Great-Circle Distance and Bearing (Haversine)

Great-circle distance, central angle and initial bearing between two points given by latitude and longitude, by the haversine formula on a spherical Earth.

Method: Haversine formula on a sphere

Input parameters

Unit system: SI

Parameter	Value	Unit
Latitude of point 1 (north positive)	19.076	°
Longitude of point 1 (east positive)	72.878	°
Latitude of point 2	28.614	°
Longitude of point 2	77.209	°
Earth radius	6,371.0	km

Calculated results

Parameter	Value	Unit
Great-circle distance	1,148.1	km
Central angle	10.325	°
Initial bearing from point 1 (from north)	21.710	°

Notes for this case

• The haversine form hav c = hav Δφ + cos φ_1 cos φ_2 hav Δλ stays accurate for short distances, where the plain spherical law of cosines loses precision. Distance is R·c with the mean Earth radius 6,371.0088 km (IUGG); on the ellipsoid true distances differ by up to about 0.5 %. The initial bearing changes along a great circle except along the equator or a meridian.

Formula and method

The formula is shown on the calculator page: https://calc.firecad.com/general/geometry/great-circle-distance-haversine

Variables

φ_1	Latitude of point 1 (north positive)	rad
λ_1	Longitude of point 1 (east positive)	rad
φ_2	Latitude of point 2	rad
λ_2	Longitude of point 2	rad
R	Earth radius	m
d	Great-circle distance	m
c	Central angle	rad
θ_0	Initial bearing from point 1 (from north)	rad

Method and standards

Haversine.

Assumptions and limits

- Spherical Earth; no terrain or altitude.

References

Haversine formula on a sphere

Report details

Report reference	FCC-YVDR-YWTD (the same inputs always give the same reference)
Generated	23 November 2026, 18:08 UTC
Calculator	Great-Circle Distance and Bearing (Haversine)
Method last reviewed	17 November 2026
Software release	FireCAD Calc, release of 22 November 2026
Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/general/geometry/great-circle-distance-haversine

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.