True North vs Magnetic North: What Is the Difference and Which Should Your Compass App Use?

True north and magnetic north are not the same — and the difference can send you kilometers off course. Learn what magnetic declination is, when it matters, and how compass apps correct for it.

Author: Lubor Šimůnek · Published: March 23, 2026 · Productivity
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When someone says "north," most people assume there is one north. But there are actually two — and depending on where you are on Earth, the difference between them can be **zero degrees or more than twenty**. If you are navigating with a compass app, understanding this distinction could be the difference between reaching your destination and ending up a kilometer off course.

What Is True North?

True north (also called geographic north) is the direction toward the Earth's geographic North Pole — the fixed point where the planet's axis of rotation meets the surface. It is the north used on all maps, charts, and coordinate systems. True north does not move. It is the same today as it was a thousand years ago.

When you look at any standard map, the top of the map points to true north. Grid lines run toward true north. GPS coordinates reference true north. It is the universal standard for navigation.

What Is Magnetic North?

Magnetic north is the direction toward the Earth's magnetic North Pole — a point where the planet's magnetic field lines converge and point downward. Unlike true north, magnetic north **is not fixed**. It moves.

The magnetic North Pole is currently located in the Canadian Arctic, and it has been drifting toward Siberia at roughly **55 kilometers per year**. In the 1990s, it was firmly in northern Canada. By the mid-2020s, it had crossed into the Arctic Ocean and continues to move northwest toward Russia.

This movement means that the relationship between magnetic north and true north **changes over time and varies by location**.

What Is Magnetic Declination?

The angle between true north and magnetic north at any given point on Earth is called **magnetic declination** (sometimes called variation). Declination can be:

- **East declination** — magnetic north is east of true north.
- **West declination** — magnetic north is west of true north.
- **Zero declination** — magnetic and true north are aligned (along the agonic line).

Declination Examples Around the World

Location	Approximate Declination (2026)	Practical Impact
London, UK	~1° W	Negligible — almost no correction needed
New York, USA	~13° W	Significant — 1 km off per 4.4 km walked
Los Angeles, USA	~12° E	Significant
Fairbanks, Alaska	~16° E	Very significant
Sydney, Australia	~12° E	Significant
Tromsoe, Norway	~10° E	Notable
Central Africa (agonic)	~0°	No correction needed
Northern Canada	~20°+ W	Extreme — compass is nearly useless without correction

The rule of thumb: **for every degree of declination, you drift about 17 meters per kilometer traveled**. At 13 degrees (like New York), that is over 200 meters per kilometer — after a 5 km hike, you could be more than a kilometer off course.

When Magnetic North Is Fine

For many everyday situations, you do not need to worry about declination:

- **Casual direction-finding** — "Which way is roughly north?" Magnetic north is fine.
- **City navigation** — walking to a nearby landmark where you can see the destination.
- **Small declination areas** — if you are in a region where declination is less than 3

degrees, the difference is rarely noticeable.

- **Short distances** — the error only compounds over distance. For a 200-meter walk, even 15 degrees of declination is barely noticeable.

When True North Matters

True north becomes essential when accuracy has real consequences:

- **Map-and-compass navigation** — topographic maps are drawn to true north. If your compass shows magnetic north and you do not correct for declination, every bearing you take from the map will be wrong.
- **Hiking long distances** — the cumulative error from uncorrected declination grows with every kilometer.
- **Search and rescue** — when communicating coordinates and bearings, true north is the standard.
- **Surveying and construction** — property lines, building orientation, and infrastructure planning use true north.
- **Aviation and maritime navigation** — while these fields account for declination explicitly, true north is the reference standard.
- **Aligning satellite dishes, solar panels, or antennas** — these need to face specific true bearings.

How Phone Compass Apps Handle North

Most basic compass apps on smartphones **show magnetic north by default**. This is because the magnetometer hardware directly measures the magnetic field — magnetic north is what the sensor "sees."

To display true north, the app needs two things:

1. **Your location** — to look up the local declination value.
2. **A declination model** — a mathematical model (like the World Magnetic Model or IGRF) that maps declination values across the globe.

Some apps let you toggle between magnetic and true north. Some apply the correction automatically. And many cheap compass apps do not offer true north at all, leaving users with an uncorrected heading they do not realize is wrong.

How NorthPin Handles Declination

NorthPin True North Compass takes the guesswork out of this entirely:

- **Automatic declination correction.** NorthPin uses your device's location to determine the local magnetic declination and applies it automatically. The heading you see on screen is true north — no manual adjustment needed.
- **Always-on true north.** You do not need to dig through settings or remember to toggle a switch. True north is the default because it is the correct reference for

navigation.

- **Works with cached location.** Even in airplane mode, if your phone has a recent GPS fix stored, NorthPin can use it for declination correction. Full offline capability.

Download NorthPin for iPhone

A Simple Way to Think About It

Imagine you are standing at a crossroads in a forest, holding a map. The map says the trail to your campsite is at bearing 045° (northeast). You look at your compass:

- **If the compass shows magnetic north** and your local declination is 13° west, you need to subtract 13° from your reading. Your magnetic bearing should be 058° to actually walk at a true bearing of 045°.
- **If the compass shows true north** (like NorthPin), you simply follow 045°. The correction is already applied.

The second option is simpler, faster, and less error-prone — especially under stress, in bad weather, or when you are tired at the end of a long hike.

Frequently Asked Questions

Does the magnetic North Pole actually move?

Yes. The magnetic North Pole moves approximately 55 kilometers per year due to changes in the Earth's liquid outer core. It has been accelerating in recent decades, moving from the Canadian Arctic toward Siberia. This is why declination values change over time and navigation models are updated every five years.

Can my phone compass show true north?

Yes, if the compass app supports it. The app needs your location (for the declination lookup) and a magnetic model to calculate the correction. **NorthPin** does this automatically. Some other apps offer it as a manual toggle in settings.

What happens if I ignore declination?

For casual, short-distance use, probably nothing noticeable. But for navigation over longer distances — hiking, boating, orienteering — uncorrected declination causes you to drift progressively off course. At 15° declination over a 10 km hike, you would end up approximately 2.6 km away from your intended destination.

Is GPS the same as true north?

GPS coordinates reference true north (the geographic pole). However, GPS gives you a **position**, not a direction. To know which way you are facing, you still need a compass (magnetometer) or to be actively moving so GPS can calculate your direction of travel.

The Bottom Line

True north and magnetic north are different, and the gap between them varies by location and changes every year. For anything beyond casual use — hiking with a map, long-distance navigation, surveying — **you need true north**. The easiest way to get it is a compass app that corrects for declination automatically. **NorthPin True North Compass** does exactly that, showing true north by default so you can focus on where you are going instead of mental arithmetic with declination tables.

Download NorthPin for iPhone

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