



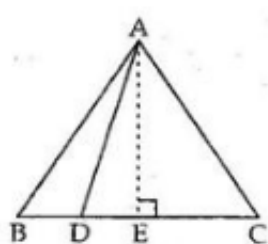
Exercise 10A

Question 25:

Given : A $\triangle ABC$ in which D is a point on BC such that;

$$BD = \frac{1}{2}DC$$

$$\text{To Prove: } \text{ar}(\triangle ABD) = \frac{1}{3} \text{ar}(\triangle ABC)$$



Construction: Draw $AE \perp BC$

$$\text{Proof: } \text{ar}(\triangle ABD) = \frac{1}{2} \times BD \times AE \dots\dots(1)$$

$$\text{and, } \text{ar}(\triangle ABC) = \frac{1}{2} \times BC \times AE \dots\dots(2)$$

$$\text{Given that } BD = \frac{1}{2}BC$$

$$\text{So, } BC = BD + DC = BD + 2BD = 3BD$$

$$\therefore BD = \frac{1}{3}BC \dots\dots(3)$$

From (1),

$$\begin{aligned} \text{ar}(\triangle ABD) &= \frac{1}{2} \times BD \times AE \\ &= \frac{1}{2} \times \frac{BC}{3} \times AE \quad [\text{from (3)}] \end{aligned}$$

$$\begin{aligned} \therefore \text{ar}(\triangle ABD) &= \frac{1}{3} \times \left(\frac{1}{2} \times BC \times AE \right) \\ &= \frac{1}{3} \times \text{ar}(\triangle ABC) \quad [\text{from (2)}] \end{aligned}$$

$$\therefore \text{ar}(\triangle ABD) = \frac{1}{3} \times \text{ar}(\triangle ABC)$$

***** END *****