# Triangles

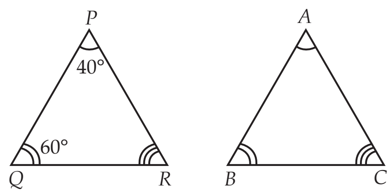
CHAPTER 7

TRY YOURSELF

## SOLUTIONS

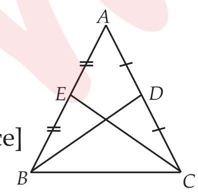
**1.** No. We have, $\Delta ABC \cong \Delta PQR$
As we know, two triangles are congruent, if the sides and angles of one triangle are equal to the corresponding sides and angles of other triangle.
$\therefore$ $\angle ABC = \angle PQR$, $\angle BCA = \angle QRP$, $\angle CAB = \angle RPQ$
Thus, it is not true to say that $\angle BCA = \angle PQR$.

**2.**




We have, $\Delta PQR \cong \Delta ABC$
$\therefore$ $\angle R = \angle C$ [By C.P.C.T.]
$\Rightarrow$ $\angle R = 180° - \angle P - \angle Q$
[By angle sum property of $\Delta PQR$]
$\Rightarrow$ $\angle C = 180° - 40° - 60° = 80°$ [$\because$ $\angle P = 40°$, $\angle Q = 60°$]
$\Rightarrow$ $\angle C = 80°$

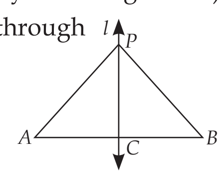
**3.** In $\Delta ABC$, $AB = AC$ [Given]
$\Rightarrow$ $\frac{1}{2}AB = \frac{1}{2}AC$
$\Rightarrow AE = AD$ [$\because$ $D$ is the mid-point of $AC$ and $E$ is the mid-point of $AB$]




Now, in $\Delta ABD$ and $\Delta ACE$,
$AB = AC$ [Given]
$\angle A = \angle A$ [Common]
$AD = AE$ [Proved above]
$\therefore$ $\Delta ABD \cong \Delta ACE$ [By SAS congruence]
$\Rightarrow$ $BD = CE$ [By C.P.C.T.]

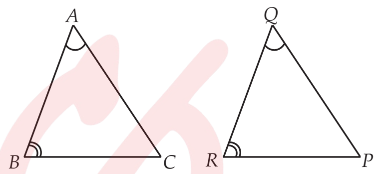
**4.** We have, $\angle ABX = \angle PQY$
$\Rightarrow$ $180° - \angle ABC = 180° - \angle PQR$
[$\because$ $\angle ABX + \angle ABC = 180°$ and $\angle PQY + \angle PQR = 180°$ (Linear Pair)]
$\Rightarrow$ $\angle ABC = \angle PQR$ ...(i)
In $\Delta ABC$ and $\Delta PQR$,
$AB = PQ$ [Given]
$\angle ABC = \angle PQR$ [From (i)]
$BC = QR$ [Given]
$\therefore$ $\Delta ABC \cong \Delta PQR$ (By SAS congruence)

**5.** Given a line $l \perp AB$. Let it passes through $C$ which is the mid-point of $AB$.
To show that $PA = PB$.
Consider $\Delta PCA$ and $\Delta PCB$.




We have, $AC = BC$ [$\because$ $C$ is the mid-point of $AB$]
$\angle PCA = \angle PCB = 90°$ [$\because$ $l \perp AB$]
$PC = PC$ [Common]
$\therefore$ $\Delta PCA \cong \Delta PCB$ [By SAS congruence]
$\Rightarrow$ $PA = PB$ [By C.P.C.T.]

**6.** We have given,




In $\Delta ABC$ and $\Delta PQR$, $\angle A = \angle Q$ and $\angle B = \angle R$
Since, the sides $AB$ and $QR$ are included between equal angles. Thus, the side $QR$ of $\Delta PQR$ should be equal to side $AB$ of $\Delta ABC$ such that $\Delta ABC \cong \Delta QRP$, by ASA congruence rule.

**7.** In $\Delta ABD$ and $\Delta CBE$
$\angle A = \angle C$ [Given]
$AB = BC$ [Given]
$\angle B = \angle B$ [Common]
$\therefore$ $\Delta ABD \cong \Delta CBE$ [By ASA congruence]

**8.** Given $AC$ is bisector of $\angle A$ and $\angle C$.
$\therefore$ $\angle BAC = \angle DAC$ and $\angle BCA = \angle DCA$ ....(i)
In $\Delta ABC$ and $\Delta ADC$,
$\angle BAC = \angle DAC$ [From (i)]
$\angle BCA = \angle DCA$ [From (i)]
$AC = AC$ [Common]
$\therefore$ $\Delta ABC \cong \Delta ADC$ [By ASA congruence]
$\Rightarrow$ $AB = AD$ [By C.P.C.T.]
$\therefore$ $AB = 5$ cm [$\because$ $AD = 5$ cm]

**9.** Let each of the base angle of an isosceles triangle be $x°$.
We have vertical angle = 100°
So, $100° + x° + x° = 180°$
[Angle sum property of a triangle]
$\Rightarrow$ $2x° = 180° - 100° = 80°$
$\Rightarrow$ $x = 40°$
$\therefore$ Each base angle measures 40°.

**10.** Since, $AE$ is the bisector of $\angle CAD$
$\therefore$ $\angle 1 = \angle 2$ ...(i)
Since, $AE \parallel BC$ and $AC$ is the transversal
$\therefore$ $\angle 1 = \angle C$ [Alternate angles] ...(ii)
Since, $AE \parallel BC$ and $AB$ is the transversal
$\therefore$ $\angle 2 = \angle B$ [Corresponding angles] ...(iii)
From (i), (ii) and (iii), we get
$\angle B = \angle C$
$\Rightarrow$ $AC = AB$ [Sides opposite to equal angles of a triangle are equal]
$\therefore$ $\Delta ABC$ is isosceles.

**11.** In $\Delta ABD$ and $\Delta ACD$,

$\angle BAD = \angle CAD$ [$\because$ $AD$ is the bisector of $\angle A$]

$AD = AD$ [Common]

$\angle ADB = \angle ADC = 90°$ [Given]

So, $\Delta ABD \cong \Delta ACD$ [By ASA congruence]

$\Rightarrow$ $AB = AC$ [By C.P.C.T.]

$\therefore$ $\Delta ABC$ is an isosceles triangle.

**12.** In $\Delta ADC$ and $\Delta CBA$

$CD = AB$ [Given]

$AD = CB$ [Given]

$CA = CA$ [Common]

$\therefore$ $\Delta ADC \cong \Delta CBA$ [By SSS congruence]

**13.** Given, $PA = PB$ and $QA = QB$

In $\Delta PAQ$ and $\Delta PBQ$

$AP = BP$ [Given]

$AQ = BQ$ [Given]

$PQ = PQ$ [Common]

So, $\Delta PAQ \cong \Delta PBQ$ [By SSS congruence]

Therefore, $\angle APQ = \angle BPQ$ [By C.P.C.T.]

Now, in $\Delta PAC$ and $\Delta PBC$,

$AP = BP$ [Given]

$\angle APC = \angle BPC$ [$\because$ $\angle APQ = \angle BPQ$ (Proved above)]

$PC = PC$ [Common]

So, $\Delta PAC \cong \Delta PBC$ [By SAS congruence]

Therefore, $AC = BC$ [By C.P.C.T.] ...(i)

and $\angle ACP = \angle BCP$ [By C.P.C.T.]

Also, $\angle ACP + \angle BCP = 180°$ [Linear pair]

$\Rightarrow$ $2\angle ACP = 180°$ $\Rightarrow$ $\angle ACP = 90°$ ...(ii)

From (i) and (ii), $PQ$ is the perpendicular bisector of $AB$.

**14.** In $\Delta QLM$ and $\Delta RNM$, we have

$QM = RM$ [Given]

$LM = NM$ [Given]

$\angle QLM = \angle RNM$ [Each equals 90°]

$\therefore$ $\Delta QLM \cong \Delta RNM$ [By RHS congruence]

$\Rightarrow$ $\angle Q = \angle R$ [By C.P.C.T.]

$\Rightarrow$ $PR = PQ$

[Sides opposite to equal angles of a triangle are equal]

**15.** In $\Delta ABC$ and $\Delta QPR$,

$\angle ACB = \angle QRP$ [Each equals 90°]

$AB = PQ$ [Given]

$BC = PR$ [Given]

$\therefore$ $\Delta ABC \cong \Delta QPR$ [By RHS congruence]

$\Rightarrow$ $AC = QR$ [By C.P.C.T.] ....(i)

Also, $BC = PR$ [Given]

$\Rightarrow$ $BC + CR = PR + CR$ $\Rightarrow BR = CP$ ...(ii)

Now, in $\Delta ACP$ and $\Delta QRB$,

$AC = QR$ [From (i)]

$\angle ACP = \angle QRB$ [Each equals 90°]

$CP = RB$ [From (ii)]

$\therefore$ $\Delta ACP \cong \Delta QRB$ [By SAS congruence]