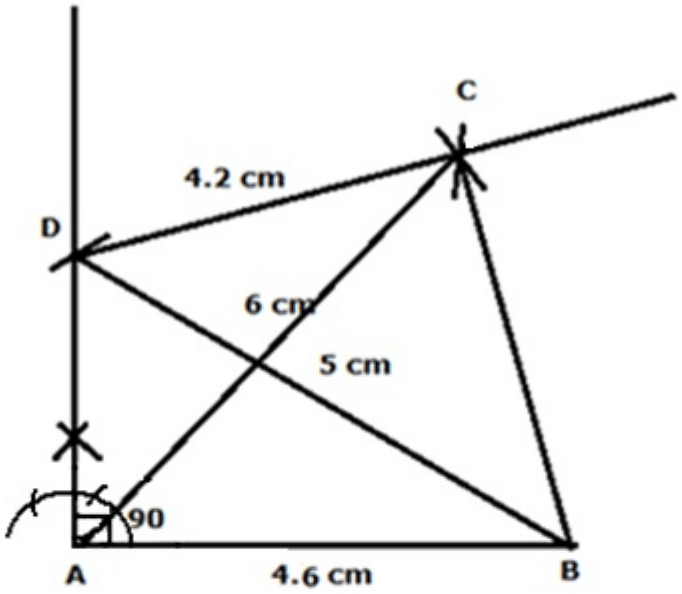
Constructions of Quadrilaterals

Ex No: 20.1

Solution 1:

(i) AB = 4.6 cm, BD = 5 cm, AC = 6 cm, CD = 4.2 cm and ∠A = 90°



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.

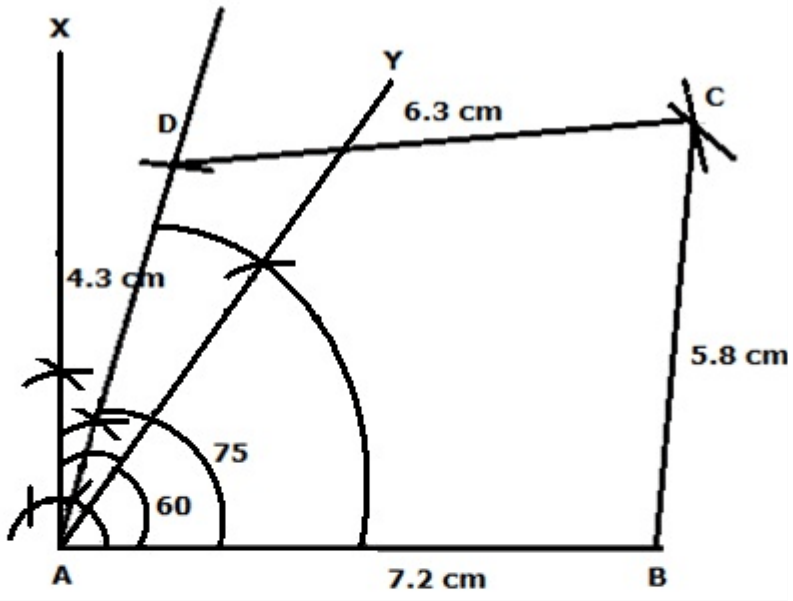
4) With D as centre and radius 4.2 cm cut an arc on right side of AD.

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 ∠A = 75°



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.

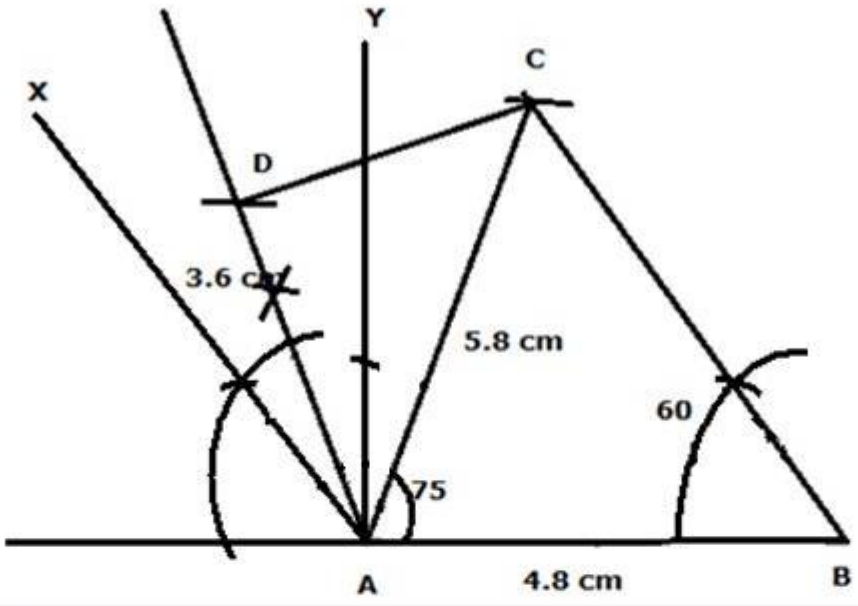
3) With A as centre and radius 4.3 cm cut an arc on line segment making 75° angles with AB and mark it as D.

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, ∠A = 105° and ∠B = 60°



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.

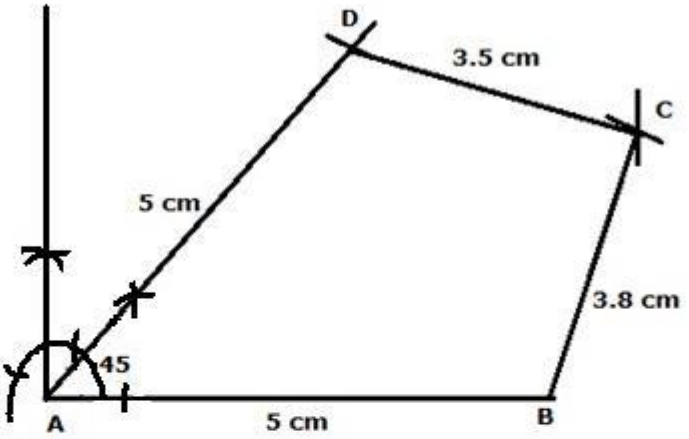
4) With B as centre draw a ray making and angle of 60° with AB.

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 ∠BAD = 45°



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 ∠BAD = 45°

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 ad D.

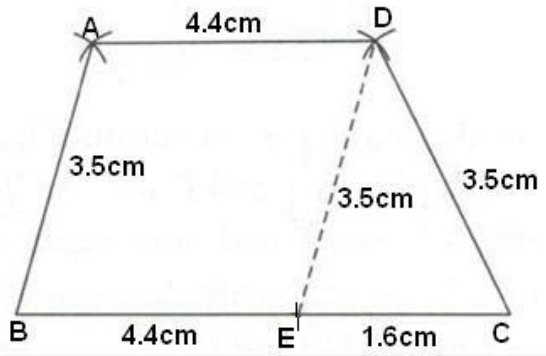
4) With D and B as centre and radii as 3.5 cm and 3.8 cm respectively draw arcs intersecting each other at C.

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||BC.



Steps of construction:

1) Draw BC = 6 cm

2) From BC, cut BE = AD = 4.4 cm

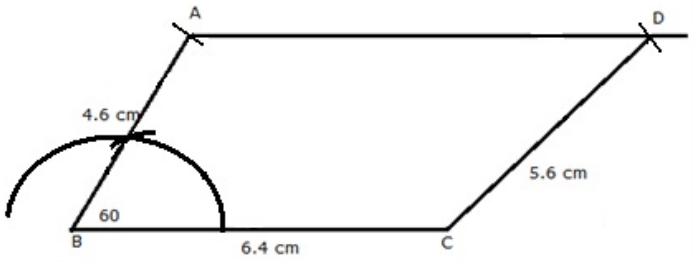
3) Draw a triangle DEC, such that DE = AB = 3.5 cm and CD = 3.5 cm

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, ∠B = 60° and AD||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.

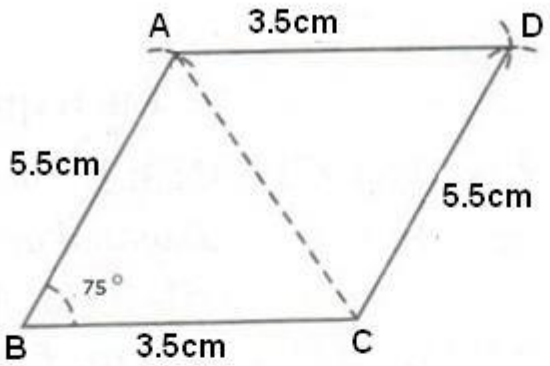
4) With C as centre and radius 5.6 cm cut an arc on the line segment parallel to BC. Mark the point as D.

5) Join CD.

6) ABCD is the required trapezium.

Solution 3:

(i) AB = 5.5 cm, BC = 3.5 cm, ∠B = 75°



Since opposite sides of a parallelogram are equal;

AB = DC = 5.5 cm and BC = AD = 3.5 cm

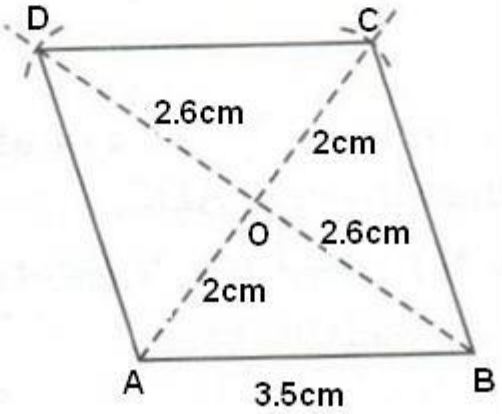
Steps of Construction:

1) Taking AB = 5.5 cm, BC = 3.5 cm and ∠B = 75°, construct triangle ABC.

2) Now, construct triangle ADC.

3) ABCD is the required parallelogram.

(ii) AB = 3.5 cm, AC = 4 cm and BD = 5.2 cm



Steps of construction:

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

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

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

And AB = 3.5 cm.

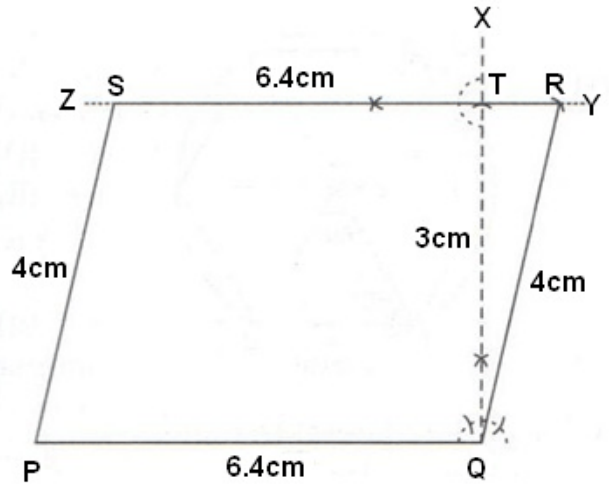
2) Produce AO up to C, such that AO = OC = 2 cm

And produce OB up to D, such that OB = OD = 2.6 cm.

3) Join BC, AD and CD.

4) ABCD is the required parallelogram.

Solution 4:



Steps of Construction:

1) Draw PQ = 6.4 cm.

2) At Q, draw QX perpendicular to PQ.

3) From QX, cut QT = 3 cm = distance between PQ and SR.

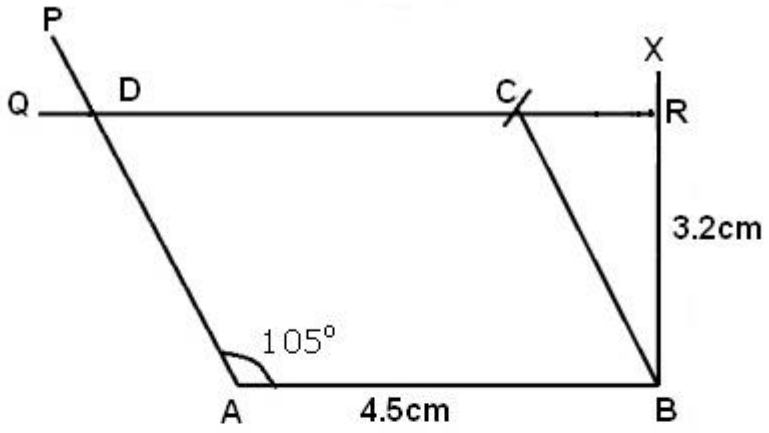
4) Through T, draw a perpendicular to QX to get ZY parallel to PQ.

5) With P as centre and radius = QR = 4 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.

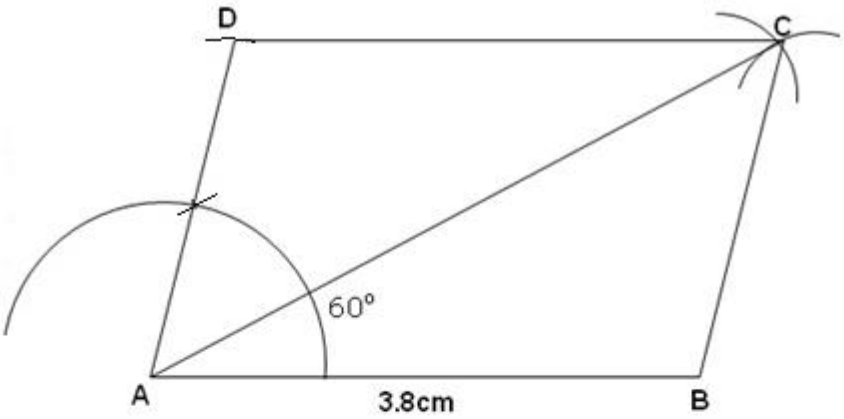
5) With A as centre, draw a ray AP making an angle of 105° with AB and meeting QR at D.

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 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.

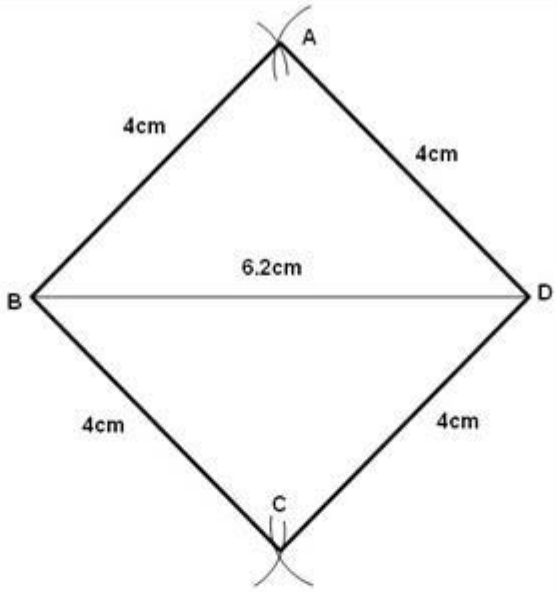
4) With B and D as centres and radii 3.8 cm mark two arcs cutting each other at point C.

5) Join DC and BC.

6) ABCD is the required rhombus.

7) On measuring AC = 6.5 cm

Solution 7:



The length of all the sides of rhombus is equal.

Hence, perimeter = side x 4

$\Rightarrow$ Side = perimeter/4 = 16/4 = 4 cm

Steps of construction:

1) Draw BD = 6.2 cm.

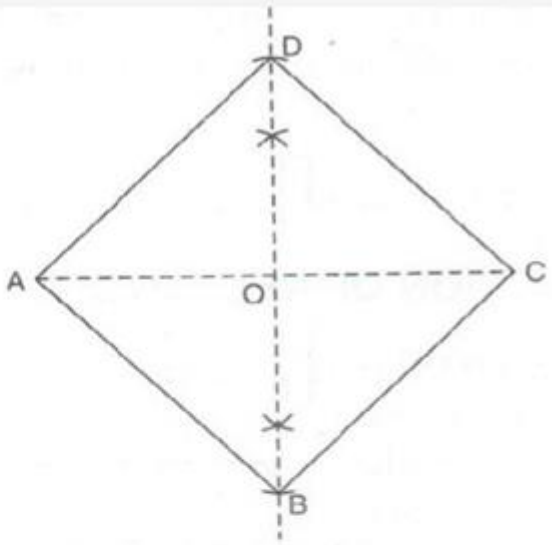
2) With B as centre and radius 4 cm, draw two arcs one above BD and the other below BD.

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.

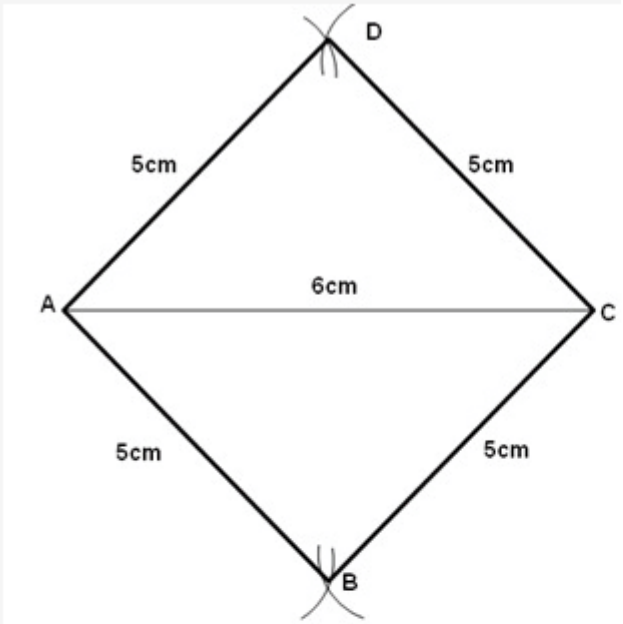
3) From this perpendicular cut OD and OB such that

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

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.

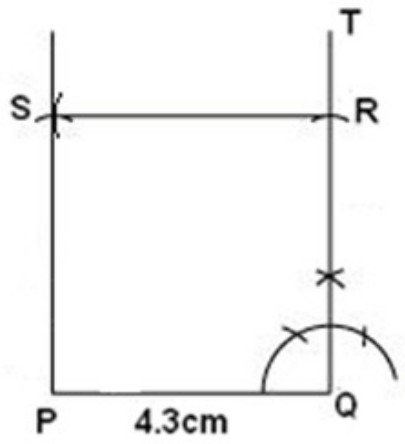
3) With C as centre and radius 5 cm draw two arcs one above AC and the other below AC intersecting the arcs of Step 2 in B and D respectively.

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 ∠PQT = 90° at Q.

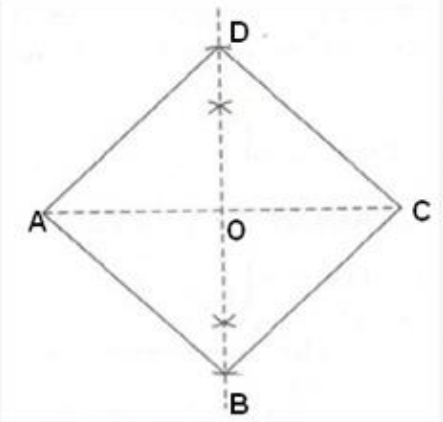
3) From QT cut off QR = 4.3 cm.

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.

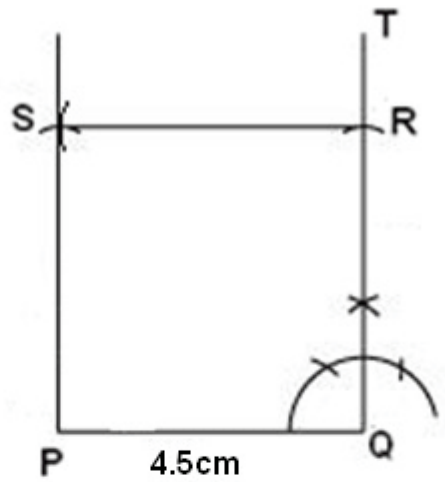
3) From this perpendicular cut OD and OB such that

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

4) Join AB, BC, CD and AD

5) ABCD is the required square.

Solution 12:



Sides of square are equal.

$\Rightarrow$ Perimeter = 4 x side

$\Rightarrow$ Side = perimeter/4 = 18/4 = 4.5 cm

Steps of construction:

1) Draw PQ = 4.5 cm.

2) Construct $\angle PQT = 90°$ at Q.

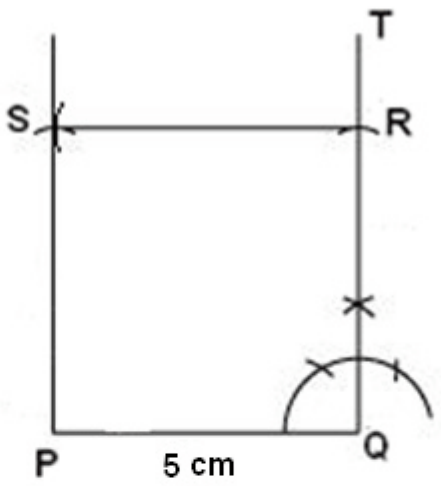
3) From QT cut off QR = 4.5 cm.

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 cm.

2) Construct ∠PQT = 90° at Q.

3) From QT cut off QR = 5 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.

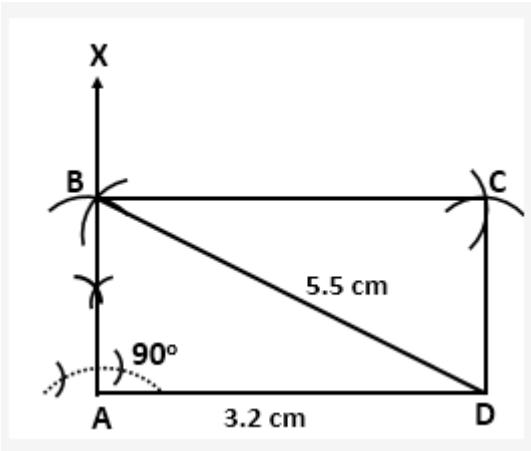
6) PQRS is the required square.

Solution 14(a):

Steps of construction:

Draw AD = 3.2 cm
Draw ∠XAD = 90°.
With D as centre and radius BD = 5.5 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

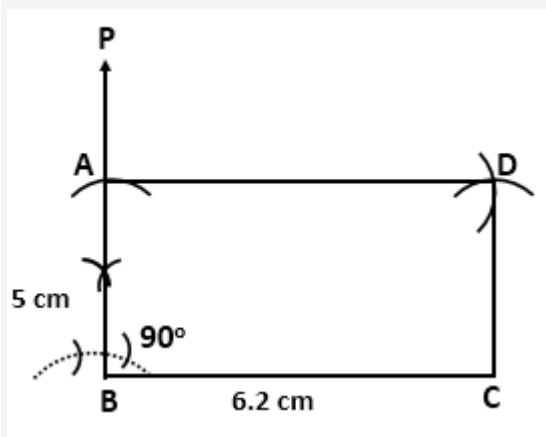
Through B, draw BP such that ∠B = 90°

From BP, cut BA = 5 cm

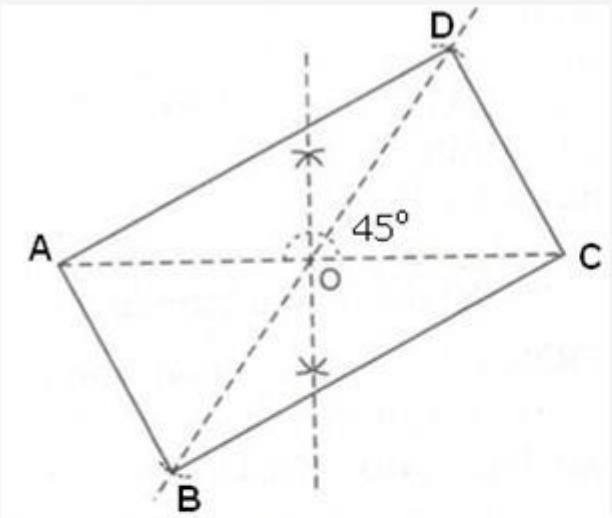
With A and C as centres and radii 6.2 cm and 5 cm respectively, draw arcs cutting each other at D.

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 $\angle DOC = 45°$ and $OB = OD = \frac{1}{2}BD = \frac{1}{2} \times 5.8cm =$ 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.

$\Rightarrow AB = CD$ and $BC = DA$

Perimeter of rectangle = AB+BC+CD+DA

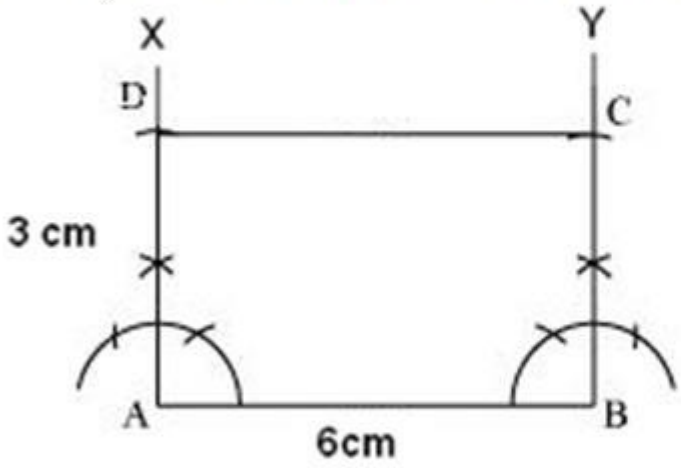
18 cm = AB+BC+AB+BC

18 cm = (6+BC+6+BC) cm

(18 – 12) cm =2BC

BC = 3 cm

Therefore, AB = CD = 6 cm and BC = DA = 3 cm



Steps of construction:

1) Draw a line segment AB = 6 cm

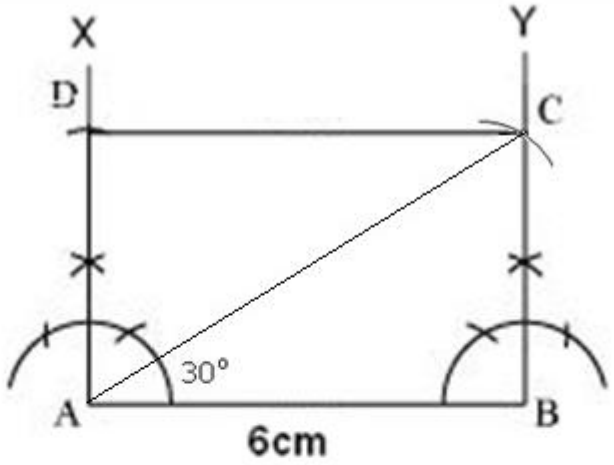
2) On A and B draw perpendiculars AX and BY to AB.

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 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.

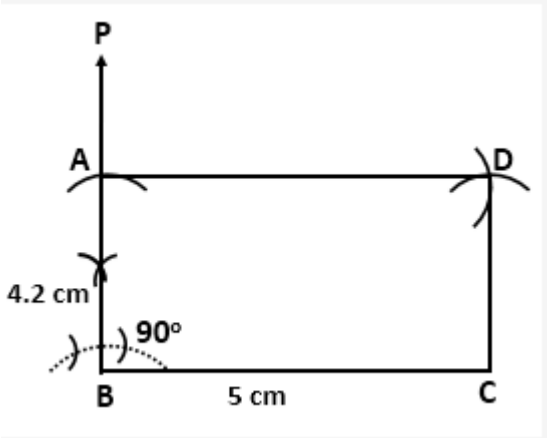
5) Join CD.

6) ABCD is the required rectangle.

Solution 18(a):

Since area of rectangle = 21 cm^2
And, length = 4.2 cm
Breadth = Area ÷ Length = 21 ÷ 4.2 = 5 cm
Steps of construction:
Draw BC = 5 cm
Through B, draw BP such that ∠B = 90°
From BP, cut BA = 4.2 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.

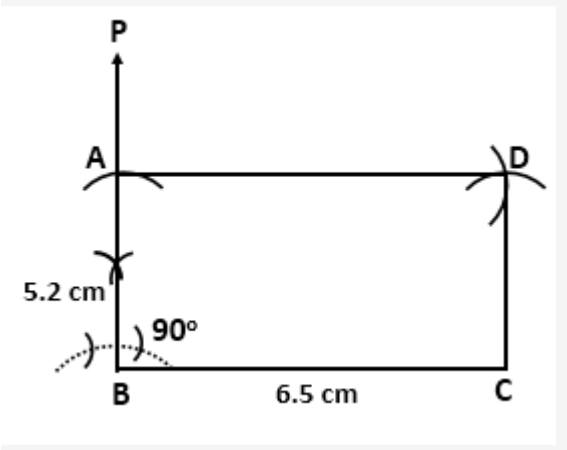


Solution 18(b):

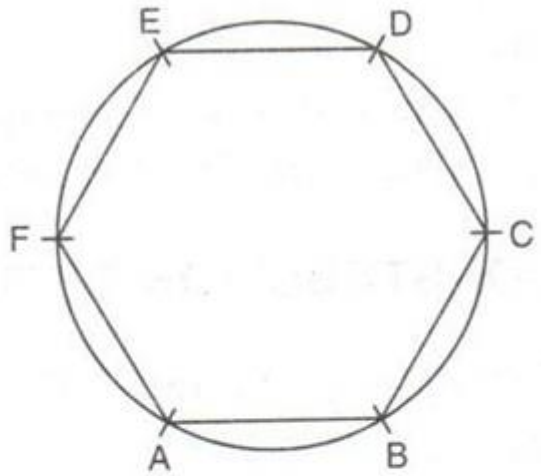
Since area of rectangle = 33.8 cm^2
And, breadth = 6.5 cm
Length = Area ÷ Breadth = 33.8 ÷ 6.5 = 5.2 cm

Steps of construction:

Draw BC = 6.5 cm
Through B, draw BP such that ∠B = 90°
From BP, cut BA = 5.2 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:

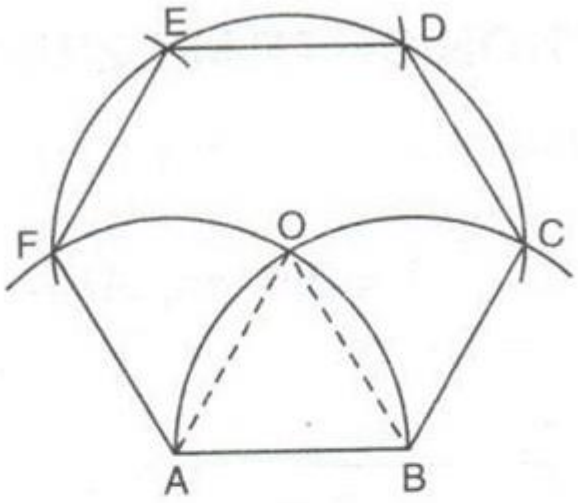
1) Draw a circle with radius = 3.5 cm.

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.