Traverse Closure: Latitudes, Departures and Precision

Linear misclosure and precision of a closed traverse of three to eight legs from their lengths and whole-circle bearings, with the sums of latitudes and departures.

Method: Latitudes L cos θ; departures L sin θ; closing error and relative precision (surveying texts)

Input parameters

Unit system: SI

Parameter	Value	Unit
Number of legs	4.0000	
Length of leg 1	120.00	m
Bearing of leg 1 (whole circle)	30.000	°
Length of leg 2	95.000	m
Bearing of leg 2 (whole circle)	120.50	°
Length of leg 3	121.00	m
Bearing of leg 3 (whole circle)	209.70	°
Length of leg 4	94.000	m
Bearing of leg 4 (whole circle)	300.40	°
Length of leg 5	0	m
Bearing of leg 5 (whole circle)	0	°
Length of leg 6	0	m
Bearing of leg 6 (whole circle)	0	°
Length of leg 7	0	m
Bearing of leg 7 (whole circle)	0	°
Length of leg 8	0	m
Bearing of leg 8 (whole circle)	0	°

Calculated results

Parameter	Value	Unit
Sum of latitudes	-1.8303	m
Sum of departures	0.82799	m
Linear misclosure	2.0089	m
Perimeter	430.00	m
Precision 1 in P/e	214.05	

Notes for this case

- Distribute the misclosure by the Bowditch (compass) rule in proportion to leg lengths if the precision is acceptable.

Formula and method

$$\Delta N = L\cos\theta, \quad \Delta E = L\sin\theta, \quad e = \sqrt{(\Sigma\Delta N)^2 + (\Sigma\Delta E)^2}$$

Variables

n	Number of legs	-
L_1	Length of leg 1	m
θ_1	Bearing of leg 1 (whole circle)	rad

L_2	Length of leg 2	m
θ_2	Bearing of leg 2 (whole circle)	rad
L_3	Length of leg 3	m
θ_3	Bearing of leg 3 (whole circle)	rad
L_4	Length of leg 4	m
θ_4	Bearing of leg 4 (whole circle)	rad
L_5	Length of leg 5	m
θ_5	Bearing of leg 5 (whole circle)	rad
L_6	Length of leg 6	m
θ_6	Bearing of leg 6 (whole circle)	rad
L_7	Length of leg 7	m
θ_7	Bearing of leg 7 (whole circle)	rad
L_8	Length of leg 8	m
θ_8	Bearing of leg 8 (whole circle)	rad
$\Sigma\Delta N$	Sum of latitudes	m
$\Sigma\Delta E$	Sum of departures	m
$\mathcal{e}$	Linear misclosure	m
P	Perimeter	m
P/e	Precision 1 in P/e	-

Method and standards

Plane coordinates.

Assumptions and limits

- A traverse that closes exactly has no misclosure, so the precision 1 in P/e is unbounded and not shown.
- Plane survey.

References

• Latitudes L cos θ
• departures L sin θ; closing error and relative precision (surveying texts)

Report details

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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/traverse-closure

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Reopens the calculator with the inputs of this report.