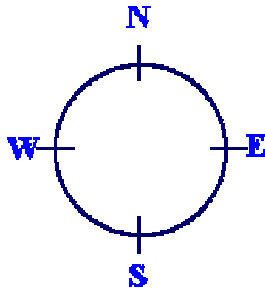


How to use a compass

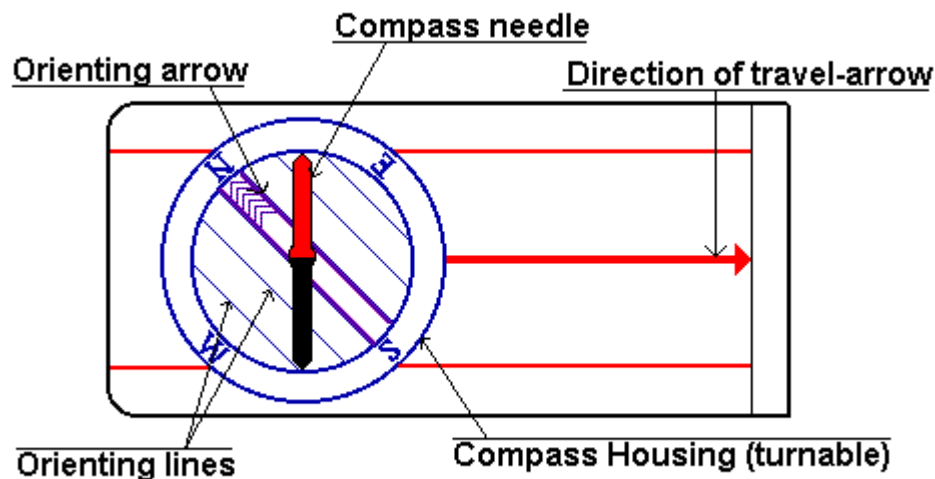
Using the compass alone

This is a very easy lesson, and I would say, not sufficient for those who would like to travel safely in unfamiliar terrain.



The first thing you need to learn, are the directions. North, South, East and West. Look at the figure and learn how they are. North is the most important.

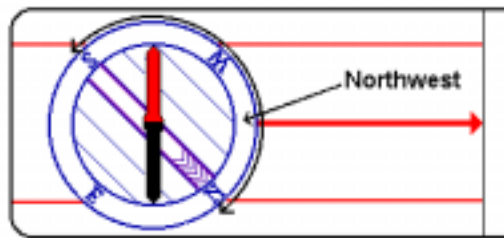
There are several kinds of compasses, one kind to attach to the map, one kind to attach to your thumb. The thumb-compass is used mostly by orienteers who just want to run fast, and this is the kind of compass most used. But for novice compass users I would recommend the third kind of compass. Let's take a look at it:



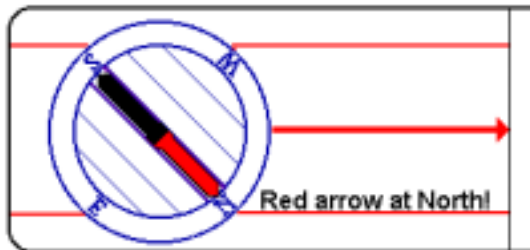
You see this red and black arrow? We call it the *compass needle*. Well, on some compasses it might be red and white for instance, but the point is, **the red part of it is always pointing towards the earth's magnetic north pole**. Got that? That's basically what you need to know. It's as simple as that.

But if you don't want to go north, but a different direction? You've got this turnable thing on your compass. We call it the *Compass housing*. On the edge of the compass housing, you will probably have a scale. From 0 to 360 or from 0 to 400. Those are the degrees or the *azimuth* (or you may also call it the bearing in some contexts). And you should have the letters N, S, W and E for North, South, West and East. If you want to go in a direction

between two of these, you would combine them. If you would like to go in a direction just between North and West, you simply say: "*I would like to go Northwest*".



Let's use that as an example: You want to go northwest. What you do, is that you find out where on the compass housing northwest is. Then you turn the compass housing so that northwest on the housing comes exactly there where the large *direction of travel*-arrow meets the housing.



Hold the compass in your hand. And you'll have to hold it quite flat, so that the compass needle can turn. Then turn yourself, your hand, the entire compass, just make sure the compass housing doesn't turn, and turn it until the compass needle is aligned with the lines inside the compass housing.

Now, time to **be careful!** It is *extremely* important that the red, north part of the compass needle points at north in the compass housing. If south points at north, you would walk off in the exact opposite direction of what you want! And it's a very common mistake among beginners. So always take a second look to make sure you did it right!

A second problem might be local magnetic attractions. If you are carrying something of iron or something like that, it might disturb the arrow. Even a staple in your map might be a problem. Make sure there is nothing of the sort around. There is a possibility for magnetic attractions in the soil as well, "*magnetic deviation*", but they are rarely seen. Might occur if you're in a mining district.

When you are sure you've got it right, walk off in the direction the direction of travel-arrow is pointing. To avoid getting off the course, make sure to look at the compass quite frequently, say every hundred meters at least.

But you shouldn't stare down on the compass. Once you have the direction, aim on some point in the distance, and go there. But this gets more important when you use a map.

There is something you should look for to avoid going in the opposite direction: The Sun. At noon, the sun is roughly in South (or in the north on the southern hemisphere), so if you are heading north and have the sun in your face, it should ring a bell.

When do you need this technique?

If you are out there without a map, and you don't know where you are, but you know that there is a road, trail, stream, river or something long and big you can't miss if you go in the right direction. And you know in what direction you must go to get there, at least approximately what direction.

Then all you need to do, is to turn the compass housing, so that the direction you want to go in, is where the direction of travel-arrow meets the housing. And follow the above steps.

But why isn't this sufficient? It is not very accurate. You are going in the right direction, and you won't go around in circles, but you're very lucky if you hit a small spot this way. And that's why I'm not talking about *declination* here. And because that is something connected with the use of maps. But if you have a mental image of the map and know what it is, do think about it. But I think you won't be able to be so accurate so the declination won't make a difference.

If you are taking a long hike in unfamiliar terrain, you should always carry a good map that covers the terrain. Especially if you are leaving the trail. It is in this interaction between the map and a compass, that the compass becomes really valuable. And that is dealt with in lesson 2.

How to use a compass

Using the compass in interaction with a map

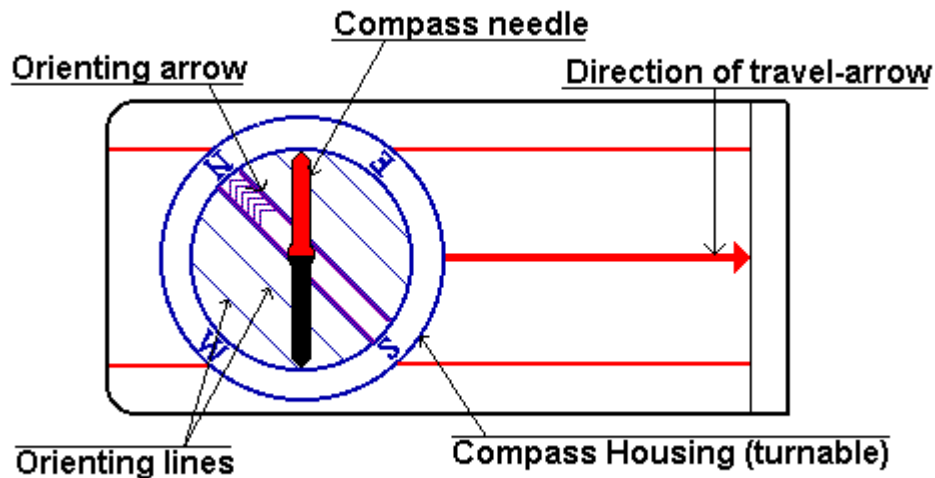
This is the important lesson, and you should learn it well.

It's when you use both compass and map the compass is really good, and you will be able to navigate safely and accurately in terrain you've never been before without following trails. But it'll take some training and experience, though.

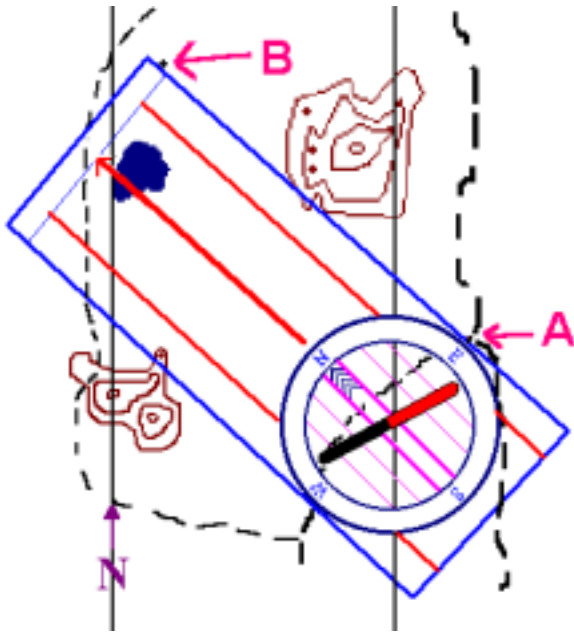
First, a quick summary of what you will learn in this lesson:

1. Align the edge of the compass with the starting and finishing point.
2. Rotate the compass housing until the orienting arrow and lines point N on the map.
3. Rotate the map and compass together until the red end of the compass needle points north.
4. Follow the direction of travel arrow on the compass, keeping the needle aligned with the orienting arrow on the housing.

Here is our compass again:



The principles are much the same as in lesson 1 but this time, you are using the map to tell you which way is correct instead of your intuition.

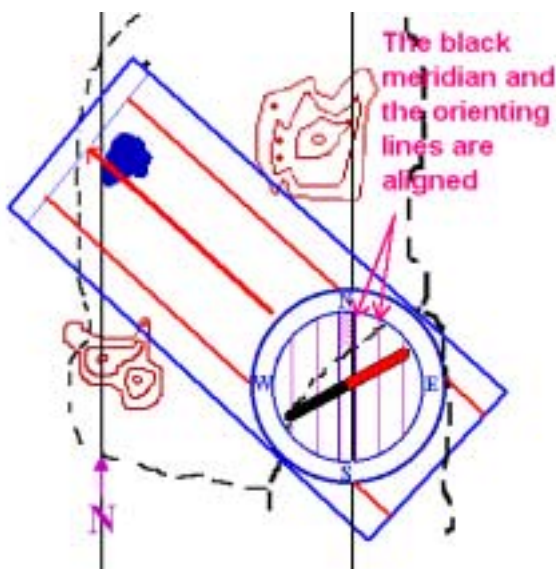


Take a map. In our first example, we look at a map made for orienteering, and it is very detailed. You want to go from the trail-crossing at **A**, to the rock at **B**. Of course, to use this method successfully, you'll have to know you really *are* at A.

What you do, is that you put your compass on the map so that the edge of the compass is at A. The edge you must be using, is the edge that is parallel to the direction of travel arrow. And then, put B somewhere along the same edge, like it is on the drawing. Of course, you could use the direction arrow itself, or one of the parallel lines, but usually, it's

more convenient to use the edge. At this point, some instructors say that you should use a pencil and draw a line along your course. I would recommend against it. First, it takes a lot of time, but offers no enhancement in accuracy of the method. Second, if you have wet weather, it may destroy your map, or if it is windy, you may lose it. You should keep your map (preferably in a sealed) transparent plastic bag, and if it is windy, tied up, so it can't blow away. But most important is that any drawings may hide important details on the map.

Time to **be careful** again! The edge of the compass, or rather the direction arrow, must point *from* A to B! And again, if you do this wrong, you'll walk off in the exact opposite direction of what you want. So take a second look. Beginners often make this mistake as well.



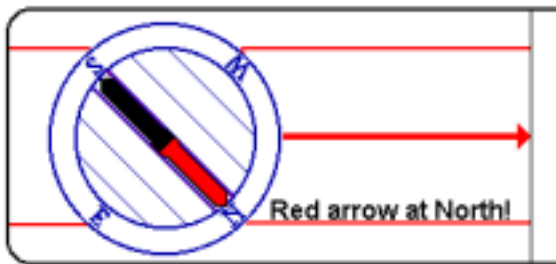
Keep the compass steady on the map. What you are going to do next is that you are going to align the orienting lines and the orienting arrow with the meridian lines of the map. The lines on the map going north, that is. While you have the edge of the compass carefully aligned from A to B, turn the compass housing so that the orienting lines in the compass housing are aligned with the meridian lines on the map. During this process, you don't mind what happens to the compass needle. There are a number of serious mistakes that can be made here. Let's take the problem with going in the opposite direction first. **Be absolutely certain** that

you know where north is on the map, and be sure that the orienting arrow is pointing towards the north on the map. Normally, north will be up on the map. The possible mistake is to let the orienting arrow point towards the south on the map.

And then, keep an eye on the the edge of the compass. If the edge isn't going along the line from A to B when you have finished turning the compass housing, you will have an error in your direction, and it can take you off your course.

When you are sure you have the compass housing right, you may take the compass away from the map. And now, you can in fact read the azimuth off the housing, from where the housing meets the direction arrow.

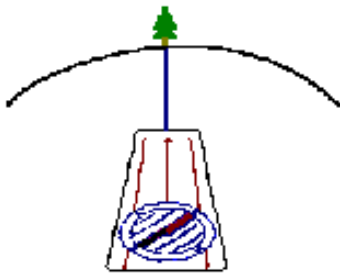
Be sure that the housing doesn't turn, before you reach your target B!



The final step is similar to what you did in lesson 1. Hold the compass in your hand. And now you'll have to hold it quite flat, so that the compass needle can turn. Then turn yourself, your hand, the entire compass, just make sure the compass housing doesn't turn, and turn it until the compass needle is aligned with the lines

inside the compass housing.

The mistake is again to let the compass needle point towards the south. The red part of the compass needle *must* point at north in the compass housing, or you'll go in the opposite direction.

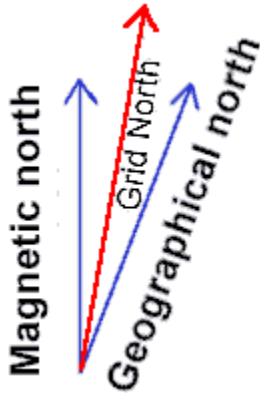


It's time to walk off. But to do that with optimal accuracy, you'll have to do that in a special way as well. Hold the compass in your hand, with the needle well aligned with the orienting arrow. Then aim, as careful as you can, in the direction the direction of travel-arrow is pointing. Fix your eye on some special feature in the terrain as far as you can see in the direction. Then go there. Be sure as you go that the compass housing doesn't turn. If you're in a dense forest, you might need to aim several times. Hopefully, you will reach your target B when you do this.

Unfortunately, sometimes, for some quite often, it is even more complicated. There is something called *magnetic declination*. And then, for hiking, you wouldn't use orienteering maps. And this is the issue for lesson 3.

How to use a compass

Magnetic Declination

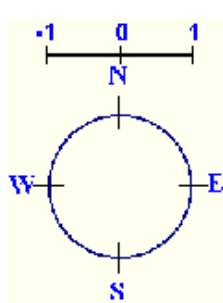


Unfortunately, sometimes, for some quite often, it is even more complicated. There is something called *magnetic declination*. You see, the compass is pointing towards the *magnetic* northpole, and the map is pointing towards the *geographic* northpole, and that is not the same place. To make things even more complicated, there is on most hiking-maps something (that is very useful) called the *UTM-grid*. This grid doesn't have a real north pole, but in most cases, the lines are not too far away from the other norths. Since this grid covers the map, it is convenient to use as meridians.

On most orienteering maps (newer than the early 70's), this is corrected, so you won't have to worry about it. But on topographic maps, this is a problem.

First, you'll have to know how large the declination is, in degrees. This depends on where on the earth you are. Here in California it varies depending on where you are. Or somewhere on the map, it says something about it. One thing you have to remember in some areas, the declination changes significantly, so you'll need to know what it is *this* year.

When you are taking out a course, you will do that more or less as described in lesson 2, but this time, you must also look out so that you don't align the orienting lines with the grid lines pointing west or east, or south for that matter. When you have taken out a course like you've learned, you must add or subtract an angle, and that angle is the angle you found before you left home, the angle between the grid lines or meridians and the magnetic north.



The declination is given as e.g. "15 degrees east". When you look at the figure, you can pretend that plus is to the right, or east, and minus is to the left and west. Like a curved row of numbers. So when something is more than zero you'll **subtract** to get it back to zero. And if it is less, you'll **add**. So in this case you'll subtract 15 degrees to the azimuth, by turning the compass housing, according to the numbers on the housing. Now, finally, the direction of travel-arrow points in the direction you want to go. Again, be careful to aim at some distant object and off you go.

You may not need to find the declination before you leave home, actually. There is a fast and pretty good method to find the declination wherever you are. This method has also the advantage that corrects for local conditions that may be present. This is what you do:

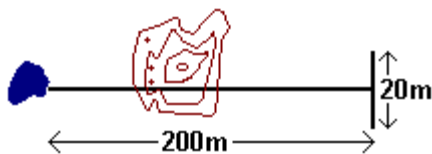
1. Determine by map inspection the grid azimuth from your location to a know, visible, distant point. The further away, the more accurate it gets. This means you have to know where you are, and be pretty sure about one other feature in the terrain.
2. Sight on that distant point with the compass and note the magnetic azimuth. You do that by turning the compass housing so that it is aligned with the needle. You may now read the number from the housing where it meets the base of the direction of travel-arrow.
3. Compare the two azimuths. The difference is the declination.
4. Update as necessary. You shouldn't need to do this very often, unless you travel in a terrain with lots of mineral deposits.

There are a few riddles and rhymes to help you remember whether you should add or subtract. I don't know them. If you live in an area where you don't go far for it to change between east and west, it is so small you wouldn't need to worry about it anyway. So it's best to just remember whether you should add or subtract.

Uncertainty

You can't always expect to hit exactly what you are looking for. In fact, you must expect to get a little off course.

How much you get off course depends very often on the things around you. How dense the forest is, fog, *visibility* is a keyword. And of course, it depends on how accurate *you* are. You *do* make things better by being careful when you take out a course, and it is important to aim as far ahead as you can see.



In normal forest conditions we say that as a rule of thumb, the uncertainty is one tenth of the distance traveled. So if it is like in the figure, you go 200 meters on course, it is possible that you end up a little off course, 20 meters or so. If you're looking for something smaller than 20 meters across, there

is a chance you'll miss. If you want to hit that rock in our example you'll need to keep the eyes open!

In the open mountain areas, things are of course a lot easier when you can see far ahead of you.
