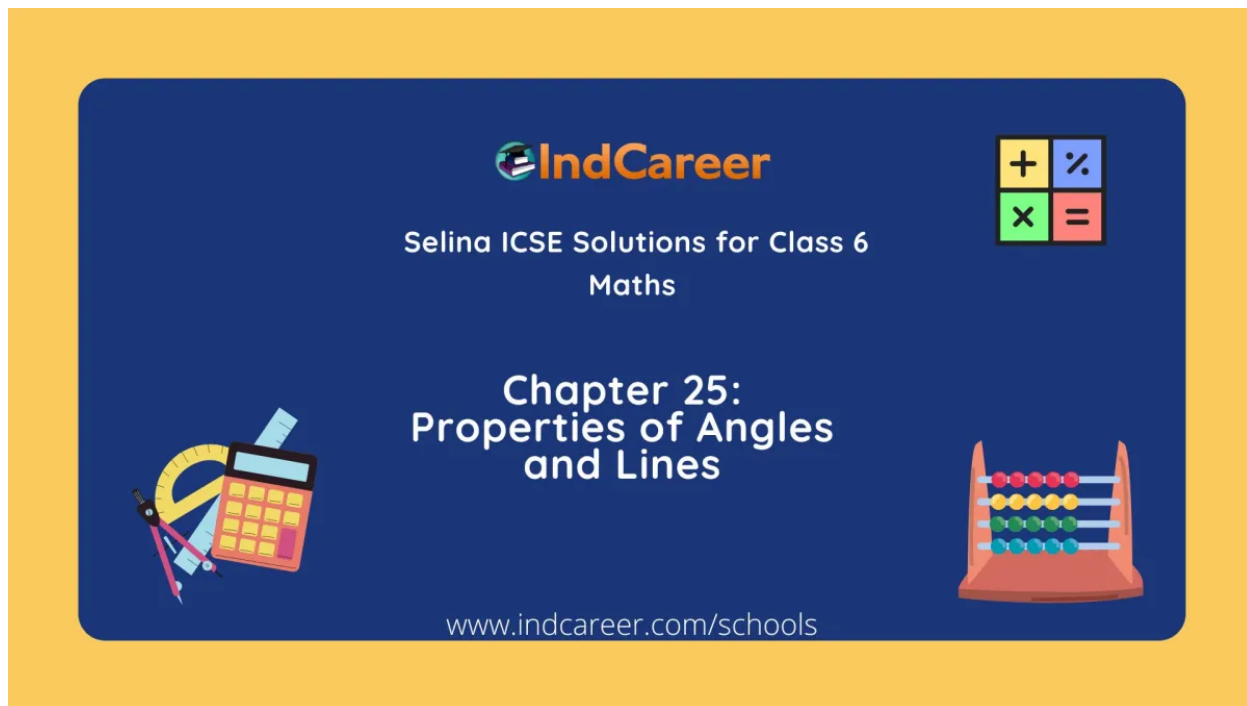


Selina Class 6 ICSE Solutions Mathematics : Chapter 25- Properties of Angles and Lines



For any clarifications or questions you can write to **info@indcareer.com**

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Selina Class 6 ICSE Solutions Mathematics :

Chapter 25- Properties of Angles and Lines

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Selina Class 6 ICSE Solutions Mathematics : Chapter 25- Properties of Angles and Lines

Selina 6th Maths Chapter 25, Class 6 Maths Chapter 25 solutions

Exercise 25(A)

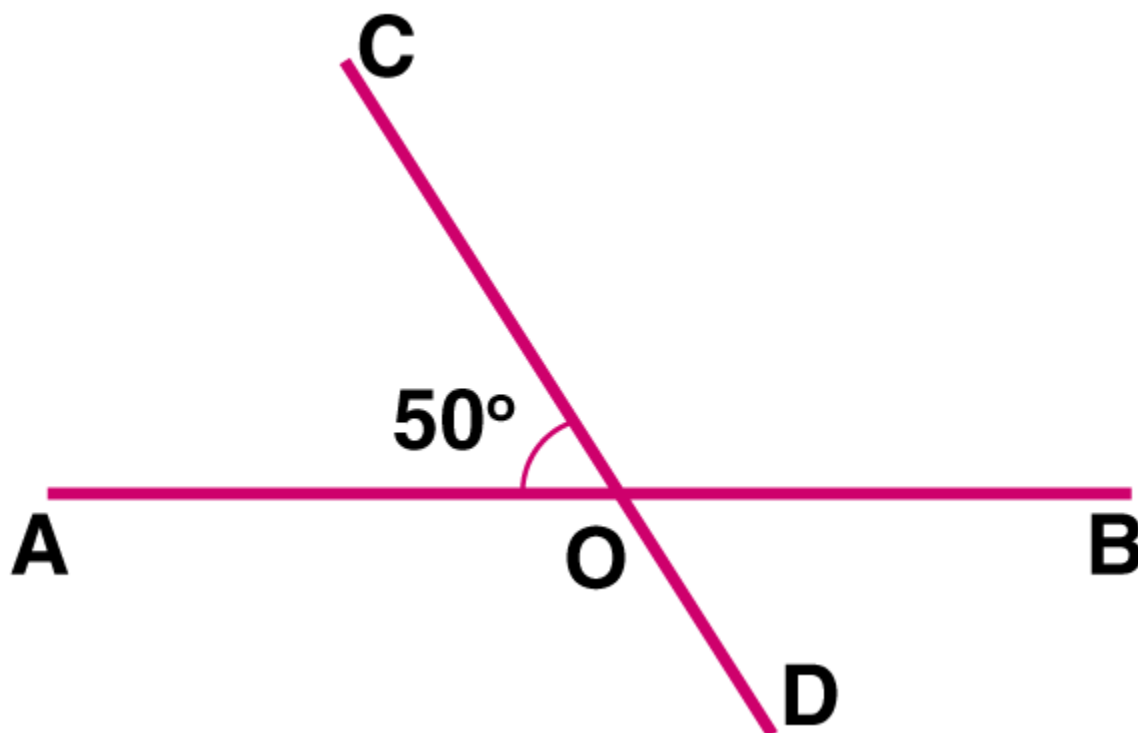
1. Two straight lines AB and CD intersect each other at a point O and angle $\text{AOC} = 50^\circ$; find:

(i) angle BOD

(ii) $\angle \text{AOD}$

(iii) $\angle \text{BOC}$

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Solution:

(i) $\angle BOD$

Given $\angle AOC = 50^\circ$

We know that,

Vertically opposite angles are equal

So, $\angle BOD = \angle AOC$

Therefore, $\angle BOD = 50^\circ$

(ii) $\angle AOD$

$\angle AOD + \angle BOD = 180^\circ$

$\angle AOD + 50^\circ = 180^\circ$ {From (i)}

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$$\angle AOD = 180^\circ - 50^\circ$$

We get,

$$\angle AOD = 130^\circ$$

(iii) $\angle BOC$

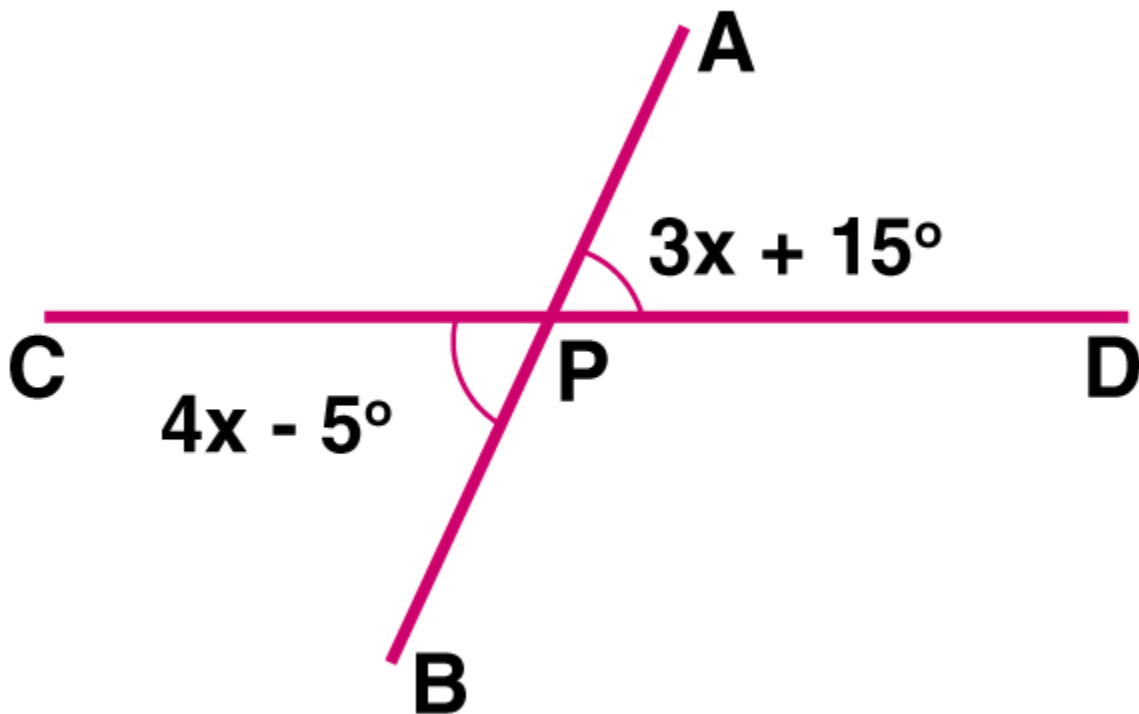
We know that,

Vertically opposite angles are equal

$$\text{So, } \angle BOC = \angle AOD$$

$$\text{Therefore, } \angle BOC = 130^\circ$$

2. The adjoining figure, shows two straight lines AB and CD intersecting at P. If $\angle BPC = 4x - 5^\circ$ and $\angle APD = 3x + 15^\circ$; find:



(i) the value of x

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(ii) $\angle APD$

(iii) $\angle BPD$

(iv) $\angle BPC$

Solution:

(i) The value of x is calculated as,

$$3x + 15^\circ = 4x - 5^\circ$$

$$3x - 4x = -5^\circ - 15^\circ$$

$$-x = -20^\circ$$

$$x = 20^\circ$$

(ii) the value of $\angle APD$ is calculated as,

$$\angle APD = 3x + 15^\circ$$

$$= 3 \times 20^\circ + 15^\circ$$

We get,

$$= 60^\circ + 15^\circ$$

$$= 75^\circ$$

(iii) The value of $\angle BPD$ is calculated as,

$$\angle BPD = 180 - \angle BPC$$

$$= 180^\circ - (4x - 5^\circ)$$

$$= 180^\circ - (4 \times 20^\circ - 5^\circ)$$

$$= 180^\circ - 80^\circ + 5^\circ$$

We get,

$$= 105^\circ$$

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(iv) The value of $\angle BPC$ is calculated as,

$$\angle BPC = (4x - 5^\circ)$$

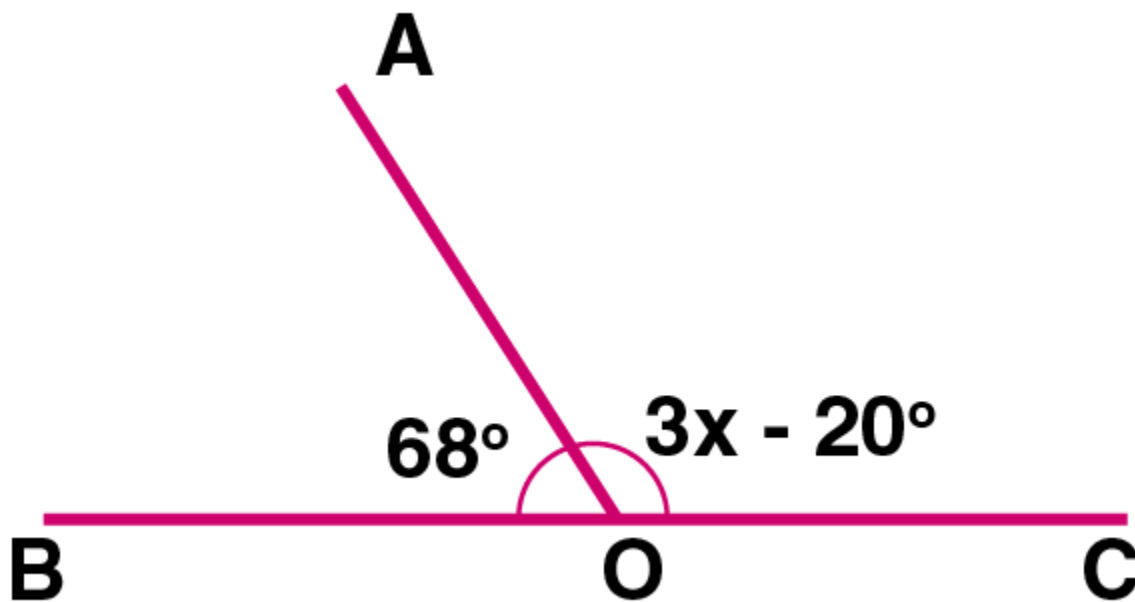
$$= (4 \times 20^\circ - 5^\circ)$$

We get,

$$= 80^\circ - 5^\circ$$

$$= 75^\circ$$

3. The given diagram, shows two adjacent angles AOB and AOC, whose exterior sides are along the same straight line. Find the value of x.



Solution:

Here, the exterior arms of the adjacent angles are in a straight line,

Hence, the adjacent angles are supplementary

$$\angle AOB + \angle AOC = 180^\circ$$

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$$68^\circ + (3x - 20^\circ) = 180^\circ$$

$$68^\circ + 3x - 20^\circ = 180^\circ$$

$$3x = 180^\circ + 20^\circ - 68^\circ$$

$$3x = 200^\circ - 68^\circ$$

We get,

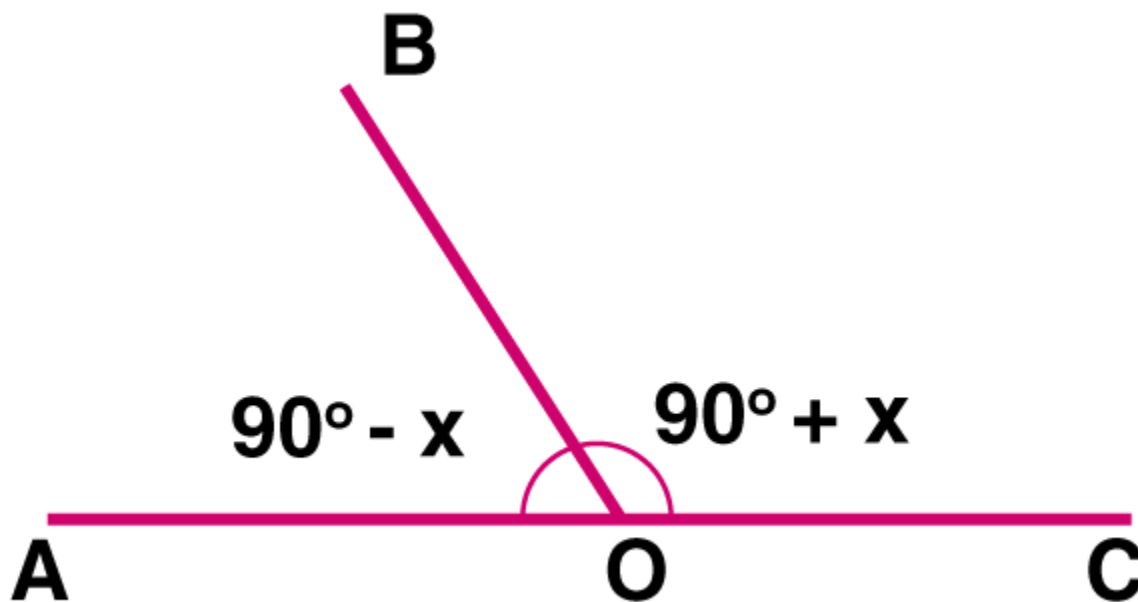
$$3x = 132^\circ$$

$$x = 132^\circ / 3$$

$$x = 44^\circ$$

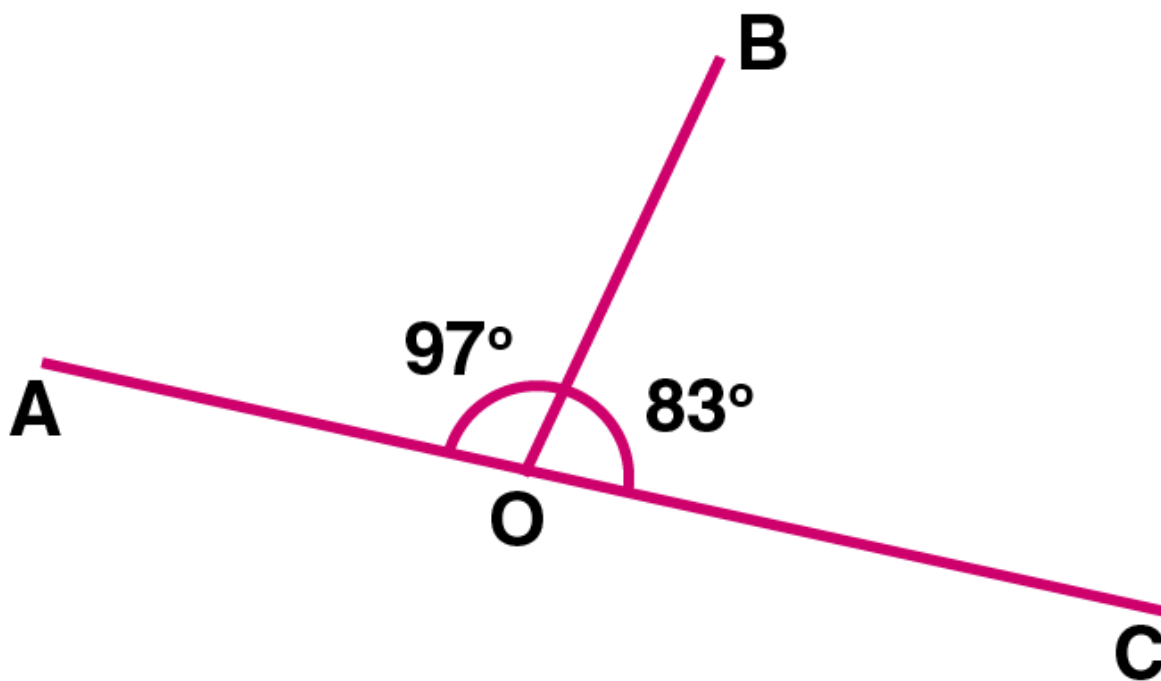
4. Each figure given below shows a pair of adjacent angles AOB and BOC. Find whether or not the exterior arms OA and OC are in the same straight line.

(i)

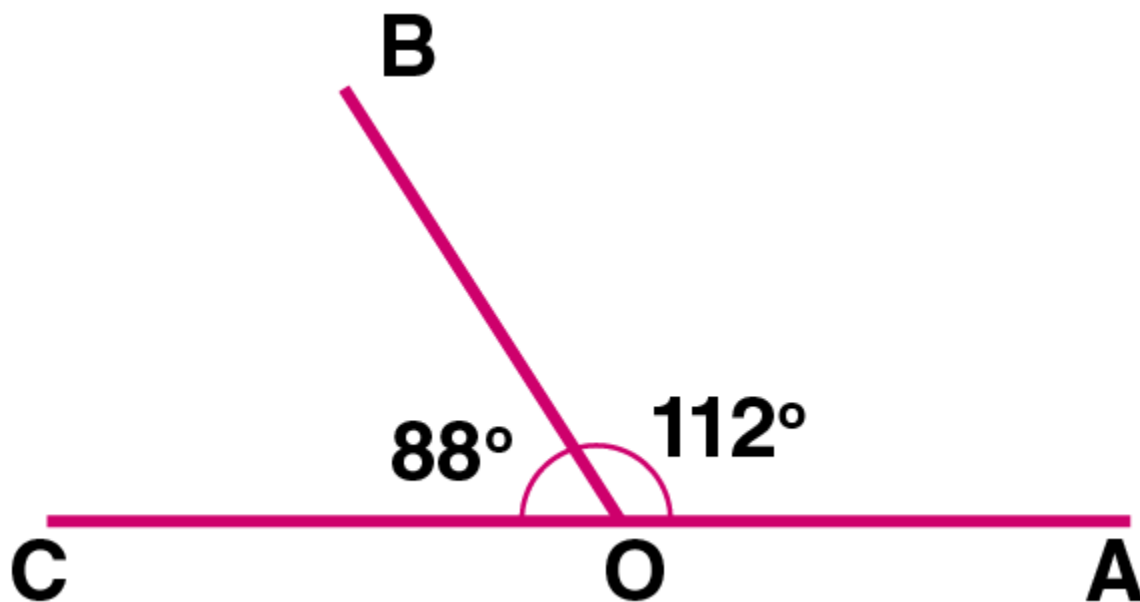


(ii)

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(iii)



Solution:

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(i) We know that,

The sum of adjacent angles AOB and COB = 180°

Hence,

$$\angle AOB + \angle COB = 180^\circ$$

$$(90^\circ - x) + (90^\circ + x) = 180^\circ$$

$$90^\circ - x + 90^\circ + x = 180^\circ$$

We get,

$$180^\circ = 180^\circ$$

The exterior arms OA and OC are in the same straight line

$$(ii) \angle AOB + \angle BOC = 97^\circ + 83^\circ$$

$$= 180^\circ$$

The sum of adjacent angles AOB and BOC is 180°

Hence, the exterior arms OA and OC are in the same straight line

$$(iii) \angle COB + \angle AOB = 88^\circ + 112^\circ$$

We get,

$$= 200^\circ \text{ [which is not equal to } 180^\circ]$$

Hence, the exterior arms OA and OC are not in the same straight line

5. A line segment AP stands at point P of a straight line BC such that $\angle APB = 5x - 40^\circ$ and $\angle APC = x + 10^\circ$; find the value of x and angle APB.

Solution:

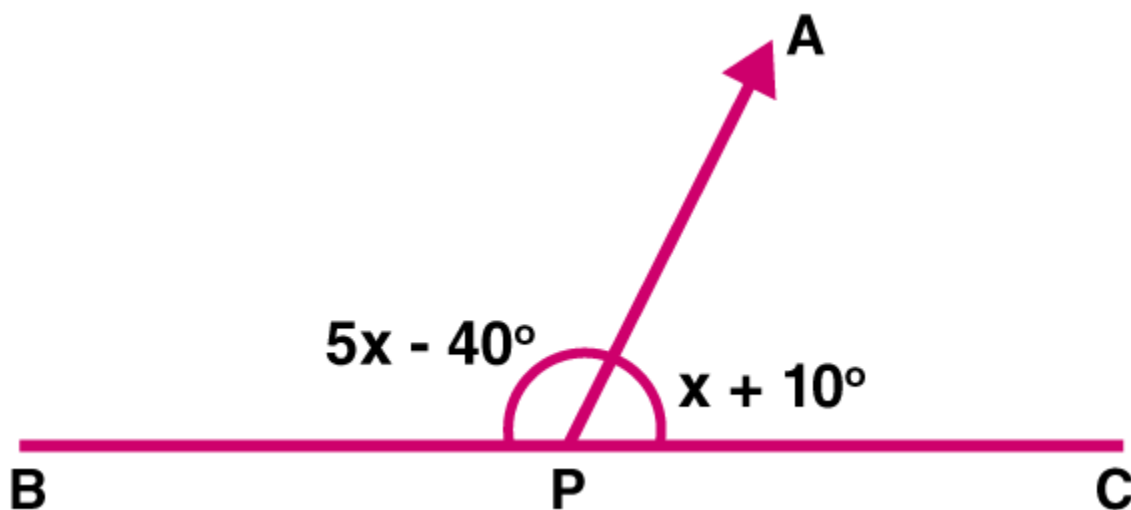
Given

A line segment AP stands at P and

$$\angle APB = 5x - 40^\circ$$

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$$\angle APC = x + 10^\circ$$



(i) BPC is a straight line

$$\angle APB + \angle APC = 180^\circ$$

$$5x - 40^\circ + x + 10^\circ = 180^\circ$$

$$6x - 30^\circ = 180^\circ$$

$$6x = 180^\circ + 30^\circ$$

We get,

$$6x = 210^\circ$$

$$x = 210^\circ / 6$$

$$x = 35^\circ$$

(ii) $\angle APB = 5x - 40^\circ$

$$= 5 \times 35^\circ - 40^\circ$$

We get,

$$= 175^\circ - 40^\circ$$

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$$= 135^{\circ}$$

Exercise 25(B)

1. Identify the pair of angles in each of the figure given below:

adjacent angles, vertically opposite angles, interior alternate angles, corresponding angles or exterior alternate angles.

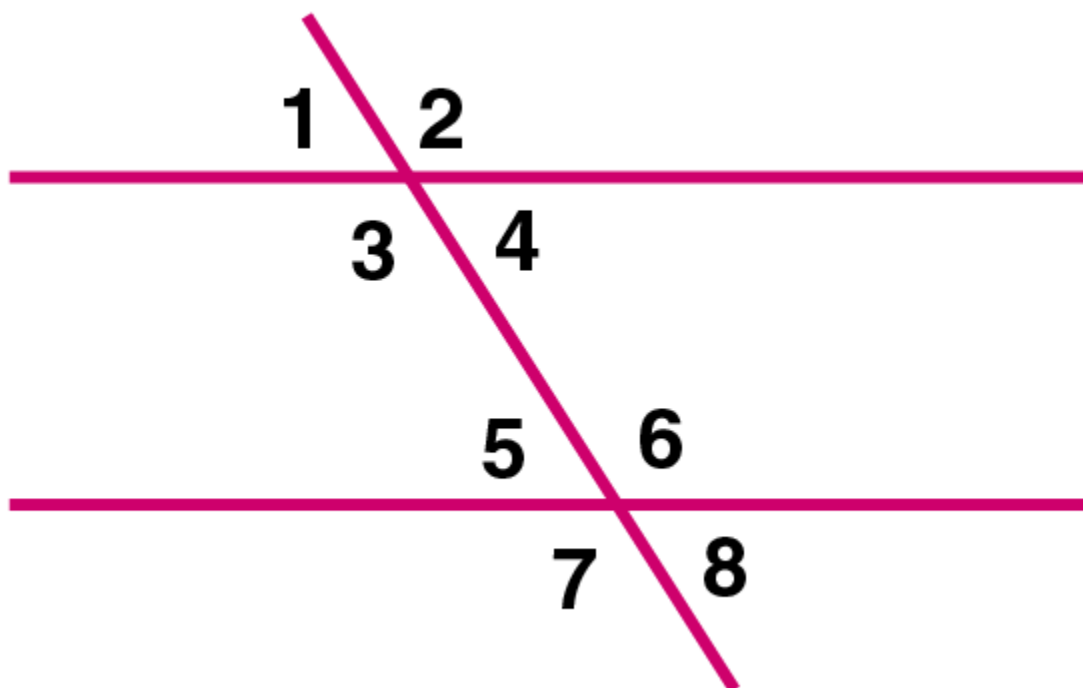
(a) (i) $\angle 2$ and $\angle 4$

(ii) $\angle 1$ and $\angle 8$

(iii) $\angle 4$ and $\angle 5$

(iv) $\angle 1$ and $\angle 5$

(v) $\angle 3$ and $\angle 5$



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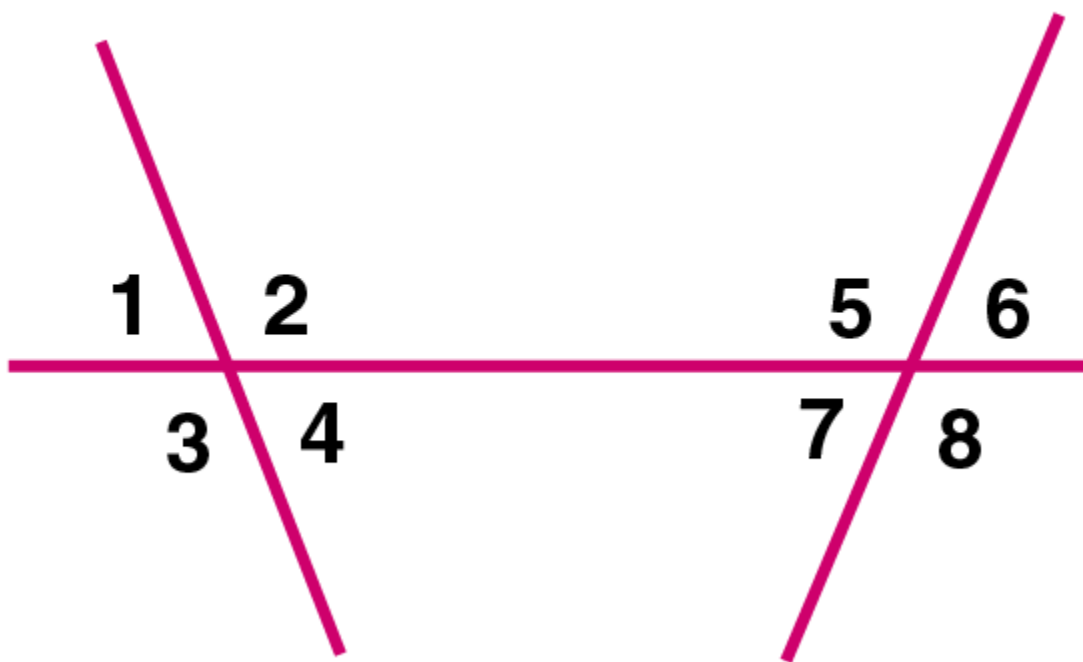
(b) (i) $\angle 2$ and $\angle 7$

(ii) $\angle 4$ and $\angle 8$

(iii) $\angle 1$ and $\angle 8$

(iv) $\angle 1$ and $\angle 5$

(v) $\angle 4$ and $\angle 7$



(c) (i) $\angle 1$ and $\angle 10$

(ii) $\angle 6$ and $\angle 12$

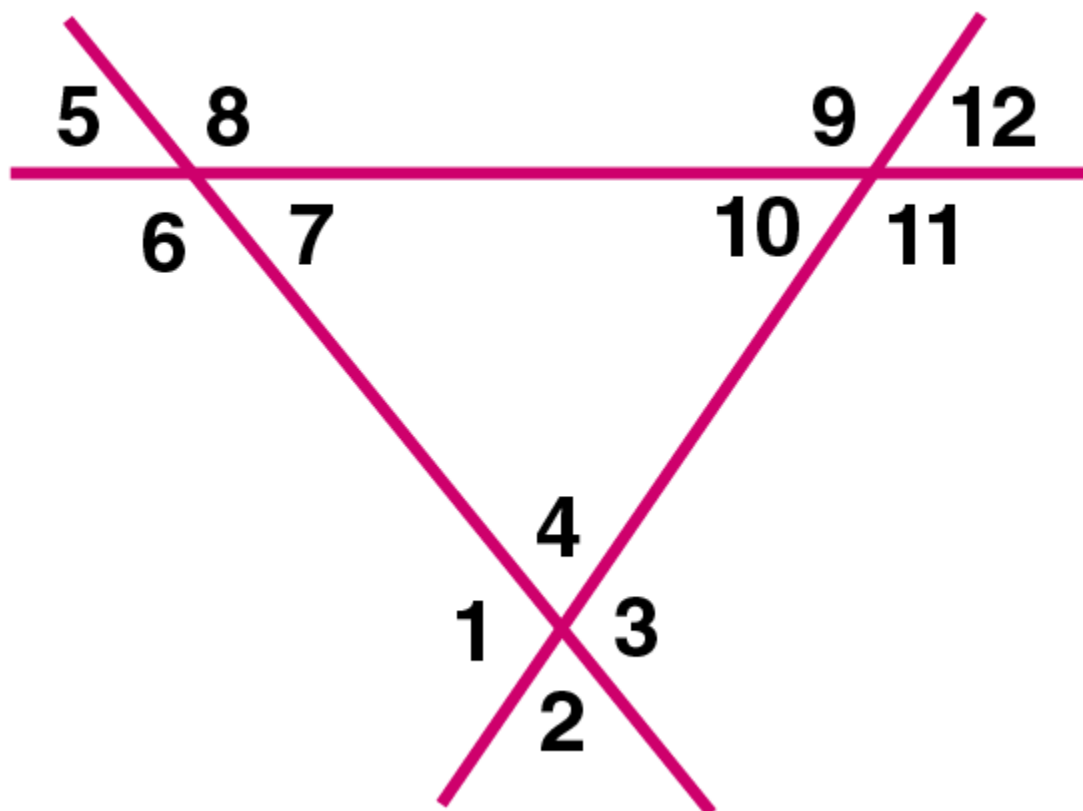
(iii) $\angle 8$ and $\angle 10$

(iv) $\angle 4$ and $\angle 11$

(v) $\angle 2$ and $\angle 8$

(vi) $\angle 5$ and $\angle 7$

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Solution:

- (a) (i) $\angle 2$ and $\angle 4$ = Adjacent angles
- (ii) $\angle 1$ and $\angle 8$ = Alternate exterior angles
- (iii) $\angle 4$ and $\angle 5$ = Alternate interior angles
- (iv) $\angle 1$ and $\angle 5$ = Corresponding angles
- (v) $\angle 3$ and $\angle 5$ = Allied angles
- (b) (i) $\angle 2$ and $\angle 7$ = Alternate interior angles
- (ii) $\angle 4$ and $\angle 8$ = Corresponding angles
- (iii) $\angle 1$ and $\angle 8$ = Alternate exterior angles

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(iv) $\angle 1$ and $\angle 5$ = Corresponding angles

(v) $\angle 4$ and $\angle 7$ = Allied angles

(c)(i) $\angle 1$ and $\angle 10$ = Corresponding angles

(ii) $\angle 6$ and $\angle 12$ = Alternate exterior angles

(iii) $\angle 8$ and $\angle 10$ = Alternate interior angles

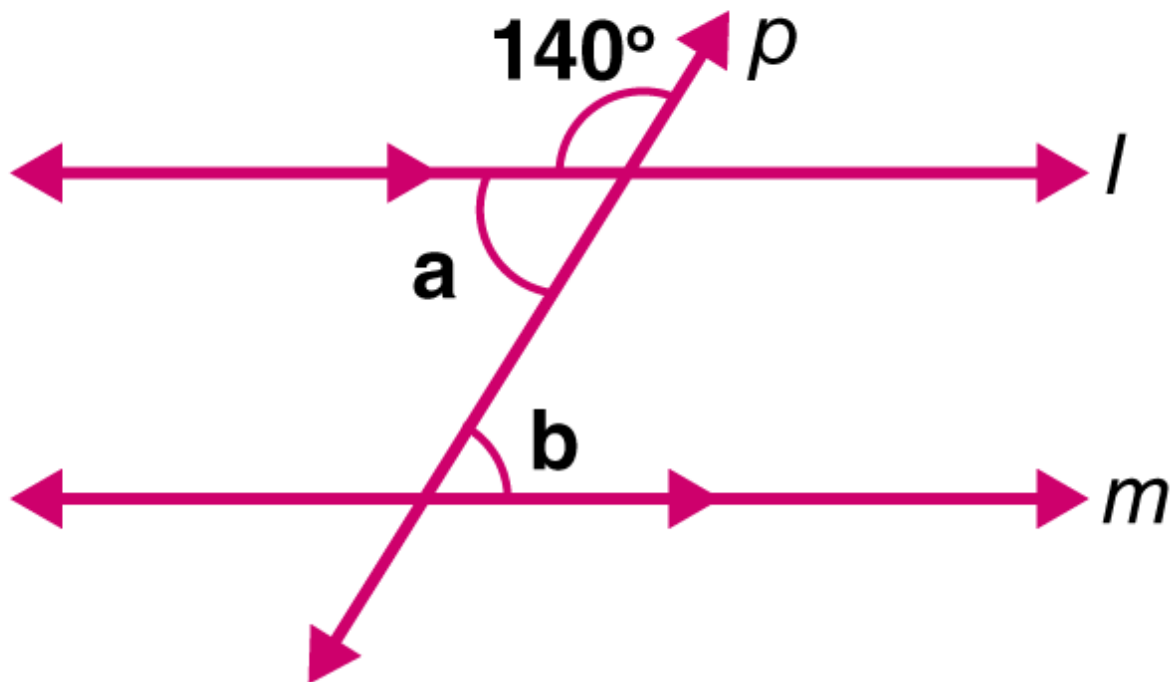
(iv) $\angle 4$ and $\angle 11$ = Alternate interior angles

(v) $\angle 2$ and $\angle 8$ = Alternate exterior angles

(vi) $\angle 5$ and $\angle 7$ = Vertically opposite angles

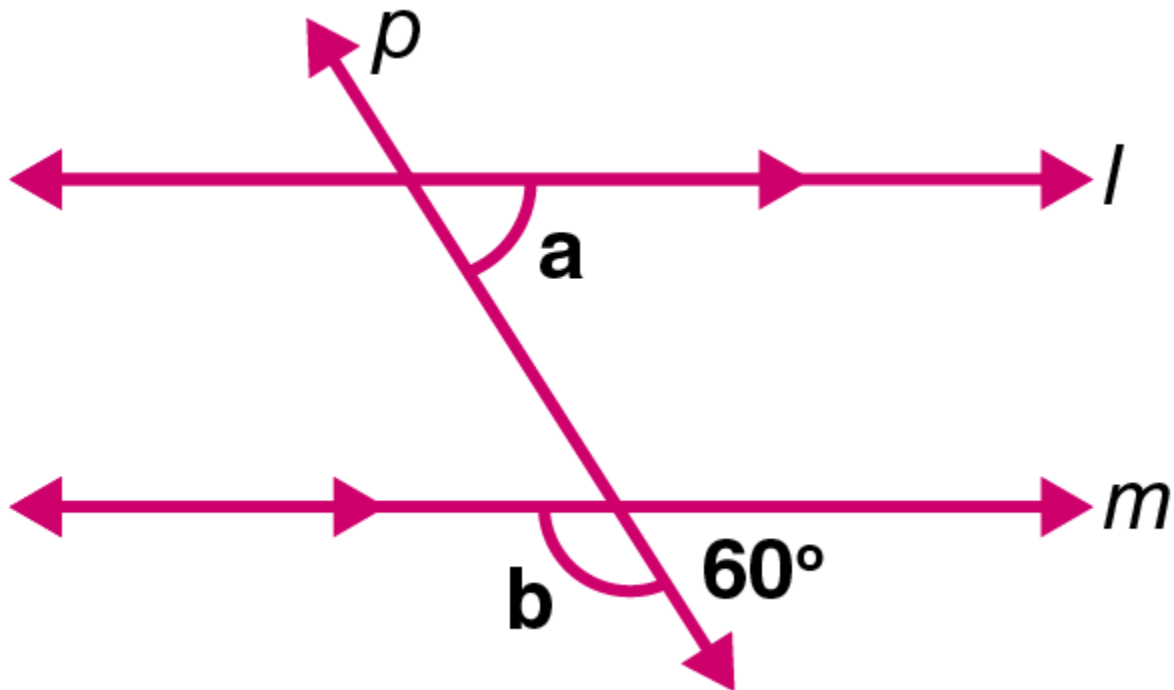
2. Each figure given below shows a pair of parallel lines cut by a transversal. For each case, find a and b , giving reasons.

(i)



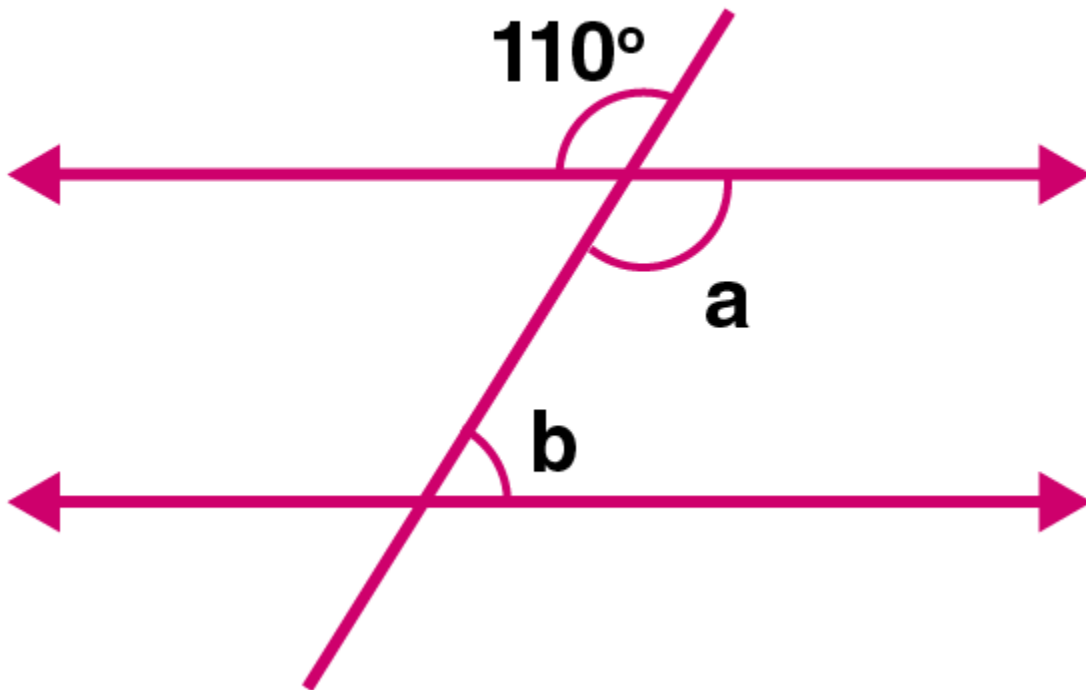
<https://www.indcareer.com/schools/selina-class-6-icse-solutions-mathematics-chapter-25-properties-of-angles-and-lines/>

(ii)

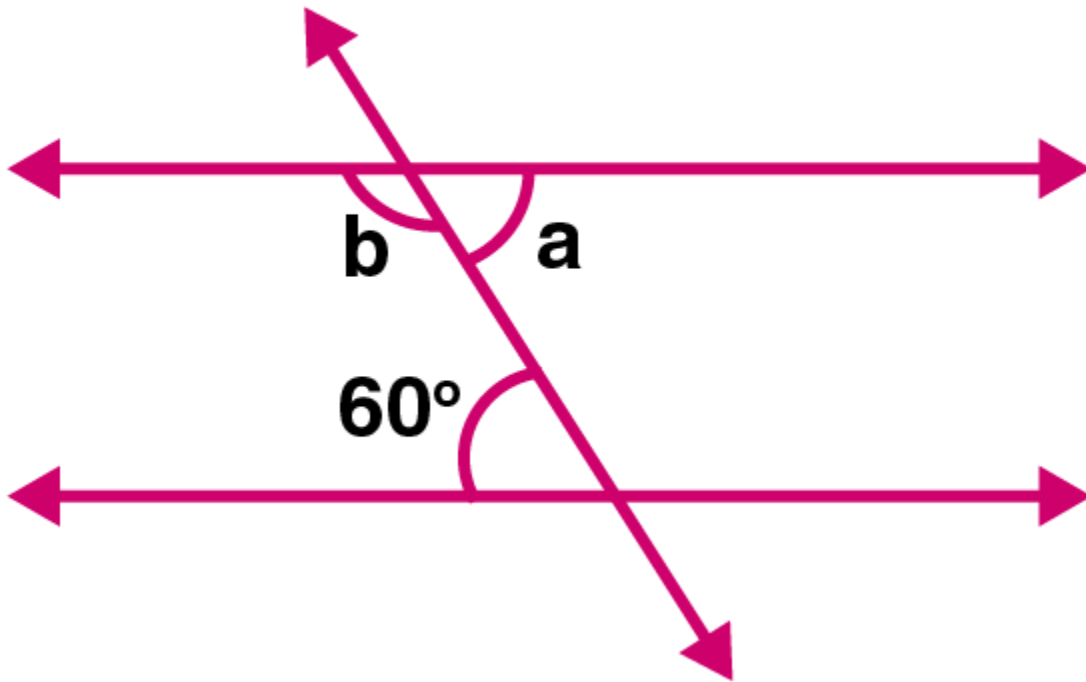


(iii)

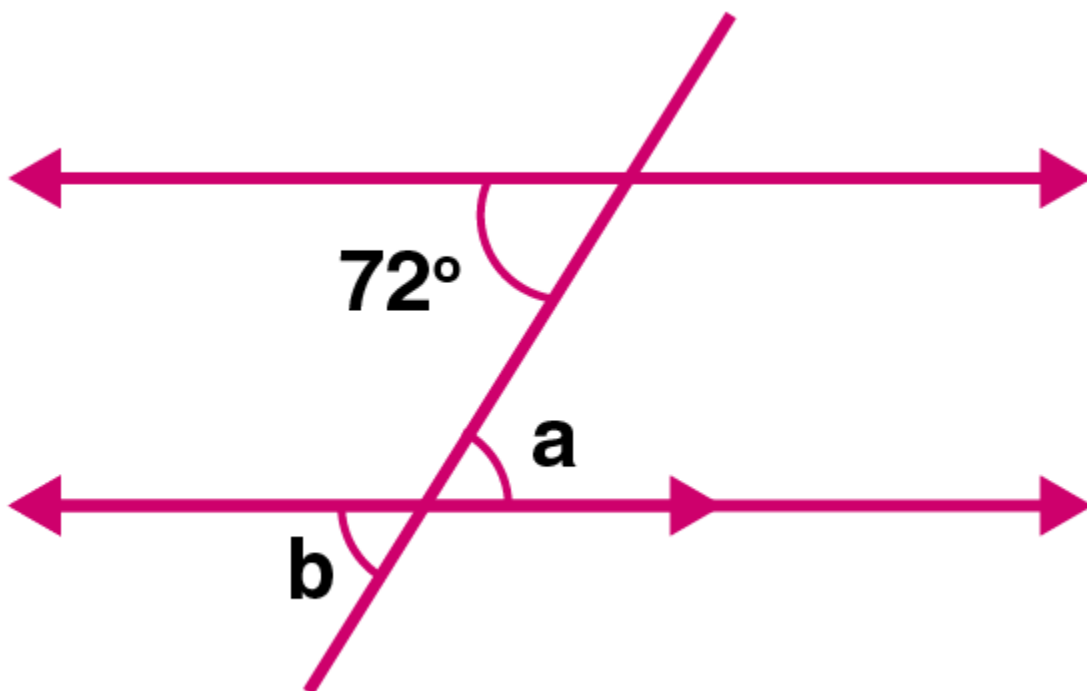
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(iv)



(v)



Solution:

(i) $a + 140^\circ = 180^\circ$ [Linear pair]

$$a = 180^\circ - 140^\circ$$

We get,

$$a = 40^\circ$$

Here, $b = a$ {alternate angles}

$$\text{Hence, } a = b = 40^\circ$$

(ii) Given

$l \parallel m$ and p intersects them

$$b + 60^\circ = 180^\circ \text{ [Linear pair]}$$

$$b = 180^\circ - 60^\circ$$

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We get,

$$b = 120^\circ$$

and $a = 60^\circ$ {corresponding angles}

Hence, $a = 60^\circ$

$$b = 120^\circ$$

(iii) $a = 110^\circ$ [Vertically opposite angles]

$$b = 180^\circ - a \text{ [Co-interior angles]}$$

$$= 180^\circ - a$$

$$= 180^\circ - 110^\circ$$

We get,

$$= 70^\circ$$

(iv) $a = 60^\circ$ [Alternate interior angles]

$$b = 180^\circ - a \text{ [Co-interior angles]}$$

$$= 180^\circ - 60^\circ$$

We get,

$$= 120^\circ$$

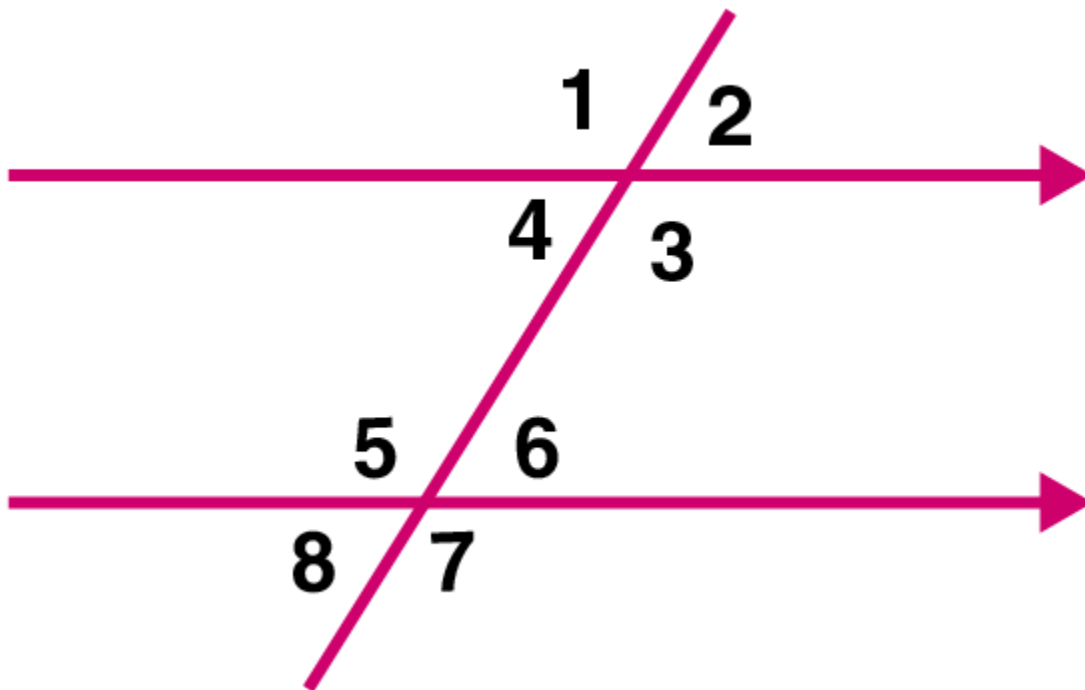
(v) $a = 72^\circ$ [Alternate interior angles]

$$b = a \text{ [Vertically opposite angles]}$$

Hence, $b = 72^\circ$

3. If $\angle 1 = 120^\circ$, find the measures of: $\angle 2$, $\angle 3$, $\angle 4$, $\angle 5$, $\angle 6$, $\angle 7$ and $\angle 8$. Give reasons.

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**Solution:**

Given

$l \parallel m$ and p is their transversal and

$$\angle 1 = 120^\circ$$

$$\angle 1 + \angle 2 = 180^\circ \text{ [Straight line angle]}$$

$$120^\circ + \angle 2 = 180^\circ$$

$$\angle 2 = 180^\circ - 120^\circ$$

We get,

$$\angle 2 = 60^\circ$$

Therefore, $\angle 2 = 60^\circ$

But $\angle 1$ and $\angle 3$ [Vertically opposite angles]

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Hence, $\angle 3 = \angle 1 = 120^\circ$

Similarly,

$\angle 4 = \angle 2$ [Vertically opposite angles]

$\angle 4 = 60^\circ$

$\angle 5 = \angle 1$ [Corresponding angles]

Hence, $\angle 5 = 120^\circ$

Similarly,

$\angle 6 = \angle 2$ [Corresponding angles]

$\angle 6 = 60^\circ$

$\angle 7 = \angle 5$ [Vertically opposite angles]

Hence, $\angle 7 = 120^\circ$

and $\angle 8 = \angle 6$ [Vertically opposite angles]

Hence, $\angle 8 = 60^\circ$

Therefore, the measures of angles are,

$\angle 2 = 60^\circ$

$\angle 3 = 120^\circ$

$\angle 4 = 60^\circ$

$\angle 5 = 120^\circ$

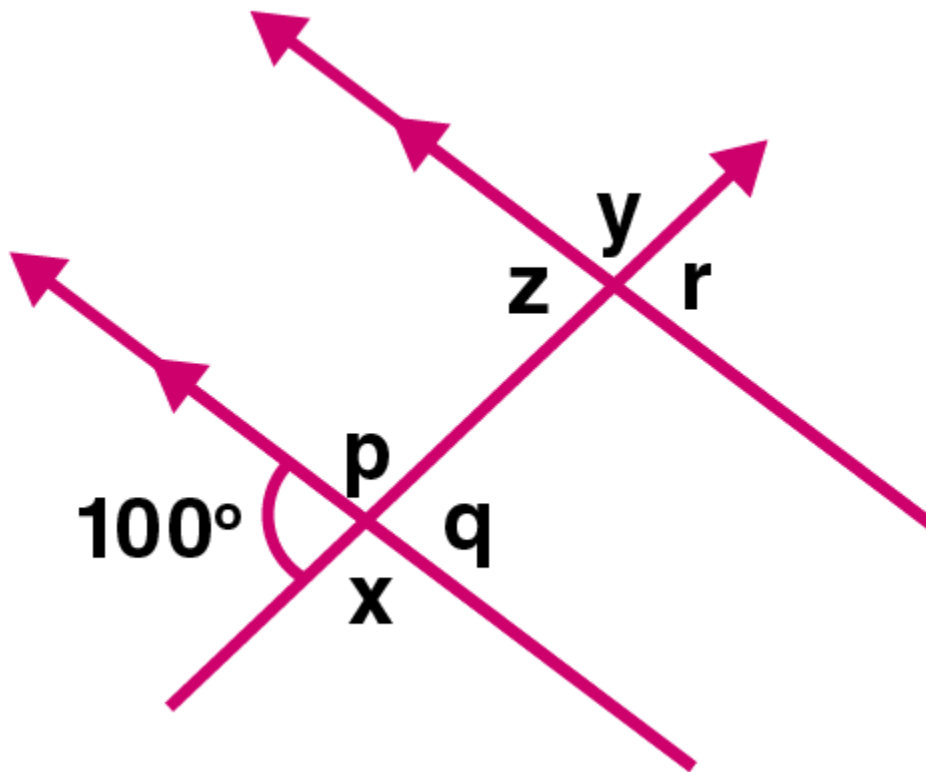
$\angle 6 = 60^\circ$

$\angle 7 = 120^\circ$ and

$\angle 8 = 60^\circ$

4. In the figure given below, find the measure of the angles denoted by x, y, z, p, q and r.

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Solution:

$$x = 180^\circ - 100^\circ \text{ (Linear pair of angles)}$$

$$x = 80^\circ$$

$$y = x \text{ (Alternate exterior angles)}$$

$$y = 80^\circ$$

$$z = 100^\circ \text{ (Corresponding angles)}$$

$$p = x \text{ (Vertically opposite angles)}$$

$$p = 80^\circ$$

$$q = 100^\circ \text{ (Vertically opposite angles)}$$

$$r = q \text{ (Corresponding angles)}$$

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$$r = 100^{\circ}$$

Therefore, the measures of angles are,

$$x = y = p = 80^{\circ}$$

$$q = r = z = 100^{\circ}$$

5. Using the given figure, fill in the blanks.

$$\angle x = \dots\dots\dots;$$

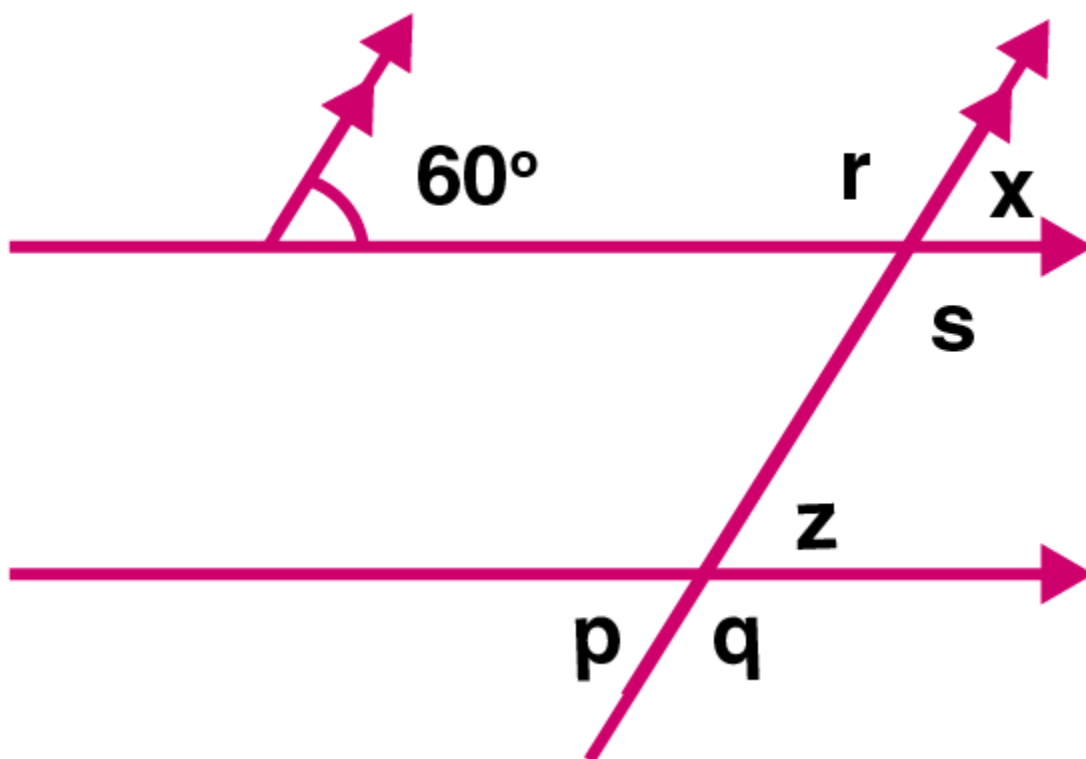
$$\angle z = \dots\dots\dots;$$

$$\angle p = \dots\dots\dots;$$

$$\angle q = \dots\dots\dots;$$

$$\angle r = \dots\dots\dots;$$

$$\angle s = \dots\dots\dots;$$

**Solutions:**

$$\angle x = 60^\circ \text{ (Corresponding angles)}$$

$$z = x \text{ (Corresponding angles)}$$

$$= 60^\circ$$

$$p = z \text{ (Vertically opposite angles)}$$

$$= 60^\circ$$

$$q = 180^\circ - p \text{ (Linear pair of angles)}$$

$$= 180^\circ - 60^\circ$$

We get,

$$= 120^\circ$$

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$$r = 180^\circ - x \text{ (Linear pair of angles)}$$

$$= 180^\circ - 60^\circ$$

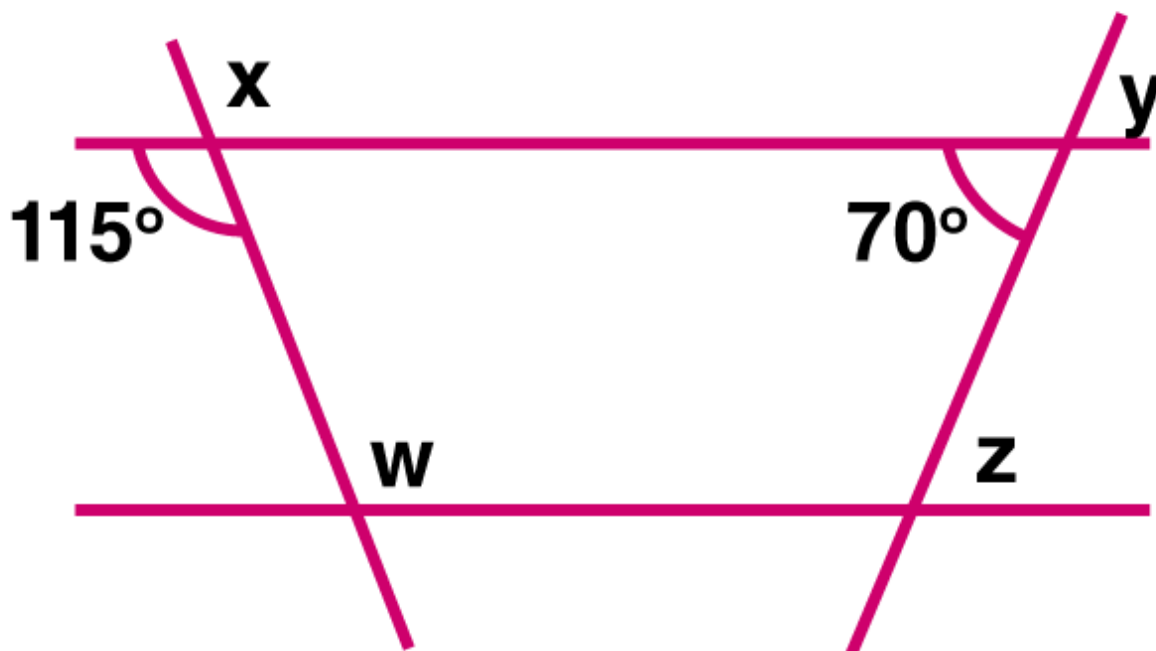
We get,

$$= 120^\circ$$

$$s = r \text{ (Vertically opposite angles)}$$

$$s = r = 120^\circ$$

6. In the given figure, find the angles shown by x, y, z and w. Give reasons.



Solution:

$$x = 115^\circ \text{ (By vertically opposite angles)}$$

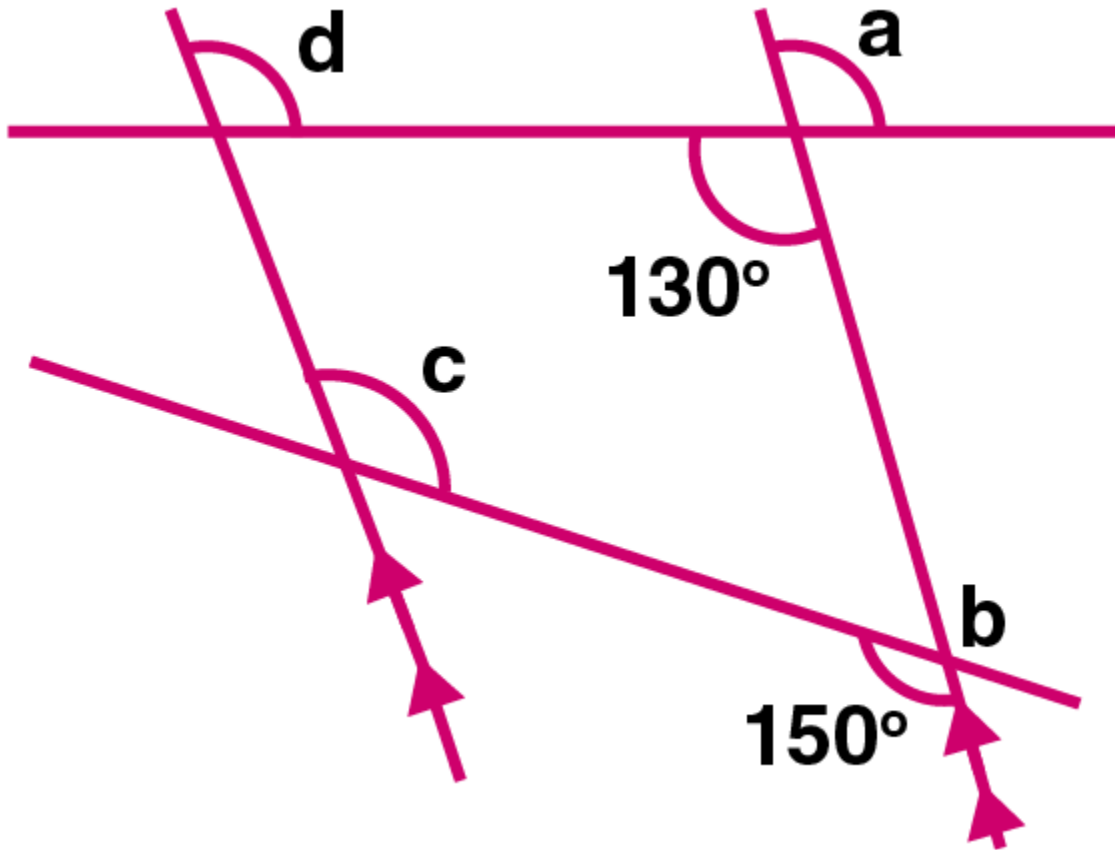
$$y = 70^\circ \text{ (By vertically opposite angles)}$$

$$z = 70^\circ \text{ (By alternate interior angles)}$$

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$w = 115^\circ$ (By alternate interior angles)

7. Find a , b , c and d in the figure given below:



Solution:

$a = 130^\circ$ (By vertically opposite angles)

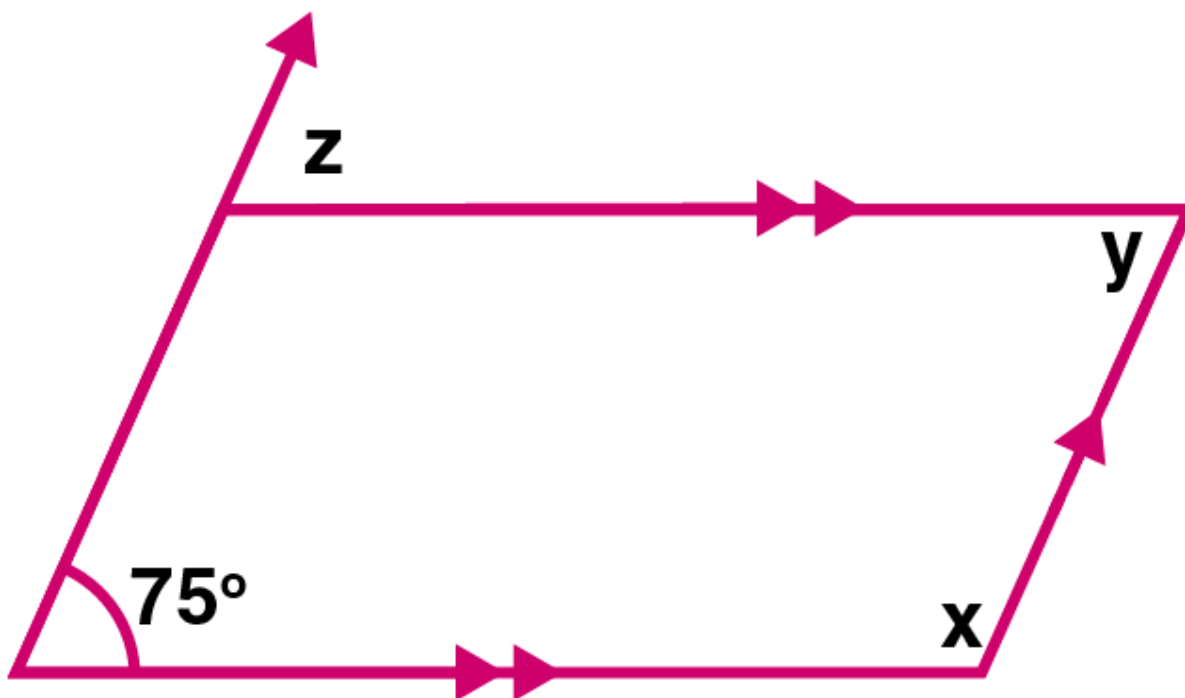
$b = 150^\circ$ (By vertically opposite angles)

$c = 150^\circ$ (By alternate interior angles)

$d = 130^\circ$ (By alternate interior angles)

8. Find x , y and z in the figure given below:

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Solution:

$$x = 180^\circ - 75^\circ \text{ (Co-interior angles)}$$

We get,

$$x = 105^\circ$$

$$y = 180^\circ - x \text{ (Co-interior angles)}$$

$$y = 180^\circ - 105^\circ$$

We get,

$$y = 75^\circ$$

$$z = 75^\circ \text{ (Corresponding angles)}$$

Therefore, the angles are,

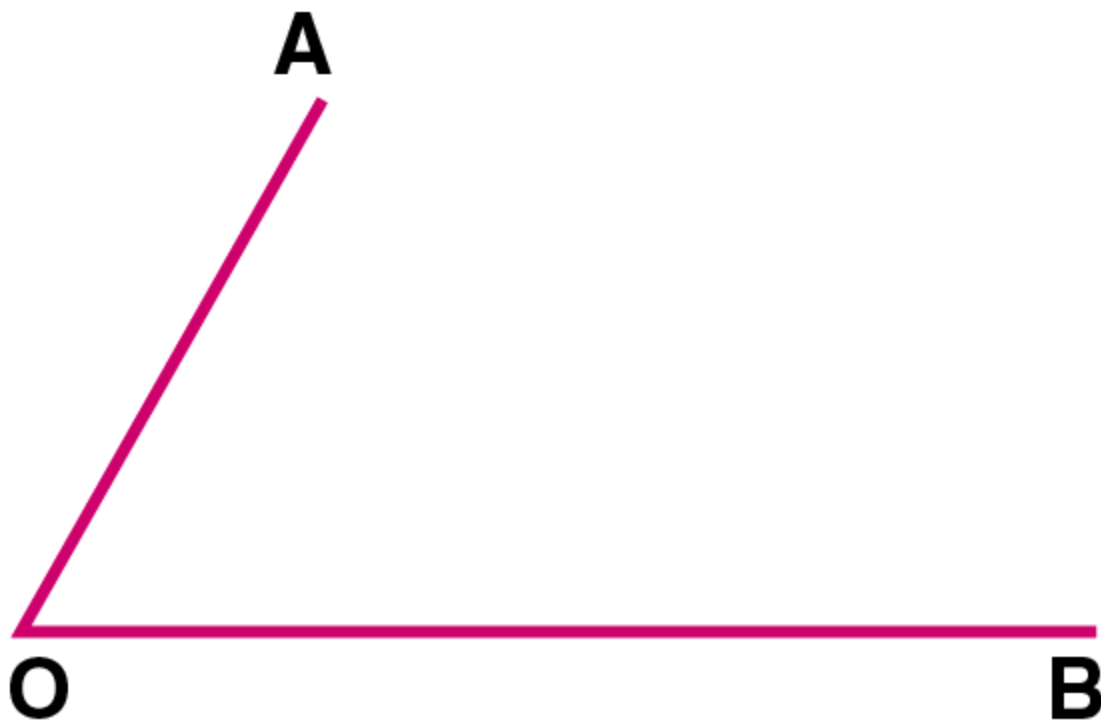
$$x = 105^\circ, y = 75^\circ \text{ and } z = 75^\circ$$

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Exercise 25(C)

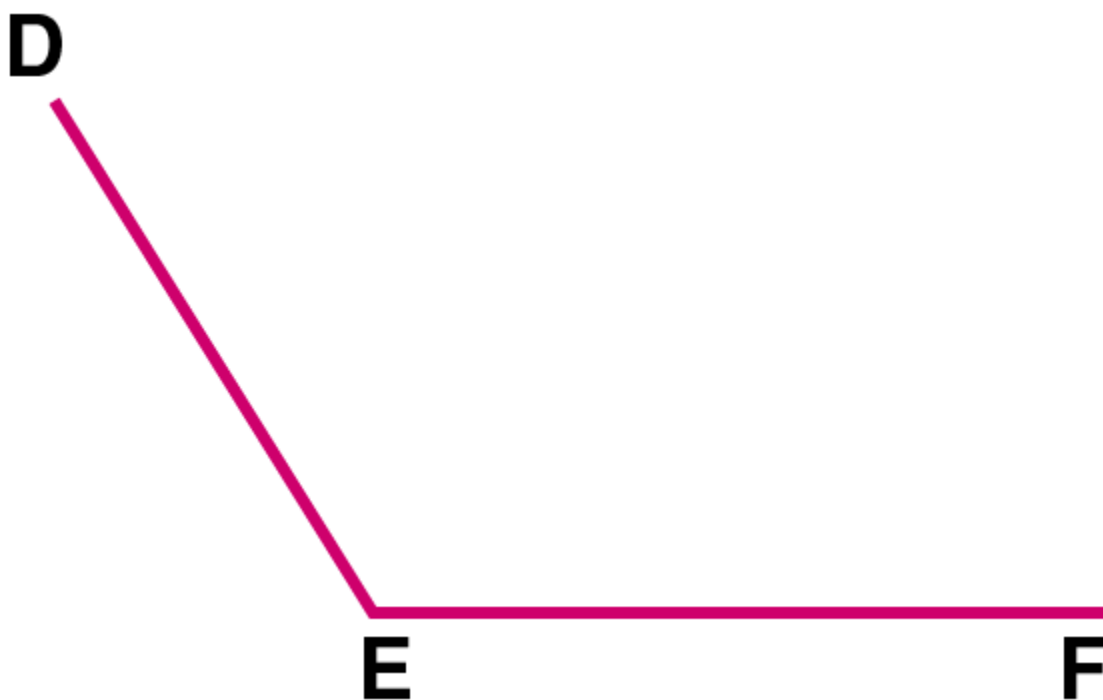
1. In your note-book copy the following angles using ruler and a pair compass only.

(i)

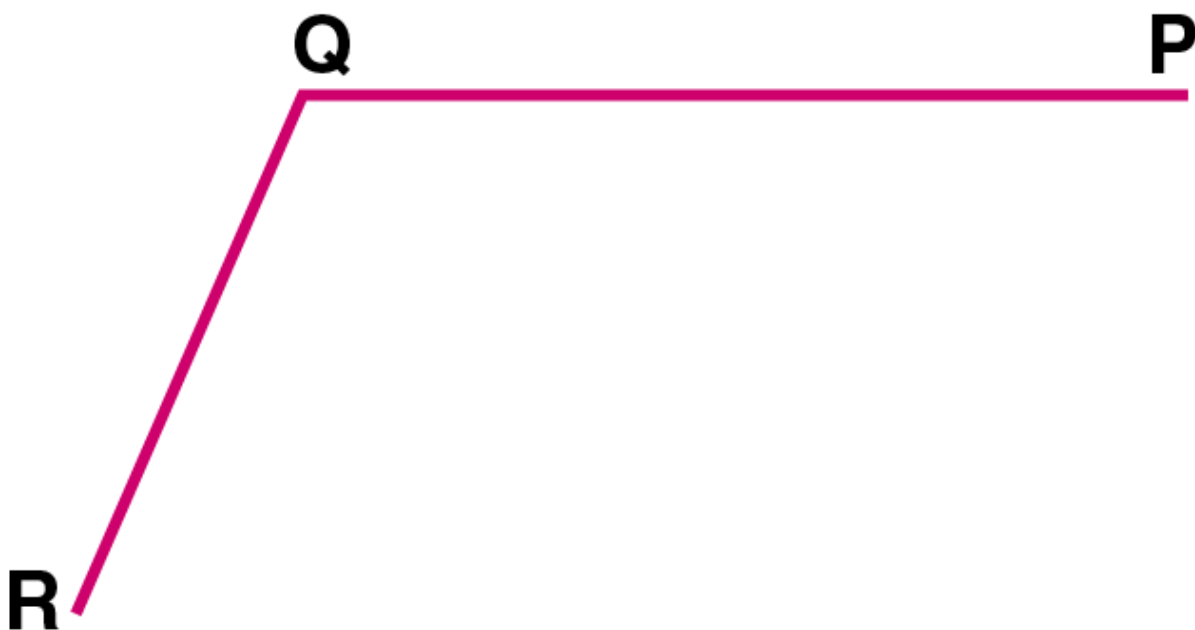


(ii)

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(iii)

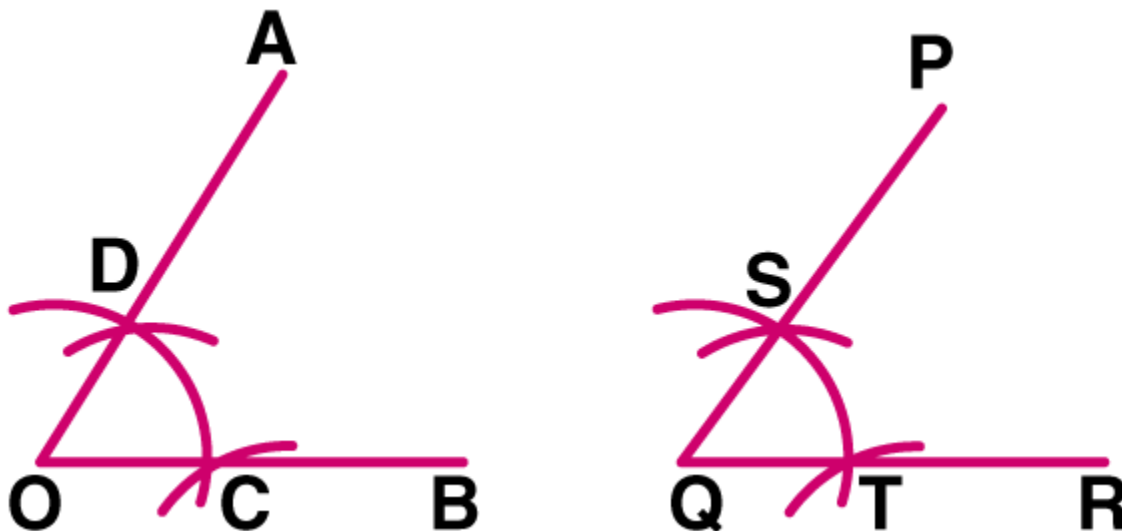


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Solution:

(i) Steps of Construction:

1. Draw line $QR = OB$ at point Q



2. Keeping O as centre, draw an arc of any suitable radius, to cut the arms of the angle at points C and D

3. Keeping Q as centre, draw the arc of the same size as drawn for C and D. Let this arc line cuts line QR at point T

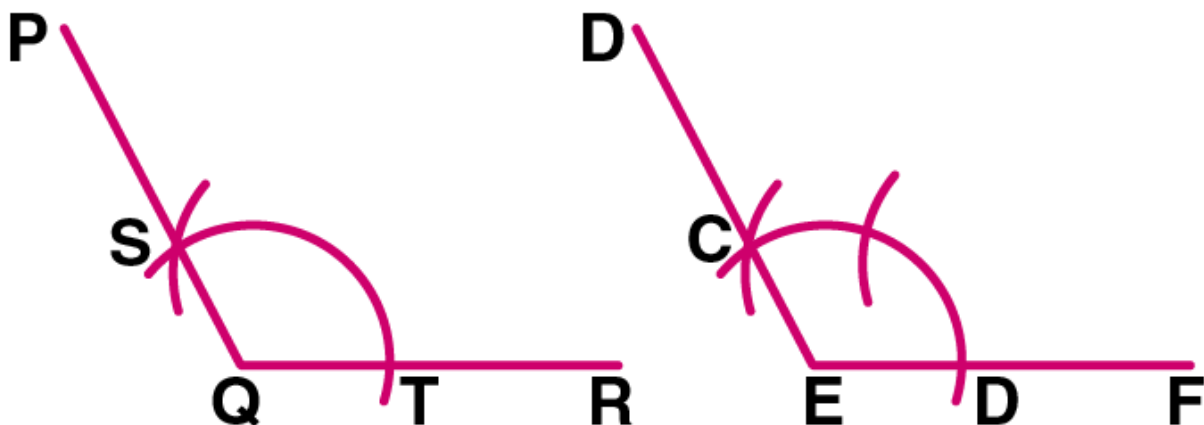
4. With the help of compasses, take the distance equal to distance between C and D; and then taking T as centre, draw an arc which cuts the earlier arc at point S.

5. Join QS and produce up to a suitable point P. Now, the obtained $\angle PQR$, is the angle equal to the given $\angle AOB$

(ii) Steps of Construction:

1. Draw a line EF, at a point E

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2. Taking E as centre, draw an arc of any suitable radius, to cut the arms of the angle at points C and D

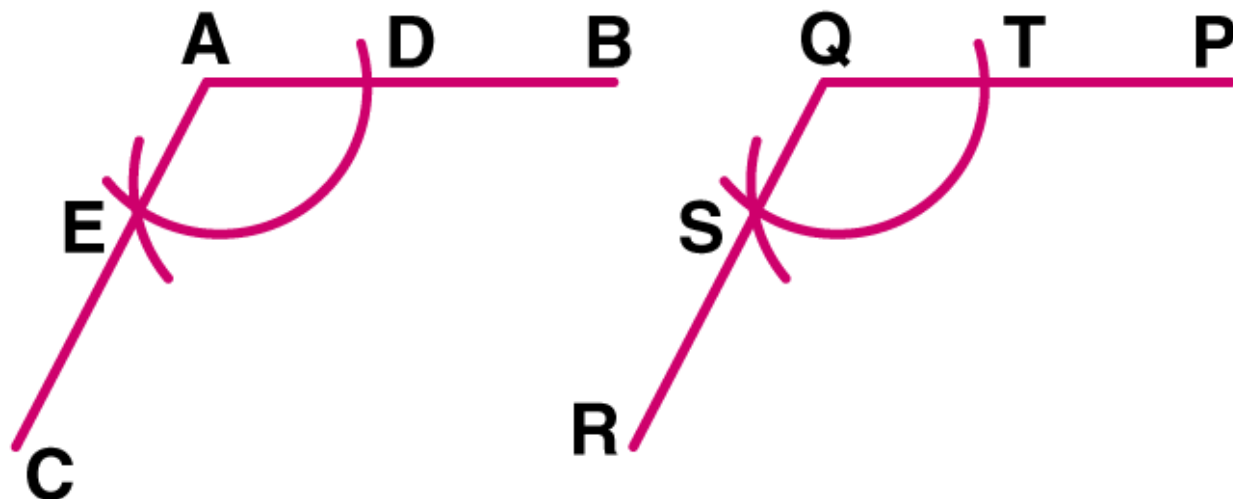
3. Taking Q as centre, draw an arc of the same size as drawn for points C and D. Let this arc cut line QR at point T

4. With the help of compasses, take the distance equal to the distance between C and D; and then taking T as centre, draw an arc which cuts the earlier arc at point S

5. Join QS and produce up to a suitable point S. Now, the obtained $\angle PQR$ is the angle equal to the given $\angle DEF$

(iii) Steps of Construction:

1. Draw a line $AB = QP$ at a point A



2. Taking Q as centre, draw an arc of any suitable radius, to cut the arms of the angle T and S
3. Taking A as centre, draw an arc of the same size as drawn for points T and S. Let this arc cuts the line AB at point D
4. With the help of compasses, take the distance equal to the distance between T and S; and then taking D as centre, draw an arc which cuts the earlier arc at point E
5. Join AE produced up to a suitable point C. The obtained $\angle BAC$ is the angle equal to the given $\angle PQR$

2. Construct the following angles, using ruler and a pair of compass only

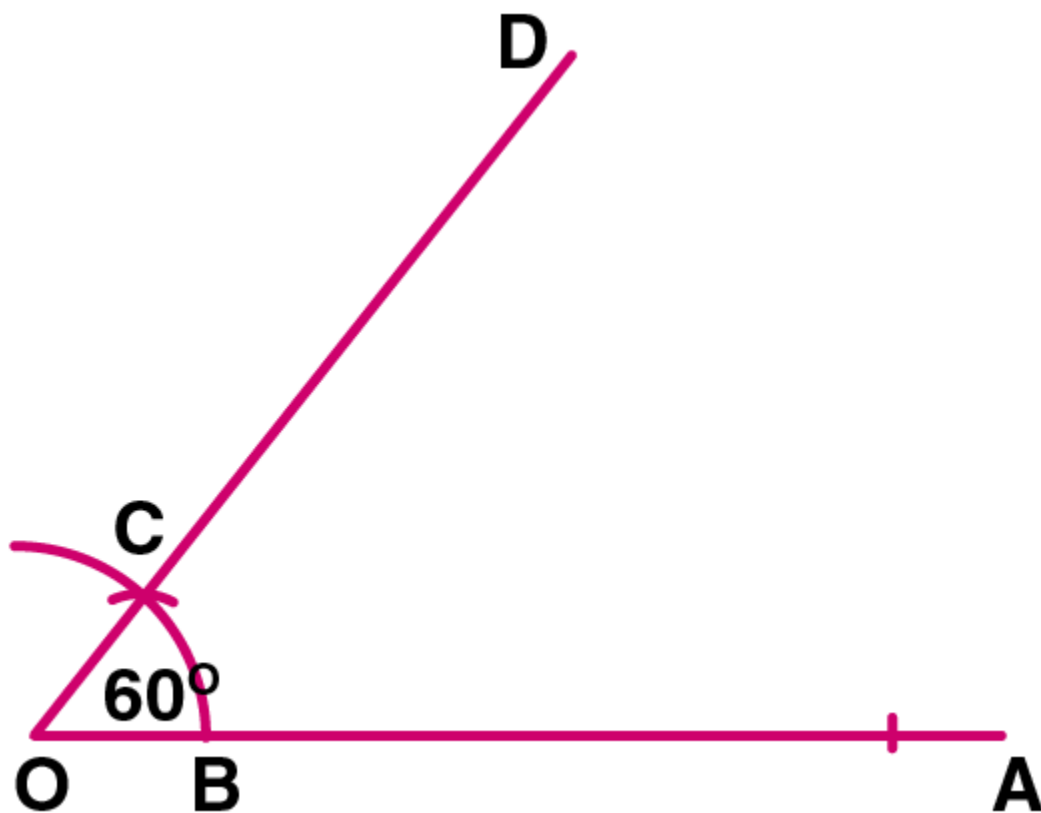
- (i) 60°
- (ii) 90°
- (iii) 45°
- (iv) 30°
- (v) 120°

Solution:

(i) Steps of Construction:

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Constructing the angle of 60°



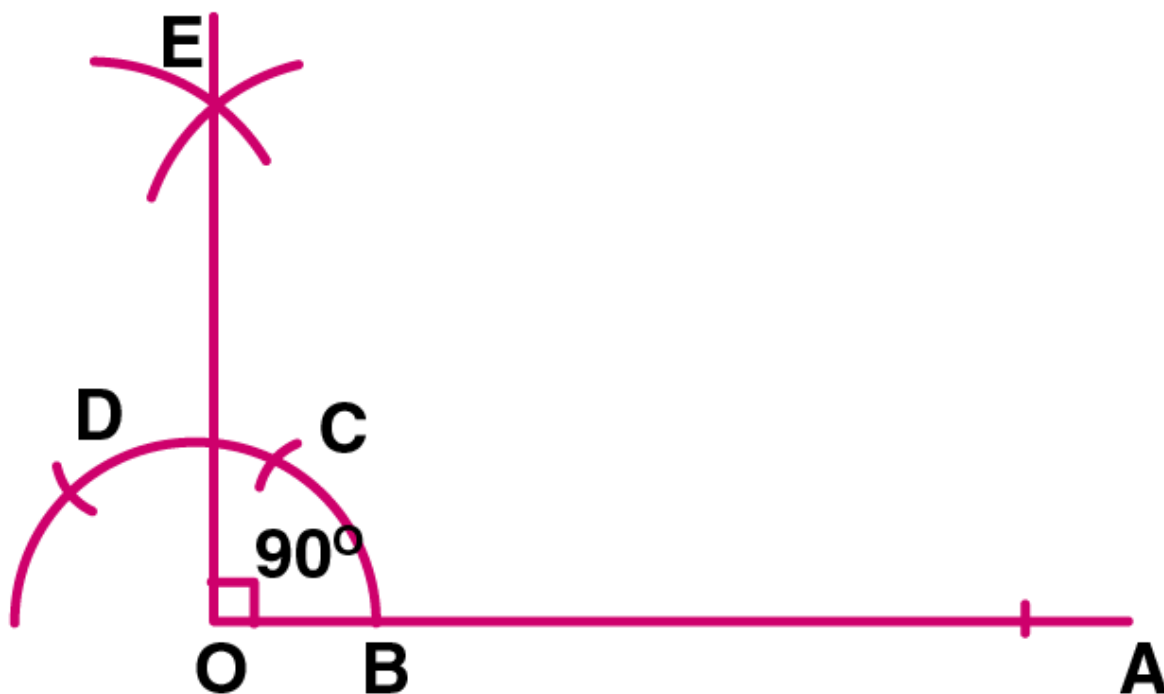
1. Draw a line OA of any suitable length
2. Taking O as centre, draw an arc of any size to cut OA at point B
3. Now, taking B as centre, draw the same size arc, to cut the previous arc at point C
4. Join OC and produce up to a suitable point D. Then, the obtained $\angle DOA$ is the angle of 60°

(ii) Steps of Construction:

Constructing angle of 90°

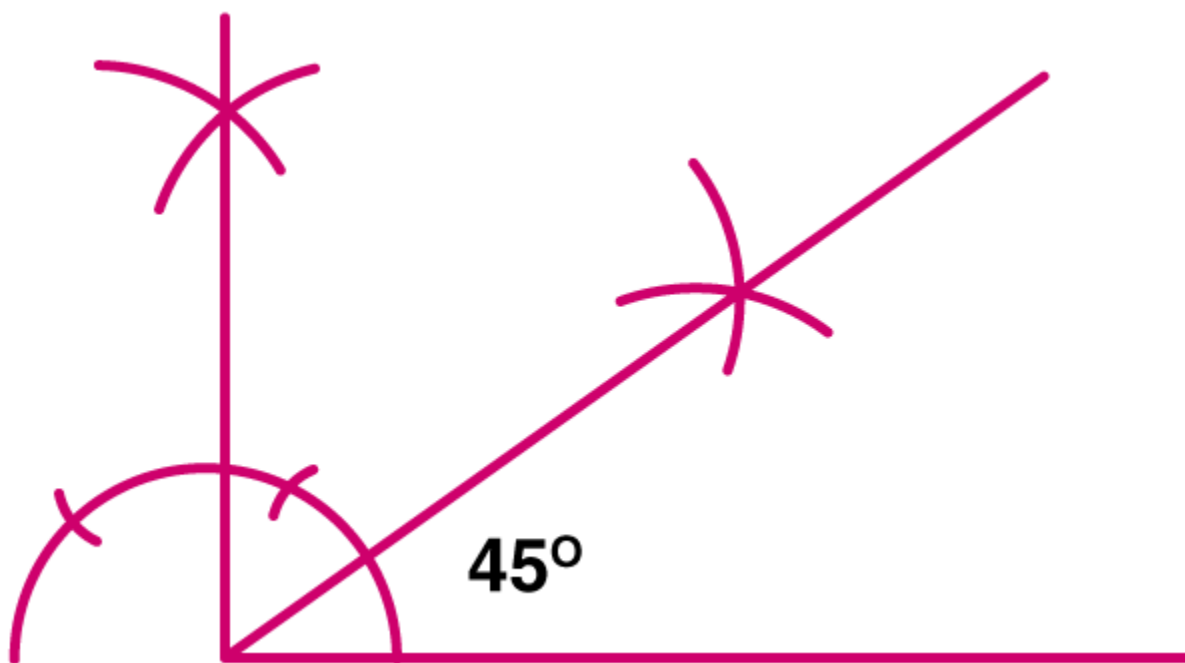
Let OA be the line and at point O, the angle of 90° is to be drawn

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1. Taking O as centre, draw an arc to cut the arm OA at point B
 2. Taking B as centre, draw the same size arc to cut the previous arc at point C
 3. Again with C as centre and with the same radius, draw one more arc to cut the previous arc at point D
 4. Now, taking C and D as centres, draw two arcs of equal radii to cut each other at point E.
 5. Join O and E. Then $\angle AOE = 90^\circ$ is obtained
- (iii) Draw an angle of 90° , following the steps as in question (ii) and bisect it. Each angle so obtained will be 45°

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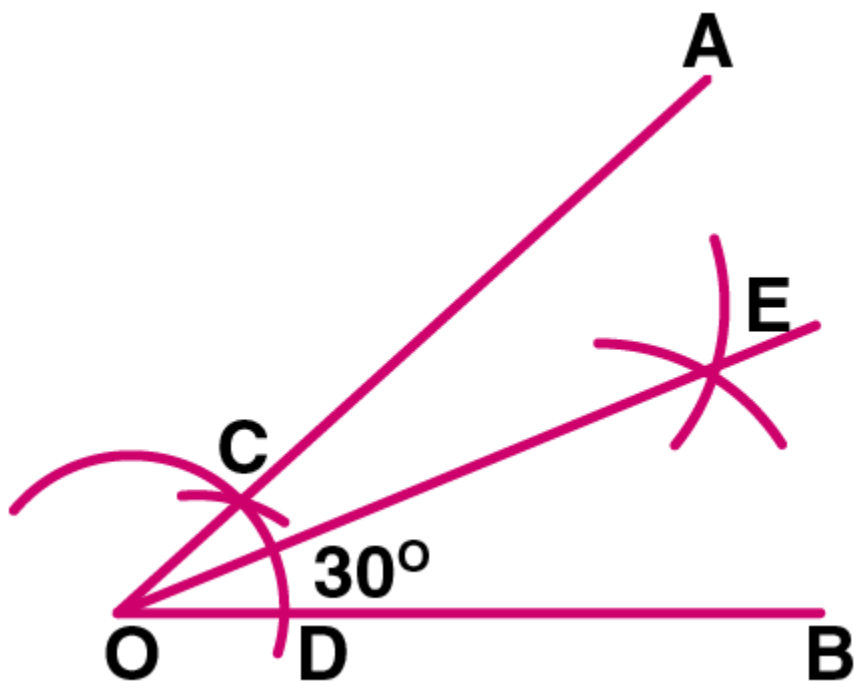


(iv) Steps of Construction:

Constructing an angle of 30°

1. Draw an angle of 60° following the steps as drawn in question no.(i)
2. Now, bisecting this angle, we get two angles each of 30° . Therefore $\angle EOB = 30^\circ$

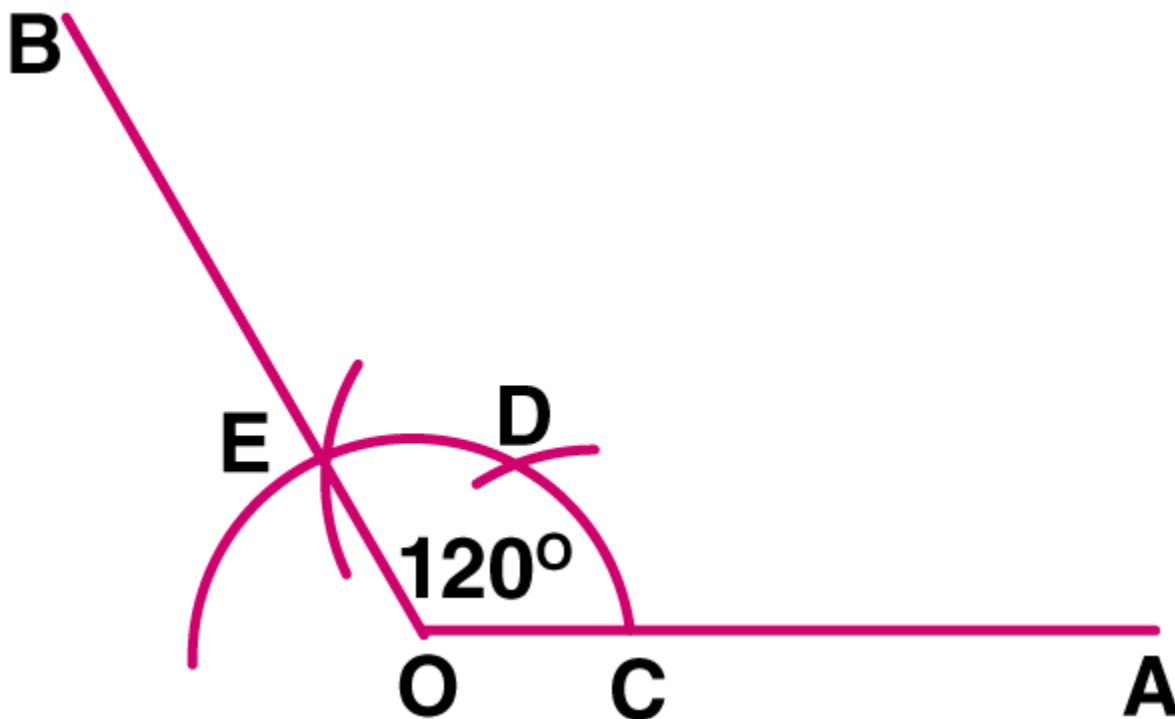
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(v) Steps of Construction:

Constructing an angle of 120°

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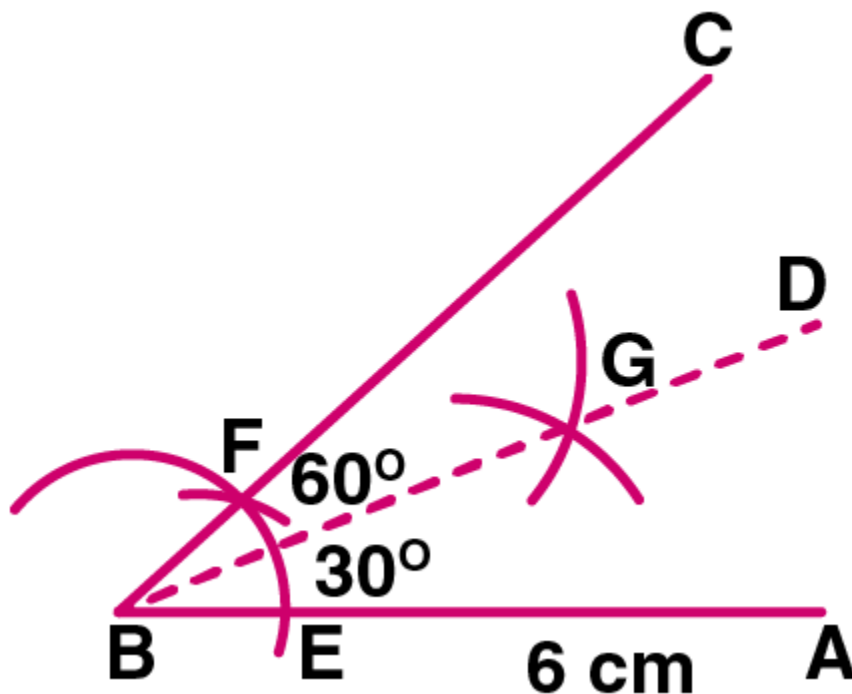
1. Taking centre as O on the line OA, draw an arc to cut this line at point C
 2. Now, taking C as centre, draw a same size arc which cuts the first arc at point D
 3. Taking D as centre, draw one more arc of same size which cuts the first arc at point E
 4. Join OE and produce it up to point B. Now, the $\angle AOB$ is the obtained angle whose measure is 120°
- 3. Draw line $AB = 6$ cm. Construct angle $ABC = 60^\circ$. Then draw the bisector of angle ABC.**

Solution:

Steps of Construction:

1. Draw a line segment AB of length 6 cm

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2. Using compass construct $\angle CBA = 60^\circ$

3. Bisect $\angle CBA$, using compass, take any radius which meet line AB and BC at points E and F

4. Now, with the help of compass take radius more than $\frac{1}{2}$ of EF and draw two arcs from point E and F, where both the arcs intersect at point G, proceed BG towards D. Now the $\angle DBA$ is bisector of $\angle CBA$

4. Draw a line segment PQ = 8 cm. Construct the perpendicular bisector of the line segment PQ. Let the perpendicular bisector drawn meet PQ at point R. Measure the lengths of PR and QR. Is PR = QR?

Solution:

Steps of Construction:

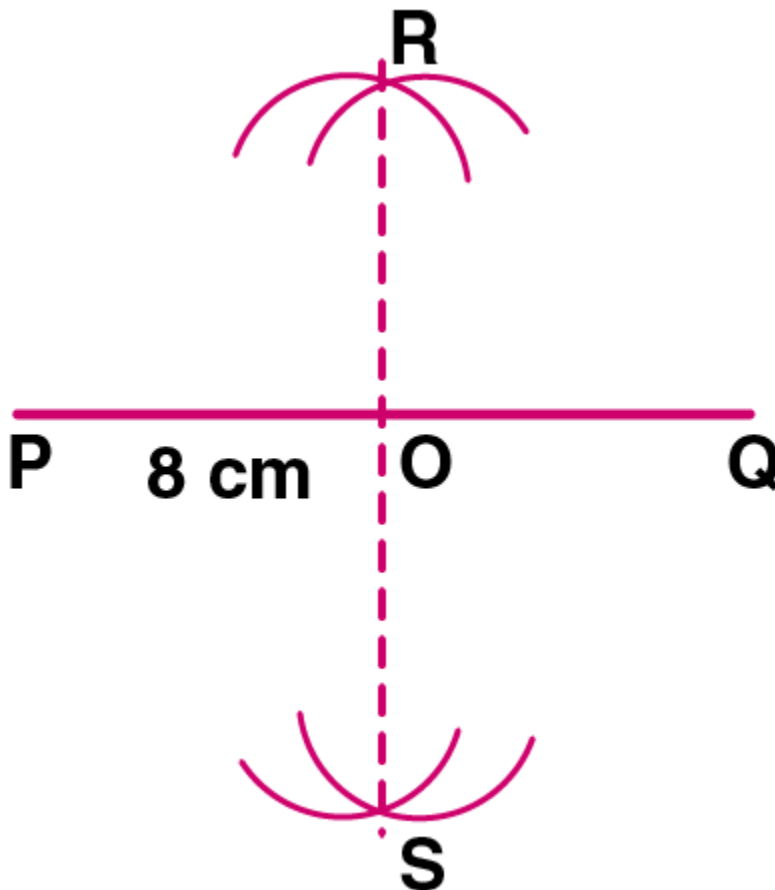
1. Taking P and Q as centres, draw arcs on both sides of PQ with equal radii. The radius should be more than half the length of PQ

2. Let these arcs cut each other at point R and RS

3. Now, join RS which cuts PQ at point D

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Now, $RS = PQ$. Also $\angle POR = 90^\circ$



Therefore, the line segment RS is the perpendicular bisector of PQ as it bisects PQ at point P and it also perpendicular to PQ. Now, on measuring the length

$PR = 4 \text{ cm}$

$QR = 4 \text{ cm}$

Since, $PR = QR = 4 \text{ cm}$

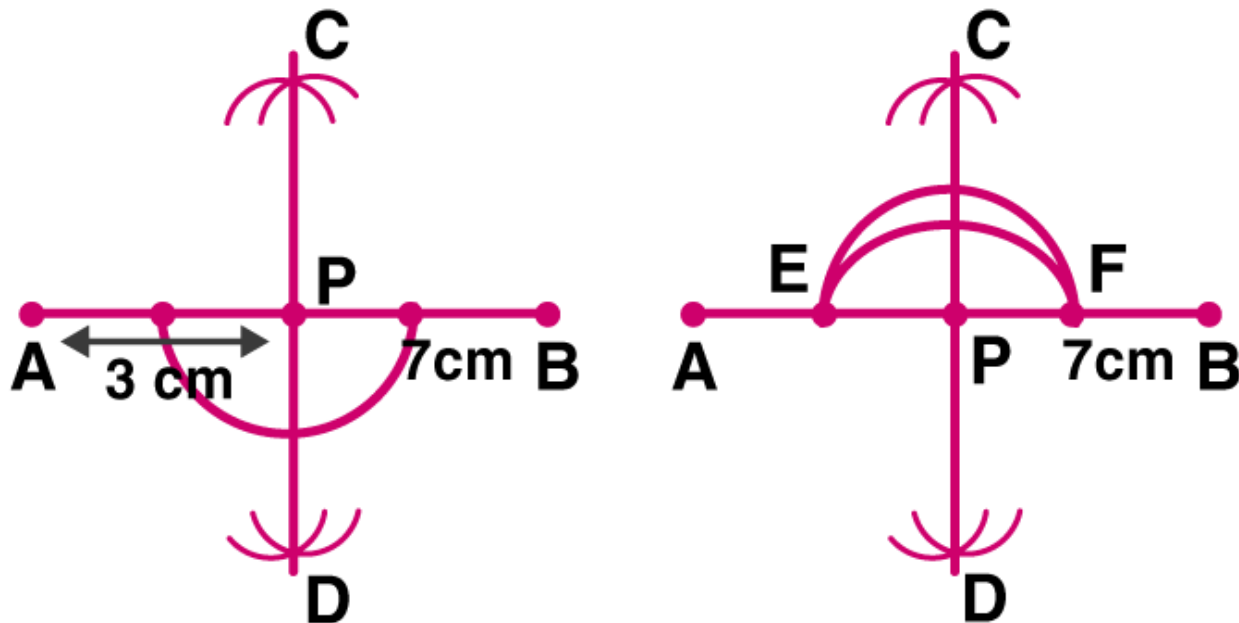
Therefore, $PR = QR$

5. Draw a line segment $AB = 7 \text{ cm}$. Mark a point P on AB such that $AP = 3 \text{ cm}$. Draw perpendicular on to AB at point P .

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Solution:

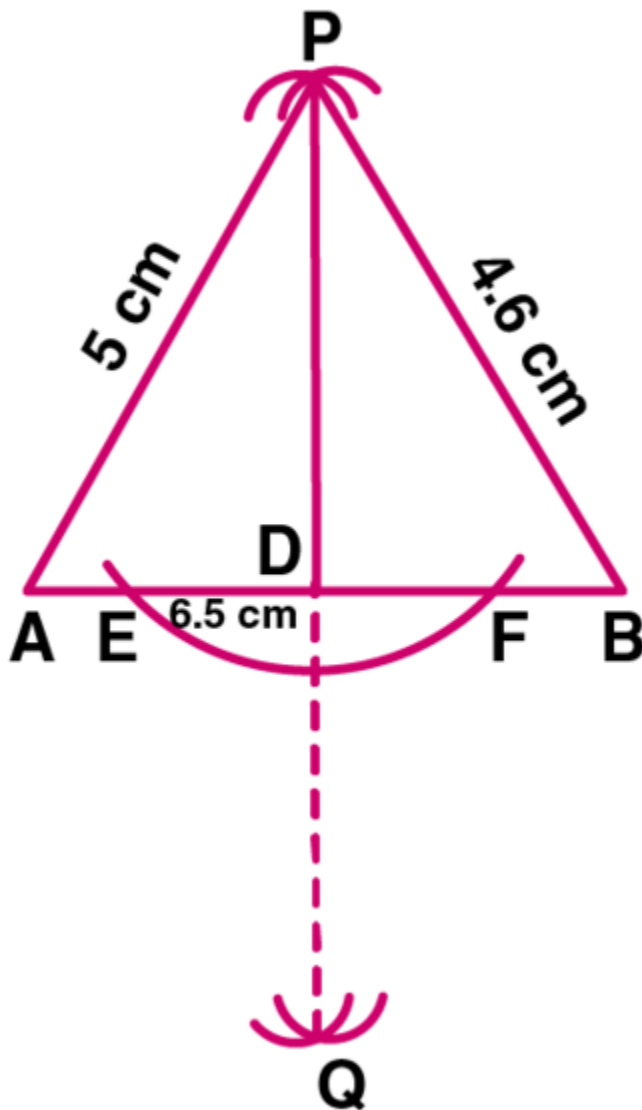
1. Draw a line segment AB of length 7 cm



2. Mark a point on AB such that, $AB - AP = 3$ cm
 3. From point P, cut arc on outside of AB, and mark them as point E and F
 4. Now, from point E and F cut arcs on both side intersecting each other at point C and D
 5. Join point P, C and D
 6. Which is the required perpendicular
- 6. Draw a line segment $AB = 6.5$ cm. Locate a point P that is 5 cm from A and 4.6 cm from B. Through the point P, draw a perpendicular on to the line segment AB.**

Solution:

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Steps of Construction:

(i) Draw a line segment AB of length 6.5 cm

(ii) Taking radius as 5 cm and with centre A, draw an arc and taking radius as 4.6 cm and with centre B, draw another arc which intersects the first arc at point P

Now, P is the required point

(iii) Taking centre A and a suitable radius, draw an arc which intersect AB at points E and F

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(iv) Now, taking E and F as centres and radius greater than half of EF, draw the arcs which intersect each other at point Q

(v) Join PQ which intersect AB at point D

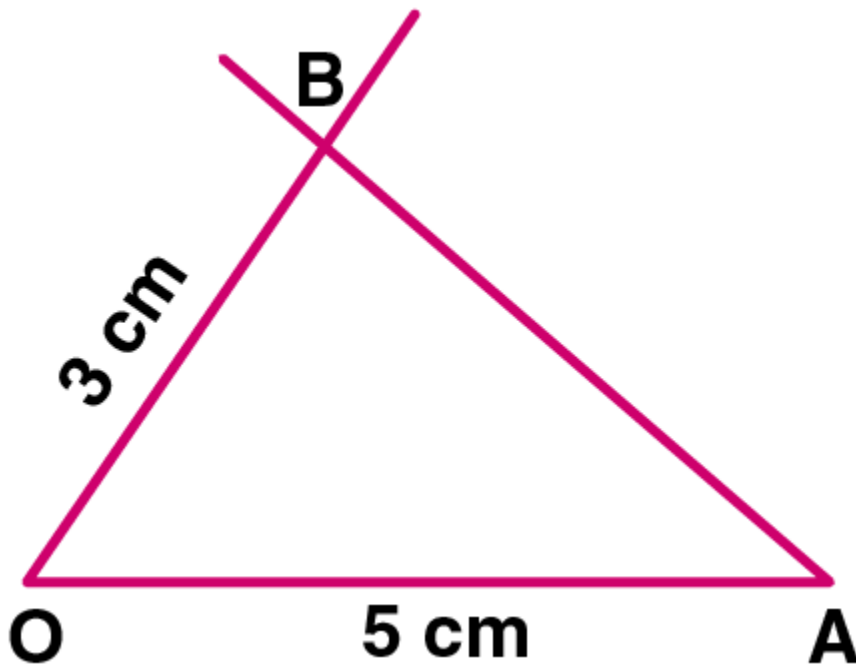
(vi) Now, PD is perpendicular to AB

Exercise 25(D)

1. Draw a line segment $OA = 5$ cm. Use set-square to construct angle $AOB = 60^\circ$, such that $OB = 3$ cm. Join A and B; then measure the length of AB.

Solution:

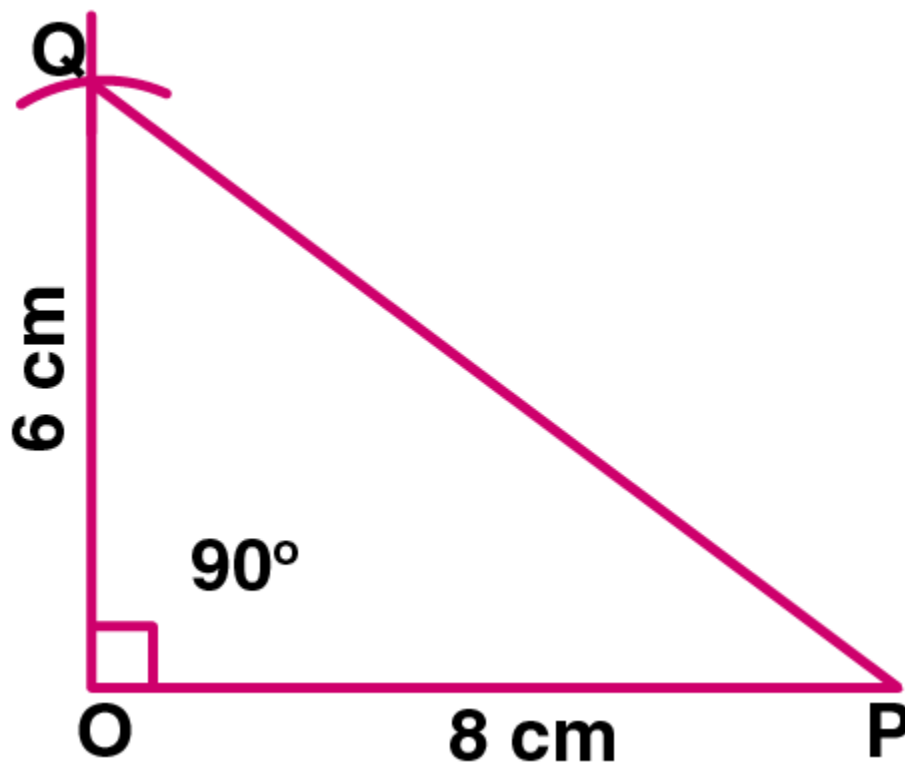
The length of AB = 4.4 cm (approximately)



2. Draw a line segment $OP = 8$ cm. Use set-square to construct $\angle POQ = 90^\circ$; such that $OQ = 6$ cm. Join P and Q; then measure the length of PQ.

Solution:

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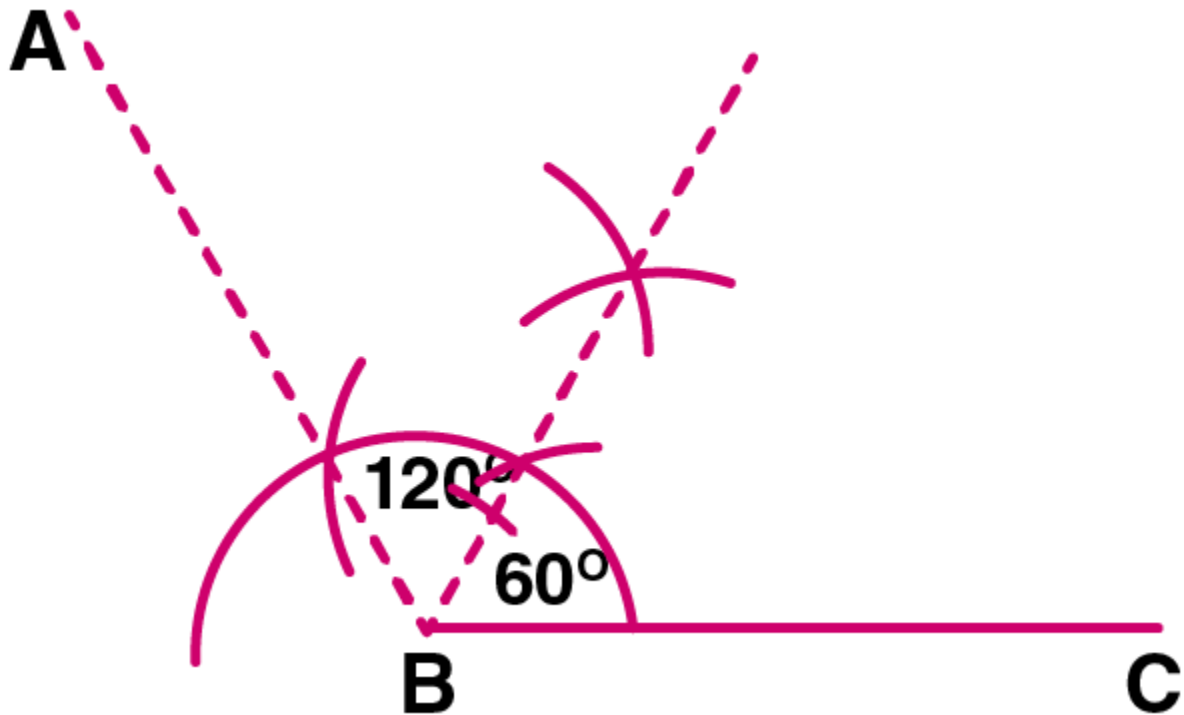


Measuring the length of PQ = 10 cm

3. Draw $\angle ABC = 120^\circ$. Bisect the angle using ruler and compasses. Measure each angle so obtained and check whether or not the new angles obtained on bisecting $\angle ABC$ are equal.

Solution:

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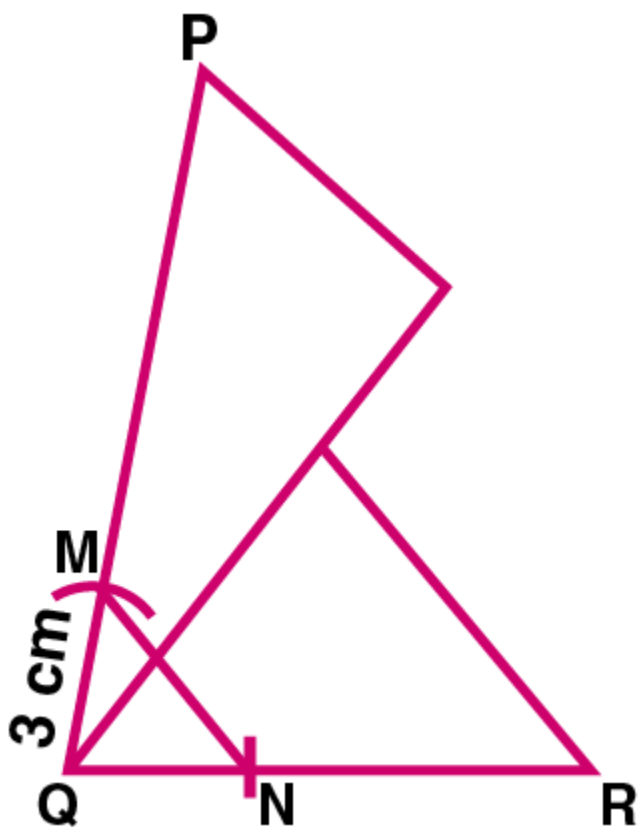
Each angle measure = 60°

Yes, the angles obtained on bisecting $\angle ABC$ are equal

4. Draw $\angle PQR = 75^\circ$ by using set-squares. On PQ mark a point M such that $MQ = 3$ cm. On QR mark a point N such that $QN = 4$ cm. Join M and N. Measure the length of MN.

Solution:

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The length of $MN = 4.3$ cm



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Postal Address

IndCareer.com
52, Shilpa Nagar,
Somalwada
Nagpur - 440015
Maharashtra, India

WhatsApp: +91 9561 204 888

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