Circle Through Three Points

Centre, radius, diameter and circumference of the circle passing through three points, the circumcircle of the triangle they form, with a collinearity check.

Method: Circumcircle by perpendicular bisectors

Input parameters

Unit system: SI

Parameter	Value	Unit
Point 1: x	0	
Point 1: y	0	
Point 2: x	4.0000	
Point 2: y	3.0000	
Point 3: x	6.0000	
Point 3: y	-1.0000	

Calculated results

Parameter	Value	Unit
Centre x	3.0909	
Centre y	0.045455	
Radius	3.0912	
Circumference	19.423	
Area of the triangle of the three points	11.000	

Notes for this case

• The centre is equidistant from the three points, so it lies where the perpendicular bisectors of two chords meet. Solving the two linear equations gives the determinant form used here; the denominator is twice the signed area of the triangle and is zero for collinear points. Use it to find the radius of an arc from three surveyed or measured points, such as a curved wall, a tank shell or a worn bore.

Formula and method

$$x_c = \frac{\sum s_i (y_j - y_k)}{D}, \quad y_c = \frac{\sum s_i (x_k - x_j)}{D}, \quad D = 2 \sum x_i (y_j - y_k), \; s_i = x_i^2 + y_i^2$$

Variables

x_1	Point 1: x	-
y_1	Point 1: y	-
x_2	Point 2: x	-
y_2	Point 2: y	-
x_3	Point 3: x	-
y_3	Point 3: y	-
x_c	Centre x	-
y_c	Centre y	-
R	Radius	-
C	Circumference	-
$A_\triangle$	Area of the triangle of the three points	-

Method and standards

Circumcircle.

Assumptions and limits

- Plane coordinates; exact points (no least-squares fit).

References

Circumcircle by perpendicular bisectors

Report details

Report reference	FCC-PN70-T6VE (the same inputs always give the same reference)
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Calculator	Circle Through Three Points
Method last reviewed	17 November 2026
Software release	FireCAD Calc, release of 22 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/general/geometry/circle-through-three-points

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.