



Areas of Parallelograms and Triangles Ex 15.3 Q9

Answer :

Given:

- (1) ABCD is a quadrilateral,
- (2) Diagonals AC and BD of quadrilateral ABCD intersect at P.

To prove: Area of $\triangle APB \times \text{Area of } \triangle CPD = \text{Area of } \triangle APD \times \text{Area of } \triangle BPC$

Construction: Draw AL perpendicular to BD and CM perpendicular to BD

Proof:

We know that

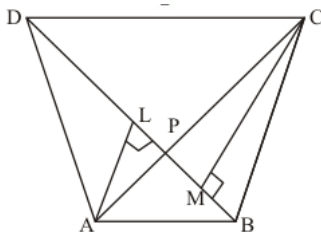
$$\text{Area of triangle} = \frac{1}{2} \times \text{base} \times \text{height}$$

$$\text{Area of } \triangle APD = \frac{1}{2} \cdot DP \cdot AL \dots\dots (1)$$

$$\text{Area of } \triangle BPC = \frac{1}{2} \cdot CM \cdot BP \dots\dots (2)$$

$$\text{Area of } \triangle APB = \frac{1}{2} \cdot BP \cdot AL \dots\dots (3)$$

$$\text{Area of } \triangle CPD = \frac{1}{2} \cdot CM \cdot DP \dots\dots (4)$$



Therefore

$$\begin{aligned} \text{Area of } \triangle APD \times \text{Area of } \triangle BPC &= \left(\frac{1}{2} \times DP \times AL \right) \times \left(\frac{1}{2} \times CM \times BP \right) \\ &= \left(\frac{1}{2} \times BP \times AL \right) \times \left(\frac{1}{2} \times CM \times DP \right) \\ &= \text{Area of } \triangle APB \times \text{Area of } \triangle CPD \end{aligned}$$

Hence it is proved that $\text{Area of } \triangle APD \times \text{Area of } \triangle BPC = \text{Area of } \triangle APB \times \text{Area of } \triangle CPD$

Areas of Parallelograms and Triangles Ex 15.3 Q10

Answer :

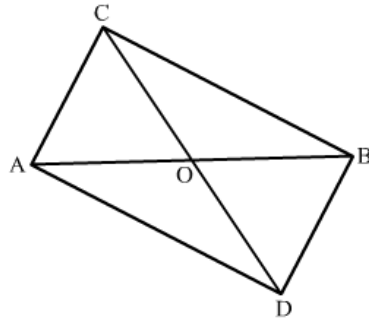
Given:

- (1) ABC and ABD are two triangles on the same base AB,
- (2) CD bisect AB at O which means $AO = OB$

To Prove: Area of $\triangle ABC$ = Area of $\triangle ABD$

Proof:

Here it is given that CD bisected by AB at O which means O is the midpoint of CD.
Therefore AO is the median of triangle ACD.



Since the median divides a triangle in two triangles of equal area
Therefore Area of $\triangle CAO$ = Area of $\triangle AOD$ (1)

Similarly for $\triangle CBD$, O is the midpoint of CD

Therefore BO is the median of triangle BCD.

Therefore Area of $\triangle COB$ = Area of $\triangle BOD$ (2)

Adding equation (1) and (2) we get

Area of $\triangle CAO$ + Area of $\triangle COB$ = Area of $\triangle AOD$ + Area of $\triangle BOD$

\Rightarrow Area of $\triangle ABC$ = Area of $\triangle ABD$

Hence it is proved that $\text{Area of } \triangle ABC = \text{Area of } \triangle ABD$

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