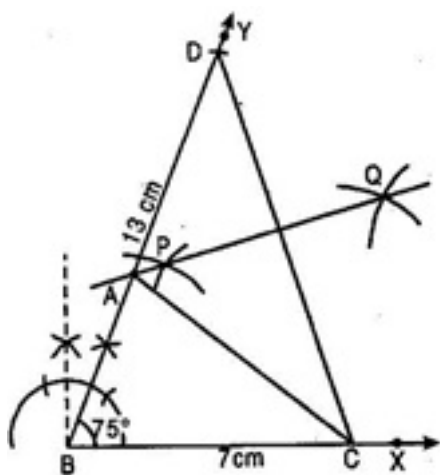


CBSE Class 9 Mathematics
NCERT Solutions
CHAPTER 11
Constructions(Ex. 11.2)

1. Construct a triangle ABC in which $BC = 7$ cm, $\angle B = 75^\circ$ and $AB + AC = 13$ cm.

Ans. Given : Base $BC = 7$ cm, $\angle B = 75^\circ$ and sum of two sides $AB + AC = 13$ cm.

To construct : A triangle ABC.



Steps of construction:

- (a) Draw a ray BX and cut off a line segment $BC = 7$ cm from it.
- (b) At B, construct $\angle YBX = 75^\circ$ with the help of compass.
- (c) With B as centre and radius = 13 cm ($\because AB + AC = 13$ cm) draw an arc to meet BY at D.
- (d) Join CD.
- (e) Draw perpendicular bisector PQ of CD intersecting BD at A.
- (f) Join AC.

Then ABC is required triangle.

Justification:

A lies on perpendicular bisector of CD.

$$\therefore AC = AD$$

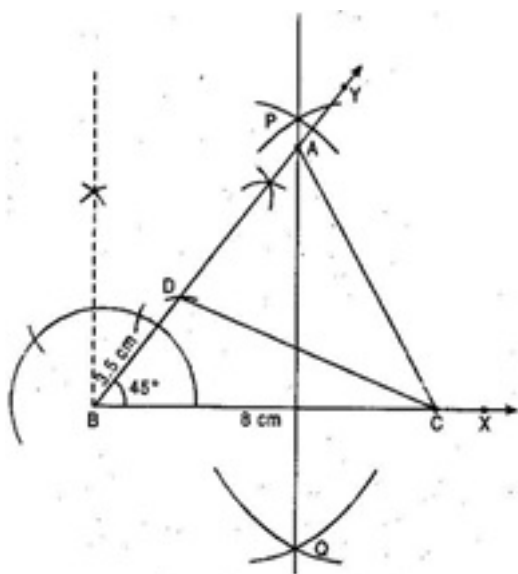
$$\text{And } AB = BD - AD \Rightarrow AB = BD - AC$$

$$\Rightarrow AB + AC = BD = 13 \text{ cm}$$

2. Construct a triangle ABC in which $BC = 8 \text{ cm}$, $\angle B = 45^\circ$ and $AB - AC = 3.5 \text{ cm}$.

Ans. Given: Base $BC = 8 \text{ cm}$, One Base angle $\angle B = 45^\circ$ and $AB - AC = 3.5 \text{ cm}$

To construct: A triangle ABC.



Steps of construction:

(a) Draw a ray BX and cut off a line segment $BC = 8 \text{ cm}$ from it.

(b) Construct $\angle YBC = 45^\circ$ with the help of compass.

(c) Cut off a line segment $BD = 3.5 \text{ cm}$ on the ray BY.

($\because AB - AC = 3.5 \text{ cm}$).

(d) Join CD.

(e) Draw perpendicular bisector PQ of CD intersecting BY at a point A.

(f) Join AC.

Then ABC is the required triangle.

Justification:

A lies on the perpendicular bisector of CD.

$\therefore AD = AC$

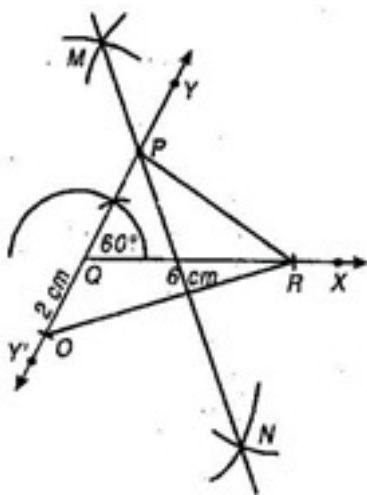
Now $BD = AB - AD$

$\Rightarrow BD = AB - AC = 3.5 \text{ cm}$

3. Construct a triangle PQR in which $QR = 6 \text{ cm}$, $\angle Q = 60^\circ$ and $PR - PQ = 2 \text{ cm}$.

Ans. Given: Base $QR = 6 \text{ cm}$, one base angle $\angle Q = 60^\circ$ and $PR - PQ = 2 \text{ cm}$.

To construct: A triangle PQR.



Steps of construction:

(a) Draw a ray QX and cut off a line segment $QR = 6 \text{ cm}$ from it.

(b) Construct a ray QY making an angle of 60° with QR and produce YQ to form a line YQY'.

(c) Cut off a line segment $QO = 2 \text{ cm}$ ($\because PR - PQ = 2 \text{ cm}$) on QY'.

(d) Join OR.

(e) Draw perpendicular bisector MN of OR.

(f) Join PR.

Then PQR is the required triangle.

Justification:

P lies on perpendicular bisector of OR.

$$\therefore PO = PR$$

$$\Rightarrow PQ + QO = PR$$

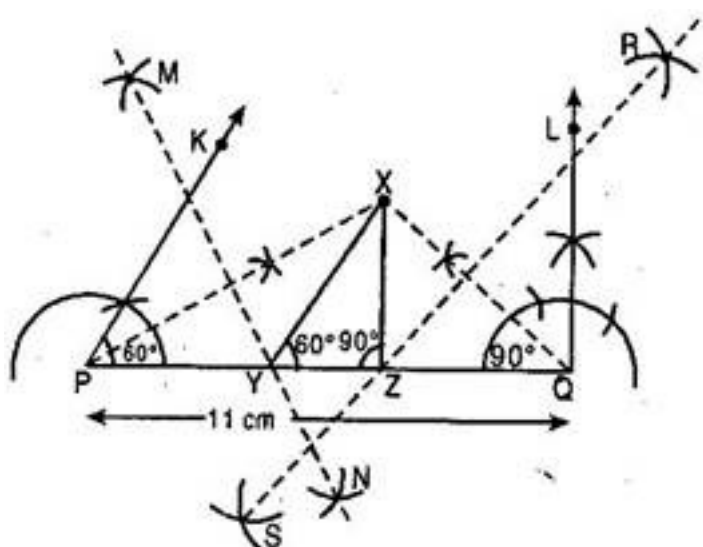
$$\Rightarrow QO = PR - PQ = 2 \text{ cm}$$

4. Construct a triangle XYZ in which $\angle Y = 30^\circ$, $\angle Z = 90^\circ$ and $XY + YZ + ZX = 11 \text{ cm}$.

Ans. Given: Base angles $\angle Y = 30^\circ$ and $\angle Z = 90^\circ$ and $XY + YZ + ZX = 11 \text{ cm}$.

To construct: $\triangle XYZ$

Steps of construction:



(a) Draw a line segment $PQ = 11 \text{ cm}$.

(b) Draw $\angle KPQ = 30^\circ$ and $\angle LQP = 90^\circ$ with the help of compass.

(c) Bisect the $\angle KPQ$ and $\angle LQP$. Let these intersect at point X.

(d) Draw perpendicular bisectors, MN of PX and RS of XQ.

(e) Let MN intersects PQ at Y and RS intersects PQ at Z.

(f) Join XY and XZ.

Then XYZ is the required triangle.

Justification:

Y lies on perpendicular bisector MN of PX.

$\therefore PY = XY$ and similarly $QZ = XZ$

This gives $XY + YZ + XZ = PY + YZ + QZ = PQ = 11 \text{ cm}$

Again $\angle YXP = \angle XPY$ [Since $XY = PY$]

$\Rightarrow \angle XYZ = \angle YXP + \angle XPY = 2 \angle XPY = \angle KPQ$

$\Rightarrow \angle XYZ = 30^\circ$

Similarly, $\angle XZY = \angle LQP$

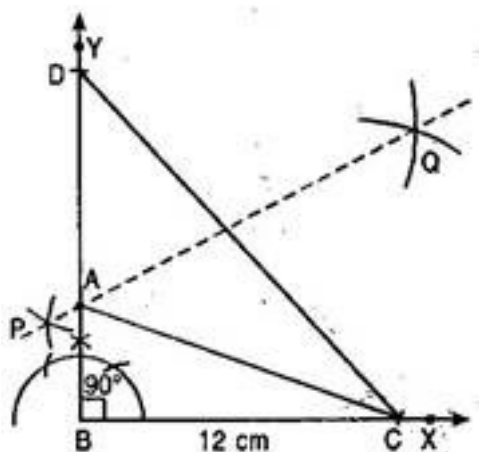
$\Rightarrow \angle XZY = 90^\circ$

5. Construct a right triangle whose base is 12 cm and sum of its hypotenuse and other side is 18 cm.

Ans. Given: Base $BC = 12 \text{ cm}$ and $AB + AC = 18 \text{ cm}$.

To construct: A right angled triangle ABC right angled at B.

Steps of construction:



- (a) Draw a ray BX and cut off a line segment $BC = 12$ cm from it.
- (b) Draw an angle $XBY = 90^\circ$ with the help of compass.
- (c) From BY cut off a line segment $BD = 18$ cm.
- (d) Join CD.
- (e) Draw the perpendicular bisector of CD intersecting BD at A.
- (f) Join AC.

Then ABC is the required right angled triangle.

Justification:

A lies on the perpendicular bisector of CD.

$$\therefore AC = AD$$

$$\text{And then } AB = BD - AD$$

$$\Rightarrow AB = BD - AC$$

$$\Rightarrow AB + AC = BD = 18 \text{ cm.}$$