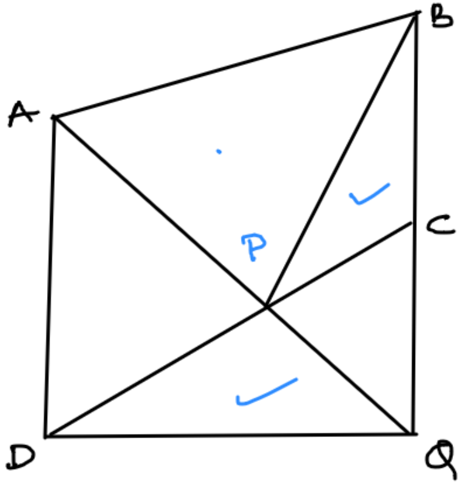
I.



Given : ABCD is a parallelogram
AQ cuts DC at point P
BC is produced to Q.

To prove ar. Δ BCP = ar of Δ DPQ

proof : Δ APB & llgram ABCD are on the same base AB & between same parallel lines AB & CD.

ar (Δ APB) = $\frac{1}{2}$ ar (llgram ABCD) — (I)

Δ ADQ & llgram ABCD are on the same base AD and between the same parallel line AD and BQ.

$\therefore$ ar (ΔADQ) = $\frac{1}{2}$ ar (llgram ABCD) — (II)

adding eq (I) & (II)

ar (ΔAPB) + ar (ΔADQ) = ar llgram ABCD ar (quadrilateral ADQB) − ar (Δ BPQ) = ar (||gram ABCD)

ar (quadrilateral ADQB) − ar (Δ BPQ) = ar (quadrilateral ADQB) − ar (Δ DCQ)

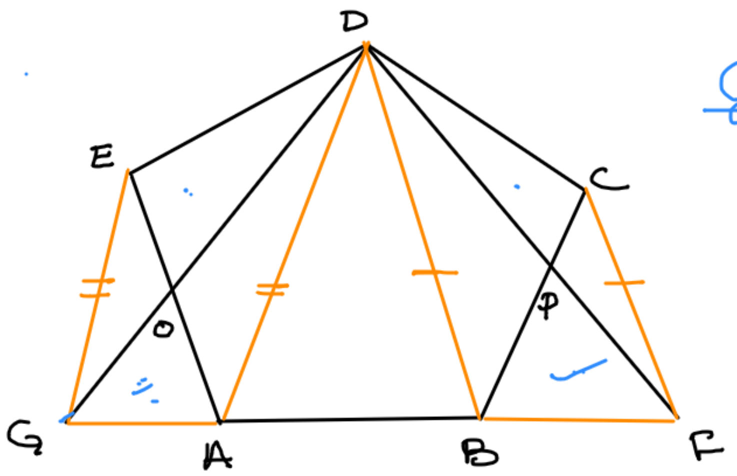
ar (Δ BPQ) = ar (Δ DCQ)

Subtracting ar Δ PCQ from both sides

ar (Δ BPQ) − ar (Δ PCQ) = ar (Δ DCQ) − ar (Δ PCQ)

ar (Δ BCP) = ar (Δ DPQ) [proved] .

8 .



Given: ABCDE is a pentagon

EG ∥ DA

BA is produced to G

CF ∥ DB

AB is produced to F

To prove : ar (pentagon ABCDE) = ar (Δ GDF) proof: ΔEDG and ΔEGA are on the same base EG & between the same parallel lines EG and DA.

$$ar.(\Delta EDG) = ar(\Delta EGA)$$

Subtracting ΔEOG from both sides.

$$ar(\Delta EOD) = ar(\Delta GOA) \quad \text{--- (i)}$$

Similarly.

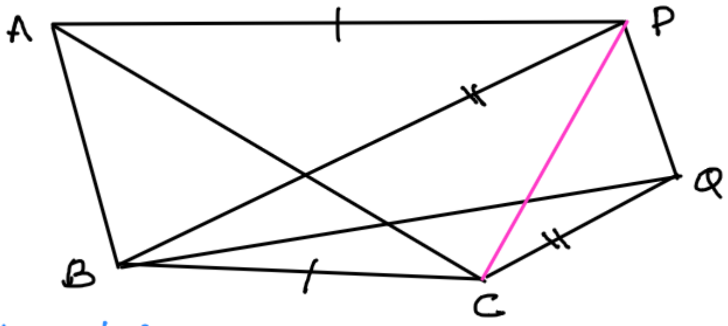
$$ar(\Delta DPC) = ar.(\Delta BPF) \quad \text{--- (ii)}$$

$$ar.(\Delta GDF) = ar(\Delta GOA) + ar(\Delta BPF) + ar(\text{pent } ABPDO)$$

$$= ar(\Delta EOD) + ar(\Delta DPC) + ar(\text{pent } ABPDO)$$

$$= ar(\text{pen } ABCDE) \quad [\text{proved}]$$

9.



Given : $AP \parallel BC$

$BP \parallel CQ$

To prove: $ar(\Delta ABC) = ar(\Delta BQP)$

Construction : Join PC

proof :

ΔABC & ΔBPC are on the same base BC and between the same parallel lines AP and BC.

$$ar(\Delta ABC) = ar(\Delta BPC) \quad \text{—— (i)}$$

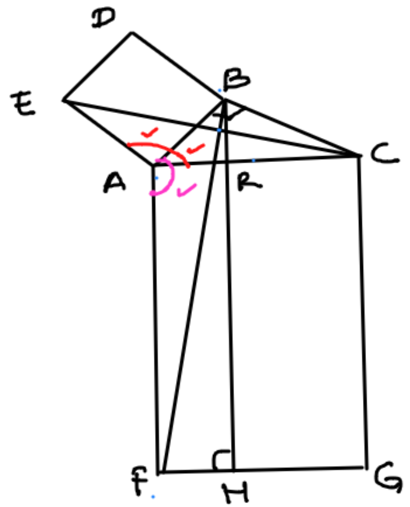
ΔBPC and ΔBQP are on the same base BP and between the same parallel lines BP & CQ.

$$ar(\Delta BPC) = ar(\Delta BQP) \quad \text{—— (ii)}$$

from (i) and (ii)

$$ar(\Delta ABC) = ar(\Delta BQP)$$ [proved].

10.



Given: ABDE & AFGC are squares.

ABC is a right angled Δ.

AC is the hypotenuse of ΔABC.

BH is $\perp$ to FG

To prove: (i) $\Delta EAC \cong \Delta BAF$

(ii) ar. of square ABDE = ar. of rectangle ARHF.

proof: $\angle EAC = \angle EAB + \angle BAC$

$\angle EAC = 90^\circ + \angle BAC$ — (1)

$\angle BAF = \angle FAC + \angle BAC$

$\angle BAF = 90^\circ + \angle BAC$ — (11)

From eq (1) and eq (11)

$\angle EAC = \angle BAF$

In ΔEAC & ΔBAF

$EA = AB$

$\angle EAC = \angle BAF$

$AC = AF$

$\therefore \triangle EAC \cong \triangle BAF$ [SAS axiom of congruency]

(ii) $\triangle ABC$ is a right triangle

$AC^2 = AB^2 + BC^2$

$AB^2 = AC^2 - BC^2$

$AB^2 = (AR+RC)^2 - (BR^2 + RC^2)$ [$\because BC^2$ is the hypotenuse of $\triangle BRC$]

$AB^2 = AR^2 + RC^2 + 2 \times AR \times RC - [BR^2 + RC^2]$

$AB^2 = AR^2 + RC^2 + 2ARRC - [(AB^2 - AR^2) + RC^2]$

$AB^2 = AR^2 \cancel{+RC^2} + 2ARRC - AB^2 + AR^2 - \cancel{RC^2}$

$AB^2 + AB^2 = 2AR^2 + 2ARRC$

$\cancel{2}AB^2 = \cancel{2}AR(AR + RC)$

$$AB^2 = AR\,(AR + RC)$$

$$AB^2 = AR \times AC$$

$\therefore$ ar of square ABDE = ar of rectangle ARHF