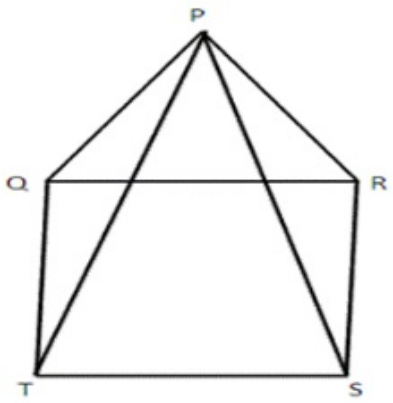
Exercise 5A

Question 22:

Given: PQR is an equilateral triangle and QRST is a square.



To Prove: PT =PS

and $\angle PSR = 15^0$

Proof: Since ΔPQR is an equilateral triangle,

$\angle PQR = 60^0$ and $\angle PRQ = 60^0$

Since QRTS is a square,

$\angle RQT = 90^0$ and $\angle QRS = 90^0$

In ΔPQT

$\angle PQT = \angle PQR + \angle RQT$

$= 60^0 + 90^0$

$= 150^0$

In ΔPRS

$\angle PRS = \angle PRQ + \angle QRS$

$= 60^0 + 90^0 = 150^0$ .....(1)

$\Rightarrow \quad \angle PQT = \angle PRS$ .....(2)

Thus, in ΔPQT and ΔPRS

$PQ = PR$ [sides of equilateral triangle ΔPQR]

$\angle PQT = \angle PRS$ [from (2)]

$QT = RS$ [sides of square $\square QRST$]

Thus, by Side-Angle-Side criterion of congruence, we have

$\therefore \quad \Delta PQT \cong \Delta PRS$ [By SAS]

The corresponding parts of the congruent triangles are equal.

$\therefore \quad PT = PS$ [C.P.C.T]

Now in Δ PRS , we have

$PR = RS$

$\Rightarrow \quad \angle RPS = \angle PSR$

But $\angle PRS = 150^0$ [from (1)]

So, by angle sum property in ΔPRS

$\angle PRS + \angle SPR + \angle PSR = 180^0$

$\Rightarrow \quad 150^0 + \angle PSR + \angle PSR = 180^0$

$\Rightarrow \quad 2\angle PSR = 180^0 - 150^0$

$\Rightarrow \quad 2\angle PSR = 30^0$

$\Rightarrow \quad \angle PSR = \frac{30}{2} = 15^0$

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