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Similar Triangles

Triangles are a special type of polygons. The study of their similarity is important.

Two triangles are said to be similar if:

(i) Their corresponding sides are proportional, and,

(ii) Their corresponding angles are equal.

THALES' THEOREM [Basic Proportionality Theorem]

If a line is drawn parallel to one of the sides of a triangle to intersect the other two sides in distinct points ten the other two sides are divided in the same ratio.

Given: A ΔABC in which DE || BC and DE intersects AC and AB at h and D respectively.

To Prove:

$$\frac{AD}{DB} = \frac{AE}{EC}$$

Construction: Join BE and ' CD.' Draw EF ⊥ AB and DC ⊥ AC

Proof: EF ⊥ AB EF is height of the ΔADE, corresponding to AD.

$$\therefore \text{ar}(\Delta ADE) = \frac{1}{2} \text{ Base} \times \text{height} = \frac{1}{2} AD \times EF$$

Similarly,

$$\text{ar}(\Delta ADE) = \frac{1}{2} DB \times EF$$

$$\therefore \frac{\text{ar}(\Delta ADE)}{\text{ar}(\Delta DBE)} = \frac{\frac{1}{2} AD \times EF}{\frac{1}{2} DB \times EF} = \frac{AD}{DB} \quad ...(1)$$

Again,

$$\text{ar}(\Delta ADE) = \frac{1}{2} AE \times DG$$

$$\text{ar}(\Delta ECD) = \frac{1}{2} EC \times DG$$

$$\therefore \frac{\text{ar}(\Delta ADE)}{\text{ar}(\Delta ECD)} = \frac{\frac{1}{2} AE \times DG}{\frac{1}{2} EC \times DC} = \frac{AE}{EC} \quad ...(2)$$

Since, ΔDBE and ΔECD being on the same base DE and between the same parallel DE and BC,

we have

ar(ΔDBE) = ar(ΔECD) ...(3)

From (1), (2) & (3), we have:

$$\frac{AD}{DB} = \frac{AE}{EC}$$

Since, AD and DB are parts of AB and whereas AE and EC are parts of AC,

∴ D and E divide the sides AB and AC in the same ratio.

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Revise and proof

1. B.P.T.
2. Converse of B.P.T.
3. Angle Bisector Theorem
4. Intercept Theorem