Whole-Circle and Quadrantal Bearings, Back Bearing and Included Angle

Quadrantal (reduced) bearing and back bearing of a line from its whole-circle bearing, and the included angle between two lines from their whole-circle bearings.

Method: Bearing conventions (Punmia, Surveying, vol. 1–2 (Laxmi), vol. 1, compass surveying)

Input parameters

Unit system: SI

Parameter	Value	Unit
Whole-circle bearing of line 1	230.00	°
Whole-circle bearing of line 2	75.000	°

Calculated results

Parameter	Value	Unit
Reduced bearing of line 1 (angle from N or S)	50.000	°
Quadrant (1 NE, 2 SE, 3 SW, 4 NW)	3.0000	
Back bearing of line 1	50.000	°
Included angle between the lines	155.00	°

Notes for this case

• Whole-circle bearings are measured clockwise from north (0–360°); reduced bearings from north or south towards east or west (0–90°). Included angle shown is the smaller one (≤ 180°).

Formula and method

$$BB = WCB \pm 180^\circ, \quad RB = \begin{cases} WCB & 0\text{–}90^\circ \\ 180^\circ - WCB & 90\text{–}180^\circ \\ WCB - 180^\circ & 180\text{–}270^\circ \\ 360^\circ - WCB & 270\text{–}360^\circ \end{cases}$$

Variables

θ_1	Whole-circle bearing of line 1	rad
θ_2	Whole-circle bearing of line 2	rad
RB_1	Reduced bearing of line 1 (angle from N or S)	rad
$\mathrm{quadrant}$	Quadrant (1 NE, 2 SE, 3 SW, 4 NW)	-
BB_1	Back bearing of line 1	rad
α	Included angle between the lines	rad

Method and standards

Bearing conventions.

Assumptions and limits

- Plane surveying.

References

• Bearing conventions (Punmia, Surveying, vol. 1–2 (Laxmi), vol. 1, compass surveying)

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/bearing-conversion

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.