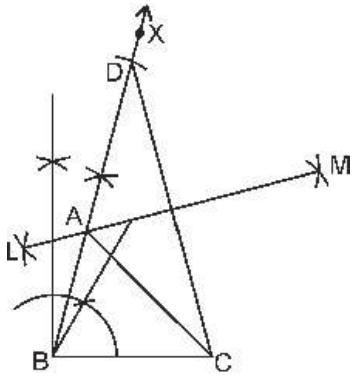
11 CONSTRUCTIONS

EXERCISE 11.2

Q.1. *Construct a triangle ABC in which BC = 7 cm, ∠B = 75° and AB + AC = 13 cm.*



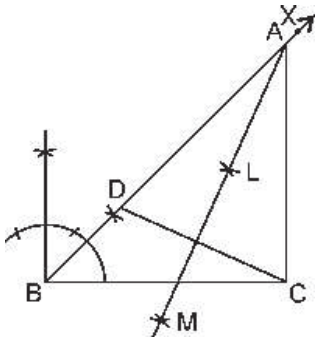
Steps of Construction

(i) Draw a line segment BC = 7 cm.
(ii) At B, draw ∠CBX = 75°.
(iii) Cut a line segment BD = 13 cm from BX.
(iv) Join DC
(v) Draw the perpendicular bisector LM of CD, which intersects BD at A.
(vi) Join AC. Then ABC is the required triangle.

Justification : In ΔACD, we have

AC = AD [A lies on the perpendicular bisector of DC.]
AB = BD – AD
= BD – AC
⇒ AB + AC = BD

Q.2. *Construct a triangle ABC, in which BC = 8 cm, ∠B = 45° and AB – AC = 3.5 cm.*



Steps of Construction

(i) Draw a line segment BC = 3.5 cm
(ii) At B, draw ∠CBX = 45°.
(iii) From BX, cut off BD = 3.5 cm.
(iv) Join DC.
(v) Draw the perpendicular bisector LM of DC, which intersects BX at A. (vi) Join AC. Then ABC is the required triangle.

Justification : In ΔADC,

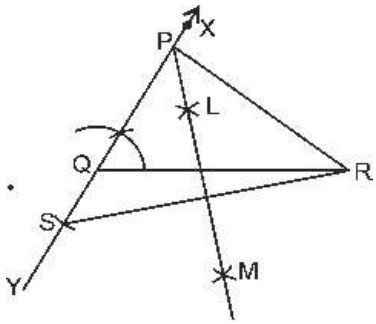
AD = AC [A lies on the perpendicular bisector of DC]
BD = AB – AD
⇒ BD = AB – AC

Q.3. *Construct a triangle PQR in which QR = 6 cm, ∠Q = 60° and PR – PQ = 2 cm.*

Steps of Construction

(i) Draw a line segment QR = 6 cm
(ii) At Q, draw ∠RQX = 60°.

(iii) Produce XQ to Y.
(iv) Cut off QS = 2 cm from QY.
(v) Join SR.
(vi) Draw the perpendicular bisector LM of SR, which intersect QX at P.
(vii) Join PR. Then PQR is the required triangle.

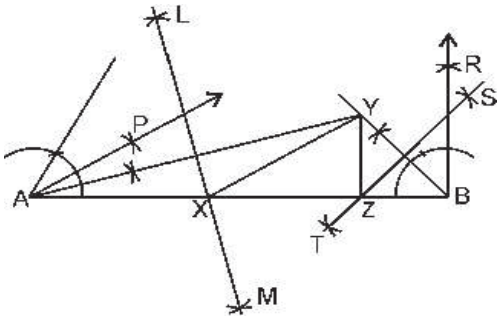


Justification : In ΔPSR, we have
SP = PR [P lies on the perpendicular bisector of SR]
QS = PS – PQ
= PR – PQ

Q.4. *Construct a ΔXYZ in which ∠X = 30°, ∠Z = 90° and XY + YZ + ZX = 11 cm.*

Steps of Construction

(i) Draw a line segment AB = 11 cm
(ii) At A, draw ∠BAP = 30° and at B, draw ∠ABR = 90°
(iii) Draw the bisector of ∠BAP and ∠ABR, which intersect each other at Y.
(iv) Join AY and BY.
(v) Draw the perpendicular bisectors LM and ST of AY and BY respectively. LM and ST intersect AB at X and Z respectively.



(vi) Join XY and YZ. Then XYZ is the required triangle.

Justification : In ΔAXY, we have
AX = XY [X lies on the perpendicular bisector of AY] ...(i)
Similarly, ZB = YZ ... (ii)
∴ XY + YZ + ZX = AX + ZB + ZX [From (i) and (ii)]
= AB
From (i), AX = AY
⇒ ∠XAY = ∠XYA [Angles opposite to equal sides are equal] ... (iii)
In ΔAXY, ∠YXZ = ∠XAY + ∠XYA [Exterior angle is equal to sum of interior opposite angles]
⇒ ∠YXZ = 2∠XAY [From (iii)]
⇒ ∠YXZ = ∠XAP [∵ AY bisects ∠XAP]
Similarly, ∠YZX = ∠ZBR.

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

Steps of Construction

(i) Draw a line segment AB = 12 cm.
(ii) At A, draw ∠BAX = 90°.
(iii) From AX, cut off AD = 18 cm.
(iv) Join DB.
(v) Draw the perpendicular bisector LM of BD, which intersects AD at C.
(vi) Join BC. Then ΔABC is the required triangle.