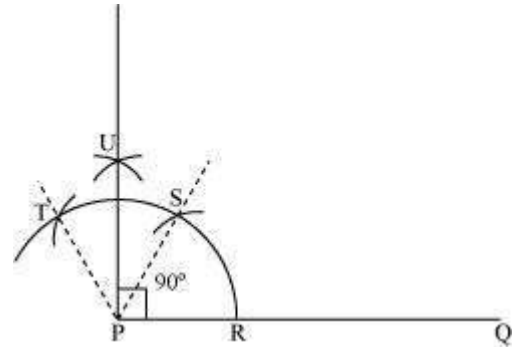


Class 09 - Construction Triangle Solved Test Paper -04

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

The below given steps will be followed to construct an angle of 90° .

- (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, which is the required ray making 90° with the given ray PQ.



Justification of Construction:

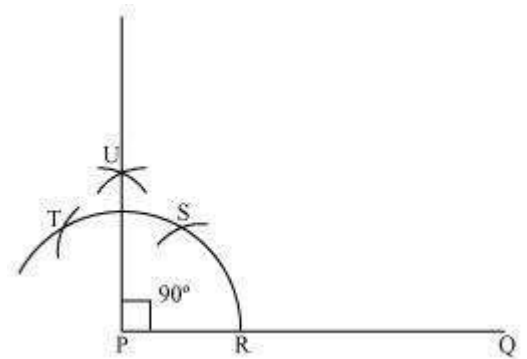
We can justify the construction, if we can prove $\angle UPQ = 90^\circ$. For this, join PS and PT

We have, $\angle SPQ = \angle TPS = 60^\circ$.

In (iii) and (iv) steps of this construction, PU was drawn as the bisector of $\angle TPS$.

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

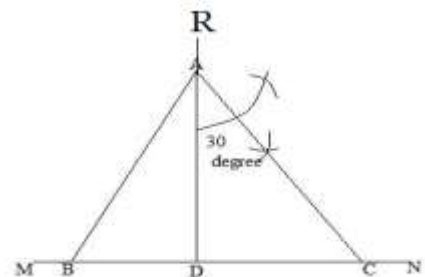
$$\text{Also, } \angle UPQ = \angle SPQ + \angle UPS = 60^\circ + 30^\circ = 90^\circ$$



Q. Construct an equilateral triangle given its altitude is 4 cm?

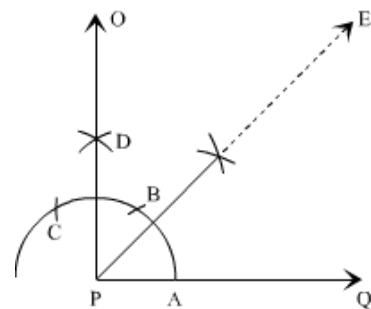
Steps for construction an equilateral triangle, when altitude is given:

- (1) Draw a line MN (2) Make a point D on line MN. At D draw an altitude DR.
- (3) Cut off $DA = 4$ cm from DR.
- (4) Draw angle $DAC = 30$ degree, which meets MN at point C.
- (5) Mark a point B on MN such that $AC = CB$
- (6) join AB Hence Triangle ABC is an equilateral triangle.



Construct an angle of 45° at the initial point of a given ray & justify the construction

1. Draw a ray PQ. 2. With P as centre and any suitable radius, draw an arc, cutting PQ at A.
3. With A as centre and the same radius, draw an arc cutting the arc drawn in step 2 at B.
4. With B as centre and the same radius as in step 2 and 3, draw an arc, cutting the arc drawn in step 3 at C.
5. With C as centre and the same radius, draw an arc
6. With C as centre and the same radius, draw an arc cutting the arc drawn in step 5 at D.



7. Draw PD and produce it to O. Now $\angle OPQ$ is the angle of measure 90° .

8. Draw PE, the bisector of $\angle OPQ$. The $\angle QPE$ so obtained is the required angle of measure 45° .

(a) State Angle Sum Property of a triangle.

(b) Is it possible to construct triangle ABC if perimeter of the triangle is 11 cm, base angles $\angle A = 60^\circ$ and $\angle B = 70^\circ$.

(c) Is it possible to construct triangle EFG, if $EF + FG + GE = 11$ cm, $\angle E = 105^\circ$ and $\angle F = 90^\circ$.

(d) Is it possible to construct triangle XYZ if perimeter is 12.5 cm, $\angle X = 75^\circ$ and $\angle Y = 30^\circ$.

(a) Angle Sum Property of a triangle : Sum of the angles of triangle is 180°

(b) yes, it is possible to construct triangle ABC if perimeter of the triangle is 11 cm, base angles $\angle A = 60^\circ$ and $\angle B = 70^\circ$ as sum of given angle is less than 180°

(c) yes, it is not possible to construct triangle EFG, if $EF + FG + GE = 11$ cm, $\angle E = 105^\circ$ and $\angle F = 90^\circ$ as sum of given angle is more than 180°

(d) yes, it is possible to construct triangle XYZ if perimeter is 12.5 cm, $\angle X = 75^\circ$ and $\angle Y = 30^\circ$ as sum of given angle is less than 180°

Give reasons :

(a) Construction of an angle of 22.5° is possible with the help of ruler and compass.

(b) It is not possible to construct a triangle ABC, given that $BC = 7$ cm, $\angle B = 45^\circ$ and $AB - AC = 10$ cm

(c) We can construct an angle of 67.5° using ruler and compass.

(d) Construction of triangle DEF, if $EF = 5.5$ cm, $\angle E = 75^\circ$ and $DE - DF = 2$ cm is possible

(a) yes, Construction of an angle of 22.5° is possible with the help of ruler and compass as $45^\circ = \frac{1}{2}$ of 90° and $45^\circ = \frac{1}{2}$ of 90°

(b) No, it is not possible. In a triangle, the difference between two sides should be less than the third side. But here, $AB - AC = 10$ which is greater than BC , which is 7 cm.

(c) We can construct an angle of 67.5° using ruler and compass. as $\frac{1}{4}$ of $30^\circ = 7.5^\circ$

(d) Construction of triangle DEF, if $EF = 5.5$ cm, $\angle E = 75^\circ$ and $DE - DF = 2$ cm is possible, because the difference between two sides should be less than the third side

Q. Is it possible to construct a triangle of given sides as 44 mm, 9.5 cm and 46 mm. justify your answer?

Ans: 44 mm = 4.4 cm, 46 mm = 4.6 cm.

Now the given sides are 4.4 cm, 4.6 cm, 9.5 cm.

As by Triangle Inequality property, if the sum of the two sides of a triangle is always greater than the third side, then only a triangle can be constructed.

So, $4.4 + 9.5 = 13.9 > 4.6$

$4.6 + 9.5 = 4.1 > 4.4$

But $4.4 + 4.6 = 9 < 9.5$

Hence it is not possible to construct a triangle.