Exterior angle property of triangle

Understanding: Exterior Angle Property of a Triangle

- An exterior angle of a triangle is formed when a side of the triangle is extended.
- The exterior angle is equal to the sum of the two interior opposite angles.
- This is called the Exterior Angle Property of a triangle.

Formula

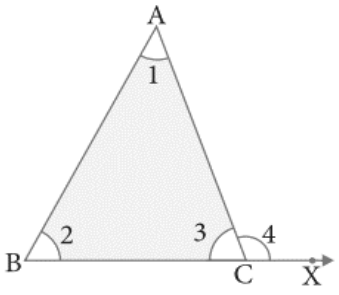
- **Exterior Angle** = Interior Opposite Angle 1 + Interior Opposite Angle 2

Important Points

- The exterior angle is always greater than each of the opposite interior angles
- This property helps in finding unknown angles in triangles

If a side of a triangle is produced, the exterior angle so formed is equal to the sum of two interior opposite angles.

- **Given:** In the given figure, the side BC of ΔABC is extended.
- **To prove:** The exterior angle ∠ACX so formed is the sum of measures of ∠ABC and ∠CAB.
- **Proof:** ∠3 and ∠4 form a linear pair since they represent the adjacent angles on a straight line.
- Thus, ∠3 + ∠4 = 180° …….(2)
- Also, from the angle sum property, it follows that:
- ∠3 + ∠1 + ∠2 = 180°…….(3)
- From equation (2) and (3) it follows that:
- ∠4 = ∠1 + ∠2
- Hence, ∠ACD = ∠BAC + ∠CBA



Let us understand with examples:

Example: In the figure, two of the angles have measures 60° and 70°. Find the measures of ∠XYT.

Solution: In ΔXYZ, ∠XYT is an exterior angle at Y.

So, ∠XYT = ∠YXZ + ∠XZY

= 60° + 70° = 130°

Thus, ∠XYT = 130°

Example: In a triangle, the two interior opposite angles are 60° and 50°. Find the exterior angle

Exterior angle = 60° + 50° = 110°

Exterior angle = 110°

Example: An exterior angle of a triangle is 120°, and one interior opposite angle is 65°. Find the second interior opposite angle

Second angle = 120° – 65° = 55°

Answer: 55°

Summary Points

- Exterior angle = sum of the two interior opposite angles.
- This rule applies to all triangles.
- Helps in finding missing angles easily.
- The exterior angle is always outside the triangle.
- Use subtraction if one angle is known to find the other.