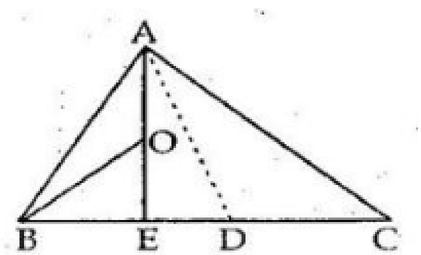
Exercise 10A

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

Proof: Since O is the midpoint of AE.

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

$\therefore \quad ar(\triangle BOE) = \frac{1}{2} ar(\triangle ABE) \ .....(1)$

Now, E is the mid-point of BD

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

$\therefore \quad ar(\triangle ABE) = \frac{1}{2} ar(\triangle ABD).....(2)$

As D is the mid point of BC

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

$$\Rightarrow \quad ar(\triangle BOE) = \frac{1}{2} ar(\triangle ABE) \quad [\text{from } (1)]$$

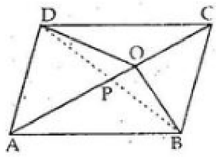
$$= \frac{1}{2}\left[\frac{1}{2} ar(\triangle ABD)\right] \quad [\text{from } (2)]$$

$$= \frac{1}{4} ar(\triangle ABD)$$

$$= \frac{1}{4} \times \frac{1}{2} ar(\triangle ABC) \ [\text{from } (3)]$$

$$= \frac{1}{8} ar(\triangle ABC)$$

Question 20:



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

To Prove: $ar(\Delta AOB) = ar(\Delta AOD)$.

Construction: Join BD which intersects AC at P.

Proof: As diagonals of a parallelogram bisect each other,

so, OP is the median of ΔODB

$\therefore \quad ar(\Delta ODP) = ar(\Delta OBP)$.

Also, AP is the median of ΔABD

$\therefore \quad ar(\Delta ADP) = ar(\Delta ABP)$

Adding both sides, we get

$ar(\Delta ODP) + ar(\Delta ADP) = ar(\Delta OBP) + ar(\Delta ABP)$

$\Rightarrow \quad ar(\Delta AOD) = ar(\Delta AOB)$.

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