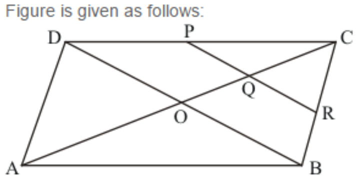
Quadrilaterals Ex 14.4 Q15

Answer :

Figure is given as follows:



ABCD is a parallelogram, where *P* is the mid-point of *DC* and *Q* is a point on *AC* such that $CQ = \frac{1}{4}AC$.

PQ produced meets *BC* at *R*.

We need to prove that *R* is a mid-point of *BC*.

Let us join *BD* to meet *AC* at *O*.

It is given that *ABCD* is a parallelogram.

Therefore, $OC = \frac{1}{2}AC$ (Because diagonals of a parallelogram bisect each other)

Also, $CQ = \frac{1}{4}AC$

Therefore, $CQ = \frac{1}{2}OC$

In ΔDCO, *P* and *Q* are the mid-points of *CD* and *OC* 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: $PQ \parallel DO$

Also, in ΔCOB, Q is the mid-point of *OC* and $QR \parallel OB$

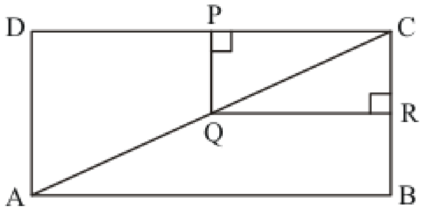
Therefore, *R* is a mid-point of *BC*.

Hence proved.

Quadrilaterals Ex 14.4 Q16

Answer :

Rectangles *ABCD* and *PQRC* are given as follows:



Q is the mid-point of *AC*.

In ΔADC , *Q* is the mid-point of *AC* such that $PQ \parallel AD$

Using the converse of mid-point theorem, we get:

P is the mid-point of *DC*

That is;

$\boxed{DP = PC}$

Similarly, *R* is the mid-point of *BC*.

Now, in ΔBCD, *P* and *R* are the mid-points of *DC* and *BC* respectively.

Then, by mid-point theorem, we get:

$$PR = \frac{1}{2} BD$$

Now, diagonals of a rectangle are equal.

Therefore putting $BD = AC$,we get:

$$\boxed{PR = \frac{1}{2} AC}$$

Hence Proved.

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