Angle Sum Property of a Triangle

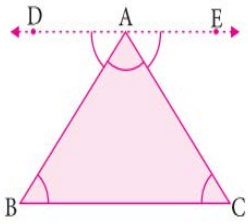
Let us prove the Angle sum property of triangle that the sum of the measures of the three angles of a triangle is equal to 180°, using the property of parallel lines.

Given: A triangle ABC

To prove: ∠A + ∠B + ∠C = 180°

Construction: draw a line DE parallel to the side BC of the given triangle.

Proof: Since DE is a straight line, it can be concluded that:



∠DAB + ∠BAC + ∠EAC = 180° .....(1)

Since DE||BC and AB, AC are transversals,

Therefore, ∠EAC = ∠ACB (a pair of alternate angles)

Also, ∠DAB = ∠CBA (a pair of alternate angles)

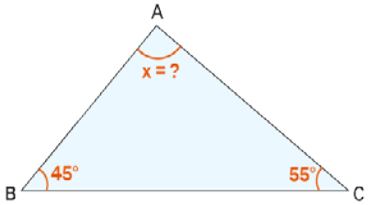
Substituting the value of ∠EAC and ∠DAB in equation (1),

∠ACB + ∠BAC + ∠CBA= 180°

Thus, the sum of the interior angles of a triangle is 180°.

Let us understand with an example:

Example: Sameera needs to find the measure of the third angle of a triangle ABC in which ∠ABC = 45° and ∠ACB = 55°. Can you help her?



Solution:

We know that ∠ABC = 45° and ∠ACB = 55°.

Using the Angle Sum Property of a triangle,

∠A + ∠B + ∠C = 180,

∠A + 45 + 55° = 180°,

∠A + 100° = 180°,

∠A = 180° -100°,

∠A = 80°.

Therefore, the third angle: ∠A = 80°