

CBSE NCERT Solutions for Class 7 Mathematics Chapter 10

Back of Chapter Questions

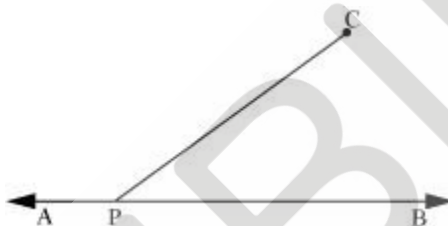
Exercise 10.1

1. Draw a line, say AB, take a point C outside it. Through C, draw a line parallel to AB using ruler and compasses only.

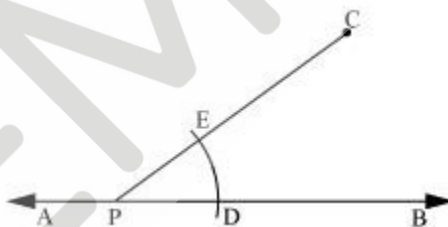
Solution:

The following are the steps of construction:

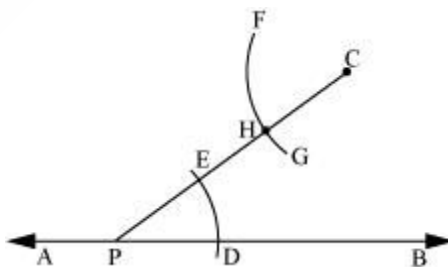
- (i) Draw a line AB. Consider a point P on it. Consider a point C outside this line. Upon joining C to P, we obtain the following figure:



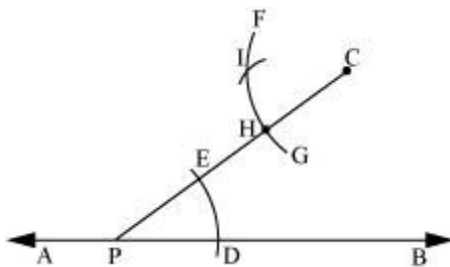
- (ii) Taking P as center and with any convenient radius, draw an arc intersecting line AB at point D and line PC at point E.



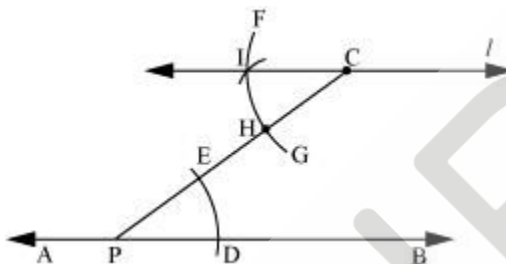
- (iii) Taking C as center and with the same radius as considered before, draw an arc FG intersecting PC at H.



- (iv) The compass is adjusted up to the length of DE. Keeping the compass intact and taking H as the center, draw an arc to intersect the previously drawn arc FG at point I.



- (v) Join the points C and I to draw a line ' l '.



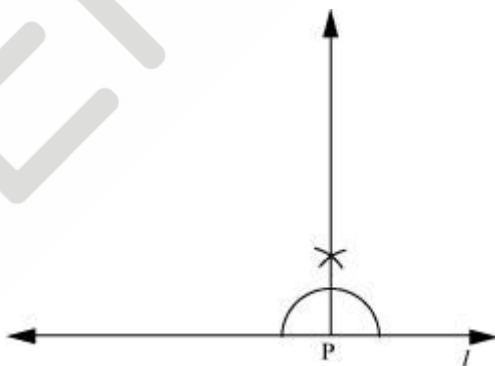
The line l required line which is parallel to line AB.

2. Draw a line l . Draw a perpendicular to l at any point on l . On this perpendicular choose a point X, 4 cm away from l . Through X, draw a line m parallel to l .

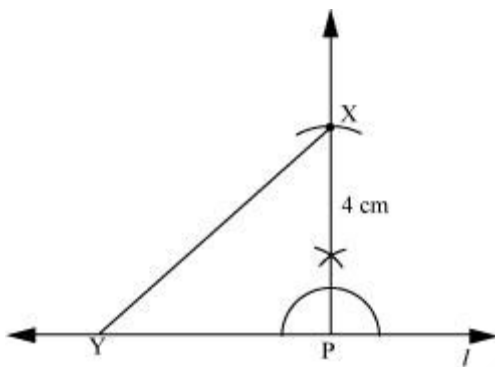
Solution:

The following are the steps of construction:

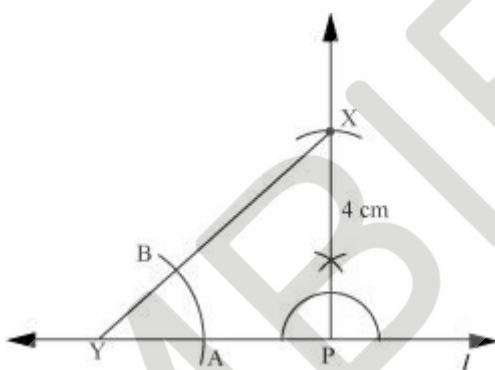
- (i) Draw a line l and consider a point P on line l . Then, construct a perpendicular at point P.



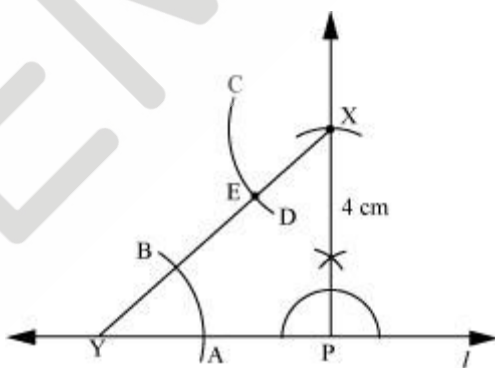
- (ii) The compass is then adjusted up to the length of 4 cm. Construct an arc to intersect this perpendicular at point X. Considering any point Y on line l , join X to Y.



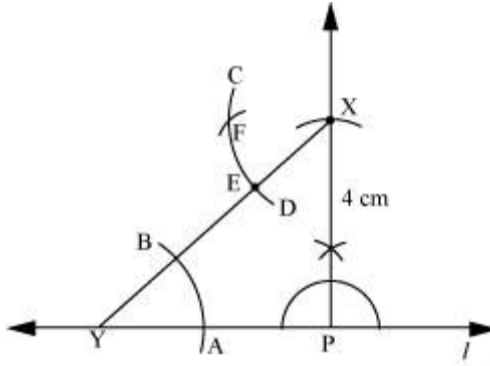
- (iii) With Y as center and with a convenient radius, construct an arc intersecting l at A and XY at B.



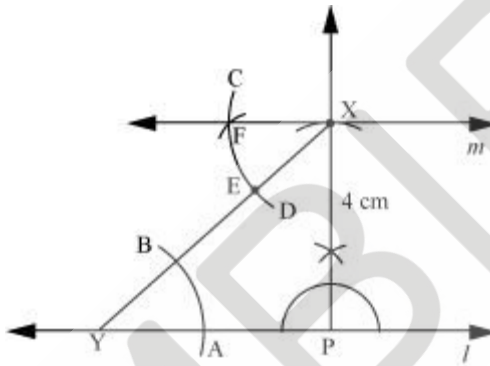
- (iv) With X as center and with the same radius as before, draw an arc CD cutting XY at E.



- (v) The compass is adjusted up to the length of AB. Keeping the compass intact and taking E as the center, construct an arc to intersect the previously drawn arc CD at point F.



- (vi) Join the points X and F to draw a line m .



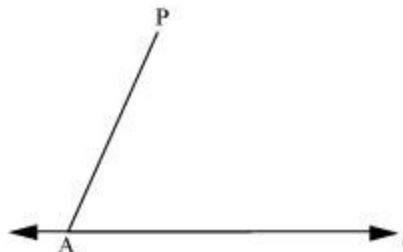
Line m is the required line which is parallel to line l .

3. Let l be a line and P be a point not on l . Through P , draw a line m parallel to l . Now join P to any point Q on l . Choose any other point R on m . Through R , draw a line parallel to PQ . Let this meet l at S . What shape do the two sets of parallel lines enclose?

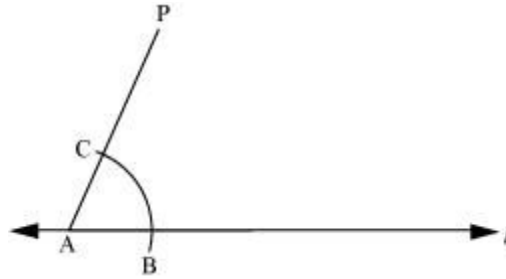
Solution:

The following are the steps of construction:

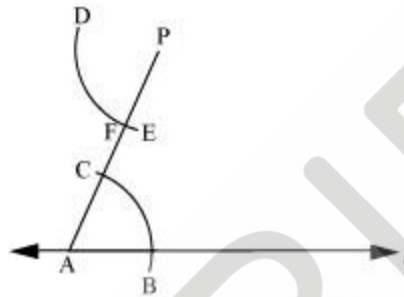
- (i) Draw a line l and consider a point A on it. Consider a point P external to line l and join A to P .



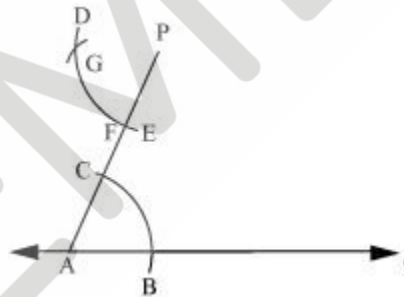
- (ii) With A as center and with any convenient radius, draw an arc cutting l at B and AP at C .



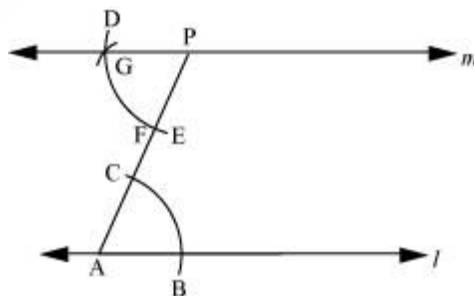
- (iii) With P as center and with the same radius as earlier, construct an arc DE to intersect AP at F.



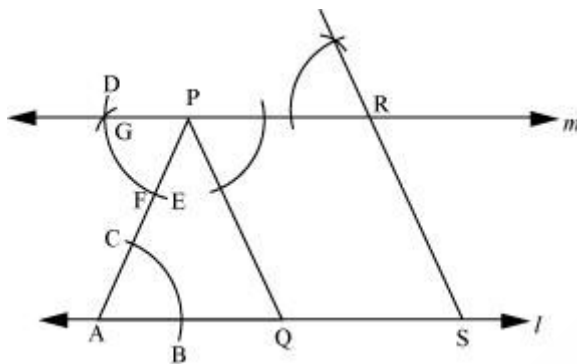
- (iv) The compass is adjusted up to the length of BC. Keeping the compass intact and taking F as the center, construct an arc to intersect the previously drawn arc DE at point G.



- (v) Upon joining P to G, we obtain the required line m . Line m will be parallel to line l .



- (vi) Join P to any point Q on line l . Consider another point R on line m . On similar grounds, a line can be drawn through point R and parallel to PQ.



Let the line drawn meet line l at point S .

We can observe that, in quadrilateral PQSR, opposite lines are parallel to each other.

That is $PQ \parallel RS$ and $PR \parallel QS$

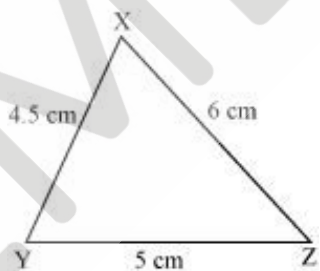
Thus we can conclude that, the quadrilateral PQSR is a parallelogram.

Exercise 10.2

1. Construct $\triangle XYZ$ in which $XY = 4.5$ cm, $YZ = 5$ cm and $ZX = 6$ cm.

Solution:

The rough figure of the required triangle can be drawn as follows:

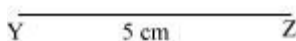


The construction is as follows:

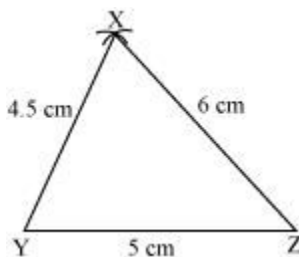
- (i) Construct a line segment YZ of length 5 cm



- (ii) From the rough sketch, we observe that point X is at a distance of 4.5 cm from Y . Now, with Y as center, construct an arc of radius 4.5 cm



- (iii) Also, we observe that point X is at a distance of 6 cm from Z. So, with Z as the center, construct an arc of radius 6 cm. The point of intersection of this arc with the previously drawn arc gives the point X.



Therefore, XYZ is the required triangle.

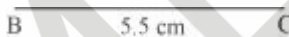
2. Construct an equilateral triangle of side 5.5 cm

Solution:

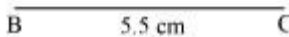
Since, all the three sides of an equilateral triangle are the same, we now need to construct a triangle such that $AB = BC = AC = 5.5$ cm.

The following are the steps of construction:

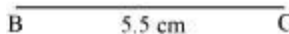
- (i) Construct a line segment BC (base of the required triangle) of length 5.5 cm



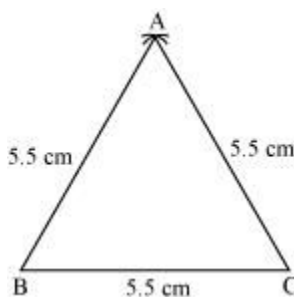
- (ii) Since, AB should measure 5.5 cm, clearly point A is at a distance of 5.5 cm from B. Therefore, with B as the center and radius of 5.5 cm, construct an arc.



- (iii) Similarly, point A must be at a distance of 5.5 cm from C. Therefore, with C as the center, construct an arc of radius 5.5 cm. The point of intersection of this arc with the previously drawn arc gives the point A.



- (iv) Upon joining B and C to A, we obtain the required triangle.



Hence, ABC is the required triangle.

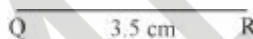
3. Draw ΔPQR with $PQ = 4$ cm, $QR = 3.5$ cm and $PR = 4$ cm. What type of triangle is this?

Solution:

Given that, $PQ = PR = 4$ cm, the required triangle is an isosceles triangle.

The steps of construction are as follows:

- (i) Let QR be the base of the triangle. Construct a line segment QR of measure 3.5 cm



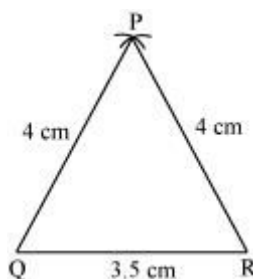
- (ii) Since QP measures 4 cm, point P is located at a distance of 4 cm from Q. Therefore, with Q as the center construct an arc of radius 4 cm.



- (iii) Since, PR measures 4 cm, point P is located at a distance of 4 cm from R. Therefore, with R as the center, construct an arc of radius 4 cm. The point of intersection of this arc with the previously drawn arc gives the point P.



- (iv) Upon joining P with points Q and R, we obtain the required triangle PQR.



Hence, PQR is the required triangle.

4. Construct $\triangle ABC$ such that $AB = 2.5$ cm, $BC = 6$ cm and $AC = 6.5$ cm. Measure $\angle B$.

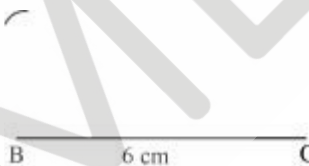
Solution:

The following are the steps of construction:

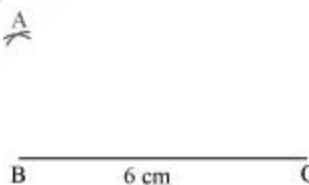
- (i) Let BC be the base of the triangle. Draw a line segment BC of length 6 cm as shown:



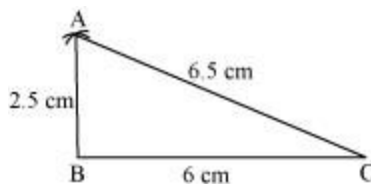
- (ii) Since A is at a distance of 6.5 cm from C, construct an arc of radius 6.5 cm with C as the center.



- (iii) Since, A is at a distance of 2.5 cm from B, construct an arc of radius 2.5 cm with B as the center. The point of intersection of the two arcs gives the required point A.



- (iv) Upon joining A with points B and C, we obtain the required triangle ABC.



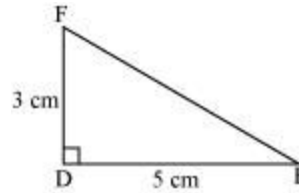
$\angle B$ when measured is equal to 90°

Exercise 10.3

1. Construct $\triangle DEF$ such that $DE = 5$ cm, $DF = 3$ cm and $m\angle EDF = 90^\circ$.

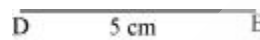
Solution:

The rough sketch of the required triangle is as shown:

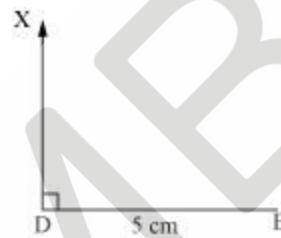


The following are the steps of construction:

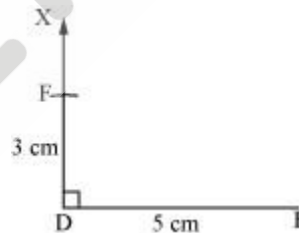
- (i) Let DE be the base. Draw a line segment DE of length 5 cm



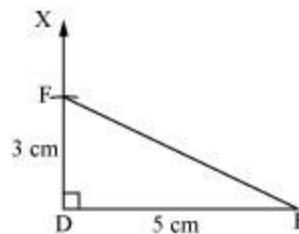
- (ii) Since, $\angle EDF = 90^\circ$, at point D draw a ray DX such that it makes an angle 90° with DE.



- (iii) Since, DF measures 3 cm, with D as the center, cut an arc of radius 3 cm such that it intersects the ray DX. The point of intersection is the required point F.



- (iv) Upon joining E and F, we obtain the required triangle.

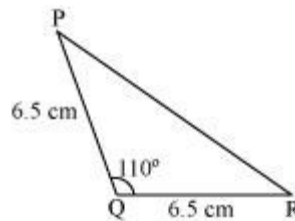


Hence, DEF is the required triangle.

2. Construct an isosceles triangle in which the lengths of each of its equal sides is 6.5 cm and the angle between them is 110° .

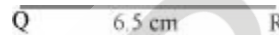
Solution:

Let us construct an isosceles triangle PQR in which $PQ = QR = 6.5$ cm. The rough sketch of the required triangle is as shown:

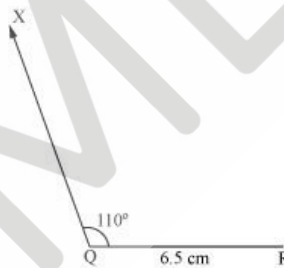


Following are the steps of construction:

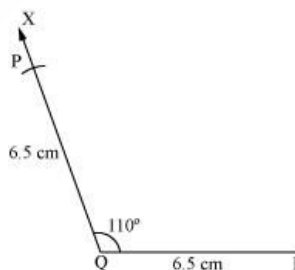
- (i) Let QR be the base of the required triangle. Draw a line segment QR of length 6.5 cm



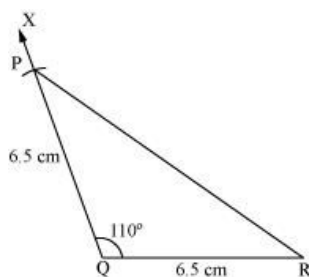
- (ii) From the rough sketch, it is seen that the angle at Q is 110° . Therefore, construct an arc QX such that it makes an angle of 110° with Q.



- (iii) With P as the center, cut an arc of radius 6.5 cm such that it intersects the ray QX at P.



- (iv) Upon joining P with R, we obtain the required triangle PQR.

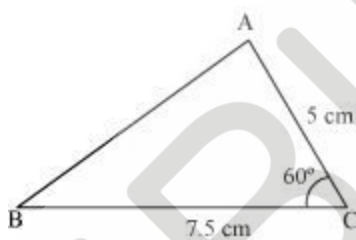


Hence, PQR is the required triangle.

3. Construct $\triangle ABC$ with $BC = 7.5$ cm, $AC = 5$ cm and $m\angle C = 60^\circ$.

Solution:

The rough sketch of the required triangle is as shown below:

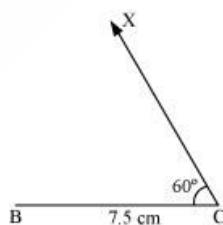


The following are the steps of construction:

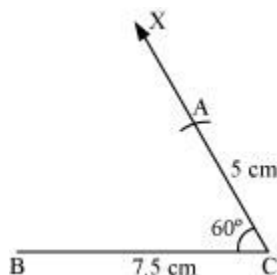
- (i) Draw a line segment BC of length 7.5 cm. This will be the base of the triangle.



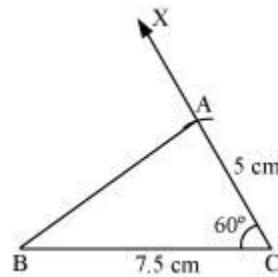
- (ii) Since the angle at C is 60° , draw a ray CX such that it makes an angle of 60° at C.



- (iii) To mark point A, construct an arc of radius 5 cm with C as the center, such that it intersects the ray CX. This point of intersection is A.



- (iv) Upon joining B and A, we obtain the required triangle ABC.



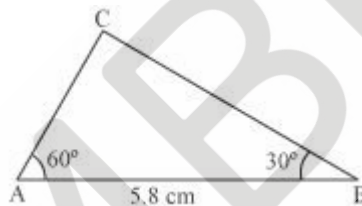
Hence, ABC is the required triangle.

Exercise 10.4

1. Construct $\triangle ABC$, given $m\angle A = 60^\circ$, $m\angle B = 30^\circ$ and $AB = 5.8$ cm.

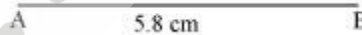
Solution:

The rough sketch of the required triangle is as shown below:

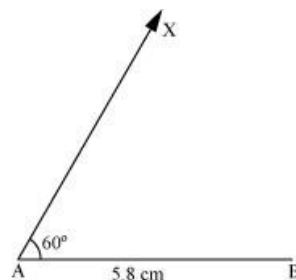


The following are the steps of construction:

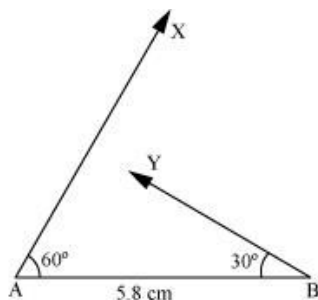
- (i) Let the base of the triangle be AB. Draw a line segment AB of length 5.8 cm



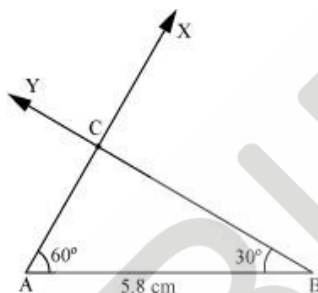
- (ii) Since we have an angle of 60° at A, construct a ray of AX such that it makes an angle of 60° with point A.



- (iii) Since we have an angle of 30° at point B, construct a ray, BX such that it makes an angle of 30° at B.



- (iv) Extend the two rays such that they intersect a point. This point of intersection is C.



Hence, ABC is the required triangle.

2. Construct ΔPQR if $PQ = 5$ cm, $m\angle PQR = 105^\circ$ and $m\angle QRP = 40^\circ$.

(Hint: Recall angle sum property of a triangle).

Solution:

In order to construct the required triangle, we need the measure of $\angle RPQ$. We make use of the angle sum property of a triangle to find $\angle RPQ$.

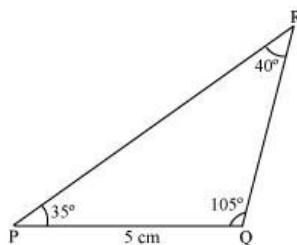
$$\angle PQR + \angle PRQ + \angle RPQ = 180^\circ$$

$$105^\circ + 40^\circ + \angle RPQ = 180^\circ$$

$$145^\circ + \angle RPQ = 180^\circ$$

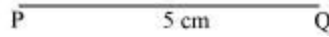
$$\angle RPQ = 180^\circ - 145^\circ = 35^\circ$$

The rough sketch of the required triangle is as shown below:

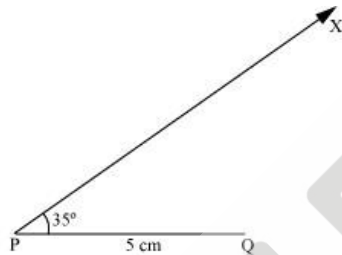


The following are the steps of construction:

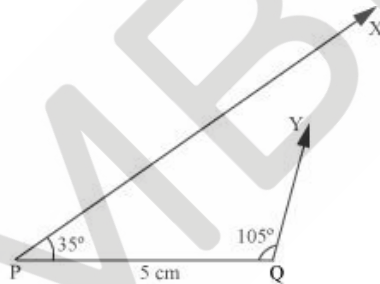
- (i) Since, we have considered PQ to be the base of the triangle, draw a line segment PQ of length 5 cm.



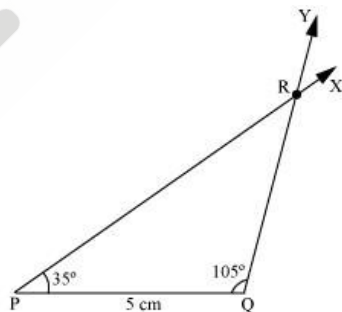
- (ii) Since we have an angle of 35° at point P, construct a ray PX such that it makes an angle of 35° with point P.



- (iii) Since we have an angle of 105° at Q, construct a ray QY such that it makes an angle of 105° at Q.



- (iv) Extend the rays such that they intersect at point. Name this point of intersection as R.



Hence, PQR is the required triangle.

3. Examine whether you can construct $\triangle DEF$ such that $EF = 7.2$ cm, $m\angle E = 110^\circ$ and $m\angle F = 80^\circ$. Justify your answer.

Solution:

It is given that,

$$\angle E = 110^\circ \text{ and } \angle F = 80^\circ$$

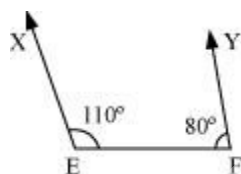
which gives

$$\angle E + \angle F = 110^\circ + 80^\circ = 190^\circ$$

But, according to the angle sum property of triangles, we have

$$\angle E + \angle F + \angle D = 180^\circ$$

Clearly, the angle sum property is violated. Therefore, we cannot construct $\triangle DEF$ with the given measurements.



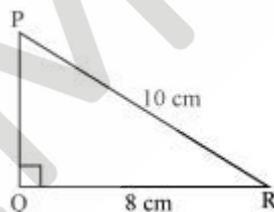
Also, for constructing the required triangle, point D must lie on the intersection of the EX and FY. However, it is seen that both the rays do not intersect. Therefore, the required triangle cannot be formed.

Exercise 10.5

1. Construct the right angled $\triangle PQR$, where $m\angle Q = 90^\circ$, $QR = 8$ cm and $P = 10$ cm.

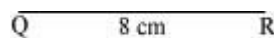
Solution:

The rough sketch of the required triangle is as follows:

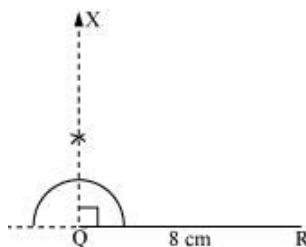


The following are the steps of construction:

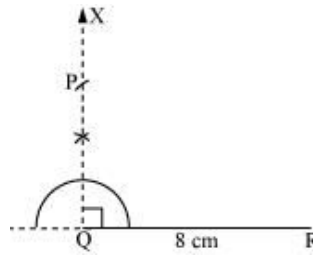
- (i) Since, QR is taken to be the base of the triangle, draw a line segment QR of length 8 cm.



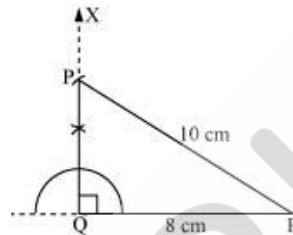
- (ii) At point Q, construct a ray QX such that it makes an angle of 90° with QR.



- (iii) With R as the center, cut an arc of 10 cm radius such that it intersects QX and call this point P.



- (iv) Upon joining P and R, we obtain the required triangle PQR.



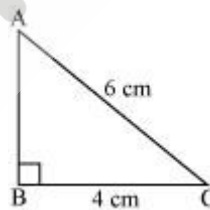
Hence, PQR is the required triangle.

2. Construct a right-angled triangle whose hypotenuse is 6 cm long and one of the legs is 4 cm long.

Solution:

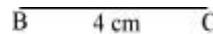
Let us assume one of the legs of the required triangle that is given to be 4 cm long as the base of the triangle.

The rough sketch is as shown below:

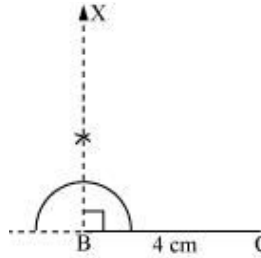


The following are the steps of construction:

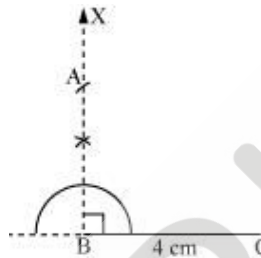
- (i) Draw a line segment $BC = 4\text{ cm}$. This will be the base of the triangle.



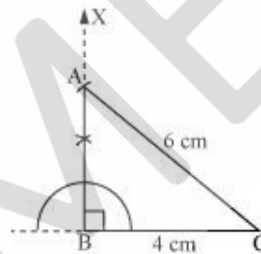
- (ii) Construct a ray BX such that it makes an angle of 90° with the base BC.



- (iii) Since, the hypotenuse measures 6 cm, with C as the center construct an arc of radius 6 cm such that it intersects the ray BX. The point of intersection is named as A.



- (iv) Upon joining A and C, we obtain the required triangle ABC.



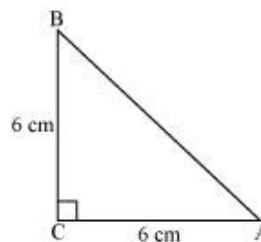
Hence, ABC is the required triangle.

3. Construct an isosceles right-angled triangle ABC, where, $m\angle ACB = 90^\circ$ and $AC = 6$ cm.

Solution:

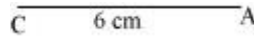
In an isosceles triangle, the measures of two sides are equal. Therefore in an isosceles right triangle, the sides apart from hypotenuse, measure the same.

The rough sketch of the required triangle is as shown:

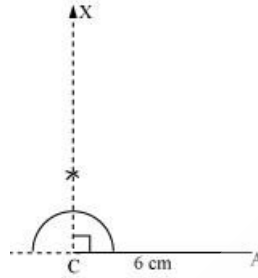


The following are the steps of construction:

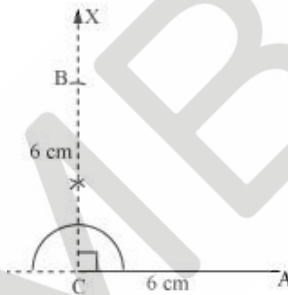
- (i) Considering AC to be the base of the triangle, draw a line segment AC of 6 cm.



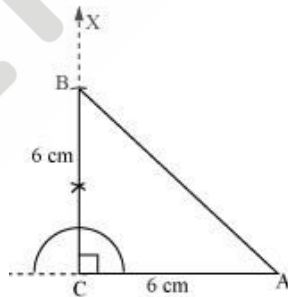
- (ii) Since, the triangle is right angled at C, construct a ray CX such that it makes an angle of 90° with AC.



- (iii) With C as the center, construct an arc of 6 cm such that it intersects the ray and call this point of intersection as B.



- (iv) Upon joining B and A, we obtain the required triangle ABC.



Hence, ABC is the required triangle.

