Area of a Plot from Coordinates (Shoelace Formula)

Area and perimeter of a plot or polygon from the coordinates of three to eight corners in order, by the coordinate (shoelace) method, area in any area unit.

Method: Coordinate (shoelace, Gauss) area formula

Input parameters

Unit system: SI

Parameter	Value	Unit
Number of corners	5.0000	
Easting of corner 1	0	m
Northing of corner 1	0	m
Easting of corner 2	85.000	m
Northing of corner 2	5.0000	m
Easting of corner 3	110.00	m
Northing of corner 3	70.000	m
Easting of corner 4	50.000	m
Northing of corner 4	105.00	m
Easting of corner 5	-10.000	m
Northing of corner 5	60.000	m
Easting of corner 6	0	m
Northing of corner 6	0	m
Easting of corner 7	0	m
Northing of corner 7	0	m
Easting of corner 8	0	m
Northing of corner 8	0	m

Calculated results

Parameter	Value	Unit
Area	0.87500	ha
Perimeter	360.08	m

Notes for this case

- Enter the corners in order around the boundary; crossing sides give a wrong area.

Formula and method

$$A = \frac{1}{2}\left|\sum_{i=1}^{n}(E_i N_{i+1} - E_{i+1} N_i)\right|$$

Variables

n	Number of corners	-
E_1	Easting of corner 1	m
N_1	Northing of corner 1	m
E_2	Easting of corner 2	m
N_2	Northing of corner 2	m

E_3	Easting of corner 3	m
N_3	Northing of corner 3	m
E_4	Easting of corner 4	m
N_4	Northing of corner 4	m
E_5	Easting of corner 5	m
N_5	Northing of corner 5	m
E_6	Easting of corner 6	m
N_6	Northing of corner 6	m
E_7	Easting of corner 7	m
N_7	Northing of corner 7	m
E_8	Easting of corner 8	m
N_8	Northing of corner 8	m
A	Area	m²
P	Perimeter	m

Method and standards

Shoelace formula.

Assumptions and limits

- Simple polygon, plane coordinates.
- The coordinates are shifted to the first corner before summing, so large grid coordinates (UTM) keep their precision.

References

• Coordinate (shoelace, Gauss) area formula

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/area-by-coordinates

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.