

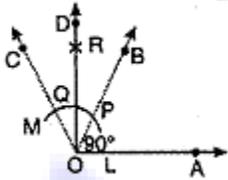


CBSE 9TH

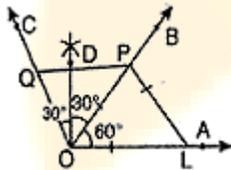
TEEVRA EDUTECH PVT.LTD.

Q.1 Construct an angle of 90° at the initial point of a given ray and justify the construction.

Ans - Steps of construction:



- Draw a ray OA.
 - With O as centre and convenient radius, draw an arc LM cutting OA at L.
 - Now with L as centre and radius OL, draw an arc cutting the arc LM at P.
 - Then taking P as centre and radius OL, draw an arc cutting arc PM at the point Q.
 - Join OP to draw the ray OB. Also join O and Q to draw the OC. We observe that:
 $\angle AOB = \angle BOC = 60^\circ$
 - Now we have to bisect $\angle BOC$. For this, with P as centre and radius greater than $\frac{1}{2}PQ$ draw an arc.
 - Now with Q as centre and the same radius as in step 6, draw another arc cutting the arc drawn in step 6 at R.
 - Join O and R and draw ray OD.
- Then AOD is the required angle of 90°



Justification:

Join PL, then $OL = OP = PL$ [by construction]

Therefore $\triangle OQP$ is an equilateral triangle and $\angle POL$ which is same as $\angle BOA$ is equal to 60° .

Now join QP, then $OP = OQ = PQ$ [by construction]

Therefore $\triangle OQP$ is an equilateral triangle.

$\therefore \angle POQ$ which is same as $\angle BOC$ is equal to 60°

By construction OD is bisector of $\angle BOC$.

$\therefore \angle DOC = \angle DOB = \frac{1}{2} \angle BOC = \frac{1}{2} \times 60^\circ = 30^\circ$

Now, $\angle DOA = \angle BOA + \angle DOB$

$$\Rightarrow \angle DOA = 60^\circ + 30^\circ$$

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

Q.2 Construct an angle of 45° at the initial point of a given ray and justify the construction.

Ans - The below given steps will be followed to construct an angle of 45° .

(i) Take the given ray PQ. Draw an arc of some radius taking point P as its centre, which intersects PQ at R.

(ii) Taking R as centre and with the same radius as before, draw an arc intersecting the previously drawn arc at S.

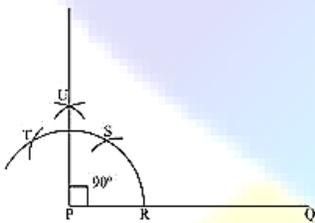
(iii) Taking S as centre and with the same radius as before, draw an arc intersecting the arc at T (see figure).

(iv) Taking S and T as centre, draw an arc of same radius to intersect each other at U.

(v) Join PU. Let it intersect the arc at point V.

(vi) From R and V, draw arcs with radius more than RV to intersect each other at W. Join PW.

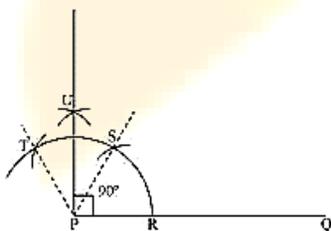
PW is the required ray making 45° with PQ.



Justification of Construction:

We can justify the construction, if we can prove $\angle UPQ = 90^\circ$.

For this, join PS and PT.



We have, $\angle SPQ = \angle TPS = 60^\circ$. In (iii) and (iv) steps of this construction, PU was drawn as the bisector of $\angle TPS$.

$$\therefore \angle UPS = \frac{1}{2} \angle TPS = \frac{1}{2} \times 60^\circ = 30^\circ$$

Also, $\angle UPQ = \angle SPQ + \angle UPS$

$$= 60^\circ + 30^\circ$$

$$= 90^\circ$$

Q.3 Construct an angle of 45° at the initial point of a given ray and justify the construction.

Ans - The below given steps will be followed to construct an angle of 45° .

(i) Take the given ray PQ. Draw an arc of some radius taking point P as its centre, which intersects PQ at R.

(ii) Taking R as centre and with the same radius as before, draw an arc intersecting the previously drawn arc at S.

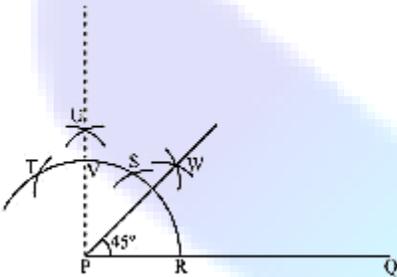
(iii) Taking S as centre and with the same radius as before, draw an arc intersecting the arc at T (see figure).

(iv) Taking S and T as centre, draw an arc of same radius to intersect each other at U.

(v) Join PU. Let it intersect the arc at point V.

(vi) From R and V, draw arcs with radius more than $\frac{1}{2}RV$ to intersect each other at W. Join PW.

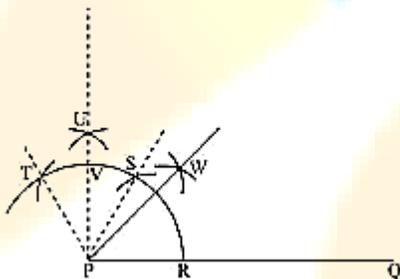
PW is the required ray making 45° with PQ.



Justification of Construction:

We can justify the construction, if we can prove $\angle WPQ = 45^\circ$.

For this, join PS and PT.



We have, $\angle SPQ = \angle TPS = 60^\circ$. In (iii) and (iv) steps of this construction, PU was drawn as the bisector of $\angle TPS$.

$$\therefore \angle UPS = \frac{1}{2} \angle TPS = \frac{60^\circ}{2} = 30^\circ$$

Also, $\angle UPQ = \angle SPQ + \angle UPS$

$$= 60^\circ + 30^\circ$$

$$= 90^\circ$$

In step (vi) of this construction, PW was constructed as the bisector of $\angle UPQ$.

$$\therefore \angle WPQ = \frac{1}{2} \angle UPQ = \frac{90^\circ}{2} = 45^\circ$$

Q.4 Construct the angles of the following measurements:

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

Ans - (i) 30°

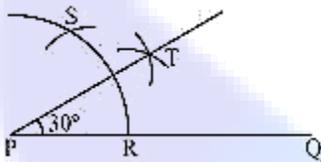
The below given steps will be followed to construct an angle of 30° .

Step I: Draw the given ray PQ. Taking P as centre and with some radius, draw an arc of a circle which intersects PQ at R.

Step II: Taking R as centre and with the same radius as before, draw an arc intersecting the previously drawn arc at point S.

Step III: Taking R and S as centre and with radius more than $\frac{1}{2}RS$, draw arcs to intersect each other at T.

Join PT which is the required ray making 30° with the given ray PQ.



(ii) $22\frac{1}{2}^\circ$

The below given steps will be followed to construct an angle of $22\frac{1}{2}^\circ$.

(1) Take the given ray PQ. Draw an arc of some radius, taking point P as its centre, which intersects PQ at R.

(2) Taking R as centre and with the same radius as before, draw an arc intersecting the previously drawn arc at S.

(3) Taking S as centre and with the same radius as before, draw an arc intersecting the arc at T (see figure).

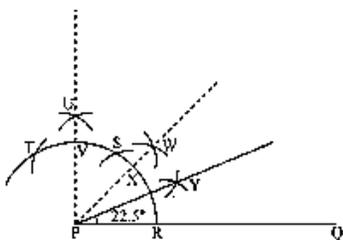
(4) Taking S and T as centre, draw an arc of same radius to intersect each other at U.

(5) Join PU. Let it intersect the arc at point V.

(6) From R and V, draw arcs with radius more than $\frac{1}{2}RV$ to intersect each other at W. Join PW.

(7) Let it intersect the arc at X. Taking X and R as centre and radius more than $\frac{1}{2}RX$, draw arcs to intersect each other at Y.

Join PY which is the required ray making $22\frac{1}{2}^\circ$ with the given ray PQ.



(iii) 15°

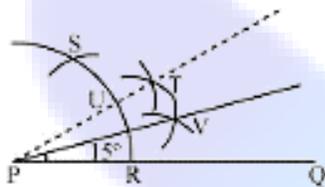
The below given steps will be followed to construct an angle of 15° .

Step I: Draw the given ray PQ. Taking P as centre and with some radius, draw an arc of a circle which intersects PQ at R.

Step II: Taking R as centre and with the same radius as before, draw an arc intersecting the previously drawn arc at point S.

Step III: Taking R and S as centre and with radius more than $\frac{1}{2}RS$, draw arcs to intersect each other at T. Join PT.

Step IV: Let it intersect the arc at U. Taking U and R as centre and with radius more than $\frac{1}{2}RU$, draw an arc to intersect each other at V. Join PV which is the required ray making 15° with the given ray PQ.



Q.5 Construct the following angles and verify by measuring them by a protractor:

(i) 75° (ii) 105° (iii) 135°

Ans - (i) 75°

The below given steps will be followed to construct an angle of 75° .

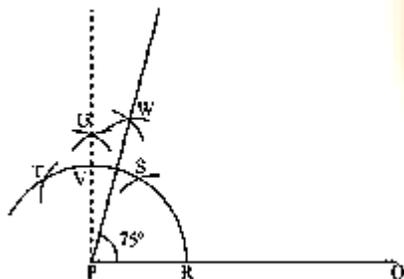
(1) Take the given ray PQ. Draw an arc of some radius taking point P as its centre, which intersects PQ at R.

(2) Taking R as centre and with the same radius as before, draw an arc intersecting the previously drawn arc at S.

(3) Taking S as centre and with the same radius as before, draw an arc intersecting the arc at T (see figure).

(4) Taking S and T as centre, draw an arc of same radius to intersect each other at U.

(5) Join PU. Let it intersect the arc at V. Taking S and V as centre, draw arcs with radius more than $\frac{1}{2}SV$. Let those intersect each other at W. Join PW which is the required ray making 75° with the given ray PQ.

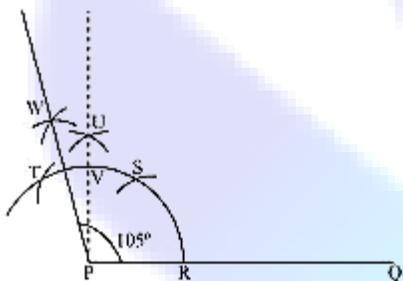


The angle so formed can be measured with the help of a protractor. It comes to be 75° .

(ii) 105°

The below given steps will be followed to construct an angle of 105° .

- (1) Take the given ray PQ. Draw an arc of some radius taking point P as its centre, which intersects PQ at R.
- (2) Taking R as centre and with the same radius as before, draw an arc intersecting the previously drawn arc at S.
- (3) Taking S as centre and with the same radius as before, draw an arc intersecting the arc at T (see figure).
- (4) Taking S and T as centre, draw an arc of same radius to intersect each other at U.
- (5) Join PU. Let it intersect the arc at V. Taking T and V as centre, draw arcs with radius more than $\frac{1}{2}TV$. Let these arcs intersect each other at W. Join PW which is the required ray making 105° with the given ray PQ.

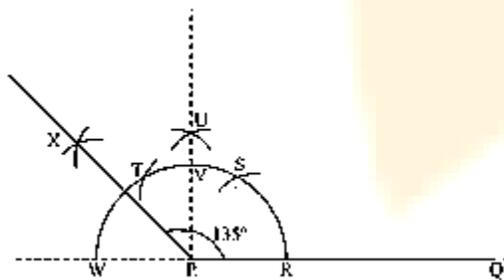


The angle so formed can be measured with the help of a protractor. It comes to be 105° .

(iii) 135°

The below given steps will be followed to construct an angle of 135° .

- (1) Take the given ray PQ. Extend PQ on the opposite side of Q. Draw a semi-circle of some radius taking point P as its centre, which intersects PQ at R and W.
- (2) Taking R as centre and with the same radius as before, draw an arc intersecting the previously drawn arc at S.
- (3) Taking S as centre and with the same radius as before, draw an arc intersecting the arc at T (see figure).
- (4) Taking S and T as centre, draw an arc of same radius to intersect each other at U.
- (5) Join PU. Let it intersect the arc at V. Taking V and W as centre and with radius more than $\frac{1}{2}VW$, draw arcs to intersect each other at X. Join PX, which is the required ray making 135° with the given line PQ.



The angle so formed can be measured with the help of a protractor. It comes to be 135° .