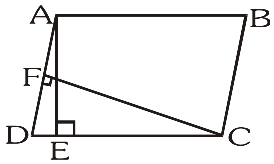
Ex - 9.2

Q1. In fig, ABCD is a parallelogram, AE ⊥ DC and CF ⊥ AD. If AB = 16 cm, AE = 8 cm and CF = 10 cm, find AD.



Sol. In figure

$AD \times CF = CD \times AE$

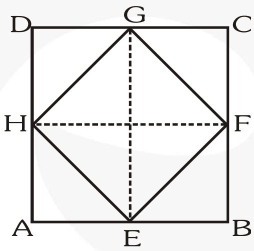
$\Rightarrow AD \times 10 = 16 \times 8$ cm

$\Rightarrow AD = 12.8$ cm

Q2. If E,F,G and H are respectively the mid-points of the sides of a parallelogram ABCD, show that ar (EFGH) = $\frac{1}{2}$ ar (ABCD).

Sol. ∵ E and G are the mid-points of AB and CD respectively

∵ EG is parallel to BC or AD.



Also ar (|| gm EBCG) = ar (|| gm AEGD)

$= \frac{1}{2}$ ar (|| gm ABCD) .....(1)

∴ ar (ΔEFG) $= \frac{1}{2}$ ar(|| gm EBCG) .....(2)

Similarly, ar (ΔEHG) $= \frac{1}{2}$ ar(|| gm AEGD) ....(3)

Adding (2) and (3), we get :

$\Rightarrow$ ar (ΔEFG) + ar (ΔEHG) = $\frac{1}{2}$ [ar(||gm EBCG) + (||gm AEGD)]

$\Rightarrow$ ar(||gm EFGH)

$\frac{1}{2}\left[\frac{1}{2}(\|\text{ gm ABCD}) + \frac{1}{2}\text{ar}(\|\text{ gm ABCD})\right]$

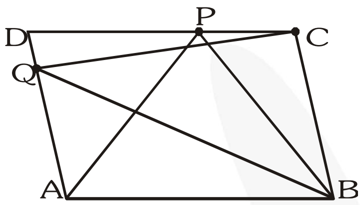
From (1)

$\Rightarrow$ ar (EFGH) $= \frac{1}{2}$ [ar (||gm ABCD)]

$\Rightarrow$ Thus, ar(||gm EFGH) = $\frac{1}{2}$ ar (||gm ABCD).

Q3. P and Q are any two points lying on the sides DC and AD respectively of a parallelogram ABCD. Show that ar (APB) = ar (BQC).

Sol. ar (ΔAPB) = $\frac{1}{2}$ ar (ABCD) ...(1)



ar (ΔBQC) = $\frac{1}{2}$ ar (ABCD) ...(2)

From (1) and (2),

ar (ΔAPB) = ar (ΔBQC)

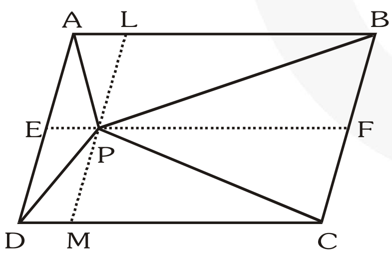
Q4. In figure, P is point in interior of a parallelogram ABCD. Show that :

(i) ar (ΔAPB) + ar (ΔPCD)

$= \frac{1}{2}$ ar ($||^{gm}$ ABCD)

(ii) ar (ΔAPD) + ar (ΔPBC)

= ar (ΔAPB) + ar (ΔPCD) .



Sol. (i) Through P, draw a line EF||AB.

Since ΔABP and parallelogram ABFE are on the same base AB and between the same parallels AB and EF.

$\therefore$ ar (ΔABP) $= \frac{1}{2}$ ar ($||^{gm}$ ABFE) ...(1)

Similarly, ΔDCP and paralleogram DCFE are on the same base DC and between the same parallel DC and EF.

$\therefore$ ar (ΔDCP) $= \frac{1}{2}$ ar ($\|^{gm}$ DCFE) ...(2)

Adding eqn. (1) and eqn. (2), we get

ar (ΔABP) + ar (ΔDCP)

$= \frac{1}{2}$ ar($\|^{gm}$ ABFE) + $\frac{1}{2}$ ar($\|^{gm}$ DCFE)

$\Rightarrow$ ar (ΔABP) + ar (ΔDCP) $= \frac{1}{2}$

{ar($\|^{gm}$ ABFE)+ar ($\|^{gm}$ DCFE)

$\Rightarrow$ ar (ΔABP) + ar (ΔDCP) $= \frac{1}{2}$ ar($\|^{gm}$ ABCD)

(ii) Through P, draw a line LM ∥ AD,

Since ΔAPD and parallelogram ALMD are on the same base AD and between the same parallels AD and LM.

$\therefore$ ar(ΔAPD) = $\frac{1}{2}$ ar ($\|^{gm}$ ALMD) ...(3)

Similarly,

ar(ΔPBC) = $\frac{1}{2}$ ar ($\|^{gm}$ BLMC) ...(4)

Adding eqns. (3) and (4), we get

ar(ΔAPD) + ar (ΔPBC)

$= \frac{1}{2}$ ar($\|^{gm}$ ALMD) + $\frac{1}{2}$ ar ($\|^{gm}$ BLMC)

$= \frac{1}{2}$ {ar($\|^{gm}$ ALMD) + ar ($\|^{gm}$ BLMC)}

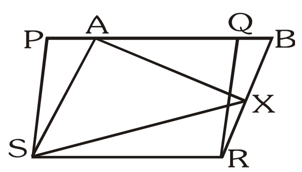
$= \frac{1}{2}$ ar($\|^{gm}$ ABCD).

Hence , ar (ΔAPD) + ar (ΔPBC)

= ar (ΔAPB) + ar (ΔPCD).

Q5. In fig, PQRS and ABRS are parallelograms and X is any point on side BR. Show that :

(i) ar (PQRS) = ar (ABRS) (ii) ar (AX S) = $\frac{1}{2}$ ar (PQRS)



Sol. (i) Parallelograms PQRS and ABRS are on the same base RS and between the same parallels RS and PB

$\therefore$ ar(|| gm PQRS) = ar (|| gm ABRS).

(ii) ΔAXS and parallelogram ABRS are on the same base AS and between the same parallels AS and BR.

$\therefore$ ar (ΔAXS) = $\frac{1}{2}$ ar (ABRS) ....(1)

But ar (PQRS) = ar (ABRS) [Proved in (i)] ....(2)

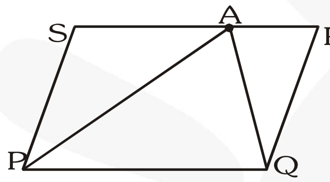
From (1) and (2), we have

ar (ΔAXS) = $\frac{1}{2}$ ar (PQRS)

Q6. A farmer was having a field in the form of a parallelogram PQRS. She took any point A on RS and joined it to points P and Q. In how many parts the fields is divided? What are the shapes of these parts? The farmer wants to sow wheat and pulses in equal portions of the field separately. How should she do it?

Sol. The field is divided into three parts. The parts are:

ΔAPS, ΔAPQ and ΔAQR.



We have ar (ΔAPQ) = $\frac{1}{2}$ ar (PQRS)

Therefore, ar (ΔAPS) + ar (ΔAQR)

= ar (ΔAPQ) = $\frac{1}{2}$ ar (PQRS)

She can sow wheat in ΔAPQ and pulses in ΔAPS and ΔAQR or vice-versa.