Areas of Parallelograms and Triangles Ex 15.3 Q13

Answer :

Given:

(1) ABC is a triangle

(2) D is a point on BC such that $BD = 2DC$

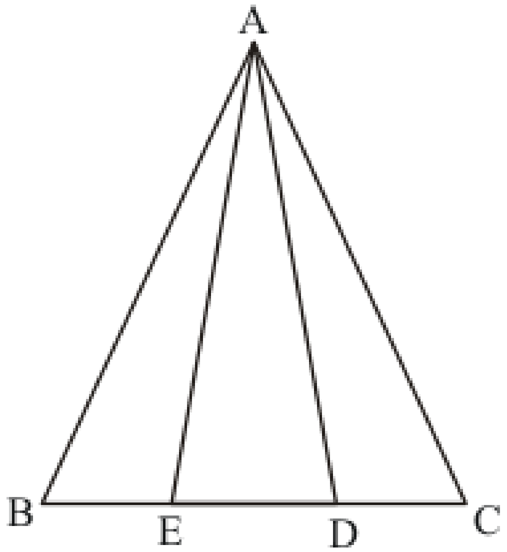
To prove: Area of $\Delta ABD = 2$ Area of ΔAGC

Proof:

In ΔABC, $BD = 2DC$

Let E is the midpoint of BD. Then,

$BE = ED = DC$



Since AE and AD are the medians of ΔABD and ΔAEC respectively

Area of $\Delta ABD = 2(\text{Area of } \Delta AED)$, and

Area of $\Delta ADC = $ Area of ΔAED

The median divides a triangle in to two triangles of equal area. So

$$\begin{aligned}\text{Area of } \Delta ABD &= 2(\text{Arae of } \Delta AED)\\ &= 2(\text{Area of } \Delta ADC)\end{aligned}$$

Hence it is proved that $\boxed{\text{Area of } \Delta ABD = 2(\text{Area of } \Delta ADC)}$

Areas of Parallelograms and Triangles Ex 15.3 Q14

Answer :

Given: Here from the given figure we get

(1) ABCD is a parallelogram

(2) BD and CA are the diagonals intersecting at O.

(3) P is any point on BO

To prove:

(a) Area of ΔADO = Area of Δ CDO

(b) Area of ΔAPB = Area of Δ CBP

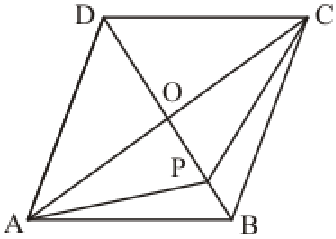
Proof: We know that diagonals of a parallelogram bisect each other.

$\Rightarrow$ O is the midpoint of AC and BD.

Since medians divide the triangle into two equal areas

In ΔACD, DO is the median

$\Rightarrow$ Area of ΔADO = Area of Δ CDO



Again O is the midpoint of AC.

In ΔAPC, OP is the median

$\Rightarrow$ Area of ΔAOP = Area of ΔCOP …… (1)

Similarly O is the midpoint of AC.

In ΔABC, OB is the median

$\Rightarrow$ Area of ΔAOB = Area of ΔCOB …… (2)

Subtracting (1) from (2) we get,

Area of ΔAOB − Area of ΔAOP = Area of ΔCOB − Area of ΔCOP

$\Rightarrow$ Area of ΔABP = Area of ΔCBP

Hence it is proved that

(a) $\boxed{\text{Area of } \Delta ADO = \text{Area of } \Delta CDO}$

(b) $\boxed{\text{Area of } \Delta ABP = \text{Area of } \Delta CBP}$

*********** END **********