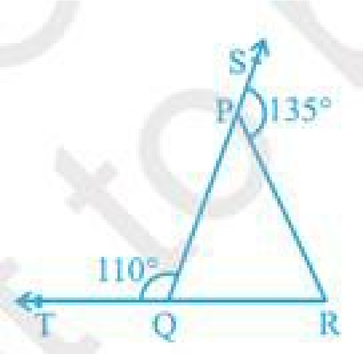
CBSE Class 9 Mathematics

NCERT Solutions

CHAPTER 6

Lines and Angles(Ex. 6.3)

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



Ans. We are given that $\angle SPR = 135^\circ$ and $\angle PQT = 110^\circ$.

We know that the sum of angles of a linear pair is 180°.

$\angle SPR + \angle RPQ = 180^\circ$. (Linear Pair axiom)

and $\angle PQT + \angle PQR = 180^\circ$. (Linear Pair axiom)

$135^\circ + \angle RPQ = 180^\circ$, and $110^\circ + \angle PQR = 180^\circ$,

Or, $\angle RPQ = 45^\circ$, and $\angle PQR = 70^\circ$.

From the figure, we can conclude that

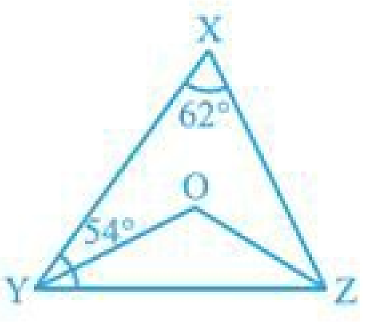
$\angle PQR + \angle RPQ + \angle PRQ = 180^\circ$. (Angle sum property)

$\Rightarrow 70^\circ + 45^\circ + \angle PRQ = 180^\circ \Rightarrow 115^\circ + \angle PRQ = 180^\circ$

$\Rightarrow \angle PRQ = 65^\circ$.

Therefore, we can conclude that $\angle PRQ = 65^\circ$.

2. In the given figure, $\angle$ X = 62º, $\angle$ XYZ = 54º. If YO and ZO are the bisectors of $\angle$ XYZ and $\angle$ XZY respectively of ΔXYZ, find $\angle$ OZY and $\angle$ YOZ.



Ans. We are given that $\angle X = 62^\circ$, $\angle XYZ = 54^\circ$ and *YO* and *ZO* are bisectors of $\angle XYZ \text{ and } \angle XZY$, respectively.

We need to find $\angle OZY \text{ and } \angle YOZ$ in the figure.

From the figure, we can conclude that in ΔXYZ

$\angle X + \angle XYZ + \angle XZY = 180^\circ$. (Angle sum property)

$\Rightarrow 62^\circ + 54^\circ + \angle XZY = 180^\circ \Rightarrow 116^\circ + \angle XZY = 180^\circ$

$\Rightarrow \ \angle XZY = 64^\circ$.

We are given that *OY* and *OZ* are the bisectors of $\angle XYZ \text{ and } \angle XZY$, respectively.

$\angle XYO = \angle ZYO = \frac{54^\circ}{2} = 27^\circ$ and $\angle OZY = \angle XZO = \frac{64^\circ}{2} = 32^\circ$

From the figure, we can conclude that in ΔOYZ

$\angle OYZ + \angle OZY + \angle YOZ = 180^\circ$ (Angle sum property)

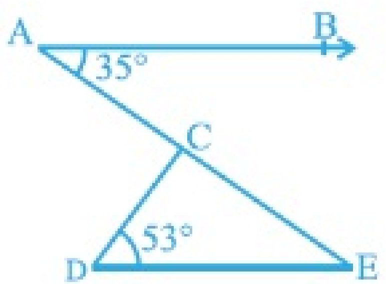
$27^\circ + 32^\circ + \angle YOZ = 180^\circ$

$\Rightarrow 59^\circ + \angle YOZ = 180^\circ$

$\Rightarrow \angle YOZ = 121^\circ$.

Therefore, we can conclude that $\angle YOZ = 121^\circ$ and $\angle OZY = 32^\circ$.

3. In the given figure, if AB | | DE, ∠ BAC = 35º and ∠ CDE = 53º, find ∠ DCE.



Ans. We are given that $AB \parallel DE$, $\angle BAC = 35^\circ$ and $\angle CDE = 53^\circ$.

We need to find the value of $\angle DCE$ in the figure given below.

From the figure, we can conclude that

$\angle BAC = \angle CED = 35^\circ$ (Alternate interior)

From the figure, we can conclude that in ΔDCE

$\angle DCE + \angle CED + \angle CDE = 180^\circ$ (Angle sum property)

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

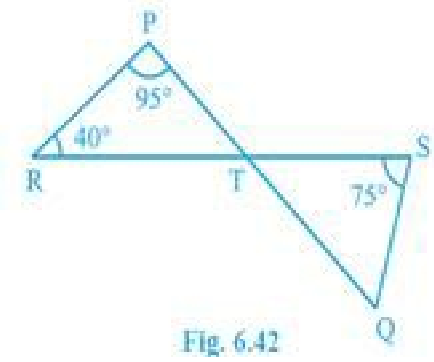
$\Rightarrow \angle DCE + 88^\circ = 180^\circ$

$\Rightarrow \angle DCE = 92^\circ$.

Therefore, we can conclude that $\angle DCE = 92^\circ$.

4. In the given figure, if lines PQ and RS intersect at point T, such that ∠ PRT = 40º,

∠ RPT = 95º and ∠ TSQ = 75º, find ∠ SQT.



Ans. We are given that $\angle PRT = 40^\circ$, $\angle RPT = 95^\circ$ and $\angle TSQ = 75^\circ$.

We need to find the value of $\angle SQT$ in the figure.

From the figure, we can conclude that in ΔRTP

$\angle PRT + \angle RTP + \angle RPT = 180^\circ$ (Angle sum property)

$40^\circ + \angle RTP + 95^\circ = 180^\circ$

$\Rightarrow \angle RTP + 135^\circ = 180^\circ$

$\Rightarrow \angle RTP = 45^\circ$.

From the figure, we can conclude that

$\angle RTP = \angle STQ = 45^\circ$ (Vertically opposite angles)

From the figure, we can conclude that in ΔSTQ

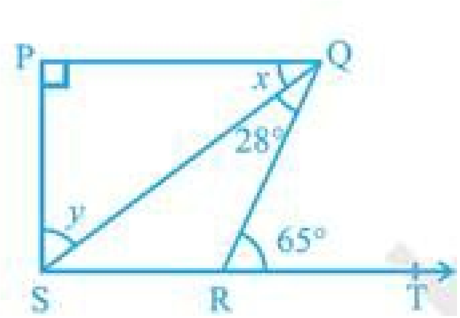
$\angle SQT + \angle STQ + \angle TSQ = 180^\circ$ (Angle sum property)

$\angle SQT + 45^\circ + 75^\circ = 180^\circ \Rightarrow \angle SQT + 120^\circ = 180^\circ$

$\Rightarrow \angle SQT = 60^\circ$.

Therefore, we can conclude that $\angle SQT = 60^\circ$.

5. In the given figure, if $PQ \perp PS$, PQ || SR, $\angle SQR = 28^\circ$ and $\angle QRT = 65^\circ$, then find the values of x and y.



Ans. We are given that $PQ \perp PS$, $PQ \parallel SR$, $\angle SQR = 28^\circ$ and $\angle QRT = 65^\circ$.

We need to find the values of x and y in the figure.

We know that "If a side of a triangle is produced, then the exterior angle so formed is equal to the sum of the two interior opposite angles."

From the figure, we can conclude that

$\angle SQR + \angle QSR = \angle QRT$, or

$28^\circ + \angle QSR = 65^\circ$

$\Rightarrow \angle QSR = 37^\circ$

From the figure, we can conclude that

$x = \angle QSR = 37^\circ$ (Alternate interior angles)

From the figure, we can conclude that ΔPQS

$\angle PQS + \angle QSP + \angle QPS = 180^\circ$ (Angle sum property)

$\angle QPS = 90^\circ \quad (PQ \perp PS)$

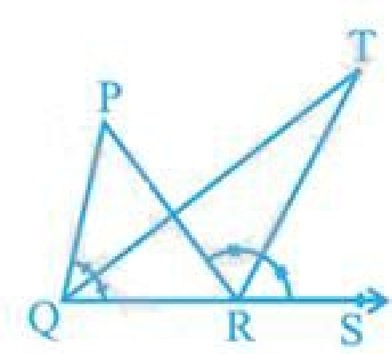
$x + y + 90^\circ = 180^\circ$

$\Rightarrow y + 37^\circ + 90^\circ = 180^\circ$

$\Rightarrow y + 127^\circ = 180^\circ \Rightarrow y = 53^\circ$

Therefore, we can conclude that $x = 37^\circ, y = 53^\circ$

6. In the given figure, 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 $\angle QTR = \frac{1}{2} \angle QPR$.



Ans. We need to prove that $\angle QTR = \frac{1}{2}\angle QPR$ in the figure given below.

We know that "If a side of a triangle is produced, then the exterior angle so formed is equal to the sum of the two interior opposite angles."

From the figure, we can conclude that in ΔQTR , $\angle TRS$ is an exterior angle

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

$\angle QTR = \angle TRS - \angle TQR$ ...(i)

From the figure, we can conclude that in ΔPQR, $\angle PRS$ is an exterior angle

$\angle QPR + \angle PQR = \angle PRS$.

We are given that QT and RT are angle bisectors of $\angle PQR$ and $\angle PRS$.

$\angle QPR + 2\angle TQR = 2\angle TRS$

$\angle QPR = 2(\angle TRS - \angle TQR)$.

We need to substitute equation (*i*) in the above equation, to get

$\angle QPR = 2\angle QTR$, or

$\angle QTR = \frac{1}{2}\angle QPR$.

Therefore, we can conclude that the desired result is proved.