Chapter 6
Lines and Angles
Exercise 6.3

Question: 1 In Fig. 6.39, sides QP and RQ of Δ PQR are produced to points S and T respectively. If ∠ SPR = 135° and ∠ PQT = 110°, find ∠ PRQ.

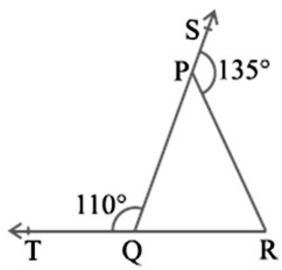

Fig. 6.39

Ans.:

Method 1:

It is given in the question that:

$\angle SPR = 135^{O}$

And,

$\angle PQT = 110^{o}$

Now, according to the question,

$\angle SPR + \angle QPR = 180°$ (SQ is a straight line)

$135° + \angle QPR = 180°$

$\angle QPR = 45°$

And,

$\angle PQT + \angle PQR = 180°$ (TR is a straight line)

$110° + \angle PQR = 180°$

$\angle PQR = 70°$

Now,

$\angle PQR + \angle QPR + \angle PRQ = 180°$ (Sum of the interior angles of the triangle)

$70° + 45° + \angle PRQ = 180°$

$115° + \angle PRQ = 180°$

$\angle PRQ = 65°$

Method 2:

It is given in the question that:

$\angle SPR = 135^\circ$

And,

$\angle PQT = 110°$

$\angle PQT + \angle PQR = 180°$ (TR is a straight line)

$110° + \angle PQR = 180°$

$\angle PQR = 70°$

Now, we know that the exterior angle of the triangle equals the sum of interior opposite angles. Therefore, $\angle SPR = \angle PQR + \angle PRQ$

$135^\circ = 70° + \angle PRQ$

$\angle PRQ = 65^\circ$

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

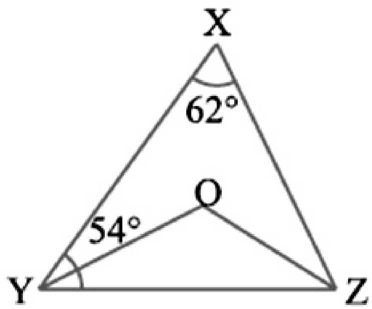

Fig. 6.40

Ans.:

Given: $\angle X = 62^o$, $\angle XYZ = 54^o$

YO and ZO are the bisectors of ∠XYZ and ∠XZY respectively.

To Find: ∠ OZY and ∠ YOZ.

Now, according to the question,

$\angle X + \angle XYZ + \angle XZY = 180^o$ (Sum of the interior angles of a triangle = 180°)

$62^o + 54^o + \angle XZY = 180^o$

$116^o + \angle XZY = 180^o$

$\angle XZY = 64^o$

Now,

As ZO is the bisector of ∠ XZY

$\angle OZY = 1/2 \ \angle XZY$

$\angle OZY = 32^o$

And,

As YO is bisector of $\angle$ XYZ

$\angle OYZ = 1/2 \angle XYZ$

$\angle OYZ = 27^o$

Now,

$\angle OZY + \angle OYZ + \angle O = 180^o$

(Sum of the interior angles of the triangle = 180°)

$= 32^o + 27^o + \angle O = 180^o$

$= 59^o + \angle O = 180^o$

$= \angle O = 121^o$

Question: 3 In Fig. 6.41, if AB ∥ DE, ∠ BAC = 35° and ∠ CDE = 53°, find ∠ DCE.

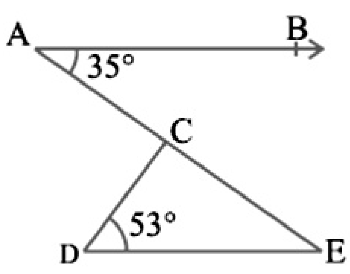

Fig. 6.41

Ans.: Given: AB parallel DE, $\angle BAC = 35^o$, $\angle CDE = 53^o$

To Find: $\angle DCE$

According to question,

$\angle BAC = \angle CED$ (Alternate interior angles)

Therefore,

$\angle CED = 35^o$

Now, In Δ DEC,

$\angle DCE + \angle CED + \angle CDE = 180^o$ (Sum of the interior angles of the triangle)

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

$\angle DCE + 88^o = 180^o$

$\angle DCE = 92^o$

Question: 4 In Fig. 6.42, if lines PQ and RS intersect at point T, such that ∠ PRT = 40°, ∠ RPT = 95°and ∠ TSQ = 75°, find ∠ SQT.

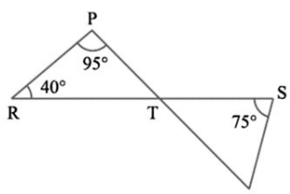

Fig. 6.42

Ans.:

Given:

$\angle PRT = 40^o$

$\angle RPT = 95^o$ and,

$\angle TSQ = 75^o$

Now according to the question,

$\angle PRT + \angle RPT + \angle PTR = 180^o$ (Sum of interior angles of the triangle)

$40^o + 95^o + \angle PTR = 180^o$

$40^o + 95^o + \angle PTR = 180^o$

$135^o + \angle PTR = 180^o$

$\angle PTR = 45^o$

$\angle PTR = \angle STQ = 45^o$ (Vertically opposite angles)

Now,

$\angle TSQ + \angle PTR + \angle SQT = 180^o$ (Sum of the interior angles of the triangle)

$75^o + 45^o + \angle SQT = 180^o$

$120^o + \angle SQT = 180^o$

$\angle SQT = 60^o$

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

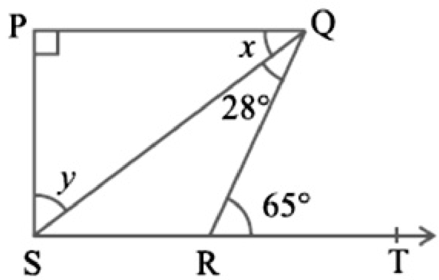

Fig. 6.43

Ans.:

To Find: Values of x and y

Given: PQ is perpendicular to PS, PQ parallel SR

$\angle SQR = 28^o$

And, $\angle QRT = 65^o$

Now according to the question,

$x + \angle SQR = \angle QRT$ (Alternate angles are equal as QR is transversal)

$x + 28^o = 65^o$

x = 37°

Now, in Δ PQS, Sum of interior angles of a triangle = 180°

∠ PQS + ∠ PSQ + ∠ QPS = 180°Therefore,

y + 37° + 90° = 180°

y= 53°So x=37° and y= 53°

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

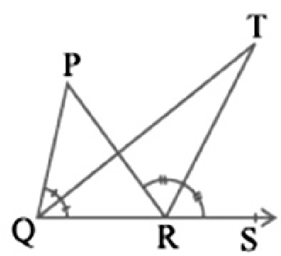

Fig. 6.44

Ans.: To Prove: ∠QTR = 1/2 ∠QPR

Given: Bisectors of ∠PQR and ∠PRS meet at point T

Proof:

In ΔQTR,

∠TRS = ∠TQR + ∠QTR (Exterior angle of a triangle equals to the sum of the two opposite interior angles)

∠QTR = ∠TRS - ∠TQR -----------(i)

Similarly in ΔQPR,

∠SRP = ∠QPR + ∠PQR

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

($\because$ $\angle TRS$ and $\angle TQR$ are the bisectors of $\angle SRP$ and $\angle PQR$ respectively.)

$\angle QPR = 2\,\angle TRS - 2\,\angle TQR$

$\angle TRS - \angle TQR = \frac{1}{2}\angle QPR$ ....(ii)

From (i) and (ii), we get

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

Hence, proved.