Join (Inverse) of Two Points: Distance and Bearing from Coordinates

Horizontal distance, whole-circle bearing, reduced (quadrant) bearing and coordinate differences between two points from their eastings and northings.

Method: Plane coordinate geometry (join or inverse problem)

Input parameters

Unit system: SI

Parameter	Value	Unit
Easting of A	1,250.4	m
Northing of A	3,480.8	m
Easting of B	1,622.2	m
Northing of B	3,195.4	m

Calculated results

Parameter	Value	Unit
Departure E_B − E_A	371.78	m
Latitude N_B − N_A	-285.39	m
Horizontal distance	468.69	m
Whole-circle bearing A to B	127.51	°
Back bearing B to A	307.51	°
Reduced bearing (angle from north or south)	52.489	°
Quadrant (1 NE, 2 SE, 3 SW, 4 NW)	2.0000	

Notes for this case

- Plane coordinates: θ = atan2(ΔE, ΔN) measured clockwise from grid north, D = √(ΔE² + ΔN²). Apply scale factor and height reduction separately for a projection.

Formula and method

The formula is shown on the calculator page: https://calc.firecad.com/civil/surveying/coordinate-join-inverse

Variables

E_A	Easting of A	m
N_A	Northing of A	m
E_B	Easting of B	m
N_B	Northing of B	m
ΔE	Departure E_B − E_A	m
ΔN	Latitude N_B − N_A	m
D	Horizontal distance	m
θ_{AB}	Whole-circle bearing A to B	rad
θ_{BA}	Back bearing B to A	rad
β	Reduced bearing (angle from north or south)	rad
q	Quadrant (1 NE, 2 SE, 3 SW, 4 NW)	-

Method and standards

Coordinate geometry.

Assumptions and limits

- Plane grid coordinates.

References

Plane coordinate geometry (join or inverse problem)

Report details

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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/civil/surveying/coordinate-join-inverse

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.