Polar (Radiation) Coordinates: New Point from Bearing and Distance

Coordinates of a new point from a known station, the whole-circle bearing and horizontal distance, with the departure and latitude, for radiation.

Method: Plane coordinate geometry (polar or forward problem)

Input parameters

Unit system: SI

Parameter	Value	Unit
Easting of the station	5,000.0	m
Northing of the station	2,000.0	m
Whole-circle bearing to the new point	127.50	°
Horizontal distance	245.80	m

Calculated results

Parameter	Value	Unit
Departure D sin θ	195.01	m
Latitude D cos θ	-149.63	m
Easting of the new point	5,195.0	m
Northing of the new point	1,850.4	m

Notes for this case

- ΔE = D sin θ, ΔN = D cos θ with θ clockwise from grid north and D the horizontal (reduced) distance.

Formula and method

$$\Delta E = D\sin\theta, \quad \Delta N = D\cos\theta, \quad E_P = E_A + \Delta E, \quad N_P = N_A + \Delta N$$

Variables

E_A	Easting of the station	m
N_A	Northing of the station	m
θ	Whole-circle bearing to the new point	rad
D	Horizontal distance	m
ΔE	Departure D sin θ	m
ΔN	Latitude D cos θ	m
E_P	Easting of the new point	m
N_P	Northing of the new point	m

Method and standards

Coordinate geometry.

Assumptions and limits

- Plane grid coordinates.

References

Plane coordinate geometry (polar or forward problem)

Report details

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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-polar-forward

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.