



Areas of Parallelograms and Triangles Ex 15.3 Q15

**Answer :**

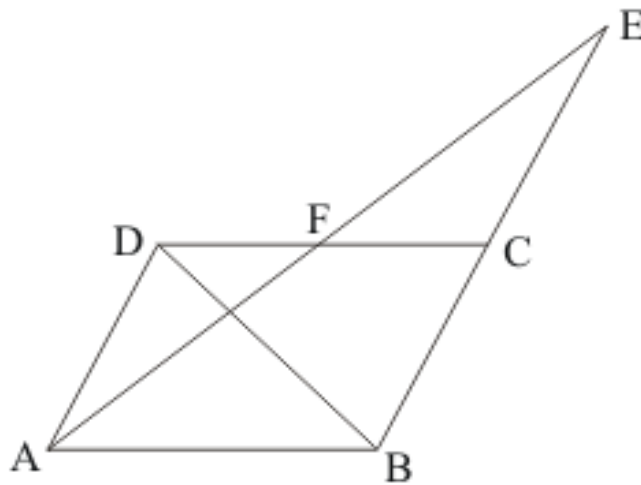
**Given:** Here from the given figure we get

- (1) ABCD is a parallelogram with base AB,
- (2) BC is produced to E such that  $CE = BC$
- (3) AE intersects CD at F
- (4) Area of  $\triangle DFB = 3 \text{ cm}^2$

**To find:**

- (a) Area of  $\triangle ADF = \text{Area of } \triangle ECF$
- (b) Area of parallelogram ABCD

**Proof:**  $\triangle ADF$  and  $\triangle ECF$ , we can see that



$\angle ADF = \angle ECF$  (Alternate angles formed by parallel sides AD and CE)

$AD = EC$

$\angle DFA = \angle CFA$  (Vertically opposite angles)

$\Rightarrow \triangle ADF \cong \triangle EFC$  (ASA condition of congruence)

$\Rightarrow \text{Area of } \triangle ADF = \text{Area of } \triangle EFC$

As  $\triangle ADF \cong \triangle EFC$

$\Rightarrow DF = CF$

Since  $DF = CF$ . So BF is a median in  $\triangle BCD$

Since median divides the triangle into two equal triangles. So

$\text{Area of } \triangle BCD = 2 \times \text{Area of } \triangle BDF$

Since  $\text{Area}(\triangle BDF) = 3 \text{ cm}^2$ . So

$\text{Area}(\triangle BCD) = 2 \times 3$

$\Rightarrow \text{Area}(\triangle BCD) = 6 \text{ cm}^2$

Hence Area of parallelogram ABCD

$= 2 \times \text{Area}(\triangle BCD)$

$= 2 \times 6$

$= 12 \text{ cm}^2$

Hence we get the result

(a)  $\boxed{\text{Area of } \triangle ADF = \text{Area of } \triangle ECF}$

(b)  $\boxed{\text{Area of parallelogram ABCD} = 12 \text{ cm}^2}$

Areas of Parallelograms and Triangles Ex 15.3 Q16

**Answer :**

**Given:**

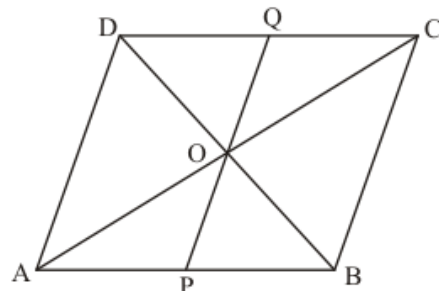
(1) Diagonals AC and BD of a parallelogram ABCD intersect at point O.

(2) A line through O intersects AB at P point.

(3) A line through O intersects DC at Q point.

**To find:**  $\text{Area of } (\triangle POA) = \text{Area of } (\triangle QOC)$

**Proof:**



From  $\triangle POA$  and  $\triangle QOC$  we get that

$\angle AOP = \angle COQ$

$OA = OC$

$\angle PAC = \angle QCA$

So, by ASA congruence criterion, we have

$\triangle POA \cong \triangle QOC$

So

$\text{Area}(\triangle POA) = \text{Area}(\triangle QOC)$

Hence it is proved that  $\boxed{\text{Area}(\triangle POA) = \text{Area}(\triangle QOC)}$

\*\*\*\*\* END \*\*\*\*\*