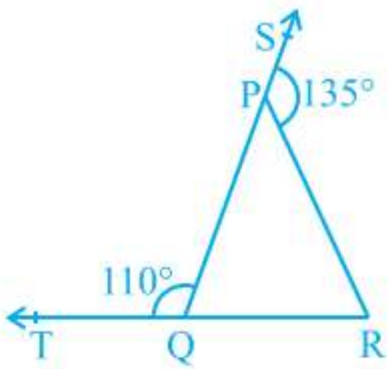
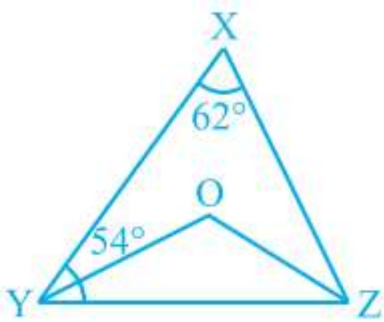
# Lines and Angles: Exercise 6.3

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




***Sol.*** Since, line QS is a straight line. So,
∠QPR + ∠SPR = 180° (Linear pair angles)
⇒ ∠QPR + 135° = 180°
⇒ ∠QPR = 180° – 135°
= 45°
Now, ∠TQP = ∠QPR + ∠PRQ (From the exterior angle theorem)
⇒ 110° = 45° + ∠PRQ
⇒ ∠PRQ = 110° – 45°
= 65°
Thus ∠PRQ = 65°

**Q.2 In figure, ∠X= 62°, ∠XYZ = 54°. If YO and ZO are the bisectors of ∠XYZ and ∠XZY respectively of Δ XYZ, find ∠OZY and ∠YOZ.**




***Sol.*** Firstly, consider Δ XYZ,
∠YXZ + ∠XYZ + ∠XZY = 180° (Since, sum of all the angles of triangle is 180°.)
⇒ 62° + 54° + ∠XZY = 180° (Given: ∠YXZ = 62°, ∠XYZ = 54°)
⇒∠XZY = 180° – 62° – 54°
= 64°
Here, YO and ZO are bisectors of angles ∠XYZ and ∠XZY.
So,

$$\angle OYZ = \frac{1}{2} \times \angle XYZ$$

$= \frac{1}{2} \times 54 = 27^\circ$

and, $\angle OZY = \frac{1}{2} \times \angle XZY$

$= \frac{1}{2} \times 64^\circ$

$= 32^\circ$

Now, In $\Delta$ OYZ,

$\angle YOZ + \angle OYZ + \angle OZY = 180^\circ$ (Since, sum of all the angles of triangle is $180^\circ$.)

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

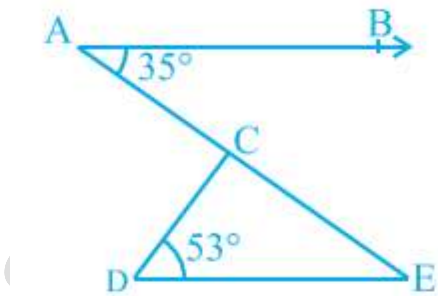
$\Rightarrow \angle YOZ = 180^\circ - 27^\circ - 32^\circ$

$= 180^\circ - 59^\circ$

$= 121^\circ$

Thus, $\angle OZY = 32^\circ$ and $\angle YOZ = 121^\circ$

**Q.3 In figure if AB || DE, $\angle BAC = 35^\circ$ and $\angle CDE = 53^\circ$, find $\angle DCE$.**




***Sol.*** Given: AB || DE and transversal AE intersects them at A and E respectively.

So, $\angle DEA = \angle BAE$ [Alternate interior angles)

$\Rightarrow \angle DEC = 35^\circ$ (Given: $\angle BAE = 35^\circ$)

Now, In $\Delta$ DEC,

$\angle DCE + \angle DEC + \angle CDE = 180^\circ$ (Since, sum of all the angles of triangle is $180^\circ$.)

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

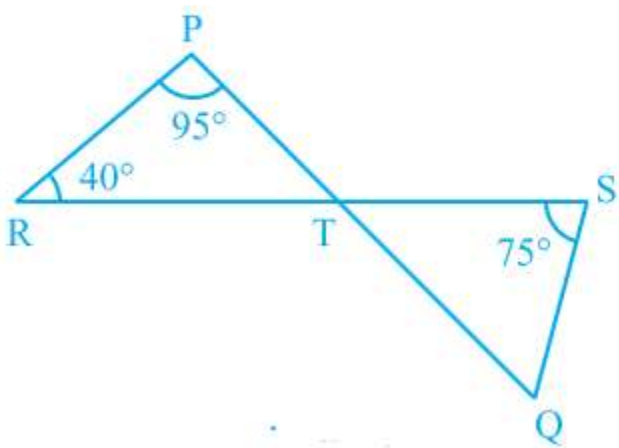
$\Rightarrow \angle DCE = 180^\circ - 35^\circ - 53^\circ$

$= 180^\circ - 88^\circ$

$= 92^\circ$

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

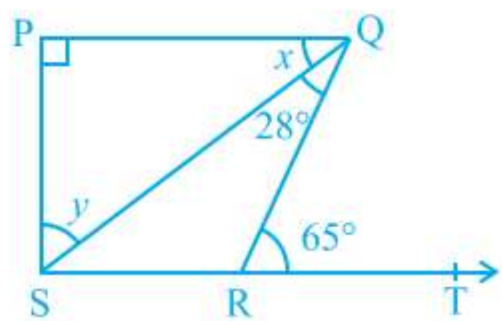
**Q.4 In figure, if lines PQ and RS intersect at point T, such that $\angle PRT = 40^\circ$, $\angle RPT = 95^\circ$ and $\angle TSQ = 75^\circ$, find $\angle SQT$.**



***Sol.*** Firstly, In Δ PRT,
∠PRT + ∠RTP + ∠TPR = 180° (Since, sum of all the angles of triangle is 180°.)
⇒ 40° + ∠RTP + 95° = 180°
⇒ ∠RTP = 180° – 40° – 95°
= 180° – 135°
= 45°

∠STQ = ∠RTP (Vertically opposite angles)
⇒ ∠STQ = 45° (Since RTP = 45°)
Now, In Δ TQS,
∠SQT + ∠STQ + ∠TSQ = 180° (Since, sum of all the angles of triangle is 180°.)
⇒ ∠SQT + 45° + 75° = 180° (Given, ∠TSQ = 75°)
⇒ ∠SQT = 180° – 45° – 75°
= 180° – 120°
= 60°
Thus, ∠SQT = 60°

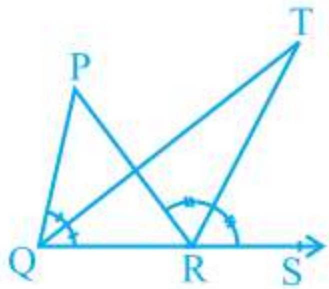
**Q.5 In figure if PQ ⊥ PS, PQ || SR, ∠SQR = 28° and ∠QRT = 65°, then find the values of x and y.**




***Sol.*** By using exterior angle property in Δ SRQ,
∠QRT = ∠RQS + ∠QSR
⇒ 65° = 28° + ∠QSR (Given, ∠QRT = 65°, ∠RQS = 28°)
⇒ QSR = 65° – 28°
= 37°

Here, PQ || SR and the transversal PS intersects them at P and S respectively.
So, ∠PSR + ∠SPQ = 180° (Since, sum of consecutive interior angles is 180°)
⇒ (∠PSQ + ∠QSR) + 90° = 180°
⇒ y + 37° + 90° = 180°
⇒ y = 180° – 90° – 37°
= 180° – 127°
= 53°
Now, In the right ΔSPQ,
∠PQS + ∠PSQ = 90°
⇒ x + 53° = 90°
⇒ x = 90° – 53°
= 37°
Thus, x = 37° and y = 53°

**Q.6 In figure, 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 = $\frac{1}{2}$∠QPR.**




***Sol.*** Firstly, In $\Delta PQR$,
Exterior $\angle PRS = \angle P + \angle Q$ (From exterior angle theorem)

$\Rightarrow \frac{1}{2}$ Exterior $\angle PRS = \frac{1}{2}\angle P + \frac{1}{2}\angle Q$

Since, QT and RT are bisectors of $\angle Q$ and $\angle PRS$ respectively.
So, $\angle Q = 2\angle TQR$ and Exterior $\angle PRS = 2\angle TRS$

$\Rightarrow \angle TRS = \frac{1}{2}\angle P + \frac{1}{2}\angle Q$............. (i)

Now, In $\Delta$ QRT,
Exterior $\angle TRS = \angle TQR + \angle T$ ........ (ii)
From (i) and (ii),

$\frac{1}{2}\angle P + \angle TQR = \angle TQR + \angle T$

$\Rightarrow \frac{1}{2}\angle P = \angle T$

Since, $\angle P = \angle QPR$ and $\angle T = \angle QTR$

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

Thus, $\angle QTR = \frac{1}{2}\angle QPR$............ Hence Proved.