

# CONSTRUCTION OF QUADRILATERALS

## 28.1 CONSTRUCTION OF A QUADRILATERAL ABCD.

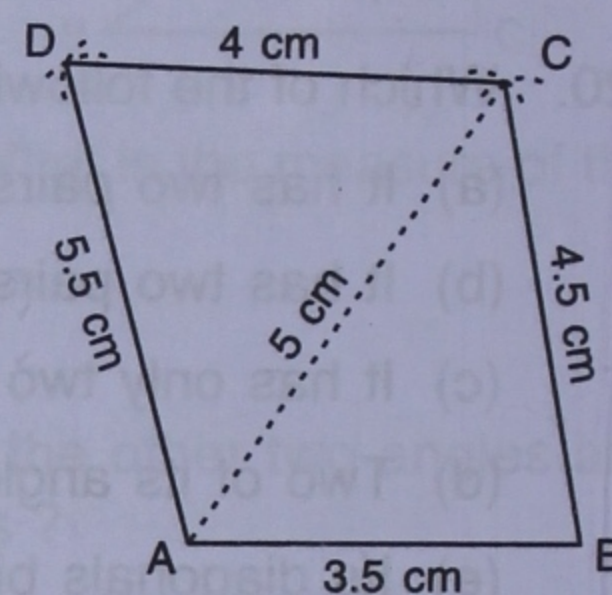
A quadrilateral has four vertices and to construct a quadrilateral means to locate the positions of these four vertices.

1. When four sides and one diagonal are given :

Let  $AB = 3.5$  cm,  $BC = 4.5$  cm,  $CD = 4$  cm,  $DA = 5.5$  cm and diagonal  $AC = 5$  cm.

**Steps :**

1. Draw  $AB = 3.5$  cm.
2. With A as centre, draw an arc of length 5 cm, (AC) and with B as centre, draw an arc of length 4.5 cm (BC). These two arcs meet at C.
3. With C as centre, draw an arc of radius 4 cm (CD) and with A as centre, draw one more arc of radius 5.5 cm (DA). These two arcs cut each other at point D.
4. Join BC, CD and AD.



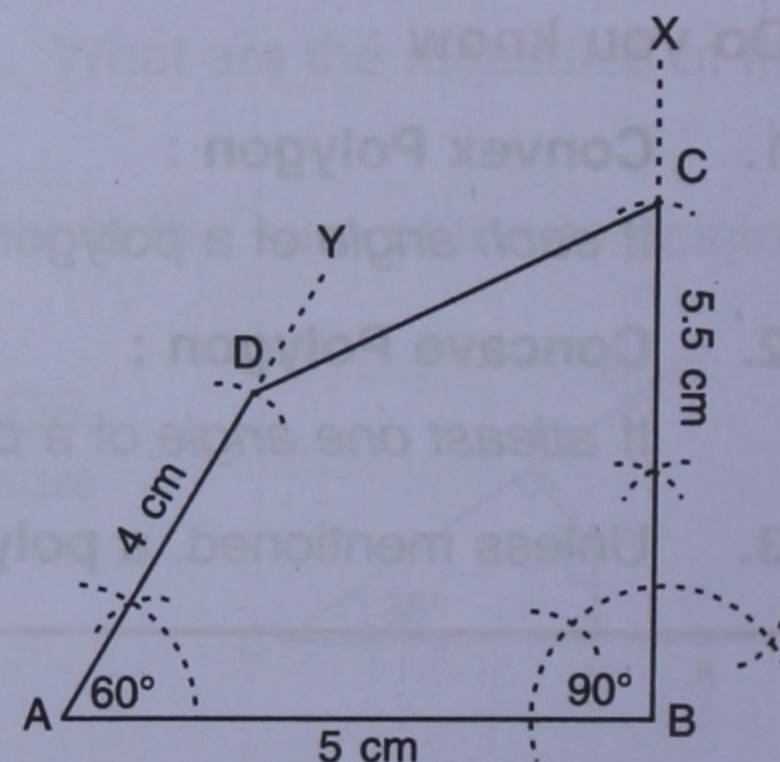
Then, **ABCD is the required quadrilateral.**

2. When three consecutive sides and two included angles are given :

Let  $AB = 5$  cm,  $AD = 4$  cm,  $BC = 5.5$  cm,  $\angle BAD = 60^\circ$  and  $\angle ABC = 90^\circ$ .

**Steps :**

1. Draw  $AB = 5$  cm.
2. At A, draw  $\angle BAY = 60^\circ$ .
3. At B, draw  $\angle ABX = 90^\circ$ .
4. From BX, cut  $BC = 5.5$  cm.
5. From AY, cut  $AD = 4$  cm.
6. Join C and D.



Then, **ABCD is the required quadrilateral.**

## 28.2 CONSTRUCTION OF A PARALLELOGRAM ABCD.

1. When two consecutive sides and an included angle are given :

Let  $BC = 4.2$  cm,  $CD = 3.6$  cm, and  $\angle BCD = 60^\circ$ .

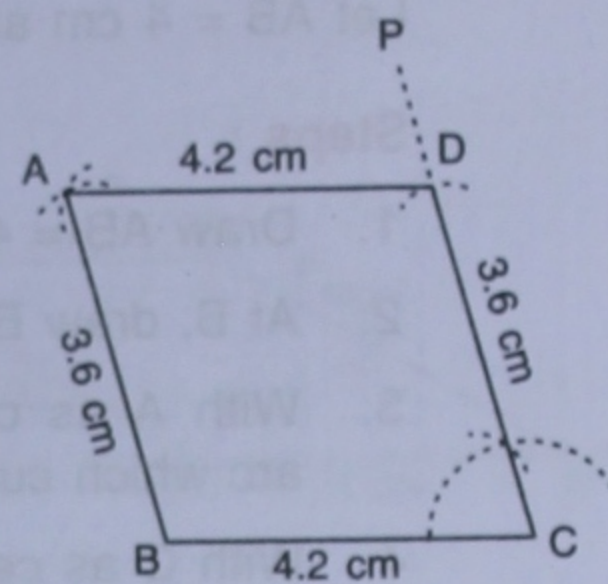
[Students know that the opposite sides of a parallelogram are equal.

$\therefore BC = 4.2$  cm = AD and  $CD = 3.6$  cm = AB].

**Steps :**

1. Draw  $BC = 4.2$  cm.
2. At C, construct angle  $PCB = 60^\circ$  and from CP cut  $CD = 3.6$  cm.
3. Taking D as centre, draw an arc of radius 4.2 cm (AD) and taking B as centre, draw an arc of radius 3.6 cm (AB). Let the two arcs intersect each other at point A.
4. Join AB and AD.

Then, ***ABCD is the required parallelogram.***



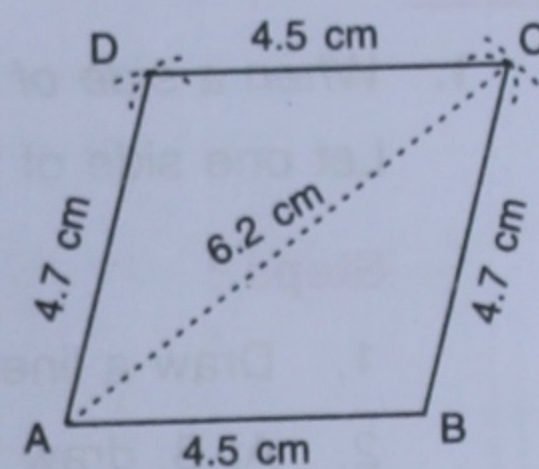
2. **When two consecutive sides and one diagonal are given :**

Let  $AB = 4.5$  cm,  $BC = 4.7$  cm and the diagonal  $AC = 6.2$  cm.

**Steps :**

1. Draw  $AB = 4.5$  cm.
2. Taking B as centre, draw an arc of radius 4.7 cm ( $= BC$ ) and taking A as centre, draw one more arc of radius 6.2 cm ( $=$  diagonal AC). Let the two arcs intersect each other at the point C.
3. Join B and C.
4. Taking C as centre, draw an arc of radius 4.5 cm ( $= AB$ ) and taking A as centre, draw one more arc of radius 4.7 cm ( $= BC$ ). Let these arcs intersect each other at the point D.
5. Join AD and CD.

Then, ***ABCD is the required parallelogram.***



### 28.3 CONSTRUCTION OF A RECTANGLE ABCD.

1. **When two adjacent sides of a rectangle are given :**

Let  $AB = 5$  cm and  $BC = 3.5$  cm.

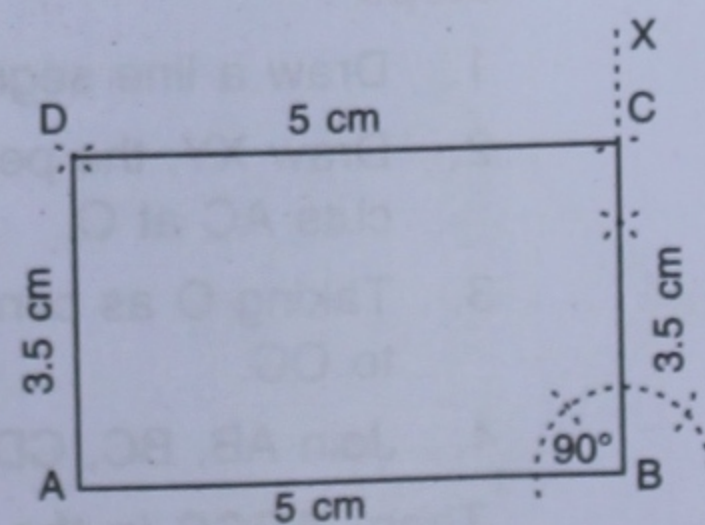
**Steps :**

1. Draw  $AB = 5$  cm.
2. At B, draw  $BX \perp$  to AB, i.e.,  $\angle ABX = 90^\circ$ .
3. With B as centre, draw an arc of 3.5 cm radius which cuts BX at the point C.
4. With C as centre, draw an arc of 5 cm radius and with A as centre, draw another arc of 3.5 cm radius.

These two arcs cut each other at the point D.

5. Join AD and CD.

Then, ***ABCD is the required rectangle.***



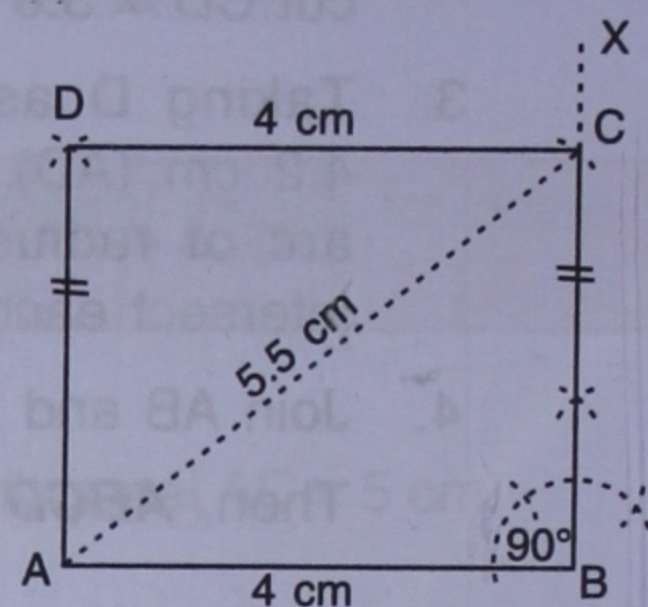
2. When one side and one diagonal of the rectangle are given :

Let  $AB = 4$  cm and the diagonal  $AC = 5.5$  cm.

**Steps :**

1. Draw  $AB = 4$  cm.
2. At B, draw  $BX$ , so that  $\angle ABX = 90^\circ$ .
3. With A as centre and 5.5 cm radius, draw an arc which cuts  $BX$  at C.
4. With C as centre and radius 4 cm, draw an arc. Also, with A as centre and radius equal to BC, draw one more arc. Let these arcs cut each other at the point D.
5. Join CD and AD.

Then,  **$ABCD$  is the required rectangle.**



### 28.4 CONSTRUCTION OF A SQUARE $ABCD$ .

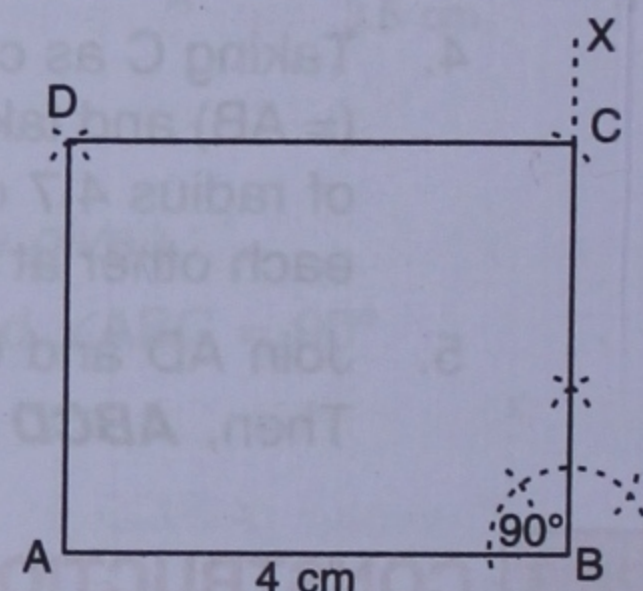
1. When a side of the square is given :

Let one side of the square = 4 cm.

**Steps :**

1. Draw a line  $AB = 4$  cm.
2. At B, draw  $BX$  perpendicular to  $AB$ .
3. From  $BX$ , cut  $BC = 4$  cm.
4. With C as centre, draw an arc of radius 4 cm and with A as centre, draw one more arc of radius 4 cm.
5. These two arcs meet at D. Join AD & CD

Then,  **$ABCD$  is the required square.**



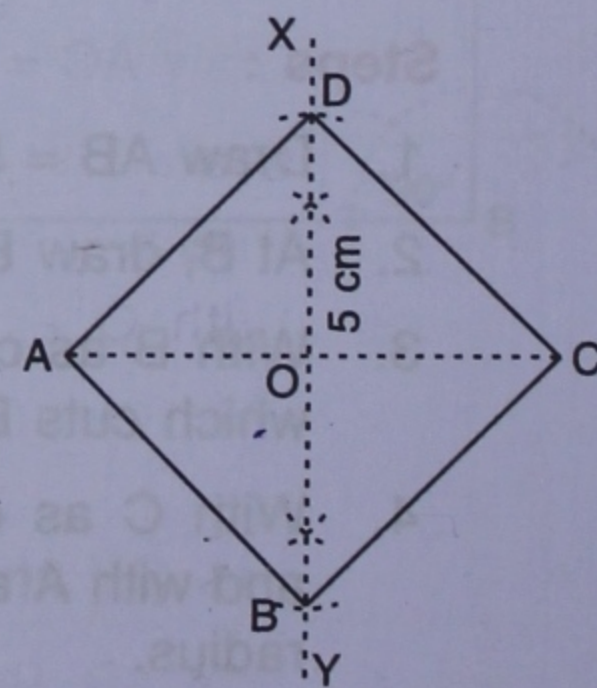
2. When one diagonal of the square is given :

Let the diagonal  $AC = 5$  cm.

**Steps :**

1. Draw a line segment  $AC = 5$  cm.
2. Draw  $XY$ , the perpendicular bisector of  $AC$  which cuts  $AC$  at O.
3. Taking O as centre, cut  $OD$  and  $OB$ , each equal to  $OC$ .
4. Join  $AB$ ,  $BC$ ,  $CD$  and  $DA$ .

Then,  **$ABCD$  is the required square.**



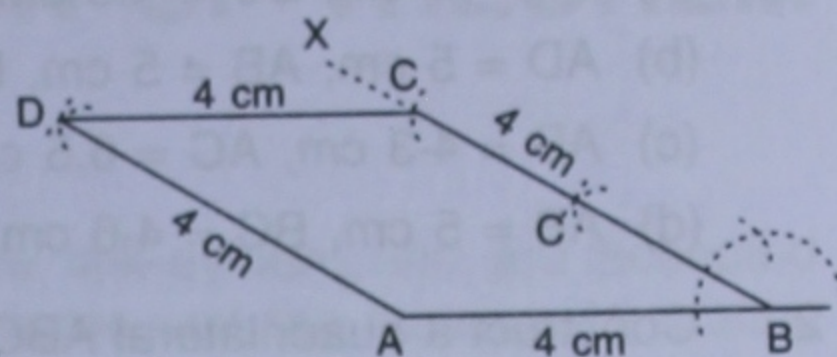
### 28.5 CONSTRUCTION OF A RHOMBUS $ABCD$ .

1. When one side and one angle are given :

Let the side  $AB = 4$  cm and  $\angle ABC = 30^\circ$ .

**Steps :**

1. Draw a line  $AB = 4$  cm.
2. At B, draw a line BX so that angle  $ABX = 30^\circ$ .
3. From BX, cut  $BC = 4$  cm.
4. With C as centre, draw an arc of 4 cm radius and with A as centre, draw one more arc of radius 4 cm.



Let, these two arcs cut each other at point D.

5. Join CD and AD.

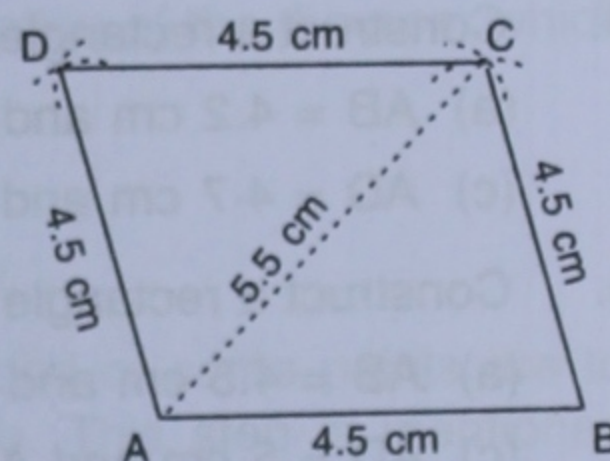
Then, **ABCD is the required rhombus.**

2. When one side and one diagonal are given :

Let the side  $AB = 4.5$  cm and the diagonal  $AC = 5.5$  cm.

**Steps :**

1. Draw  $AB = 4.5$  cm.
2. With A as centre, draw an arc of radius 5.5 cm and with B as centre, draw an arc of radius 4.5 cm. Let these two arcs cut each other at point C.
3. With C as centre, draw an arc of radius 4.5 cm and with A as centre, draw another arc of radius 4.5 cm.
4. Let these two arcs meet at the point D. Join BC, CD and AD.



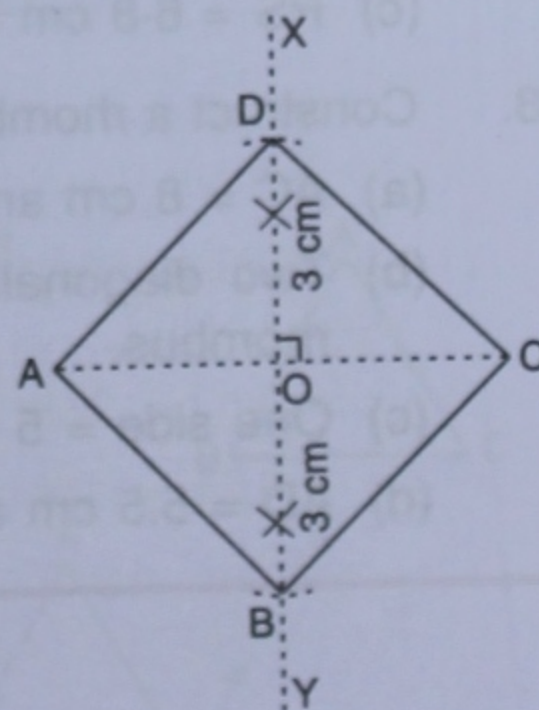
Then, **ABCD is the required rhombus.**

3. Two diagonals are given :

Let the diagonal  $AC = 4.5$  cm and the diagonal  $BD = 6$  cm.

**Steps :**

1. Draw  $AC = 4.5$  cm.
2. Draw XY, the perpendicular bisector of AC which cuts AC at point O.
3. With O as centre, draw arcs of radii 3 cm  $\left( = \frac{BD}{2} = \frac{6}{2} \text{ cm} = 3 \text{ cm} \right)$  which cut OX at D and OY at B respectively.
4. Join AB, BC, CD and DA.



Then, **ABCD is the required rhombus.**

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**EXERCISE 28**


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1. Construct a quadrilateral ABCD, such that :
  - (a)  $AB = 5$  cm,  $BC = 4.5$  cm,  $CD = 5.2$  cm,  $DA = 4$  cm and  $AC = 6$  cm.
  - (b)  $AD = 5$  cm,  $AB = 5$  cm,  $BD = 6$  cm,  $CD = 4.5$  cm and  $BC = 5.5$  cm.
  - (c)  $AB = 4.3$  cm,  $AC = 6.5$  cm,  $BC = 4$  cm,  $DC = 5.7$  cm and  $DA = 4.6$  cm.
  - (d)  $AB = 5$  cm,  $BC = 4.6$  cm,  $CD = 4.6$  cm,  $BD = 6.4$  cm and  $AD = 4.8$  cm.
2. Construct a quadrilateral ABCD, if :
  - (a)  $AB = 4$  cm,  $BC = 5$  cm,  $AD = 6$  cm,  $\angle ABC = 90^\circ$  and  $\angle BAD = 120^\circ$ .
  - (b)  $AD = 5$  cm,  $\angle ADC = 60^\circ$ ,  $\angle BCD = 75^\circ$ ,  $CD = 7$  cm and  $CB = 4.5$  cm.
  - (c)  $AB = 3.5$  cm,  $BC = 4.5$  cm,  $CD = 6$  cm,  $\angle ABC = 135^\circ$  and  $\angle BCD = 60^\circ$ .  
Measure AD.
3. Construct a parallelogram ABCD, if :
  - (a)  $AB = 6$  cm,  $BC = 4.8$  cm and  $\angle ABC = 60^\circ$ .
  - (b)  $AB = 5.6$  cm,  $AD = 5$  cm and  $\angle BAD = 120^\circ$ .
  - (c)  $AB = 5$  cm,  $BC = 6.2$  cm and the diagonal  $AC = 7.5$  cm.
  - (d)  $BC = 6.2$  cm,  $CD = 5.4$  cm and the diagonal  $BD = 6.8$  cm.
4. Construct a rectangle ABCD, if :
 

(a) $AB = 4.2$ cm and $BC = 5.8$ cm	(b) $AB = 6$ cm and $AD = 5.2$ cm
(c) $AD = 4.7$ cm and $CD = 5.5$ cm	(d) $AB = 4.3$ cm and $AD = 5.6$ cm.
5. Construct a rectangle ABCD, if :
 

(a) $AB = 4.5$ cm and $BD = 6.4$ cm	(b) $BD = 5.8$ cm and $BC = 4.8$ cm
(c) $AD = 5$ cm and $AC = 6$ cm	(d) $CD = 4.2$ cm and $CA = 5.5$ cm.
6. Construct a square ABCD, if :
 

(a) $AB = 5.7$ cm. Measure its diagonals.	(b) $BC = 6.2$ cm. Measure its diagonals.
(c) $AC = 8$ cm. Measure its sides.	(d) $BD = 7.2$ cm. Measure its sides.
7. Construct a rhombus PQRS, if :
 

(a) $PQ = 5$ cm and $\angle PQR = 60^\circ$	(b) $QR = 5.6$ cm and $\angle QRS = 75^\circ$
(c) $PS = 6.8$ cm and $\angle QPR = 30^\circ$	(d) $RS = 5.8$ cm and $\angle PSR = 120^\circ$ .
8. Construct a rhombus ABCD, if :
  - (a)  $AC = 8$  cm and  $BD = 6$  cm. Measure AB.
  - (b) Two diagonals are  $6.6$  cm and  $7.4$  cm respectively. Measure each side of the rhombus.
  - (c) One side =  $5$  cm and one diagonal =  $8$  cm.
  - (d)  $AD = 5.5$  cm and  $BD = 7$  cm. Measure AC.

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