Areas of Parallelograms and Triangles

CHAPTER 9

TRY YOURSELF SOLUTIONS

1. Figures (i) and (iv) lie on same base and between the same parallels.

	Common base	Two parallels
Figure (i)	SP	SP and QR
Figure (iv)	DC	DC and PB

2. We know, area of $\|^{gm}$ = Base × Height

$\therefore$ $ar(\|^{gm}\ ABCD) = AB \times DL = (AD \times BM)$

$\therefore$ $12 \times 6 = AD \times 8 \Rightarrow AD = 72/8 \text{ cm} = 9 \text{ cm}$

3. Since, ΔAPD and parallelogram $ABCD$ are on the same base AD and between the same parallels AD and BC.

$$\therefore\ ar(\Delta APD) = \frac{1}{2}\, ar(\|^{gm}\ ABCD) = \left(\frac{1}{2} \times 80\right) \text{cm}^2 = 40 \text{ cm}^2$$

$[\because ar(\|^{gm}\ ABCD) = 80 \text{ cm}^2]$

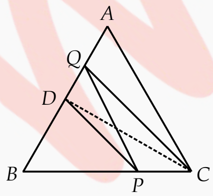
4. Join CD.

Since, D is the mid-point of AB. So, CD is the median of ΔABC.

$\therefore$ $ar(\Delta BCD) = \frac{1}{2} ar(\Delta ABC)$ [$\because$ Median of a triangle divides it into two triangles of equal area.]

$\Rightarrow$ $ar(\Delta BPD) + ar(\Delta DPC) = \frac{1}{2} ar(\Delta ABC)$ ...(i)

Since, ΔDPQ and ΔDPC are on the same base DP and between the same parallels DP and CQ.



$\therefore$ $ar(\Delta DPQ) = ar(\Delta DPC)$ ...(ii)

From (i) and (ii), we get

$ar(\Delta BPD) + ar(\Delta DPQ) = \frac{1}{2} ar(\Delta ABC)$

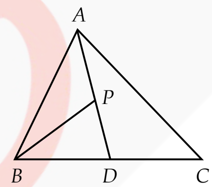
$\therefore$ $ar(\Delta BPQ) = \frac{1}{2} ar(\Delta ABC)$

Hence proved.

5. Since, AD is a median of ΔABC.

$\therefore$ $ar(\Delta ABD) = \frac{1}{2} ar(\Delta ABC)$

[$\because$ Median of a triangle divides it into two triangles of equal area.]



$= \frac{1}{2} \times 96$ [$\because ar(\Delta ABC) = 96 \text{ cm}^2$]

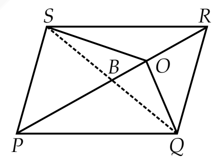
$= 48 \text{ cm}^2$

Also, BP is a median of ΔABD.

($\because$ P is the mid-point of AD)

$\therefore$ $ar(\Delta ABP) = \frac{1}{2} ar(\Delta ABD) = \frac{1}{2} \times 48 = 24 \text{ cm}^2$

6. Given, a parallelogram $PQRS$, where O is any point on the diagonal PR.



Now, join SQ which intersects PR at B.

As we know, the diagonals of a parallelogram bisect each other, so B is the mid-point of SQ.

$\Rightarrow$ PB is a median of ΔQPS.

$\therefore$ $ar(\Delta BPQ) = ar(\Delta BPS)$ ...(i) [$\because$ Median of a triangle divides it into two triangles of equal area]

Also, OB is the median of ΔOSQ.

$\therefore$ $ar(\Delta OBQ) = ar(\Delta OBS)$ ...(ii)

Adding (i) and (ii), we get

$ar(\Delta BPQ) + ar(\Delta OBQ) = ar(\Delta BPS) + ar(\Delta OBS)$

$\Rightarrow$ $ar(\Delta PQO) = ar(\Delta PSO)$

Hence proved.