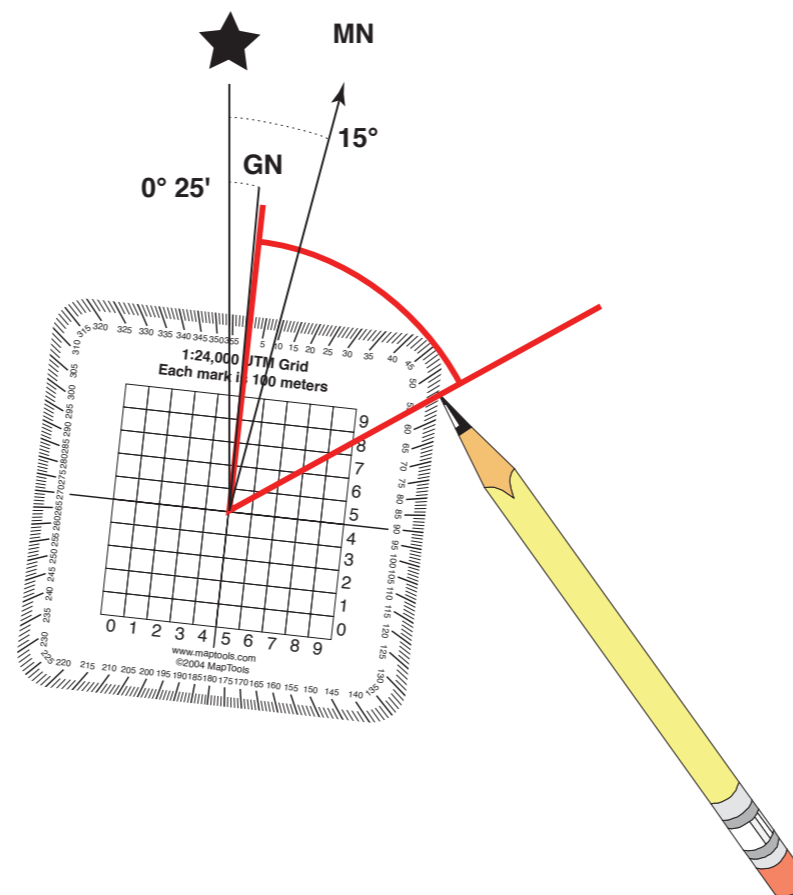


# Choosing a North Reference

- 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

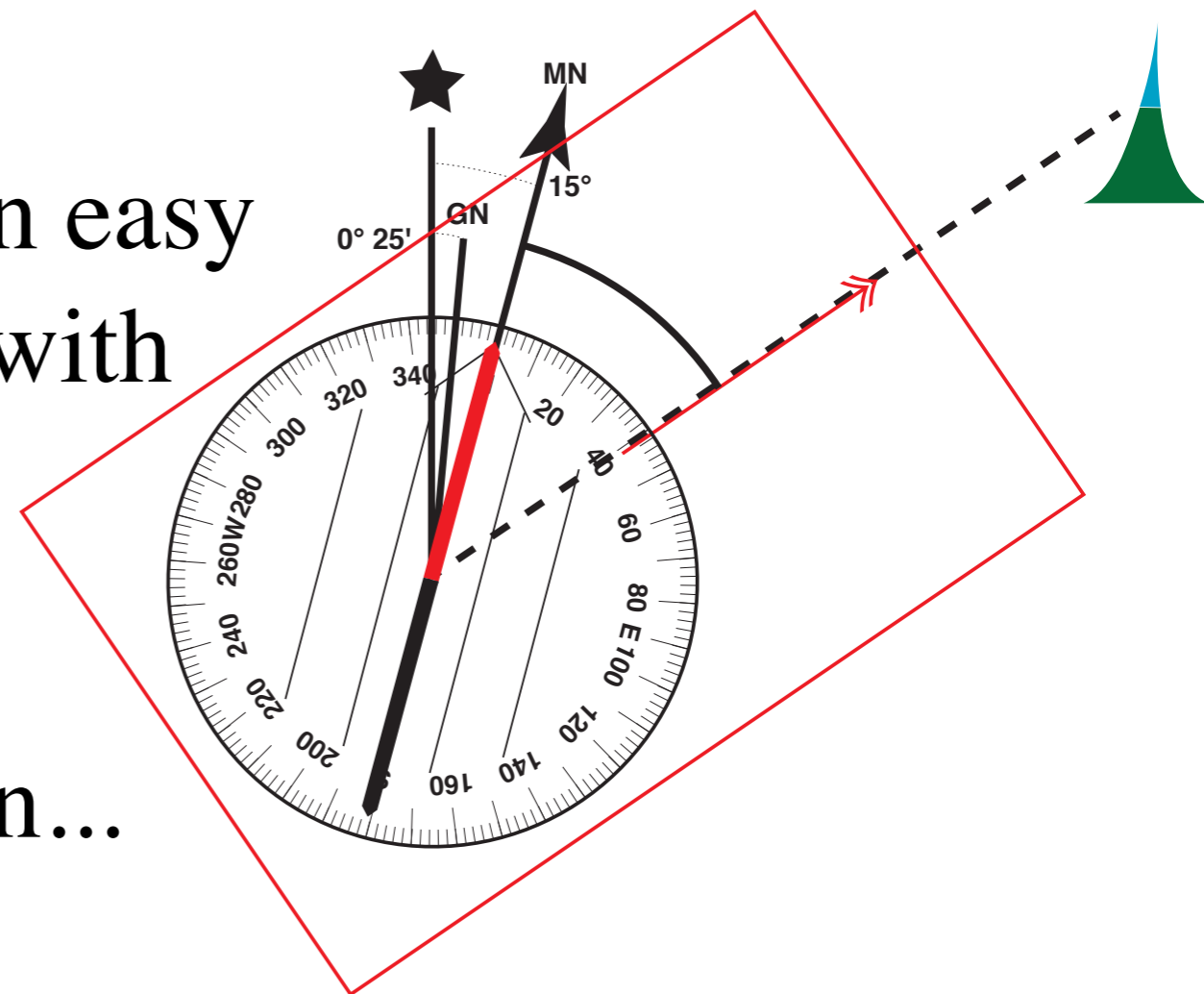
- Lines of Longitude are True North lines.
  - Often the two vertical edges of the map are lines of longitude and can be used as True North reference lines.
  - They may be the only two True North lines on your map. Unless your map has a lat/lon grid printed on it.

# 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...

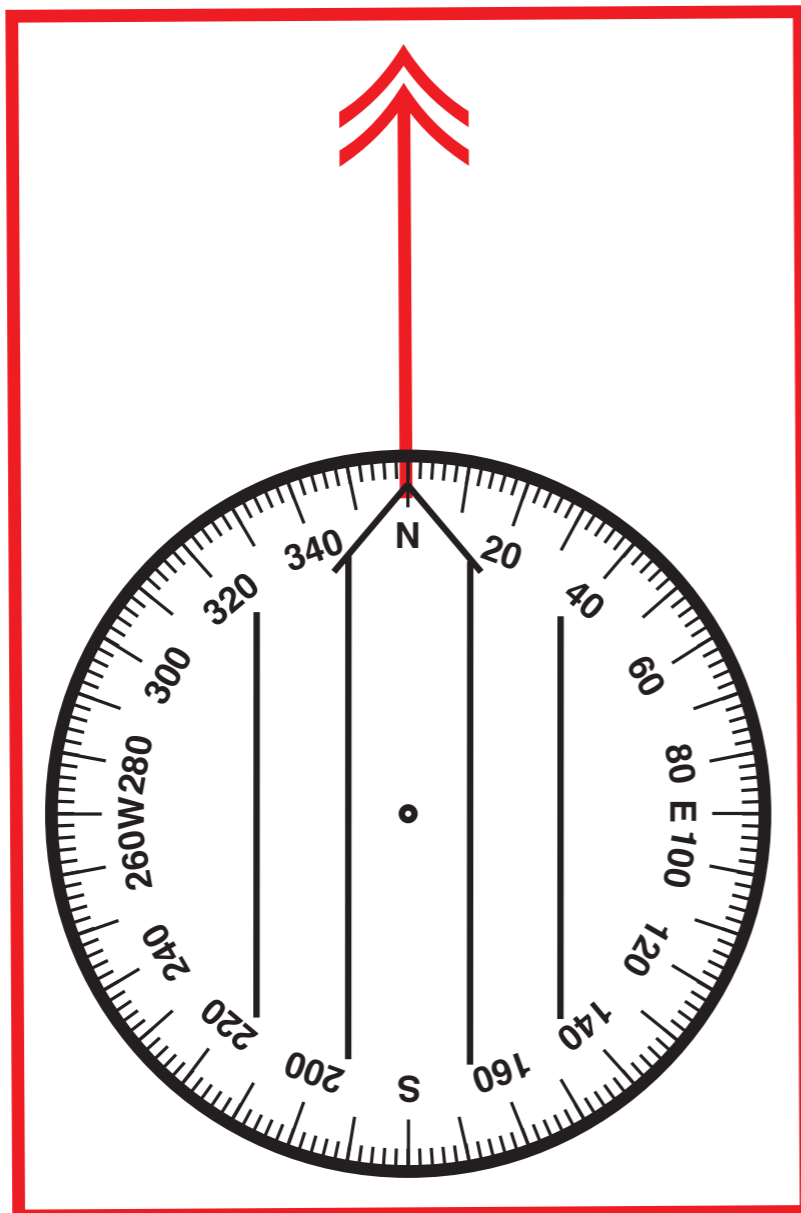


# North Reference on your Compass

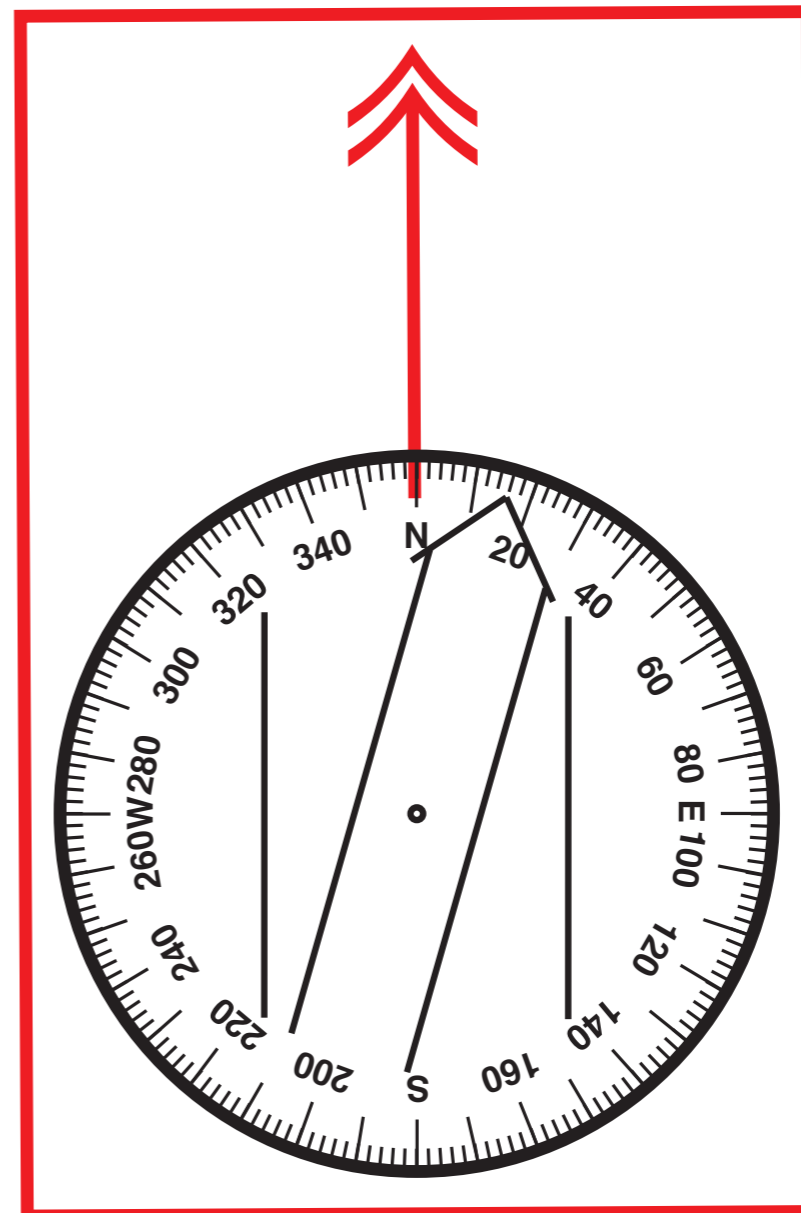
- Some compasses allow the orientation needle to be moved independently from the angular measurement dial.
- This makes it possible to set your compass to read bearings in any of the three north references.

# 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 can not 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

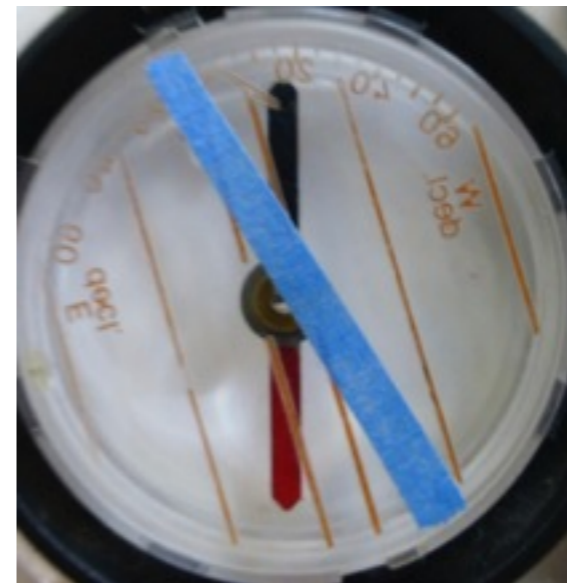
- When the orientation arrow can not be adjusted independently from the angular dial, you can use some other mark to align the compass needle.
- Some compasses have a printed scale for this purpose.
- You can also make you own mark on the capsule. (remember you need to be able to change the mark, as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

# Alternate North Reference Adjustments

Alcohol Pen on capsule



Tape on bottom of capsule

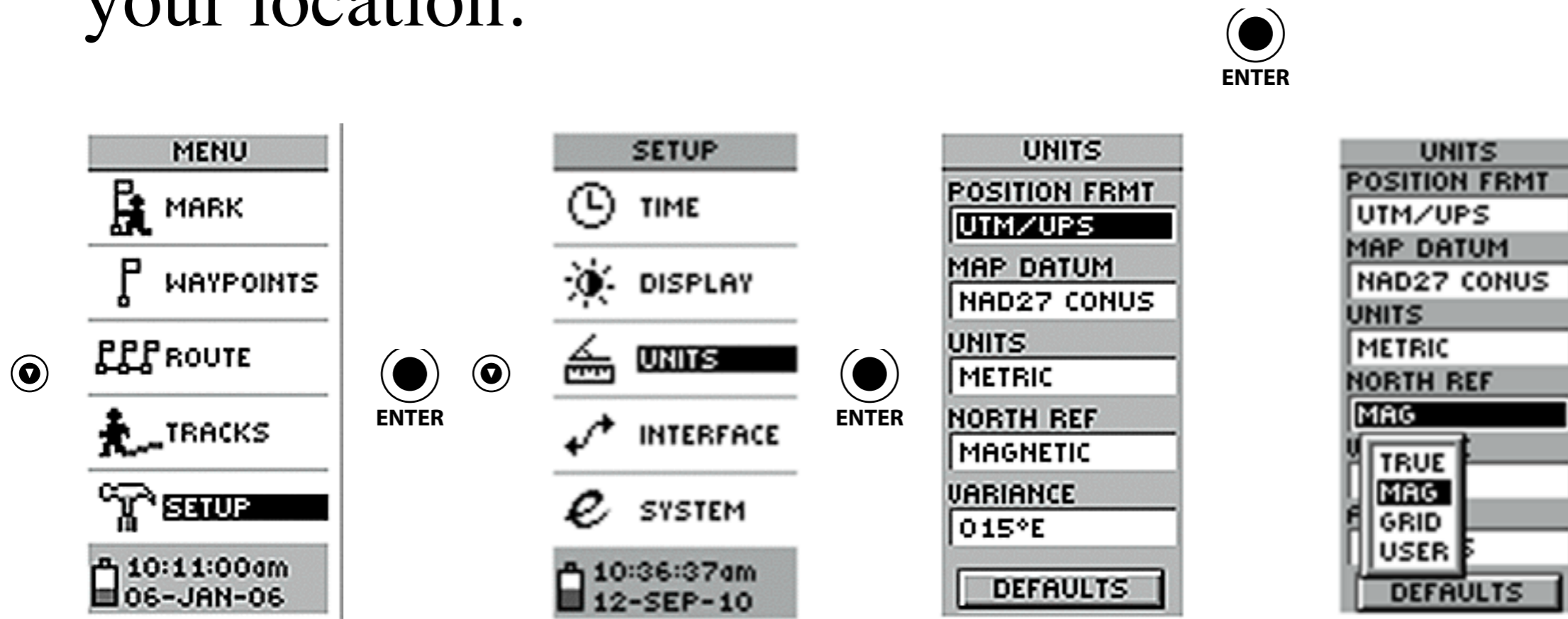


# Two Schools of Thought

- 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  $0^\circ$ , 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 too Common Scenario

- Someone else set my compass up for me.
- Is it set for true, grid, or magnetic bearings?
  - I don't remember.
- Is it 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!