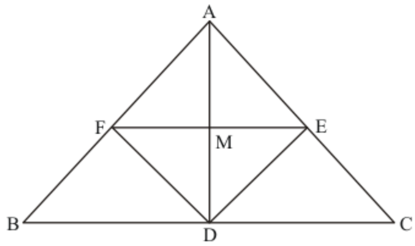
Quadrilaterals Ex 14.4 Q13

**Answer :**

$\Delta ABC$, 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 $\Delta ABC$, *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 $\Delta ABC$, 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.

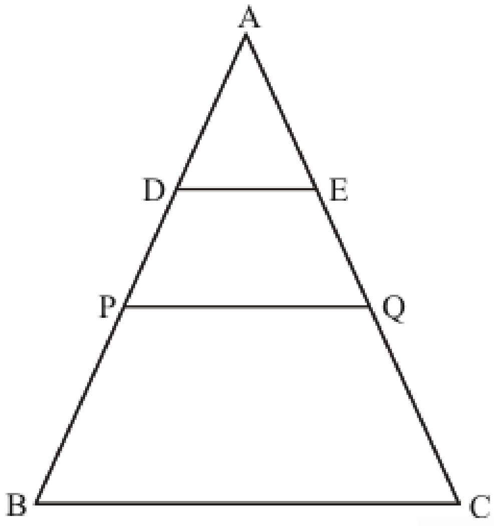
Therefore, *M* is the mid-point of *EF* and $AM \perp BC$

Hence proved.

Quadrilaterals Ex 14.4 Q14

**Answer :**

$\Delta ABC$ 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 $\Delta ABC$, $P$ 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 $\Delta APQ$, $D$ 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 **********