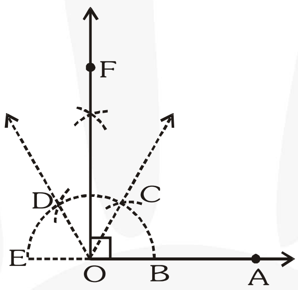
Ex - 11.1

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 $\angle COD$

Thus, $\angle AOF = 90°$



Justification

$\angle BOC = 60°$

$\angle BOD = 120°$

$\therefore$ Bisector OF of $\angle$ COD = 90°

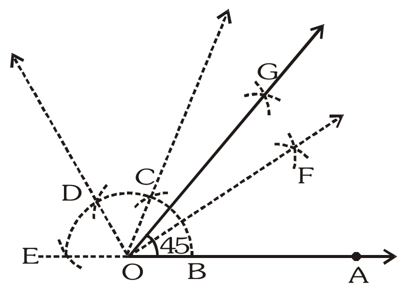
Q2. Construct an angle of 45° at the initial point of a given ray and justify the construction.

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 $\angle FOC$.

Thus, $\angle BOG = 45°$



Justification

$\angle BOC = 60°$

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

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

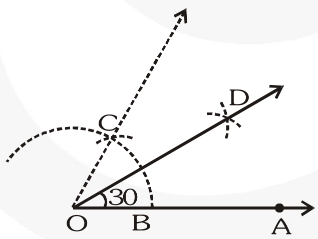
Q3. Construct the angles of the following measurements :

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

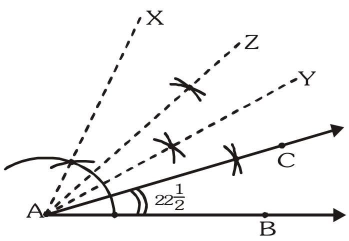
Sol. (i) Steps of construction

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 :

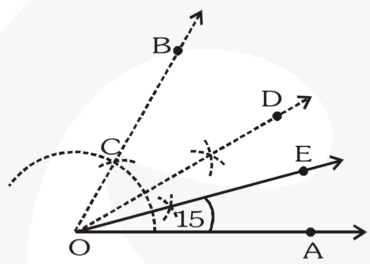
1. Draw a ray $\overrightarrow{OA}$
2. Construct $\angle AOB = 60°$.
3. Draw $\overrightarrow{OD}$, the bisector of $\angle AOC$, such that

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

   i.e. $\angle AOD = 30°$

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

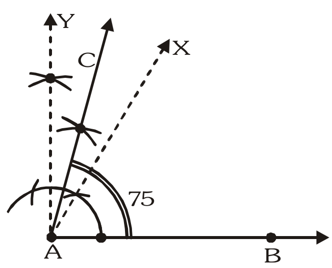
   Thus, $\angle AOE = 15°$



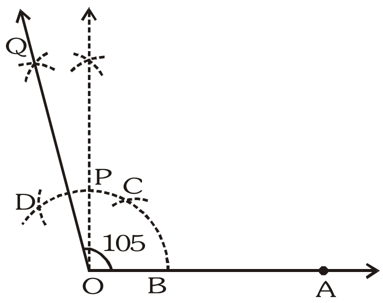
Q4. Construct the following angles and verify by measuring them by a protractor:

(i) 75° (ii) 105° (iii) 135°

Sol. (i) $\angle BAC = 75°$



(ii) $\angle AOQ = 105°$

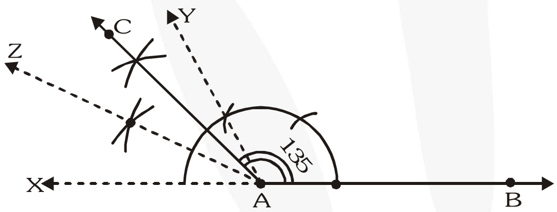


(iii) $\angle BAY = 120°$

$\angle YAZ = 30°$

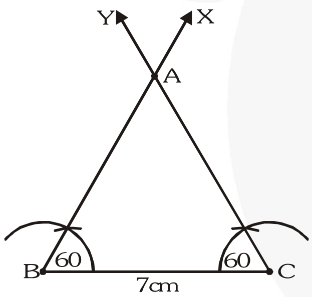
$\angle YAC = 15°$

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.