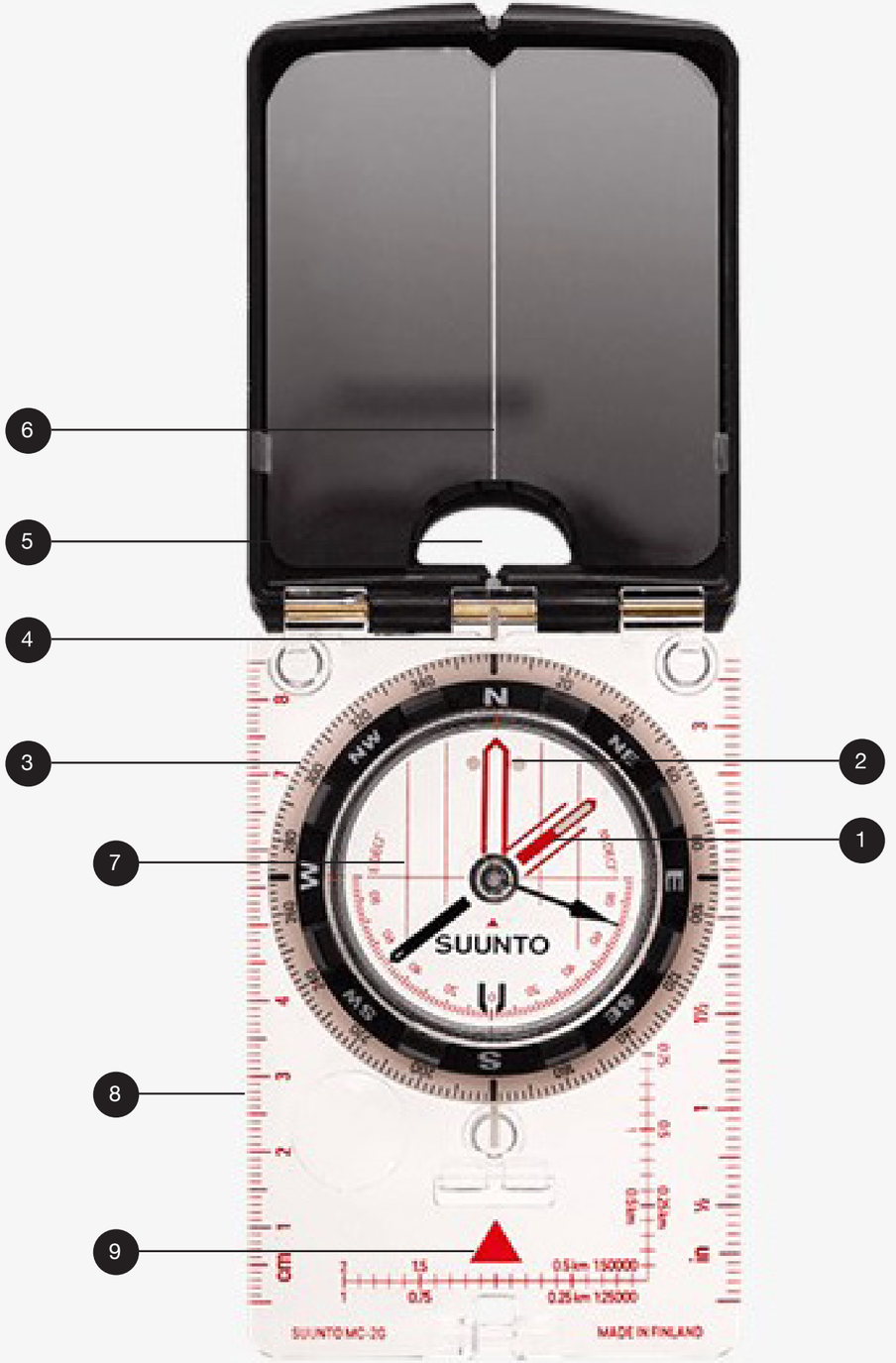
COMPASS BASICS

ANATOMY OF A COMPASS

(using the Suunto MC2G)

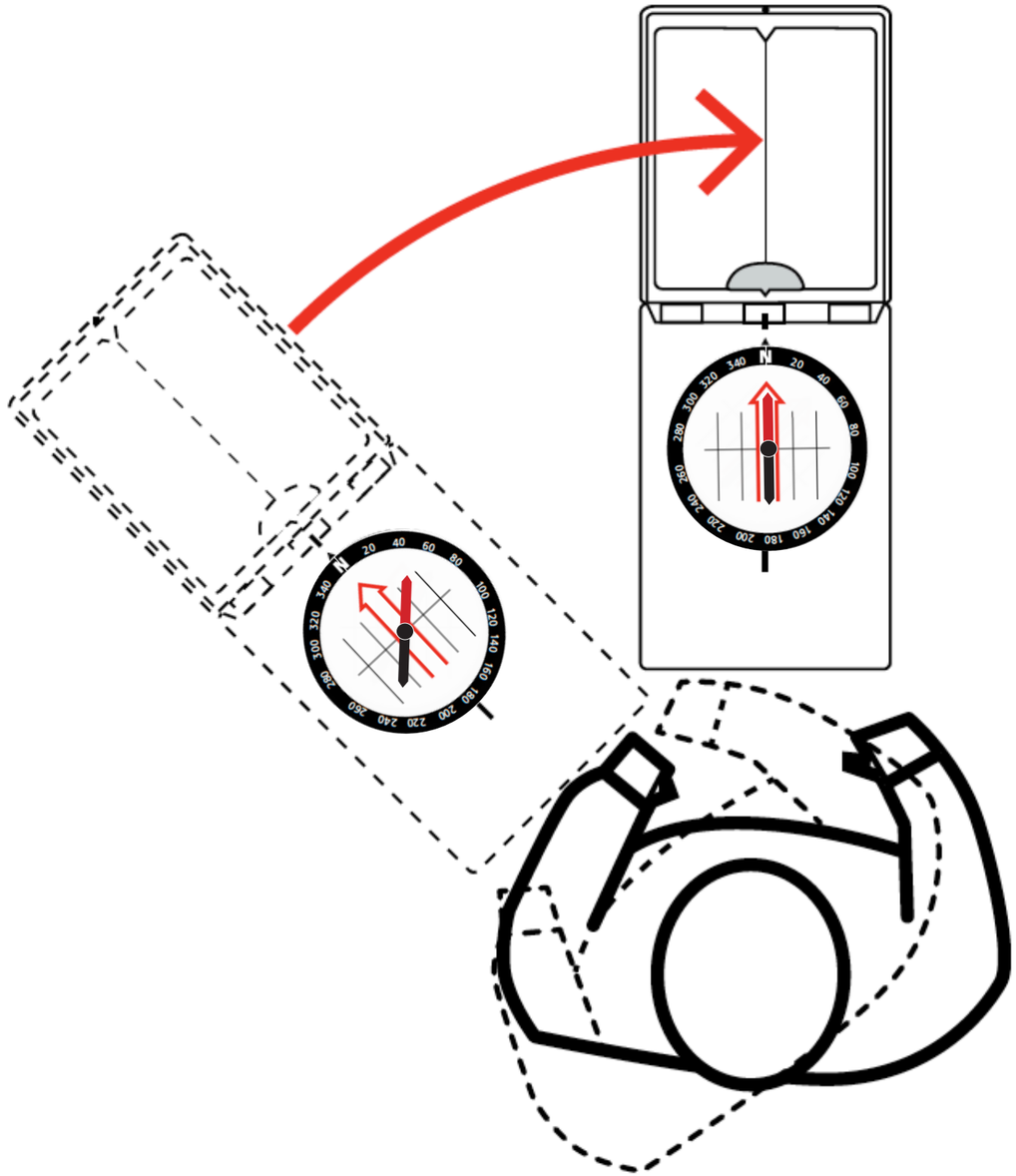
1. **Needle** with red side that always points to magnetic north
2. **Orienting Arrow** for aligning with needle to find direction to target
3. Rotating **Bezel** with directions in degrees
4. **Bearing Index** for reading numerical bearing from bezel
5. **Notch**, **Mirror** and **Sighting Hole** for precise sighting of an object
6. **Center Line** for aligning target and compass
7. **Meridian Lines** used to align the dial with grid lines on a map
8. **Baseplate** with straight edges and scales for working on map
9. **Direction-of-travel Arrow** for pointing to target on map and when moving



Finding North

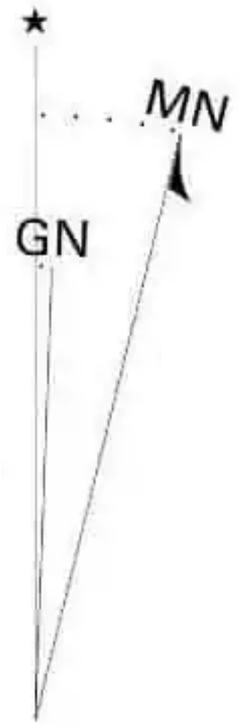
1. The compass works based on magnetism. The **Needle**, will always point to ***Magnetic North****. To orient yourself using the compass, all you need to do is hold the compass flat and turn around until Red is in the Shed (the red end of the **Needle** is squarely inside the **Orienting Arrow**).

   You are now facing North.



* More about ***Magnetic North*** later (Did you know there are three DIFFERENT “Norths” in navigation?)

Three Norths



True North
The geographical north where the 'North Pole' is, as defined by the rotation of the Earth.

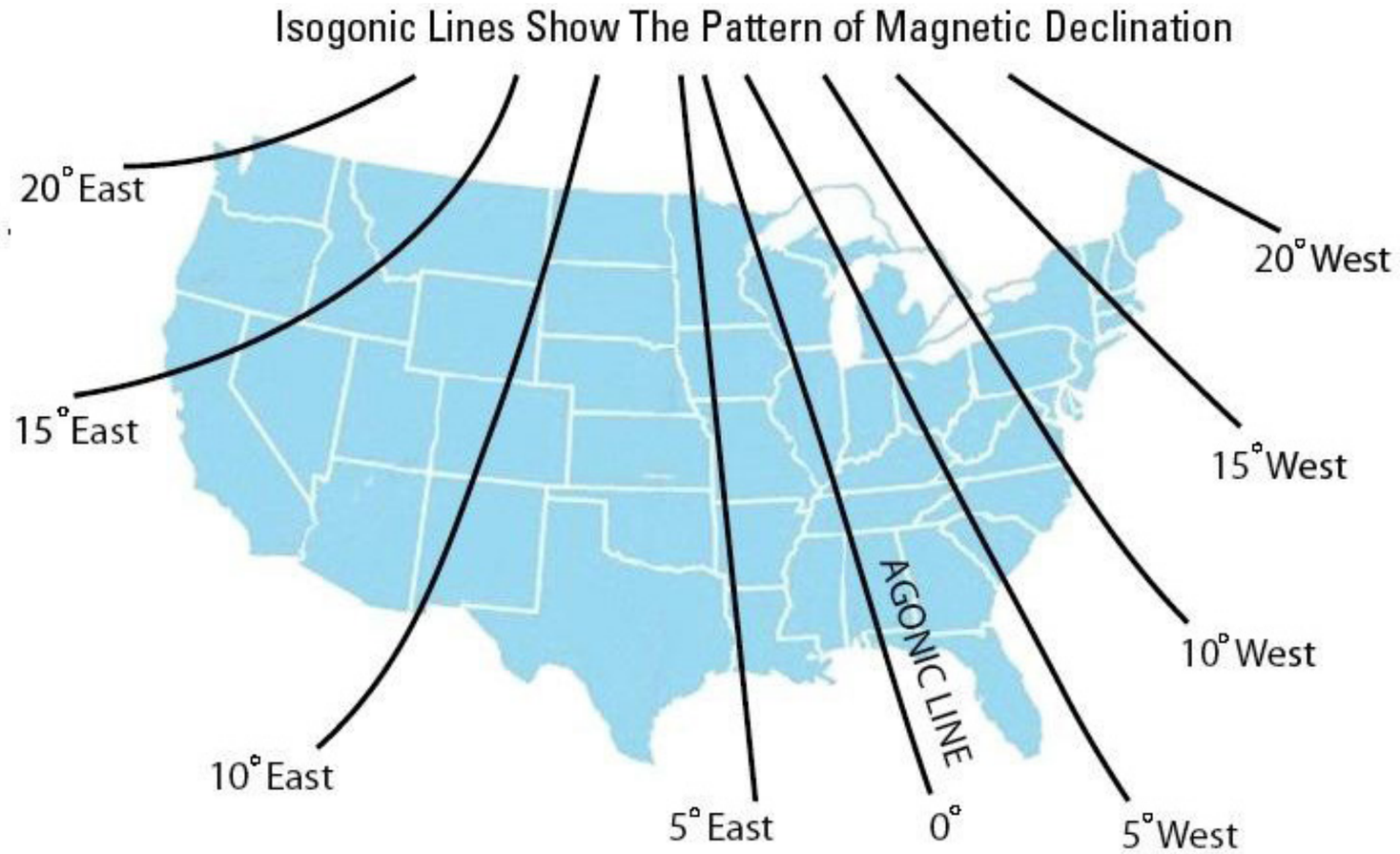
Grid North
The north to which the grid lines on your map points i.e. the top of the map.

Magnetic North
The north to which your compass points. Magnetic North moves slowly with a variable rate and currently is west of Grid North in Great Britain

Magnetic Declination

Magnetic declination is the direction and amount of variation between the Magnetic Pole and True North. The amount and direction of declination depends upon how those two poles align relative to a given point on Earth.

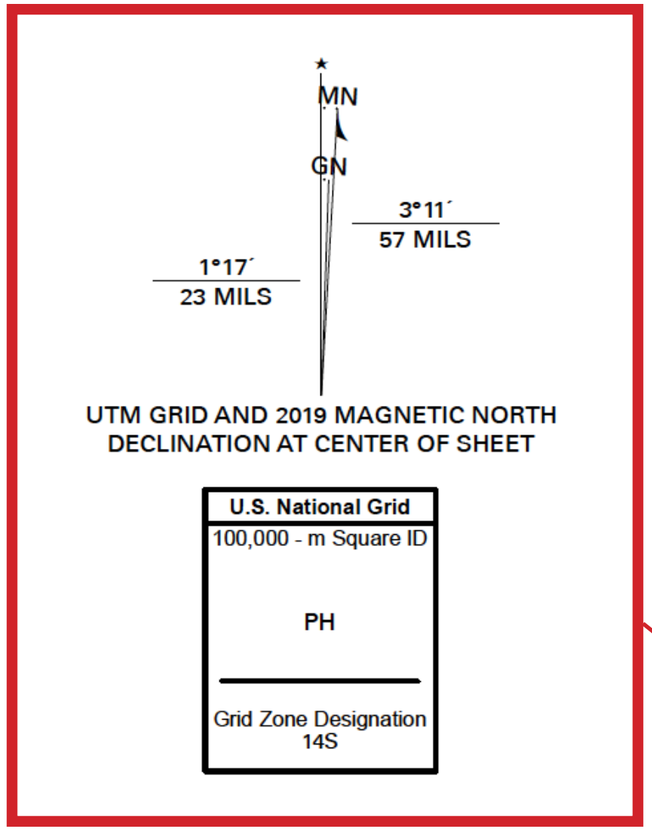
Magnetic Declination Varies Considerably Across The United States.

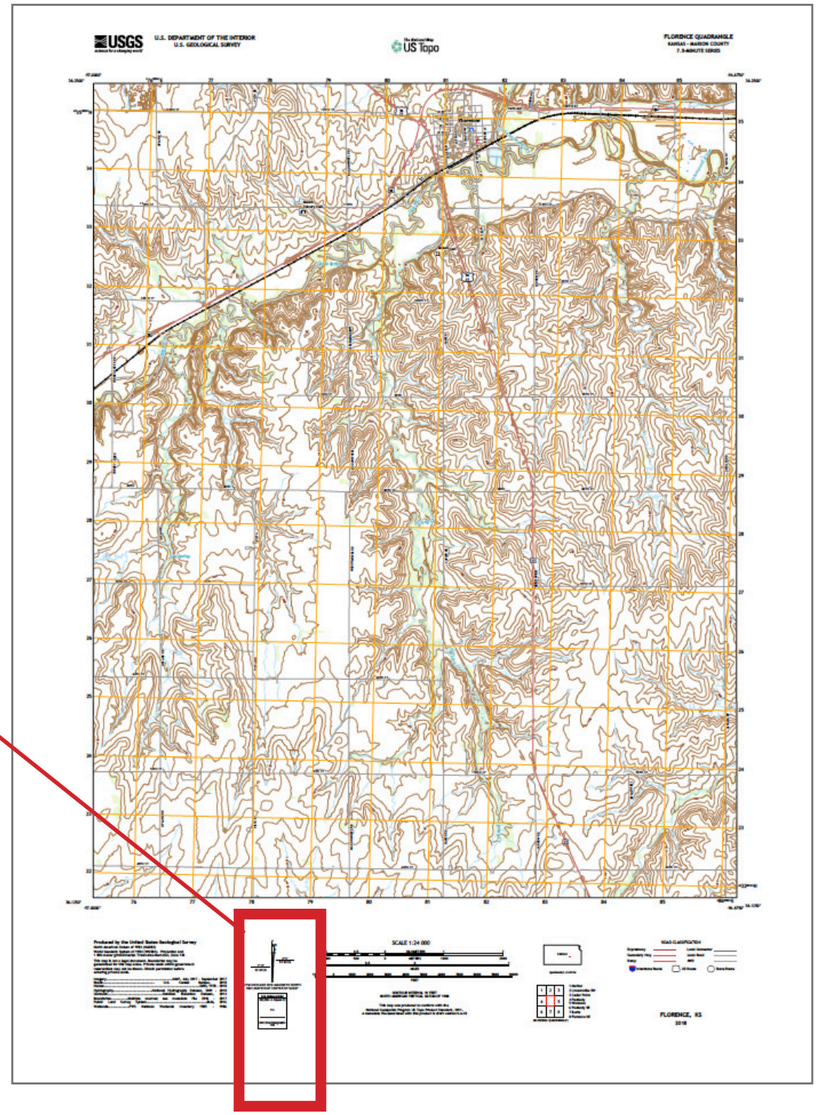


Magnetic Declination

Magnetic declination is printed on any map that is intended for navigation purposes, however it can be outdated. To get the most current declination values for an area use the National Oceanic and Atmospheric Administration (NOAA) online calculator:

https://www.ngdc.noaa.gov/geomag/calculators/magcalc.shtml



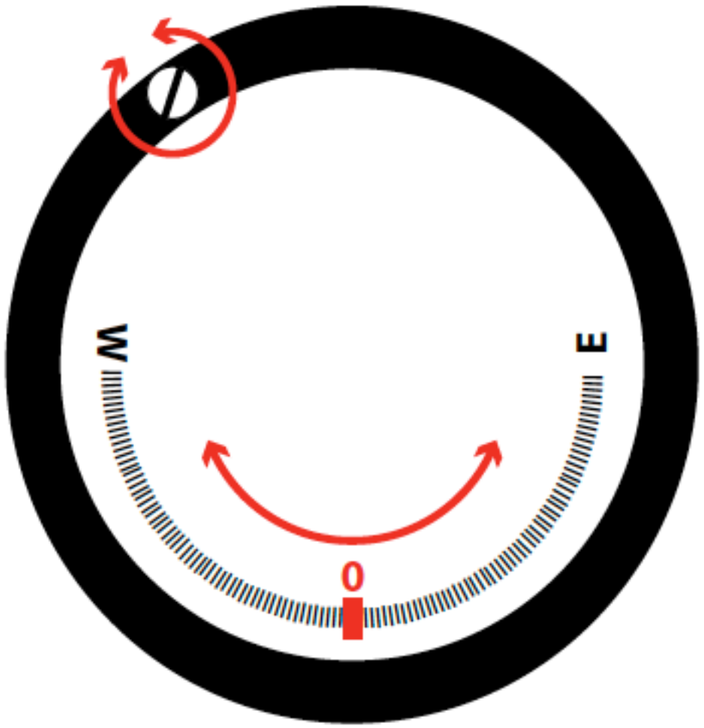


Magnetic Declination

You must correct for magnetic declination when using a map and compass together.

Some compasses, like the Suunto MC-2, have a declination adjustment that you can set:

1. Turn the compass over.
2. Insert the metal key into the adjustment screw.
3. Turn the key until the declination indicator is the correct number of degrees east or west of 0° to your current location.



Magnetic Declination

If you do not have a compass with a declination adjustment that you can set, you will have to account for the declination:

- You will need to add or subtract the declination value for the area each time you take a reading and work with a bearing. An east declination will be a positive number, and a west declination will be a negative number).
- When taking a reading from the terrain and transferring it to your map, you must add the magnetic variation to get the correct bearing
- When transferring a bearing from your map to the terrain, you must subtract the magnetic variation to calculate the magnetic bearing you will then travel on

Example 1: If you happen to be in Tucson, Arizona, which has a 9-degree East declination – that magnetic north is east of true north by 9-degrees.

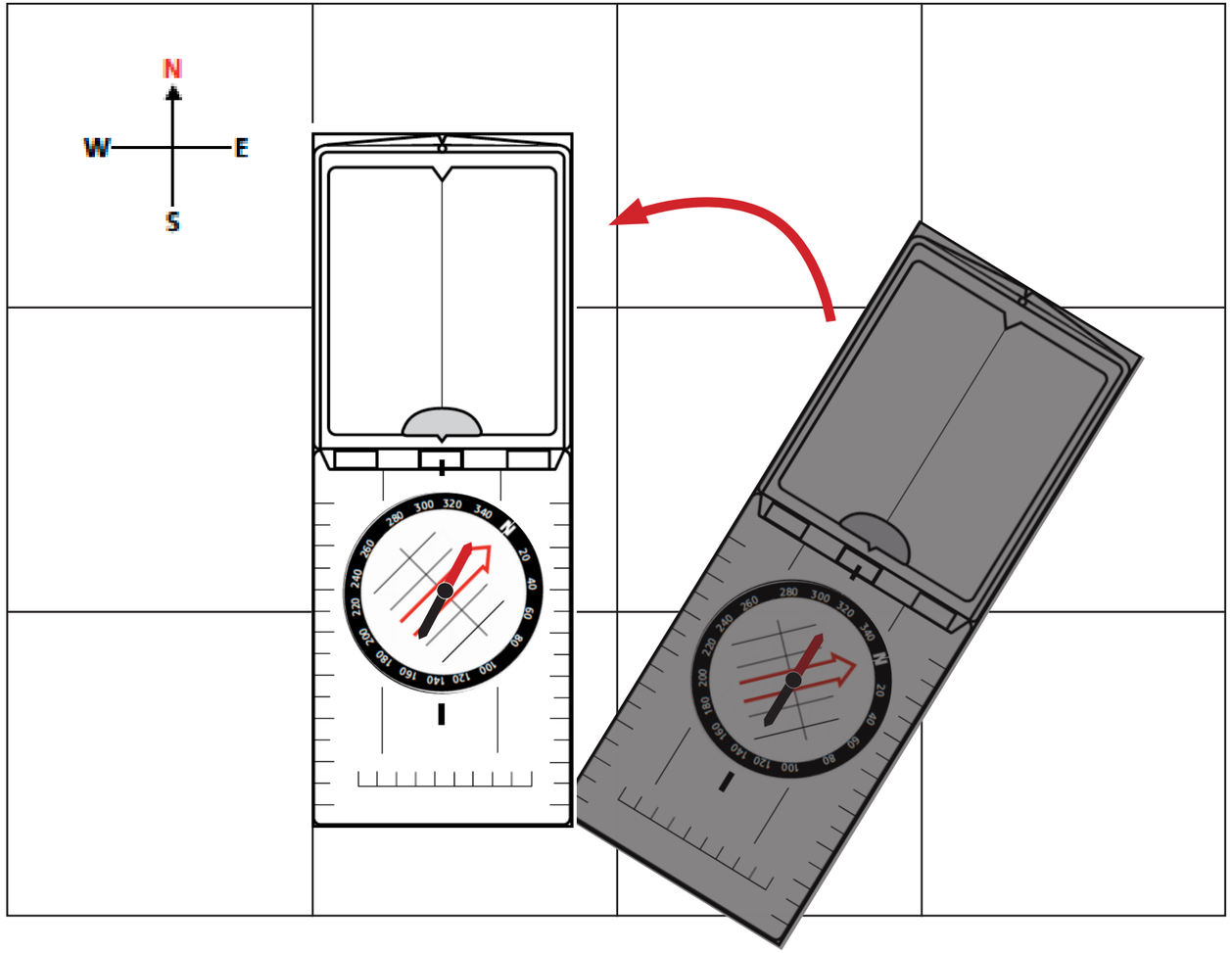
Therefore, you must add 9 degrees to the heading (the direction your compass needle points towards) on your compass's dial to determine your true heading, i.e., if your reading is 230 degrees, you are pointed towards a heading of 239 degrees, and to travel on a bearing of 230 degrees will need to get a reading of 221 degrees on your dial.

Example 2: If you happen to be in the vicinity of Mount Fuji, Japan, where the angle of declination is -7 degrees, then magnetic north and true north are 7 degrees apart, with magnetic north sitting 7 degrees to the west of true north.

To adjust for this you must subtract 7 degrees to the heading to determine your true heading, i.e., if your reading is 200 degrees, you are pointed towards a heading of 193 degrees, and to travel on a bearing of 200 degrees will need to get a reading of 207 degrees on your dial.

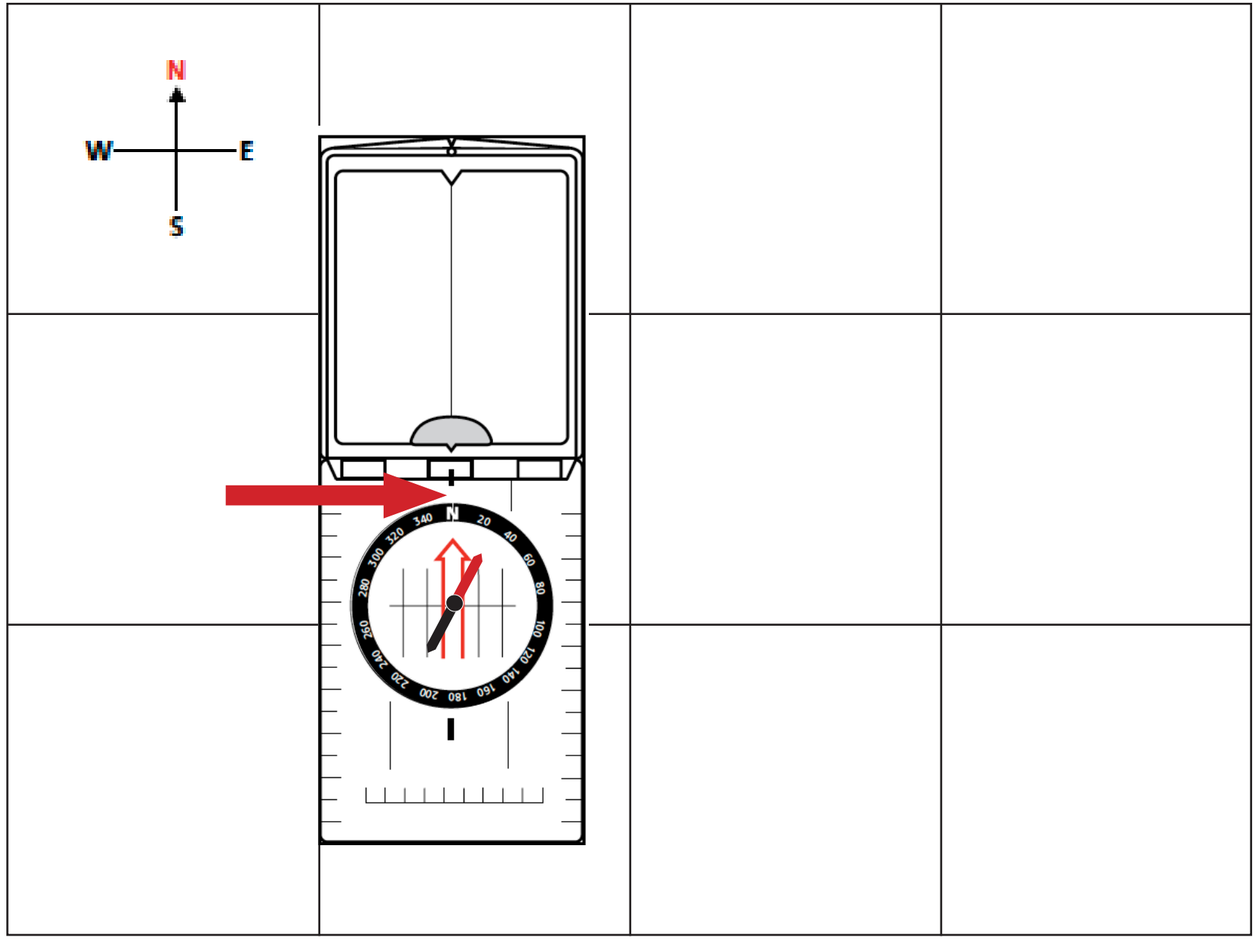
Orienting the Map to the Ground

1. Place the map flat on the ground, and align the edge of the compass baseplate with a longitude line or the edge of the map grid.



Orienting the Map to the Ground

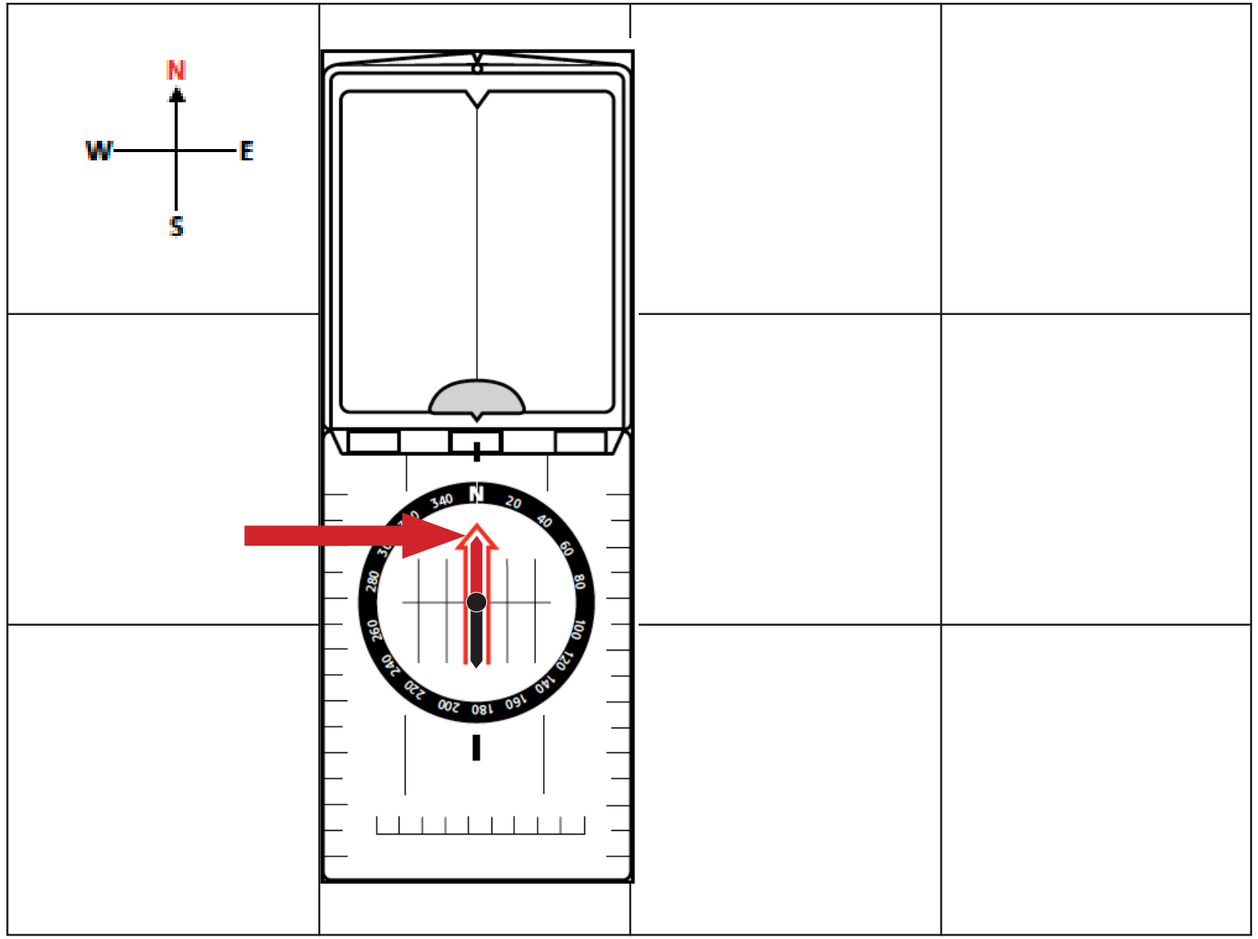
2. Rotate the compass **Bezel** so that North is at the top, aligned with the **Bearing Index**



Orienting the Map to the Ground

3. Now turn the map, keeping the compass aligned with the longitude line, until Red is in the Shed (the red end of the **Needle** is squarely inside the **Orienting Arrow**).

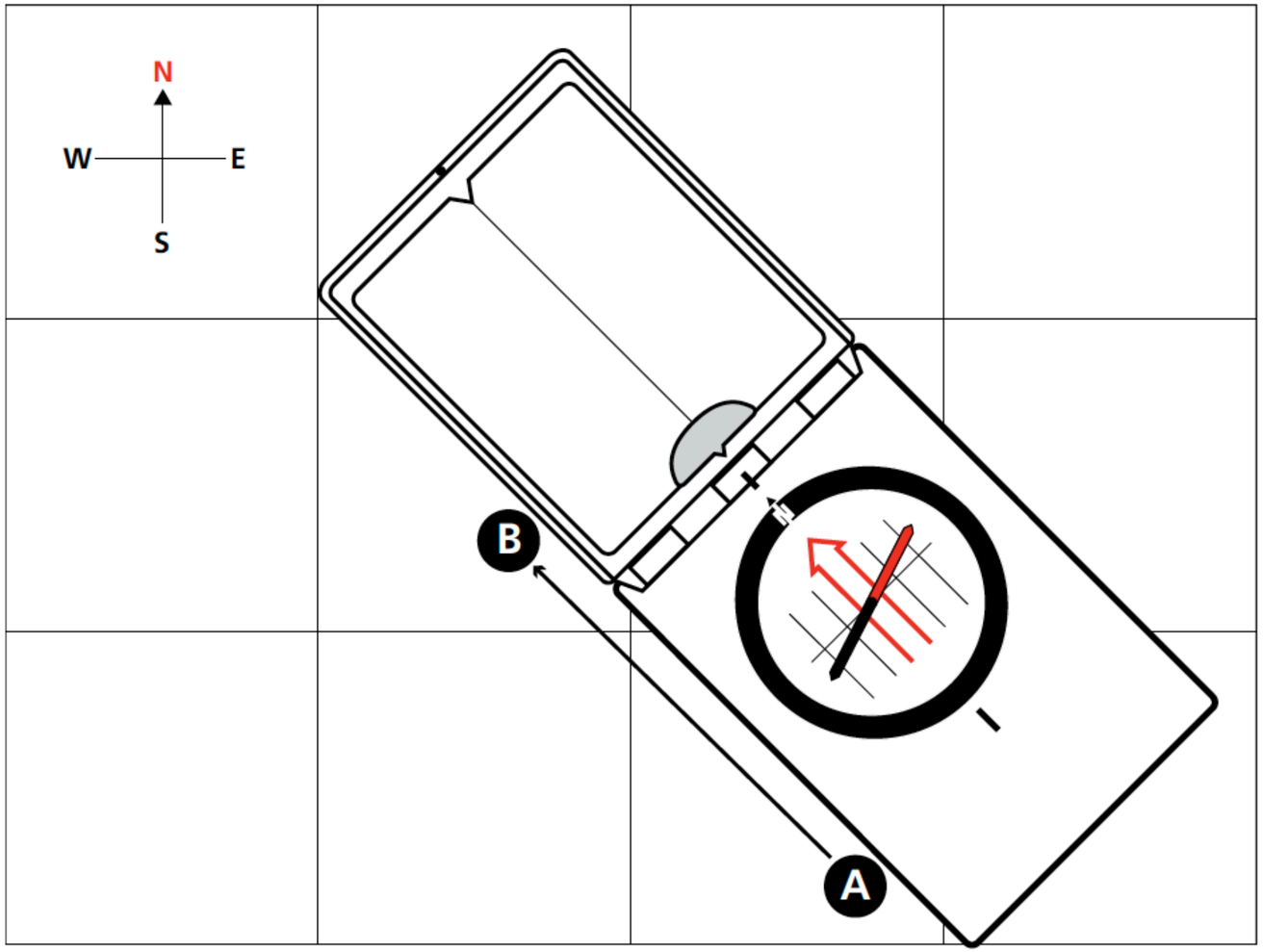
   Your map is now correctly oriented to the ground.



Navigating with Map and Compass

1. When navigating with a map and compass, you are first determining a direction of travel on the map and then transferring that direction to the real world.

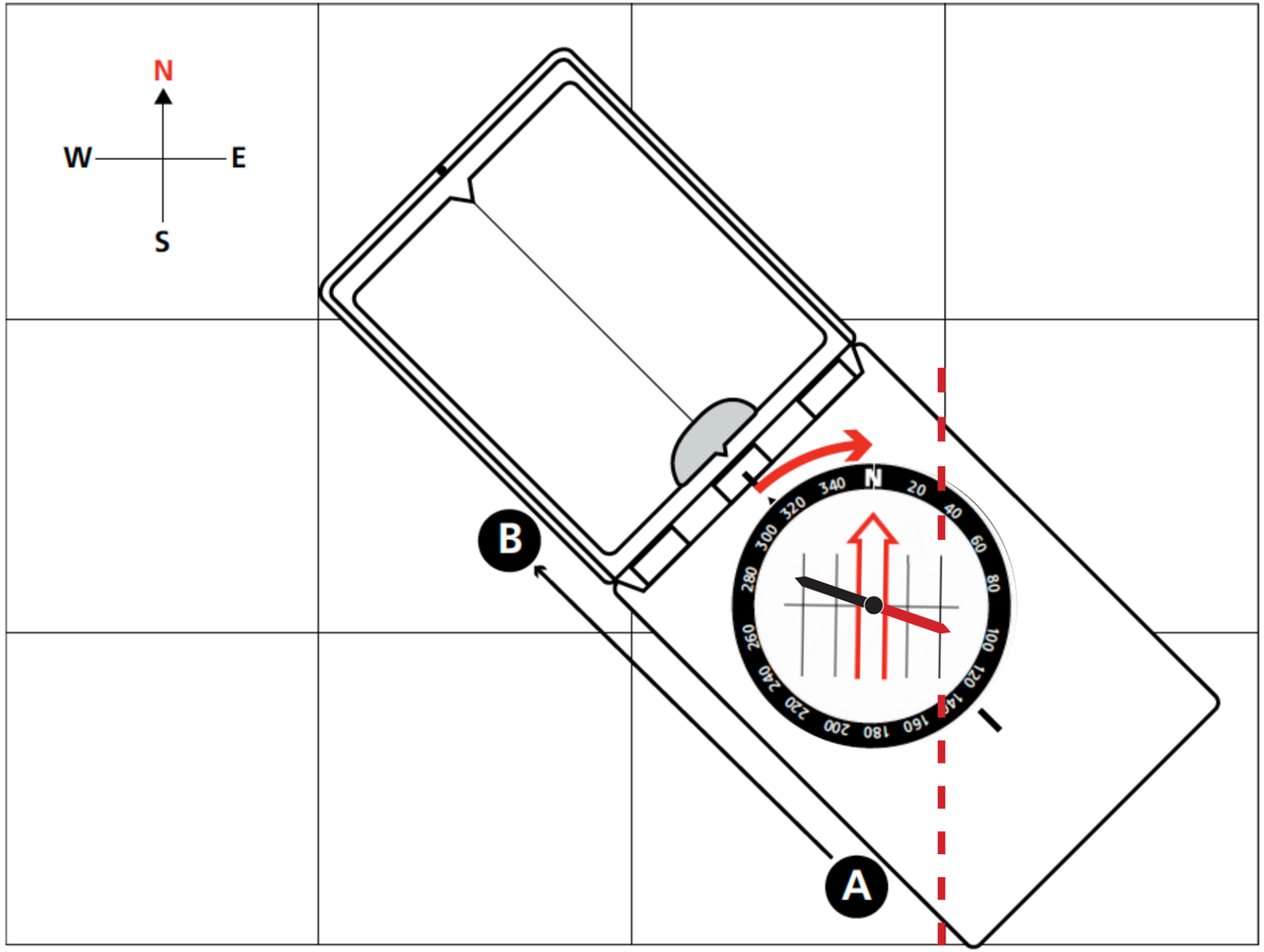
   Place your compass on your map between the starting point (A) and the target (B).



Navigating with Map and Compass

2. Turn the **Bezel** until the **Meridian Lines** are parallel to the grid lines on the map with N pointing north.

   (note that Red may not be in the Shed as you do this -- you are using the compass as a “breton plotter” or protracter for this step)

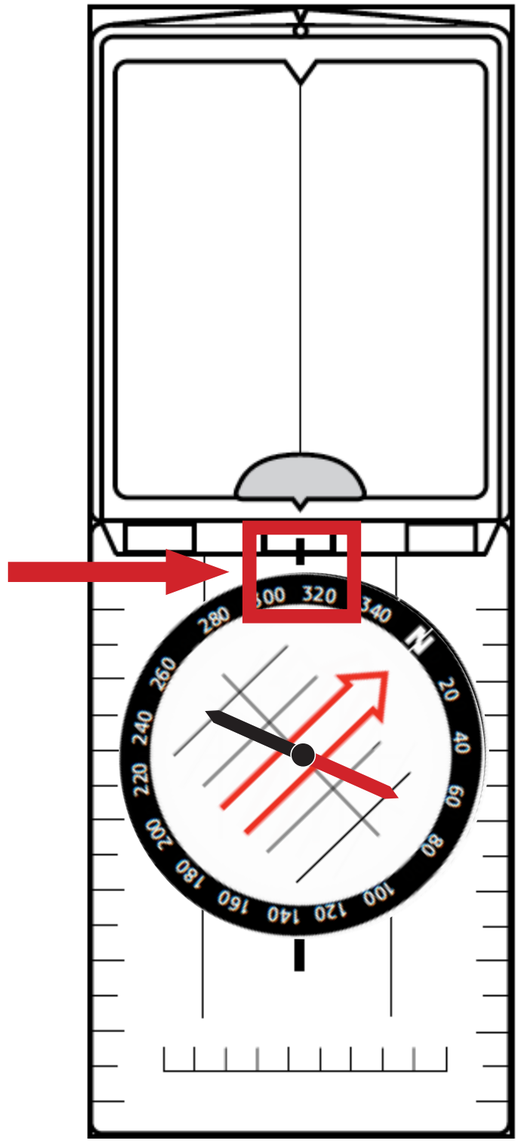


Navigating with Map and Compass

3. Now you can pick up the compass and read the bearing, which will be the number on the **Bezel** that is lined up with the **Index Line**.

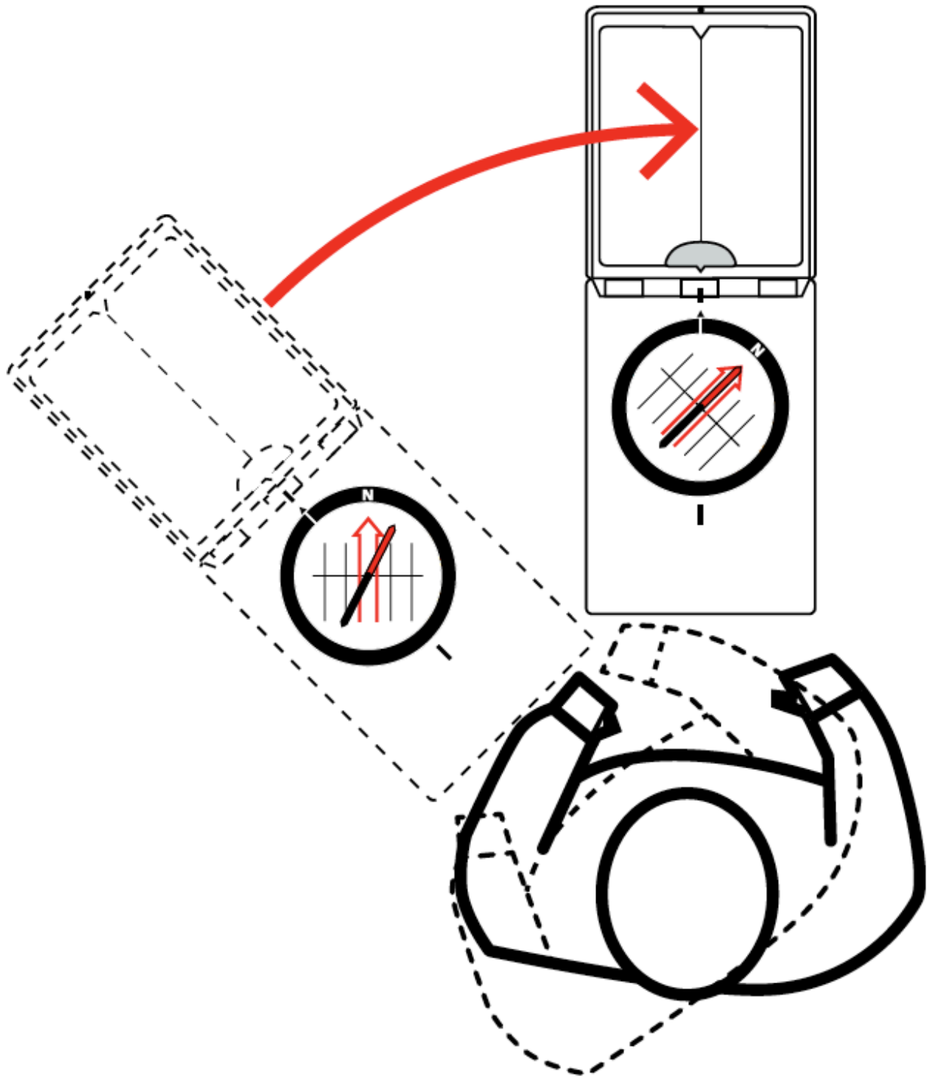
   This bearing is your directional heading as you travel.

Bearing is 315°



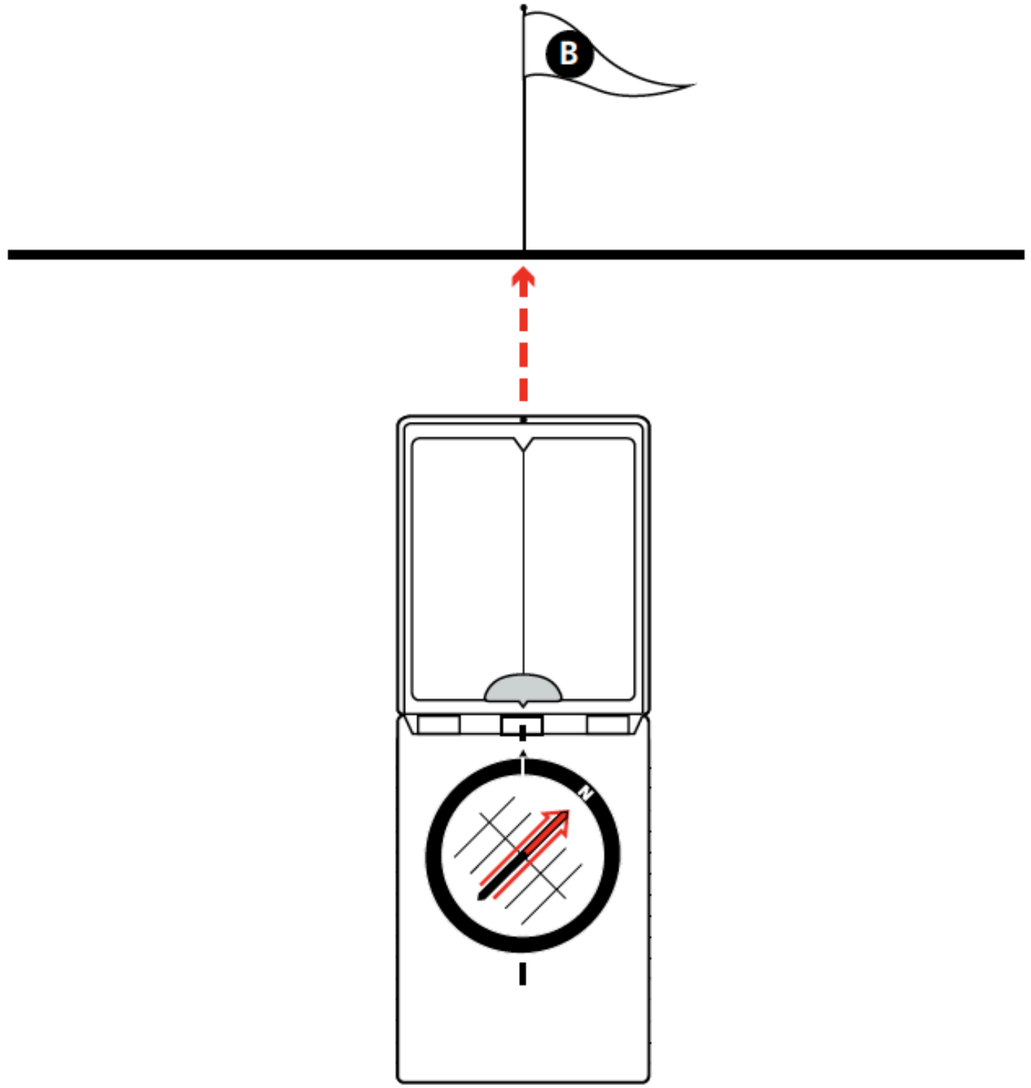
Navigating with Map and Compass

4. Now with your heading still dialed in, hold your compass level at waist height and turn yourself until the Needle and **Orienting Arrow** are aligned (putting Red in the Shed) and walk straight in this direction.



Navigating with Map and Compass

5. Select a visible target in front of you to help you maintain your direction while travelling and follow your progress by comparing landmarks to the map.

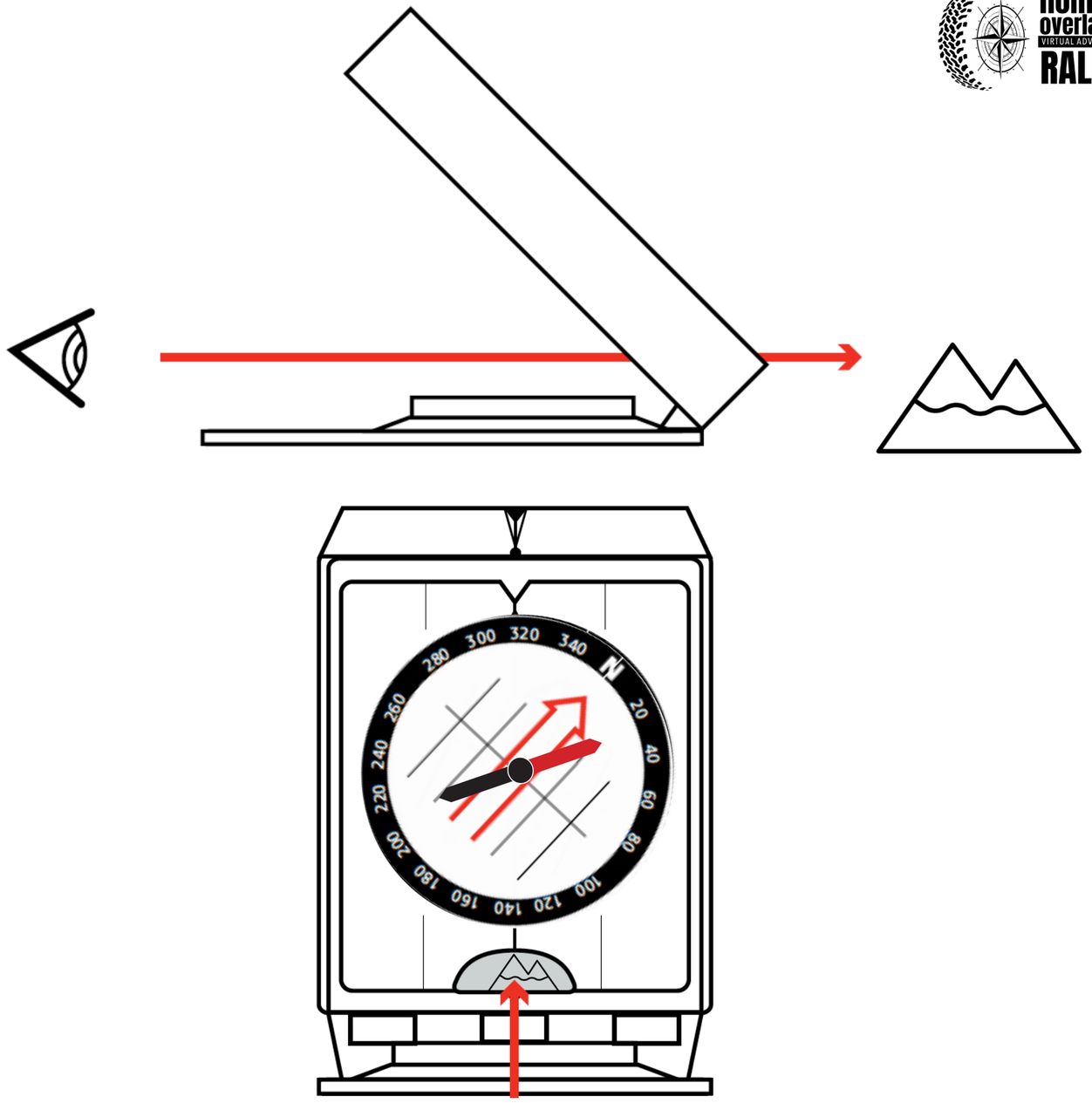


Sighting a Bearing

aka “taking a heading”

1. Open the **Mirror** and hold the compass at eye level, adjusting the angle of the **Mirror** until you can see the compass dial with the **Needle** and **Orienting Arrow** in the reflection.

   Looking through the **Sighting Hole**, align the target with the **Sighting Notch** and the **Center Line**.

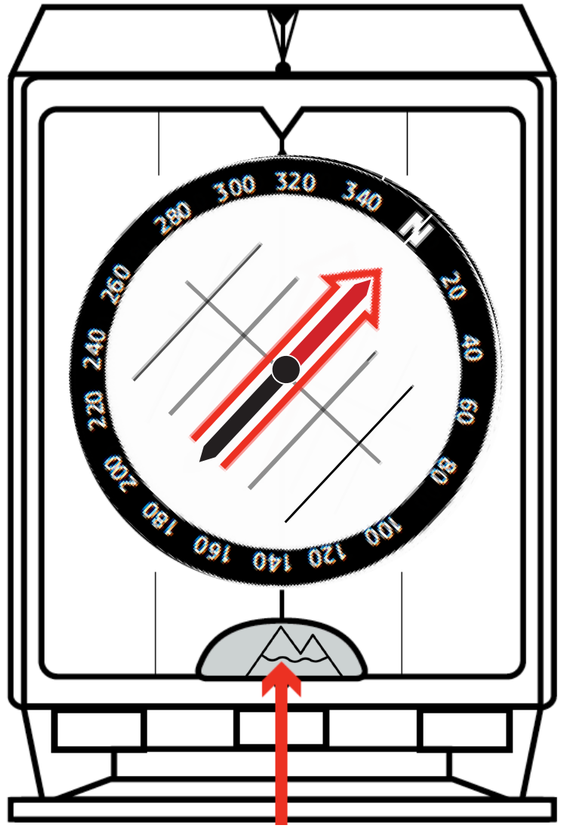


Sighting a Bearing

aka “taking a heading”

2. Hold the compass steady and turn the **Bezel** until the **Needle** and **Orienting Arrow** are aligned.

   Looking through the **Sighting Hole**, align the target with the **Sighting Notch** and the **Center Line**.

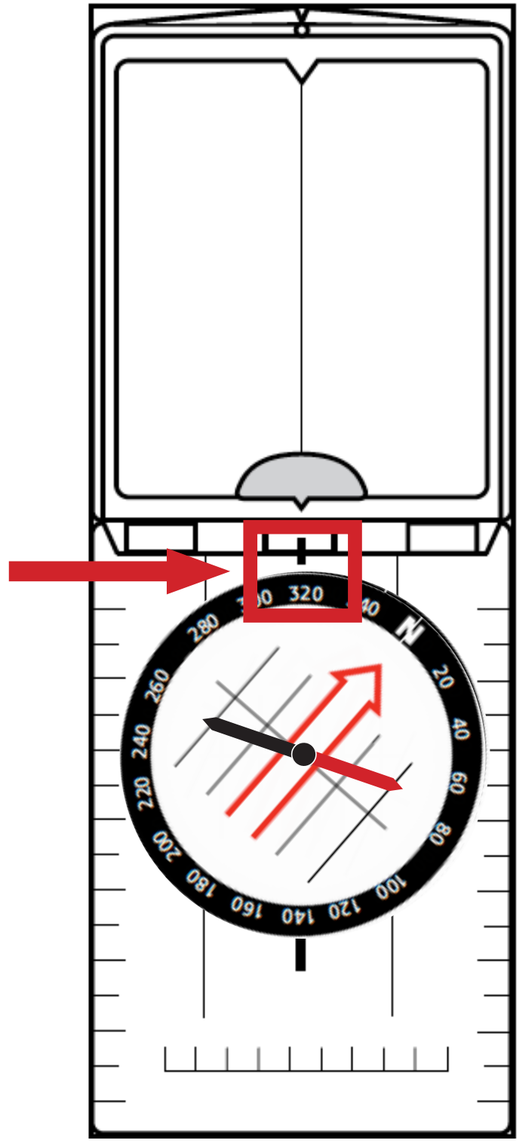


Sighting a Bearing

aka “taking a heading”

3. Now you can lower the compass and read the bearing, which will be the number on the **Bezel** that is lined up with the **Index Line** (note that Red may not be in the Shed as you are moving around, but the Bezel will remain in place indicating that bearing until you rotate it again).

Bearing is 320°

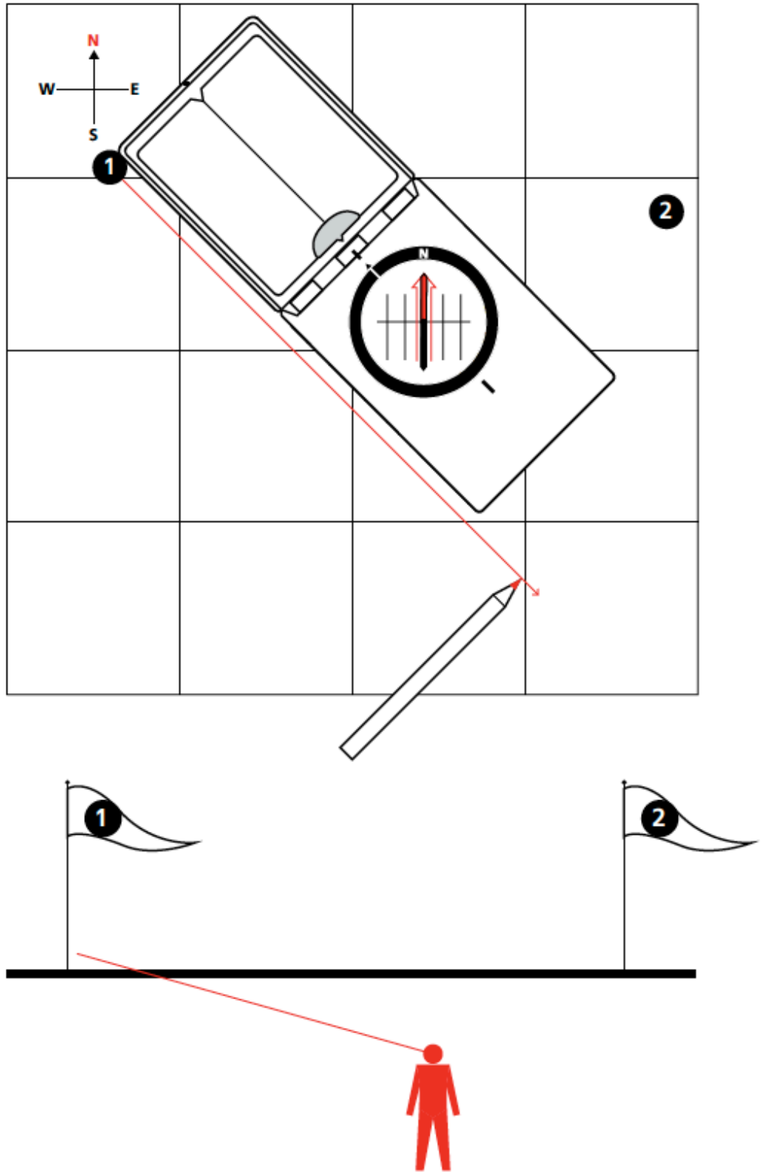


Triangulation

1. You can sight two or more objects and use triangulation to determine where you are.

   Find a visible object that is identifiable on your map and follow steps 1-3 of ‘Sighting a Bearing.’

2. On the map, place the long edge of the compass on the object (1), then turn the **Bezel** until the **Meridian Lines** on the dial and map grid lines are parallel, with North on top, and draw a line from the object.



Triangulation

3. Choose a second object and repeat steps 1-2. The intersection of the two lines indicates your position, and the closer the angle between the intersecting lines is to 90°, the greater the accuracy.