

J S U N I L T U T O R I A L

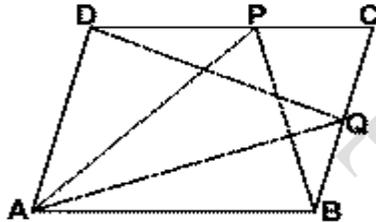
PANJABI COLONY, GALI NO. 01

Area and Midpoint Theorems

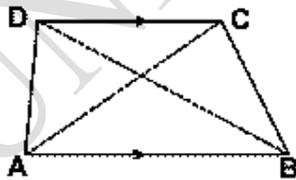
- Parallelograms on the same base and between the same parallels are equal in area.
- The area of a parallelogram is equal to the area of a rectangle on the same base and between the same parallels.
- Area of a triangle is half that of a parallelogram on the same base and between the same parallels.
- Triangles on the same base and between the same parallels are equal in area.
- The line segment joining the mid-points of any two sides of a triangle is parallel to the third side and is equal to half of it.
- The line drawn through the mid-point of one side of a triangle parallel to another side bisects the third side.

Exercise

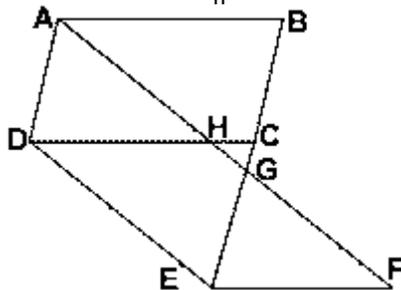
1. In the following diagram, ABCD is a parallelogram. P and Q are points on the sides DC and BC respectively. Prove that
 - (i) area of $\triangle APB =$ area of $\triangle AQD$
 - (ii) area of $\triangle APB =$ area of $\triangle ABQ +$ area of $\triangle DQC$.



2. In the following figure, area of the parallelogram ABCD is 29 cm^2 . If $AB = 5.8 \text{ cm}$, find the height of the parallelogram EFCD.
3. In the following figure, $AB \parallel DC$ and area of $\triangle ABD$ is 24 sq. units . If $AB = 8 \text{ units}$, find the height of $\triangle ABC$.

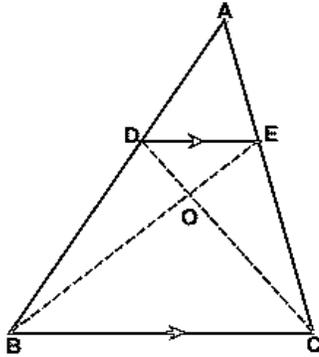


4. In the following figure, $AB \parallel DC \parallel EF$, $DA \parallel EB$ and $DE \parallel AF$. Prove that area of $\parallel \text{ gm DEFH} =$ area of $\parallel \text{ gm ABCD}$.
[Hint. Area of $\parallel \text{ gm ABCD} =$ area of $\parallel \text{ ADEG} =$ area of $\parallel \text{ gm DEFH}$.]

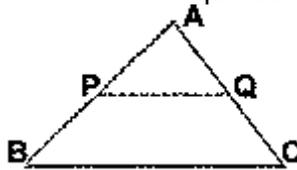


5. In the following figure, DE is parallel to the side BC of $\triangle ABC$. BE and CD intersect at O. Prove that
 - (i) area of $\triangle BED =$ area of $\triangle CED$.

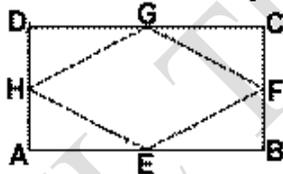
- (ii) area of $\triangle BOD = \text{area of } \triangle COE$.
 (iii) area of $\triangle ABE = \text{area of } \triangle ADC$.



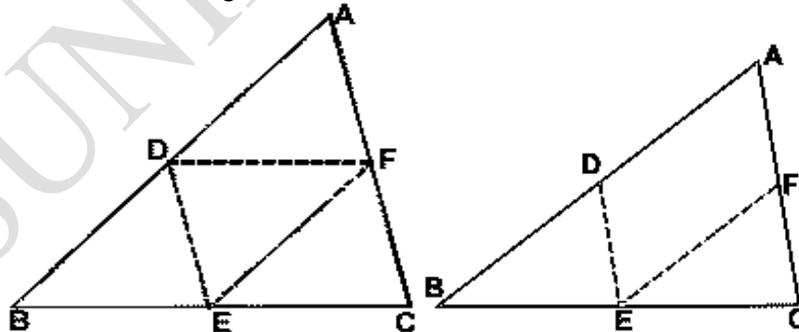
6. In $\triangle ABC$, P and Q are mid-points of the sides AB and AC respectively. If $BC = 6$ cm, $AB = 5.4$ cm and $AC = 5$ cm, calculate the perimeter of the quadrilateral PBCQ.



7. ABCD is a rectangle. E, F, G and H are the mid-points of the sides AB, BC, CD and DA respectively. Prove that EFGH is a rhombus.
 [Hint. EF is parallel and half of AC and HG is parallel and half of AC
 \Rightarrow EFGH is a || gm.
 Also $FG = BD/2$ but $BD = AC \Rightarrow FG = HG$.]



8. In $\triangle ABC$, D, E and F are the mid-points of the sides AB, BC and CA respectively. Prove that the \triangle s ADF, DBE, ECF and EFD are congruent to each other.



9. In $\triangle ABC$, E and F are the mid-points of the sides BC and CA respectively. $EF = 4$ cm and $ED \parallel CA$. If area of ||gm DEFA = 16 cm^2 , calculate.
 (i) AB (ii) area of $\triangle BED$ (iii) area of trapezium DECA.

Answers

2. 5 cm 3. 6 units 6. 14.2 cm
 9. (i) 8 cm (ii) 8 cm^2 (iii) 24 cm^2