Congruent Triangles Ex 10.1 Q3

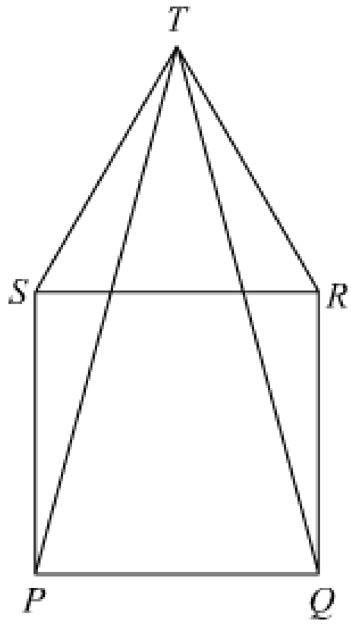
Answer :

It is given that

$\Delta PQRS$ is a square and ΔSRT is an equilateral triangle.

We have to prove that

(1) $PT = QT$ and (2) $\angle TQR = 15^0$



(1)

Since,

$\angle PSR = 90^0$ (Angle of square)

$\angle TSR = 60^0$ (Angle of equilateral triangle)

Now, adding both

$$\angle PSR + \angle TSR = 90^0 + 60^0$$
$$\angle PST = 150^0$$

Similarly, we have $\angle QRT = 150^0$

Thus in ΔPST and ΔQRT we have

$PS = QR$ (Side of square)

$\angle PST = \angle QRT = 150^0$

And $ST = RT$ (equilateral triangle side)

So by SAS congruence criterion we have

$\Delta PST \cong \Delta QRT$

Hence $\boxed{PT = QT}$.

(2)

Since

QR = RS (Sides of Square)

RS = RT (Sides of Equilateral triangle)

We get

QR = RT

Thus, we get

$\angle TQR = \angle RTQ$ (Angles opposite to equal sides are equal)

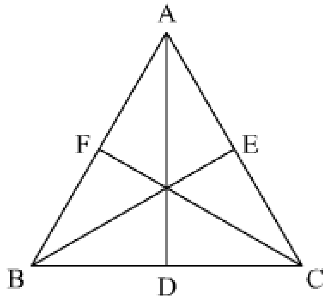
Now, in the triangle TQR, we have

$$\angle TQR + \angle RTQ + \angle QRT = 180^0$$
$$\angle TQR + \angle TQR + 150^0 = 180^0$$
$$2\angle TQR + 150^0 = 180^0$$
$$2\angle TQR = 180^0 - 150^0$$
$$2\angle TQR = 30^0$$
$$\angle TQR = \frac{30^0}{2} = 15^0$$

Congruent Triangles Ex 10.1 Q4

Answer :

We have to prove that the median of an equilateral triangle are equal.



Let ΔABC be an equilateral triangle with $AD, BE,$ and CF as its medians.

Let $AB = AC = BC$

In ΔBFC and ΔCEB we have

$BF = CE$ (Since $AB = AC = \frac{1}{2}AB = \frac{1}{2}AC$ similarly $BF = CE$)

$\angle ABC = \angle ACB$ (In equilateral triangle, each angle $= 60^0$)

And $BC = BC$ (common side)

So by SAS congruence criterion we have

$\Delta BFC \cong \Delta CEB$

This implies that,

$BE = CF$

Similarly we have $AD = BE$

Hence $\boxed{AD = BE = CF}$.

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