Exercise: 6.3 **(Page No: 107)**

1. In Fig. 6.39, sides QP and RQ of ΔPQR are produced to points S and T respectively. If $\angle SPR = 135°$ and $\angle PQT = 110°$, find $\angle PRQ$.

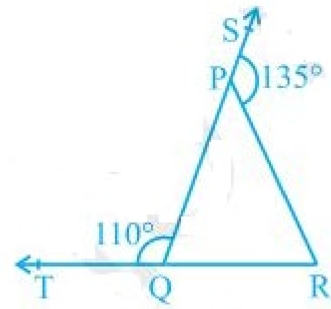

Fig. 6.39

Solution:

It is given the TQR is a straight line and so, the linear pairs (i.e. $\angle TQP$ and $\angle PQR$) will add up to 180°

So, $\angle TQP + \angle PQR = 180°$

Now, putting the value of $\angle TQP = 110°$ we get,

$\angle PQR = 70°$

Consider the ΔPQR,

Here, the side QP is extended to S and so, $\angle SPR$ forms the exterior angle.

Thus, $\angle SPR$ ($\angle SPR = 135°$) is equal to the sum of interior opposite angles. (triangle property)

Or, $\angle PQR + \angle PRQ = 135°$

Now, putting the value of $\angle PQR = 70°$ we get,

$\angle PRQ = 135° - 70°$

Or, $\angle PRQ = 65°$

2. In Fig. 6.40, $\angle X = 62°$, $\angle XYZ = 54°$. If YO and ZO are the bisectors of $\angle XYZ$ and $\angle XZY$ respectively of Δ XYZ, find $\angle OZY$ and $\angle YOZ$.

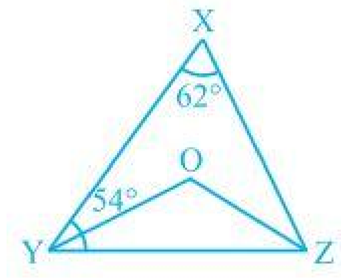

Fig. 6.40

Solution:

We know that the sum of the interior angles of the triangle.

So, $\angle X + \angle XYZ + \angle XZY = 180°$

Putting the values as given in the question we get,

$62° + 54° + \angle XZY = 180°$

Or, $\angle XZY = 64°$

Now, we know that ZO is the bisector so,

$\angle OZY = ½ \angle XZY$

$\therefore \angle OZY = 32°$

Similarly, YO is a bisector and so,

$\angle OYZ = ½ \angle XYZ$

Or, $\angle OYZ = 27°$ (As $\angle XYZ = 54°$)

Now, as the sum of the interior angles of the triangle,

$\angle OZY + \angle OYZ + \angle O = 180°$

Putting their respective values we get,

$\angle O = 180° - 32° - 27°$

Or, $\angle O = 121°$

3. In Fig. 6.41, if AB || DE, $\angle BAC = 35°$ and $\angle CDE = 53°$, find $\angle DCE$.

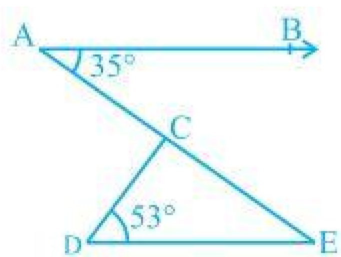

Fig. 6.41

Solution:

We know that AE is a transversal since AB // DE

Here $\angle BAC$ and $\angle AED$

are alternate interior angles.

Hence, $\angle BAC = \angle AED$

It is given that $\angle BAC = 35^\circ$

=> $\angle AED = 35^\circ$

Now consider the triangle CDE. We know that the sum of the interior angles of a triangle is 180°.

∴ $\angle DCE + \angle CED + \angle CDE = 180^\circ$

Putting the values we get

$\angle DCE + 35^\circ + 53^\circ = 180^\circ$

Or, $\angle DCE = 92^\circ$

4. In Fig. 6.42, if lines PQ and RS intersect at point T, such that $\angle PRT = 40^\circ$, $\angle RPT = 95^\circ$ and $\angle TSQ = 75^\circ$, find $\angle SQT$.

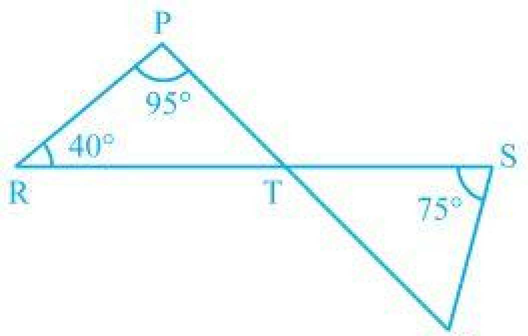

Fig. 6.42

Solution:

Consider triangle PRT.

$\angle PRT + \angle RPT + \angle PTR = 180^\circ$

So, $\angle PTR = 45^\circ$

Now $\angle PTR$ will be equal to $\angle STQ$ as they are vertically opposite angles.

So, $\angle PTR = \angle STQ = 45^\circ$

Again in triangle STQ,

$\angle TSQ + \angle PTR + \angle SQT = 180^\circ$

Solving this we get,

$\angle SQT = 60^\circ$

5. In Fig. 6.43, if PQ $\perp$ PS, PQ || SR, $\angle SQR = 28°$ and $\angle QRT = 65°$, then find the values of x and y.

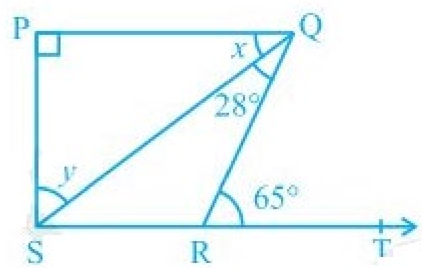

Fig. 6.43

Solution:

$x + \angle SQR = \angle QRT$ (As they are alternate angles since QR is transversal)

So, x + 28° = 65°

∴ x = 37°

It is also known that alternate interior angles are same and so,

$\angle QSR = x = 37°$

also,

Now,

$\angle QRS + \angle QRT = 180°$ (As they are a Linear pair)

Or, $\angle QRS + 65° = 180°$

So, $\angle QRS = 115°$

Now, we know that the sum of the angles in a quadrilateral is 360°. So,

$\angle P + \angle Q + \angle R + \angle S = 360°$

Putting their respective values we get,

$\angle S = 360° - 90° - 65° - 115°$

Or, $\angle QSR + y = 360°$

=>y = 360° - 90° - 65° - 115° - 37°

Or, y = 53°

6. In Fig. 6.44, the side QR of ΔPQR is produced to a point S. If the bisectors of $\angle PQR$ and $\angle PRS$ meet at point T, then prove that $\angle QTR = 1/2 \angle QPR$.

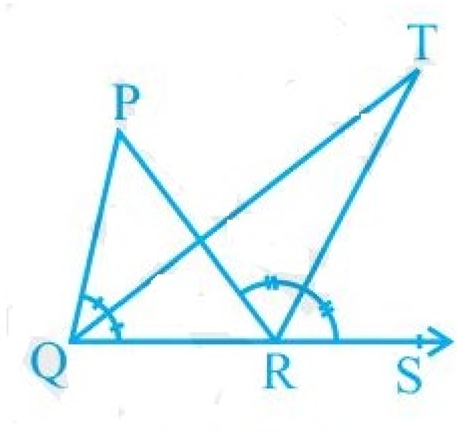

Fig. 6.44

Solution:

Consider the ΔPQR. $\angle PRS$ is the exterior angle and $\angle QPR$ and $\angle PQR$ are interior angles.

So, $\angle PRS = \angle QPR + \angle PQR$ (According to triangle property)

Or, $\angle PRS - \angle PQR = \angle QPR$ -----------(i)

Now, consider the ΔQRT,

$\angle TRS = \angle TQR + \angle QTR$

Or, $\angle QTR = \angle TRS - \angle TQR$

We know that QT and RT bisect $\angle PQR$ and $\angle PRS$ respectively.

So, $\angle PRS = 2\angle TRS$ and $\angle PQR = 2\angle TQR$

Now, $\angle QTR = \frac{1}{2}\angle PRS - \frac{1}{2}\angle PQR$

Or, $\angle QTR = \frac{1}{2}(\angle PRS - \angle PQR)$

From (i) we know that $\angle PRS - \angle PQR = \angle QPR$

So, $\angle QTR = \frac{1}{2}\angle QPR$ (hence proved).