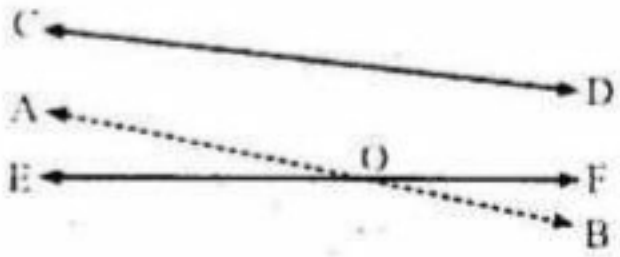
UNIT 8

PRACTICAL GEOMETRY

EXERCISE 8.1

1. ***Given two converging lines CD and EF. Find the angle between them without producing the lines.***



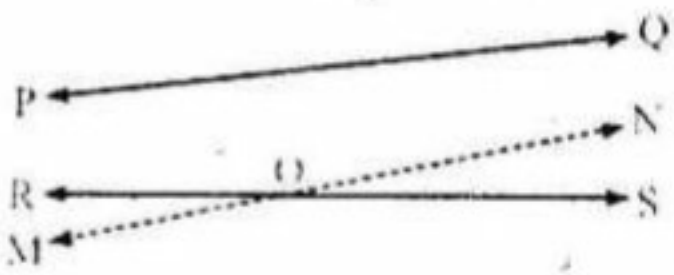
Steps of Constructions

(1) Draw converging lines CD and EF.

(2) Draw a line AB parallel to line CD which intersects line EF at point O.

(3) Final ∠EOA with the help of protector which is required angle between the line CD and EF.

2. ***Draw two converging lines PQ and RS. Find the angle b/w them without producing the lines.***



Steps of Constructions

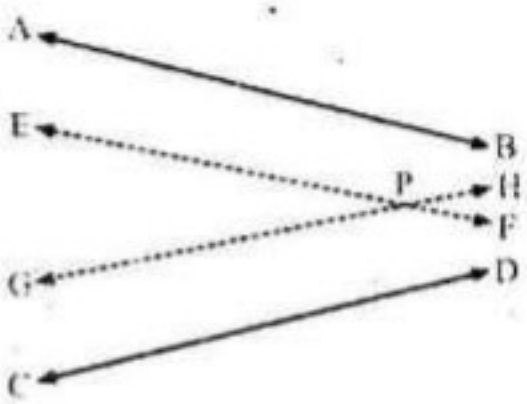
(1) Draw two converging lines RS and PQ.

(2) Draw a line MN parallel to line RQ line RS at point O.

(3) Final ∠MON with the help of protector which is required angle between lines PQ and RS.

3. ***Given two converging lines AB and CD. Bisect the*** *producing the*

MATHEMATICS FOR 8TH CLASS (UNIT 8)



Steps of Construction

(1) Draw two converging lines AB and CD.

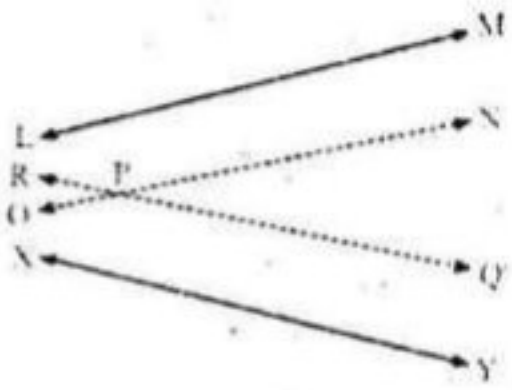
(2) Draw a line EF at a distance D from line AB and parallel to line AB.

(3) Draw another line GH at the same distance from line CD and parallel to line CD.

(4) Lines EF and GH intersect each other at point P.

(5) Draw bisector PQ of ∠EPG which is the required angle bisector.

4. Draw two converging lines LM and XY. Bisect the angle between them without producing the lines.



Steps of Constructions

(1) Draw two converging lines LM and XY.

(2) Draw a line ON at a distance Y from line LM and parallel to line LM.

(3) Draw another line RQ at the same distance from line XY and parallel to XY.

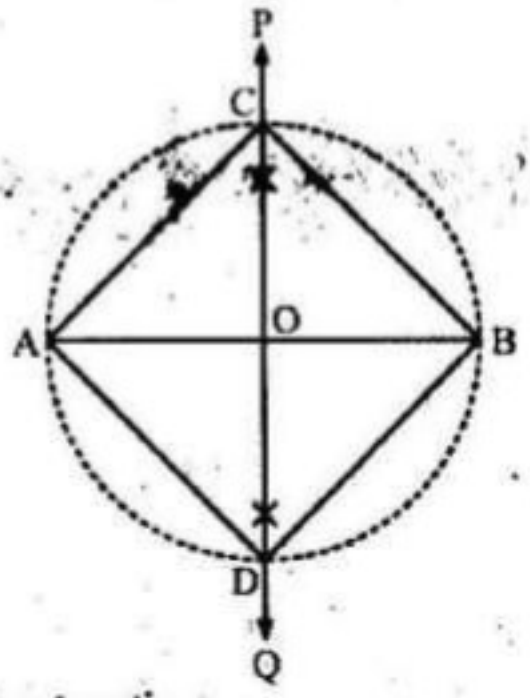
(4) Lines RQ and NO intersect each other at point P.

(5) Draw bisector PQ of ∠OPN which is the required angle bisector.

EXERCISE 8.2

1. Construct the squares whose diagonals have lengths.

(i) 5.4cm



Steps of Construction

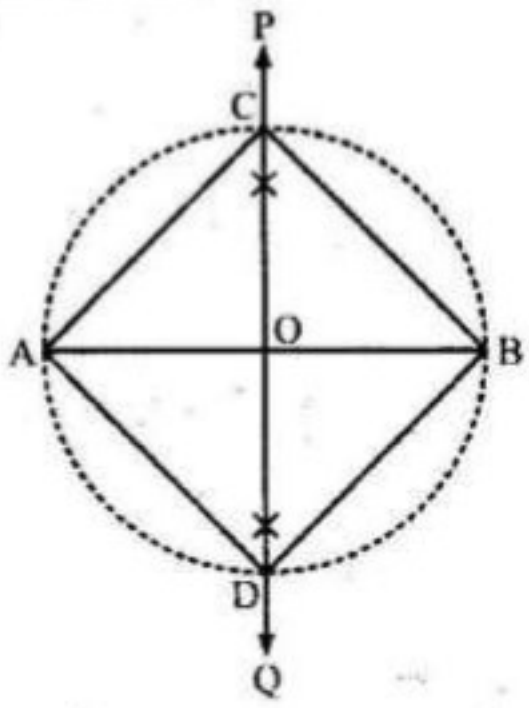
(1) Draw AB = 5.4cm.

(2) Draw a right bisector PQ of $\overline{AB}$ intersecting it at point O.

(3) With centre O, construct a circle of radius OA or OB intersecting the line PQ at points C and D.

(4) Join point A to C and D. Similarly join point B to C and D. ABCD is required square.

(ii) 6.2cm



Steps of Constructions

(1) Draw AB = 6.2cm.

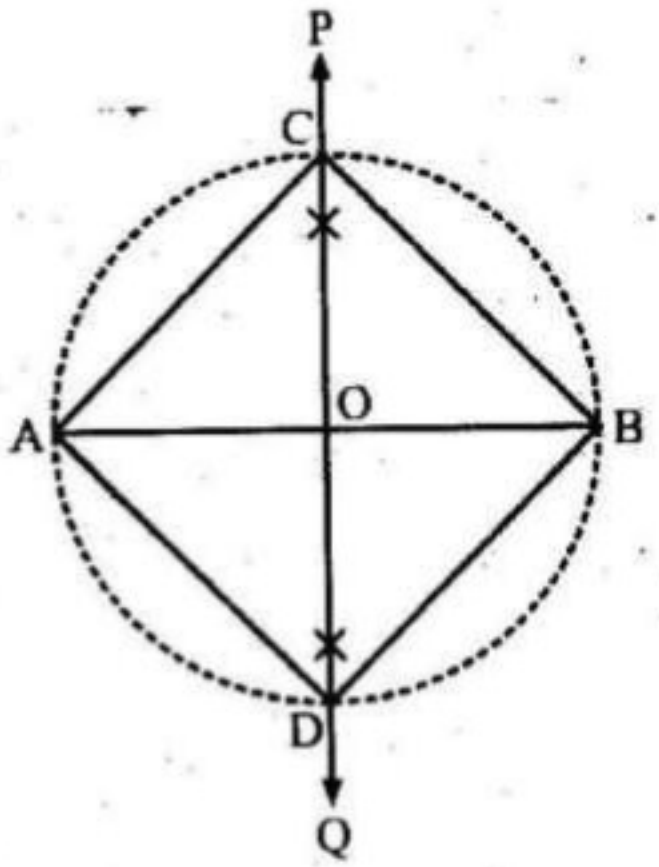
(2) Draw a right bisector PQ of $\overline{AB}$ intersecting it at point O.

(3) With centre O, construct a circle of radius OA or OB interesting the line PQ at points C and D.

(4) Join point A to C and D. Similarly join point B to C and D.

ABCD is required square.

(iii) 5.8cm



Steps of Constructions

(1) Draw AB = 5.8cm.

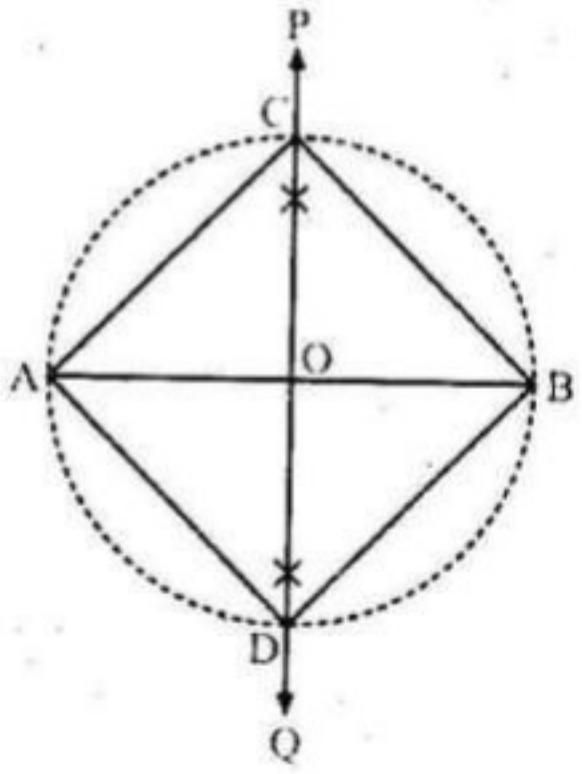
(2) Draw a right bisector PQ of $\overline{AB}$ intersecting it at point O.

(3) With centre O, construct a circle of radius OA or OB interesting the line PQ at points C and D.

(4) Join point A to C and D. Similarly join point B to C and D.

ABCD is required square.

(iv) 5cm



Steps of Constructions

(1) Draw AB = 5cm.

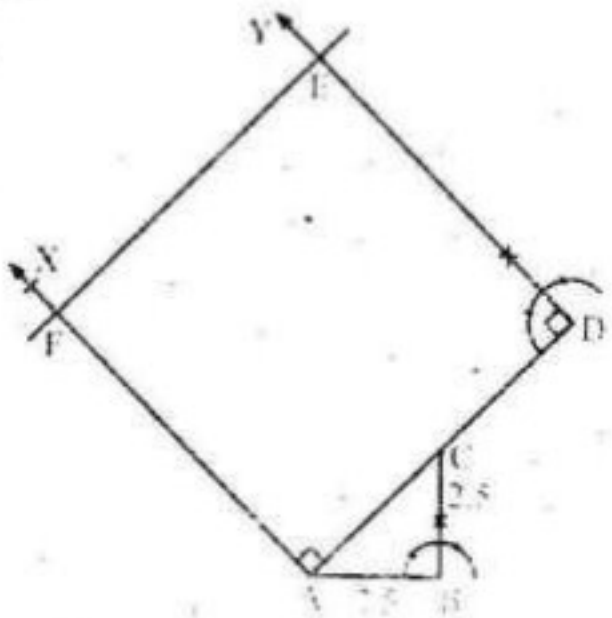
(2) Draw a right bisector PQ of $\overline{AB}$ intersecting it at point O.

(3) With centre O, construct a circle of radius OA or OB interesting the line PQ at points C and D.

(4) Join point A to C and D. Similarly join point B to C and D. ABCD is required square.

2. ***Construct the square when difference of its diagonal and side is:***

(i) 2.5cm



Steps of Constructions

(1) Draw AB = 2.5cm.

(2) Construct a right angled triangle ABC such that AB = BC.

(3) Produce $\overline{AC}$ to point D such that BC = CD. ($\overline{AD}$ is the side of required square).

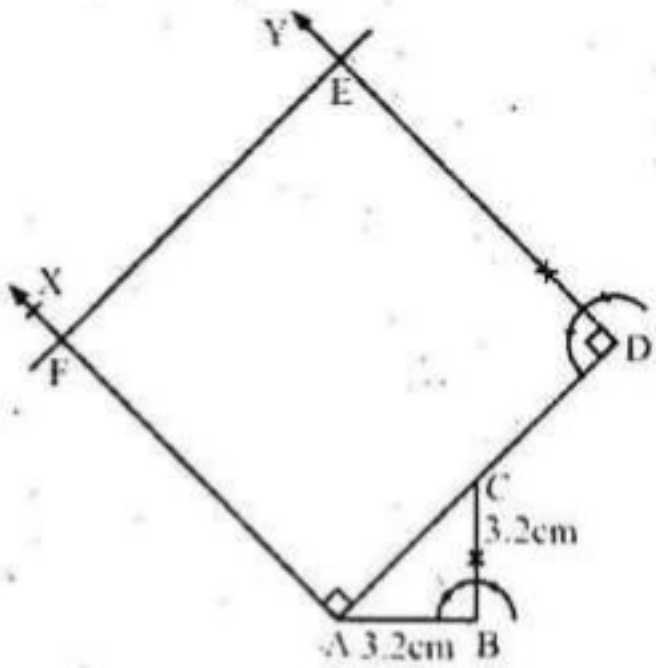
(4) Construct $\angle DAX = \angle ADY = 90^0$.

(5) With centre D, draw an arc of radius equal to AD, intersecting ray DY at point E.

(6) With centre A, draw an arc of radius equal to AD, intersecting ray AX at point F.

(7) Join point E to F. ADEF is required square.

(ii) 3.2cm



Steps of Constructions

(1) Draw AB = 3.2cm.

(2) Construct a right angled triangle ABC such that AB = BC.

(3) Produce $\overline{AC}$ to point D such that BC = CD. ($\overline{AD}$ is the side of required square).

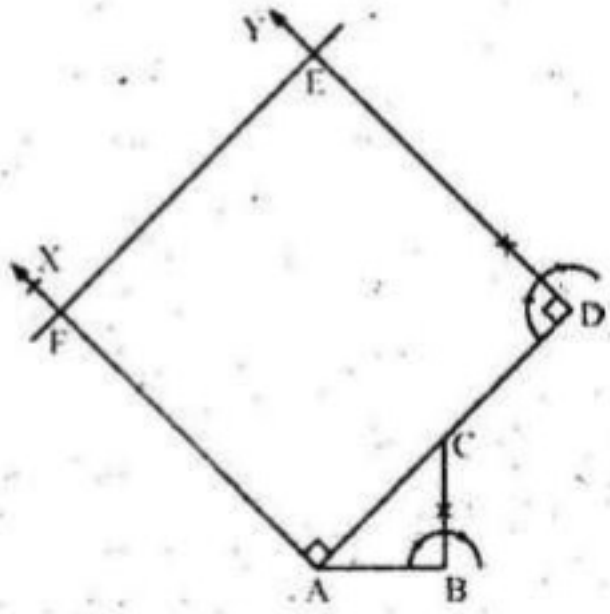
(4) Construct $\angle DAX = \angle ADY = 90^0$.

(5) With centre D, draw an arc of radius equal to AD, intersecting ray DY at point E.

(6) With centre A, draw an arc of radius equal to AD, intersecting ray AX at point F.

(7) Join point E to F. ADEF is required square.

(iii) 2.3cm



Steps of Constructions

(1) Draw AB = 2.3cm.

(2) Construct a right angled triangle ABC such that AB = BC.

(3) Produce $\overline{AC}$ to point D such that BC = CD. ($\overline{AD}$ is the side of required square).

(4) Construct $\angle DAX = \angle ADY = 90^{o}$.

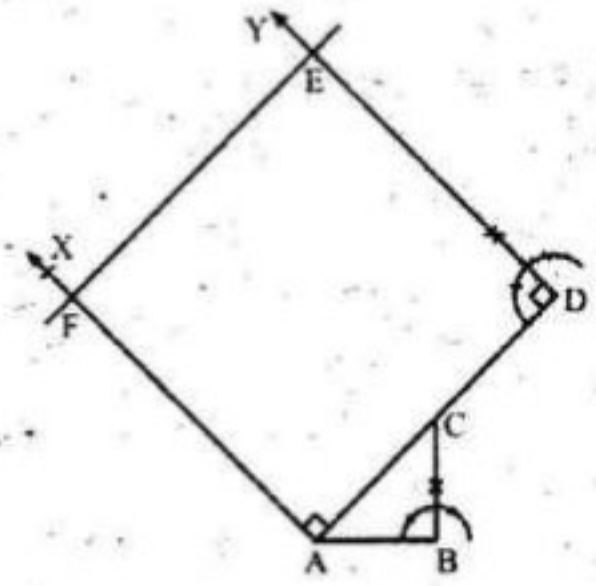
(5) With centre D, draw an arc of radius equal to AD, intersecting ray DY at point E.

(6) With centre A, draw an arc of radius equal to AD, intersecting ray AX at point F.

(7) Join point E to F. ADEF is required square.

3. Construct the square when the sum of its diagonal and side is:

(i) 10cm



Steps of Constructions

(1) Draw AB = 10cm.

(2) Construct $\angle BAC = 45^\circ$.

(3) Construct $\angle ABD = 22.5^\circ$ such that outer arms of both the angles intersect at point E.

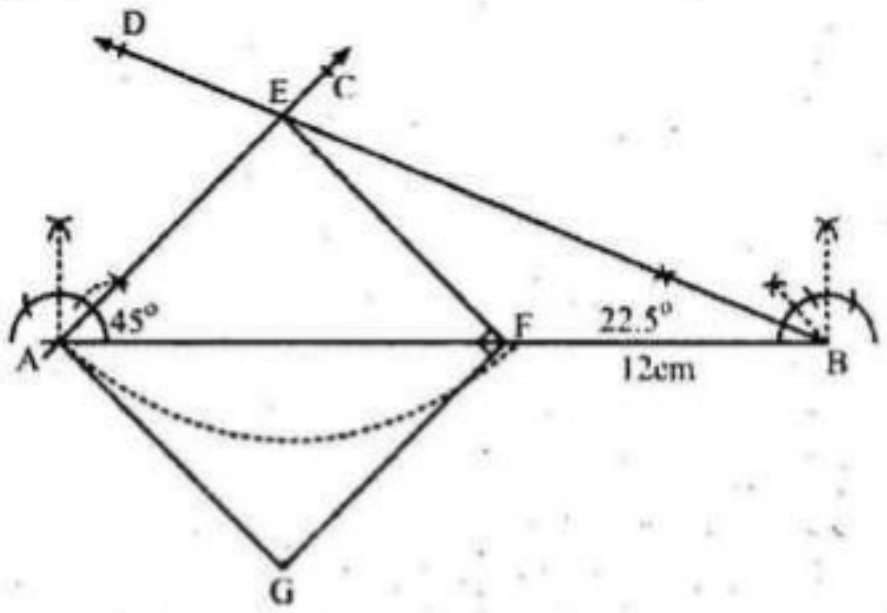
(4) With centre E, draw an arc equal to radius EA, intersecting $\overline{AB}$ at point F.

(5) Join F to E.

(6) With centre A and F, draw two arcs of radius AE intersecting at point G.

(7) Join point E to A and F. AEFG is required square.

(ii) 12cm



Steps of Constructions

(1) Draw AB = 12cm.

(2) Construct $\angle BAC = 45^\circ$.

(3) Construct $\angle ABD = 22.5^\circ$ such that outer arms of both the angles intersect at point E.

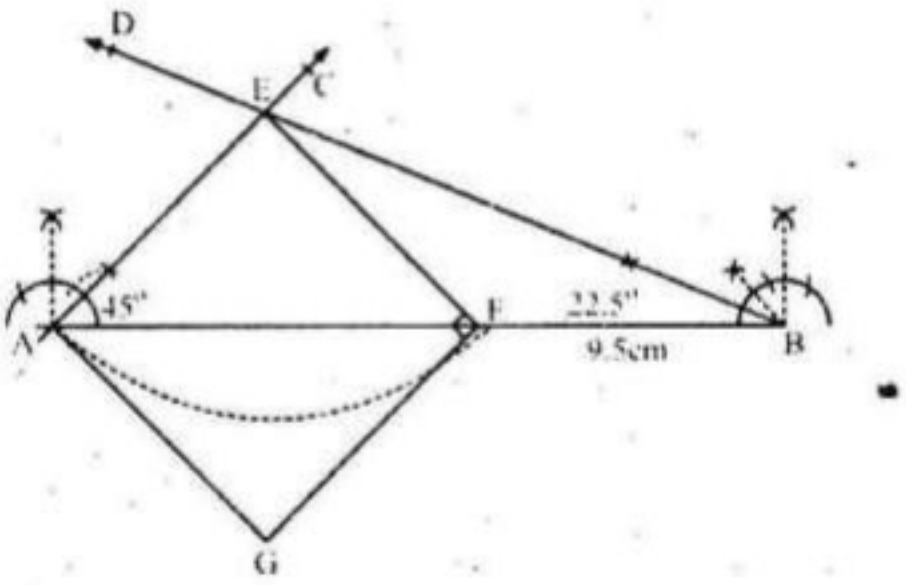
(4) With centre E, draw an arc equal to radius EA, intersecting $\overline{AB}$ at point F.

(5) Join F to E.

(6) With centre A and F, draw two arcs of radius AE intersecting at point G.

(7) Join point E to A and F. AEFG is required square.

(iii) 9.5cm



Steps of Constructions

(1) Draw AB = 9.5cm.

(2) Construct $\angle BAC = 45^\circ$.

(3) Construct $\angle ABD = 22.5^\circ$ such that outer arms of both the angles intersect at point E.

(4) With centre E, draw an arc equal to radius EA, intersecting $\overline{AB}$ at point F.

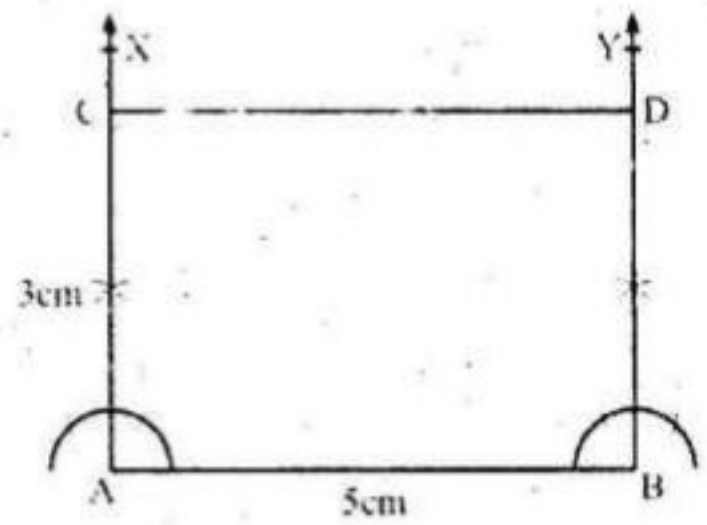
(5) Join F to E.

(6) With centre A and F, draw two arcs of radius AE intersecting at point G.

(7) Join point E to A and F. AEFG is required square.

4. Construct a rectangle when its two sides are:

(i) 5cm and 3cm



Steps of Constructions

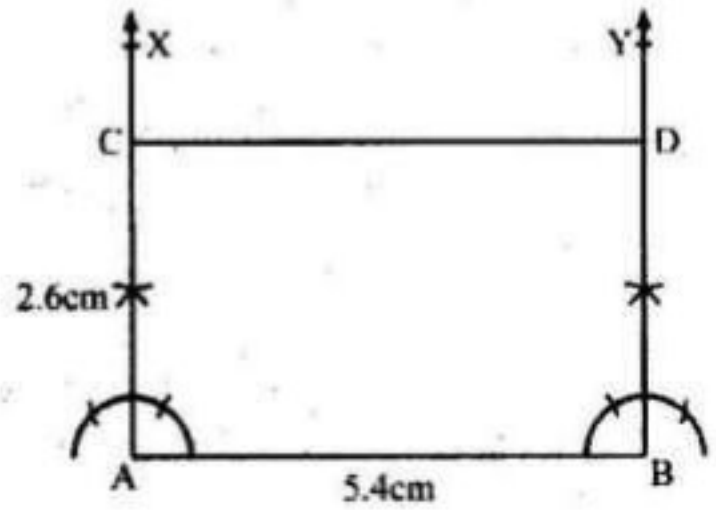
(1) Draw AB = 5cm.

(2) Draw perpendiculars AX and BY at both ends of $\overline{AB}$.

(3) On the ray AX, take AC = 3cm. Similarly on the ray by, take BD = 3cm.

(4) Join C to D to obtain a rectangle ABGD.

(ii) 5.4cm and 2.6cm



Steps of Constructions

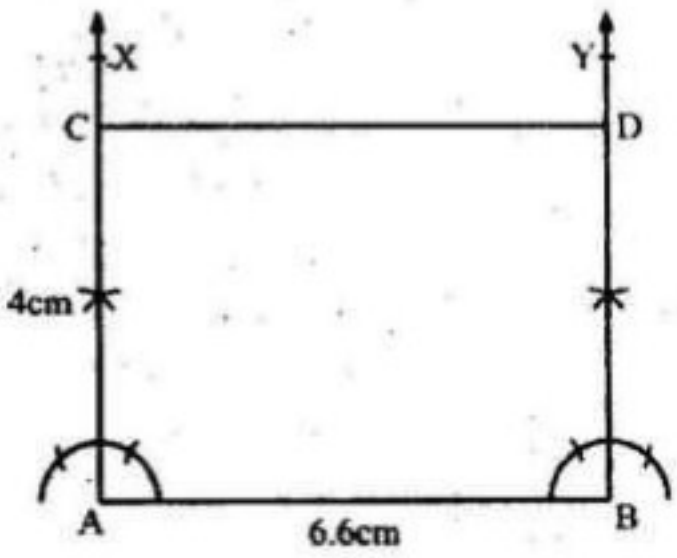
(1) Draw AB = 5.4cm.

(2) Draw perpendiculars AX and BY at both ends of $\overline{AB}$.

(3) On the ray AX, take AC = 2.6cm. Similarly on the ray by, take BD = 2.6cm.

(4) Join C to D to obtain a rectangle ABCD.

(iii) 6.6cm and 4cm



Steps of Constructions

(1) Draw AB = 6.6cm.

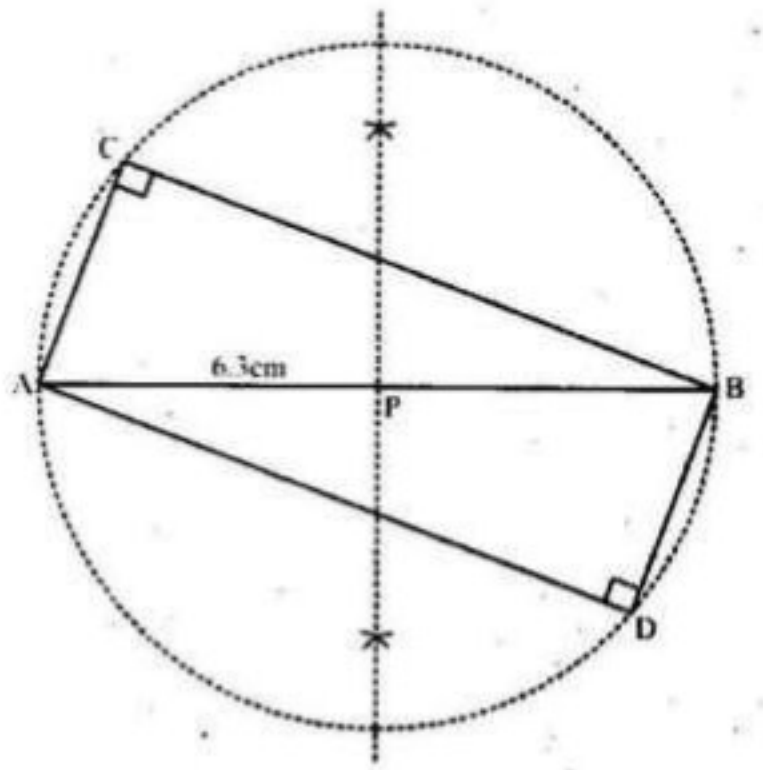
(2) Draw perpendiculars AX and BY at both ends of $\overline{AB}$.

(3) On the ray AX, take AC = 4cm. Similarly on the ray by, take BD = 4cm.

(4) Join C to D to obtain a rectangle ABCD.

5. Construct a rectangle when

(i) diagonal = 6.3cm, side = 2.2cm



Steps of Constructions

(1) Draw AB = 6.3cm.

(2) Bisect AB at point P.

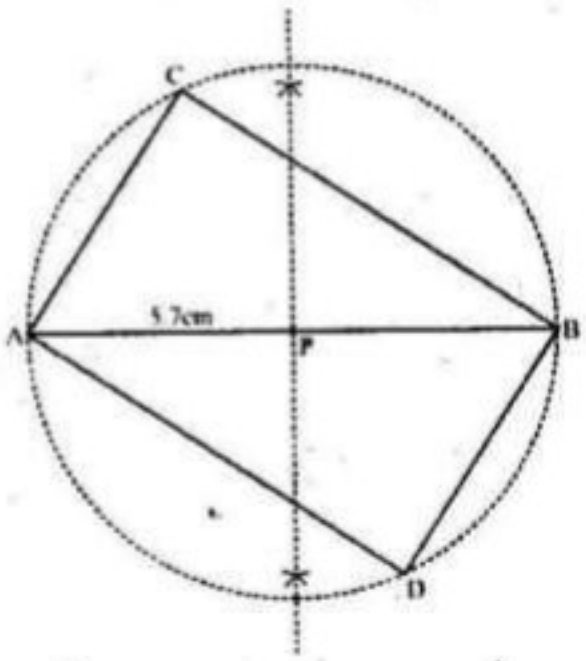
(3) With centre P, construct a circle of radius PA or PB.

(4) With centre A, draw an arc of radius 2.2cm intersecting the circle at point C.

(5) With centre B, draw another arc of radius 2.2cm intersecting the circle at point D.

(6) Join point A to C and D.
Also join point B to C and D.
ABCD is required rectangle.

(ii) diagonal = 5.7cm, side = 3.1cm



Steps of Constructions

(1) Draw AB = 5.7cm.

(2) Bisect $\overline{AB}$ at point P.

(3) With centre P, construct a circle of radius PA or PB.

(4) With centre A, draw an arc of radius 3.1cm intersecting the circle at point C.

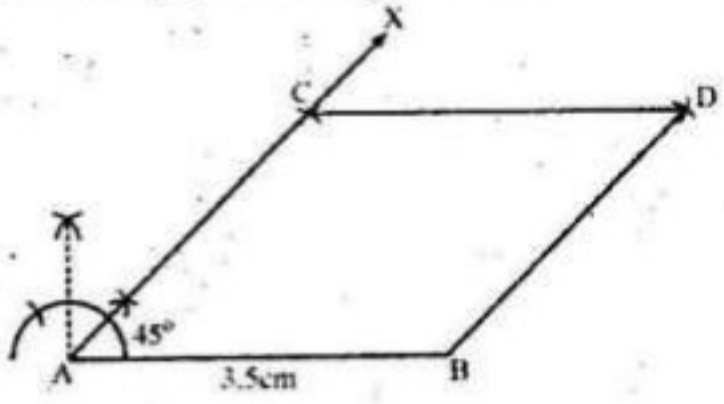
(5) With centre B, draw another arc of radius 3.1cm intersecting the circle at point D.

(6) Join point A to C and D.
Also join point B to C and D.
ABCD is required rectangle.

EXERCISE 8.3

1. Construct a rhombus when:

(i) One side 3.5cm, base angle = 45°



Steps of Constructions

(1) Draw AB = 3.5cm.

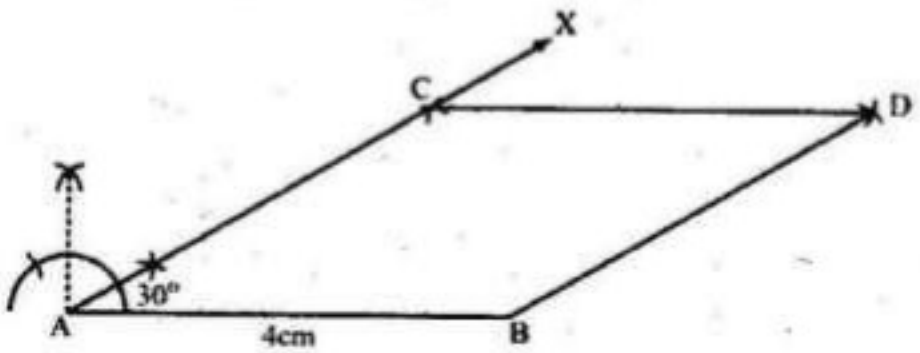
(2) Construct $\angle BAX = 45^{\circ}$.

(3) With centre A, draw an arc of radius 3.5cm, intersecting the ray AX at point D.

(4) With centre B and D, draw two arcs of radius 3.5cm, intersecting each other at point C.

(5) Join point C to D and B, to get required rhombus.

(ii) one side 4cm, base angle = 30°



Steps of Constructions

(1) Draw AB = 4cm.

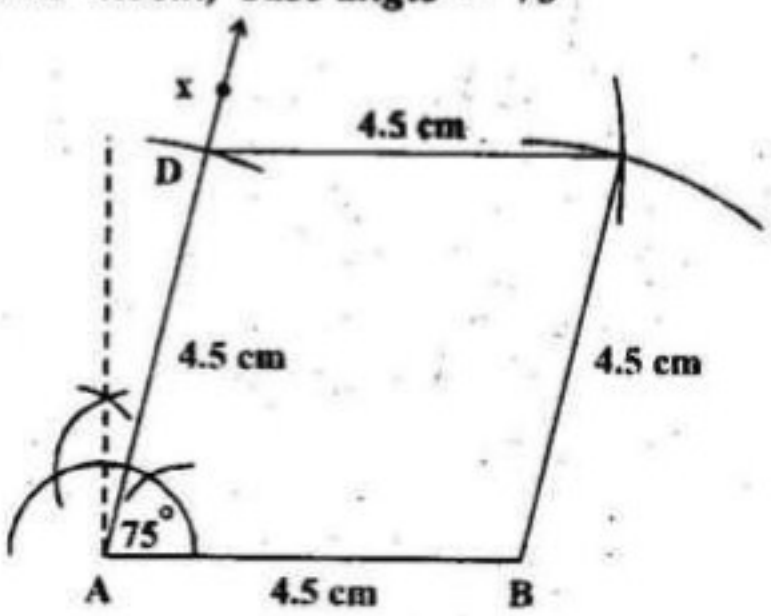
(2) Construct $\angle BAX = 30^{\circ}$.

(3) With centre A, draw an arc of radius 3.5cm, intersecting the ray AX at point D.

(4) With centre B and D, draw two arcs of radius 4cm, intersecting each other at point C.

(5) Join point C to D and B, to get required rhombus.

(iii) one side 4.5cm, base angle = 75°

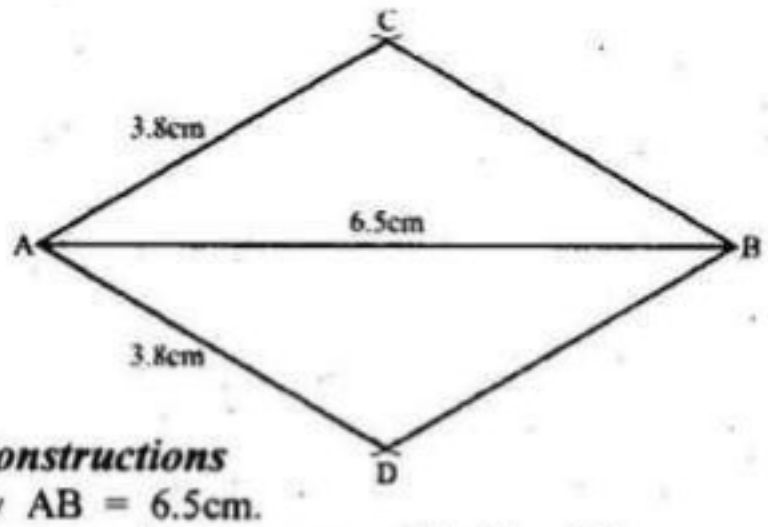


Steps of Constructions

(1) Draw $\overline{AB}$ = 4.5cm.
(2) Construct an angle of 75° at point A.
(3) Take A as centre and draw an arc of radius 4.5cm which intersects Ax at D.
(4) Take B and D as centre and draw an arcs of radius 4.5cm which cuts each other at point C.
(5) Join C to B and D.
Hence ABCD is required rhombus.

2. Construct a rhombus when:

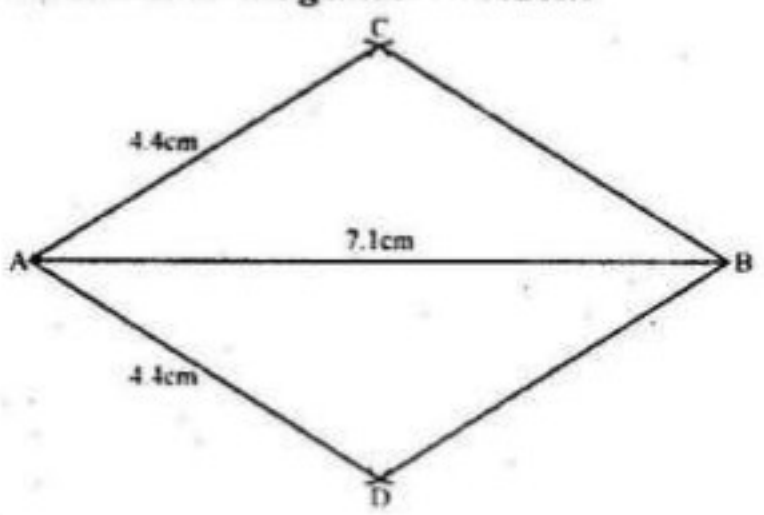
(i) Side 3.8cm and diagonal = 6.5cm



Steps of Constructions

(1) Draw AB = 6.5cm.
(2) With centre A, draw an arc of radius 3.8cm.
(3) With centre B, draw an arc of same radius intersecting the first arc at points C and D.
(4) Join point C to A and B. Similarly join point D to A and B. ABCD is required rhombus.

(ii) Side 4.4cm and diagonal = 7.1cm



Steps of Constructions

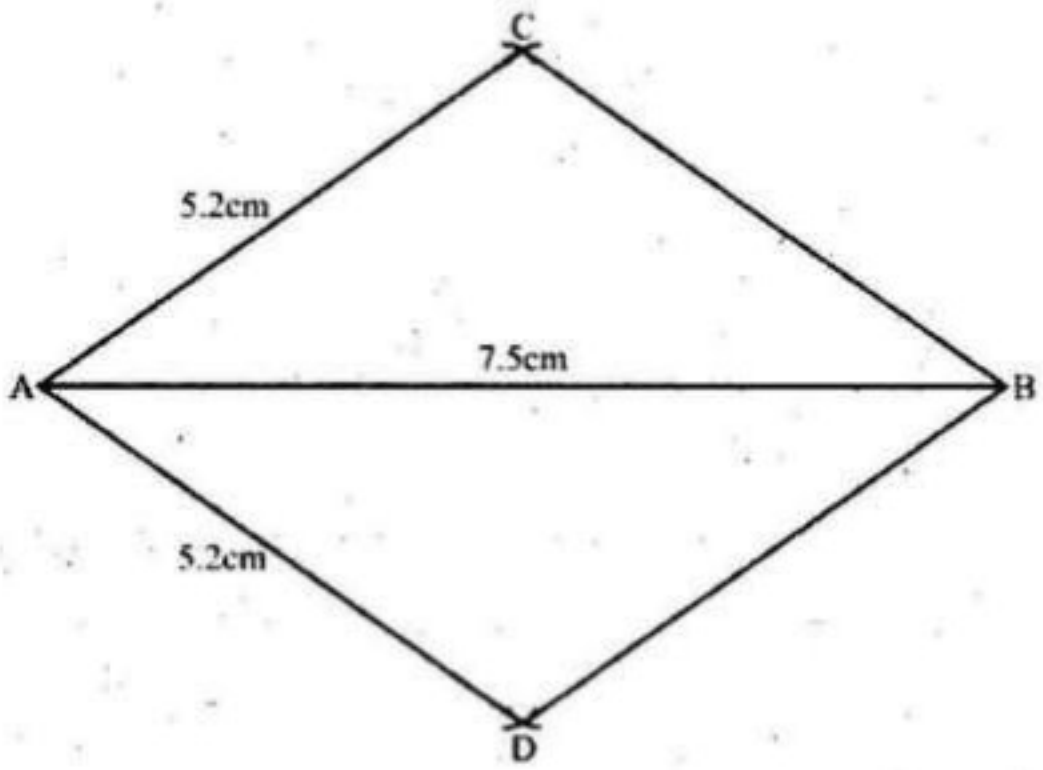
(1) Draw AB = 7.1cm.

(2) With centre A, draw an arc of radius 4.4cm.

(3) With centre B, draw an arc of same radius intersecting the first arc at points C and D.

(4) Join point C to A and B. Similarly join point D to A and B. ABCD is required rhombus.

(iii) Side 5.2cm and diagonal = 7.5cm



Steps of Constructions

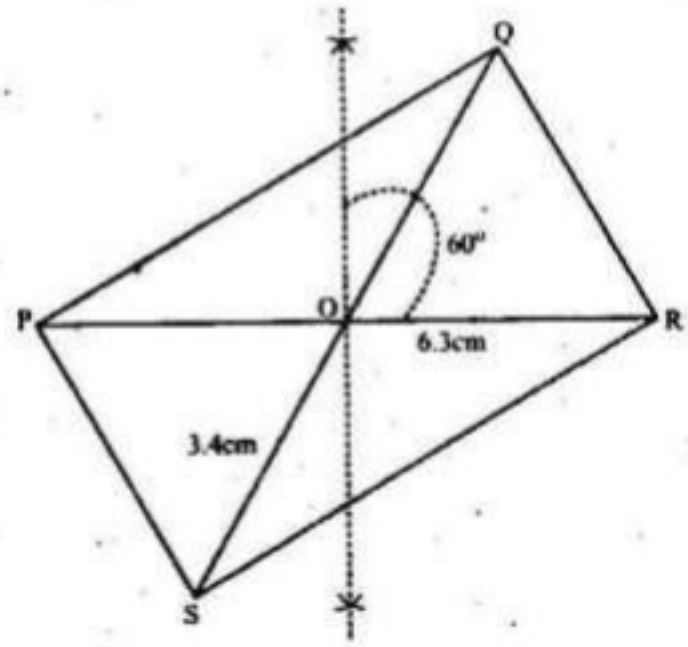
(1) Draw AB = 7.5cm.

(2) With centre A, draw an arc of radius 5.2cm.

(3) With centre B, draw an arc of same radius intersecting the first arc at points C and D.

(4) Join point C to A and B. Similarly join point D to A and B. ABCD is required rhombus.

3. ***Construct a parallelogram when two diagonals are 6.3cm and 3.4cm long and angle between them is 60^o.***



Steps of Constructions

(1) Draw PR = 6.3cm.

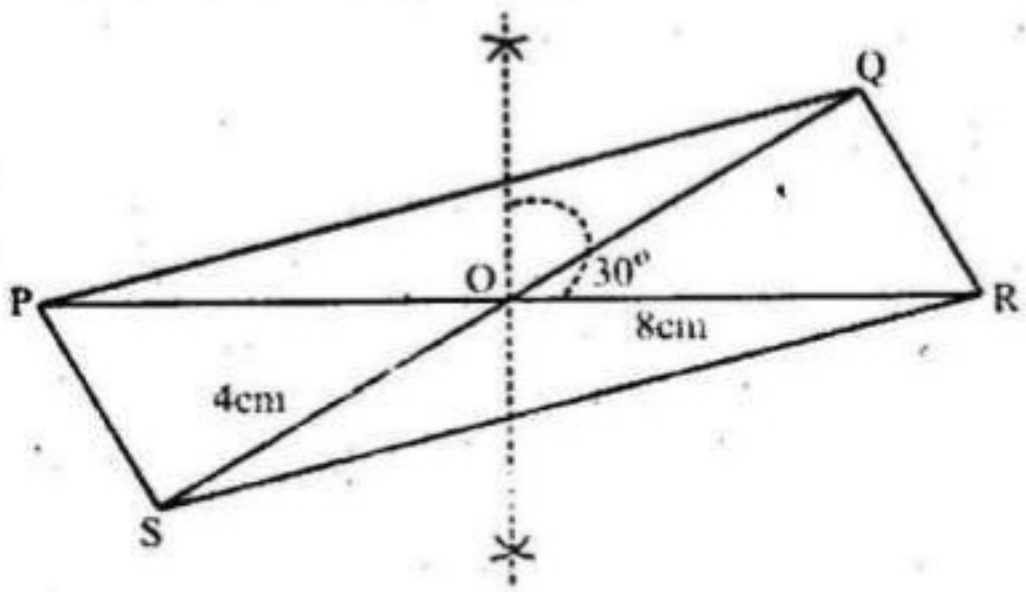
(2) Final midpoint O of $\overline{PR}$ by drawing the right bisector of $\overline{PR}$ shown by doted line segment.

(3) Draw another line segment QS through point O at an angle of 60^o. Such that OQ = OS = 2cm (half of QS).

(4) Join the point R to Q and S.

Thus PQRS is the required parallelogram.

4. ***Construct a parallelogram when two diagonals are 8cm and 4cm long and angle between them is 30^o.***



Steps of Constructions

(1) Draw PR = 8cm.

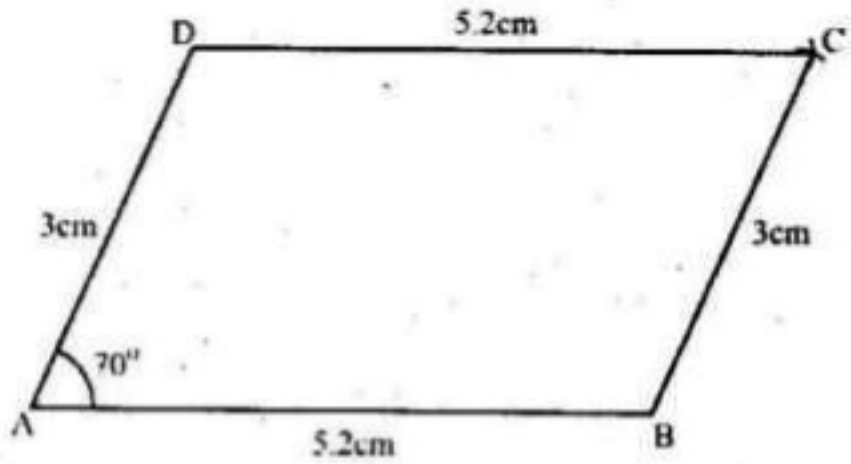
(2) Final midpoint O of $\overline{PR}$ by drawing the right bisector of $\overline{PR}$ shown by doted line segment.

(3) Draw another line segment QS through point O at an angle of 30°. Such that OQ = OS = 2cm (half of QS).

(4) Join the point R to Q and S.
Thus PQRS is the required parallelogram.

5. Construct a parallelogram ABCD where: (Construct the angles with the help of compasses where possible.)

(i) AB = 5.2cm, BC = 3cm, $\angle ABC = 70^{\circ}$



Solution:

AB = CD = 5.2cm
BC = AD = 3cm
$\angle ABC = 70^{\circ}$

Steps of Constructions

(1) Draw a line segment $\overline{AB}$ of length 5.2cm.

(2) Construct an angle of 70° at point A with the help of protractor.

(3) Draw $\overline{AD}$ of length 3cm making angle of 70° with AB.

(4) Draw an arc of radius 3cm with centre at B with the help of compass.

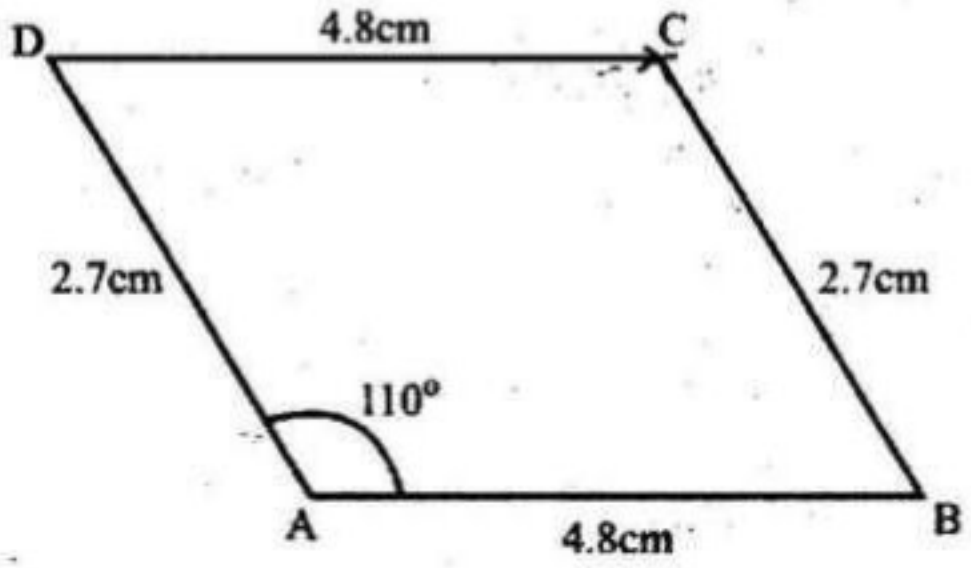
(5) Draw another arc of radius 5.2cm with centre at D in the same way.

(6) The two arcs meet at point C.

(7) Join C to B and C to D.

Therefore ABCD is required parallelogram.

(ii) AD = 2.7cm, AB = 4.8cm, ∠A = 110°



Solution:

AB = CD = 4.8cm

BD = BC = 2.7cm

∠BAD = 110°

Steps of Constructions

(1) Draw a line segment $\overline{AB}$ of length 4.8cm.

(2) Construct an angle of 110° at point A with the help of protractor.

(3) Draw $\overline{AD}$ of length 2.7cm making angle of 110° with $\overline{AB}$.

(4) Draw an arc of radius 2.7cm with centre at B with the help of compass.

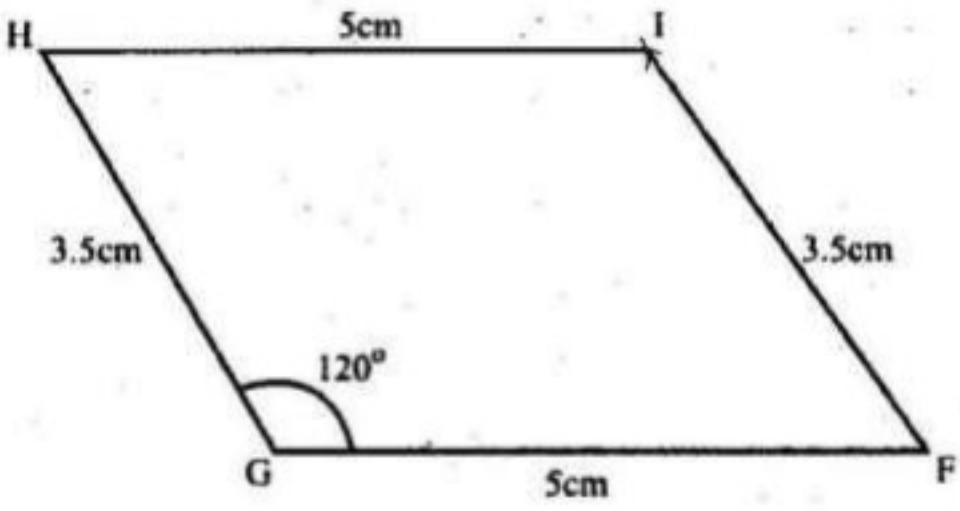
(5) Draw another arc of radius 4.8cm with centre at D in the same way.

(6) The two arcs meet at point C.

(7) Join C to B and C to D.

Therefore ABCD is required parallelogram.

(iii) FG = 5cm, GH = 3.5cm, ∠G = 120°



Solution

GF = HI = 5cm

GH = FI = 3.5cm

∠FGH = 120°

Steps of Constructions

(1) Draw a line segment $\overline{GF}$ of length 5cm.

(2) Construct an angle of 120° at point G with the help of protractor.

(3) Draw $\overline{GH}$ of length 3.5cm making angle of 120° with $\overline{GF}$.

(4) Draw an arc of radius 3.5cm with centre at F with the help of compass.

(5) Draw another arc of radius 5cm with centre at H in the same way.

(6) The two arcs meet at point I.

(7) Join H to I and I to F.

Therefore HIFG is required parallelogram.

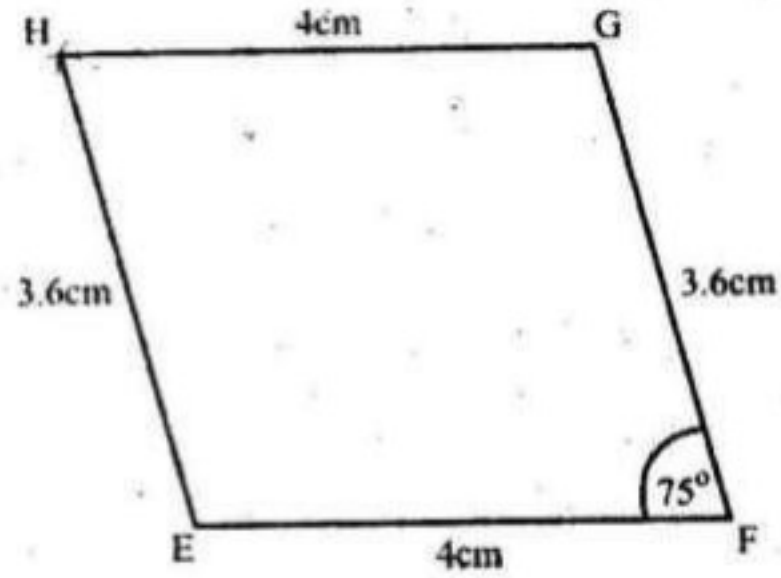
(iv) EF = 4cm, FG = 3.6cm, ∠F = 75°

Solution:

EF = HG = 4cm

EH = FG = 3.6cm

∠EFG = 75°



Steps of Constructions

(1) Draw a line segment $\overline{EF}$ of length 4cm.

(2) Construct an angle of 75° at point F with the help of protractor.

(3) Draw $\overline{FG}$ of length 3.6cm making angle of 75° with $\overline{EF}$.

(4) Draw an arc of radius 3.6cm with centre at E with the help of compass.

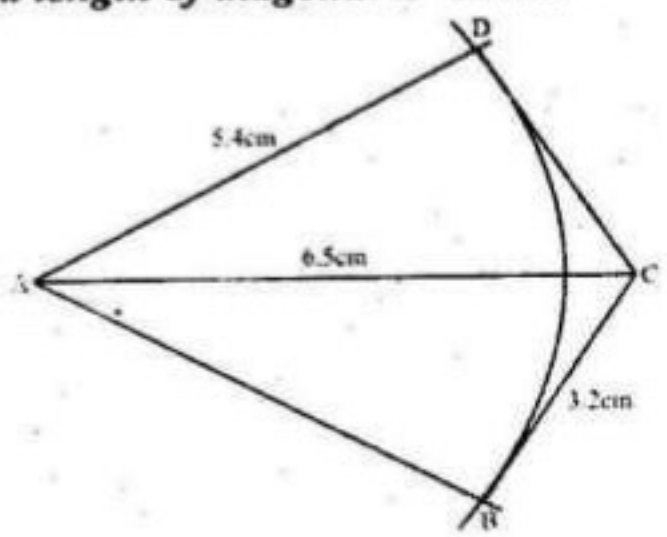
(5) Draw another arc of radius 4cm with centre at G in the same way.

(6) The two arcs meet at point H.

(7) Join G to H and H to E.

Therefore EFGH is required parallelogram.

6. Construct a kite when two sides are 5.4cm and 3.2cm long and length of diagonal is 6.5cm.



Steps of Constructions

(1) Draw diagonal AC = 6.5cm.

(2) With centre A, draw an arc of radius 5.4cm.

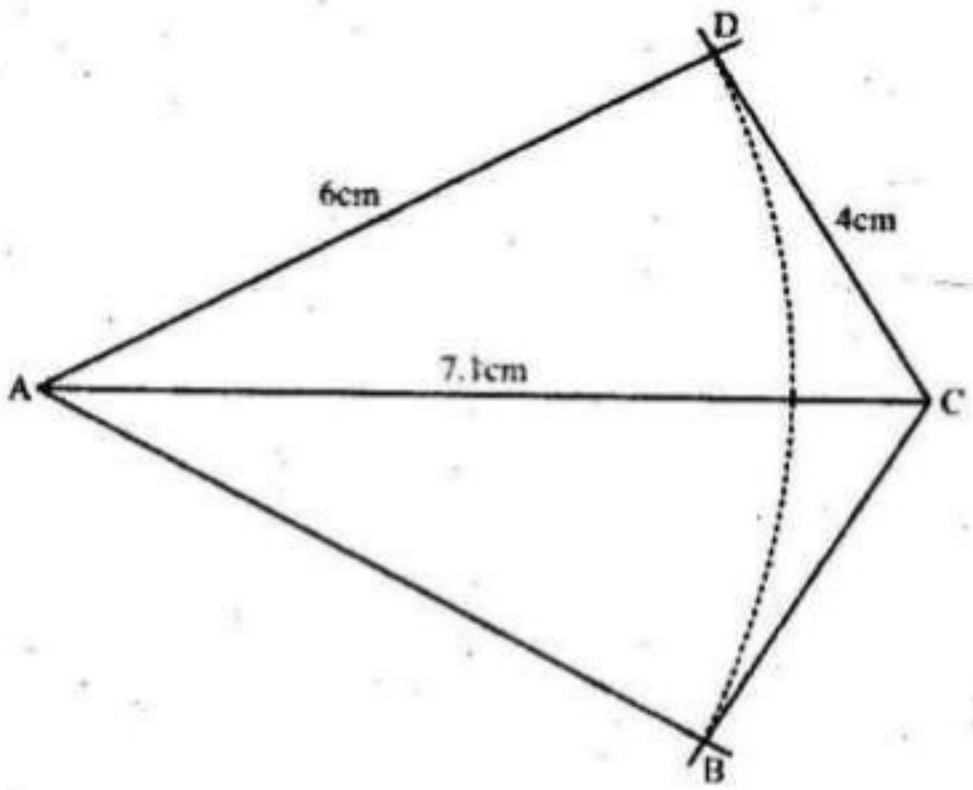
(3) With centre C, draw two arcs of radius 3.2cm, intersecting first arc at point B and D.

(4) Join point B to A and C.

(5) Similarly join point D to A and C.

ABCD is the required kite.

6. ***Construct a kite when two sides are 6cm and 4cm long and length of diagonal is 7.1cm.***



Steps of Constructions

(1) Draw diagonal AC = 7.1cm.

(2) With centre A, draw an arc of radius 6cm.

(3) With centre C, draw two arcs of radius 4cm, intersecting first arc at point B and D.

(4) Join point B to A and C.

(5) Similarly join point D to A and C.

ABCD is the required kite.

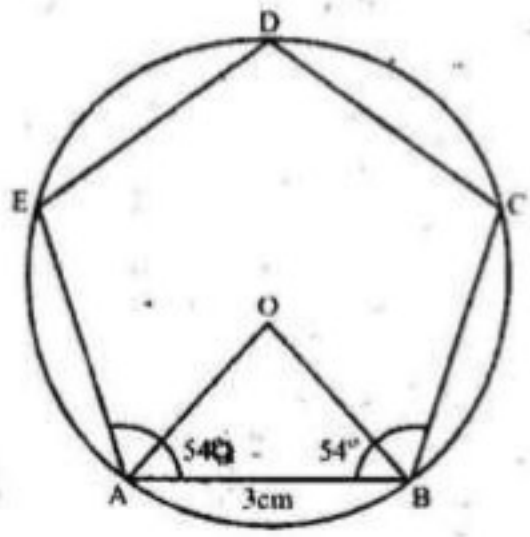
EXERCISE 8.4

1. Construct a regular

(a) Pentagons

when lengths of sides are:

(i) 3cm



Steps of Constructions

(i) Draw AB = 3cm.

(ii) Construct an isosceles triangle OAB such that $\angle OAB = \angle OBA = 54^\circ$.

(iii) Construct a circle with centre O and radius = OA.

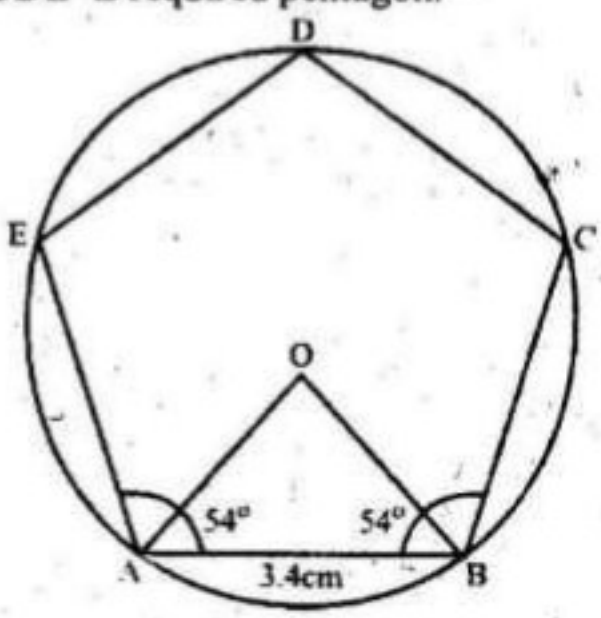
(iv) Draw an arc of radius 3cm with centre B intersecting the circle at C.

(v) Draw another arc of same radius with centre C intersecting the circle at D.

(vi) Repeat the same process to get point E.

(vii) Join B to C, C to D, D to E and E to A.
Thus ABCDE is required pentagon.

(ii) 3.4cm



Steps of Constructions

(i) Draw AB = 3.4cm.

(ii) Construct an isosceles triangle OAB such that $\angle OAB = \angle OBA = 54^{\circ}$.

(iii) Construct a circle with centre O and radius = OA.

(iv) Draw an arc of radius 3.4cm with centre B intersecting the circle at C.

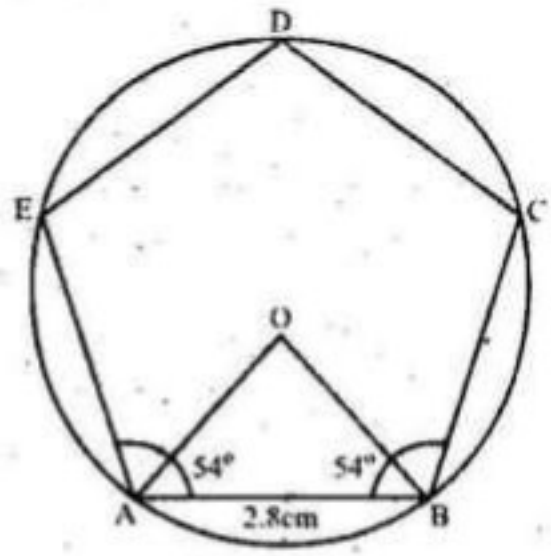
(v) Draw another arc of same radius with centre C intersecting the circle at D.

(vi) Repeat the same process to get point E.

(vii) Join B to C, C to D, D to E and E to A.

Thus ABCDE is required pentagon.

(iii) 2.8 cm



Steps of Constructions

(i) Draw AB = 2.8cm.

(ii) Construct an isosceles triangle OAB such that $\angle OAB = \angle OBA = 54^{\circ}$.

(iii) Construct a circle with centre O and radius = OA.

(iv) Draw an arc of radius 2.8cm with centre B intersecting the circle at C.

(v) Draw another arc of same radius with centre C intersecting the circle at D.

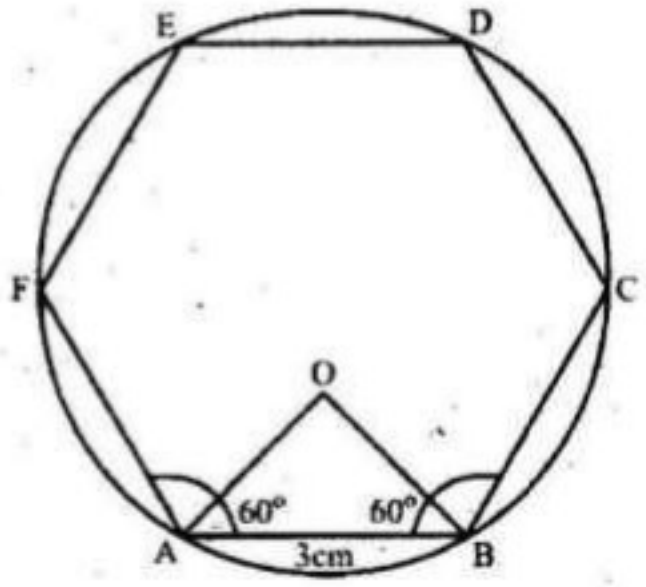
(vi) Repeat the same process to get point E.

(vii) Join B to C, C to D, D to E and E to A.

Thus ABCDE is required pentagon.

(b) Hexagon

(i) 3cm



Steps of Constructions

(i) Draw AB = 3cm.

(ii) Construct an isosceles triangle OAB such that $\angle OAB = \angle OBA = 60^{\circ}$.

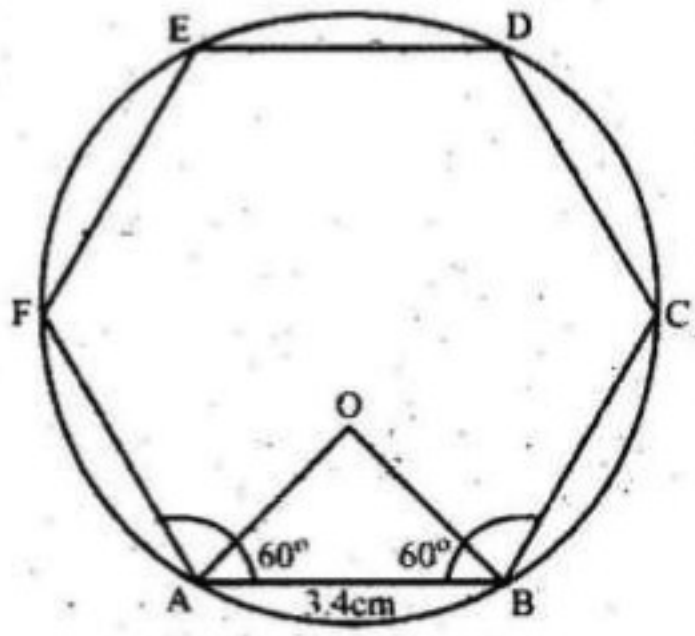
(iii) Construct a circle whose centre is O and radius = OA.

(iv) Draw an arc of radius 3cm with centre B intersecting the circle at C.

(v) Repeat the same process to get points D, E and F on the circle.

(vi) Join B to C, C to D, D to E, E to F and F to A.
Thus ABCDEF is required hexagon.

(ii) 3.4cm



Steps of Constructions

(i) Draw AB = 3.4cm.

(ii) Construct an isosceles triangle OAB such that $\angle OAB = \angle OBA = 60^{\circ}$.

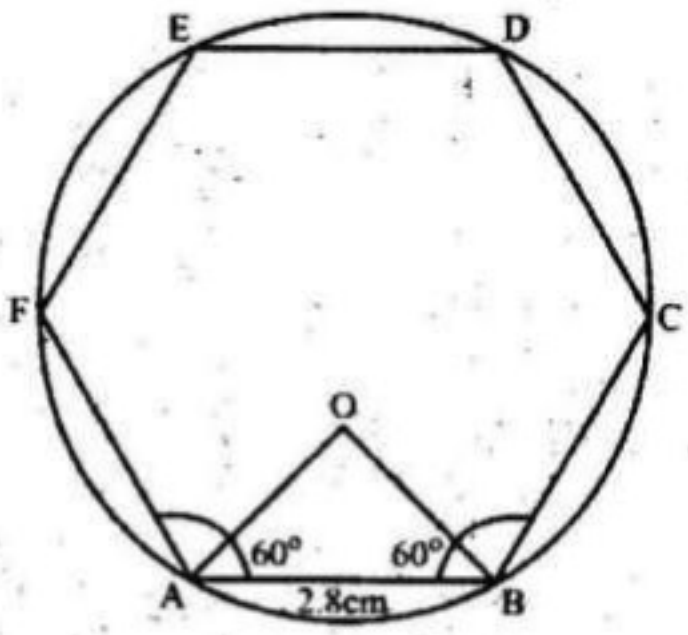
(iii) Construct a circle whose centre is O and radius = OA.

(iv) Draw an arc of radius 3.4cm with centre B intersecting the circle at C.

(v) Repeat the same process to get points D, E and F on the circle.

(vi) Join B to C, C to D, D to E, E to F and F to A.
Thus ABCDEF is required hexagon.

(iii) 2.8cm



Steps of Constructions

(i) Draw AB = 2.8cm.

(ii) Construct an isosceles triangle OAB such that $\angle OAB = \angle OBA = 60^{\circ}$.

(iii) Construct a circle whose centre is O and radius = OA.

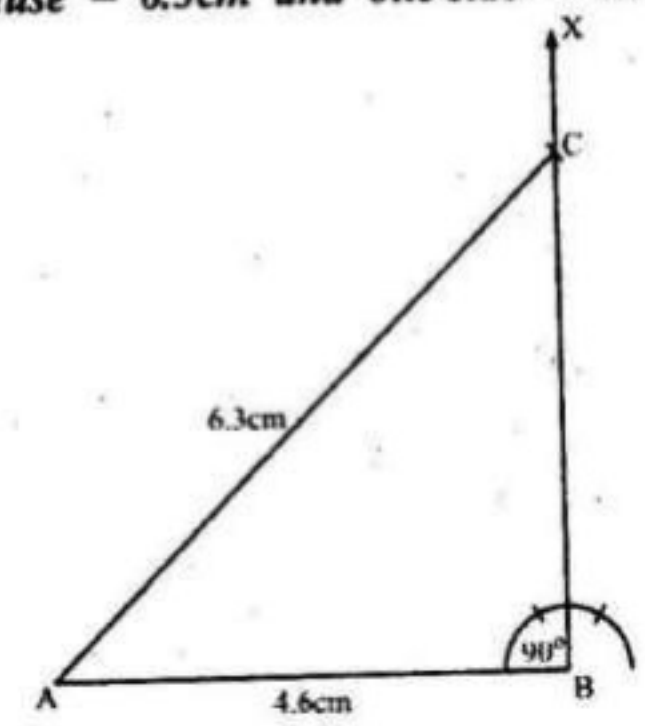
(iv) Draw an arc of radius 2.8cm with centre B intersecting the circle at C.

(v) Repeat the same process to get points D, E and F on the circle.

(vi) Join B to C, C to D, D to E, E to F and F to A.
Thus ABCDEF is required hexagon.

2. *Construct a right angled triangle when:*

(i) Hypotenuse = 6.3cm and one side = 4.6cm



Steps of Constructions

(i) Draw AB = 4.6cm.

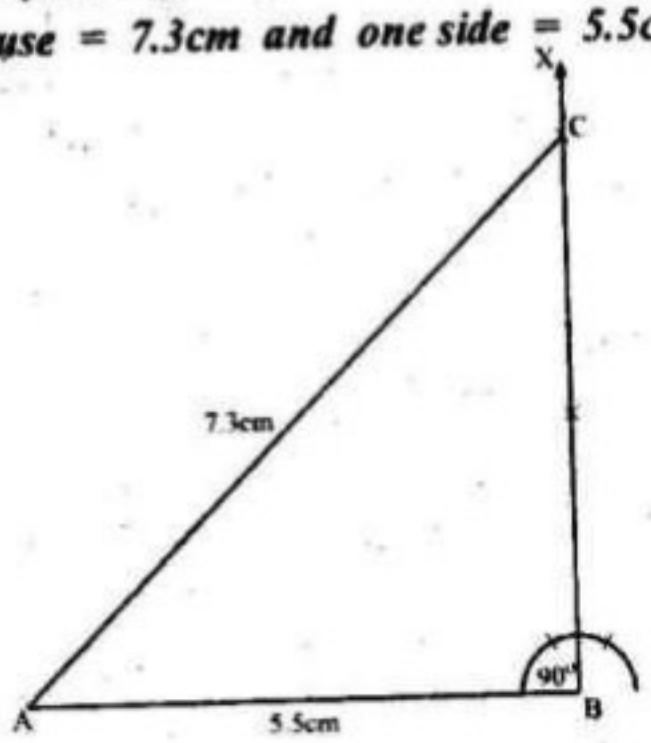
(ii) Construct $\angle ABX = 90^{\circ}$.

(iii) With centre A, draw an arc of radius 6.3cm intersecting ray BX at point C.

(iv) Join point C to A.

ABC is required right angled triangle.

(ii) Hypotenuse = 7.3cm and one side = 5.5cm



Steps of Constructions

(i) Draw AB = 5.5cm.

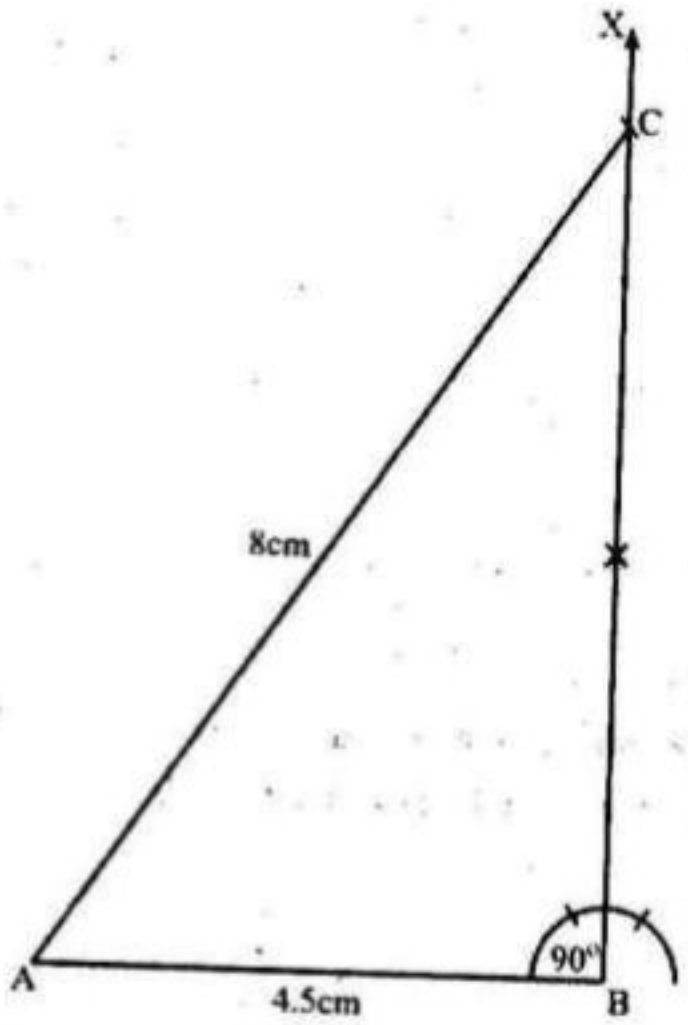
(ii) Construct $\angle ABX = 90^{\circ}$.

(iii) With centre A, draw an arc of radius 7.3cm intersecting ray BX at point C.

(iv) Join point C to A.

ABC is required right angled triangle.

(iii) Hypotenuse = 8cm and one side = 4.5cm



Steps of Constructions

(i) Draw AB = 4.5cm.

(ii) Construct $\angle ABX = 90^{\circ}$.

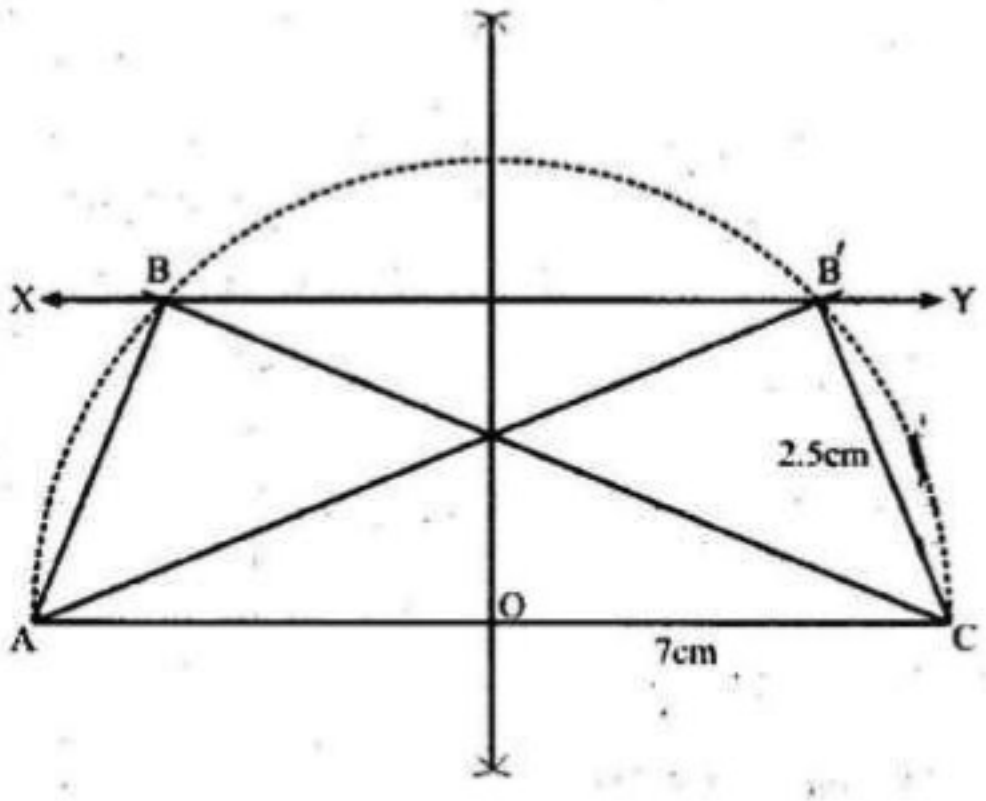
(iii) With centre A, draw an arc of radius 8cm intersecting ray BX at point C.

(iv) Join point C to A.

ABC is required right angled triangle.

3. *Construct a right angled triangle when:*

(i) *Hypotenuse = 7cm, Vertical height from Vertex = 2.5cm*



Steps of Constructions

(i) Draw AC = 7cm.

(ii) Bisect $\overline{AC}$ at point O.

(iii) Construct a semi circle of radius AO or OC.

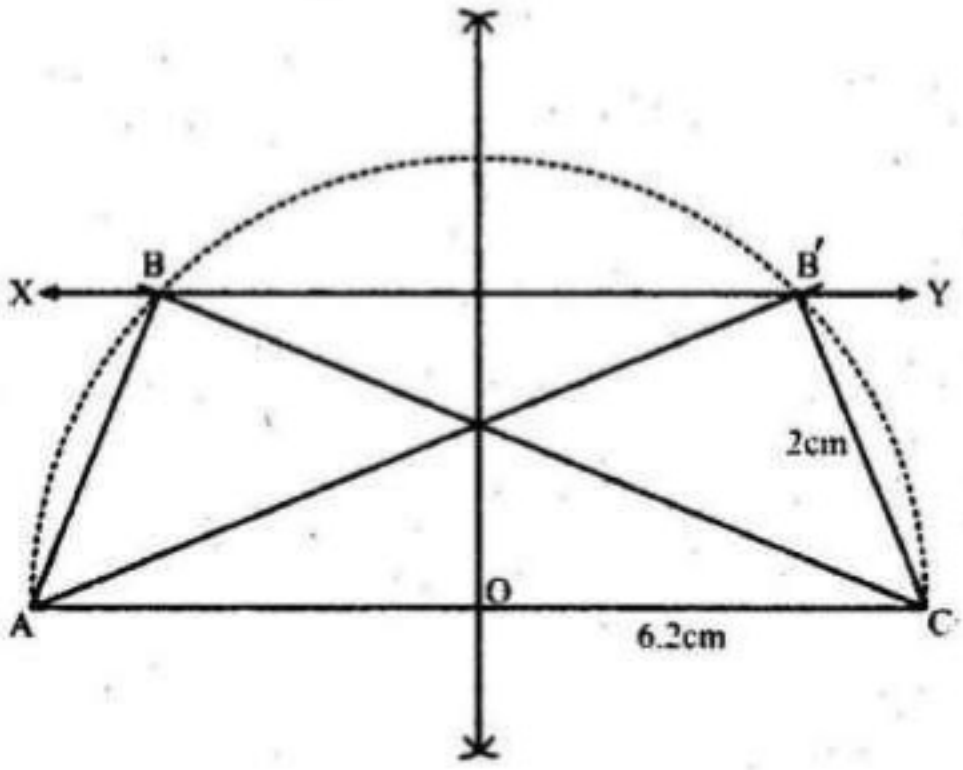
(iv) Draw a line XY parallel to $\overline{AC}$ at a distance of 2.5cm from $\overline{AC}$, intersecting semi circle at points B and B′.

(v) Join point B to A and C.

(vi) Similarly join point B′ to A and C.

ABC and AB′C are required triangles.

(ii) Hypotenuse = 6.2cm, Vertical height from Vertex = 2cm



Steps of Constructions

(i) Draw AC = 6.2cm.

(ii) Bisect $\overline{AC}$ at point O.

(iii) Construct a semi circle of radius AO or OC.

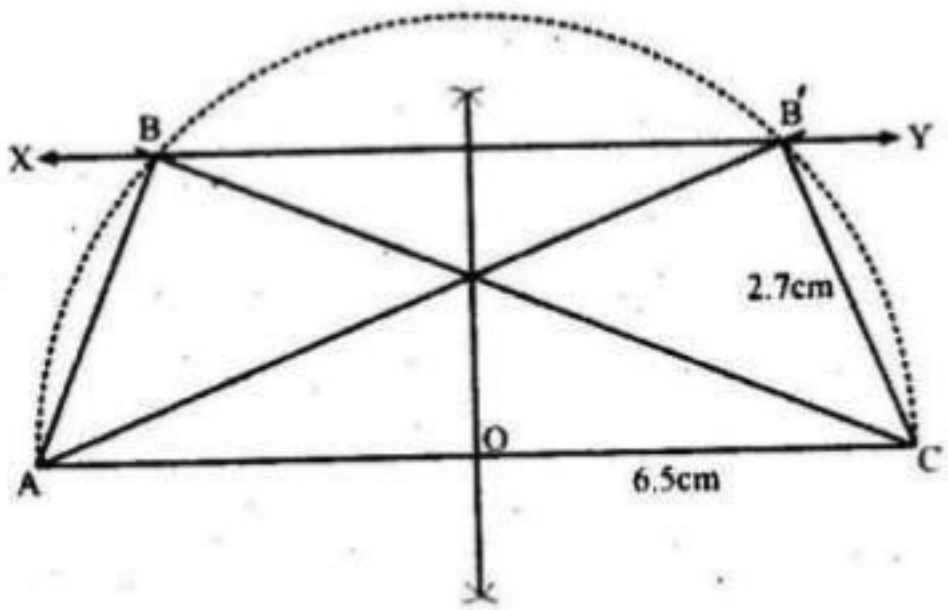
(iv) Draw a line XY parallel to $\overline{AC}$ at a distance of 2cm from $\overline{AC}$, intersecting semi circle at points B and B′.

(v) Join point B to A and C.

(vi) Similarly join point B′ to A and C.

ABC and AB′C are required triangles.

(iii) Hypotenuse = 6.5cm, Vertical height from Vertex = 2.7cm



Steps of Constructions

(i) Draw AC = 6.5cm.

(ii) Bisect $\overline{AC}$ at point O.

(iii) Construct a semi circle of radius AO or OC.

(iv) Draw a line XY parallel to $\overline{AC}$ at a distance of 2.7cm from $\overline{AC}$, intersecting semi circle at points B and B′.

(v) Join point B to A and C.

(vi) Similarly join point B′ to A and C.

ABC and AB′C are required triangles.