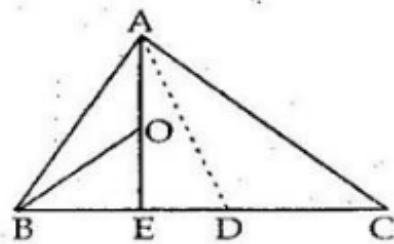




Exercise 10A

Question 19:

Given : A $\triangle ABC$ in which AD is the median and E is the mid-point of BD. O is the mid-point of AE.



To Prove : $\text{ar}(\triangle BOE) = \frac{1}{8} \text{ar}(\triangle ABC)$

Proof : Since O is the midpoint of AE.

So, BO is the median of $\triangle BAE$

$$\therefore \text{ar}(\triangle BOE) = \frac{1}{2} \text{ar}(\triangle ABE) \dots (1)$$

Now, E is the mid-point of BD

So AE divides $\triangle ABD$ into two triangles of equal area.

$$\therefore \text{ar}(\triangle ABE) = \frac{1}{2} \text{ar}(\triangle ABD) \dots (2)$$

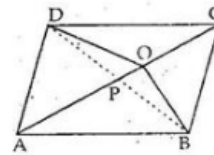
As D is the mid point of BC

$$\text{So } \text{ar}(\triangle ABD) = \frac{1}{2} \text{ar}(\triangle ABC) \dots (3)$$

$$\begin{aligned} \Rightarrow \text{ar}(\triangle BOE) &= \frac{1}{2} \text{ar}(\triangle ABE) \quad [\text{from (1)}] \\ &= \frac{1}{2} \left[\frac{1}{2} \text{ar}(\triangle ABD) \right] \quad [\text{from (2)}] \\ &= \frac{1}{4} \text{ar}(\triangle ABD) \\ &= \frac{1}{4} \times \frac{1}{2} \text{ar}(\triangle ABC) \quad [\text{from (3)}] \\ &= \frac{1}{8} \text{ar}(\triangle ABC) \end{aligned}$$

Question 20:

Given: A parallelogram ABCD in which O is any point on the diagonal AC.



To Prove: $\text{ar}(\triangle AOB) = \text{ar}(\triangle AOD)$.

Construction: Join BD which intersects AC at P.

Proof: As diagonals of a parallelogram bisect each other,

so, OP is the median of $\triangle ODB$

$\therefore \text{ar}(\triangle ODP) = \text{ar}(\triangle OBP)$.

Also, AP is the median of $\triangle ABD$

$\therefore \text{ar}(\triangle ADP) = \text{ar}(\triangle ABP)$

Adding both sides, we get

$\text{ar}(\triangle ODP) + \text{ar}(\triangle ADP) = \text{ar}(\triangle OBP) + \text{ar}(\triangle ABP)$

$\Rightarrow \text{ar}(\triangle AOD) = \text{ar}(\triangle AOB)$.

***** END *****