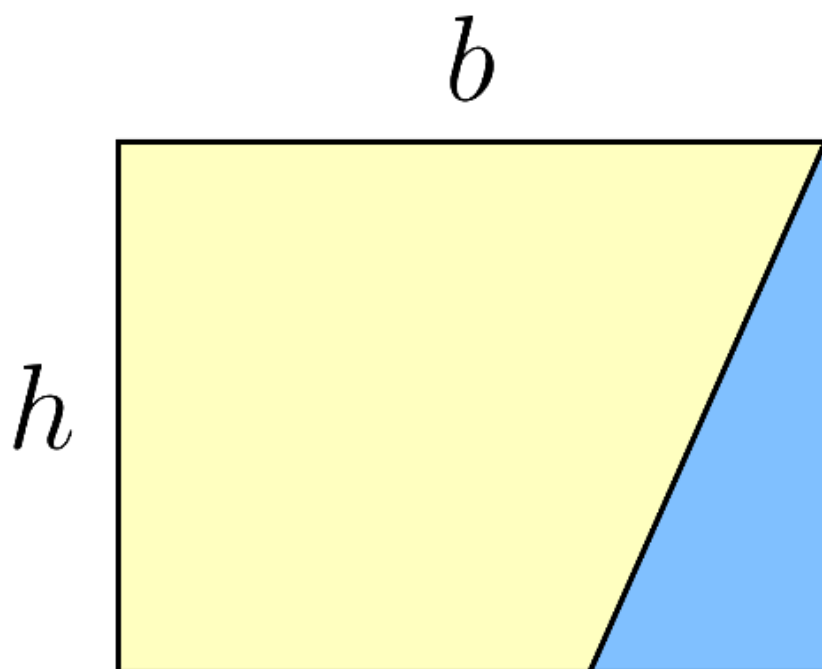
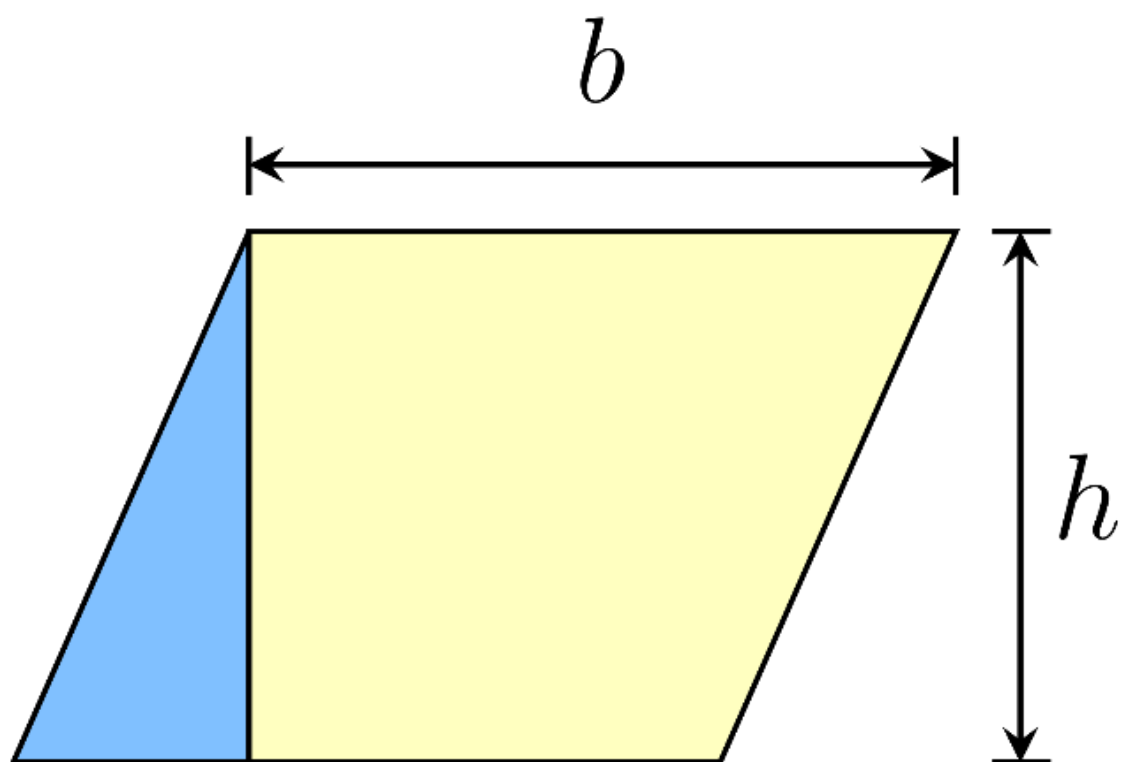


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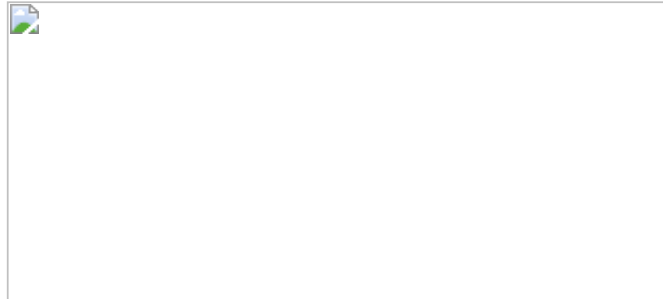
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NCERT Class 9 Solutions: Areas of Parallelograms and Triangles (Chapter 9) Exercise 9.2 – Part 1

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



Solution:

Given,

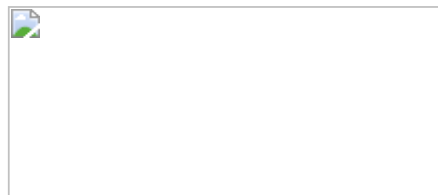
- ABCD is a parallelogram, $AE \perp DC$ and $CF \perp AD$
- Also $AB = CD = 16\text{cm}$ (opposite side of a parallelogram)
- $CF = 10\text{cm}$ and $AE = 8\text{cm}$

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

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

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 $EFH = \frac{1}{2}$ 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 $GHF = \frac{1}{2}$ area of HFCD ... equation (2)

Adding equation (1) and (2)

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