

MATH RAILWAY (GEOMETRY 09 OCTOBER 2018)

Sine Theorem

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

Cosine Theorem

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

$$a^2 = b^2 + c^2 - 2bc \times \cos A$$

$$c \cos B = \frac{a^2 + c^2 - b^2}{ac}$$

$$c \cos C = \frac{b^2 + a^2 - c^2}{ab}$$

Condition to construct a triangle

Sum of two sides > third side

Sum of all interior angle = 180°

Sum of all exterior angle = 360°

TRIANGLE

Acute Triangle (न्यून कोण त्रिभुज)

$$c^2 < a^2 + b^2$$

Right angle Triangle (सम कोण त्रिभुज)

$$c^2 = a^2 + b^2$$

Obtuse Triangle (अधिक कोण त्रिभुज)

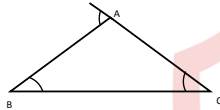
$$c^2 > a^2 + b^2$$

EX: The sides of a triangle is 5, 6, 9 then the triangle is-

एक त्रिभुज की भुजायें 5, 6, 9 हैं, तो त्रिभुज है -

Sum of the two interior angle is equal to the exterior angle of third (opposite) angle.

दो आंतरिक कोण का योग तीसरा (विपरीत) कोण के बराबर होता है



$$\angle B + \angle C = m \angle A$$

EX: In a triangle ABC, BC is produced to D so that AC = DC. If

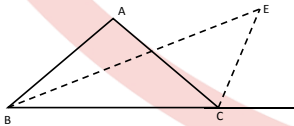
$\angle BAD = 110^\circ$ and $\angle ACB = 80^\circ$, then $\angle ABC$ is equal to

त्रिभुज ABC में, BC को D तक इसप्रकार बढ़ाया जाता है कि AC=DC है, यदि

$\angle BAD = 110^\circ$ और $\angle ACB = 80^\circ$, तो $\angle ABC$ बराबर है

Angle formed by the interior angle bisector of one of the base angle and angle bisector of exterior angle of other base angle is half of the third (vertex) angle.

$$\angle BEC = \frac{\angle BAC}{2}$$

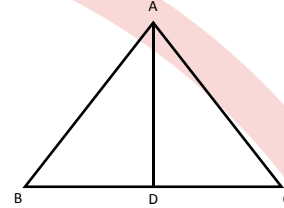


EX: In a triangle ABC, the bisector of the internal angle $\angle ABC$ and exterior angle $\angle C$ intersect at D. If $\angle BDC = 30^\circ$, then $\angle BAC$ is equal to

एक त्रिभुज ABC में, अन्तः कोण $\angle ABC$ और बाह्य कोण $\angle C$ के अर्धक एक दुसरे को बिंदु D पर प्रतिच्छेद करते हैं। यदि $\angle BDC = 30^\circ$ हैं, तो $\angle BAC$ बराबर है-

The sum of the squares of any two sides of any triangle is equals to twice the square of half of the third side, together with twice the square of the median bisecting the third side.

$$AB^2 + AC^2 = 2(BD^2 + AD^2)$$

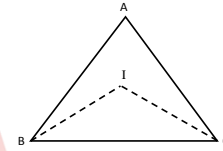


EX: In a $\triangle ABC$, if $AB = 20$ cm, $AC = 21$ cm and $BC = 29$ cm, then find the distance between the vertex A and the mid point of BC.

एक त्रिभुज $\triangle ABC$ में, यदि $AB = 20$ सेमी, $AC = 21$ सेमी और $BC = 29$ सेमी है, तो शीर्ष बिंदु A से BC की मध्य बिंदु की दूरी ज्ञात कीजिए।

The angle formed by two interior angle bisector inside the triangle is equal to the sum of right angle and half of the third angle.

$$\angle BIC = 90^\circ + \frac{\angle BAC}{2}$$

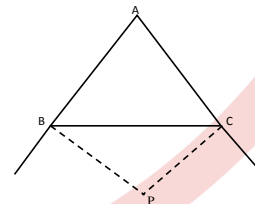


EX: The interior bisectors of $\angle ABC$ and $\angle ACB$ of $\triangle ABC$ meet each other at O. If $\angle BOC = 140^\circ$, then $\angle BAC$ is equal to

$\triangle ABC$ के अन्तः कोण $\angle ABC$ और $\angle ACB$ के अर्धक त्रिभुज में बिंदु O पर एक दूसरे से मिलते हैं। यदि $\angle BOC = 140^\circ$ है, तो $\angle BAC$ बराबर है-

The angle formed by two exterior angle bisector outside the triangle is equal to the difference of right angle and half of the third angle.

$$\angle BPC = 90^\circ - \frac{\angle BAC}{2}$$



EX: The exterior bisectors of $\angle B$ and $\angle C$ of $\triangle ABC$ meet each other at P. If $\angle BAC = 50^\circ$, then $\angle BPC$ is equal to

$\triangle ABC$ के बाह्य कोण $\angle B$ और $\angle C$ के अर्धक त्रिभुज के बाहर बिंदु P पर एक दूसरे से मिलते हैं। यदि $\angle BAC = 50^\circ$ है, तो $\angle BPC$ बराबर है-

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