



Areas of Parallelograms and Triangles Ex 15.3 Q26

Answer :

Given: ABCD and AEFD are two parallelograms

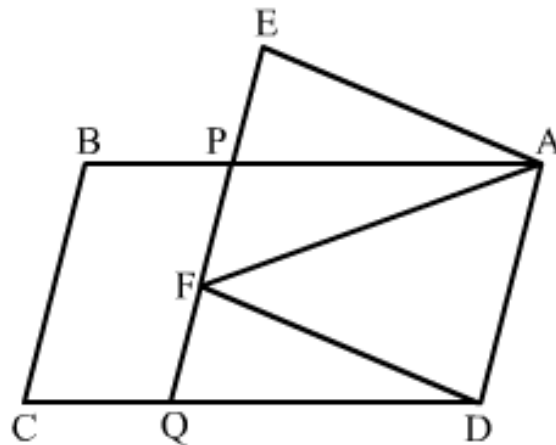
To prove:

(i) $PE = FQ$

(ii) $\text{ar}(\triangle APE) : \text{ar}(\triangle PFA) = \text{ar}(\triangle QFD) : \text{ar}(\triangle PFD)$

(iii) $\text{ar}(\triangle PEA) = \text{ar}(\triangle QFD)$

Proof: (i) and (iii)



In $\triangle APE$ and $\triangle DQF$

$$\angle APE = \angle DQF$$

$$AE = DF$$

$$\angle AEP = \angle DFQ$$

$\Rightarrow \triangle APE \cong \triangle DQF$ (A.S.A congruence condition)

Therefore

$$\boxed{PE = QF}, \text{ and}$$

$$\boxed{\text{ar}(\triangle APE) = \text{ar}(\triangle DQF)} \quad \dots\dots(1)$$

(ii) $\triangle PFA$ and $\triangle PFD$ are on the same base PF and between the same parallels PQ and AD.

$$\text{ar}(\triangle PFA) = \text{ar}(\triangle PFD) \quad \dots\dots (2)$$

From (1) and (2) we get

$$\boxed{\frac{\text{ar}(\triangle APE)}{\text{ar}(\triangle PFA)} = \frac{\text{ar}(\triangle DQF)}{\text{ar}(\triangle PFD)}}$$

Areas of Parallelograms and Triangles Ex 15.3 Q27

Answer :

Given:

(1) ABCD is a parallelogram

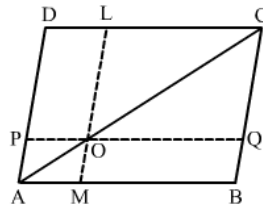
(2) O is any point of AC.

(3) $PQ \parallel AB$ and $LM \parallel AD$

To prove: $\text{ar}(\parallel^{\text{gm}} \text{DLOP}) = \text{ar}(\parallel^{\text{gm}} \text{BMOQ})$

Calculation:

We know that the diagonal of a parallelogram divides it into two triangles of equal area



Therefore we have

$$\text{ar}(\triangle ADC) = \text{ar}(\triangle ABC)$$

$$\Rightarrow \text{ar}(\triangle AOP) + \text{ar}(\parallel^{\text{gm}} \text{DLOP}) + \text{ar}(\triangle OLC)$$

$$= \text{ar}(\triangle AOM) + \text{ar}(\parallel^{\text{gm}} \text{BMOQ}) + \text{ar}(\triangle OQC) \dots\dots (1)$$

Since OC and AO are diagonals of parallelogram OQCL and AMOP respectively. Therefore

$$\text{ar}(\triangle APO) = \text{ar}(\triangle AMO) \dots\dots (2)$$

$$\text{ar}(\triangle OLC) = \text{ar}(\triangle OQC) \dots\dots (3)$$

Subtracting (2) and (3) from (1) we get

$$\text{ar}(\parallel^{\text{gm}} \text{DLOP}) = \text{ar}(\parallel^{\text{gm}} \text{BMOQ})$$

Hence we get the result $\text{ar}(\parallel^{\text{gm}} \text{DLOP}) = \text{ar}(\parallel^{\text{gm}} \text{BMOQ})$

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