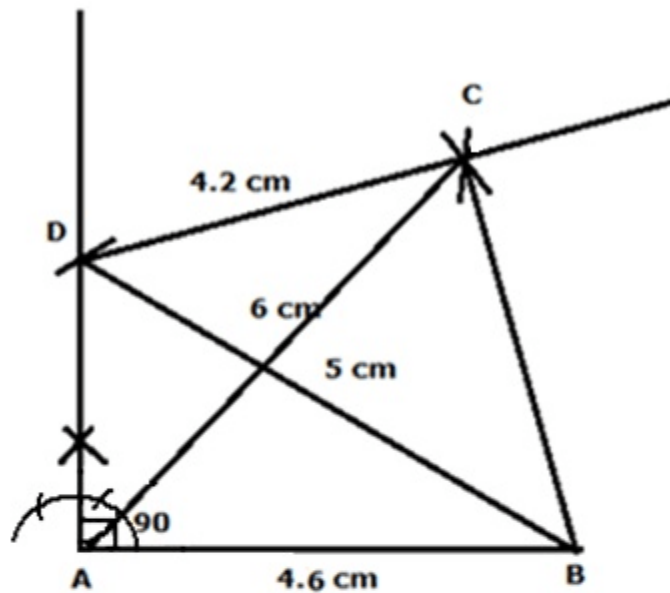


Constructions of Quadrilaterals

Ex No: 20.1

Solution 1:

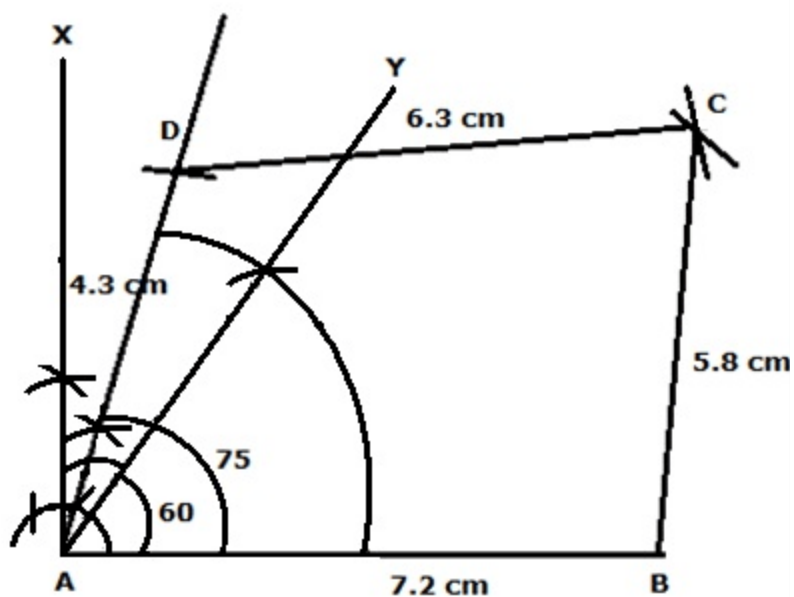
(i) $AB = 4.6$ cm, $BD = 5$ cm, $AC = 6$ cm, $CD = 4.2$ cm and $\angle A = 90^\circ$



Steps of Construction:

- 1) Draw a line segment $AB = 4.6$ cm
- 2) With A as centre, draw a ray making an angle of 90° with AB.
- 3) With B as centre and radius equal to 5 cm cut an arc on the ray from A and mark it as D.
- 4) With D as centre and radius 4.2 cm cut an arc on right side of AD.
- 5) With A as centre and radius 6 cm cut an arc which meets the arc from D at point C.
- 6) Join BC.
- 7) ABCD is the required quadrilateral.

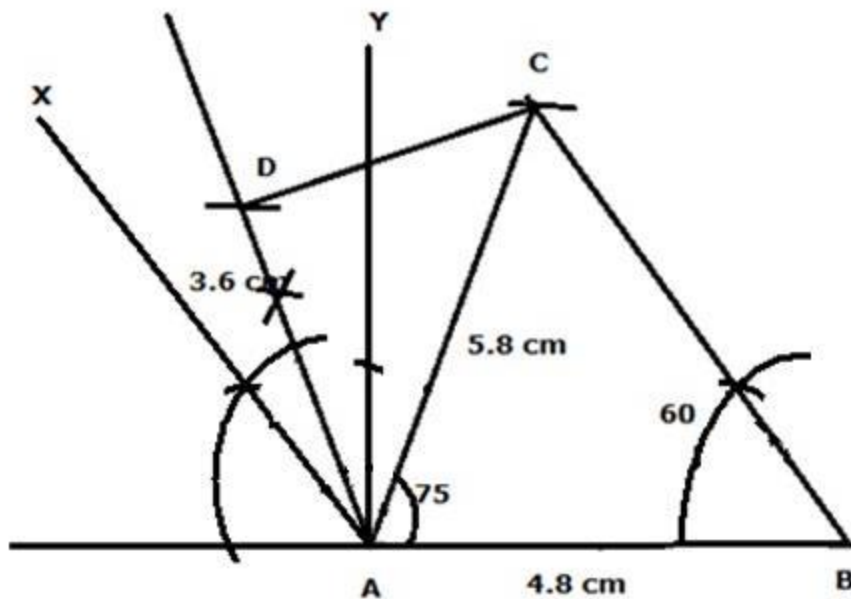
(ii) $AB = 7.2$ cm, $BC = 5.8$ cm, $CD = 6.3$ cm, $AD = 4.3$ cm and $\angle A = 75^\circ$



Steps of Construction:

- 1) Draw a line segment $AB = 7.2$ cm
- 2) With A as centre draw rays X and Y to make angles 90° and 60° with AB. Then bisect the angle between them to make an angle of 75° with AB.
- 3) With A as centre and radius 4.3 cm cut an arc on line segment making 75° angles with AB and mark it as D.
- 4) With D and B as centres and radii of 6.3 and 5.8 cm respectively, draw arcs cutting each other at C.
- 5) Join DC and BC.
- 6) ABCD is the required quadrilateral.

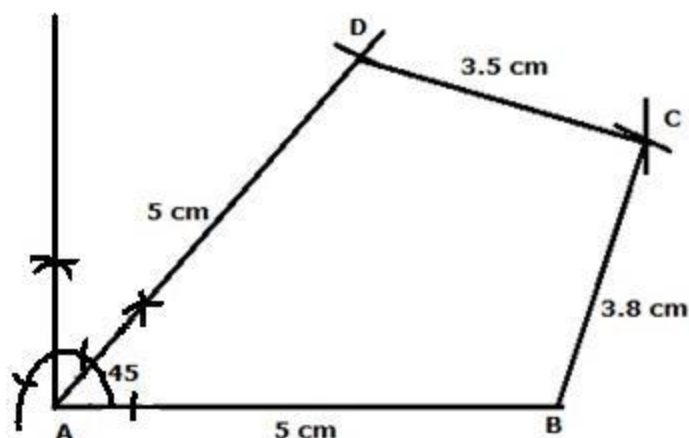
(iii) $AB = 4.8$ cm, $AC = 5.8$ cm, $AD = 3.6$ cm, $\angle A = 105^\circ$ and $\angle B = 60^\circ$



Steps of Construction:

- 1) Draw a line segment $AB = 4.8$ cm.
- 2) With A as centre draw rays X and Y to make angles 60° and 90° with AB produced. Then bisect the angle between them to make an angle of 105° with AB.
- 3) With A as centre and radius 3.6 cm cut an arc on line segment making 105° angles with AB and mark it as D.
- 4) With B as centre draw a ray making an angle of 60° with AB.
- 5) With A as centre and radius 5.8 cm cut an arc on the ray from B and mark the point as C
- 6) Join BC and DC.
- 7) ABCD is the required quadrilateral.

(iv) $AD = AB = 5$ cm, $BC = 3.8$ cm, $CD = 3.5$ cm, and $\angle BAD = 45^\circ$

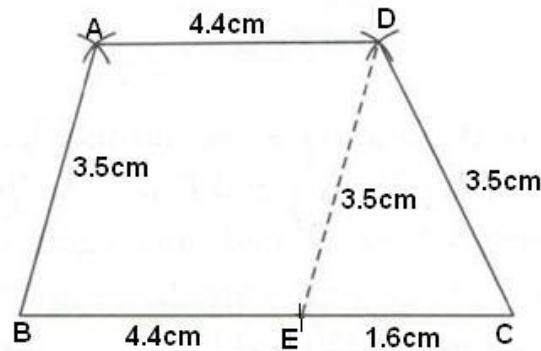


Steps of Construction:

- 1) Draw a line segment $AB = 5$ cm.
- 2) With A as centre draw an angle of 90° and bisect it to form $\angle BAD = 45^\circ$
- 3) With A as centre and radius 5 cm cut an arc on the ray making an angle of 45° with AB and mark it as D.
- 4) With D and B as centre and radii as 3.5 cm and 3.8 cm respectively draw arcs intersecting each other at C.
- 5) Join DC and BC.
- 6) ABCD is the required quadrilateral.

Solution 2:

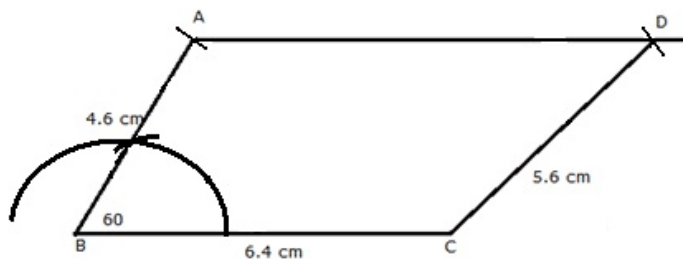
(i) $AB = 3.5$ cm, $BC = 6$ cm, $CD = 3.5$ cm, $AD = 4.4$ cm and $AD \parallel BC$.



Steps of construction:

- 1) Draw $BC = 6$ cm
- 2) From BC , cut $BE = AD = 4.4$ cm
- 3) Draw a triangle DEC , such that $DE = AB = 3.5$ cm and $CD = 3.5$ cm
- 4) Taking B and D as centres and radii 3.5 cm and 4.4 cm respectively, draw arcs cutting each other at A .
- 5) Join AB and AD .
- 6) $ABCD$ is the required trapezium.

(ii) $AB = 4.6$ cm, $BC = 6.4$ cm, $CD = 5.6$ cm, $\angle B = 60^\circ$ and $AD \parallel BC$.

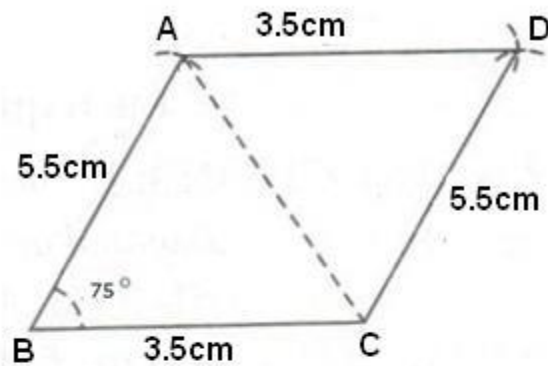


Steps of construction:

- 1) Draw $BC = 6.4$ cm
- 2) With B as centre, draw an angle of 60° and cut an arc with radius 4.6 cm. Mark the point as A .
- 3) From point A , draw a line segment parallel to BC .
- 4) With C as centre and radius 5.6 cm cut an arc on the line segment parallel to BC . Mark the point as D .
- 5) Join CD .
- 6) $ABCD$ is the required trapezium.

Solution 3:

(i) $AB = 5.5 \text{ cm}$, $BC = 3.5 \text{ cm}$, $\angle B = 75^\circ$



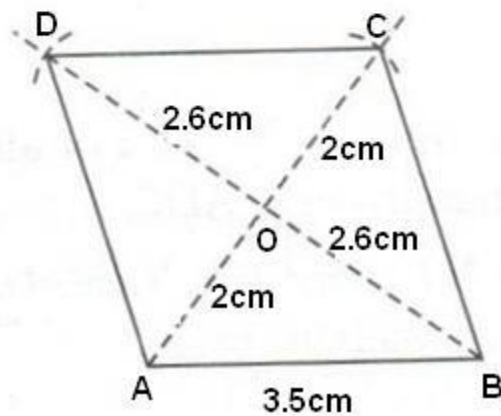
Since opposite sides of a parallelogram are equal;

$AB = DC = 5.5 \text{ cm}$ and $BC = AD = 3.5 \text{ cm}$

Steps of Construction:

- 1) Taking $AB = 5.5 \text{ cm}$, $BC = 3.5 \text{ cm}$ and $\angle B = 75^\circ$, construct triangle ABC.
- 2) Now, construct triangle ADC.
- 3) ABCD is the required parallelogram.

(ii) $AB = 3.5 \text{ cm}$, $AC = 4 \text{ cm}$ and $BD = 5.2 \text{ cm}$



Steps of construction:

- 1) Since diagonals of a parallelogram bisect each other; construct triangle OBC, such that:

$$OB = \frac{1}{2}BD = \frac{1}{2} \times 5.2\text{cm} = 2.6\text{cm}$$

$$OC = \frac{1}{2}AC = \frac{1}{2} \times 4\text{cm} = 2\text{cm}$$

And $AB = 3.5\text{ cm}$.

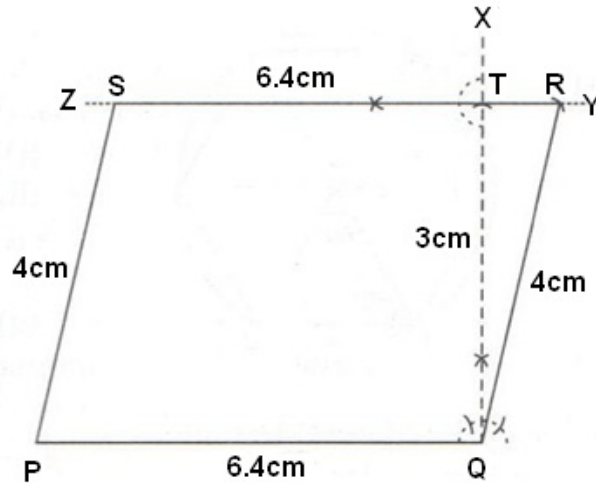
- 2) Produce AO up to C, such that $AO = OC = 2\text{ cm}$

And produce OB up to D, such that $OB = OD = 2.6\text{ cm}$.

- 3) Join BC, AD and CD.

- 4) ABCD is the required parallelogram.

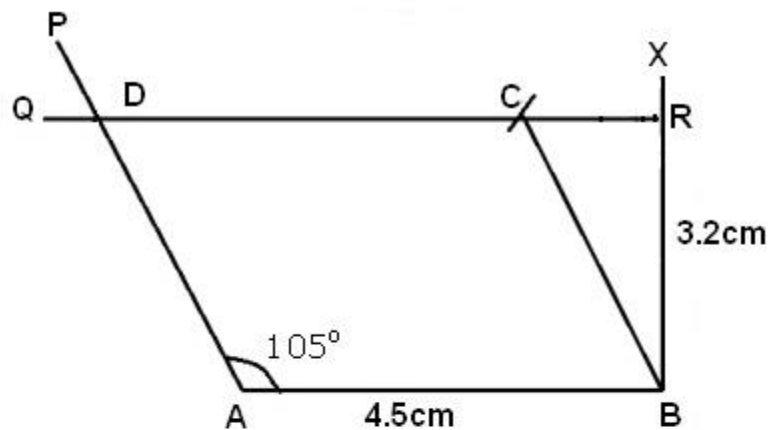
Solution 4:



Steps of Construction:

- 1) Draw $PQ = 6.4\text{ cm}$.
- 2) At Q, draw QX perpendicular to PQ .
- 3) From QX , cut $QT = 3\text{ cm}$ = distance between PQ and SR .
- 4) Through T, draw a perpendicular to QX to get ZY parallel to PQ .
- 5) With P as centre and radius = $QR = 4\text{ cm}$, draw an arc which cuts ZY at S.
- 6) With Q as centre and radius = 4 cm , draw an arc which cuts ZY at R.
- 7) ABCD is the required parallelogram.

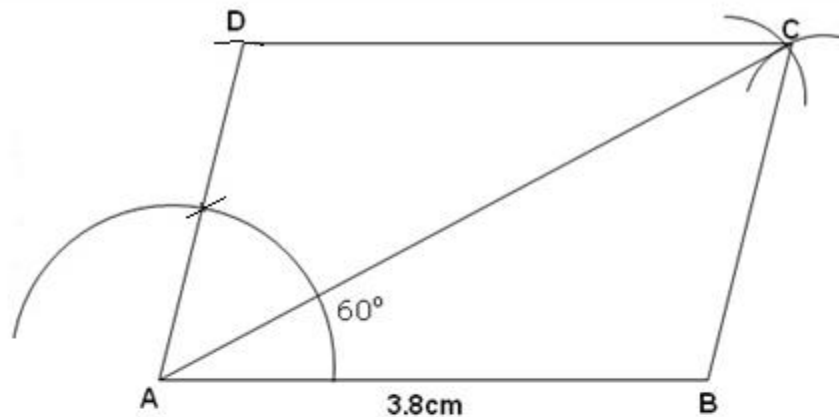
Solution 5:



Steps of construction:

- 1) Draw line $AB = 4.5$ cm.
- 2) At B, draw BX perpendicular to AB.
- 3) From BX, cut $BR = 3.2$ cm = distance between AB and CD.
- 4) Through R, draw a line perpendicular to BX to get QR parallel to AB.
- 5) With A as centre, draw a ray AP making an angle of 105° with AB and meeting QR at D.
- 6) With B as centre, draw an arc with radius = AD on QR and mark it as C.
- 7) Join BC.
- 8) ABCD is the required parallelogram.

Solution 6:

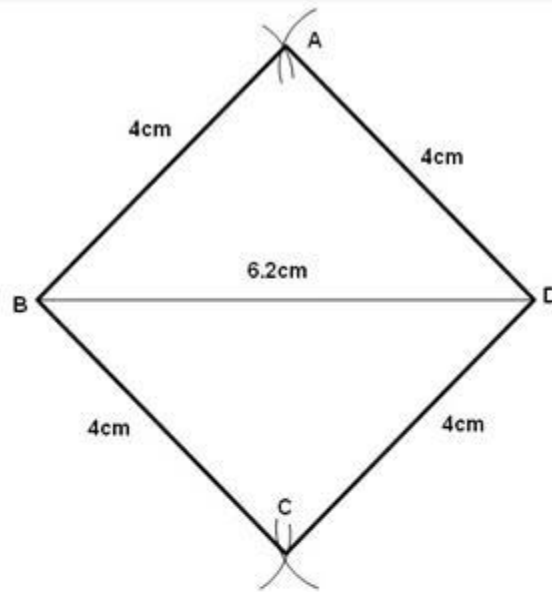


In rhombus length of all the sides is equal.

Steps of Construction:

- 1) Draw a line segment $AB = 3.8 \text{ cm}$
- 2) At A, draw a ray making an angle of 60° with AB.
- 3) With A as centre and radius 3.8 cm cut an arc on the ray making an angle of 60° with AB. Mark the point as D.
- 4) With B and D as centres and radii 3.8 cm mark two arcs cutting each other at point C.
- 5) Join DC and BC.
- 6) ABCD is the required rhombus.
- 7) On measuring $AC = 6.5 \text{ cm}$

Solution 7:



The length of all the sides of rhombus is equal.

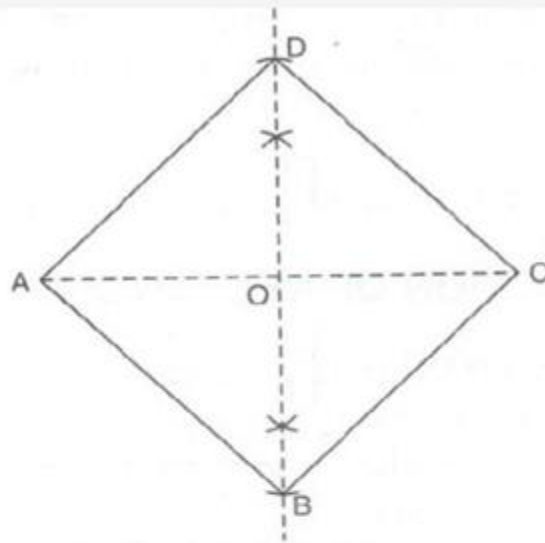
Hence, perimeter = side $\times$ 4

$$\Rightarrow \text{Side} = \text{perimeter}/4 = 16/4 = 4 \text{ cm}$$

Steps of construction:

- 1) Draw $BD = 6.2 \text{ cm}$.
- 2) With B as centre and radius 4 cm, draw two arcs one above BD and the other below BD.
- 3) With D as centre and radius 4 cm draw two arcs one above BD and the other below BD intersecting the arcs of Step 2 in A and C respectively.
- 4) Join AB, BC, CD and AD.
- 5) ABCD is the required rhombus.

Solution 8:



The diagonals of a rhombus bisect each other.

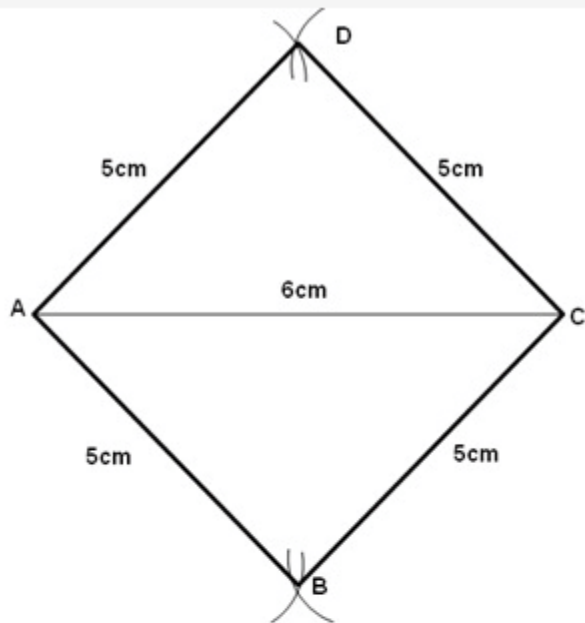
Steps of Construction:

- 1) Draw $AC = 7.4$ cm
- 2) Draw perpendicular bisector to AC which cuts AC at O.
- 3) From this perpendicular cut OD and OB such that

$$OD = OB = \frac{1}{2}BD = \frac{1}{2} \times 6\text{cm} = 3\text{cm}$$

- 4) Join AB, BC, CD and AD
- 5) ABCD is the required rhombus.

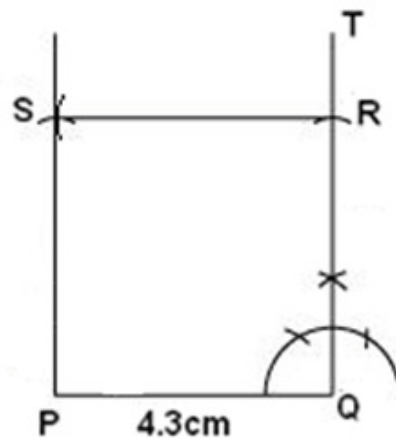
Solution 9:



In rhombus all sides are equal.

- 1) Draw $AC = 6$ cm.
- 2) With A as centre and radius 5 cm, draw two arcs one above AC and the other below AC.
- 3) With C as centre and radius 5 cm draw two arcs one above AC and the other below AC intersecting the arcs of Step 2 in B and D respectively.
- 4) Join AB, BC, CD and AD.
- 5) ABCD is the required rhombus.
- 6) On measuring, $AD = 5$ cm and $DB = 8$ cm.

Solution 10:

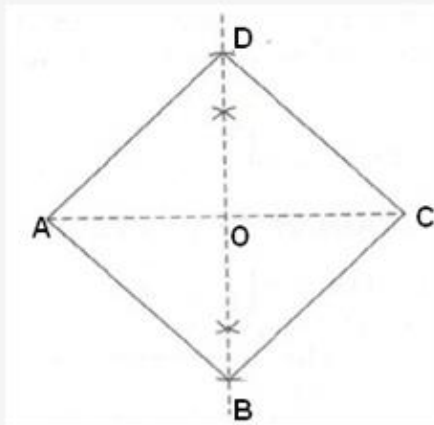


Sides of square are equal.

Steps of construction:

- 1) Draw $PQ = 4.3$ cm.
- 2) Construct $\angle PQT = 90^\circ$ at Q.
- 3) From QT cut off $QR = 4.3$ cm.
- 4) From P and R, draw two arcs of radii 4.3 cm each to cut each other at S.
- 5) Join PS and RS.
- 6) PQRS is the required square.

Solution 11:



The diagonals of a square are equal and bisect each other.

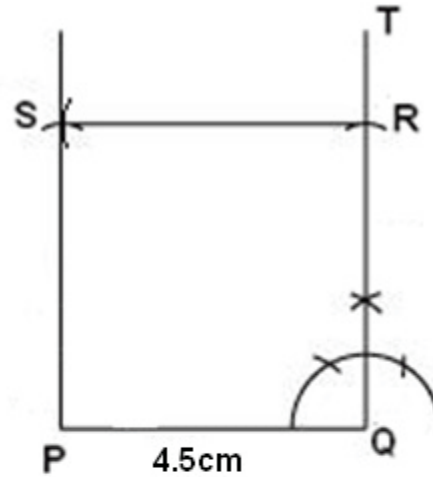
Steps of Construction:

- 1) Draw $AC = 6.5$ cm
- 2) Draw perpendicular bisector to AC which cuts AC at O.
- 3) From this perpendicular cut OD and OB such that

$$OD = OB = \frac{1}{2} BD = \frac{1}{2} \times 6.5 \text{ cm} = 3.25 \text{ cm}$$

- 4) Join AB, BC, CD and AD
- 5) ABCD is the required square.

Solution 12:



Sides of square are equal.

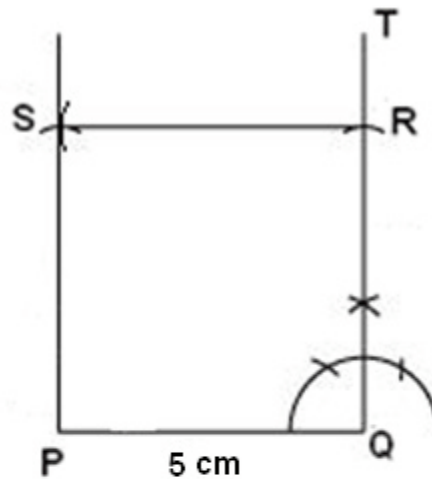
$$\Rightarrow \text{Perimeter} = 4 \times \text{side}$$

$$\Rightarrow \text{Side} = \text{perimeter}/4 = 18/4 = 4.5 \text{ cm}$$

Steps of construction:

- 1) Draw $PQ = 4.5 \text{ cm}$.
- 2) Construct $\angle PQT = 90^\circ$ at Q.
- 3) From QT cut off $QR = 4.5 \text{ cm}$.
- 4) From P and R, draw two arcs of radii 4.5 cm each to cut each other at S.
- 5) Join PS and RS.
- 6) PQRS is the required square.

Solution 13:



Steps of construction :

- 1) Draw $PQ = 5 \text{ cm}$.
- 2) Construct $\angle PQT = 90^\circ$ at Q.
- 3) From QT cut off $QR = 5 \text{ cm}$.
- 4) From P and R, draw two arcs of radii 5 cm each to cut each other at S.
- 5) Join PS and RS.
- 6) PQRS is the required square.

Solution 14(a):

Steps of construction:

Draw $AD = 3.2 \text{ cm}$

Draw $\angle XAD = 90^\circ$.

With D as centre and radius $BD = 5.5 \text{ cm}$, draw an arc to cut AX at point B.

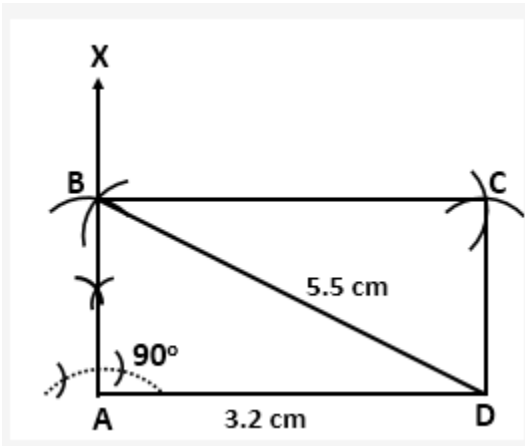
Join BD.

With B as centre and radius 3.2 cm draw an arc and with D as centre and radius = AB, draw another arc to cut the previous arc at C.

Join BC and CD.

Thus, ABCD is the required rectangle.

CD = 4.5 cm



Solution 14(b):

Steps of construction:

Draw BC = 6.2 cm

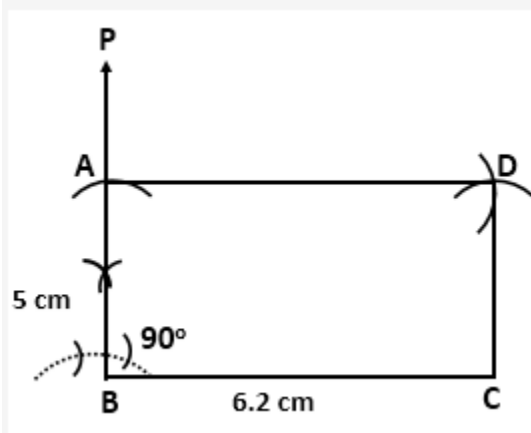
Through B, draw BP such that $\angle B = 90^\circ$

From BP, cut BA = 5 cm

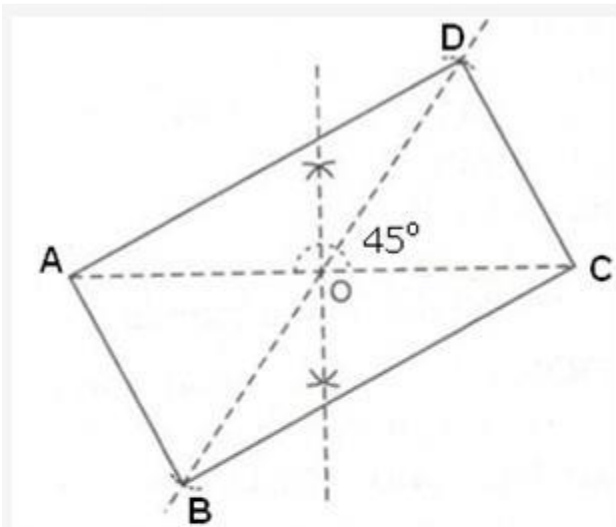
With A and C as centres and radii 6.2 cm and 5 cm respectively, draw arcs cutting each other at D.

Join AD and CD.

Thus, ABCD is the required triangle.



Solution 15:



Steps of Construction:

- 1) Draw $AC = 5.8$ cm and locate its mid-point O .
- 2) Draw line BOD such that $\angle DOC = 45^\circ$ and $OB = OD = \frac{1}{2}BD = \frac{1}{2} \times 5.8\text{cm} = 2.9$ cm.
- 3) Join AB , BC , CD and DA .
- 4) $ABCD$ is the required rectangle.

Solution 16:

Opposite sides of a rectangle are equal.

$$\Rightarrow AB = CD \text{ and } BC = DA$$

Perimeter of rectangle = $AB + BC + CD + DA$

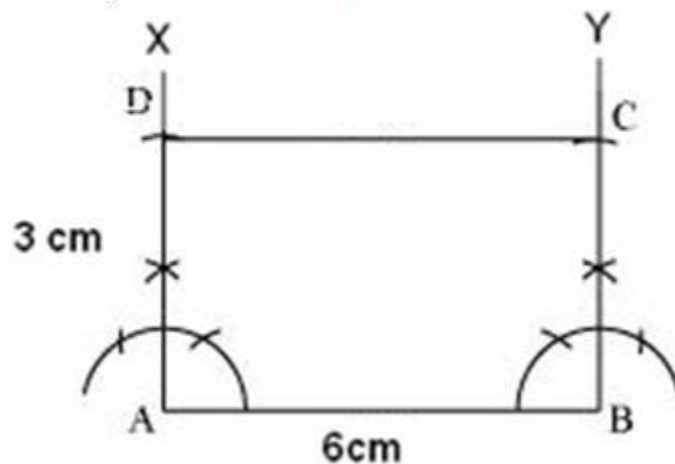
$$18 \text{ cm} = AB + BC + AB + BC$$

$$18 \text{ cm} = (6 + BC + 6 + BC) \text{ cm}$$

$$(18 - 12) \text{ cm} = 2BC$$

$$BC = 3 \text{ cm}$$

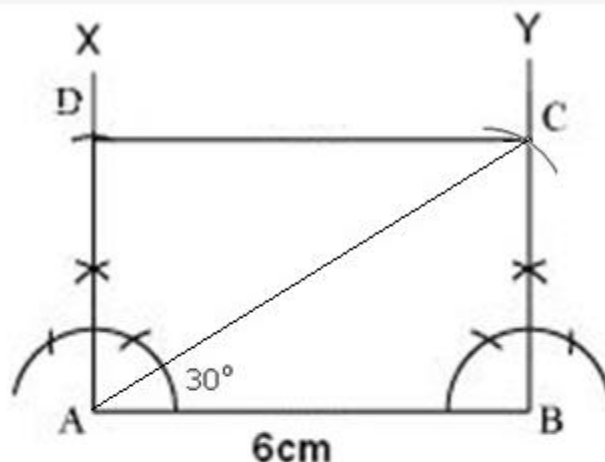
Therefore, $AB = CD = 6 \text{ cm}$ and $BC = DA = 3 \text{ cm}$



Steps of construction:

- 1) Draw a line segment $AB = 6 \text{ cm}$
- 2) On A and B draw perpendiculars AX and BY to AB.
- 3) With A and B as centres and radii 3 cm draw arcs on AX and BY. Mark them as D and C respectively.
- 4) Join CD.
- 5) ABCD is the required rectangle.

Solution 17:



Steps of construction:

- 1) Draw a line segment $AB = 6 \text{ cm}$
- 2) On A and B draw perpendiculars AX and BY to AB.
- 3) With A as centre, draw a line making an angle of 30° with AB and intersecting BY at C.
- 4) With A as centre and radius = BC cut an arc on AX. Mark it as D.
- 5) Join CD.
- 6) ABCD is the required rectangle.

Solution 18(a):

Since area of rectangle = 21 cm^2

And, length = 4.2 cm

Breadth = $\text{Area} \div \text{Length} = 21 \div 4.2 = 5 \text{ cm}$

Steps of construction:

Draw $BC = 5 \text{ cm}$

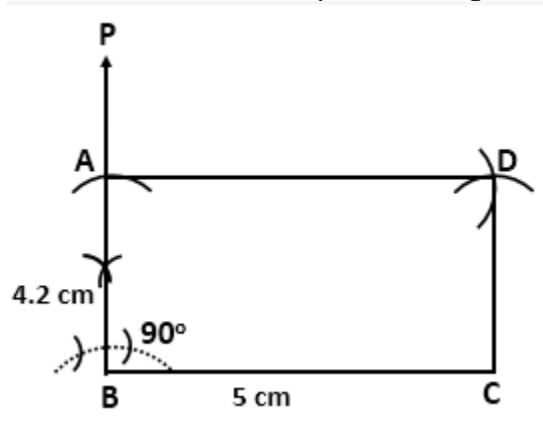
Through B, draw BP such that $\angle B = 90^\circ$

From BP, cut $BA = 4.2 \text{ cm}$

With A and C as centres and radii 5 cm and 4.2 cm respectively, draw arcs cutting each other at D.

Join AD and CD.

Thus, ABCD is the required triangle.



Solution 18(b):

Since area of rectangle = 33.8 cm^2

And, breadth = 6.5 cm

Length = $\text{Area} \div \text{Breadth} = 33.8 \div 6.5 = 5.2 \text{ cm}$

Steps of construction:

Draw $BC = 6.5 \text{ cm}$

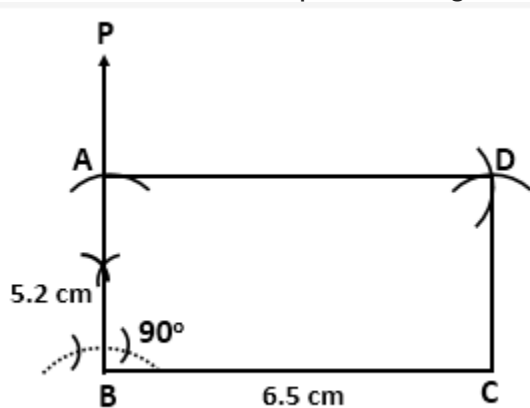
Through B, draw BP such that $\angle B = 90^\circ$

From BP, cut $BA = 5.2 \text{ cm}$

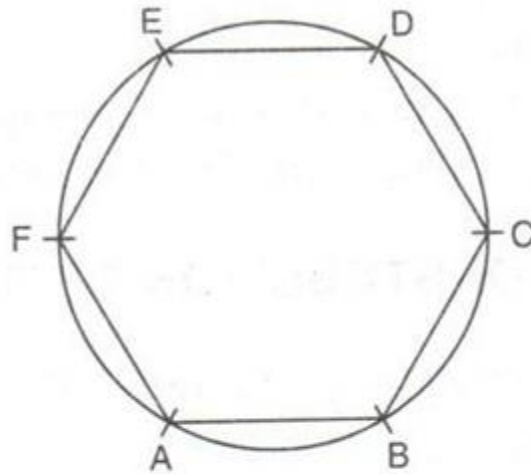
With A and C as centres and radii 6.5 cm and 5.2 cm respectively, draw arcs cutting each other at D.

Join AD and CD.

Thus, ABCD is the required triangle.



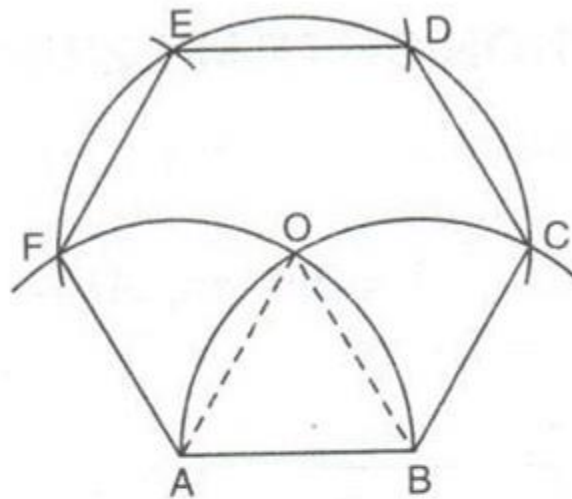
Solution 19:



Steps of Construction:

- 1) Draw a circle with radius = 3.5 cm.
- 2) Take a point A on the circle. With A as centre and radius 3.5 cm cut the circle at B and from B with radius 3.5 cm cut the circle at C and so on.
- 3) Join AB, BC, CD, DE, EF, AF
- 4) ABCDEF is the required regular hexagon.

Solution 20:



Steps of Construction:

- 1) Draw $AB = 4$ cm.
- 2) With centres A and B and radius 4 cm draw arcs to cut each other at O.
- 3) With centre O and the radius 4 cm cut the arcs in step 2 at C and F. Join AF, BC.
- 4) With centres C and F and radius 4 cm cut the arc drawn in step 3 at D and E. Join CD, DE and EF.
- 5) ABCDEF is the required regular hexagon.