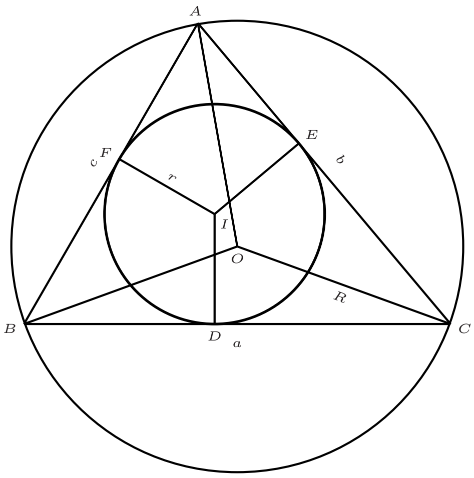
Triangle Area Formulae



Let ABC be a triangle, and let $A = \angle BAC$, $B = \angle ABC$, $C = \angle ACB$, $a = BC$, $b = AC$, $c = AB$. Let $s = \frac{a+b+c}{2}$, let R be the cicumradius, let r be the inradius, and let r_A, r_B and r_C be the radii of the excircles opposite the vertices A, B, and C respectively. Let h_A, h_B and h_C be the lengths of the altitudes from A, B and C respectively. Let I be the incentre. The area of triangle ABC is equal to all of the following:

Formulae you should know:

- $\frac{1}{2}ah_A$
- $\frac{1}{2}ab\sin C$
- $2R^2 \sin A \sin B \sin C$
- $\frac{abc}{4R}$
- sr
- $\sqrt{s(s-a)(s-b)(s-c)}$

Other formulae

- $Rr(\sin A + \sin B + \sin C)$
- $r^2(\cot A + \cot B + \cot C + \frac{1}{2}(\csc A + \csc B + \csc C))$
- $r^2\left(\cot\frac{A}{2} + \cot\frac{B}{2} + \cot\frac{C}{2}\right)$
- $\frac{1}{2}R^2(\sin 2A + \sin 2B + \sin 2C)$
- $\frac{a^2}{2(\cot B + \cot C)}$
- $\frac{a^2+b^2+c^2}{4(\cot A + \cot B + \cot C)}$
- $\sqrt{\frac{Rh_Ah_Bh_C}{2}}$
- $\sqrt{\frac{s^2.AI.BI.CI}{4R}}$
- $\frac{s.AI.BI.CI}{4Rr}$
- $r_A(s-a)$
- $\sqrt{rr_Ar_Br_C}$