

Exercise

Question 1.

Given below are the angles x and y .



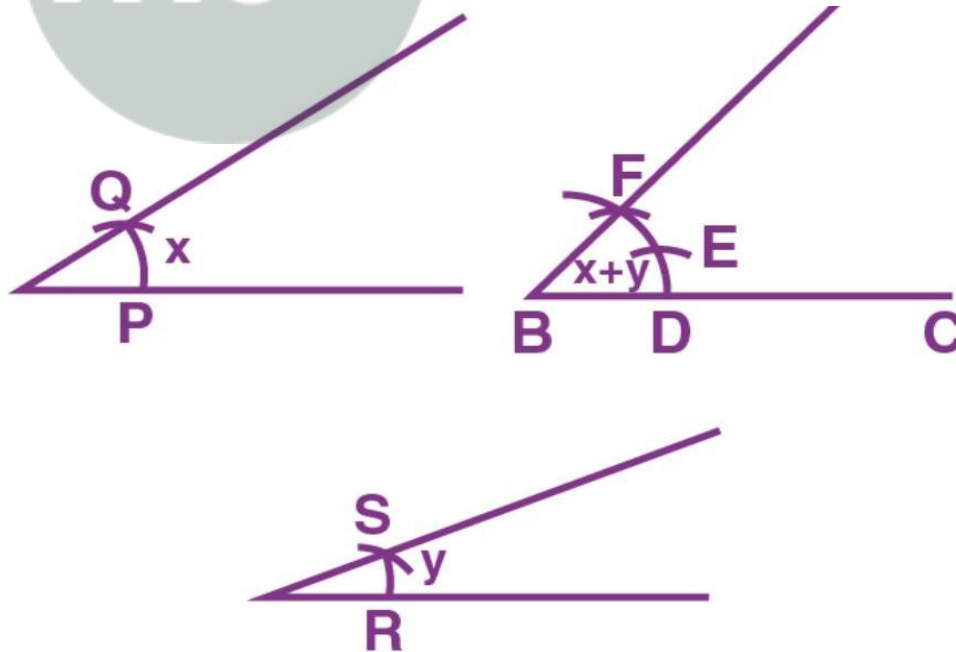
Without measuring these angles, construct:

(i) $\angle ABC = x + y$

(ii) $\angle ABC = 2x + y$

(iii) $\angle ABC = x + 2y$

Solution:-



(i) Steps of Construction:

1. Construct a line segment BC of any suitable length.

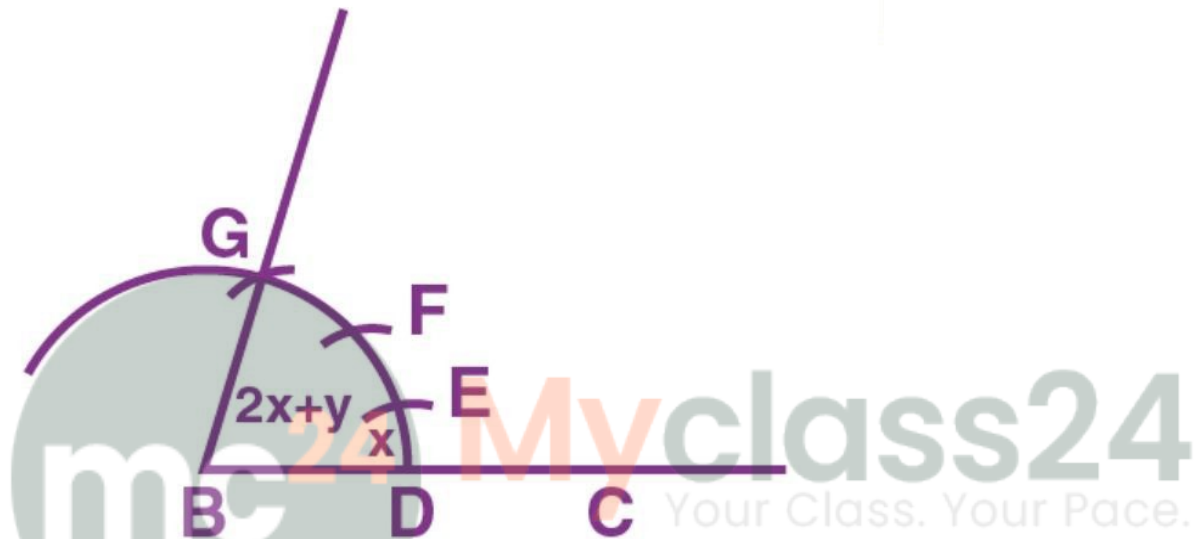
2. Taking B as centre, construct an arc of any suitable radius. With the same radius, construct arcs with the vertices of given angles as centers. Consider these arcs to cut arc x at points P and Q and arms of angle y at points R and S.

3. From the arc, with B as centre, cut $DE = PQ$ arc of x and $EF = RS$ arc of y

4 Now join BF and produce up to point A.

Therefore, $\angle ABC = x + y$

(ii) Steps of Construction:



Continue the same steps as in part (i)

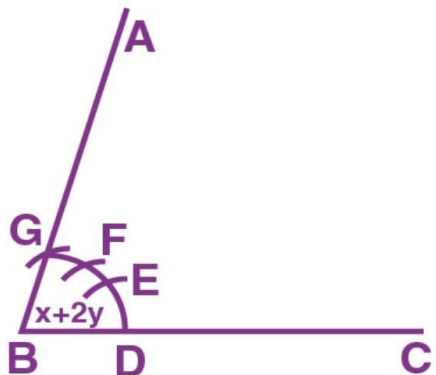
(i) Consider $DE = PQ =$ arc of x.

$EF = RS =$ arc of x and $FG = RS =$ arc of y

Now join BG and produce it up to A.

Therefore, $\angle ABC = x + x + y = 2x + y$

(iii) Steps of Construction:



Continue the same steps as in (ii)

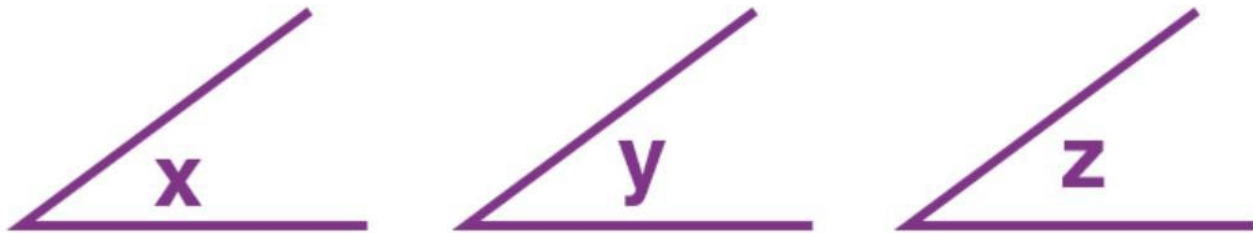
Consider $DE = PQ = \text{arc of } x$. and $EF = RS = \text{arc of } y$ and $FG = RS = \text{arc of } y$.

Now join BF and produce up to point A .

Thus $\angle ABC = x + y + y = x + 2y$

Question 2.

Given below are the angles x, y and z .



Without measuring these angles construct:

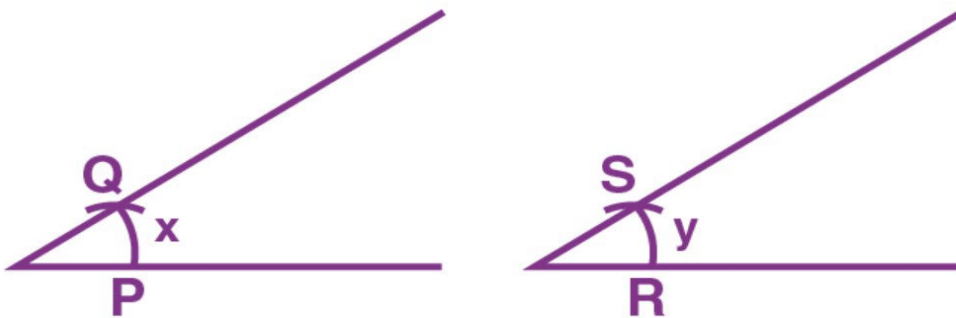
(i) $\angle ABC = x + y + z$

(ii) $\angle ABC = 2x + y + z$

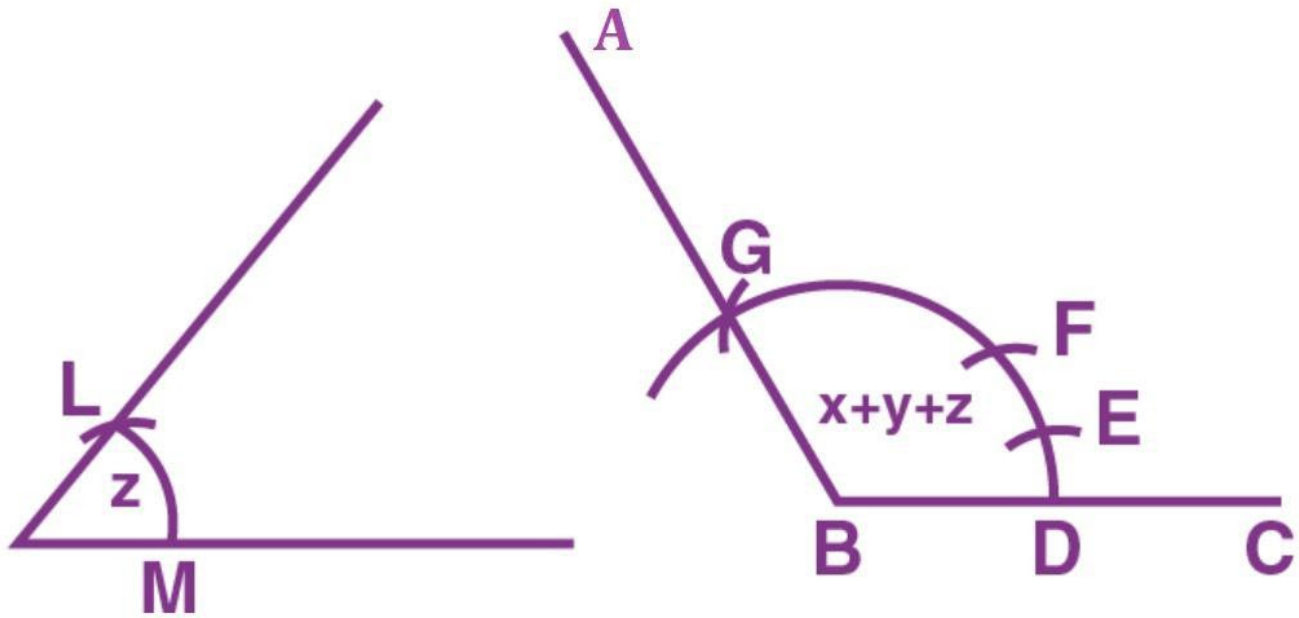
(iii) $\angle ABC = x + 2y + z$

Solution:-

(ii) Steps of Construction:



1. Construct line segment BC of any suitable length.



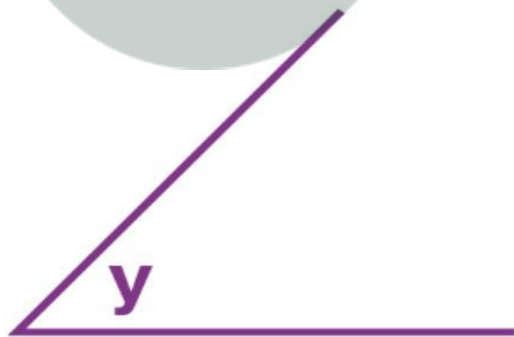
2. Taking B as centre, construct an arc of any suitable radius. With the same radius, construct arcs with the vertices of given angles as centers. Let these arcs cut arms of the angle x at the points P and Q and arms of the angle y at points R and S and arms of the angle z at the points L and M.

3. From the arc, with B as centre, cut $DE = PQ =$ arc of x , $EF = RS =$ arc of y and $FG = LM =$ arc of z

4. Now join BG and produce it up to A.

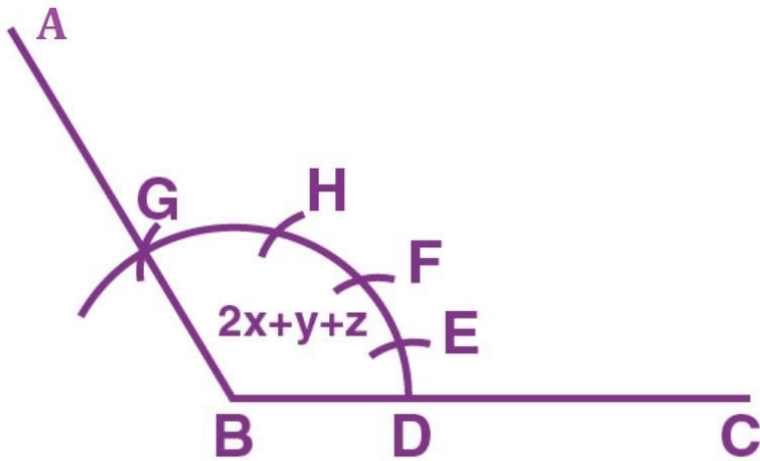
Therefore, $\angle ABC = x + y + z$

(ii) $\angle ABC = 2x + y + z$



(ii) Repeat as in part (i) up to step 2.

From the arc, with B as centre, cut



$DE = 2PQ = 2$ arc of x

$EF = RS =$ arc of y

$FG = \angle M =$ arc of z

Now join BG and produce it up to point A

Therefore, $\angle ABC = 2x + y + z$

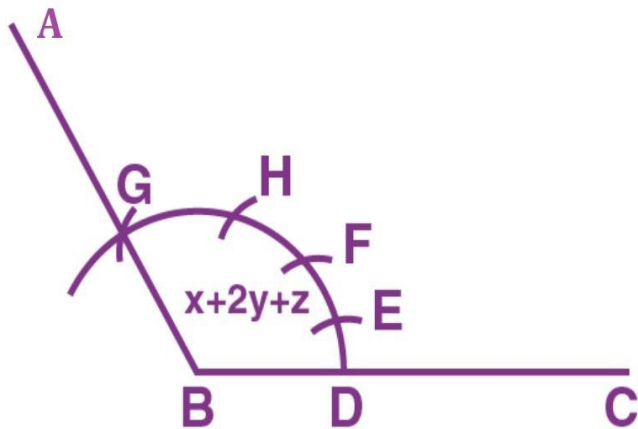
(iii) $\angle ABC = x + 2y + z$

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(iii) Repeat as in (i) up to step 2



Cut arc $DE = \text{arc } PQ = \text{arc of } x$ arc $EF = 2\text{arc } RS = 2\text{ARC OF } Y$ arc $FG = \text{arc } LM = \text{arc of } Z$.

Now join BG and produce it up to A

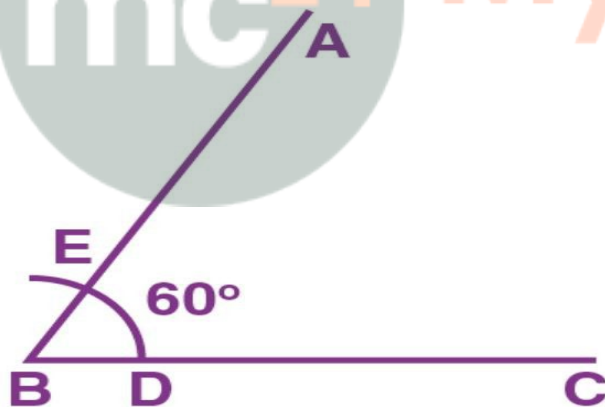
Therefore, $\angle ABC = x + 2y + z$

Question 3.

Draw a line segment $BC = 4\text{cm}$. Construct angle $ABC = 60^\circ$.

Solution:-

Steps of Construction:



1. Construct a line segment $BC = 4\text{cm}$

2 Taking B as centre, construct an arc of any suitable radius which cuts BC at the point D .

3. Taking D as centre, and the same radius as in step 2, construct one more arc which cuts the previous arc at point E .

4. Now join BE and produce it to the point A .

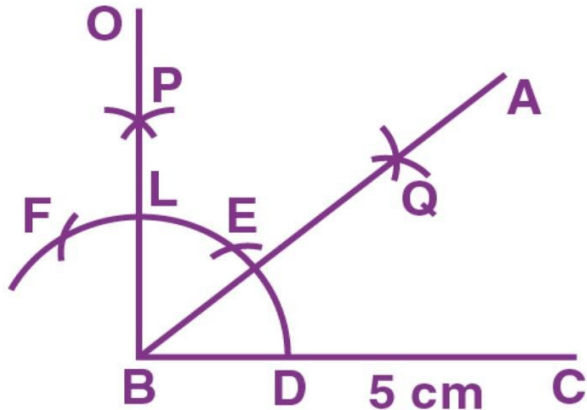
Therefore, $\angle ABC = 60^\circ$

Question 4.

Construct angle $ABC = 45^\circ$ in which $BC = 5\text{cm}$ and $AB = 4.6\text{cm}$.

Solution:-

Steps of Construction:



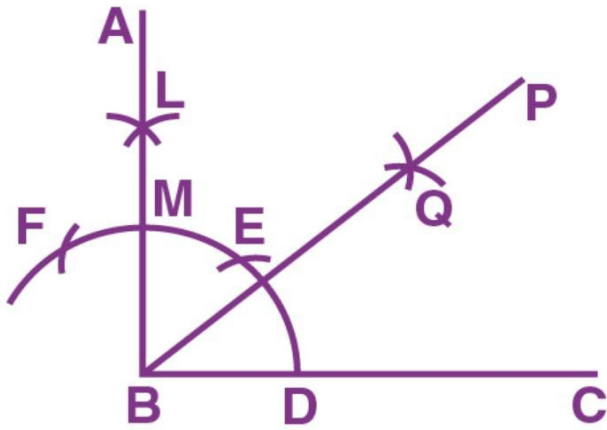
1. Construct a line segment $BC = 5\text{cm}$
 2. With centre B, construct an arc of any suitable radius, which cuts BC at the point D.
 3. Taking D as centre and the same radius, as taken in step 2, construct an arc which cuts the previous arc at point E.
 4. Taking E as centre and the same radius, construct one more arc which cuts the first arc at point F.
 5. Taking E and F as centers and radii equal to more than half the distance between E and F, construct arc which cut each other at point P.
 6. Now join BP to meet EF at L and produce to point O. Then $\angle OBC = 90^\circ$
 7. Construct BA, the bisector of angle OBC. [With D, L as centers and suitable radius construct two arcs meeting each other at Q produced to R]
- $\Rightarrow \angle ABC = 45^\circ$ [\because BA is bisector of $\angle OBC \therefore \angle ABC = 45^\circ$]
8. From BR cut arc AB = 4.6 cm

Question 5.

Construct angle $ABC = 90^\circ$. Draw BP, the bisector of angle ABC. State the measure of angle PBC.

Solution:-

1. Construct $\angle ABC = 90^\circ$ (as in Ques. 4)



2. Construct bisector of $\angle ABC$

$$\text{Then } \angle PBC = \frac{1}{2}(90^\circ) = 45^\circ$$

Question 6.

6. Draw angle ABC of any suitable measure.

(i) Draw BP, the bisector of angle ABC.

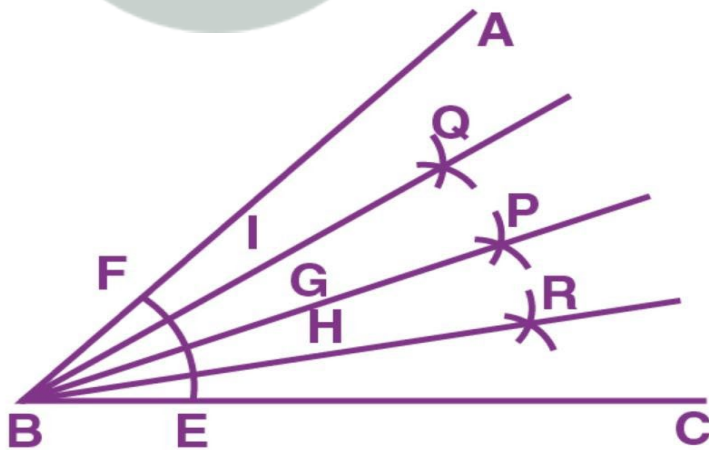
(ii) Draw BR, the bisector of angle PBC and draw BQ, the bisector of angle ABP.

(iii) Are the angles ABQ, QBP, PBR and RBC equal?

(iv) Are the angles ABR and QBC equal?

Solution:

Steps of Construction:



1. Draw any angle ABC

2. Taking B as centre, construct an arc EF meeting BC at E and AB at F.

3. Taking E, F as centers construct two arc of equal radii meeting each other at the point P

4. Now join BP. Then BP is the bisector of $\angle ABC = \angle ABP = \angle PBC = \frac{1}{2} \angle ABC$

5. In the same way draw BR, the bisector of $\angle PBC$ and draw BQ as the bisector of $\angle ABP$ [With the same method as in steps 2,3]

6. Then $\angle ABQ = \angle QBP = \angle PBR = \angle RBO$

7. $\angle ABR = \frac{3}{4} \angle ABC$ and $\angle QBC = \frac{3}{4} \angle ABC = \angle ABR = \angle OBC$

Question 7.

Draw a line segment AB of length 5.3 cm. using two different methods bisect AB.

Solution:-

Steps of Construction:

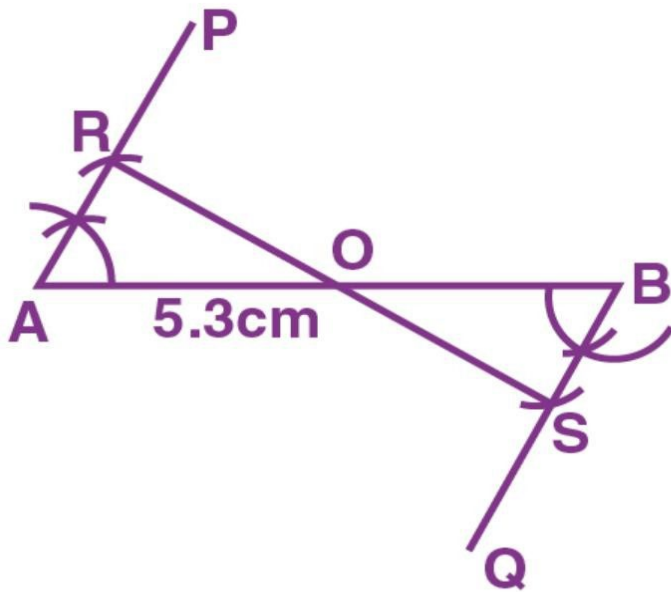


1. Construct a line segment $AB = 5.3\text{cm}$
2. Taking A as centre and radius equal to more than half of AB, construct arcs on both sides of AB.
3. Taking B as centre and with the same radius as taken in step 2, construct arcs on both the sides of AB.
4. Let the arcs intersect each other at points P and Q.
5. Now join P and Q.
6. The line PQ cuts the given line segment AB at the point O.

Therefore, PQ is a bisector of AB such that

$$OA = OB = \frac{1}{2} AB$$

Second Method



Steps of Construction:

1. Construct the given line segment $AB = 5.3$ cm.
2. At the point A, draw $\angle PAB$ of any suitable measure. Then $\angle PAB = 60^\circ$ construct $\angle QBA = 60^\circ$
3. From AP, cut AR of any suitable length and from BQ; cut $BS = AR$.
4. Now join R and S
5. Let RS cut the given line segment AB at the point O.

Therefore, RS is a bisector of AB such that

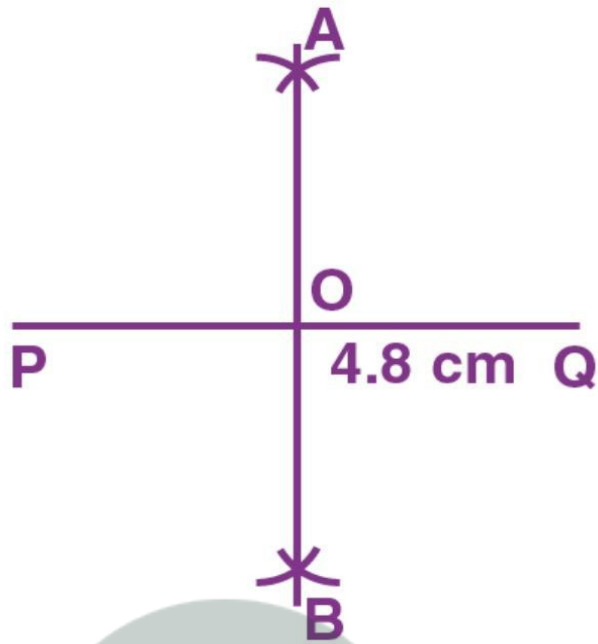
$$OA = OB = \frac{1}{2}AB$$

Solution:-

Steps of Construction:

Question 8.

Draw a line segment $PQ = 4.8$ cm. Construct the perpendicular bisector of PQ.



1. Construct a line segment $PQ = 4.8\text{cm}$.
2. Taking P as centre and radius equal than half of PQ, construct arc on both the PQ.
3. Taking Q as centre and the same radius as taken in step 2, construct arcs on both sides of PQ.
4. Let the arcs intersect each other at point A and B
5. Now join A and B.
6. The line AB cuts the line segment PQ at the point O. Here $OP = OQ$ and $\angle AOQ = 90^\circ$ Then the line AB is perpendicular bisector of PQ.

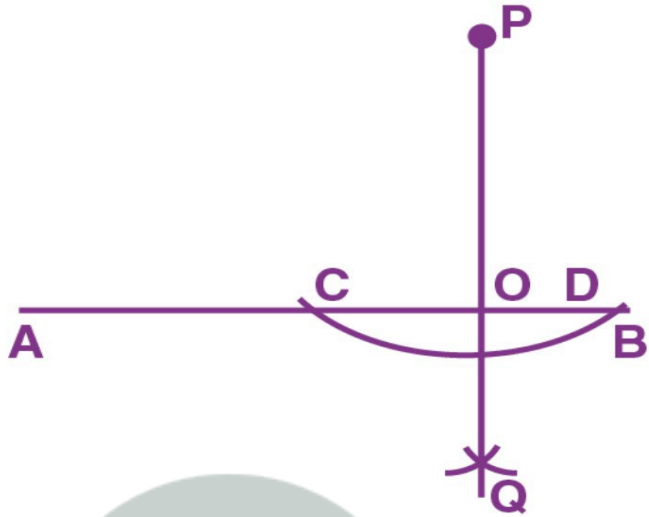
Question 9.

In each of the following, draw perpendicular through point P to the line segment AB.



Solution:-

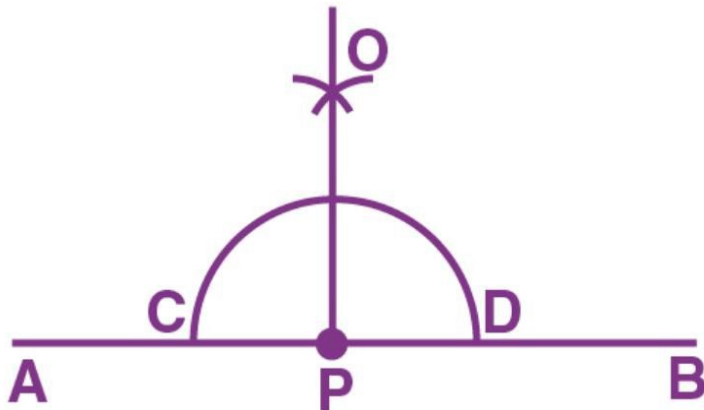
(i) Steps of Construction:



1. Taking P as centre, construct an arc of a suitable radius which cuts AB at points C and D
2. Taking C and D as centers, construct arcs of equal radii and let these arcs intersect each other at the point O [The radius of these arcs must be more than half of CD and both the arcs must be drawn on the other side]
3. Now join P and Q
4. Let PQ cut AB at the point O.

Therefore, OP is the required perpendicular clearly, $\angle AOP = \angle BOP = 90^\circ$

(ii) Steps of Construction:

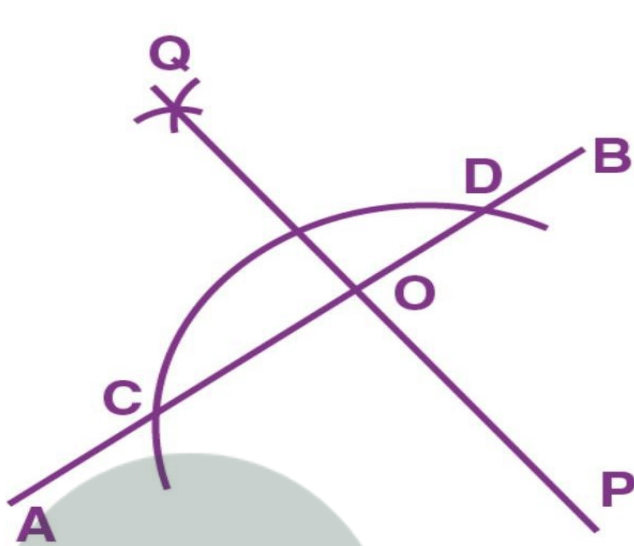


1. Taking P as centre, construct an arc of any suitable radius which cuts AB at points C and D.
2. Taking C and D as centers, construct arcs of equal radii which intersect each other at point A.

[This radius must be more than half of CD and let these arc intersect each other at the point O]
3. Now join P and O. Then OP is the required perpendicular.

$$\angle OPA = \angle OPB = 90^\circ$$

(iii) Steps of Construction:



1. Taking P as centre, construct an arc of any suitable radius which cuts AB at points C and D
2. Taking C and D as centre, construct arcs of equal radii

[The radius of these arcs must be more than half of CD and both the arcs must be drawn on the other side.]
And let these arcs intersect each other at the point Q.

3. Now join Q and P. Let QP cut AB at the point O. Then OP is the required perpendicular.

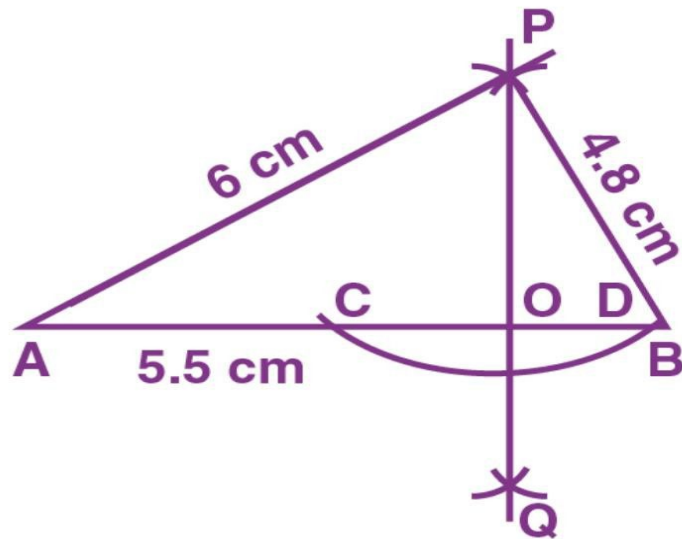
Clearly, $\angle AOP = \angle BOP = 90^\circ$

Question 10:

Draw a line segment AB=5.5 cm. Mark a point P, such that PA=6 cm and PB=4.8 cm. From the point P draw perpendicular to AB.

Solution:-

Step of Construction:



1. Construct a line segment $AB=5.5$ cm
2. Taking A as centre and radius $=6$ cm construct an arc.
3. Taking B as centre and radius $=4.8$ cm construct another arc.
4. Let these arcs meet each other at the point P. $PA=6$ cm, $PB=4.8$
5. Take P as centre and some suitable radius construct an arc meeting AB at the points C and D.
6. Take C as centre and radius more than half of CD construct an arc.
7. Take D as center and same radius as in step 6, construct an arc.
8. Let these arcs meet each other at the point Q.
9. Now join PQ.
10. The PQ meet AB at point O.

Then $PO \perp AB$ i.e; $\angle AOP = 90^\circ = \angle POB$

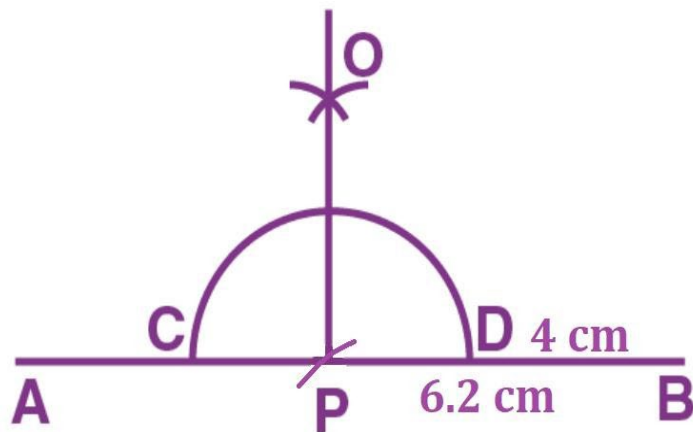
Question 11.

Draw a line segment $AB=6.2$ cm. Mark a point P in AB such that $BP=4$ cm. Through point P draw perpendicular to AB.

Solution:

Steps of Construction:

1. Construct a line segment $AB=6.2$ cm
2. Cut off $BP=4$ cm
3. Take P as centre and some radius construct arc meeting AB at the points C, D.
4. Take C, D as centers and equal radii [each is more than half of CD] construct two arcs, meeting each other at the point O.
5. Now join OP. Then OP is perpendicular for AB.

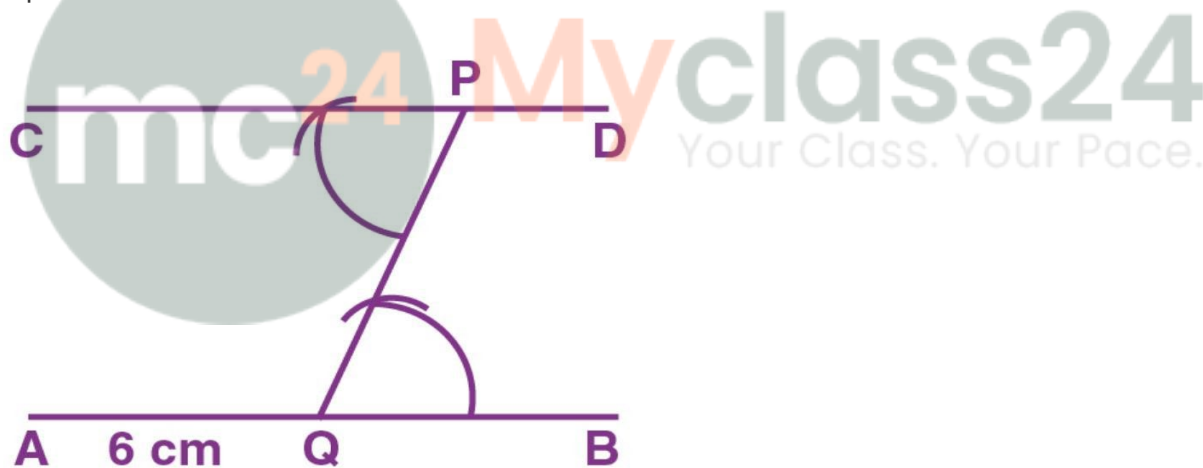


Question 12.

Draw a line $AB=6\text{cm}$. Mark a point P anywhere outside the line AB . Through the point P , construct a line parallel to AB .

Solution:-

Steps of construction:



1. Construct a line $AB=6\text{cm}$
2. Take any point Q on the line AB and join it with the given point P .
3. At point P , draw $\angle CPQ = \angle PQB$
4. Produce CP up to any point D .

Therefore, CPD is the required parallel line.

Question 13.

Draw a line $MN=5.8\text{cm}$. Locate point A which is 4.5cm from M and 5cm from N . Through A draw a line parallel to line MN .

Solution:-

Steps of construction:

1. Construct a line $MN = 5.8\text{cm}$
2. Taking M as centre and radius $= 4.5\text{cm}$, construct an arc.



3. Taking N as centre draw another arc of radius 5cm . These arcs intersect each other at A .
4. Now join AM and AN .
5. At point A , construct $\angle DAN = \angle ANM$
6. Produce DA to any point C .

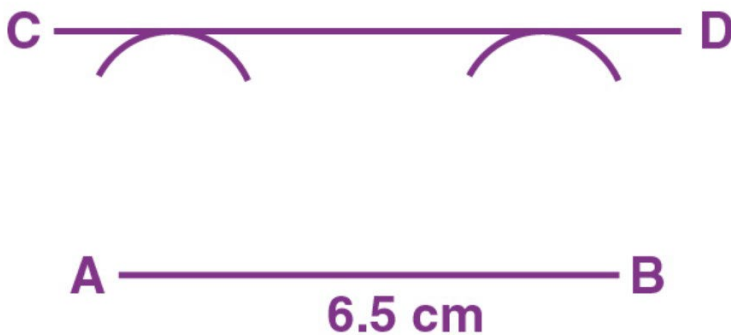
Therefore, CAD is the required parallel line.

Question 14.

Draw a straight line $AB = 6.5\text{cm}$. Draw another line which is parallel to AB at a distance of 2.8cm from it.

Solution:-

Steps of construction:



1. Construct a straight line $AB = 6.5\text{cm}$

2. With A as centre, construct an arc of radius 2.8cm.
3. With B as centre, construct another arc of radius 2.8cm.
4. Construct a line CD which touches the two arcs drawn.

Therefore, CD is the required parallel line.

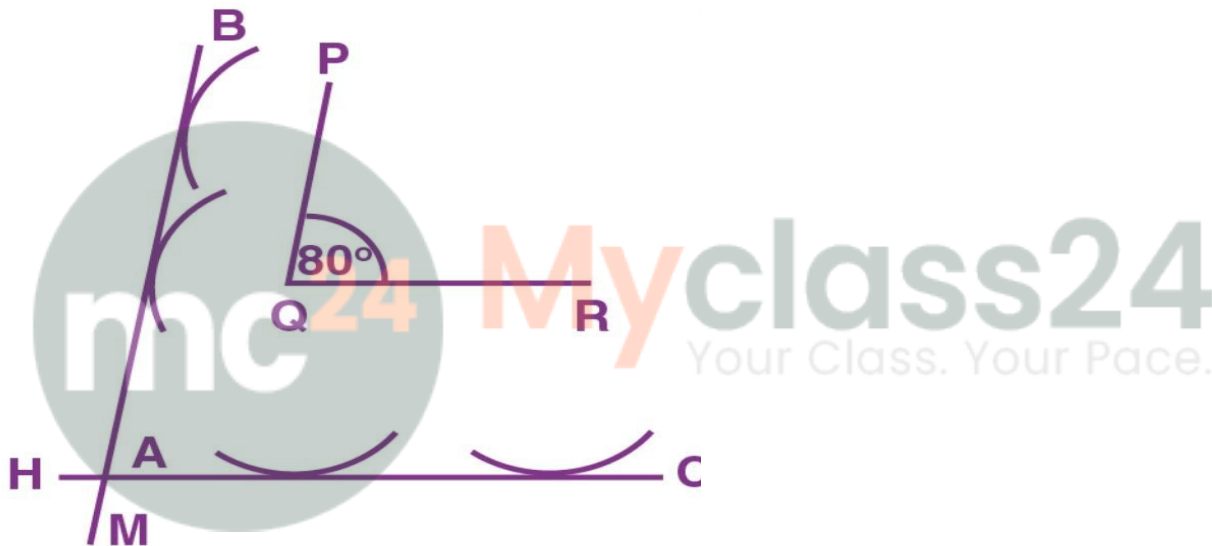
Question 15.

Construct an angle $\text{PQR}=80^\circ$. Draw a line parallel to PQ at a distance of 3cm from it and another line parallel to QR at a distance of 3.5cm from it. Mark the point of intersection of these parallel lines as A.

Solution:-

Steps of construction:

1. Construct $\angle\text{PQR}=80^\circ$



2. Taking P as center construct an arc of radius 2cm.
3. Again with Q as centre, construct another arc of radius 2cm. Then BM is a line which touches the two arcs. Then BM is a line parallel to PQ.
4. Taking Q as centre, construct an arc of radius 3.5cm. Taking R as centre construct another arc of radius 3.5cm. Construct a line HC which touches these two arcs. Let these two parallel lines intersect at A.