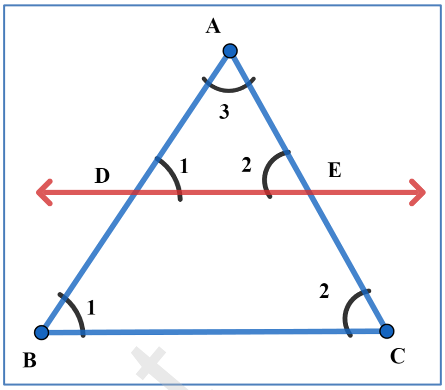
10 TH MATHEMATICS THEOREMS STUDY MATERIAL

THEOREM 1 — THALES THEOREM OR BPT (BASIC PROPORTIONALITY THEOREM)

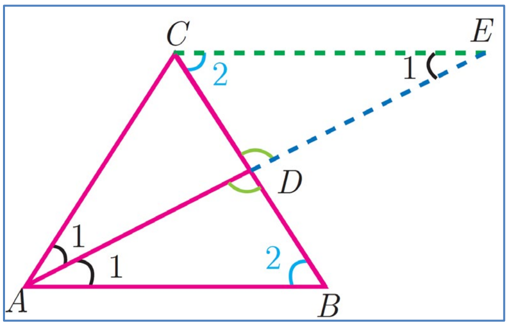


1. **STATEMENT**
   - A Straight line drawn Parallel to a side of triangle intersecting the other two sides, divides the sides in the Same ratio.
2. **GIVEN**: In ΔABC D and E is a Point on AB and AC
3. **TO PROVE**: $\frac{AD}{DB} = \frac{AE}{EC}$
4. **CONSTRUCTION**: Draw a line $DE \parallel BC$.

S. NO	STATEMENT	REASON
1.	$\angle ABC = \angle ADE = \angle 1$	Corresponding Angles Equal ($DE \parallel BC$)
2.	$\angle ACB = \angle AED = \angle 2$	
3.	$\angle DAE = \angle BAC = \angle 3$	Both Triangle a Common Angle.
4.	$\Delta ABC \sim \Delta ADE$	By AAA Similarity
	$\frac{AB}{AD} = \frac{AC}{AE}$	Corresponding Sides Proportional
	$\frac{AD+DB}{AD} = \frac{AE+EC}{AE}$	
	$\frac{AD}{AD} + \frac{DB}{AD} = \frac{AE}{AE} + \frac{EC}{AE}$	Split AB and AC Using Points D and E
	$1 + \frac{DB}{AD} = 1 + \frac{EC}{AE}$	Cancelling 1 on both sides
	$\frac{DB}{AD} = \frac{EC}{AE}$	Taking Reciprocals
	$\frac{AD}{DB} = \frac{AE}{EC}$	Hence Proved

THEOREM 2 — ABT (ANGLE BISECTOR THEOREM)

1. **STATEMENT**
   - The Internal Bisector of an angle of a triangle divides the Opposite side Internally in the ratio of the Corresponding sides Containing the Angle.



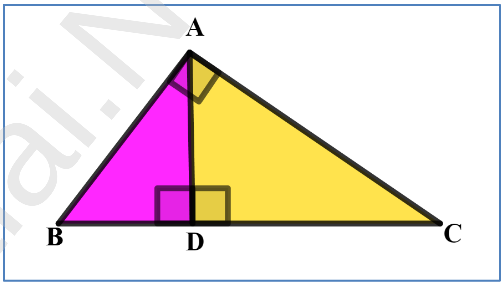
2. **GIVEN**: In ΔABC AD is the Internal Bisector
3. **TO PROVE**: $\frac{AB}{AC} = \frac{BD}{CD}$
4. **CONSTRUCTION**: Draw a line Parallel to AB. Extend AD line Through C at E.

S. NO	STATEMENT	REASON
1.	$\angle AEC = \angle BAE = \angle 1$	Two parallel lines Cut a transversal. (Alternate Angle s Equal)
2.	$\angle ABD = \angle ECD = \angle 2$	
3.	$\Delta\, ACE$ is isosceles $AC = CE ----(1)$	In $\Delta\, ACE, \angle CAE = \angle CEA$
4.	$\Delta\, ABD \sim \Delta\, ECD$ $\frac{AB}{CE} = \frac{BD}{CD}$ $\frac{AB}{AC} = \frac{BD}{CD}$	By AAA Similarity From (1) $AC = CE$ Hence Proved

THEOREM 3 **PYTHAGORAS THEOREM (BAUDHAYANA THEOREM)**

1. **STATEMENT**

❖ In a Right angle Triangle, the Square on the Hypotenuse is equal to the sum of the Squares on the other Two sides.



2. **GIVEN**: In $\Delta\, ABC$ $\angle A = 90^{\circ}$ is the Internal Bisector

3. **TO PROVE**: $AB^2 + AC^2 = BC^2$

4. **CONSTRUCTION**: Draw $AD \perp BC$

S. NO	STATEMENT	REASON
1.	$\Delta\, ABC$ and $\Delta\, DBA$ ($\angle B$ is Common) $\angle BAC = \angle BDA = 90^{\circ}$	Given $\angle BAC = 90^{\circ}$ and $\angle BDA = 90^{\circ}$
2.	$\therefore\ \Delta\, ABC \sim \Delta\, DBA$ $\frac{AB}{BD} = \frac{BC}{AB}$ $AB^2 = BC \times BD ---(1)$	By AA Similarity
3.	$\Delta\, ABC$ and $\Delta\, DAC$ ($\angle C$ is Common) $\angle BAC = \angle ADC = 90^{\circ}$	Given $\angle BAC = 90^{\circ}$ and $\angle BDA = 90^{\circ}$
4.	$\therefore\ \Delta\, ABC \sim \Delta\, DAC$ $\frac{BC}{AC} = \frac{AC}{DC}$ $AC^2 = BC \times DC ---(2)$	By AA Similarity

Add $(1) + (2) \Rightarrow AB^2 + AC^2 = BC \times BD + BC \times DC$

$= BC[BD + DC]$

$= BC \times BC$

$AB^2 + AC^2 = BC^2$

PREPARED AND TYPED BY
Y. SEENIVASAN. M.Sc, B.Ed (MATHS TEACHER)