Choosing a North Reference

• On your Map
• For your Compass
• For your GPS

• When the north references are different, you will need to do conversions as you move bearings between your map, compass, and GPS.
North Reference on your Map

• North Reference is important when you are plotting or reading bearings on the map.
North Reference on your Map

• Grid North is easy to use on maps with printed UTM / MGRS / USNG grid lines.
  – Lots of north reference lines already printed on the map.
  – Likely to be very close to True North.
• When the level of accuracy required is low, Grid North lines are often used as True North lines.
North Reference on your Map

• Lines of Longitude are True North lines.
  – Often the two vertical edges of the map are lines of longitude and can be used as True North reference lines.
  – They may be the only two True North lines on your map. Unless your map has a lat/lon grid printed on it.
North Reference on your Map

• You can draw parallel lines aligned with Magnetic North onto your map for use as north reference lines.

• Many aviation and marine charts have preprinted Magnetic North lines. Most other maps do not.
North Reference on your Compass

• The needle or card of your compass will always align itself with Magnetic North.

• Thus Magnetic North is an easy and natural choice to use with your compass.

• But it’s not the only option...
North Reference on your Compass

• Some compasses allow the orientation needle to be moved independently from the angular measurement dial.

• This makes it possible to set your compass to read bearings in any of the three north references.
North Reference on your Compass

Compass Not Adjusted for Declination

Compass Adjusted for 16° E Declination
North Reference on your Compass

• Card style compasses and sighting compasses generally cannot be adjusted, and will always provide bearings relative to Magnetic North.

• This is because the card and magnet are fixed to each other and sealed inside of the capsule.
North Reference on your Compass

• When the orientation arrow can not be adjusted independently from the angular dial, you can use some other mark to align the compass needle.
• Some compasses have a printed scale for this purpose.
• You can also make you own mark on the capsule. (remember you need to be able to change the mark, as you change your locale.)
Alternate North Reference Adjustments

Alcohol Pen on capsule

Tape on bottom of capsule
Two Schools of Thought

• Set your compass and forget it
  – Adjust for the declination in your compass.
  – All bearings will be grid or true.
  – No conversion required to use it on a map.
  – Don’t forget to check the setting occasionally.
  – Don’t forget to change it when you go somewhere else.

• Set your compass to 0°, and always think about it
  – All bearings will be magnetic.
  – Conversion to grid or true, or drawing magnetic north reference lines on your map, will be necessary for map work.
  – Works with all compasses.
  – You are more likely to remember how declination works.
North Reference on your GPS

• You GPS can be set to use any of the three north references.
  – Use the set up page for Heading or North Reference

• It will even figure out the angles to use based on your location.
Common Scenarios
Map=Grid, Compass=Mag, GPS=Mag

• Easy to use reference lines already on the map.
• No compass adjustment needed.

• Conversion between Grid and Magnetic is required to work with compass bearings on the map.
Common Scenarios
Map=Grid, Compass=Grid, GPS=Grid

• Easy to use reference lines already on the map.
• Compass adjusted to Grid North.
  – Adjustment should be checked for correctness

• No conversions required to work with compass bearings on the map.
Common Scenarios
Map=Mag, Compass=Mag, GPS=Mag

• You will need to draw reference lines on your maps.
• No compass adjustment needed.
• No conversions required to work with compass bearings on the map.
• You only need to worry about north reference at home when you draw the lines on your maps.
An All to Common Scenario

• Someone else set my compass up for me.
• Is it set for true, grid, or magnetic bearings?
  – I don’t remember.
• Is is set for the declination here, or somewhere else?
  – I don’t know.
• Have you checked that it is set correctly?
  – I don’t know how to check it, or how to adjust it.
No bearing or heading is complete without the word *True*, *Magnetic*, or *Grid* following it.

- Don’t make people guess, say it and write it!