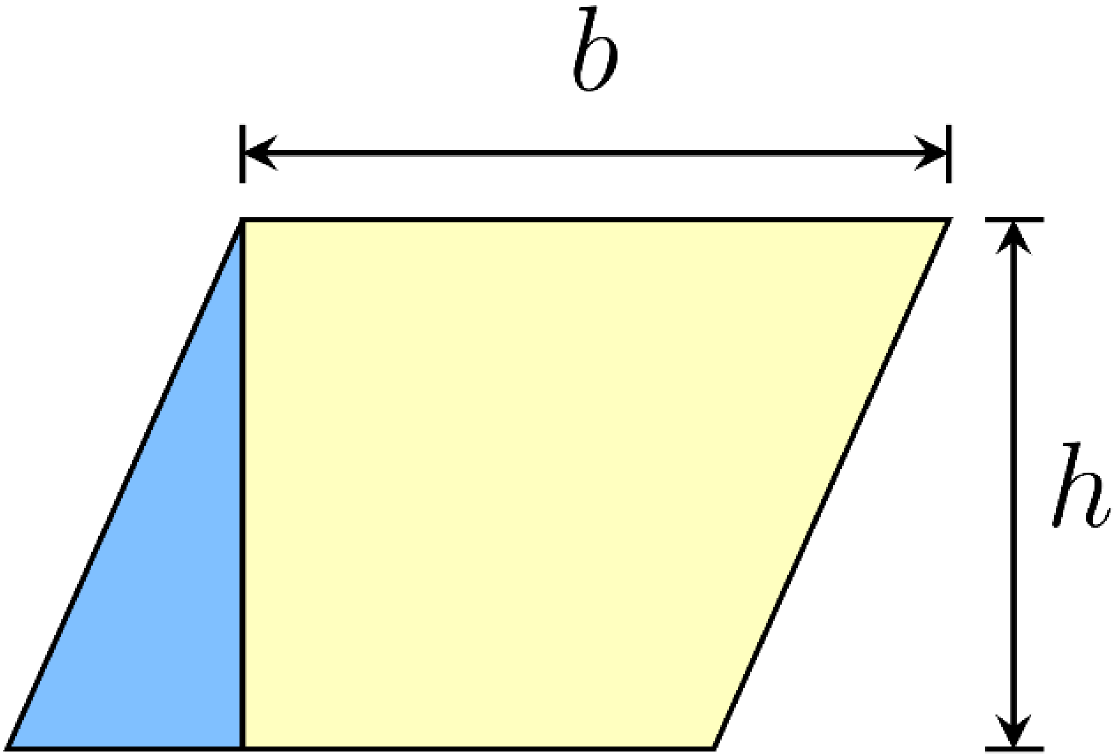
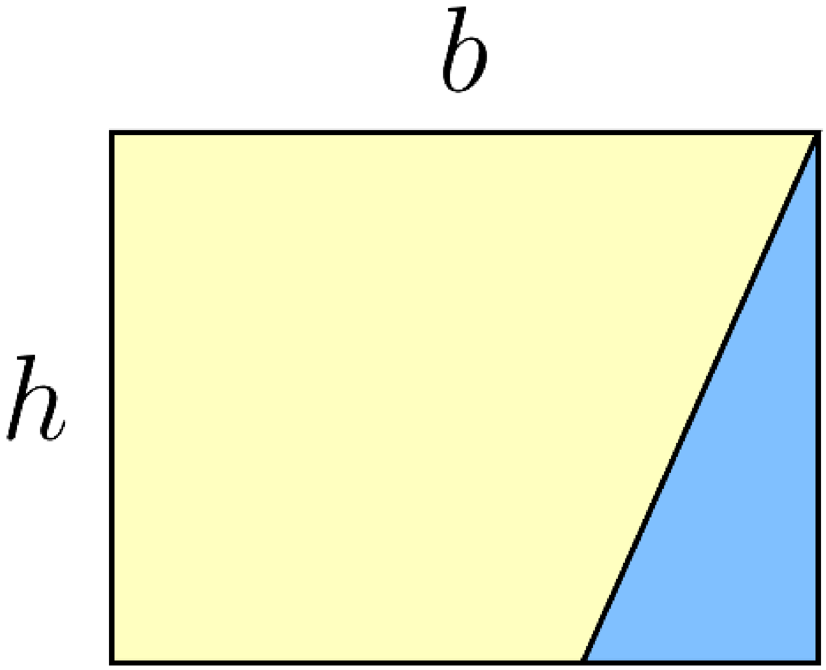
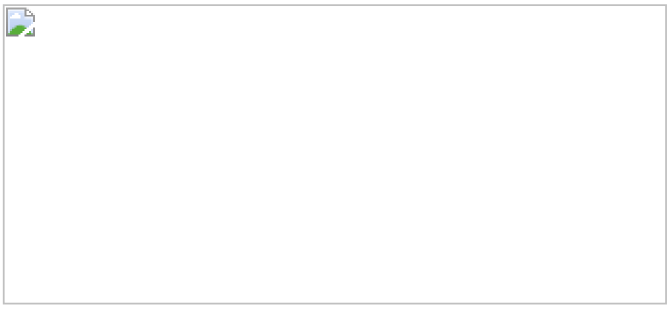
NCERT Class 9 Solutions: Areas of Parallelograms and Triangles (Chapter 9) Exercise 9.2 – Part 1





Q-1 In the figure, ABCD is a parallelogram, $AE \perp DC$ and $CF \perp AD$. If $AB = 16cm$, $AE = 8cm$ and $CF = 10cm$, find AD .



Solution:

Given,

- ABCD is a parallelogram, $AE \perp DC$ and $CF \perp AD$
- Also $AB = CD = 16cm$ (opposite side of a parallelogram)
- $CF = 10cm$ and $AE = 8cm$

Now, $\text{Area of parallelogram} = Base \times \text{Altitide}$

- $CD \times AE = AD\,(base) \times CF\,(\text{Altitide})$ ($\because$ $\text{Area of parallelogram} = base \times \text{height}$)
- $16 \times 8 = AD \times 10$ ($AB = CD = 16cm$)
- $128 = 10AD$
- $AD = 12.8cm$

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

Solution:

- Given, E, F, G and H are respectively the mid-point of the sides of a parallelogram ABCD
- To prove, $ar\,(EFGH) = \frac{1}{2} ar\,(ABCD)$
- Construction, H and F are joined.

Proof,

- $AD \parallel BC$ and $AD = BC$ (opposite sides of a parallelogram) so $\frac{1}{2}AD = \frac{1}{2}BC$
- Also, $AH \parallel BF$ and $DH \parallel CF$ therefore $AH = BF$ and $DH = CF$ (H and F are mid points) Thus, ABFH and HFCD are parallelograms.
- Now, $\triangle\ EFH$ And parallelogram ABFH lie on the same base FH and between the same parallel lines AB and HF.
- So, area of $EFH = \frac{1}{2}\text{area of ABFH}$ ... equation (1) (this is because area of triangle is $\frac{1}{2}bh$ and area of parallelogram is bh and the triangle and parallelogram share same base and height) ,
- Similarly, area of $GHF = \frac{1}{2}\text{area of HFCD}$ ... equation (2)

Adding equation (1) and (2)

- Area of $\triangle\ EFH + \text{area of} \triangle\ GHF = \frac{1}{2}$ area of $ABFH + \frac{1}{2}\text{area of HFCD}$
- $\text{Area of EFGH} = \frac{1}{2}[\text{area of ABFH} + \text{area of HFCD}]$
- $Area\,(EFGH) = \frac{1}{2}area\,(ABCD)\,(\because\ ABFH + HFCD = ABCD)$
- $ar\,(EFGH) = \frac{1}{2}ar\,(ABCD)$