

Field Navigation Guide

This tutorial teaches reliable, low-tech navigation. You'll learn how to use a compass and paper map, correct for magnetic declination, triangulate your position, and find north from the sun and stars. These skills work anywhere — no batteries required.



1) Compass Basics

Parts

: Baseplate, direction-of-travel arrow, rotating bezel, index line, magnetic needle (red points to magnetic north).

To take a bearing

- :
- 1. Point the direction-of-travel arrow at your target.
- 2. Rotate the bezel until the orienting lines align with the needle ("red in the shed").
- 3. Read the number at the index line — that's your bearing ($^{\circ}$).

Follow a bearing

: Turn until the needle aligns with the orienting arrow again, then walk along the direction-of-travel arrow. Pick distant features to reduce drift.

Magnetic declination

: The angle between magnetic north and true north. Adjust your bearing by local declination.

- Egypt (Cairo, 2025): approx $+3^{\circ}\text{E}$ (check current value).
- Rule of thumb: $\text{True} = \text{Magnetic} + \text{Easterly declination}$; $\text{True} = \text{Magnetic} - \text{Westerly declination}$.
- Use NOAA's calculator to confirm:
<https://www.ngdc.noaa.gov/geomag/calculators/magcalc.shtml>

2) Map Reading & Triangulation

Orient the map

: Place the compass on the map edge; rotate map and compass together until the needle points to the map's north (correct for declination).

Triangulate your position (resection)

:

1. Identify two (ideally three) distant, known landmarks on the map.
2. Take a field bearing to each landmark, convert to *map back-bearings* ($\pm 180^\circ$), correct for declination.
3. Draw the back-bearings on the map. Their intersection is your location.

Pacing

: Measure your steps per 100 m on flat terrain; use it to track distance in the field.

Handrails & Catch Features

: Follow linear features (streams, ridgelines) and use obvious boundaries to prevent overshooting.

2B) Measuring Distance on a Map (Curvimeter / Map Wheel)

Prepare

: Note the map scale (e.g., 1:50,000 → 1 cm = 500 m). If your wheel has adjustable scales, set it to match.

Zero the wheel

: Set the counter to 0 (or mark the starting reading).

Trace the route

: Roll the wheel carefully along the road/river/trail. Keep steady pressure and stay on the line.

Read & convert

:

- If the wheel shows *map units* (e.g., centimeters), convert with the scale. Example: 12.6 cm at 1:50,000 → $12.6 \times 500 \text{ m} = 6.3 \text{ km}$.
- If the wheel shows *direct distance* (scale dial), read kilometers/miles directly.

Accuracy tips

: Break long routes into segments; average two passes; avoid pressing too hard; recheck tight corners.

Alternatives

(no wheel):

- *String method*: Lay thread along the route, straighten, then measure against the scale bar.
- *Dividers/compass step-off*: Set to a known map distance (e.g., 1 km), walk it along the route counting steps.

Formula

: Real distance = Map distance × scale factor. At 1:25,000 → 1 cm = 250 m; at 1:100,000 → 1 cm = 1 km.

Note on projection

: Over small areas most maps are fine; on very large distances, projections can distort measurements.

3) Finding North from Nature

Shadow-stick (daytime)

:

1. Stick in ground; mark the tip of the shadow (point A). Wait 10–15 minutes; mark the new tip (point B).
2. Line A → B runs roughly *West* → *East*. Stand with A on your left, B on your right: you now face *North*.

Sun method

: In the Northern Hemisphere, the sun is due south at local solar noon; shadows point north.

- Use timeanddate.com to estimate solar noon for your location.

Night (Polaris)

: Find the Big Dipper; trace a line from the two bowl edge stars ~5× that distance to Polaris — that's near true north.

Improvised compass

: Magnetize a needle (rub on silk/hair 50–100×), place on a leaf over still water — it will align roughly N–S; red-mark one end beforehand.

Reality check

: Moss growth, tree branches, and ant hills are unreliable on their own — use multiple indicators.

4) Common Errors & Safety

Keep the compass level; avoid metal objects, phones, and knives near the needle.

Account for

declination

every time you convert between field and map bearings.

Use distant aiming points and frequent checks to avoid drift in low visibility.

Always carry a backup: spare compass, whistle, headlamp, paper maps in a dry bag.

5) Quick Reference (Printable)

True = Magnetic + E (or - W). Cairo ~ +3°E (verify current data).

Triangulation: two back-bearings ($\pm 180^\circ$) → intersection = your position.

Shadow-stick: first mark (W), second mark (E) → face north with W left, E right.

Night: Big Dipper bowl edge → 5× to Polaris (north).

Downloads (PDF)

Authoritative Resources

- [NOAA Magnetic Declination Calculator](#)

[← Back to the Human Continuity Blueprint](#)

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