

CHAPTER 06

Lines and Angles

Properties of triangles:

Angle sum property of a triangle:

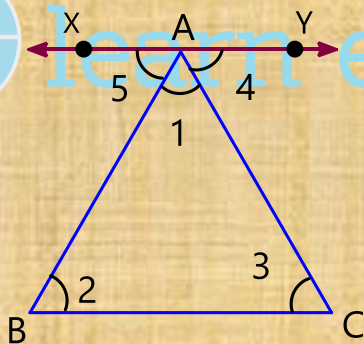
Theorem:

Statement:

The sum of the three angles of a triangle is 180° .

i.e. $\angle 1 + \angle 2 + \angle 3 = 180^\circ$

Proof:



Draw a line XY through point 'A' parallel to BC

$$\angle 3 = \angle 4 \quad (\text{Alternate interior angles})$$

$$\angle 5 = \angle 2 \quad (\text{Alternate interior angles})$$

Also, $\angle 5 + \angle 1 + \angle 4 = 180^\circ$ (Straight angle)

Replacing $\angle 5$ and $\angle 4$ by $\angle 2$ and $\angle 3$ respectively, we get

$$\angle 2 + \angle 1 + \angle 3 = 180^\circ$$

$$\Rightarrow \angle 1 + \angle 2 + \angle 3 = 180^\circ$$

$\therefore$ Sum of all angles of a triangle is 180° .

Example:

In $\triangle ABC$, BC is the base. Sum of the base angles is 126° and their difference is 16° . Find all the angles of the triangle.

Sol.

Given,

$$\angle B + \angle C = 126^\circ \dots\dots\dots (1)$$

$$\angle B - \angle C = 16^\circ \dots\dots\dots (2)$$

Add (1) + (2),

$$\Rightarrow 2\angle B = 142^\circ \Rightarrow \angle B = \frac{142}{2} \Rightarrow \angle B = 71^\circ$$

$$\angle C = 126 - 71^\circ = 55^\circ (\because \text{from (1)})$$

But, $\angle A + \angle B + \angle C = 180^\circ$ (Sum of 3 angles of triangle = 180°)

$$\angle A + 71^\circ + 55^\circ = 180^\circ$$

$$\angle A = 181^\circ - 126^\circ = 54^\circ$$

$$\angle A = 54^\circ, \angle B = 71^\circ \text{ and } \angle C = 55^\circ$$