NCERT SOLUTIONS

Constructions

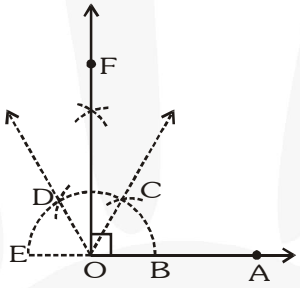
Ex - 11.1

Q1. Construct an angle of 90° at the initial point of a given ray and justify the construction.

Sol. Steps of construction :

1. Draw a ray $\overrightarrow{OA}$
2. Taking O as centre and suitable radius, draw a semicircle, which cuts OA at B.
3. Keeping the radius same, divide the semicircle into three equal part such that $\overset{\frown}{BC} = \overset{\frown}{CD} = \overset{\frown}{DE}$
4. Draw $\overrightarrow{OC}$ and $\overrightarrow{OD}$.
5. Draw $\overrightarrow{OF}$, the bisector of ∠COD

Thus, ∠AOF = 90°



Justification

∠BOC = 60°

∠BOD = 120°

∴ Bisector OF of ∠ COD = 90°

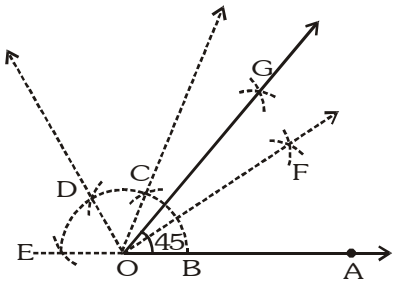
Q2. Construct an angle of 45° at the initial point of a given ray and justify the construction.

Sol. Steps of construction :

1. Draw a ray $\overrightarrow{OA}$.
2. Taking O as centre and with a suitable radius, draw a semicircle such that it intersects $\overrightarrow{OA}$ at B.
3. Taking B as centre and keeping the same radius, cut the semicircle at C. Now, taking C as centre and keeping the same radius, cut the semicircle at D and similarly, cut at E, such that $\overset{\frown}{BC} = \overset{\frown}{CD} = \overset{\frown}{DE}$.

   Join $\overrightarrow{OC}, \overrightarrow{OD}$.
4. Draw $\overrightarrow{OF}$, the angle bisector of BOC.
5. Draw $\overrightarrow{OG}$, the angle bisector of ∠FOC.

Thus, $\angle BOG = 45°$



Justification

$\angle BOC = 60°$

$\angle BOF = \frac{1}{2}\angle BOC = 30°$

$\therefore$ Bisector OG of $\angle FOC = 45°$

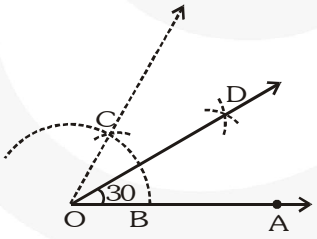
Q3. Construct the angles of the following measurements :

(i) 30° (ii) $22\frac{1}{2}°$ (iii) 15°

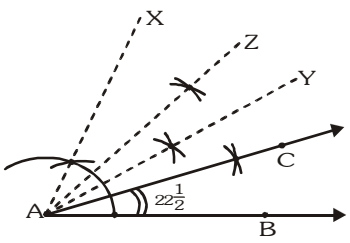
Sol. (i) Steps of construction

1. Draw a ray $\overrightarrow{OA}$.
2. With O as centre and having a suitable radius, draw an arc cutting $\overrightarrow{OA}$ at B.
3. With centre B and the same radius as above, draw an arc to cut the previous arc at C.
4. Join $\overrightarrow{OC}$, bisector of $\angle BOC$, such that $\angle BOD = \frac{1}{2}\angle BOC = \frac{1}{2}(60°) = 30°$

Thus, $\angle BOD = 30°$



(ii) $\angle BAX = 60°$ AY is bisector of $\angle BAX$.



Now, AZ bisects $\angle XAY$.

Then,

$\angle YAZ = 15°$

$\Rightarrow \angle BAZ = 45°$

AC bisects $\angle BAZ$

$\therefore \angle BAC = 22\frac{1}{2}°$

(iii) Angle of 15°

Steps of construction :

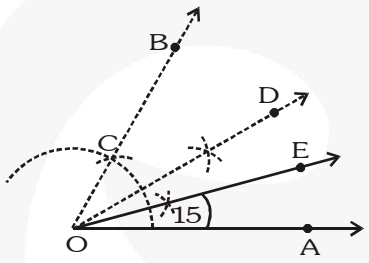
1. Draw a ray $\overrightarrow{OA}$
2. Construct $\angle AOB = 60°$.
3. Draw $\overrightarrow{OD}$, the bisector of $\angle AOC$, such that

   $\angle AOD = \frac{1}{2}\angle AOC = \frac{1}{2}(60°) = 30°$

   i.e. $\angle AOD = 30°$

4. Draw $\overrightarrow{OE}$, the bisector of $\angle AOD$ such that $\angle AOE = \frac{1}{2}\angle AOD = \frac{1}{2}(30°) = 15°$

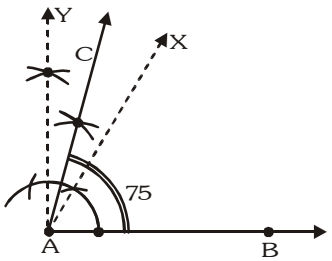
   Thus, $\angle AOE = 15°$



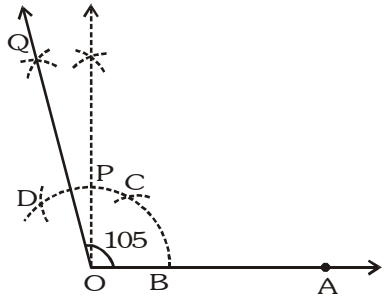
Q4. Construct the following angles and verify by measuring them by a protractor:

(i) 75° (ii) 105° (iii) 135°

Sol. (i) $\angle BAC = 75°$



(ii) $\angle AOQ = 105°$

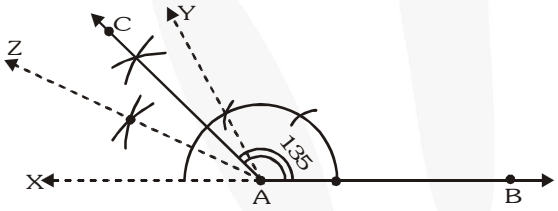


(iii) $\angle BAY = 120°$

$\angle YAZ = 30°$

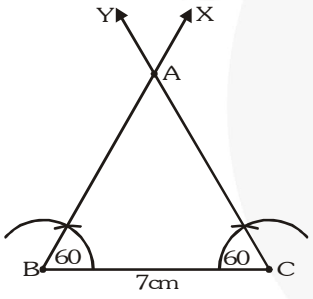
$\angle YAC = 15°$

Therefore, $\angle BAC = 120° + 15° = 135°$



Q5. Construct an equilateral triangle, given its side and justify the construction.

Sol. Let each side of the equilateral triangle ABC be 7 cm



we have BC = 7 cm.

At B and C we construct 60° angles. $\angle CBX = 60°$ and $\angle BCY = 60°$.

Now BX and CY intersect at A.

$\angle A + \angle B + \angle C = 180°$

$\Rightarrow \angle A + 60° + 60° = 180°$

$\Rightarrow \angle A = 180°$

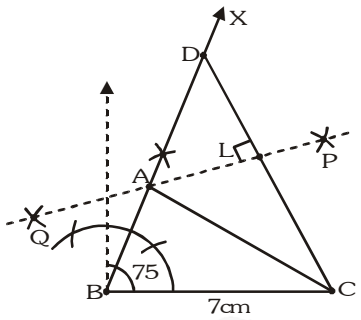
$\Rightarrow \angle A = \angle B = \angle C = 60°$

Therefore, ΔABC is required equilateral triangle and AB = BC = CA = 7 cm.

Ex - 11.2

Q1. Construct a triangle ABC in which BC = 7 cm, $\angle B = 75°$ and AB + AC = 13 cm.

Sol.

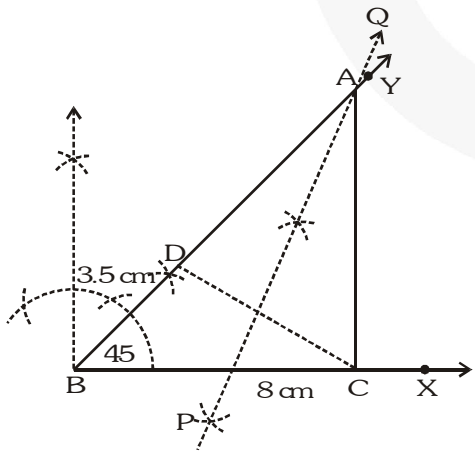


Q2. Construct a triangle ABC in which BC = 8 cm, $\angle B = 45°$ and AB – AC = 3·5 cm.

Sol. Steps of construction :

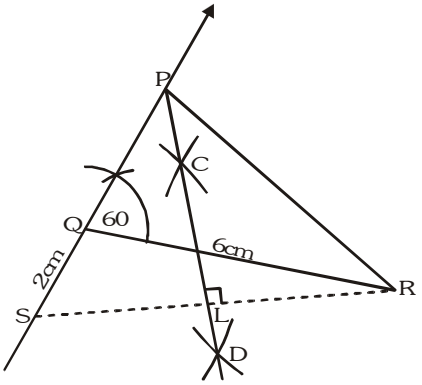
1. Draw a ray $\overline{BX}$.
2. Along $\overrightarrow{BX}$, cut off a line segment BC = 8 cm.
3. Construct $\angle CBY = 45°$
4. From BY, cut off BD = 3.5 cm.
5. Join DC.
6. Draw PQ, perpendicular bisector of DC, which intersects $\overline{BY}$ at A.
7. Join AC.

Thus, ABC is the required triangle.



Q3. Construct a triangle PQR in which QR = 6 cm, ∠Q = 60° and PR – PQ = 2 cm.

Sol.

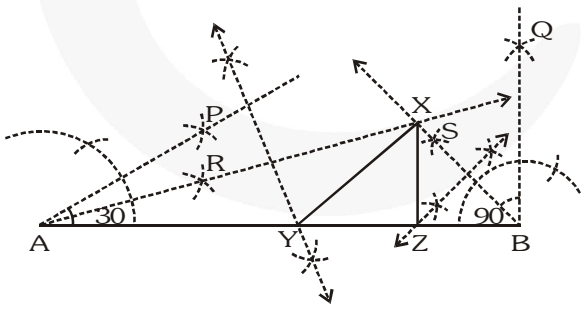


Q4. Construct a triangle XYZ in which ∠Y = 30°, ∠Z = 90° and XY + YZ + ZX = 11 cm.

Sol. Steps of construction :

1. Draw a line segment AB = 11 cm
   = (XY + YZ + ZX)
2. Construct ∠BAP = 30°
3. Contruct ∠ABQ = 90°
4. Draw AR, the bisector of ∠BAP.
5. Draw BS, the bisector of ∠ABQ. Let AR and BS intersect at X.
6. Draw perpendicular bisector of AX, which intersects AB at Y.
7. Draw perpendicular bisector of XB, which intersects AB at Z.
8. Join XY and XZ.

Thus, ΔXYZ is the required triangle.



Q5. Construct a right triangle whose base is 12 cm and sum of its hypotenuse and other side is 18 cm.

Sol. BC = 12 cm

BD = 18 cm

AC = AD.

Here, AB + AC = AB + AD = BD = 18 cm.