Sine rule

This rule states that the sides of any triangle are proportional to the sines of the angle opposite to them in ∆ABC, i.e.

$a/\sin A = b/\sin B = c/\sin C$

Note:

The rule can further be expressed as $(\sin A)/a = (\sin B)/b = (\sin C)/c$

The rule is extremely useful for expressing the sides of a triangle in terms of sines of angle or vice versa as per the requirement of the question. Hence, for the form $a/\sin A = b/\sin B = c/\sin C = k$, we have,

$a = k \sin A$, $b = k \sin B$, $c = k \sin C$

and for $(\sin A)/a = (\sin B)/b = (\sin C)/c = l$, we have

$\sin A = la$, $\sin B = lb$, $\sin C = lc$

Cosine rule

In any triangle ABC, the following results hold good:

$\cos A = (b2 + c2 - a2)/2ac$

$\cos B = (a2 + c2 - b2)/2ac$

$\cos C = (a2 + b2 - c2)/2ab$

Note: In case

$\angle A = 60°$, then $b2 + c2 - a2 = bc$

$\angle B = 60°$, then $a2 + c2 - b2 = ac$

$\angle C = 60°$, then $a2 + b2 - c2 = ab$

Trigonometric ratios of half-angles:

$\sin A/2 = \sqrt{(s-b)(s-c)/bc}$

$\sin B/2 = \sqrt{(s-b)(s-c)/bc}$

$\sin C/2 = \sqrt{(s-a)(s-b)/ab}$

$\cos A/2 = \sqrt{s(s - a)/bc}$

$\cos B/2 = \sqrt{s(s -}$

b)/ca

$\cos C/2 = \sqrt{s(s - c)/ab}$

$\tan A/2 = \sqrt{(s - b)(s - c)/s(s - a)}$

$\tan B/2 = \sqrt{(s - c)(s - a)/s(s - b)}$

$\tan C/2 = \sqrt{(s - a)(s - b)/s(s - c)}$

Projection rule:

$a = b \cos C + c \cos B$

$b = c \cos A + a \cos C$

$c = a \cos B + b \cos A$

Semi-perimeter of the triangle

If 's' is assumed to be the perimeter of the triangle then $s = a + b + c \ /2$

Area of a triangle

If Δ is the area of the triangle ABC then

$\Delta = 1/2\, bc \sin A = 1/2\, ca \sin B = 1/2\, ab \sin$