

Mathematics

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(Chapter - 11)(Constructions)
(Class - 9)
Exercise 11.2

Question 1:

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

Answer 1:

Steps of construction

- Draw a line segment $BC = 7\text{ cm}$.
- Using ruler and compass, draw an angle $\angle CBX = 75^\circ$.
- Taking B as centre and 13 cm as radius, mark an arc on BX, which intersects at D.
- Join CD and draw a perpendicular bisector (PQ) of CD, which intersects BD at A.
- Join AC.
- Triangle ABC is the required triangle.

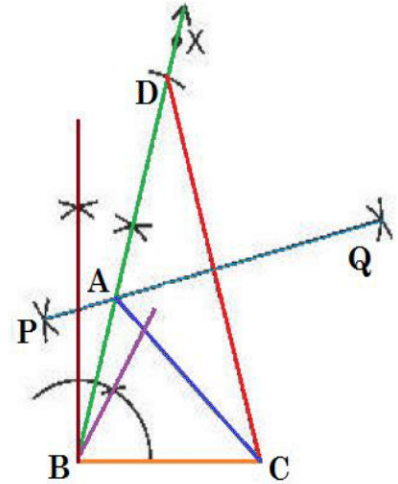
Justification

Point A lies on the perpendicular bisector of DC. So, $AD = AC$

Here, $AB = BD - AD$

$$\Rightarrow AB = BD - AC \quad [\because AD = AC]$$

$$\Rightarrow AB + AC = BD$$



Question 2:

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

Answer 2:

Steps of construction

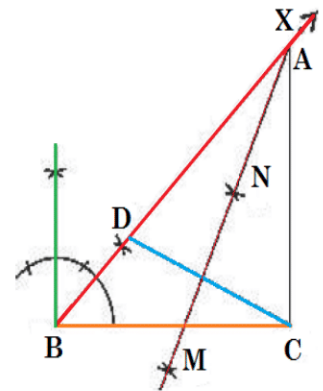
- Draw a line segment $BC = 8\text{ cm}$.
- At point B, using ruler and compass, draw an angle $\angle CBX = 45^\circ$.
- Taking B as centre and radius 3.5 cm, mark an arc, which intersects AX at D.
- Join CD and draw a perpendicular bisector (MN) of CD, which intersects BD produced at A.
- Join AC.
- Triangle ABC is the required triangle.

Justification

Point A lies on the perpendicular bisector of DC. So, $AD = AC$

Here, $BD = AB - AD$

$$\Rightarrow BD = AB - AC \quad [\because AD = AC]$$



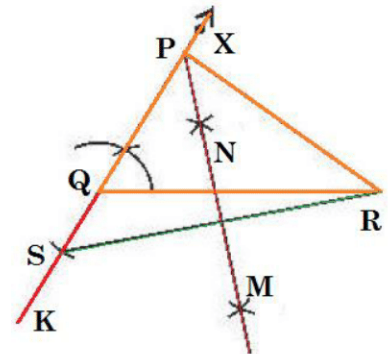
Question 3:

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

Answer 3:

Steps of construction

- Draw a line segment $QR = 6\text{ cm}$.
- At point Q, using ruler and compass, draw an angle $\angle RQX = 60^\circ$. Produce XQ to K.
- Taking Q as centre and 2 cm as radius, draw an arc which intersects QK at S.
- Join SR and draw the perpendicular bisector (MN) of SR, which intersects QX at point P.
- Join PR. Triangle PQR is the required triangle.



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Justification

Point P lies on the perpendicular bisector of SR. So, PS = PR
Here, QS = PS - PQ
 $\Rightarrow QS = PR - AC$ $[\because PS = PR]$

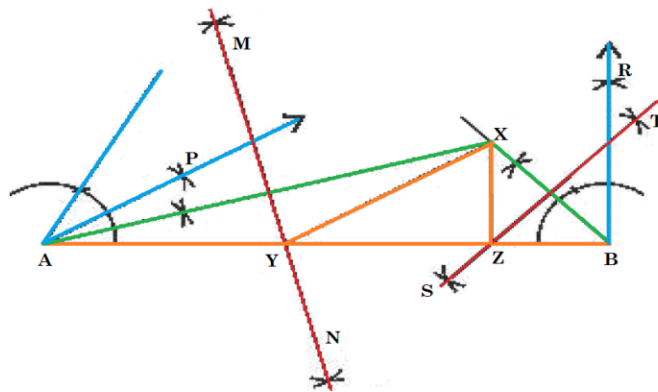
Question 4:

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

Answer 4:

Steps of construction

- (i) Draw a line segment AB = 11 cm.
- (ii) At A, using ruler and compass, draw an angle $\angle BAX = 15^\circ$ and at point B, draw an angle $\angle ABX = 45^\circ$.
- (iii) Draw the perpendicular bisector (MN) of AX, which intersects AB at Y.
- (iv) Draw the perpendicular bisector (ST) of BX, which intersects AB at Z.
- (v) Join X to Y and X to Z.
- (vi) Triangle XYZ is the required triangle.



Justification

Point Y lies on the perpendicular bisector of AX.

So, AY = XY

Point Z lies on the perpendicular bisector of BX.

So, BZ = ZX

Here, AB = AY + YZ + ZB

$\Rightarrow AB = XY + YZ + ZX$

$[\because AY = XY \text{ और } BZ = ZX]$

$\angle XYZ$ is the exterior angle of triangle AXZ.

Therefore, $\angle XYZ = \angle YXA + \angle YAX = 15^\circ + 15^\circ = 30^\circ$

Similarly, $\angle XZY$ is the exterior angle of triangle BXZ.

Hence, $\angle XZY = \angle ZXB + \angle ZBX = 45^\circ + 45^\circ = 90^\circ$

Question 5:

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

Answer 5:

Steps of construction

- (i) Draw a line segment AB = 12 cm.
- (ii) At point A, using ruler and compass, draw an angle $\angle BAX = 90^\circ$.
- (iii) Taking A as centre and 18 cm as radius, draw an arc which intersects AX at D.
- (iv) Join B to D. Draw a perpendicular bisector (MN) of BD which intersects AD at C.
- (v) Join B to C. Triangle ABC is the required triangle.

Justification

Point C lies on the perpendicular bisector of BD.

So, BC = CD

Here, AD = AC + CD

$\Rightarrow AD = AC + BC$ $[\because BC = CD]$

