Deven Jadhav Class 10 C Roll, no 10

6/11/20

Math MTRV 5

1. Given - $\triangle ABC$ where $DE \parallel BC$

To prove → $\frac{AD}{DB} = \frac{AE}{EC}$

Construction → Join BE and CD
Draw $DM \perp AC$ and $EN \perp AB$

Proof →

$ar(\triangle ADE) = \frac{1}{2} \cdot B \cdot H$

$= \frac{1}{2} \cdot AD \cdot EN$ - (i)

$ar(\triangle BDE) = \frac{1}{2} \cdot DB \cdot EN$ - (ii)

$ar(\triangle ADE) = \frac{1}{2} \cdot AE \cdot DM$ - (iii)

$ar(\triangle DEC) = \frac{1}{2} \cdot EC \cdot DM$ - (iv)

Divide (i) and (ii)

$$\frac{Ar(\triangle ADE)}{Ar(\triangle BDE)} = \frac{\frac{1}{2} \cdot AD \cdot EN}{\frac{1}{2} \cdot DB \cdot EN}$$

$$\therefore \frac{ar(\triangle ADE)}{ar(\triangle BDE)} = \frac{AD}{DB} \quad \text{- (A)}$$

Divide (iii) by (iv) → $\frac{ar(\triangle ADE)}{ar(\triangle DEC)} = \frac{\frac{1}{2} \cdot AE \cdot DM}{\frac{1}{2} \cdot EC \cdot DM}$

$$\frac{ar(\Delta ADE)}{ar(\Delta DEC)} = \frac{AE}{EC} \quad — (B)$$

Now, Δ ΔBDE and ΔDEC are on same base DE between same parallels BC and DE

$ar(\Delta BDE) = ar(\Delta DEC)$

Hence,

$$\frac{Ar(ADE)}{Ar(BDE)} = \frac{ar(ADE)}{Ar(DEC)}$$

$$\therefore \frac{AD}{DB} = \frac{AE}{EC} \quad \text{(from A \& B)}$$

Hence proved.

2. Given: ΔABC right angled at B.

To prove: $AC^2 = AB^2 + BC^2$

Construction: Draw $BD \perp AC$

Proof: Since $BD \perp AC$

using theorem 6.7: If a perpendicular is drawn from vertex of right angle of the Δ to the hypotenuse then triangle on b.s. of the ⊥ are similar to whole Δ and each other.

Δ ~~ABD~~ → → PTO

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$\Delta ADB \sim \Delta ABC$

Since, sides of similar triangles are in the same ratio,

$$\Rightarrow \frac{AD}{AB} = \frac{AB}{AC}$$

$$\Rightarrow AD \cdot AC = AB^2 \quad -(1)$$

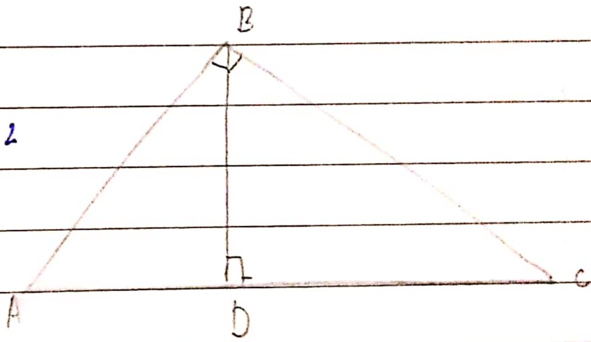
$\Delta BDC \sim \Delta ABC$

Since, sides of sim Δ are in same ratio.

$$\Rightarrow \frac{CD}{BC} = \frac{BC}{AC}$$

$$\Rightarrow CD \cdot AC = BC^2 \quad -(11)$$

Adding (1) and (11),



$$AD \cdot AC + CD \cdot AC = AB^2 + BC^2$$
$$AC(AD + CD) = AB^2 + BC^2$$
$$AC \cdot AC = AB^2 + BC^2$$
$$AC^2 = AB^2 + BC^2$$

Hence proved.