to the object. Set the compass on the map with one edge of the baseplate touching your location. Point the N end of the housing toward the top of the map. Pivot the entire compass around your location until either the north-south lines in the compass housing or the orienting arrow parallels the north-south magnetic lines of the map. Extend a line from your location up into the map using the baseplate edge of the compass as a guide. Somewhere along that line is the landmark you wish to identify. Compare map, bearing, and actual terrain to locate and identify the feature in question.

Using a Straight Edge

You can easily calculate distances using a strip of paper or other straight edge. This works well on routes with several legs and routes that are not straight.



To measure the straight-line distance between the hunter's stand (A) and the northwest end of the cliff (B) on the Sid Richardson Scout Ranch map, place the straight edge along the line from "A" to "B." Make a mark on the edge of the paper at "A" and one at "B." Move the straight edge to the distance ruler on the map and measure the distance between the two marks. The distance is 585 meters.



To figure a crooked-line distance between "C" and "D," lay a slip of paper on the map as in the illustration. Make a tick mark on the paper at "C" and at each bend in the route until you reach "D." You can determine the total distance by laying the piece of paper against the distance ruler and reading the result. The crooked-line distance in this example is 288 meters.



Judging Distance on the Ground

For some people, judging distance is the hardest part of orienteering. But you can make it easier with some preparation. One way of judging distance is by *pace-counting* or counting every time your right (or left) foot touches the ground over a given distance. Another method is to calculate the time it takes you to cover a predetermined distance. A standard length course for taking these measurements is 100 meters.

Setting Up a 100-Meter Pace-Measuring Course

Lay out a 100-meter course in a straight line using a tape measure. Clearly mark the beginning and the end of the course. It is best to lay out the course where terrain and vegetation are about the same throughout the entire course. This will help you determine more accurately your pace per 100 meters for a given type of terrain or vegetation.

If you will be moving through a variety of terrain and vegetation while orienteering, it is best to determine a 100-meter pace for each type of area in which you will travel. This could mean setting up several 100-meter pace courses. When choosing an area to set up courses, look for places that have a number of 100-meter-long blocks with differing conditions. This will save time in the process of learning your pace count.

Tip: Remember, you are growing rapidly in this stage of your life. Your pace will change as you grow and start taking longer strides. Remeasure your pace frequently.

If the terrain is too mixed, the value you get for the pace count will be less accurate for any single condition.

Every time orienteers switch from walking to running or the reverse, they must mentally adjust the pace and time as well.

Walking Pace/Time

Once you have laid out the course, start at the beginning and walk the length of it, counting the number of paces and recording the time it takes you to reach the end. This is your walking pace and time per 100 meters. You will get a more accurate measure if you walk the course two or more times and then divide the total paces and minutes by the total meters walked. This is particularly important if the course is on uneven ground.



Running Pace/Time

Foot speed is important in orienteering, especially for competitive orienteering. As your stride lengthens, the distance you cover increases. So the number of paces per 100 meters will decrease, as will the time it takes you to cover that distance.

Measuring your running pace and time is exactly the same as measuring your walking pace. Because this is much more active, it is even more important that you run the course several times to get a true measure.

Uphill and Downhill Pace/Time

Your stride will shorten as you move uphill, so the number of paces and the time to cover 100 meters will be more than on level terrain.

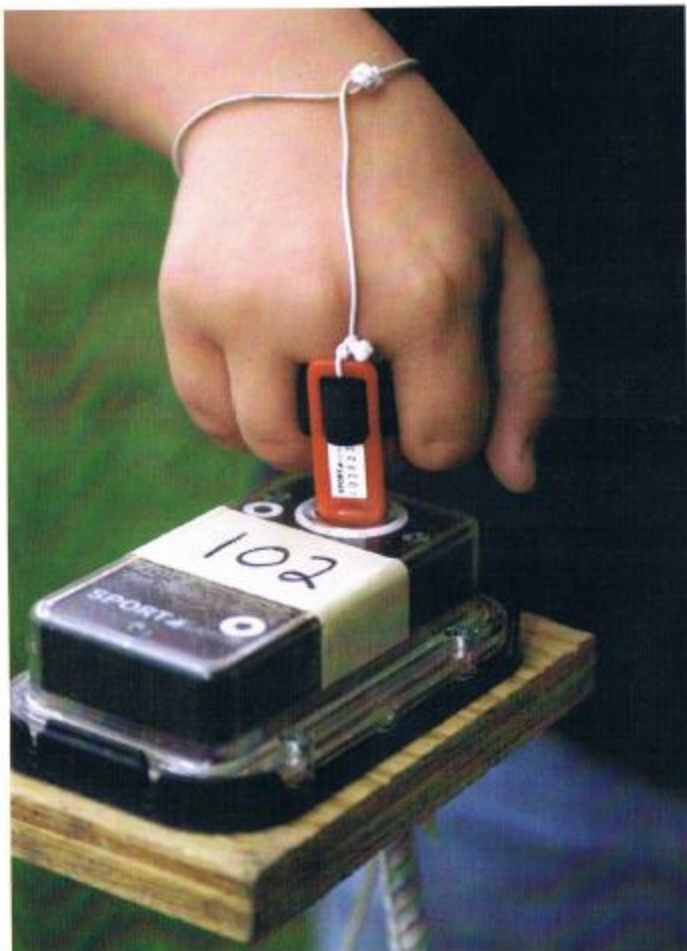
You can get downhill measurements on the same course you use for the uphill by traveling in the opposite direction. Gravity wants to pull the downhill walker or runner along at a faster clip. Your stride will lengthen and the number of paces and time per 100 meters will decrease.

Vegetation Pace/Time

The runnability of vegetation can vary from impenetrable (called *fight* by orienteers), walkable, slowly runnable, and runnable. These conditions may be indicated on maps made especially for orienteering (see the legend of the Sid Richardson Scout Ranch map). Other maps indicate only that vegetation is present, so each meter you traverse can be a surprise—sometimes pleasant, sometimes not. However, you probably will have a general idea what the vegetation will be like in your area.



You can make more accurate pace estimates by calculating paces and times on several 100-meter courses through typical vegetation for your area.



Some orienteering meets use electronic punching to record competitors' times.

Competitive Orienteering

There are two major forms of orienteering competition: *score orienteering* and *cross-country orienteering* (also called free or point-to-point orienteering). There are a number of variations of each type.

Score Orienteering

In score orienteering competitions, many *controls*, or checkpoints, are placed in an area of 1 to 2 kilometers around the starting point, which is also the finish line. The number of controls may vary. Each one can have a point value. Controls that are farthest from the start or hardest to find are awarded a high point value; those near the start and easy to find get lower values.

Competitors have a set time to find as many controls as they can and earn as large a point total as possible. They may visit the controls in any order they wish. The course is designed so that they cannot possibly find all the controls in the time allowed. A penalty of 1 point is subtracted from a competitor's total for every 10 seconds he is overdue at the finish. In team events, this penalty can be changed to 5 points for every minute late. The highest score wins.

In score orienteering, there is no reward for arriving at the finish ahead of time. Competitors must judge the time well and know their own ability at running and map reading in relation to time and distance. This is the best way to introduce orienteering to a group of beginners because it is an equal test for the strong runner and map reader and for the novice.

Team competition is an ideal competition for Scouts when they become good at orienteering. Prizes can be awarded for the best individual competitor and the best team.

Team Competition

Score orienteering can be run as a team competition. Each team is given marked maps and a score sheet that describes all the controls and shows their point values. The team captain notes the length of time that the team has to complete the course. He then assigns controls to each member of the team, giving the harder ones to the best members of the team and the easier ones to the weakest members. He may send team members off in pairs. The competitors find the controls assigned to them, note the code letter on each control, and report back to their leader. The team cannot hand in its score sheet with the code letters written in until all members of the team have returned.

Another way to run this event is to have only the best scores for each team count toward the team total. This number is at the discretion of event organizers. Each member starts at a different time so that he or she cannot help anyone else. The team's score is the total of the best individual scores.

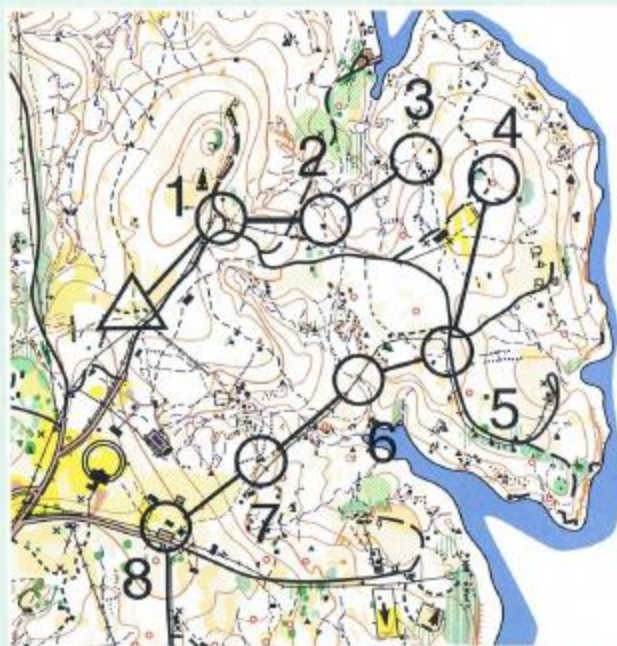
Variations on Score Orienteering

In **night orienteering**, competitors use lights on the course, and the controls often are marked with reflective tape. In **ski orienteering**, skis and ski trails are used. There is a well-established international competition in ski orienteering. **ROGAINE (Rugged Outdoor Group Activity Involving Navigation and Endurance)** events last a long time—6, 12, 24, or 48 hours. Generally, competitors must work with a partner or group. These variations also can be used for cross-country orienteering.

Cross-Country, Free, or Point-to-Point Orienteering

In cross-country orienteering, every competitor must visit the same controls in numerical order, and as quickly as possible. This form of orienteering is a challenge in route choice and stamina. Controls, usually eight to 24, will be marked on competitors' maps with numbered circles. All features where controls are placed will be clearly described on a *control description sheet* that each competitor gets along with the map. Each control will have a unique code letter or number.

CONTROL MAP FOR YELLOW (ADVANCED BEGINNER) LEVEL COURSE



Study the cross-country course shown here. The descriptive clues on the control description sheet for this contest would look like this:

- | | |
|--------------------------------------|--------------------------------------|
| 1. Road bend | 5. Trail junction pipeline |
| 2. Building northeast outside corner | 6. Pipeline crossing stream |
| 3. Trail junction stream | 7. Northeastern boulder cluster |
| 4. Special artificial feature | 8. Building southwest outside corner |

In line orienteering, competitors start at different times so that they can't follow in another's footsteps.

Cross-country courses are age- and skill-graded and can vary in length. A junior or beginner's course may be only 1.5 kilometers long, while a championship course can be up to 14 kilometers. Course levels, indicated by color, progress from novice to expert: white (beginner), yellow (advanced beginner), orange (intermediate), and brown, green, red, and blue (advanced). Long-course orienteering courses are up to twice as long as the standard course of the same level. The winner in each age and course level is the fastest competitor who has all the correct control punches.

Line Orienteering

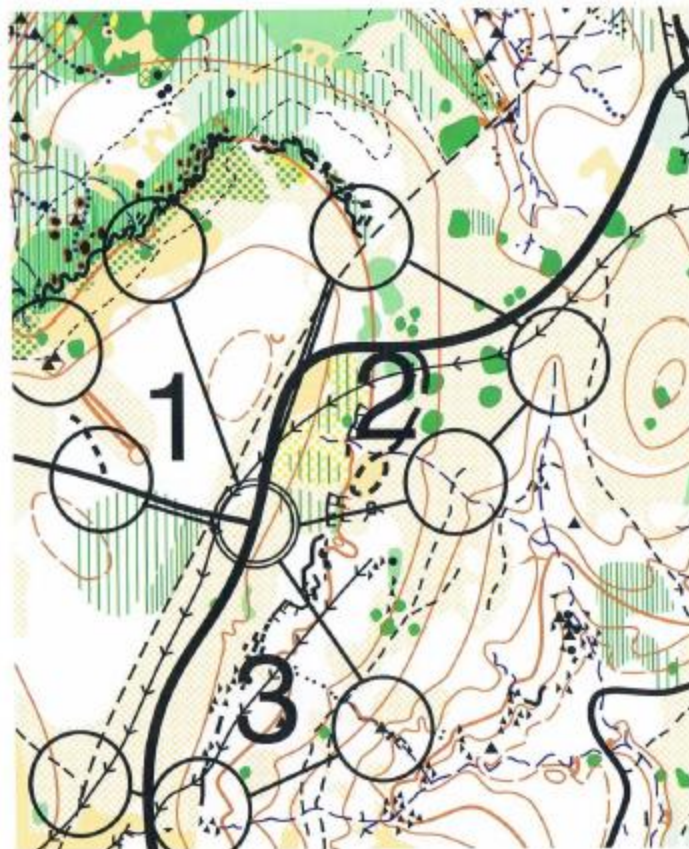
Line orienteering is organized like the cross-country event, with one major difference: No controls are marked on the master map, only a route. The route sometimes follows trails. At other times it goes through woods on a direct bearing. Eventually it returns to the starting location.

Competitors must copy this route exactly on their own maps and follow it as fast as possible by accurate map reading. If they are accurate, they will find controls along the route. There is a time penalty of 10 to 15 minutes for each missed control. The fastest person around the course with the highest number of controls found wins.

Relay Orienteering

Relay orienteering is the most popular team competition. All the rules for cross-country orienteering apply to relay orienteering with one addition: A competitor runs only one loop. The number of loops in the relay depends on the number of members on a team.

The first team member runs to the master map and finds only the controls of his own loop marked on the map. The first runner will be given a *baton*—an identity disk on a cord to hang around his neck. Sometimes the map or the control card is the baton. The runner hands it to the next runner on the team when he has completed his loop. The next member of the team then does his loop and so forth until all members have finished their loops and the team has completed the course.



Relay orienteering course for three-person team

Participants in orienteering events carry a control card, which they punch or stamp at each control to prove that they have been there.

Route Orienteering

In route orienteering, a course is marked on the ground with colored streamers so that it is simple to move from one streamer to the next. The course may meander through woods and across fields until it eventually finishes where it started. At varying distances along the course, yellow flags are placed beside reasonably obvious features. There also is a series of blue flags. Each blue flag is beside a sighting stick with a fore site and a rear site at objects such as a house, a windmill, or a corner of a wood no farther than 1,500 meters away. An official waits at each flag.

Competitors are given some pins and a map stapled to cardboard. The only thing marked on the map is the location of the start. The start time of the competitor is noted, and he is sent down the course.

Competitors must count their paces and check their location the entire time they are on the course. When they see a yellow flag, they make a pinprick on their maps at the exact location of the yellow flag. The pricks must be accurate; the official checks the pin mark and gives a two-minute penalty for every millimeter the pinprick is off. When competitors reach a blue flag, they make a pinprick on their maps for the object at which the sighting stick is pointing. Competitors must know their own location to correctly pinpoint the object's location. Again, a two-minute penalty for each millimeter of error is added to the total time around the course. The course may be 2 to 4 kilometers long with eight yellow and three blue flags.

The judge at the finish has a template showing the exact locations of all controls. Laying the template on top of the competitor's map will reveal any errors in marking.

Window and Corridor Orienteering

In corridor orienteering, a variation of point-to-point orienteering, competitors are given a map with only a narrow strip of terrain visible. If only the control points are visible, it is called window orienteering. These types of competition place a premium on compass skills and the ability to figure out the terrain without seeing the "big picture."

General Orienteering Rules

The U.S. Orienteering Federation is the ruling body for sanctioned orienteering events in the United States. Its rule book is comprehensive and addresses the technicalities of holding an event, as well as conduct that is expected of the participants. A few general rules are provided below, but for detailed information, it is best to consult the rule book or to contact the USOF.

1. Competitors who have prior knowledge of the course that will give them an unfair advantage should not participate. Investigation of the course before an event is forbidden.
2. The use of any navigational aid other than a compass is prohibited, including GPS (global positioning system) units, altimeters, and pedometers. Competitors may use only a compass and the map provided by the organizer.
3. Competitors cannot use outside help nor collaborate with other competitors.
4. It is unfair to profit from the skills of the other competitors.
5. Competitors must move over the course as quietly as possible, so as not to disturb or aid fellow competitors.
6. All participants should be aware of how danger areas are identified and avoid them.
7. It is a competitor's duty to help anyone who is injured.
8. Competitors must not damage competition terrain.
9. Competitors must close all gates and barriers that they may have opened.
10. Competitors must stay out of yards, gardens, planted fields, limited-access roads, railway corridors, and areas marked "Out of Bounds." The only exception to this is if permission has been given in the race instructions.
11. If competitors have not completed the course by the designated closing time, they must report to the race authorities at the finish line and turn in control cards and maps. They must not remain on the course past the competition close. Competitors must never leave the course area without informing race officials.

Source: Adapted from "Selected Rules of Orienteering," a summary by Joe Scarborough, in *Orienteering: The Sport of Navigating with Map and Compass*, by Steven Boggs, Stackpole Books, 1997.

Memory Orienteering

In a memory orienteering competition, competitors are shown only one leg of the course at a time, and they must memorize it before setting off for the control point. The course is completed through a series of memorization and movement legs. This is excellent practice in training the mind to learn information quickly and accurately. This skill is essential to be competitive in orienteering, in that it is directly related to speed.

Trail Orienteering

Trail orienteering is a competitive form of national and international orienteering that is suitable for people with physical disabilities. Participants use high-quality trails to get near the controls, where they must determine the correct control from several choices.

International Control Description Symbols and Sheets

Competitors get a control description or clue sheet and map before or at the start of an orienteering event. For beginners' courses, the clues are given in symbols and written out in words, but for intermediate and advanced competitors, the clues are given in a table format with symbols. A lot of information can be given, and the best competitors read carefully to get as much information as possible.

To promote international competition, the IOF has standardized the maps and symbols used. This makes it possible for orienteers to compete in events in any country, even without understanding that country's language. The symbols are easy to learn. You can guess what most mean without a description.

Column	A	B	C	D	E	F	G	H	
Yellow				1,64K			70m		
Start	△	/	Y						Start path junction
1	121		/	∟					Road bend
2	114		—				┌		Building northeast outside corner
3	101		/	X	≡				Path crossing ditch
4	159		○						Special item
5	132		/	Y	/				Path junction pipeline
6	164		≡	X	/				Ditch crossing pipeline
7	166		▲						Boulder cluster
8	191		—						Building southwest outside corner
									136m marked route to finish

Control description sheet for yellow course

Examine the sample control description sheet shown here. The top of the sheet shows the level of competition (yellow), the course distance in meters (1.64 kilometers), and the meters of vertical climb along the route (70 meters).

Column A shows the control points in the order they are visited, numbers 1 through 8. Column B shows the control codes used in the competition, followed by a "description" of each control's location in the rest of the columns. (See the international control description symbols shown on the following pages.) The last line describes how competitors will approach the finish from the last control—in the example, a 136-meter marked route to the finish.

International Control Description Symbols

Column C: Which Feature (of any similar ones)?

	Southern
	Northeastern
	Upper
	Lower
	Middle

Column D: The Control Feature

	Steep bank
	Quarry
	Earthbank, dam
	Terrace
	Spur
	Rib
	Re-entrant
	Gully
	Dry ditch
	Hill
	Knoll
	Saddle
	Depression
	Small depression
	Pit
	Cliff, crag
	Bare rock
	Cave
	Boulder
	Boulder field
	Stony ground
	Cairn/stone pile

Column D (continued)

	Narrow passage (between cliffs)
	Lake
	Pond
	Water hole
	Stream
	Ditch
	Marsh
	Small marsh
	Firm ground
	Well
	Spring
	Narrow marsh
	Seasonal watercourse
	Open land, field
	Semiopen land
	Forest corner
	Clearing
	Thicket
	Felled area
	Vegetation boundary
	Copse
	Hedge
	Linear thicket
	Road
	Path
	Narrow ride
	Wall
	Fence
	Footbridge

Column D (continued)

	Building
	Ruin
	Tower
	Power line
	Power line pylon/pole
	Shooting platform
	Fodder rack
	Rock pillar
	Single tree
	Salt lick
	Root stock
	Boundary stone
	Charcoal burning ground
	Anthill
	Broken ground
	Special feature
	Special feature

Column E: Details of Appearance

	Shallow
	Deep
	Overgrown
	Open
	Rocky
	Marshy
	Sandy
	Coniferous
	Deciduous
	Ruined or collapsed

Column F: Dimensions of the Feature

	Height in meters
	Size in meters (length/width)
	Height of object on slope

Column G: Location of the Marker

	North side
	Northwest edge
	East corner (inside)
	Southwest corner
	Southern tip
	Western part
	Upper part (head)
	Lower part (foot)
	On top of
	Southern foot
	Southwest end
	Between
	Bend
	At the foot

Column H: Other Information

	Refreshments
	Radio control
	Manned control
	First aid

Orienteering Techniques

Even the most skilled orienteer should always be looking for navigational handrails in the terrain.

Orienteers use a number of techniques to choose their routes along a course.

Handrails

Handrails are linear features along the leg of a course that lead you in the direction you want to go and provide easier travel, continuous direction, and a more accurate position. Orienteers' handrails can be either natural or artificial features such as



In this illustration, the orienteer follows the pipeline handrail almost directly to the control location.

streams, trails, roads, fences, and power lines. More obscure handrails might be ridge lines, valleys, tree lines, forest fire burns, or avalanche scars.

Beginners' courses rely heavily on handrails to help the novice get to each control. The route for the easiest courses may actually go right down a trail or road—the handrail. As the orienteer's skills develop and the courses become more difficult, handrails become less obvious, but the terrain will have usable handrails if the map reader is skilled enough to pick them out from the details.

Collecting, Check-Off, and Catching Features

Always look around and take note of the features you pass as you move toward the next control. There may be some obvious features along the route, such as a large pond or small lake, that will help send you in the right direction. These are *collecting features*, which lie *between* you and the control.

Equally important but less obvious are *check-off features*, which you will see along the way. You can constantly verify your position by making a mental note as you pass the features and moving your thumb along the map as you go.

A *catching feature* lies *beyond* the control. This term makes sense if you think of a catching feature as a landmark that warns you that you have actually passed the control. The feature catches you!

Attack Point

An *attack point* is a large, easily recognized feature that is near the control. The attack point helps you determine your exact location and reach the control. From the attack point, you can use precise navigation, such as an accurate bearing and pace counting, to carefully zero in on the control. The route from the attack point to the control may be so obvious, or so restricted, that you might not even have to take a compass bearing. Generally, orienteering relies more heavily on the map than the compass.

In using collecting points, check-off, and catching features, remember that features on older maps may have long since disappeared.

Aiming Off or Offset Technique

If a control or attack point is on a linear feature, such as a road, it can be more efficient and safer to deliberately aim off to one side of the straight line that heads to the feature. If you arrive at the linear feature and do not see the control, you will then know which way to turn to find it.



In this map, it would be easy to reach the road and not be sure what direction the control lies. To prevent this, you can deliberately aim a few meters south of the control so you know to turn north when you get to the road.

Reading Ahead

Keep a clear mental picture of the terrain that you will pass through. Read the map every few seconds, think beyond your location, and plan ahead. The best way to practice reading ahead is to take time at the beginning of the course and after each control to make sure you understand what the map is telling you. Do not move until you are sure. It is just as important to keep oriented every moment while you are traveling and to keep an eye on what lies ahead. Keep your map out