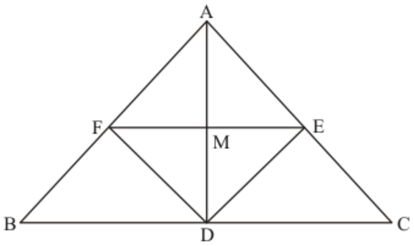
Quadrilaterals Ex 14.4 Q13

Answer :

ΔABC, an isosceles triangle is given with *D*,*E* and *F* as the mid-points of *BC*, *CA* and *AB* respectively as shown below:



We need to prove that the segment *AD* and *EF* bisect each other at right angle.

Let's join *DF* and *DE*.

In ΔABC, *D* and *E* are the mid-points of *BC* and *AC* respectively.

Theorem states, the line segment joining the mid-points of any two sides of a triangle is parallel to the third side and equal to half of it.

Therefore, we get: $DE \parallel AB$ Or $DE \parallel AF$

Similarly, we can get $DF \parallel AE$

Therefore, *AEDF* is a parallelogram

We know that opposite sides of a parallelogram are equal.

$DF = AE$ and $DE = AF$

$DF = AE$ and $DE = AF$

Also, from the theorem above we get $AF = \frac{1}{2}AB$

Thus, $DE = \frac{1}{2}AB$

Similarly, $DF = \frac{1}{2}AC$

It is given that ΔABC, an isosceles triangle

Thus, $AB = AC$

Therefore, $DE = DF$

Also, $AE = AF$

Then, *AEDF* is a rhombus.

We know that the diagonals of a rhombus bisect each other at right angle.

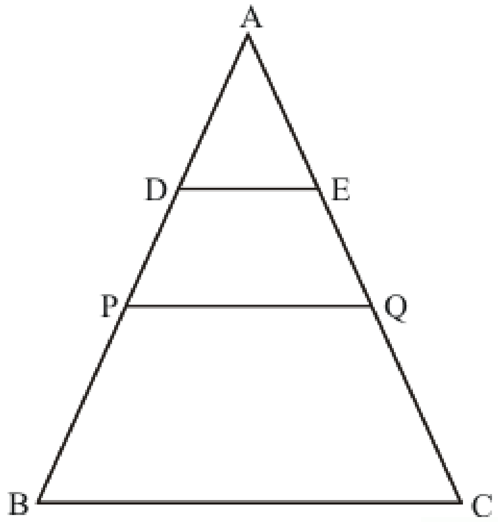
Therefore, *M* is the mid-point of *EF* and $AM \perp BC$

Hence proved.

Quadrilaterals Ex 14.4 Q14

Answer :

ΔABC is given with *D* a point on *AB* such that $AD = \frac{1}{4} AB$.



Also, *E* is point on *AC* such that $AE = \frac{1}{4} AC$.

We need to prove that $DE = \frac{1}{4} BC$

Let *P* and *Q* be the mid points of *AB* and *AC* respectively.

It is given that

$AD = \frac{1}{4} AB$ and $AE = \frac{1}{4} AC$

But, we have taken *P* and *Q* as the mid points of *AB* and *AC* respectively.

Therefore, *D* and *E* are the mid-points of *AP* and *AQ* respectively.

In ΔABC, *P* and *Q* are the mid-points of *AB* and *AC* respectively.

Theorem states, the line segment joining the mid-points of any two sides of a triangle is parallel to the third side and equal to half of it.

Therefore, we get $PQ \parallel BC$ and $PQ = \frac{1}{2} BC$ …… (i)

In ΔAPQ, *D* and *E* are the mid-points of *AP* and *AQ* respectively.

Therefore, we get $DE \parallel PQ$ and $DE = \frac{1}{2} PQ$ …… (ii)

From (i) and (ii),we get:

$\boxed{DE = \frac{1}{4} BC}$

Hence proved.

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