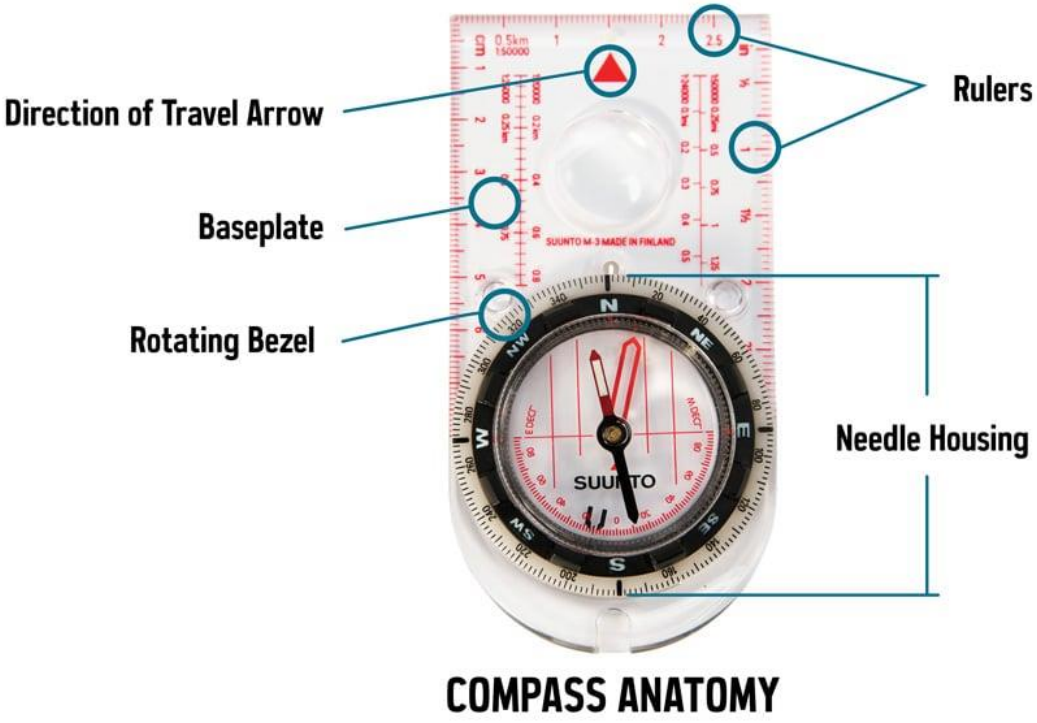
How to Use a Compass

This article covers the following concepts:

- Identifying the basic parts of a compass
- Understanding and setting declination adjustment
- Using your compass to orient your map
- Understanding bearings and how to use them

Also read REI's companion article, How to Use a Topo Map. Why not rely exclusively on a phone or GPS receiver? Because batteries can die, and gadgets can malfunction. A compass relies only on Earth's magnetic fields.

1. Get to Know the Parts of a Compass



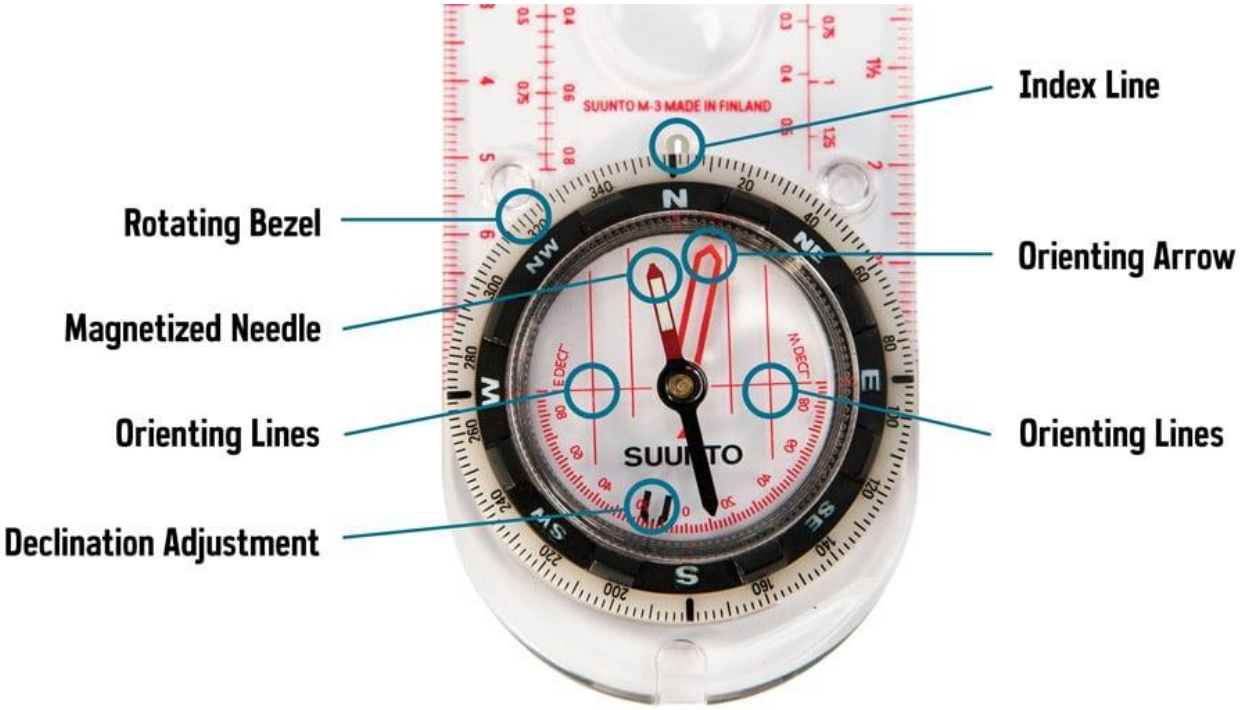
For this article, we're using a compass that has all the features you need for basic navigation:

Baseplate: Clear, so you can see the map below it, it has at least one straight edge for taking bearings and transferring them to your map.

Ruler(s): Used with your map's scale to determine distances.

Direction-of-travel arrow: Tells you which direction to point the compass when you're taking or following a bearing.

Rotating bezel: Also called the "azimuth ring," this outer circle has 360-degree markings.



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Index line: Located directly above the bezel, it's also called a "read bearing here" mark.

Magnetized needle: The end that always points to the magnetic pole is usually colored red or white. The red end of the needle points toward Magnetic North. Often, the red end of the needle referred to as "Red."

Orienting arrow: Used to orient the bezel, it has an outline shaped to exactly fit the magnetized end of the needle. Often, the Orienting Arrow is referred to as "the Shed."

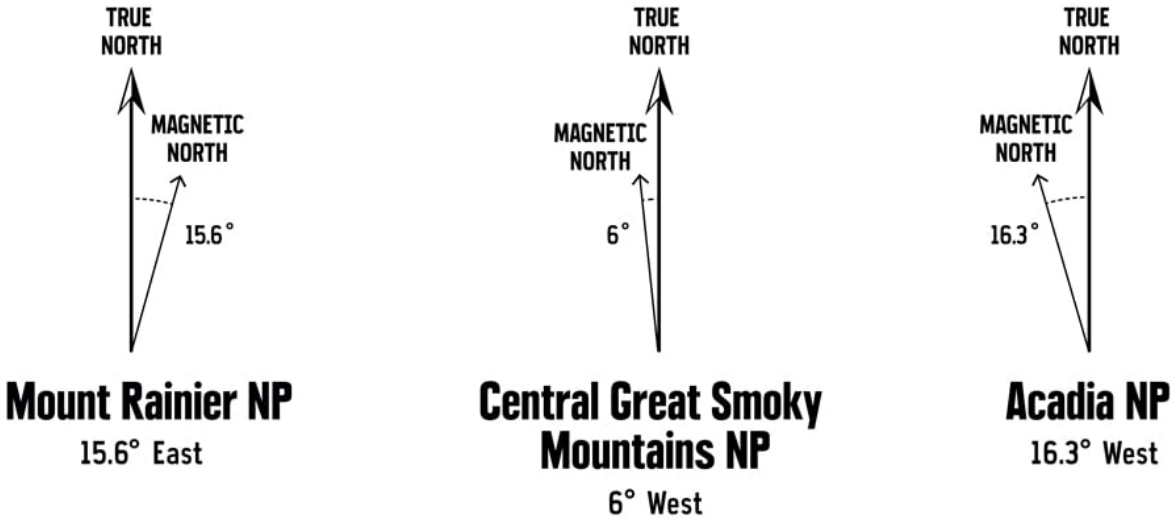
Orienting lines: Parallel lines that rotate with the bezel; correctly aligning these with the north-south lines on a map aligns your orienting arrow with north.

2. Adjust Declination

North on a map is easy to find (it's at the top). North on a map is known as "True North." In most locations in the real world, though, magnetic north (where your needle points) and true north differ by a few degrees: That difference is known as "declination."

In the continental U.S., declinations vary from 20 degrees east in parts of Washington state to 20 degrees west in parts of Maine. For instance, the magnetic declination at the Albany Airport is 13 degrees, 8 minutes west (Feb. 2023, NOAA). Because a single degree of error can set you off course by 100 feet over a mile, it's important to accurately adjust for declination.

Before you can adjust for it, you must find the declination value in your trip area. Topo maps list it, but the value varies over time. So check the map's revision date or, better yet, consult the National Oceanic and Atmospheric Administration (NOAA) website.



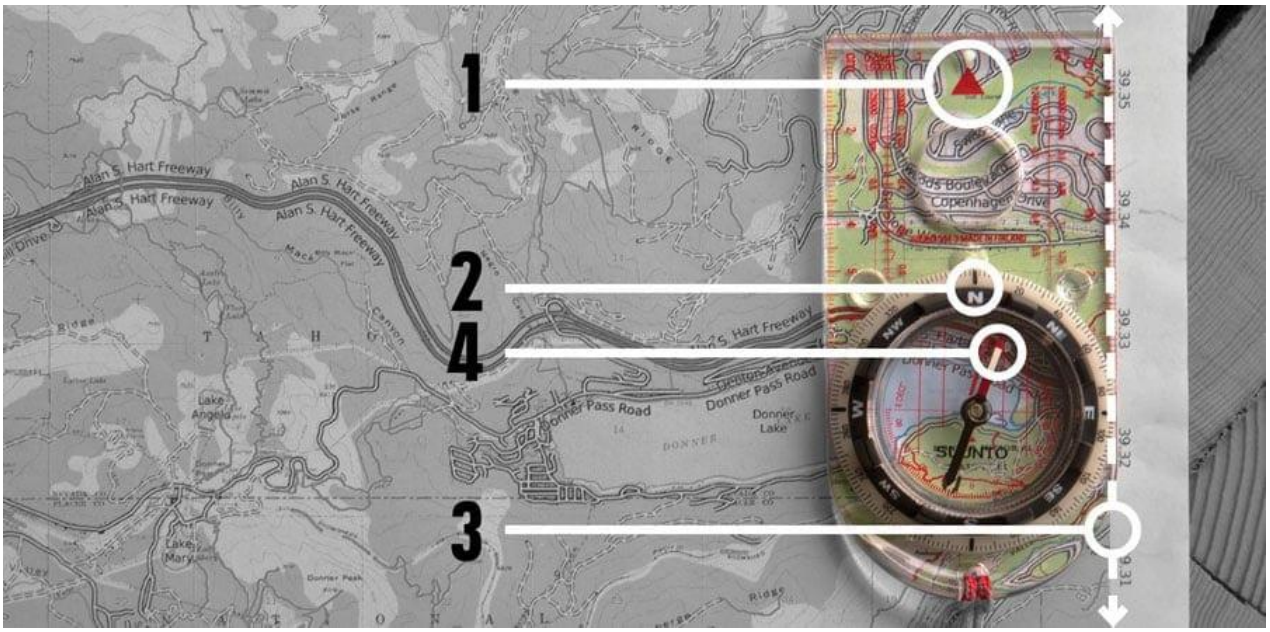
The way you adjust for declination varies with different compass brands (some use a small tool) and you'll need to follow the provided instructions. Once the declination is set for a trip, you don't have to think about it again until you travel to a faraway place.

You can adjust for declination without adjusting your compass by adding west declinations to a map-read bearing or subtracting east declinations from a map-read bearing. Quick example:

- You take a bearing from point A to point from your map of 132 degrees. If the declination in your area is 13 degrees west, what magnetic bearing should you follow?
    - Map bearing = 133 degrees
    - Declination = 13 degrees west (or +13 degrees)
    - Magnetic bearing to follow in the field = 132 + 13 = 145 degrees.
    - Set your compass to 145 degrees and head out!
- To convert map bearings to magnetic bearings remember this rhyme: West is best, East is least.

3. Orient Your Map

Map reading—correlating what you see on paper to what you see around you—is a foundational skill that you should practice early and often. Before you can do that, though, you must have your map oriented correctly.



Once you've set your compass for your local declination, map orientation is simple:

1. Place your compass on the map with the direction of travel arrow pointing toward the top of the map.
2. Rotate the bezel so that N (north) is lined up with the direction of travel arrow.
3. Slide the baseplate until one of its straight edges aligns with either the left or right edge of your map. (The direction of travel arrow should still be pointing toward the top of the map.)
4. Then, while holding both map and compass together and steady, rotate your body until the end of the magnetic needle is within the outline of the orienting arrow. (Putting RED in the SHED).

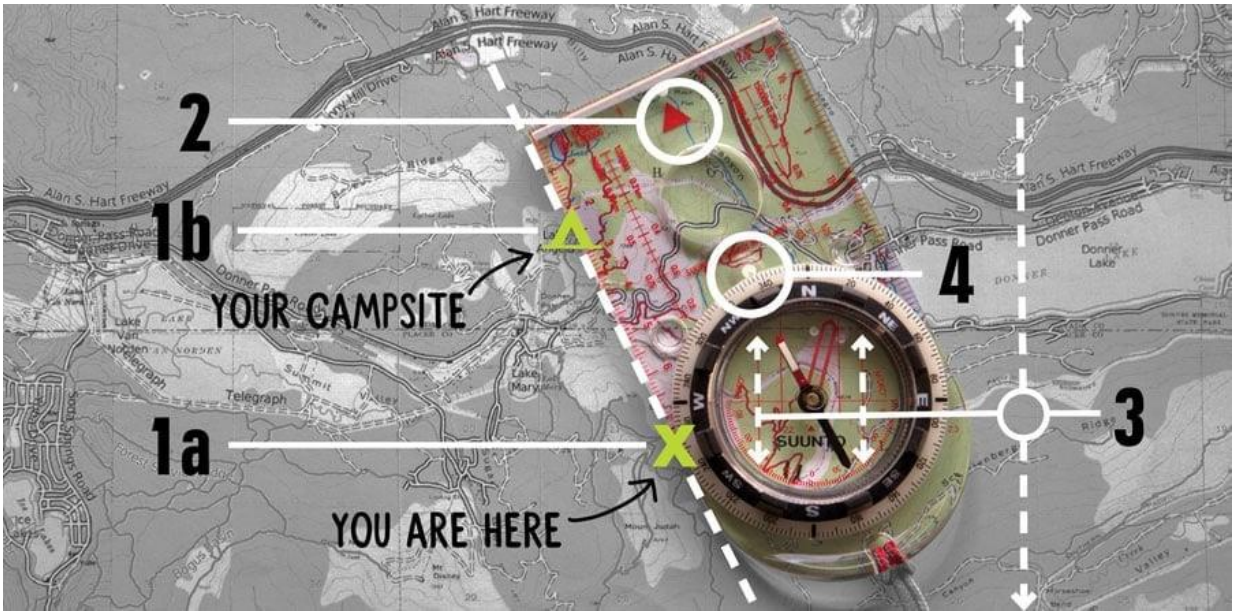
Now you have the map oriented correctly and can identify nearby landmarks on it. Take time to become familiar with your map and surroundings before you head off. And keep reading your map along the way: Staying found is far easier than finding yourself after you're lost. So, pay attention to where you are on the map as you go.

4. Take a Bearing

A "bearing" is simply a navigationally precise way to describe a direction. For example, instead of heading "northwest" to get to a campsite, you might follow a bearing of 315 degrees.

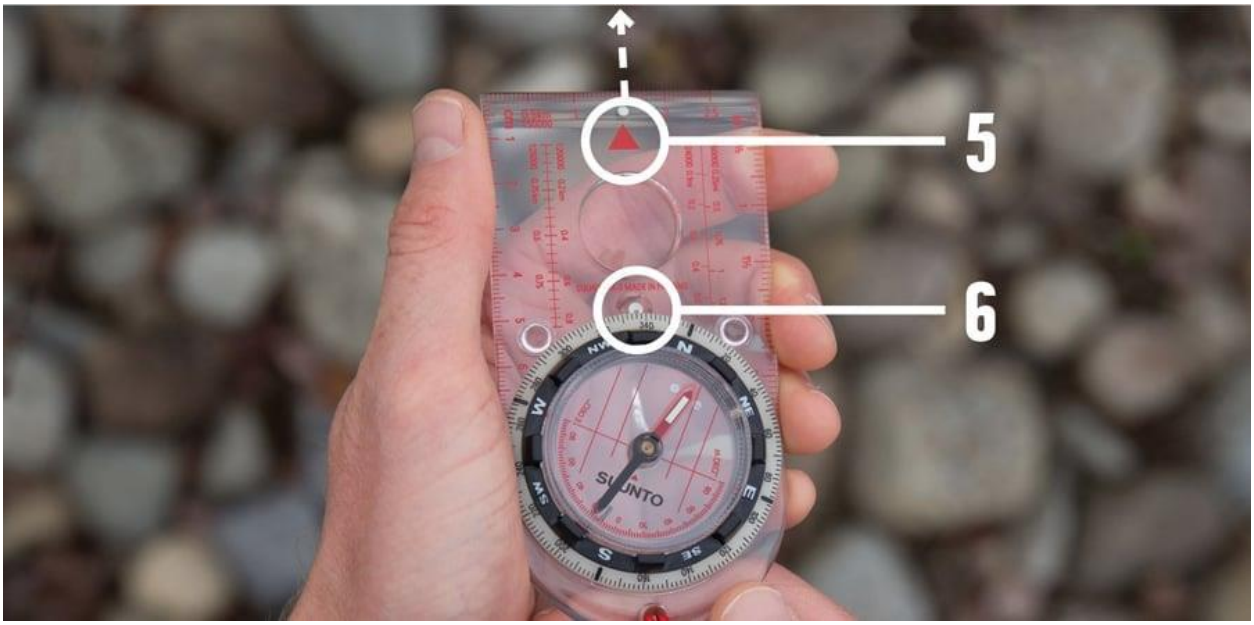
Bearings are always relative to a specific location. Following the same bearing from two different places will not get you to the same destination.

Taking a Bearing from a Map



You can use a bearing to get to a location any time you know where you are on a map:

1. Set your compass on the map so that the straight side of the baseplate lines up between your current position (1a) and the map location for a destination like a campsite (1b).
2. Make sure the direction of travel arrow is pointing in the general direction of that campsite (in other words, it's not upside down). This is a key point. Double check your direction of travel or the bearing you take from the map will be exactly the opposite direction of where you want to go!
3. Now rotate the bezel until the orienting lines on the compass are aligned with the north-south grid lines and/or the left and right edges of your map. (Be sure the north marker on the bezel is pointing north on the map, not south.)
4. Look at the index line to read the bearing you've just captured.



Now you can use the compass to follow that bearing to your destination:

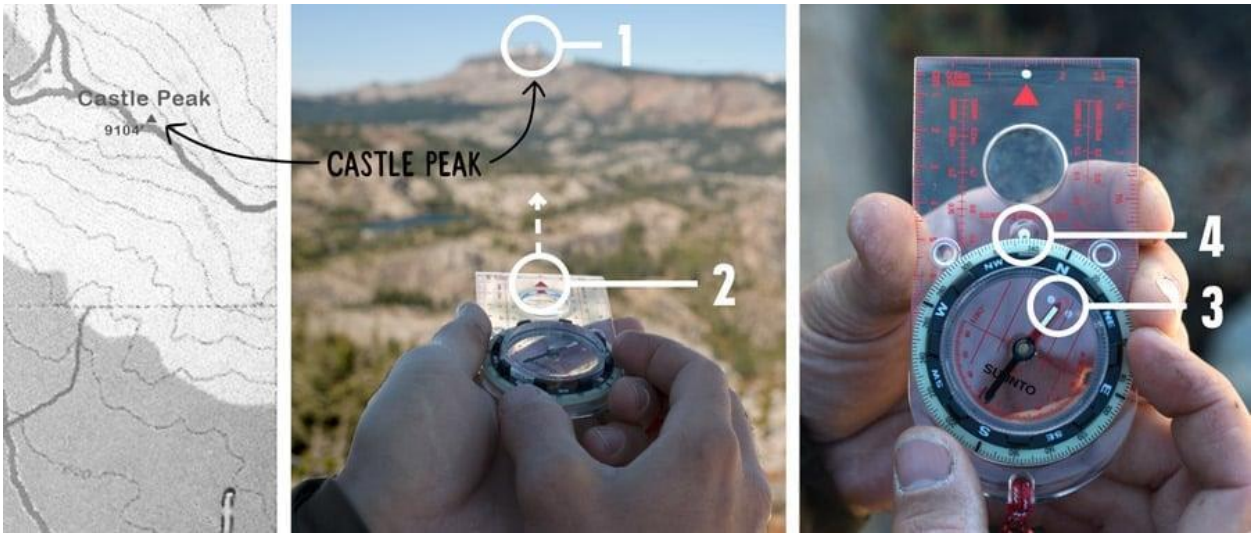
5. Hold the compass with the direction of travel arrow pointing away from you.

6. Rotate your body until the magnetized needle is inside the orienting arrow (again, you're putting RED in the SHED). DO NOT ROTATE THE BEZEL; ROTATE YOUR BODY!! The direction of travel arrow is now facing the bearing you captured, and you can follow the DIRECTION OF TRAVEL to your destination.

7. Find a target on the horizon in that direction and walk to it. Once you get there, repeat Steps 5 & 6, find a new target and walk to that one.

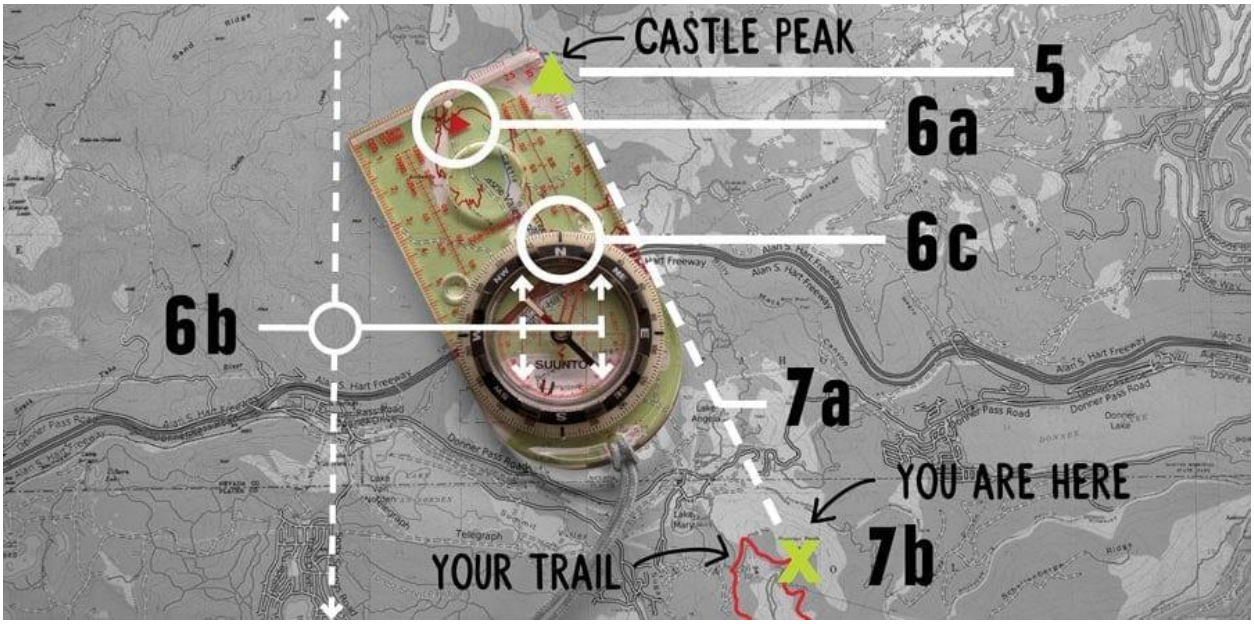
8. Repeat until you reach your destination

Taking a Bearing in the Field



You can also use a bearing to find where you are on a map. You might want to know exactly where you are along a trail.

1. Start by finding a landmark that you can also identify on your map.
2. Hold your compass flat with the direction of travel arrow pointing away from you and directly at the landmark.
3. Now rotate the bezel until the magnetized needle is inside the orienting arrow (Putting RED in the SHED).
4. Look at the index line to read the bearing you've just captured.

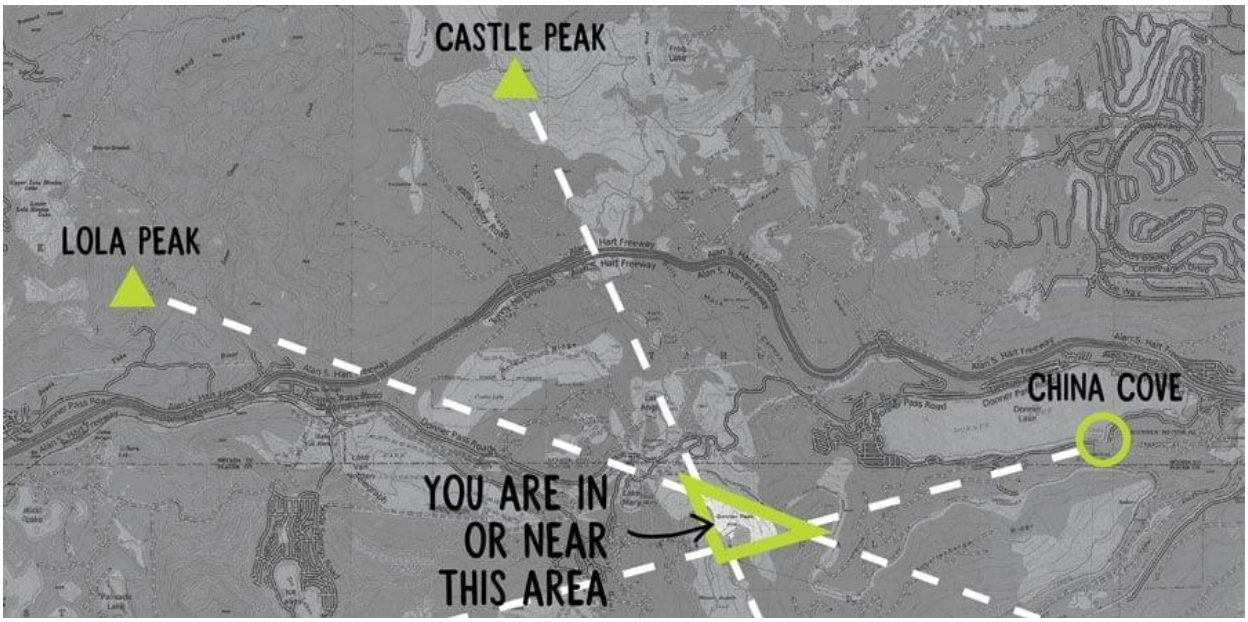


Now you can transfer that bearing to your map to find your location:

5. Lay your compass on the map and align one corner of the straight edge with the landmark.

6. Making sure that the direction of travel arrow remains pointed in the general direction of the landmark (6a), rotate the entire baseplate (DO NOT ROTATE THE BEZEL) until the orienting lines are running north/south (6b) and the north marker on the bezel is pointing to north on the map (6c).

7. Now you can draw a line on the map along the straight edge of your compass (7a). The point where that line from the landmark crosses your trail is your location (7b).



You should use multiple bearings to find where you are on a map. If you aren't on a linear feature like a trail, you can still find where you are on a map. Called "triangulation," this process simply requires you to follow these same steps with a second and a third landmark, preferably ones that are at least 60 degrees away from your first landmark (and each other).

If the lines you draw meet at a single point, that's your location. Most of the time, though, the three lines will form a small triangle—your location will be somewhere in or near that small area. If the lines form a very large triangle, recheck your work because you have at least one significant error.

Note: Content in this article was modified from REI's Expert Advice Outdoor Basics Website: https://www.rei.com/learn/expert-advice/navigation-basics.html . The REI has additional content and videos for those interested in a deeper understanding on this and other outdoor topics.