Triangle Calculator from Three Sides (Angles, Area)

Angles, area (Heron's formula), perimeter, and the circumscribed and inscribed circle radii of a triangle from its three sides, by the cosine rule.

Method: Cosine rule; Heron's formula

Input parameters

Unit system: SI

Parameter	Value	Unit
Side a	3.0000	m
Side b	4.0000	m
Side c	5.0000	m

Calculated results

Parameter	Value	Unit
Angle opposite a	36.870	°
Angle opposite b	53.130	°
Angle opposite c	90.000	°
Area	6.0000	m²
Perimeter	12.000	m
Circumscribed circle radius	2.5000	m
Inscribed circle radius	1.0000	m

Formula and method

$$A = \arccos\frac{b^2 + c^2 - a^2}{2bc}$$

$$S = \sqrt{s(s-a)(s-b)(s-c)}, \quad s = \frac{a+b+c}{2}$$

$$R = \frac{abc}{4S}, \quad r = \frac{S}{s}$$

Variables

a	Side a	m
b	Side b	m
c	Side c	m
A	Angle opposite a	rad
B	Angle opposite b	rad
C	Angle opposite c	rad
S	Area	m²
P	Perimeter	m
R	Circumscribed circle radius	m
r	Inscribed circle radius	m

Method and standards

Cosine rule and Heron's formula.

Assumptions and limits

- Plane triangle.

References

- Cosine rule; Heron's formula

Report details

Report reference	FCC-ABRQ-Q84P (the same inputs always give the same reference)
Generated	17 November 2026, 19:43 UTC
Calculator	Triangle Calculator from Three Sides (Angles, Area)
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/general/geometry/triangle-solver

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.