# CHAPTER 13

# CONSTRUCTION OF QUADRILATERALS

**1. Construct a quadrilateral PQRS where PQ = 4.5 cm, QR = 6 cm, RS = 5.5 cm, PS = 5 cm and PR = 6.5 cm. Solution:**

Steps of Construction:

(i) Construct a line segment PR = 6.5 cm.

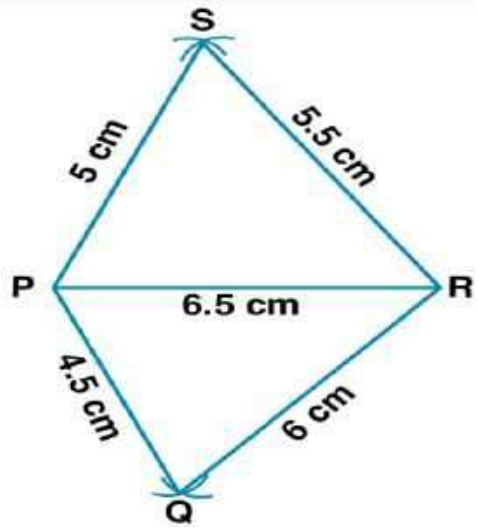
(ii) Taking P as centre and 4.5 cm radius and R as centre and 6 cm radius construct arcs which intersect each other at Q.

(iii) Now join PQ and QR.

(iv) Taking P as centre and 5 cm radius and R as centre and 5.5 cm radius, construct arcs which intersect each other at S.

(v) Join PS and SR.

Hence, PQRS is the required quadrilateral.




**2. Construct a quadrilateral ABCD in which AB = 3.5 cm, BC = 5 cm, CD = 5.6 cm, DA = 4 cm, BD = 5.4 cm. Solution:**

Steps of Construction:

(i) Construct a line segment AB = 3.5 cm.

(ii) Taking A as centre and 4 cm radius construct and arc and with B as centre and 5.4 cm construct an arc which meets the previous arc at the point D.

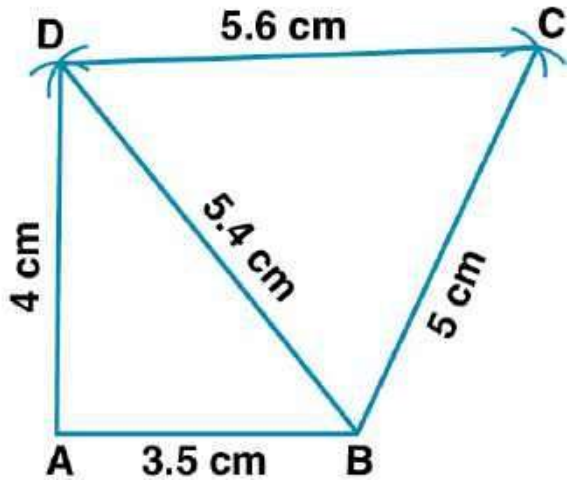
Now join AD and BD.

(iii) Taking B as centre and 5 cm radius, construct an arc

Taking D as centre and 5.6 cm radius, construct an arc which meets the previous arc at the point C.

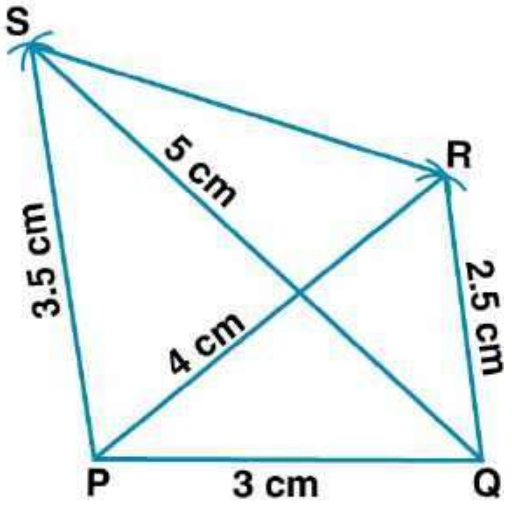
(iv) Join BC and CD.

Hence, ABCD is the required quadrilateral.




**3. Construct a quadrilateral PQRS in which PQ = 3 cm, QR = 2.5 cm, PS = 3.5 cm, PR = 4 cm and QS = 5 cm. Solution:**

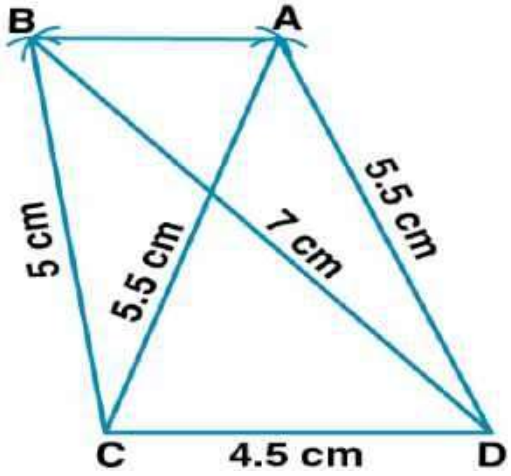
Steps of Construction:
(i) Construct PQ = 3 cm.
(ii) Taking P as centre and 4 cm radius, construct an arc
Taking Q as centre and 2.5 cm radius, construct an arc which meets the previous arc at R Now join PQ and QR
(iii) Taking P as centre and 3.5 cm radius, construct an arc
Taking Q as centre and 5 cm radius, construct an arc which meets the previous arc at S.
(iv) Join PS, QS and SR.
Therefore, PQRS is the required quadrilateral.




**4. Construct a quadrilateral ABCD such that BC = 5 cm, AD = 5.5 cm, CD = 4.5 cm, AC = 7 cm and BC = 5.5 cm.**
**Solution:**

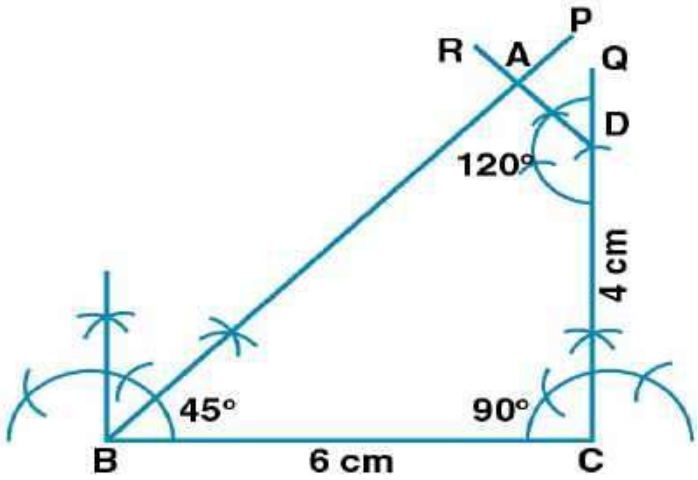
Steps of Construction:

(i) Construct a line segment CD = 4.5 cm.
(ii) Taking C as centre and 5.5 cm radius and taking D as centre and 7 cm radius construct arcs which intersect each other at B. (iii) Join BC and BD.
(iv) Taking C as centre and 5.5 cm radius and taking D as centre and 5.5 cm radius, construct arcs which intersect each other at A.
(v) Now join AC and AD.
(vi) Join AB.
Therefore, ABCD is the required quadrilateral.



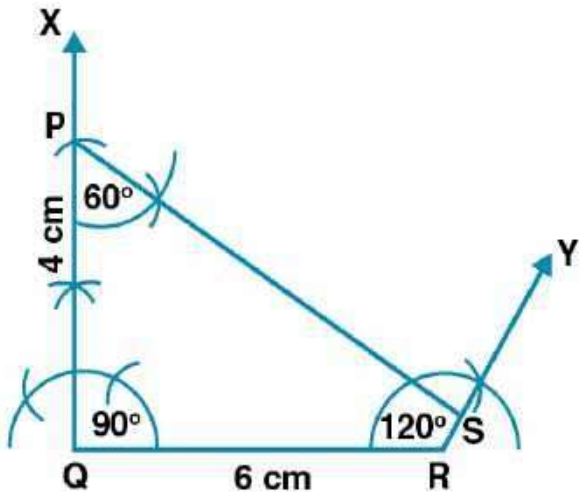

**5. Construct a quadrilateral ABCD given that BC = 6 cm, CD = 4 cm, ∠B = $45^0$, ∠C = $90^0$ and ∠D = $120^0$.**
**Solution:**

Steps of Construction:
(i) Construct BC = 6 cm.
(ii) At the point B, draw ∠CBP = $45^0$.
(iii) At the point C, draw ∠BCQ = $90^0$.
(iv) Cut off CD = 4 cm from CQ.
(v) At the point D, draw ∠CDR = $120^0$.
(iv) Let BP and DR meet at the point A.
Therefore, ABCD is the required quadrilateral.



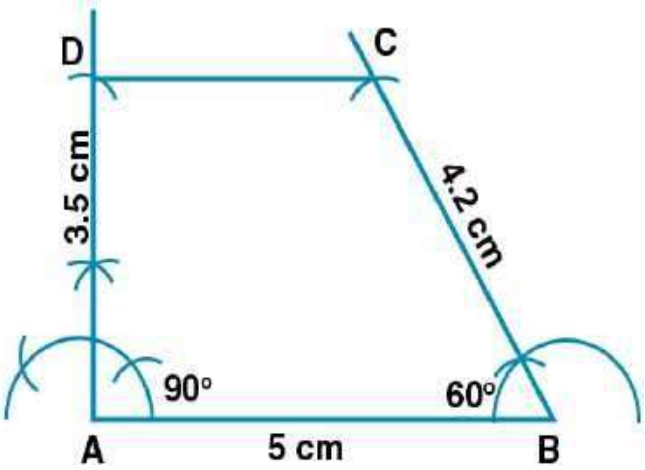
**6. Construct a quadrilateral PQRS where PQ = 4 cm, QR = 6 cm, $\angle P = 60^0$, $\angle Q = 90^0$ and $\angle R = 120^0$.**
**Solution:**

Steps of Construction:
(i) Construct a line segment QR = 6 cm.
(ii) At the point Q, construct a ray QX making an angle of $90^0$ and cut off QP = 4 cm.
(iii) At the point P, construct a ray making an angle of $60^0$ and at R, a ray making an angle $120^0$ which meets each other at the point S.
Therefore, PQRS is the required quadrilateral.



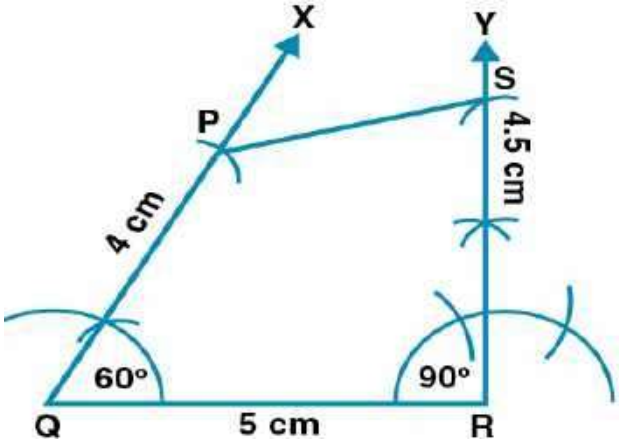

**7. Construct a quadrilateral ABCD such that AB = 5 cm, BC = 4.2 cm, AD = 3.5 cm, $\angle A = 90^0$ and $\angle B = 60^0$.**
**Solution:**

Steps of Construction:
(i) Construct AB = 5 cm.
(ii) At the point A, construct $\angle A = 90^0$.
(iii) At the point B, construct $\angle B = 60^0$.
(iv) Taking B as centre and radius 4.2 cm cut off $\angle B$ at C.
(v) Taking A as centre and radius 3.5 cm cut off $\angle A$ at D.
(vi) Now join CD.
Therefore, ABCD is the required quadrilateral.



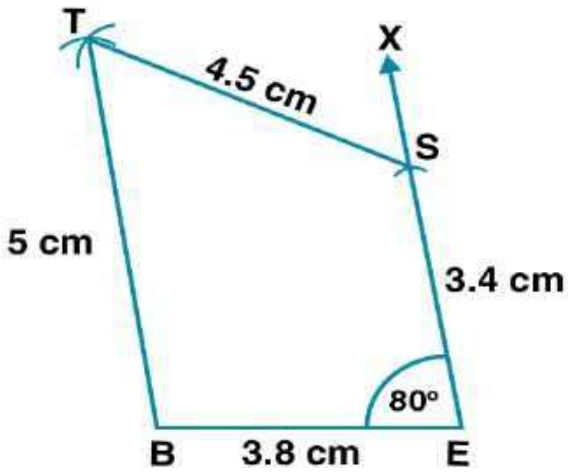

**8. Construct a quadrilateral PQRS where PQ = 4 cm, QR = 5 cm, RS = 4.5 cm, ∠Q = $60^0$ and ∠R = $90^0$.**
**Solution:**

Steps of Construction:
(i) Construct a line segment QR = 5 cm.
(ii) At the point Q, construct a ray QX making an angle of $60^0$ and cut off QP = 4 cm.
(iii) At the point R, construct a ray RY making an angle of $90^0$ and cut off RS = 4.5 cm.
(iv) Now join PS.
Therefore, PQRS is the required quadrilateral.



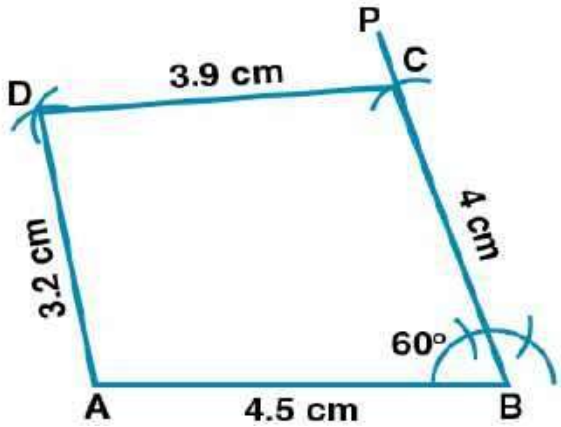

**9. Construct a quadrilateral BEST where BE = 3.8 cm, ES = 3.4 cm, ST = 4.5 cm, TB = 5 cm and ∠E = $80^0$.**
**Solution:**

Steps of Construction:
(i) Construct a line segment BE = 3.8 cm.
(ii) At the point E, construct a ray EX making an angle of $80^0$ and cut off ES = 3.4 cm.
(iii) Taking B as centre and 5 cm radius and S as centre and 4.5 cm radius, construct arcs which intersect each other at T.
(iv) Now join TB and TS.
Therefore, BEST is the required quadrilateral.




**10. Construct a quadrilateral ABCD where AB = 4.5 cm, BC = 4 cm, CD = 3.9 cm, AD = 3.2 cm and ∠B = $60^0$.**
**Solution:**

Steps of Construction:
(i) Construct AB = 4.5 cm.
(ii) At point B, construct ∠ABP = $60^0$.
(iii) Cut off ∠BC = 4 cm from BP.
(iv) Taking C as centre and radius 3.9 cm construct an arc.
(v) Taking A as centre and radius 3.2 cm construct an arc which meets the previous arc at D. (vi) Now join AD and CD.

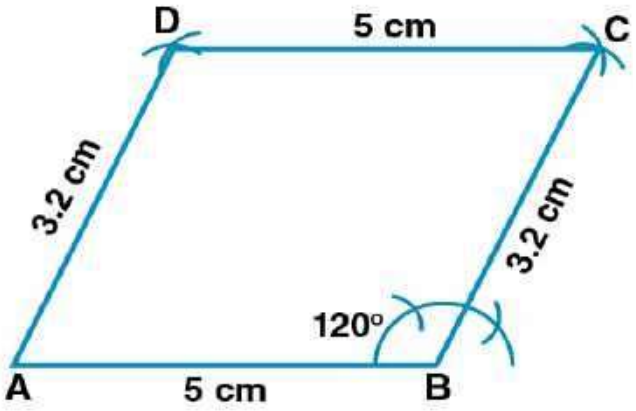



# EXTRA QUESTIONS

**1. Construct a parallelogram ABCD such that AB = 5 cm, BC = 3.2 cm and ∠B = $120^0$. Solution:**

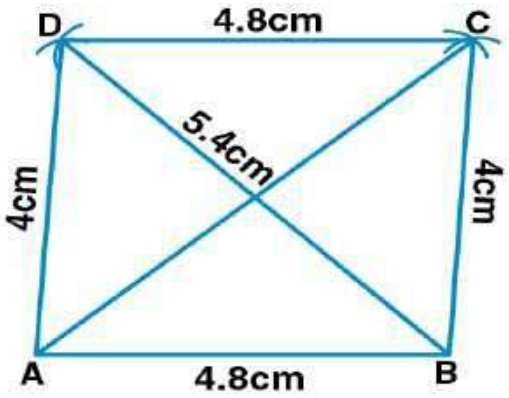
Steps of Construction:
(i) Construct AB = 5 cm.

(ii) At point B, draw angle $120^0$.
(iii) Taking B as centre and radius 3.2 cm cut off ∠B at C.
(iv) Taking C as centre and radius AB construct an arc.
(v) Taking A as centre and radius 3.2 cm, construct an arc which meets the previous arc at D.
(vi) Now join AD and CD.
Therefore, ABCD is the required parallelogram.




**2. Construct a parallelogram ABCD such that AB = 4.8 cm, BC = 4 cm and diagonal BD = 5.4 cm. Solution:**

Steps of Construction:
(i) Draw a triangle ABCD.
(ii) Taking B as centre and radius 4 cm, construct an arc.
(iii) Taking D as centre and radius 4.8 cm, construct an arc which meets the previous arc at C.
(iv) Now join CD, BC and AC.
Therefore, ABCD is the required parallelogram.




**3. Construct a parallelogram ABCD such that BC = 4.5 cm, BD = 4 cm and AC = 5.6 cm. Solution:**

Steps of Construction:
(i) Draw a triangle BOC with BC = 4.5 cm
Here
BO = ½ × 4 = 2 cm

OC = ½ AC

= ½ × 5.6

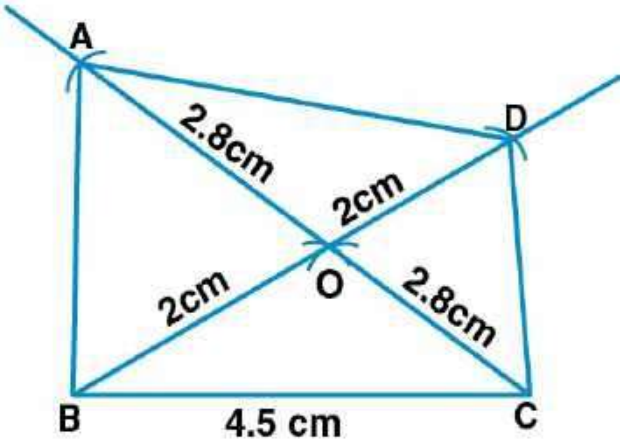
= 2.8 cm

We know that the diagonals of parallelogram bisect each other.

(ii) Produce OC to point A such that OC = OA.

(iii) Produce BO to point D such that OD = OB. (iv) Now join AD.

Therefore, ABCD is the required parallelogram.




**4. Construct a parallelogram ABCD such that AC = 6 cm, BD = 4.6 cm and angle between them is $45^0$.**

**Solution:**

Steps of Construction:

(i) Construct AO = ½ AC = 3 cm and produce AO to C such that OC = OA. (ii)

At the point O, draw ∠COP = $45^0$.

(iii) From OP

Cut OD = ½ BD

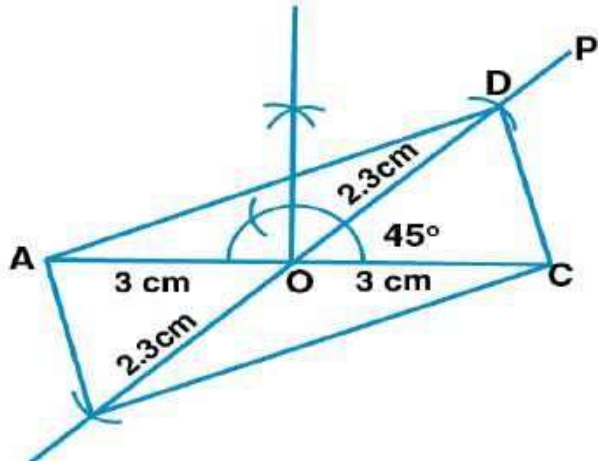
= ½ × 4.6

= 2.3 cm

(iv) Produce OD to OB such that OB = OD.

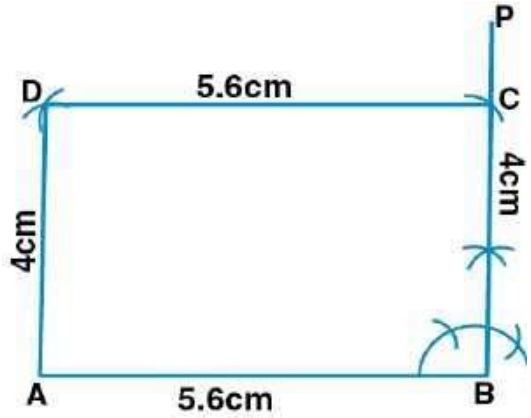
(v) Now join AB, BC, CD and DA.

Therefore, ABCD is the required parallelogram.



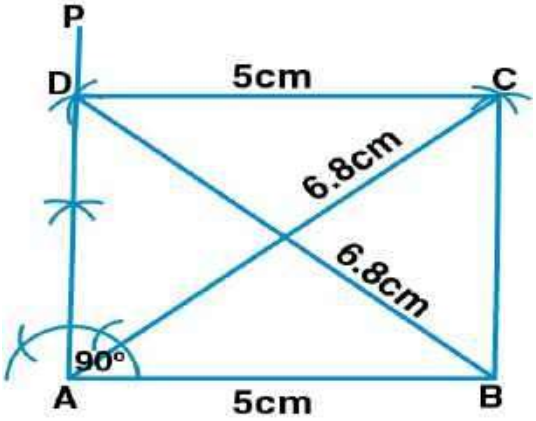
**5. Construct a rectangle whose adjacent sides are 5.6 cm and 4 cm. Solution:**

Steps of Construction:
(i) Construct AB = 5.6 cm.
(ii) At the point B, draw $\angle ABP = 90^0$.
(iii) Cut off BC = 4 cm from BP.
(iv) Taking C as centre and 5.6 cm radius, construct an arc.
(v) Taking A as centre and 4 cm radius, construct an arc which meets the previous arc at point D.
(vi) Now join AD and CD.
Therefore, ABCD is the required rectangle.



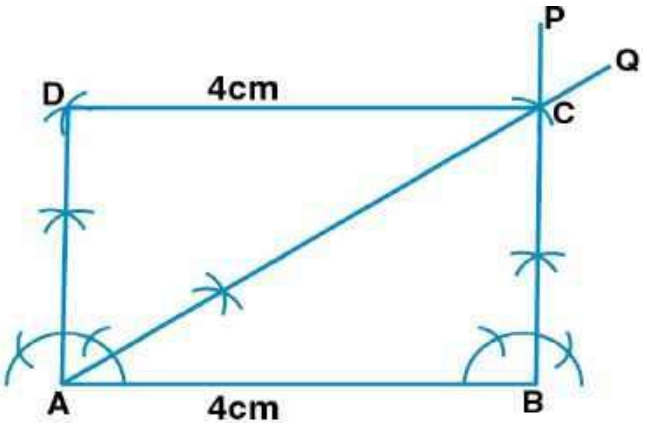

**6. Construct a rectangle such that one side is 5 cm and one diagonal is 6.8 cm. Solution:**

Steps of Construction:
(i) Construct AB = 5 cm.
(ii) At the point A, draw $\angle BAP = 90^0$.
(iii) Taking B as centre and 6.8 cm radius, construct an arc which meets AP at D.
(iv) Taking A as centre and 6.8 cm radius, construct an arc.
(v) Taking D as centre and 5 cm radius, construct an arc which meets the previous arc at C.
(vi) Now join BC and CD.
Therefore, ABCD is the required rectangle.



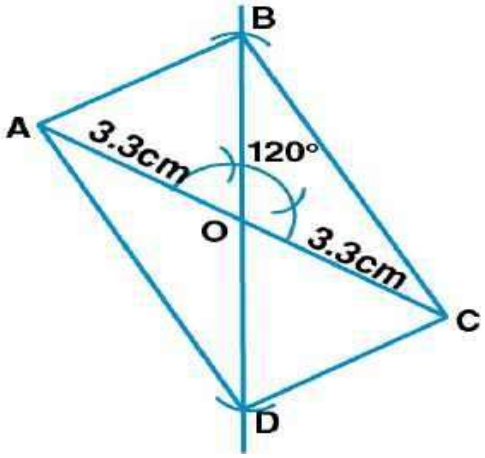
**7. Construct a rectangle ABCD such that AB = 4 cm and $\angle BAC = 60^0$. Solution:**

Steps of Construction:
(i) Construct AB = 4 cm.
(ii) At the point B, construct $\angle ABP = 90^0$.
(iii) At the point A, draw $\angle BAQ = 30^0$. Let AQ meet BP at the point D.
(iv) Taking D as centre and 4 cm radius construct an arc.
(v) Taking A as centre and BD as radius, construct an arc which meets the previous arc at the point C.
(vi) Now join AC and CD.
Therefore, ABCD is the required rectangle.



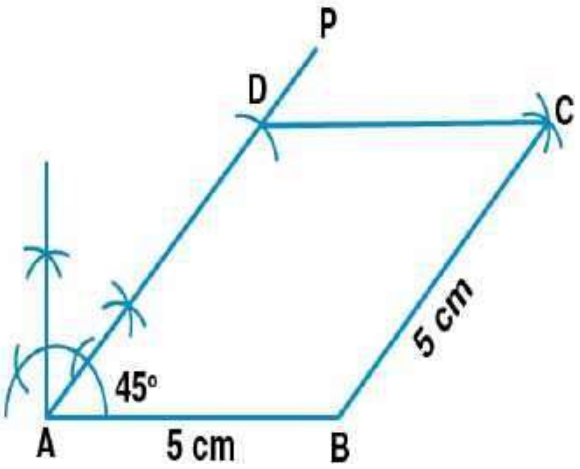

**8. Construct a rectangle such that one diagonal is 6.6 cm and angle between two diagonals is $120^0$. Solution:**

Steps of Construction:
(i) Construct AO = ½ AC = (½ × 6.6) cm and produce AO to C such that OC = OA = 3.3 cm.
(ii) At the point O, draw $\angle COB = 120^0$.
(iii) Cut off OB = ½ AC = 3.3 cm from OB.
(iv) Produce BO to D such that OB = OD = 3.3 cm.
(v) Now join AB, BC, CD and DA.
Therefore, ABCD is the required rectangle.



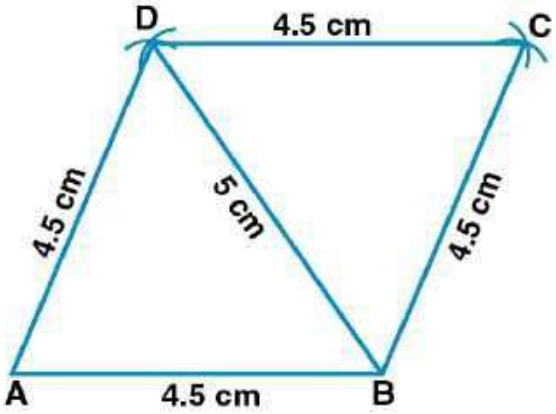

**9. Construct a rhombus whose one side is 5 cm and one angle is $45^0$. Solution:**

Steps of Construction:
(i) Construct AB = 5 cm.
(ii) At the point A, draw ∠BAP = $45^0$.
(iii) Cut off AD = 5 cm from AP.
(iv) Taking B as centre and 5 cm radius, construct an arc.
(v) Taking D as centre and 5 cm radius, construct an arc which meets the previous arc at the point C.
(vi) Now join BC and CD.
Therefore, ABCD is the required rhombus.



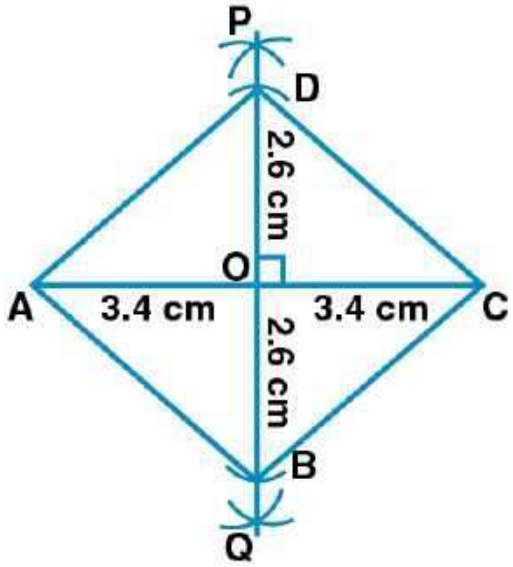

**10. Construct a rhombus whose one side is 4.5 cm and one diagonal is 5 cm. Solution:**

Steps of Construction:
(i) Construct AB = 4.5 cm.
(ii) Taking A as centre and 4.5 cm radius, construct an arc.
(iii) Taking B as centre and 5 cm radius, construct an arc which meets the previous arc at D.
(iv) Taking B as centre and 4.5 cm radius, construct an arc.
(v) Taking D as centre and 4.5 cm radius, construct an arc which meets the previous arc at point C.
(vi) Now join AD, BC and CD.
Therefore, ABCD is the required rhombus.



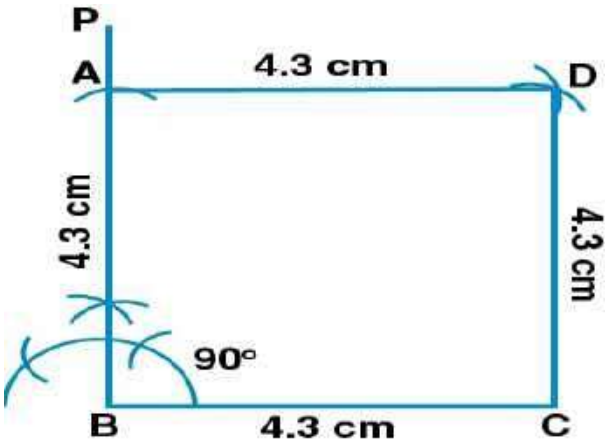
**11. Construct a rhombus whose diagonals are 6.8 cm and 5.2 cm. Solution:**

Steps of Construction:
(i) Construct AC = 6.8 cm.
(ii) Construct one bisector PQ of AC to meet it at the point O.
(iii) From POQ, cut off OB and OD such that OB = OD = ½ BD = ½ × 5.2 = 2.6 cm (iv) Now join AB, BC, CD and DA.
Therefore, ABCD is the required rhombus.




**12. Construct a square whose one side is 4.3 cm.**
**Solution:**

Steps of Construction:
(i) Construct BC = 4.3 cm.
(ii) At the point B, draw ∠CBP = $90^0$.
(iii) Cut off BA = 4.3 cm from BP.
(iv) Taking C as centre and 4.3 cm radius, construct an arc.
(v) Taking A as centre and 4.3 cm radius, construct an arc which meets the previous arc at D.
(vi) Now join AD and CD.
Therefore, ABCD is the required square.




**13. Construct a square whose one diagonal is 6.2 cm.**
**Solution:**

Steps of Construction:
(i) Construct AC = 6.2 cm.
(ii) Construct a perpendicular bisector PQ of AC to meet it at point O.
(iii) From POQ, cut off OB = OD = ½ AC = 3.1 cm.
(iv) Now join AB, BC, CD and DA.
Therefore, ABCD is the required square.