1. Let $\Delta ABC \sim \Delta DEF$ and their areas be, respectively, 64 cm² and 121 cm². If EF = 15.4 cm, find BC.

Ans. We have, $\frac{\text{Area }(\Delta ABC)}{\text{Area }(\Delta DEF)} = \frac{BC^2}{EF^2}$

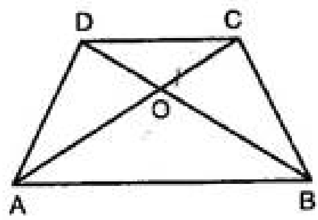
$$\Rightarrow \frac{64}{121} = \frac{BC^2}{(15.4)^2}$$

$$\Rightarrow \frac{8}{11} = \frac{BC}{15.4}$$

$$\Rightarrow BC = \left(\frac{8}{11} \times 15.4\right) \text{cm} = 11.2 \text{ cm}$$

2. Diagonals of a trapezium ABCD with AB $\parallel$ DC intersect each other at the point O. If AB = 2CD, find the ratio of the areas of triangles AOB and COD.

Ans. In Δs AOB and COD, we have,



$\angle AOB = \angle COD$[Vertically opposite angles]

$\angle OAB = \angle OCD$[Alternate angles]

By AA-criterion of similarity,

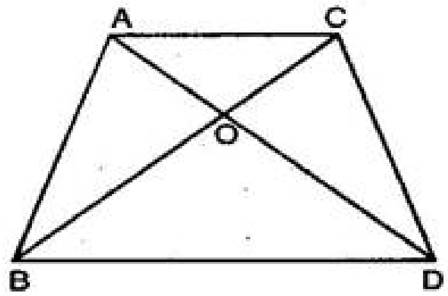
$\therefore \Delta AOB \sim \Delta COD$

$$\therefore \frac{\text{Area }(\Delta AOB)}{\text{Area }(\Delta COD)} = \frac{AB^2}{DC^2}$$

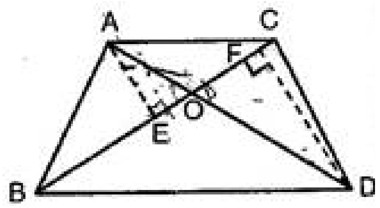
$$\Rightarrow \frac{\text{Area }(\Delta AOB)}{\text{Area }(\Delta COD)} = \frac{(2DC)^2}{DC^2} = \frac{4}{1}$$

Hence, Area (ΔAOB) : Area (ΔCOD) = 4 : 1

3. In figure, ABC and DBC are two triangles on the same base BC. If AD intersects BC at O, show that $\frac{ar(\Delta ABC)}{ar(\Delta DBC)} = \frac{AO}{DO}$.



Ans. Given: Two Δs ABC and DBC which stand on the same base but on the opposite sides of BC.



To Prove: $\frac{\text{Area }(\Delta ABC)}{\text{Area }(\Delta DBC)} = \frac{AO}{DO}$

Construction: Draw AE $\perp$ BC and DF $\perp$ BC.

Proof: In Δs AOE and DOF, we have, $\angle$AEO = $\angle$DFO = 90°

and $\angle$AOE = $\angle$DOF[Vertically opposite)

$\therefore$ ΔAOE ~ ΔDOF[By AA-criterion]

$\therefore \frac{AE}{DF} = \frac{AO}{OD}$ ....(i)

Now, $\frac{\text{Area }(\Delta ABC)}{\text{Area }(\Delta DBC)} = \frac{\frac{1}{2}\times BC\times AE}{\frac{1}{2}\times BC\times DF}$

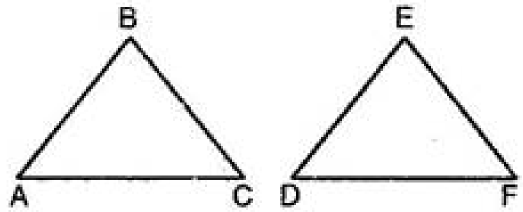
$$\Rightarrow \frac{\text{Area }(\Delta ABC)}{\text{Area }(\Delta DBC)} = \frac{AE}{DF}$$

$$\Rightarrow \frac{\text{Area}(\Delta ABC)}{\text{Area}(\Delta DBC)} = \frac{AO}{OD} \text{ [using eq. (i)]}$$

4. If the areas of two similar triangles are equal, prove that they are congruent.

Ans. Given: Two Δs ABC and DEF such that $\Delta ABC \sim \Delta DEF$

And Area(ΔABC) = Area (ΔDEF)



To Prove: $\Delta ABC \cong \Delta DEF$

Proof: $\Delta ABC \sim \Delta DEF$

$\therefore \angle A = \angle D, \angle B = \angle E, \angle C = \angle F$

And $\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$

To establish $\Delta ABC \cong \Delta DEF$, it is sufficient to prove that, AB = DE, BC = EF and AC = DF

Now, Area(ΔABC) = Area (ΔDEF)

$$\therefore \frac{\text{Area}(\Delta ABC)}{\text{Area}(\Delta DEF)} = 1$$

$$\Rightarrow \frac{AB^2}{DE^2} = \frac{BC^2}{EF^2} = \frac{AC^2}{DF^2} = 1$$

$$\Rightarrow \frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF} = 1$$

$\Rightarrow$ AB = DE, BC = EF, AC = DF

Hence. $\Delta ABC \cong \Delta DEF$

5. D, E and F are respectively the mid-points of sides AB, BC and CA of ΔABC. Find the ratio of the areas of ΔDEF and ΔABC.

Ans. Since, D and E are the mid-points of the sides BC and CA of ΔABC respectively.

$\therefore$ DE $\parallel$ BA $\Rightarrow$ DE $\parallel$ FA ....(i)

Since, D and F are the mid-points of the sides BC and AB of ΔABC respectively.

*********** END **********