Setting Out a Curve: Offsets from the Long Chord and Tangent

Offsets for setting out a circular curve from the long chord (mid-ordinate and offset at any distance) and perpendicular offsets from the tangent.

Method: Exact circle offsets from the long chord and tangent (surveying texts)

Input parameters

Unit system: SI

Parameter	Value	Unit
Radius	300.00	m
Long chord	200.00	m
Distance from the chord mid-point	50.000	m
Distance along the tangent from the start	50.000	m

Calculated results

Parameter	Value	Unit
Mid-ordinate R − √(R² − (L/2)²)	17.157	m
Offset from the long chord at x	12.961	m
Perpendicular offset from the tangent R − √(R² − x_t²)	4.1960	m

Formula and method

$$O_0 = R - \sqrt{R^2 - (L/2)^2}, \quad O_x = \sqrt{R^2 - x^2} - (R - O_0), \quad O_t = R - \sqrt{R^2 - x_t^2}$$

Variables

R	Radius	m
L	Long chord	m
x	Distance from the chord mid-point	m
x_t	Distance along the tangent from the start	m
O_0	Mid-ordinate R − √(R² − (L/2)²)	m
O_x	Offset from the long chord at x	m
O_t	Perpendicular offset from the tangent R − √(R² − x_t²)	m

Method and standards

Circle geometry.

Assumptions and limits

- Exact circle.

References

- Exact circle offsets from the long chord and tangent (surveying texts)

Report details

Report reference	FCC-5TPF-TTYT (the same inputs always give the same reference)
Generated	17 November 2026, 19:37 UTC
Calculator	Setting Out a Curve: Offsets from the Long Chord and Tangent
Method last reviewed	12 November 2026
Software release	FireCAD Calc, release of 17 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/curve-offsets-long-chord

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.