Construction Of Quadrilaterals

Exercise 3.1

Q. 1. Construct the quadrilaterals with the given measurements. And write steps of construction.

Quadrilateral ABCD with AB = 5.5 cm, BC = 3.5 cm, CD = 4 cm, AD = 5 cm and ∠A = 45º.

Answer : GIVEN : In quadrilateral ABCD ,

AB = 5.5 cm

BC = 3.5 cm

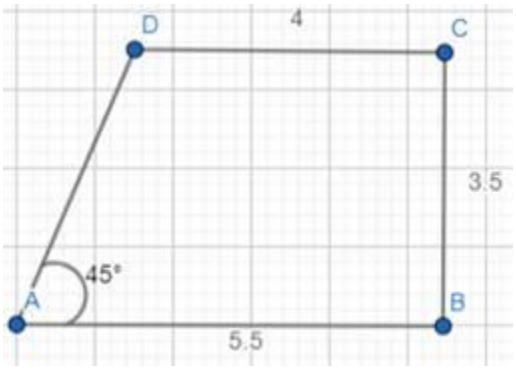
CD = 4 cm

AD = 5 cm

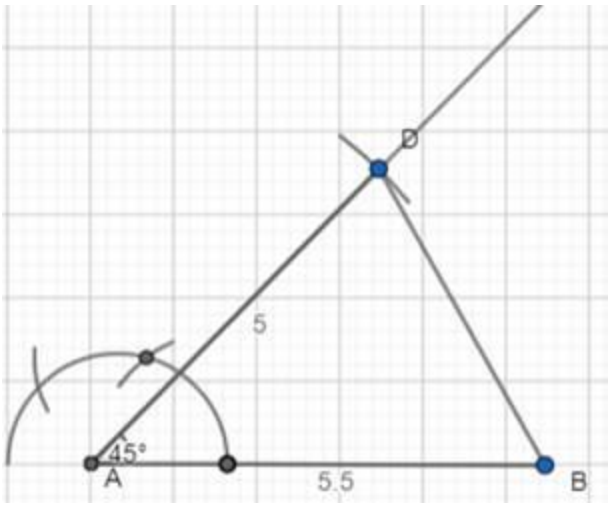
∠A = 45^o

PROCEDURE :

Step 1 : Draw a rough sketch of the required quadrilateral and mark the given measurements.

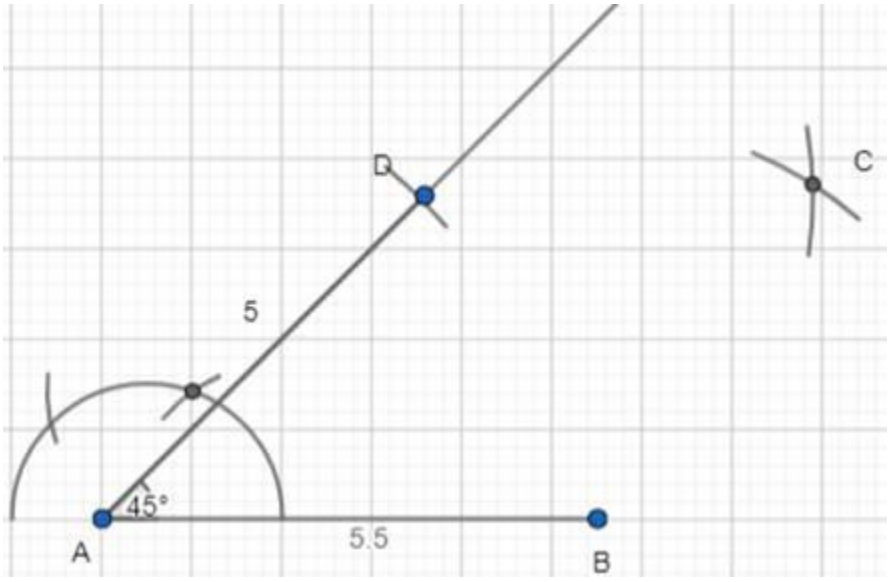


Step 2 : Draw ΔDAB using S.A.S property of construction , by taking AD = 5 cm , ∠ DAB = 45° and AB = 5.5 cm.

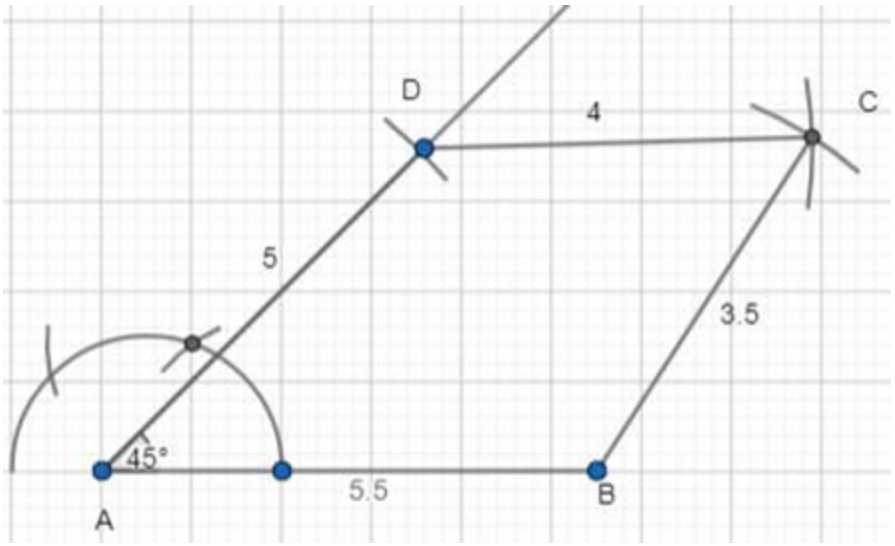


Step 3 : To locate the fourth vertex ‘C’ , draw an arc , with center D and radius 4cm (CD=4cm).

Draw another arc with center B and radius 3.5 cm (BC=3.5cm) which cuts the previous arc at C.



Step 4: Join DC and BC to complete the required quadrilateral ABCD.



Q. 2. Construct the quadrilaterals with the given measurements. And write steps of construction.

Quadrilateral BEST with BE = 2.9 cm, ES = 3.2 cm, ST = 2.7 cm, BT = 3.4 cm and ∠B = 75º.

Answer : GIVEN : In quadrilateral ABCD ,

BE = 2.9 cm

ES = 3.2 cm

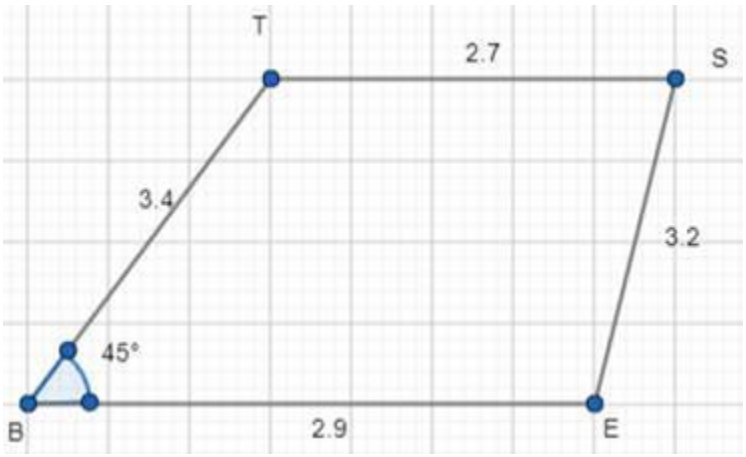
ST = 2.7 cm

BT = 3.4 cm

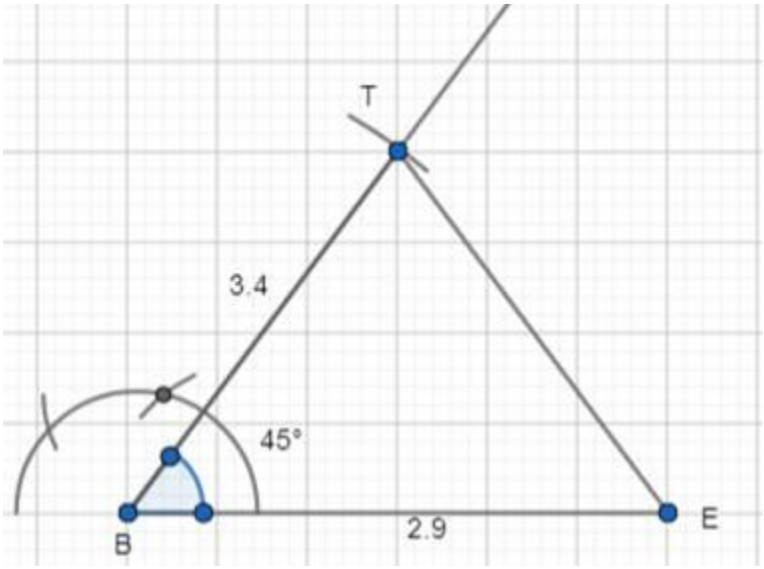
$\angle B = 45^{o}$

PROCEDURE :

Step 1 : Draw a rough sketch of the required quadrilateral and mark the given measurements.

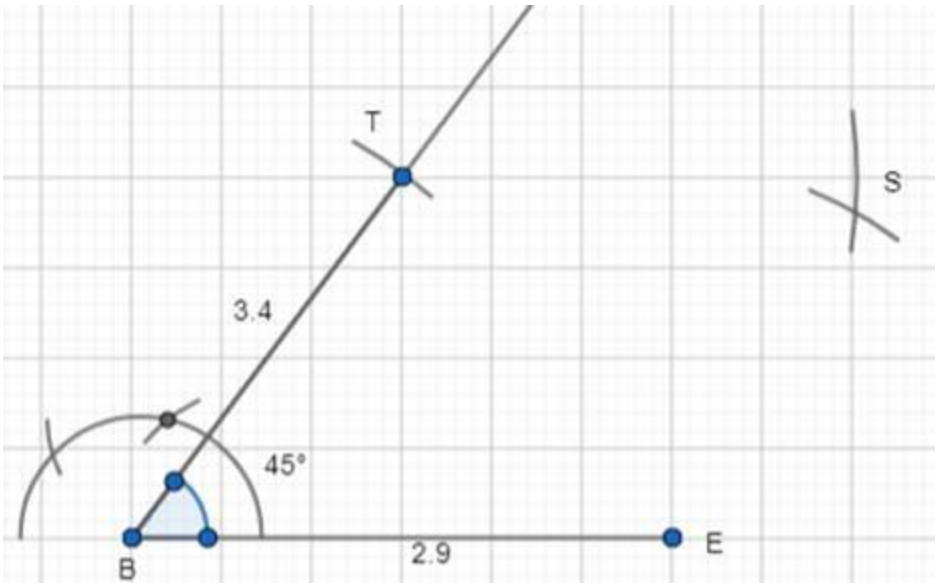


Step 2 : Draw ΔTBE using S.A.S property of construction , by taking BT = 3.4 cm , ∠ TBE = 75° and BE = 2.9 cm.

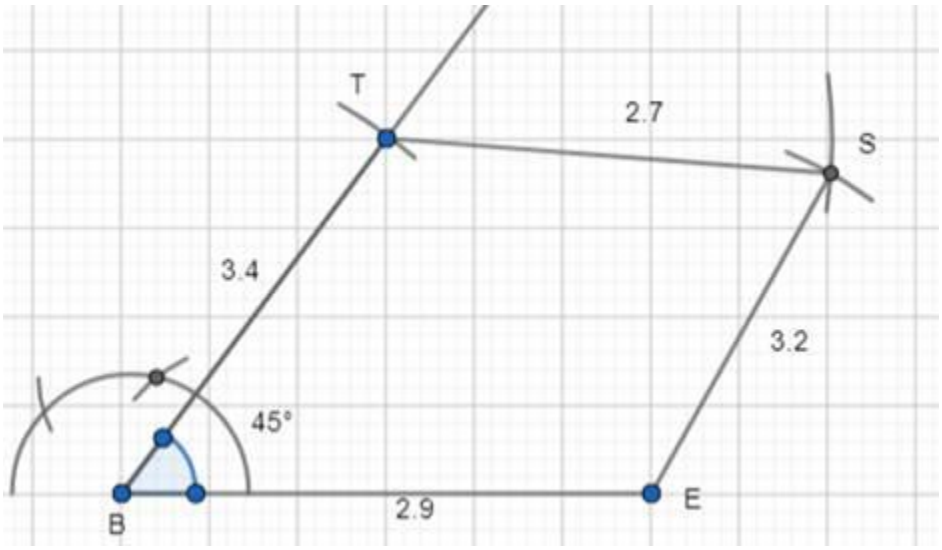


Step 3 : To locate the fourth vertex ‘S’ , draw an arc , with center T and radius 2.7cm (TS=2.7cm).

Draw another arc with center E and radius 3.2 cm (ES=3.2cm) which cuts the previous arc at S.



Step 4: Join TS and ES to complete the required quadrilateral BEST.



Q. 3. Construct the quadrilaterals with the given measurements. And write steps of construction.

Parallelogram PQRS with PQ = 4.5 cm, QR = 3 cm and ∠PQR = 60º.

Answer : GIVEN : In Parallelogram PQRS,

PQ = 4.5 cm

QR = 3 cm

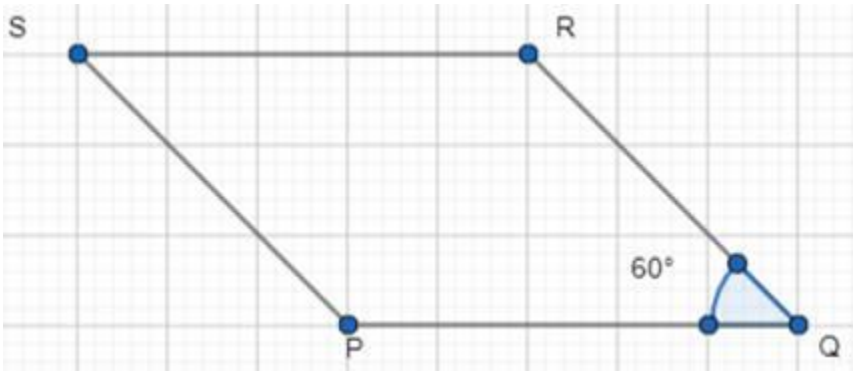
∠PQR = 60º

PROCEDURE :

Step 1: Draw a rough sketch of the parallelogram and mark the given measurements.

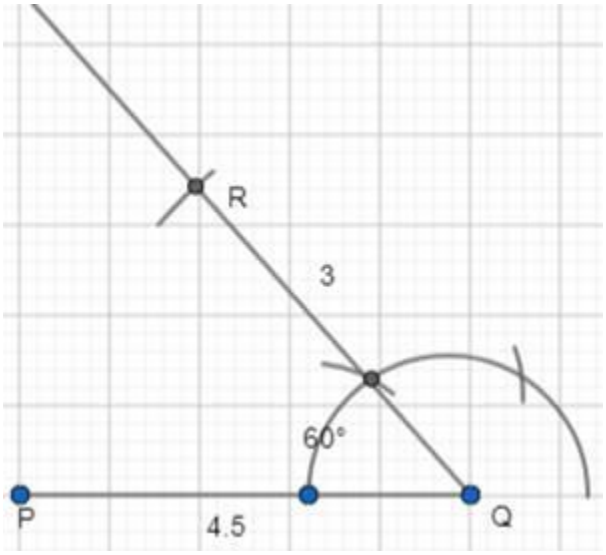
Here , we are given only 3 measurements. But as PQRS is a parallelogram, we can also write that RS = PQ = 4.5 cm and SP = QR = 3 cm.

(Now we got 5 measurements in total)



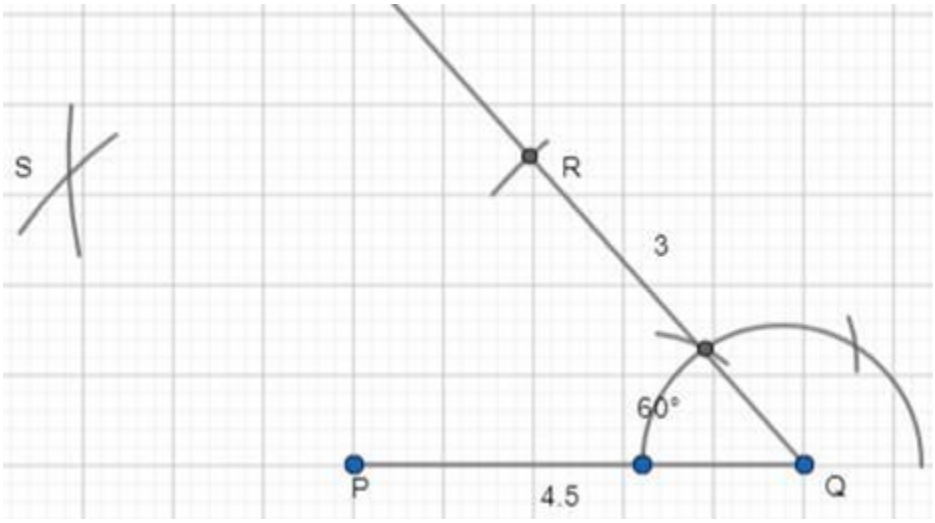
Step 2 : Draw ΔPQR using the measures PQ = 4.5 cm , ∠PQR = 60°

And QR = 3 cm.

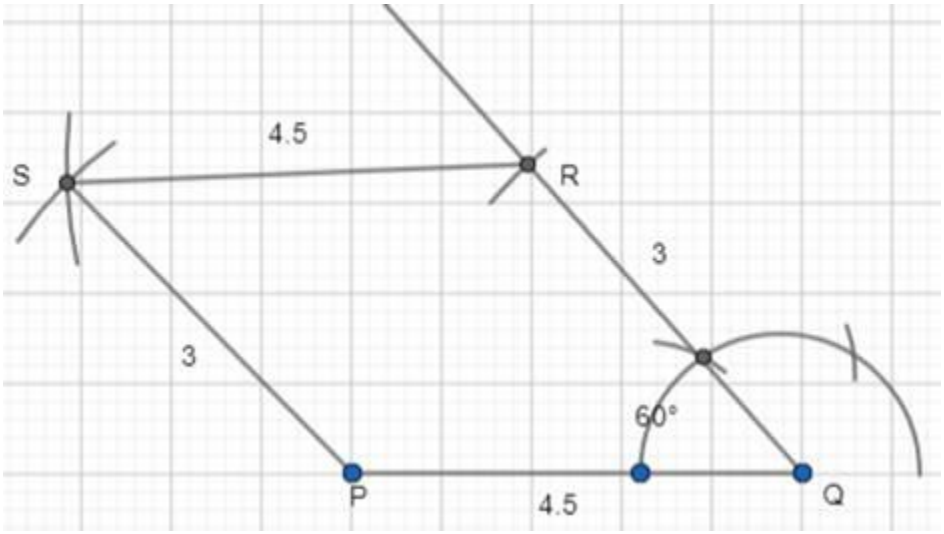


Step 3 : Locate the 4th vertex ‘S’ using the other 2 measurements PS = 3 cm and RS = 4.5 cm. To locate the fourth vertex ‘S’, draw an arc, with center P and radius 3cm (PS=3cm).

Draw another arc with center R and radius 4.5cm (RS=4.5cm) which cuts the previous arc at S.



Step 4 : Join RS and PS to complete the required parallelogram.



Q. 4. Construct the quadrilaterals with the given measurements. And write steps of construction.

Rhombus MATH with AT = 4 cm, ∠MAT = 120º.

Answer : GIVEN : In Rhombus MATH,

AT = 4 cm

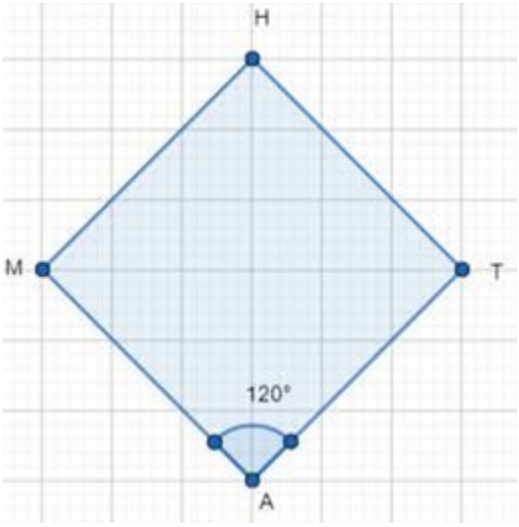
∠MAT = 120º

PROCEDURE :

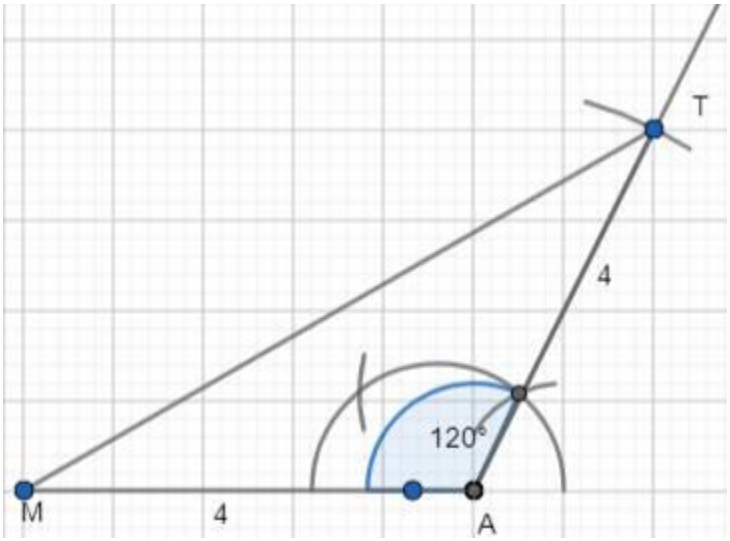
Step 1 : Draw a rough sketch of the required quadrilateral and mark the given measurements.

Here , we are given only 2 measurements. But as MATH is a rhombus, we can also write that MA = AT = TH = HM = 4cm.

(Now we got 5 measurements in total)

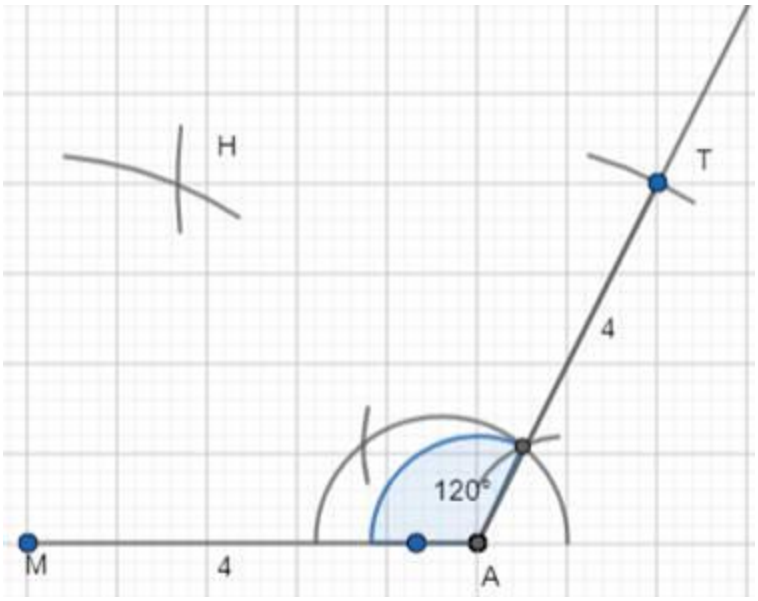


Step 2 : Draw ΔMAT using S.A.S property of construction , by taking MA = 4 cm , ∠ MAT = 120° and AT = 4 cm.

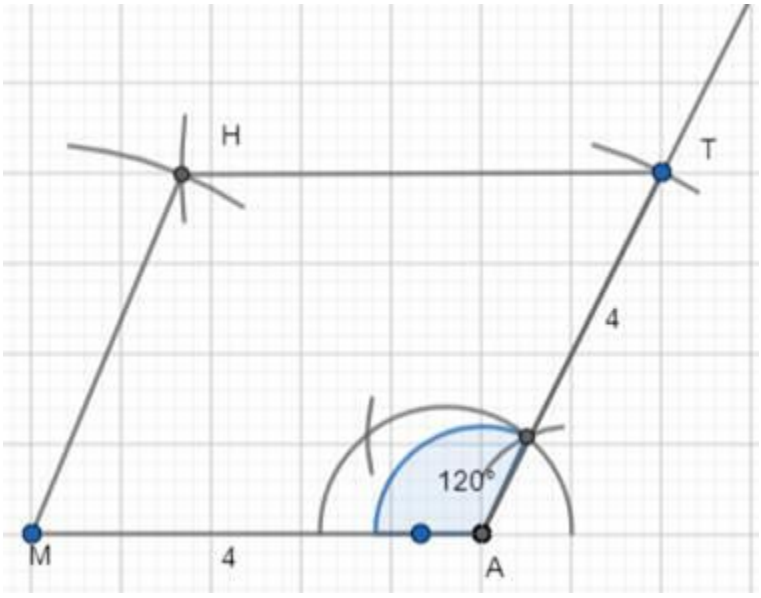


Step 3 : To locate the fourth vertex ‘H’ , draw an arc , with center T and radius 4cm (TH=4cm).

Draw another arc with center M and radius 4 cm (MH=4cm) which cuts the previous arc at H.



Step 4: Join TH and MH to complete the required rhombus MATH.



Q. 5. Construct the quadrilaterals with the given measurements. And write steps of construction.

Rectangle FLAT with FL = 5 cm, LA = 3 cm.

Answer : GIVEN : In Rectangle FLAT,

FL = 5 cm

LA = 3 cm

∠FLA = 90º

PROCEDURE :

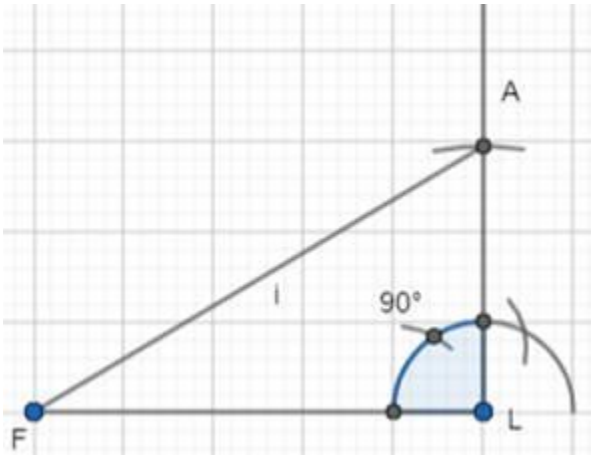
Step 1: Draw a rough sketch of the parallelogram and mark the given measurements.

Here , we are given only 3 measurements. But as FLAT is a rectangle, we can also write that FL = AT = 5 cm and LA = TF = 3 cm.

(Now we got 5 measurements in total)

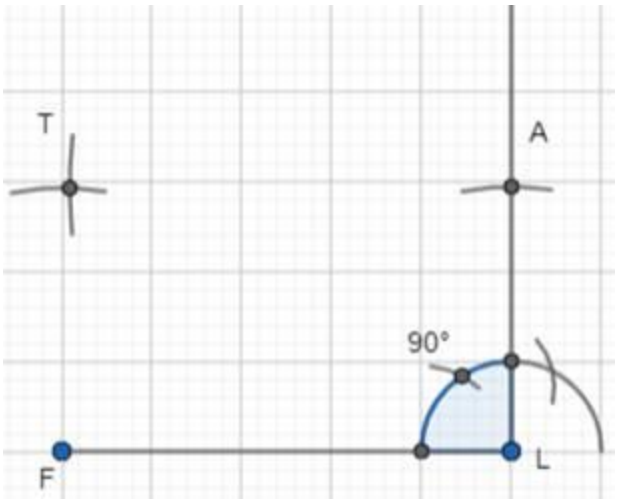
Step 2 : Draw ΔFLA using the measures FL = 5 cm , ∠FLA = 90°

And LA = 3 cm.

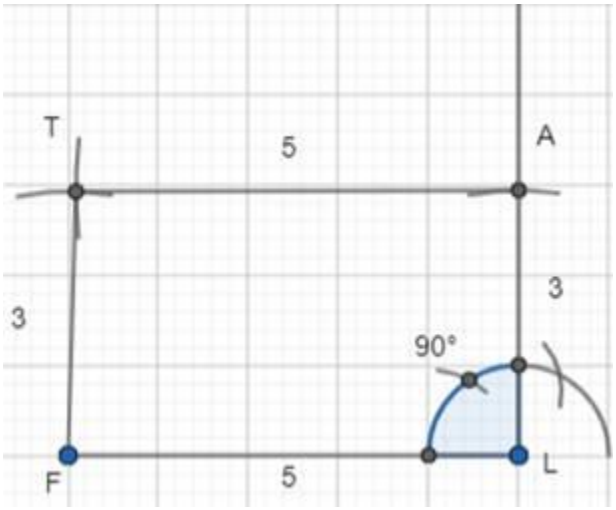


Step 3 : Locate the 4th vertex ‘T’ using the other 2 measurements TF = 3 cm and AT = 5 cm. To locate the fourth vertex ‘T’, draw an arc , with center F and radius 3cm (FT=3cm).

Draw another arc with center A and radius 5cm (AT=5cm) which cuts the previous arc at T.



Step 4 : Join AT and FT to complete the required rectangle FLAT.



Q. 6. Construct the quadrilaterals with the given measurements. And write steps of construction.

Square LUDO with LU = 4.5 cm.

Answer : GIVEN : In Square LUDO,

LU = 4.5 cm

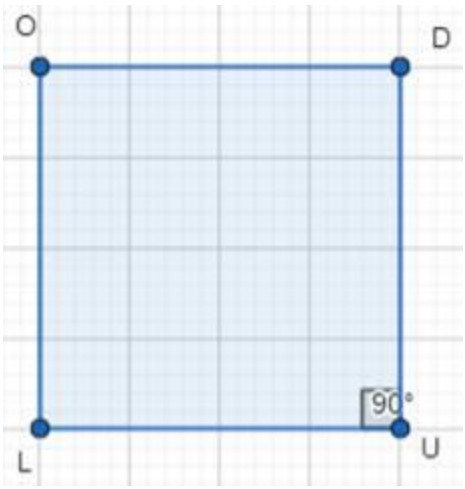
$\angle LUD = 90^o$

PROCEDURE :

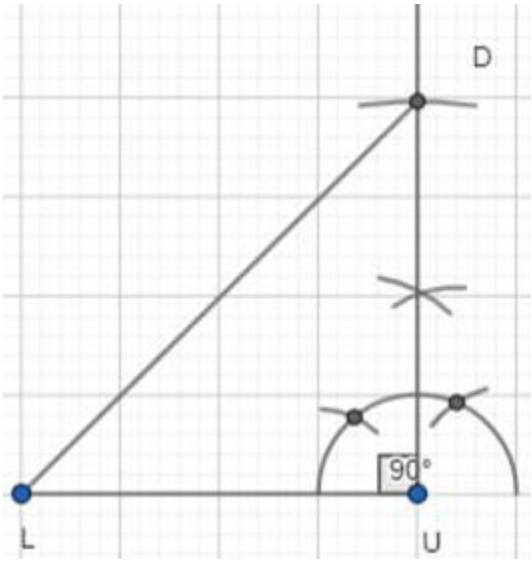
Step 1 : Draw a rough sketch of the required quadrilateral and mark the given measurements.

Here , we are given only 2 measurements. But as LUDO is a square , we can also write that LU = UD = DO = OL = 4.5 cm.

(Now we got 5 measurements in total)

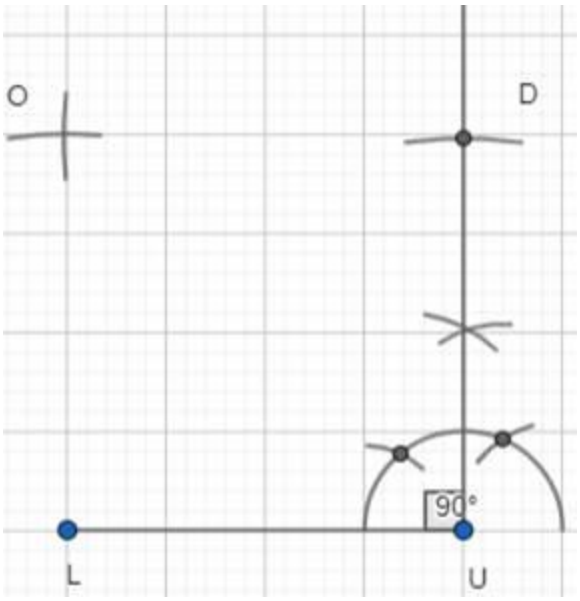


Step 2 : Draw ΔLUD using S.A.S property of construction , by taking LU = 4.5 cm , ∠ LUD = 90° and UD = 4.5 cm.

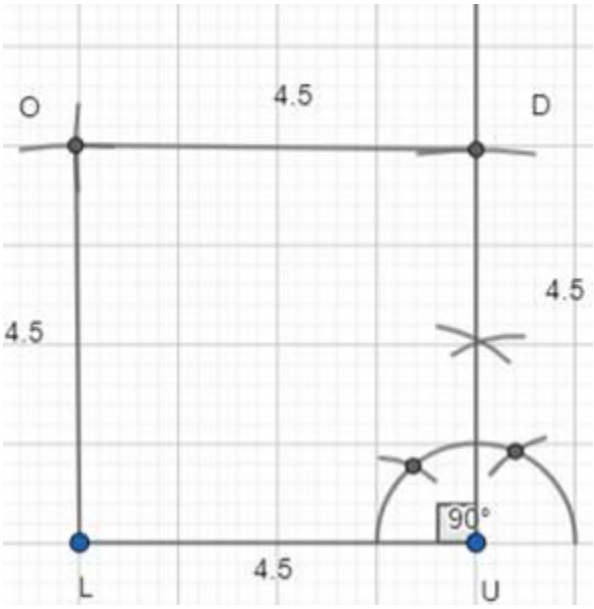


Step 3 : To locate the fourth vertex ‘O’ , draw an arc , with center L and radius 4.5cm (LO=4.5cm).

Draw another arc with center D and radius 4.5 cm (DO=4.5cm) which cuts the previous arc at O.



Step 4: Join LO and DO to complete the required square LUDO.



Exercise 3.2

Q. 1. Construct quadrilateral with the measurements given below:

Quadrilateral ABCD with AB = 4.5 cm, BC = 5.5 cm, CD = 4 cm, AD = 6 cm and AC = 7 cm

Answer : GIVEN : In quadrilateral ABCD ,

AB = 4.5 cm

BC = 5.5 cm

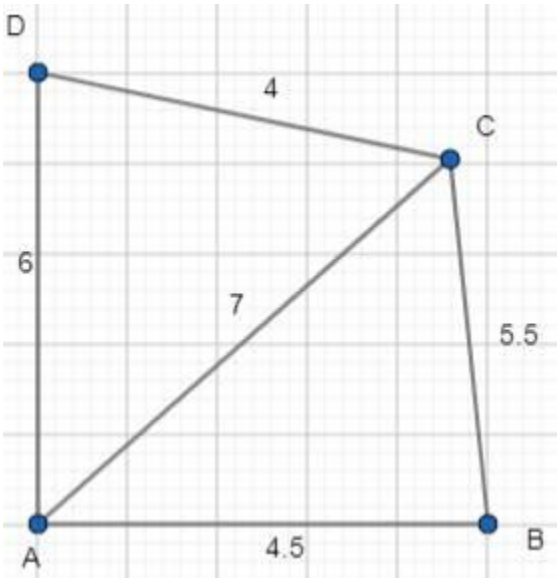
CD = 4 cm

AD = 6 cm

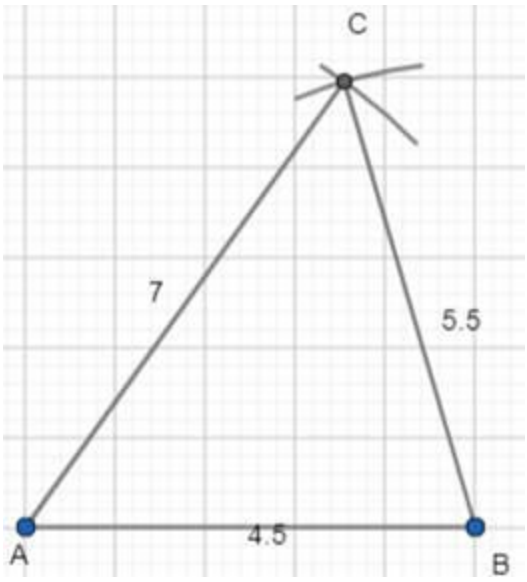
AC = 7 cm

PROCEDURE :

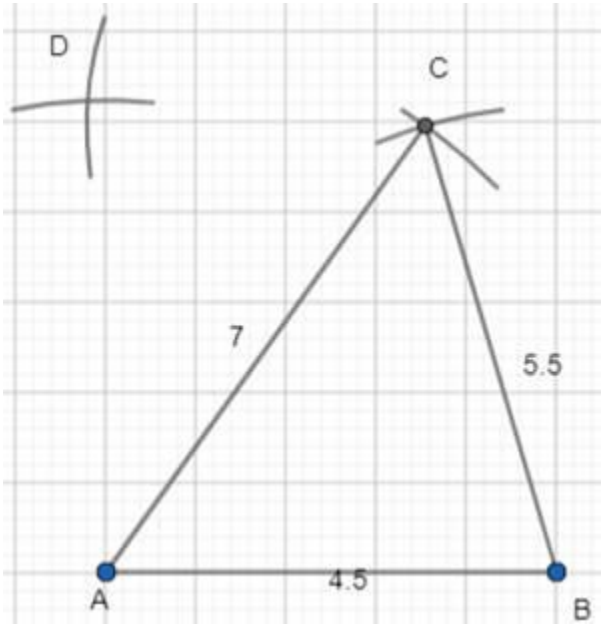
Step 1 : draw a rough sketch of the quadrilateral ABCD with the given measurements.



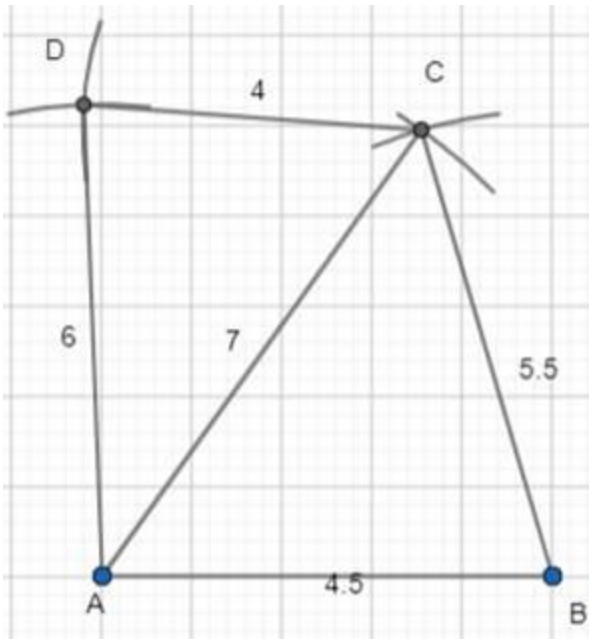
Step 2 : Construct ΔABC using SSS construction property with AB = 4.5 cm , BC = 5.5 cm and AC = 7 cm.



Step 3 : we have to locate the 4th vertex ‘D’ . it would be on the other side of AC. So , with center A and radius 6 cm(AD = 6 cm) draw an arc and with center C and radius 4 cm (CD = 4 cm) draw another arc to cut the previous arc at D.



Step 4 : join A,D and C,D to complete the quadrilateral ABCD.



Q. 2. Construct quadrilateral with the measurements given below:

Quadrilateral PQRS with PQ = 3.5 cm, QR = 4 cm, RS = 5 cm, PS = 4.5 cm and QS = 6.5 cm

Answer : GIVEN : In quadrilateral PQRS ,

PQ = 3.5 cm

QR = 4 cm

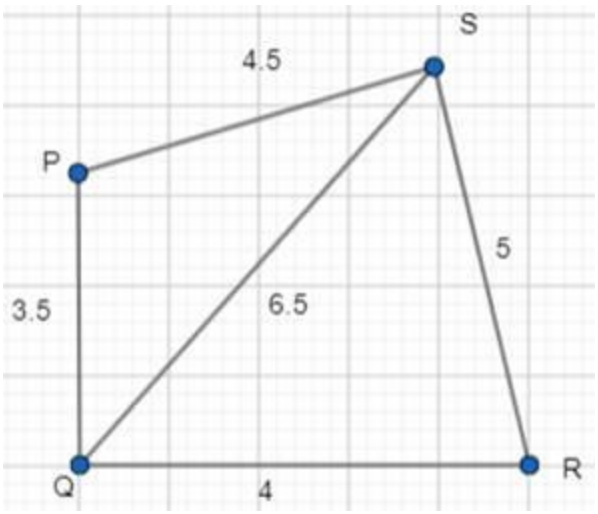
RS = 5 cm

PS = 4.5 cm

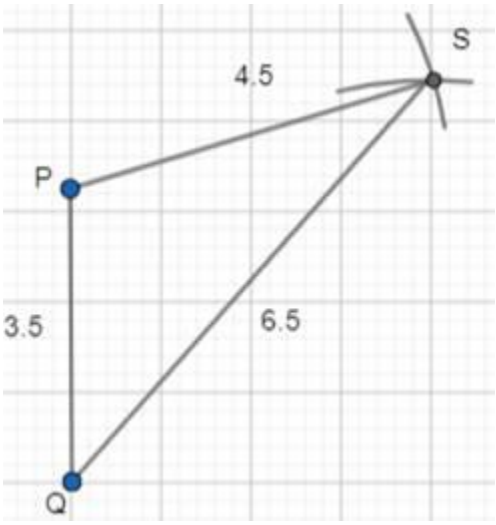
QS = 6.5 cm

PROCEDURE :

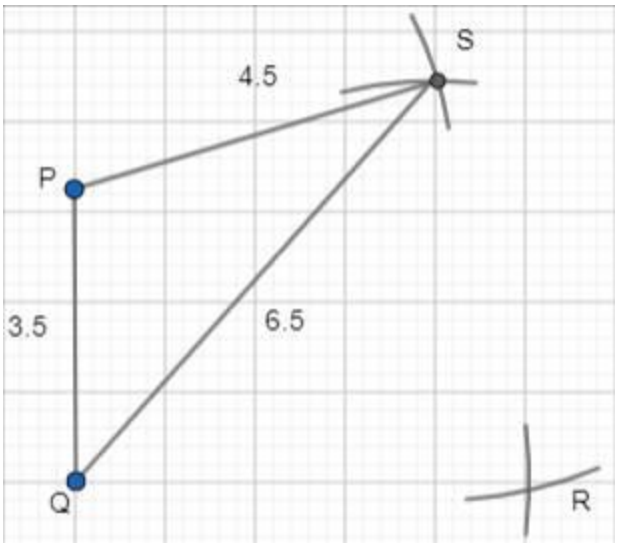
Step 1 : draw a rough sketch of the quadrilateral PQRS with the given measurements.



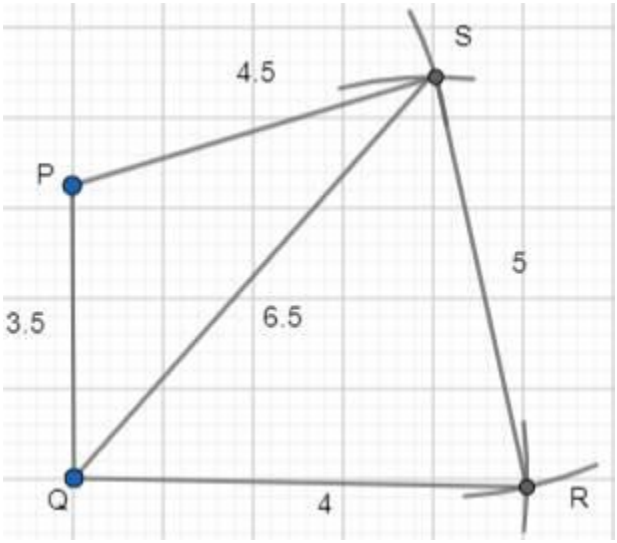
Step 2 : Construct ΔPQS using SSS construction property with PQ = 4.5 cm , PS = 4.5 cm and QS = 6.5 cm.



Step 3 : we have to locate the 4^{th} vertex ‘R’ . it would be on the other side of QS. So , with center Q and radius 4 cm(QR = 4 cm) draw an arc and with center S and radius 5 cm (SR = 5 cm) draw another arc to cut the previous arc at R.



Step 4 : join S,R and Q,R to complete the quadrilateral PQRS.



Q. 3. Construct quadrilateral with the measurements given below:

Parallelogram ABCD with AB = 6cm, BC = 4.5 cm and BD = 7.5 cm

Answer : GIVEN : In Parallelogram ABCD ,

AB = 6 cm

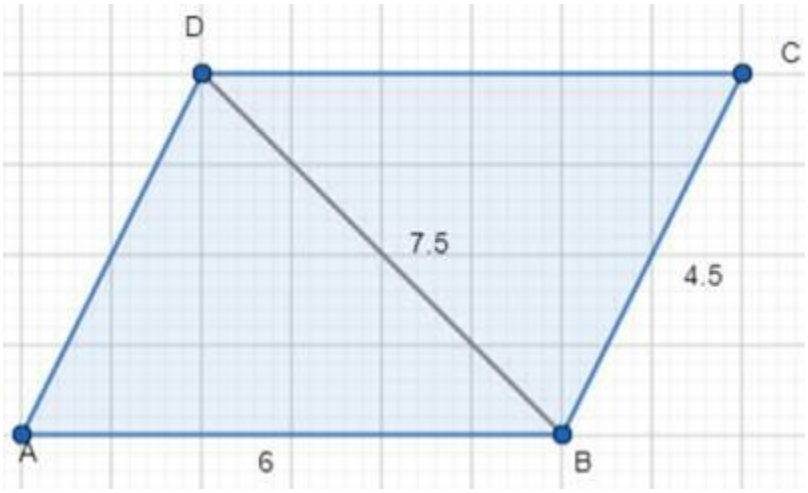
BD = 7.5 cm

BC = 4.5 cm

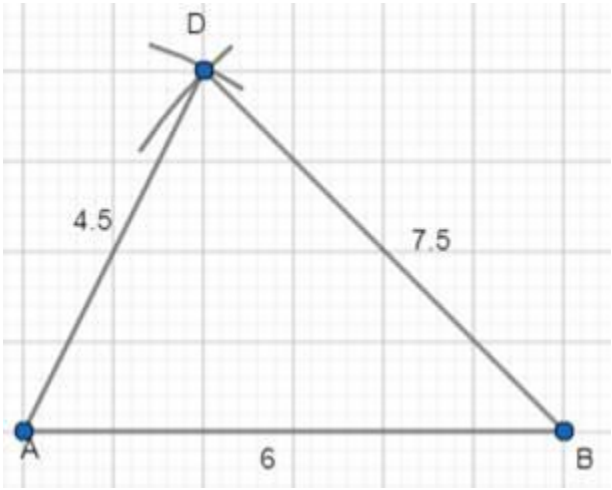
PROCEDURE :

Step 1 : draw a rough sketch of the Parallelogram ABCD with the given measurements.

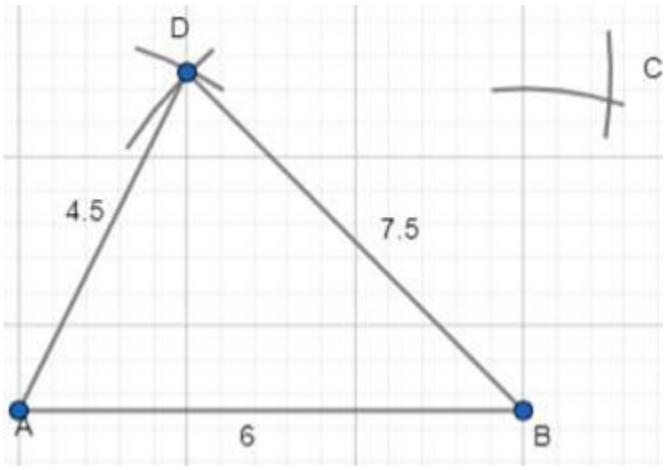
Here, we are given only 3 measurements. But as ABCD is a parallelogram, we can also write that AB = CD = 6 cm and BC = AD = 4.5 cm.



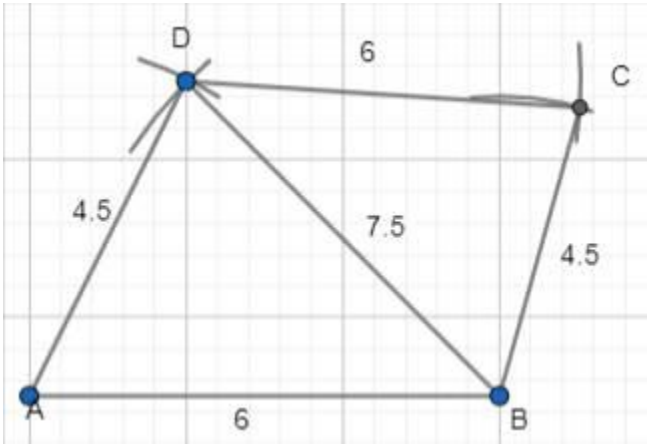
Step 2 : Construct ΔABD with AB = 4.5 cm , AD = 4.5 cm and BD = 7.5 cm.



Step 3 : we have to locate the 4^{th} vertex ‘C’ . it would be on the other side of BD. So, with center B and radius 4.5 cm(BC = 4.5 cm) draw an arc and with center D and radius 6 cm (CD = 6 cm) draw another arc to cut the previous arc at C.



Step 4 : join C,B and C,D to complete the quadrilateral ABCD.



Q. 4. Construct quadrilateral with the measurements given below:

Rhombus NICE with NI = 4 cm and IE = 5.6 cm

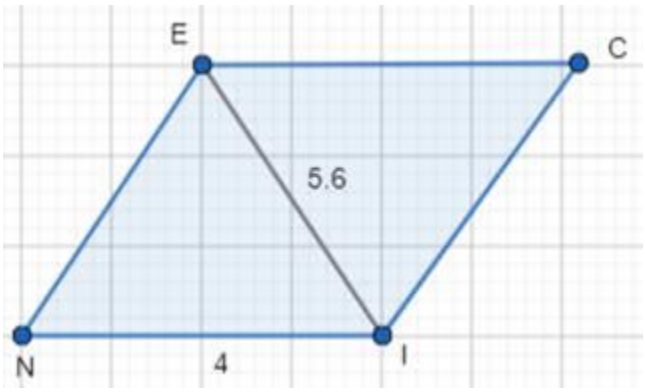
Answer : GIVEN : In Rhombus NICE,

NI = 4 cm

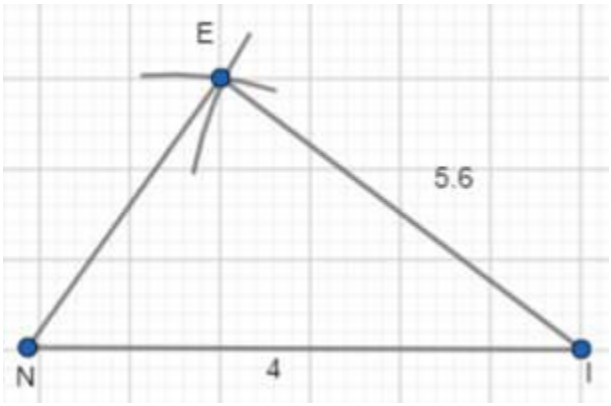
IE = 5.6 cm

PROCEDURE :

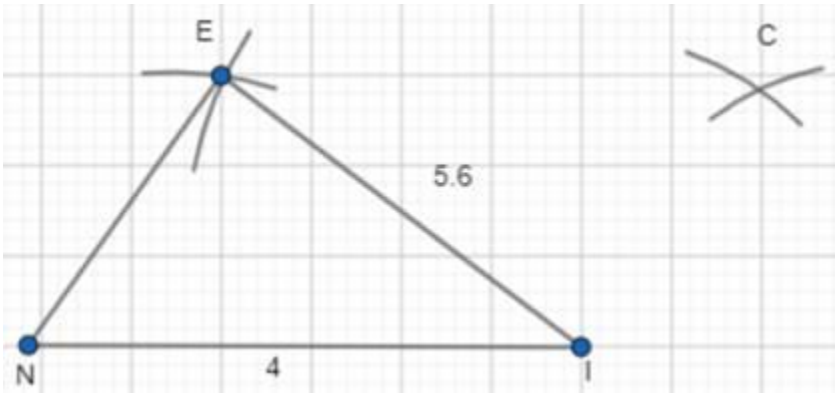
Step 1 : draw a rough sketch of the rhombus. Hence all the sides are equal, so, NI = IC = CE = NE = 4 cm and mark the given measurements.



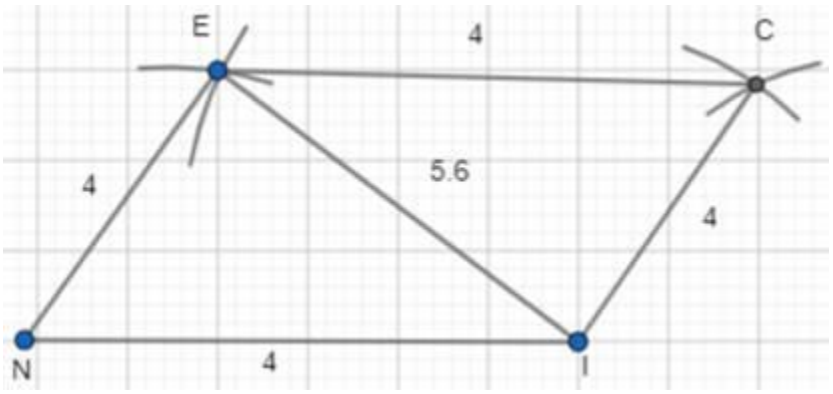
Step 2 : draw ΔNIE using SSS construction with measures NI = 4cm , IE= 5.6 cm and EN = 4cm.



Step 3 : we have to locate the 4th vertex ‘C’ . it would be on the other side of IE. So , with center I and radius 4 cm(IC = 4 cm) draw an arc and with center E and radius 4 cm (EC = 4 cm) draw another arc to cut the previous arc at C.



Step 4 : Join I,C and C,E to complete the required Rhombus NICE.



Exercise 3.3

Q. 1. Construct the quadrilateral with the measurements given below:

Quadrilateral GOLD OL = 7.5 cm, GL = 6 cm, LD = 5 cm, DG = 5.5 cm and OD = 10 cm.

Answer : GIVEN : in Quadrilateral GOLD,

OL = 7.5 cm

GL = 6 cm

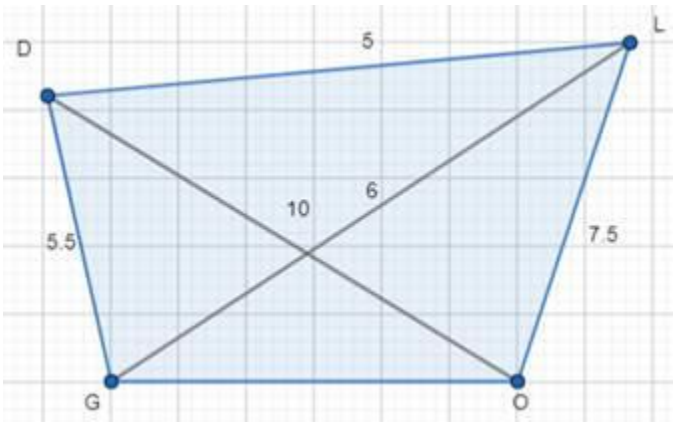
LD = 5 cm

DG = 5.5 cm

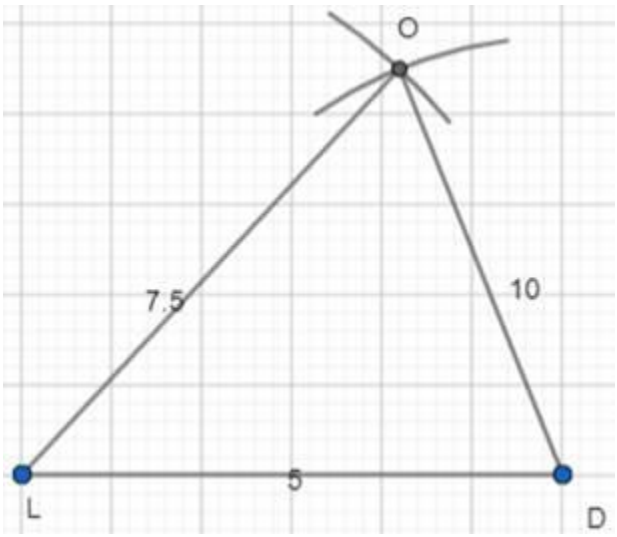
OD = 10 cm

PROCEDURE :

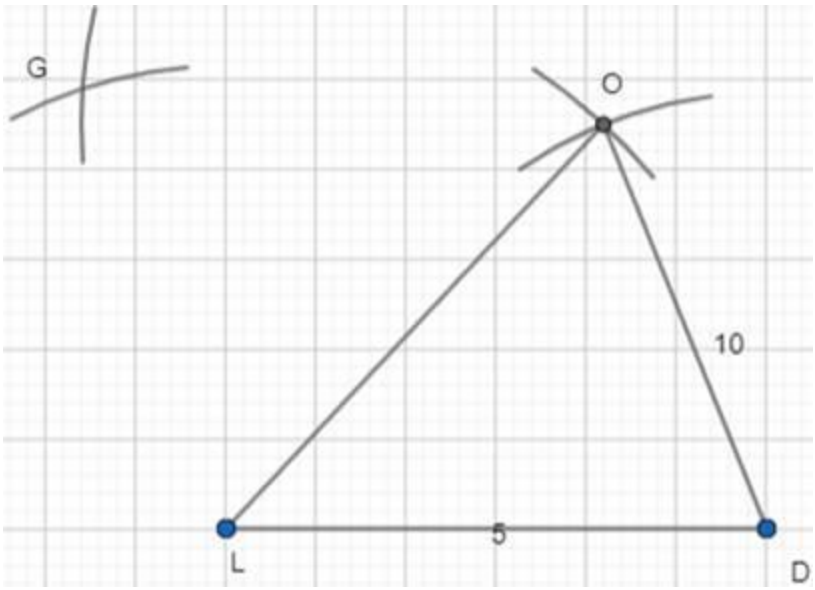
Step 1 : we first draw the rough sketch of the Quadrilateral GOLD.



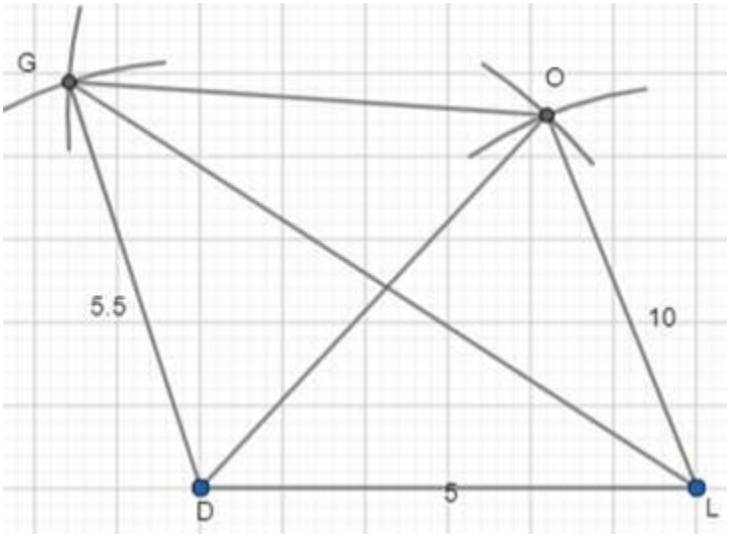
Step 2 : draw ΔOLD using SSS construction property with measures OL = 7.5 cm , LD = 5 cm and OD = 10 cm.



Step 3 : with center L and radius 6 cm (LG = 6cm) and with center D and radius 5.5 cm (DG = 5.5 cm) , draw 2 arcs opposite to vertex L to locate G.



Step 4 : Join G,D , L,G and G,O to complete the Quadrilateral GOLD.



Q. 2. Construct the quadrilateral with the measurements given below:

Quadrilateral PQRS, PQ = 4.2 cm, QR = 3 cm, PS = 2.8 cm, PR = 4.5 cm and QS = 5 cm.

Answer : GIVEN : in Quadrilateral PQRS,

PQ = 4.2 cm

QR = 3 cm

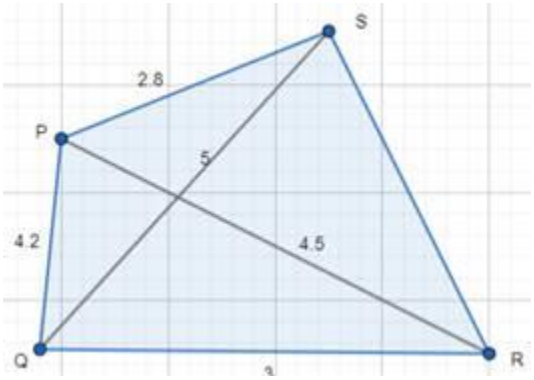
PS = 2.8 cm

PR = 4.5 cm

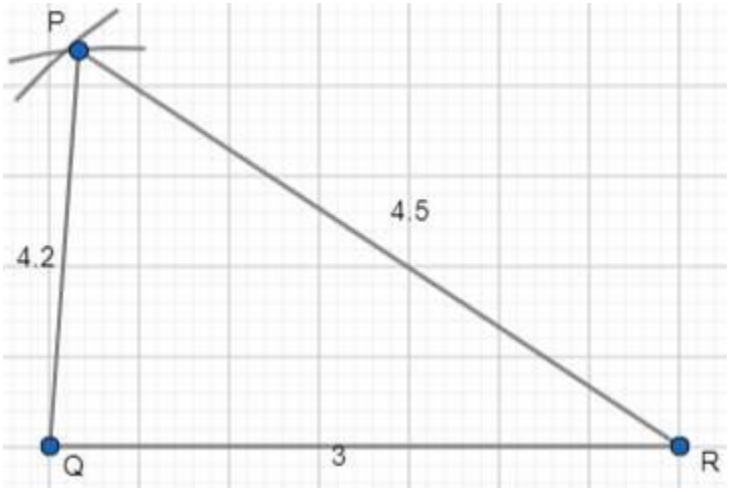
QS = 5 cm

PROCEDURE :

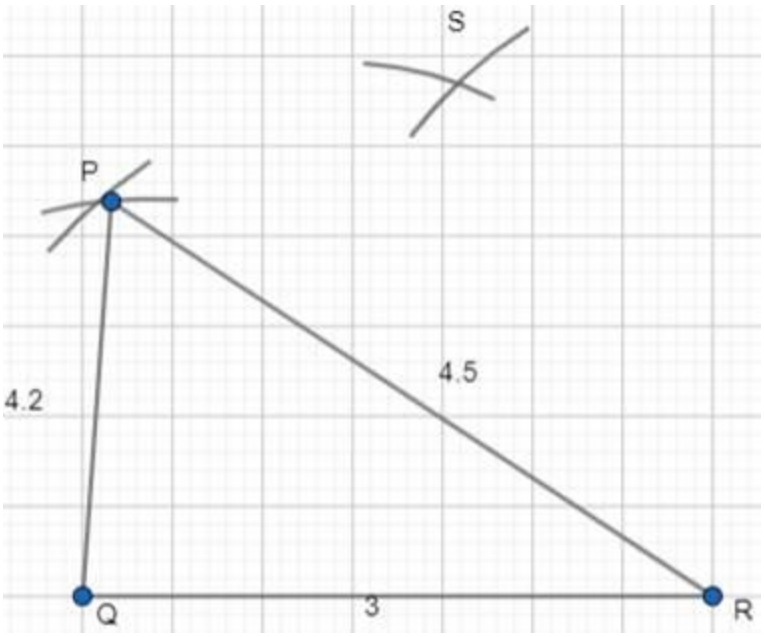
Step 1 : we first draw the rough sketch of the Quadrilateral PQRS



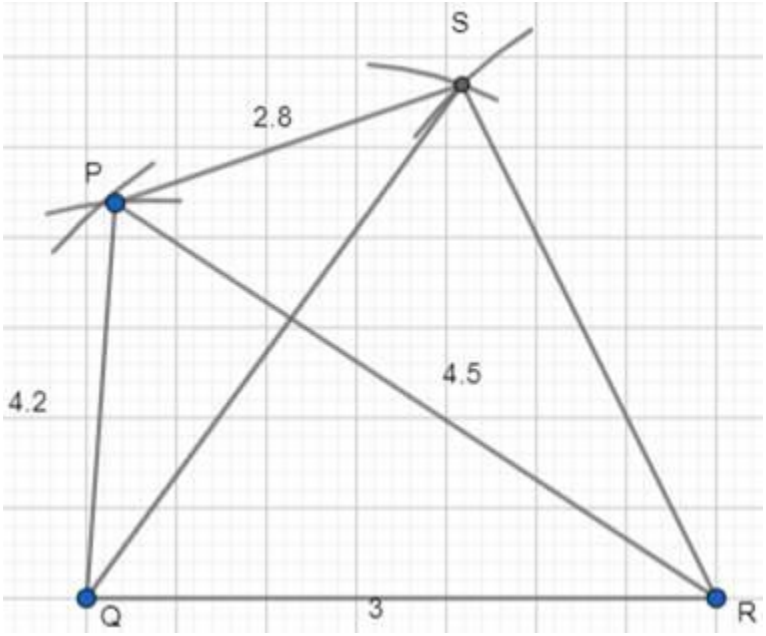
Step 2 : draw ΔPQR using SSS construction property with measures PQ = 4.2 cm, QR = 3 cm and PR = 4.5 cm.



Step 3 : with center Q and radius 5 cm (QS = 5 cm) and with center P and radius 2.8 cm (PS = 2.8 cm) , draw 2 arcs opposite to vertex Q to locate S.



Step 4 : Join S,P , Q,S and S,R to complete the Quadrilateral PQRS.



Exercise 3.4

Q. 1. Construct quadrilaterals with the measurements given below:

Quadrilateral HELP with HE = 6cm, EL = 4.5 cm, ∠H=60º, ∠E =105º and ∠P= 120º.

Answer : GIVEN : In Quadrilateral HELP,

HE = 6cm

EL = 4.5 cm

∠H=60º

∠E =105º

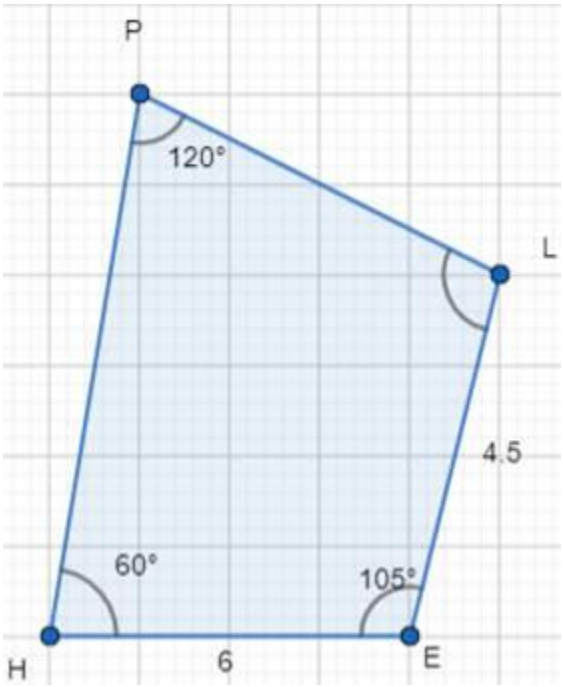
∠P= 120º

PROCEDURE :

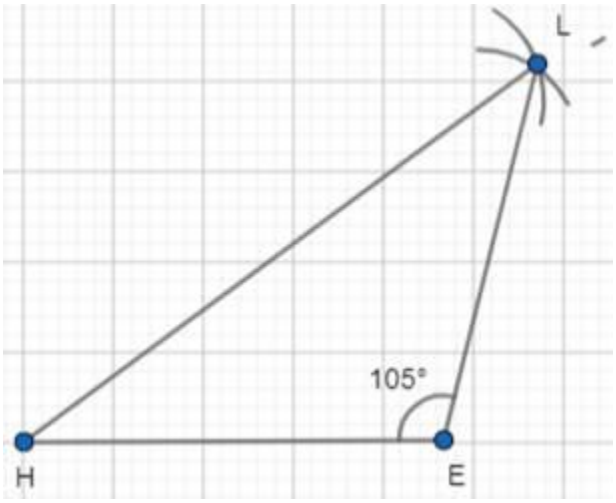
Step 1: draw a rough sketch of the Quadrilateral HELP and mark the given measurements.

As we can see that ∠P is not between the given 2 sides , so we now find the ∠L that is between HE and EL using the property of sum of all angles of a quadrilateral ie. ∠L = 360° - (∠H + ∠E + ∠P) = 360° - (60° + 105° + 120°) = 75°.

∴ ∠L = 75°.



Step 2: construct ΔHEL using SAS property of construction model with HE = 6cm , ∠E = 105^{o} and EL = 4.5 cm.

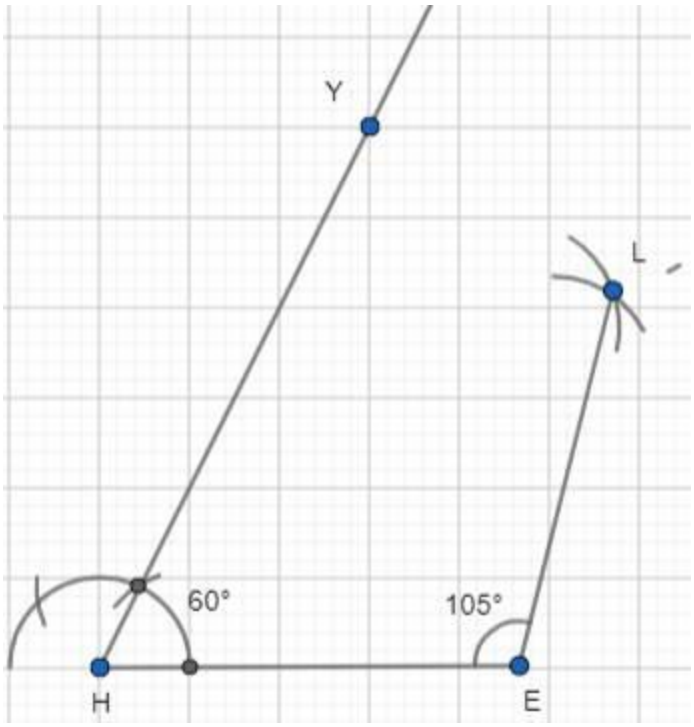


Step 3 : Construct ∠H = 60° and draw HY .

(How to draw 60° angle ?

⇒ an arc is drawn from H . let it intersect HE at H' . with center H' and with same radius draw 2 arcs to cut at 2 points A,B which gives 60° and 120° respectively.

So , draw a line from H which passes through A to get the required angle.)



Step 4 : construct ∠L = 75^o and draw LZ to meet HY at P.

HELP is the required quadrilateral.

Q. 2. Construct quadrilaterals with the measurements given below:

Parallelogram GRAM with GR = AM = 5 cm, RA = MG = 6.2 cm and ∠R = 85^o.

Answer : GIVEN : In Parallelogram GRAM,

GR = AM = 5 cm

RA = MG = 6.2 cm

∠R = 85^o

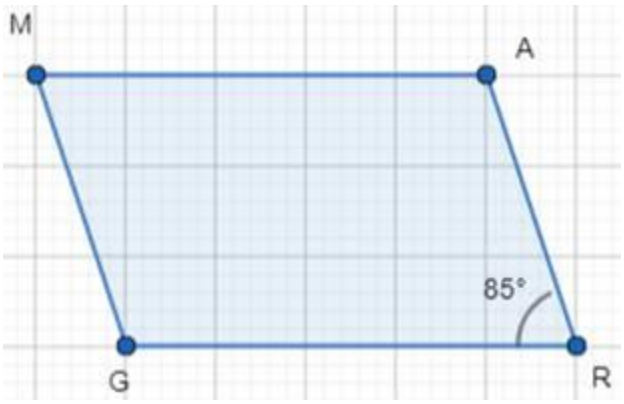
PROCEDURE :

Step 1 : draw a rough sketch of the parallelogram GRAM and mark the given measurements.

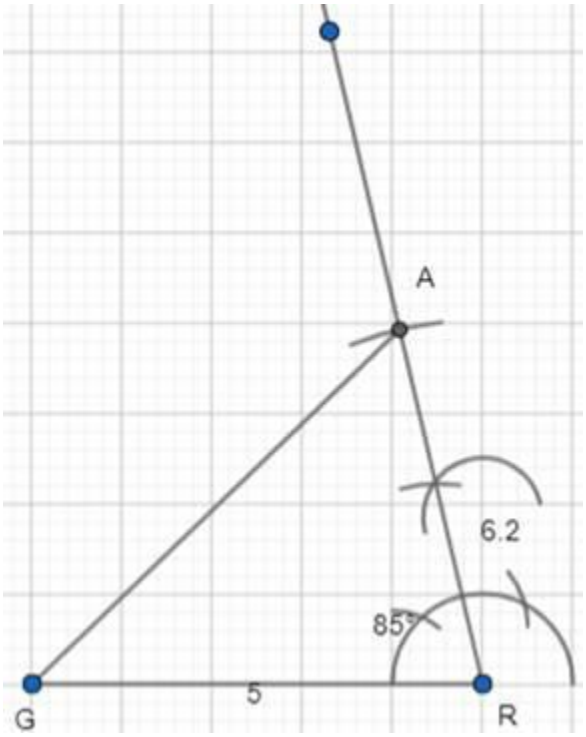
Since the given measurements are not sufficient for construction, we shall find the required measurements using the properties of the parallelogram.

As opposite angles of parallelogram are equal so, ∠R = ∠M = 85^o and as the consecutive angles are supplementary so, ∠G = 180° - 85° = 95°.

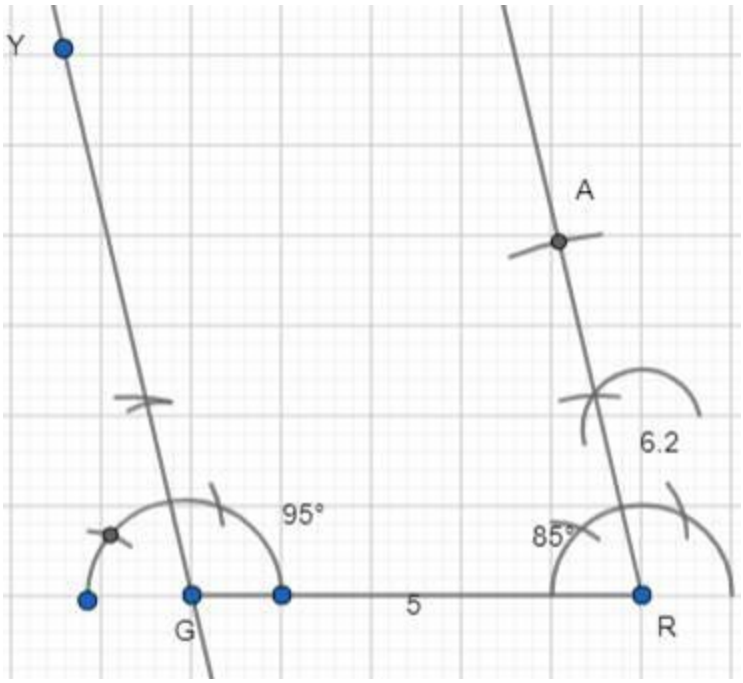
Thus ∠G = ∠A = 95°.



Step 2 : construct ΔGRA using SAS property of construction model with GR = 5cm , ∠R = 85º and RA = 6.2 cm.

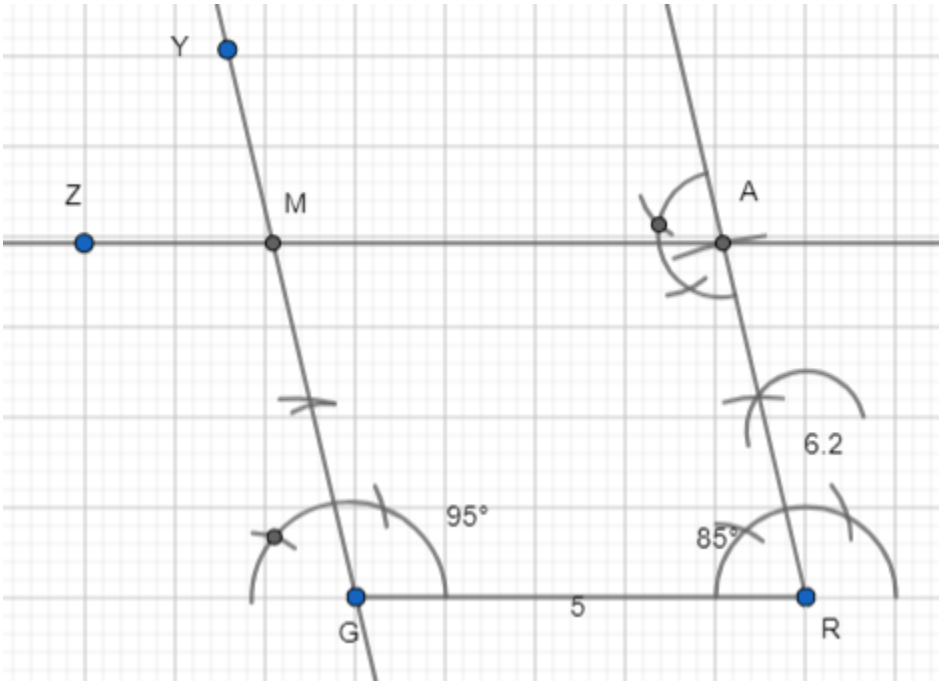


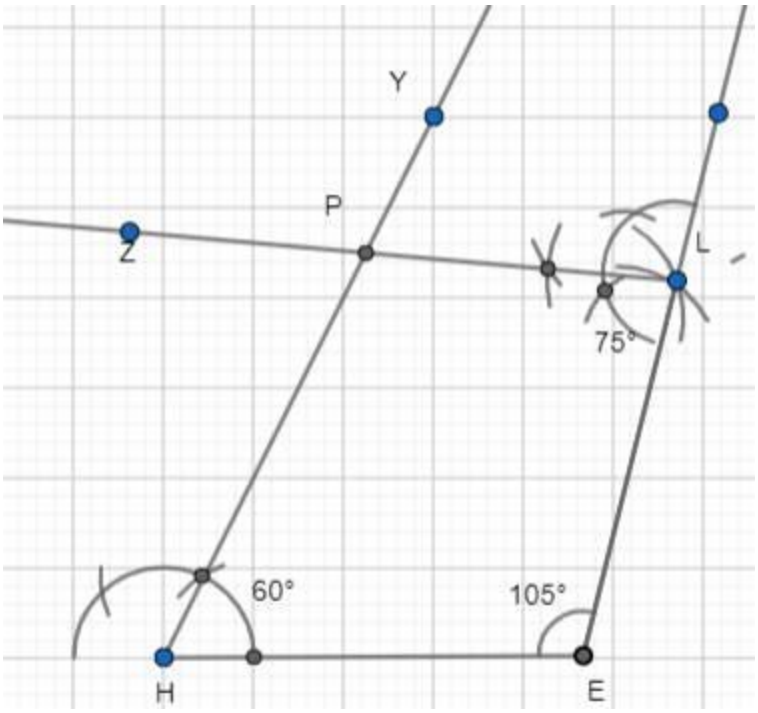
Step 3 : construct ∠G = 95° and draw GY || RA.



Step 4 : construct ∠A = 95° and draw AN to meet GY at M.

GRAM is the required quadrilateral (ie. Parallelogram).





Q. 3. Construct quadrilaterals with the measurements given below:

Rectangle FLAG with sides FL = 6cm and LA = 4.2 cm.

Answer : GIVEN : In Rectangle FLAG,

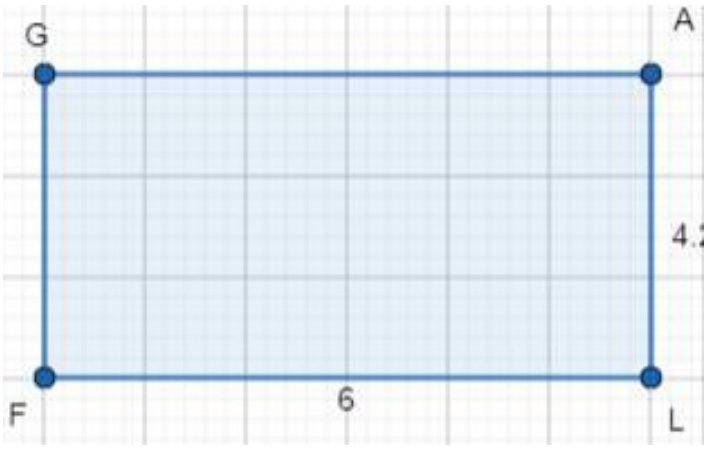
FL = 6 cm

LA = 4.2 cm

PROCEDURE :

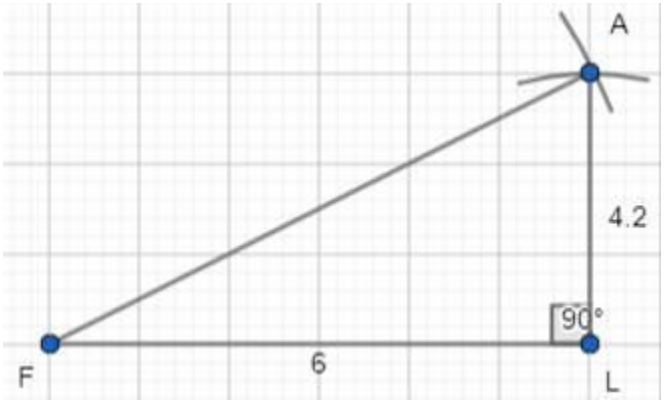
Step 1 : draw a rough sketch of the Rectangle FLAG and mark the given measurements.

Since the given measurements are not sufficient for construction, we shall find the required measurements using the properties of the RECTANGLE.

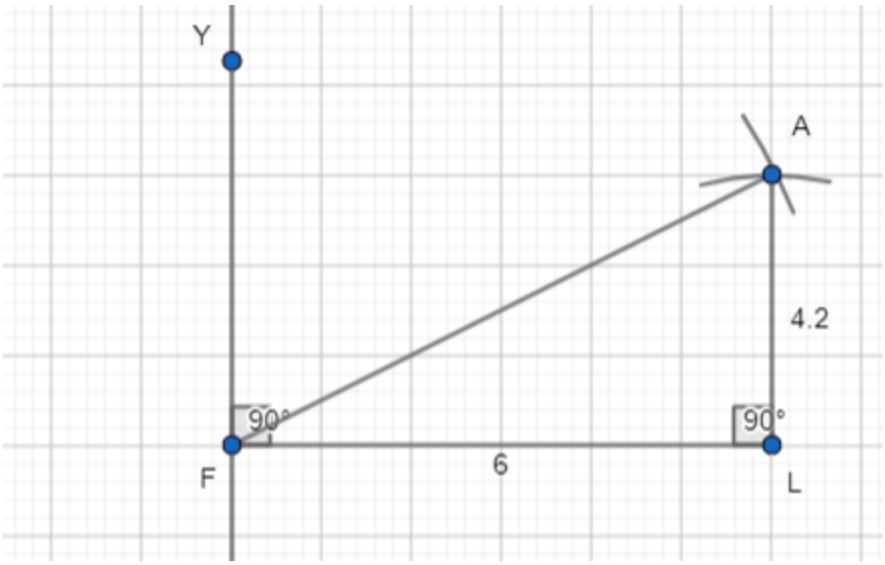


As opposite sides of rectangle are equal so, FL = AG = 6cm and LA = GF = 4.2 cm and ∠F = ∠L = ∠A = ∠G = 90°.

Step 2 : construct ΔFLA using SAS property of construction model with FL = 6cm , ∠L = 90º and LA = 4.2 cm.

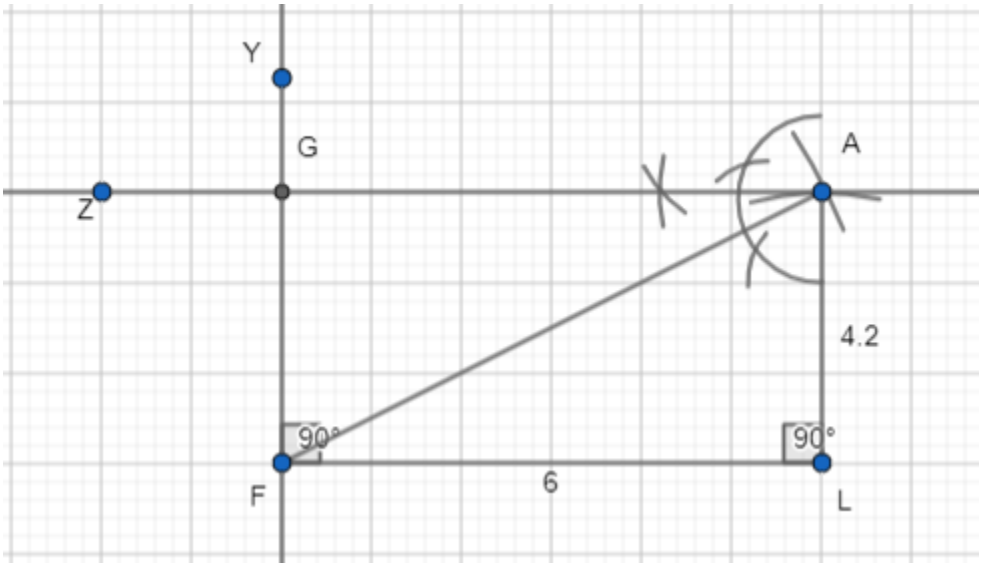


Step 3 : construct ∠F = 90° and draw FY || LA.



Step 4 : construct ∠A = 90° and draw AN to meet FY at G.

FLAG is the required quadrilateral (ie. rectangle).



Exercise 3.5

Q. 1. Construct following quadrilaterals-

Quadrilateral PQRS with PQ = 3.6cm, QR = 4.5 cm, RS = 5.6cm, ∠PQR = 135º and ∠QRS = 60º.

Answer : GIVEN : In Quadrilateral PQRS,

PQ = 3.6c

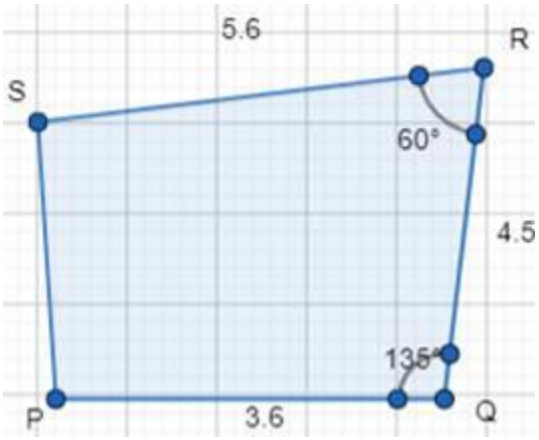
QR = 4.5 cm

RS = 5.6 cm

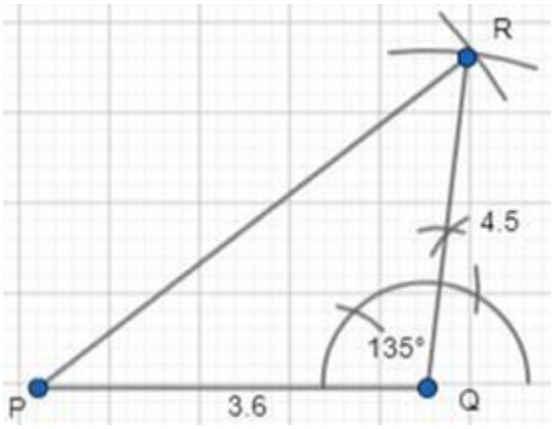
∠PQR = 135º and ∠QRS = 60º

PROCEDURE :

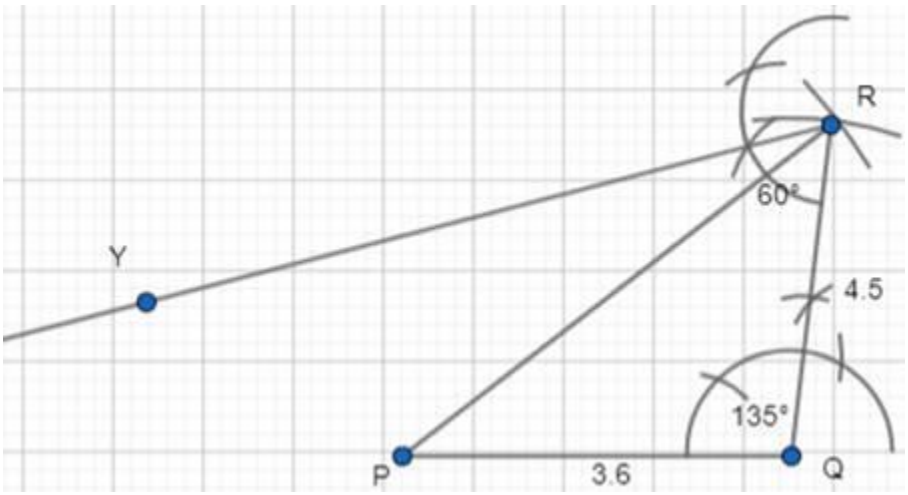
Step1 : draw a rough sketch and mark the measurements given.



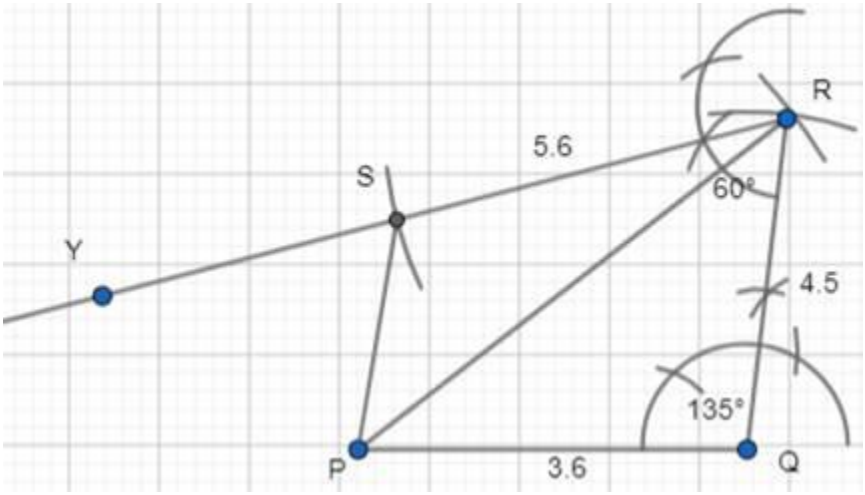
Step 2 : draw ΔPQR using SAS construction rule with measures PQ = 3.6cm,∠PQR = 135º and QR = 4.5 cm.



Step 3 : construct ∠R = 60° and draw RY.



Step 4 : with center ‘R’ and radius 5.6cm (RS = 5.6 cm) draw an arc to intersect RY at S. Join P,S . PQRS is the required quadrilateral.



Q. 2. Construct following quadrilaterals-

Quadrilateral LAMP with AM = MP = PL = 5cm, ∠M = 90º and ∠P = 60º.

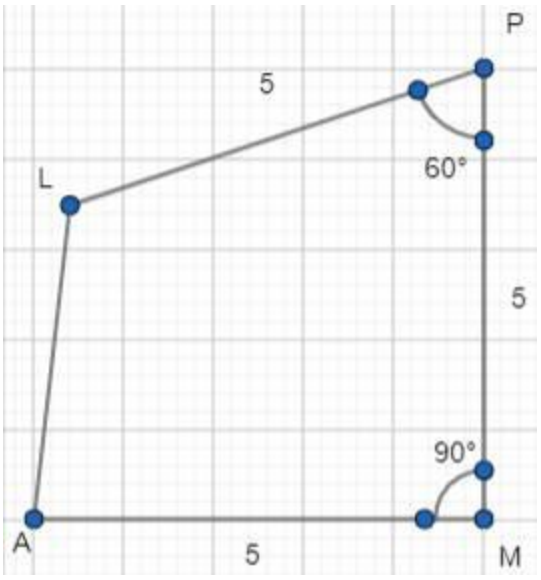
Answer : GIVEN : In Quadrilateral LAMP,

AM = MP = PL = 5cm

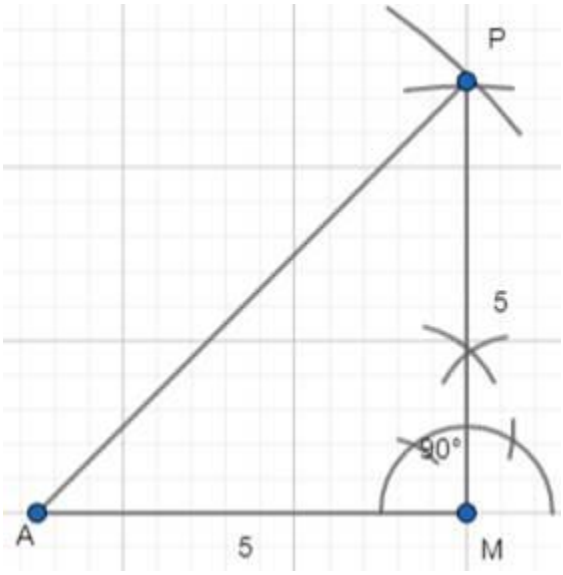
∠M = 90º and ∠P = 60º.

PROCEDURE :

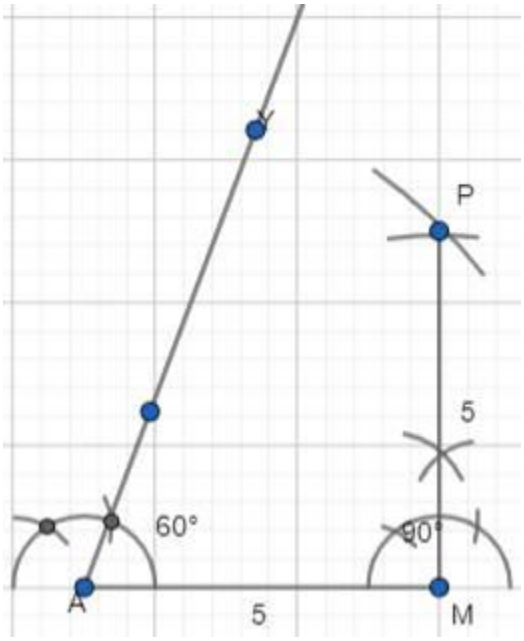
Step1 : draw a rough sketch and mark the measurements given.



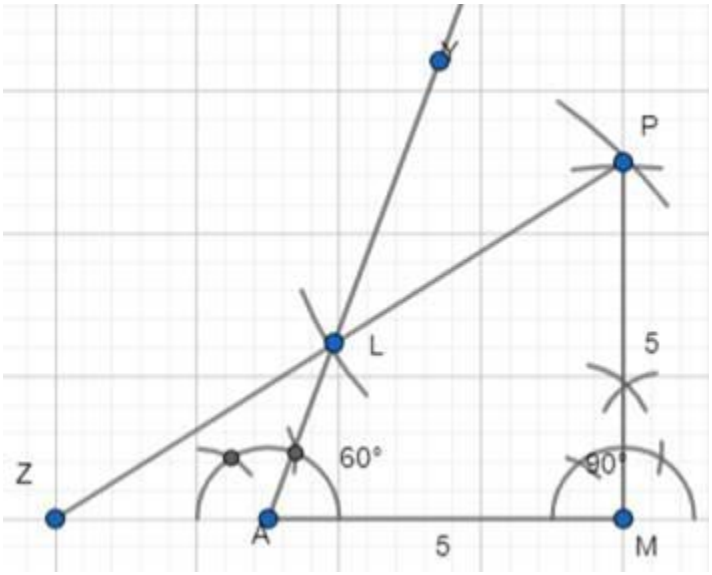
Step 2 : draw ΔAMP using SAS construction rule with measures AM = 5cm, ∠M = 90^{o} and MP = 5 cm.



Step 3 : construct ∠P = 60° and draw PY.



Step 4 : with center ‘P’ and radius 5cm (PL = 5 cm) draw an arc to intersect PY at L. Join L,P . LAMP is the required quadrilateral.



Q. 3. Construct following quadrilaterals-

Trapezium ABCD in which AB || CD, AB = 8 cm, BC = 6cm, CD = 4cm and ∠B = 60º.

Answer : GIVEN : In Trapezium ABCD,

AB || CD

AB = 8 cm

BC = 6cm

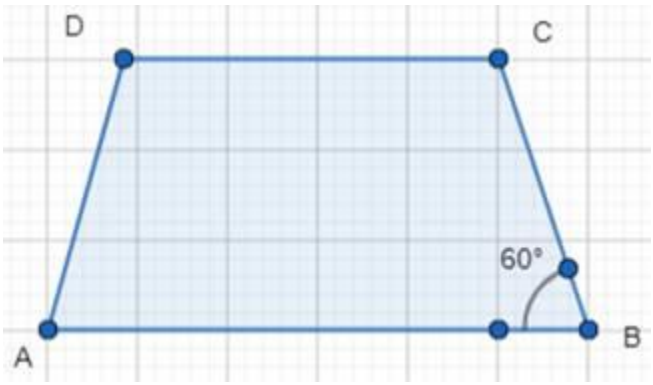
CD = 4cm

$\angle B = 60^o$.

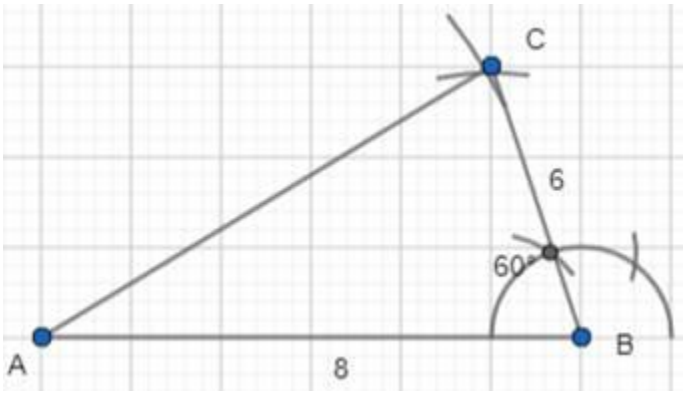
PROCEDURE :

Step1 : draw a rough sketch and mark the measurements given.

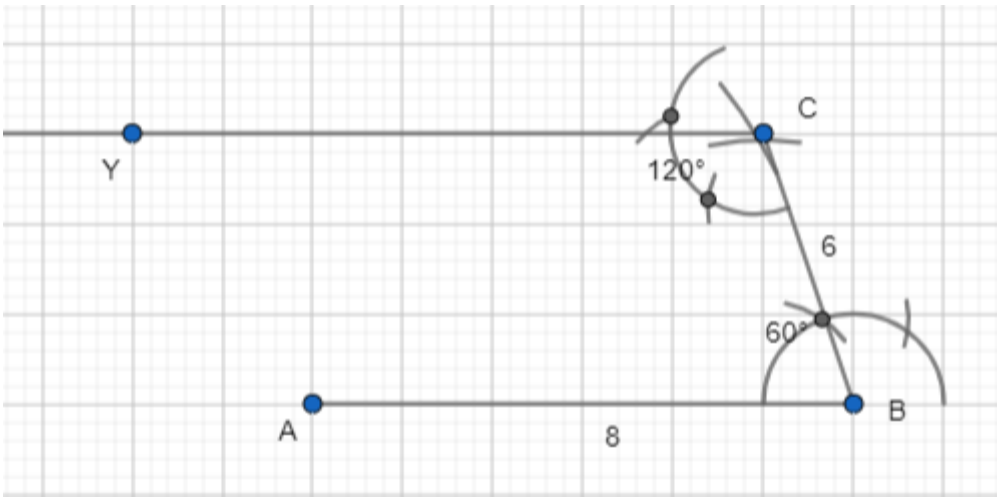
As it is given that AB || CD, so $\angle B + \angle C = 180°$ (linear pair). So $\angle C = 180° – 60° = 120°$



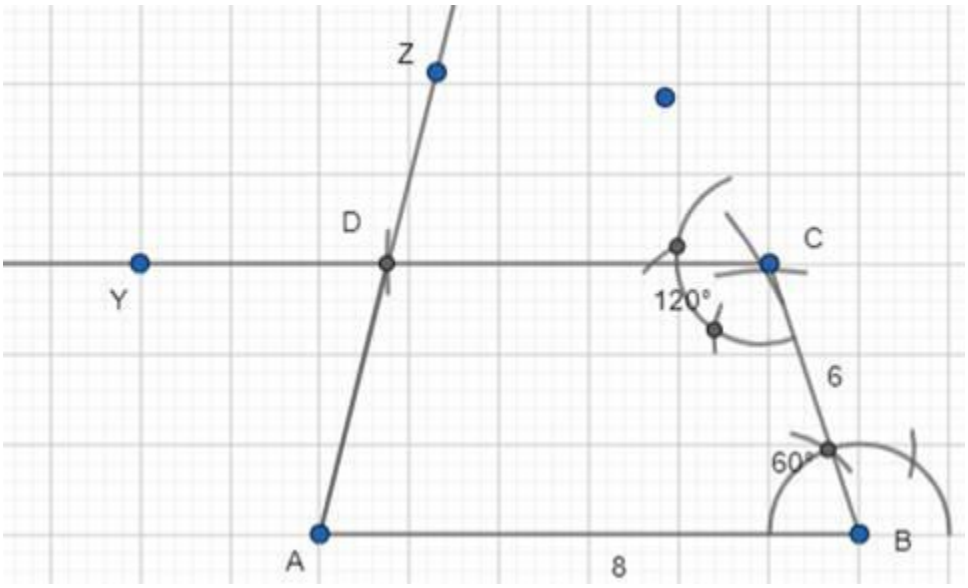
Step 2 : draw ΔABC using SAS construction rule with measures AB = 8 cm, $\angle B = 60^o$ and BC = 6 cm.



Step 3 : construct $\angle C = 120°$ and draw CY.



Step 4 : with center ‘C’ and radius 4cm (CD = 4 cm) draw an arc to intersect CY at D. Join A,D . ABCD is the required quadrilateral (trapezium).



Exercise 3.6

Q. 1. Construct quadrilaterals for measurements given below:

A rhombus CART with CR = 6 cm, AT = 4.8 cm

Answer : GIVEN : In rhombus CART,

CR = 6 cm

AT = 4.8 cm (diagonals)

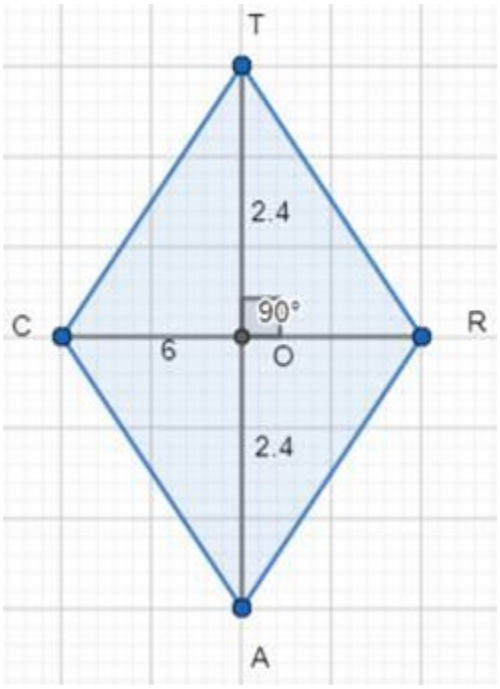
PROCEDURE :

Step 1 : draw a rough sketch of rhombus CART and mark th given measurements.

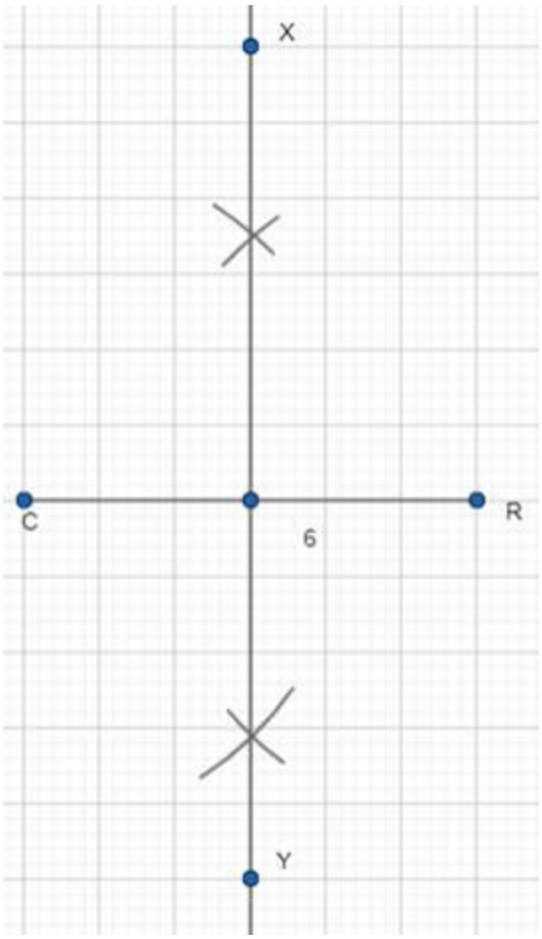
The diagonals of a rhombus bisect each other perpendicularly.

CR and AT are diagonals of the rhombus CART which bisect each other at ‘O’

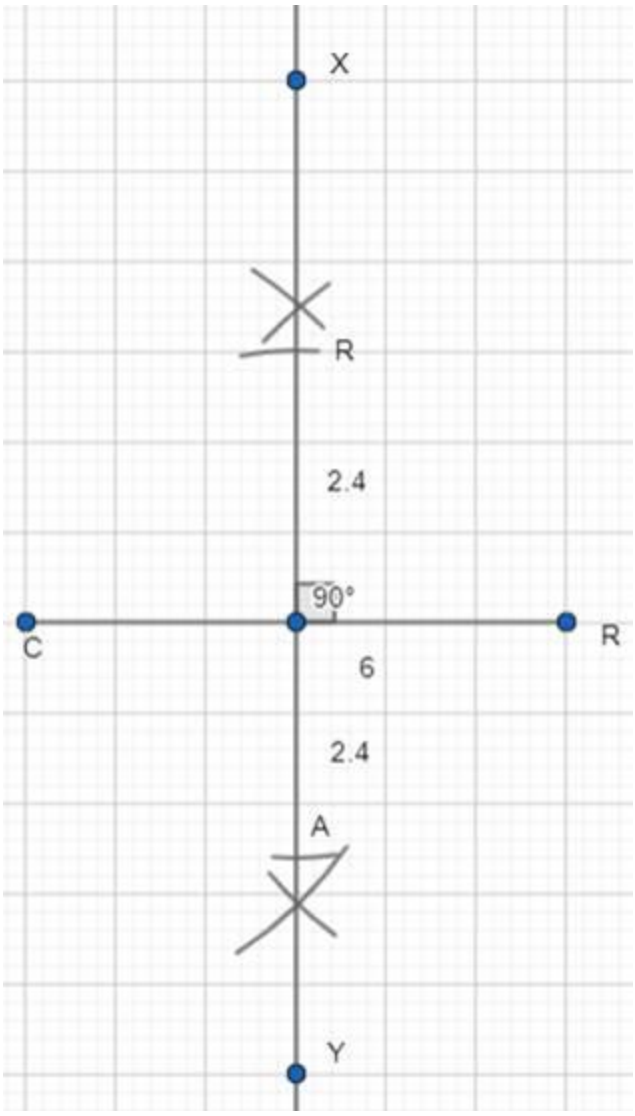
ie. ∠ COA = 90° and AO = OT = $\frac{AT}{2}$ = $\frac{4.8}{2}$ = 2.4cm.



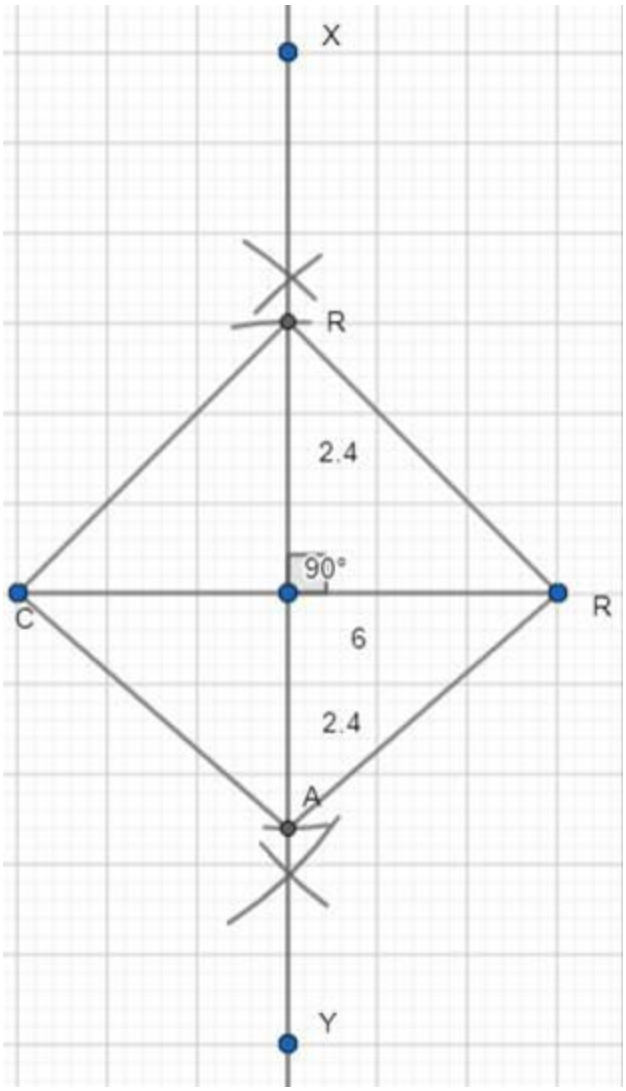
Step 2 : draw CR = 6cm (one diagonal of the rhombus CART) and draw a perpendicular bisector XY of it and mark the point of intersection as ‘O’.



Step 3 : as the other diagonal AT is perpendicular to CR , AT is a part of XY. So, with center ‘O’ and radius 2.4 cm (AO = OT = 2.4cm) draw 2 arcs on either sides of CR to cut XY at A and T.



Step 4 : join C,A ;A,R ; R,T ; C,T to complete the required rhombus CART.



Q. 2. Construct quadrilaterals for measurements given below:

A rhombus SOAP with SA = 4.3 cm, OP = 5 cm

Answer : GIVEN : In rhombus SOAP,

SA = 4.3 cm

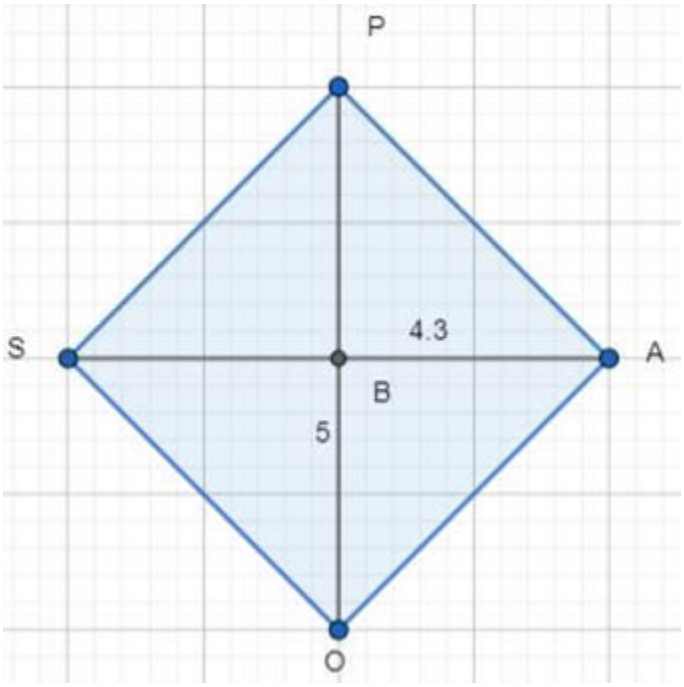
OP = 5 cm (diagonals)

PROCEDURE :

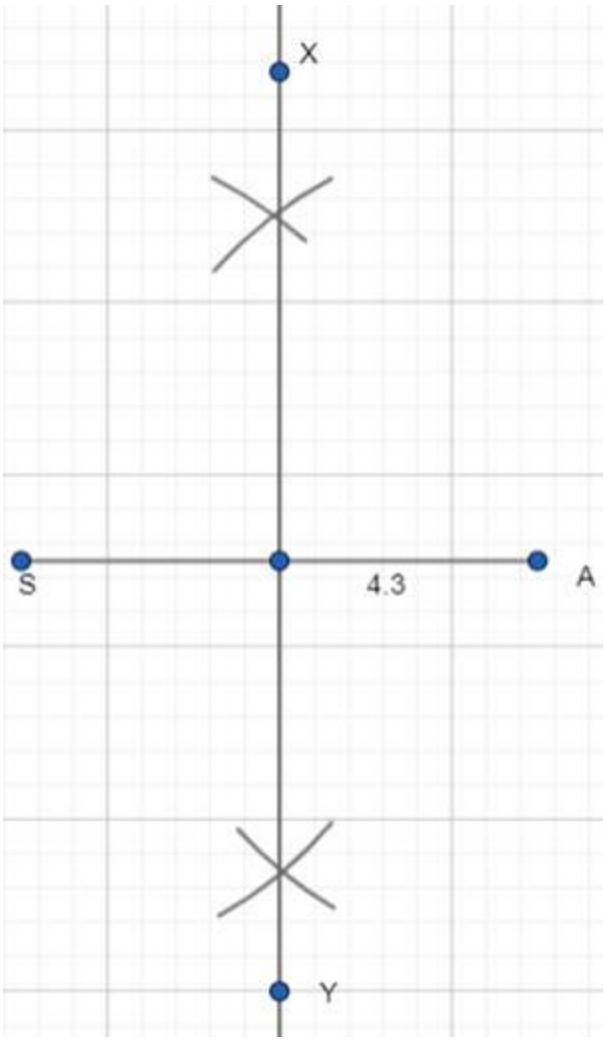
Step 1 : draw a rough sketch of rhombus SOAP and mark th given measurements.

The diagonals of a rhombus bisect each other perpendicularly.

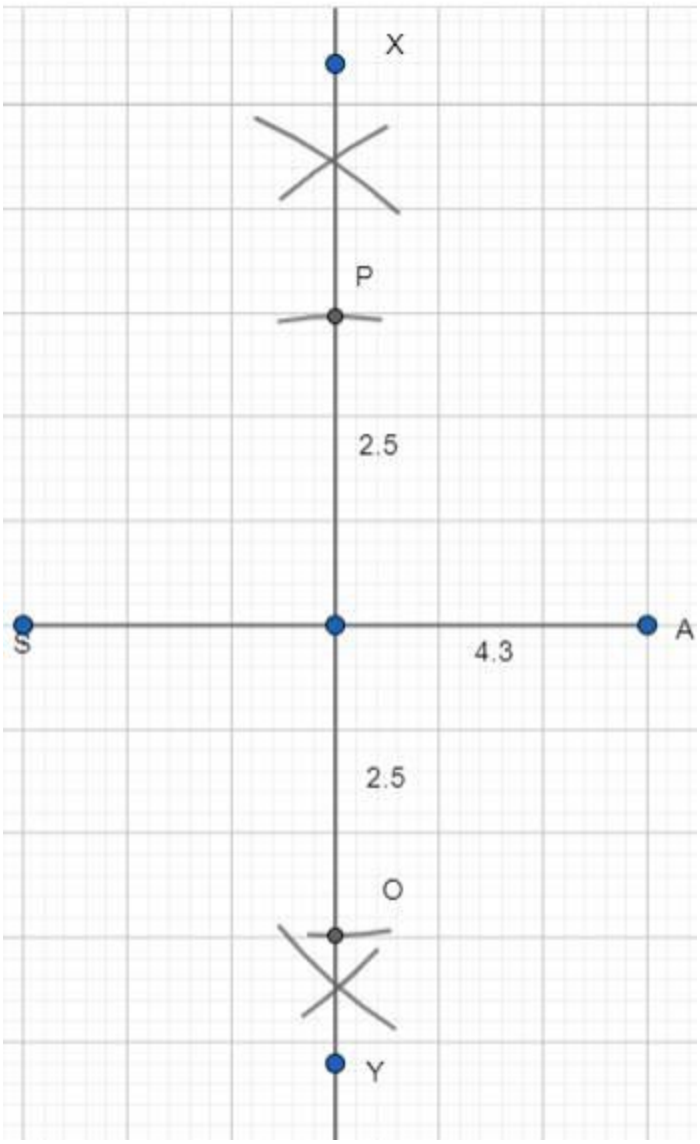
SA and OP are diagonals of the rhombus SOAP which bisect each other at ‘B ie. ∠ SBO = 90° and OB = BP = $\frac{OP}{2} = \frac{5}{2}$ = 2.5cm.



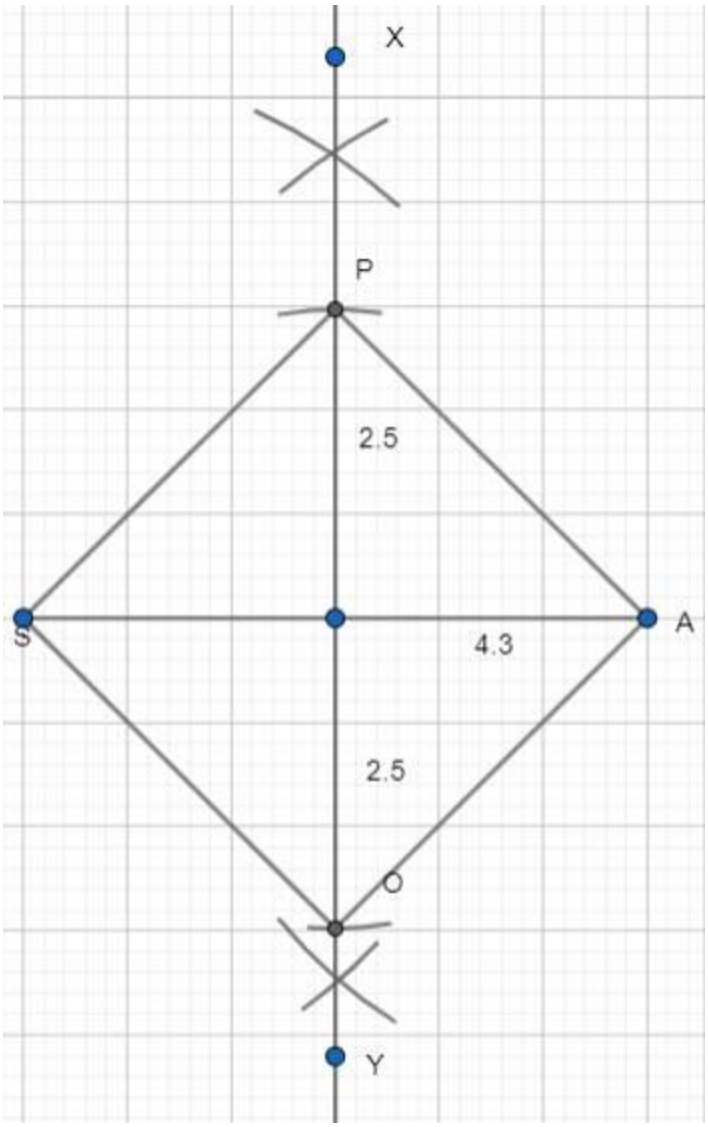
Step 2 : draw SA = 4.3cm (one diagonal of the rhombus SOAP) and draw a perpendicular bisector XY of it and mark the point of intersection as ‘B’.



Step 3 : as the other diagonal OP is perpendicular to SA , OP is a part of XY. So, with center ‘B’ and radius 2.5 cm (OB = BP = 2.5cm) draw 2 arcs on either sides of SA to cut XY at O and P.



Step 4 : join S,O ;O,A ; A,P ; S,P to complete the required rhombus SOAP.



Q. 3. Construct quadrilaterals for measurements given below:

A square JUMP with diagonal 4.2 cm.

Answer : GIVEN : In square JUMP,

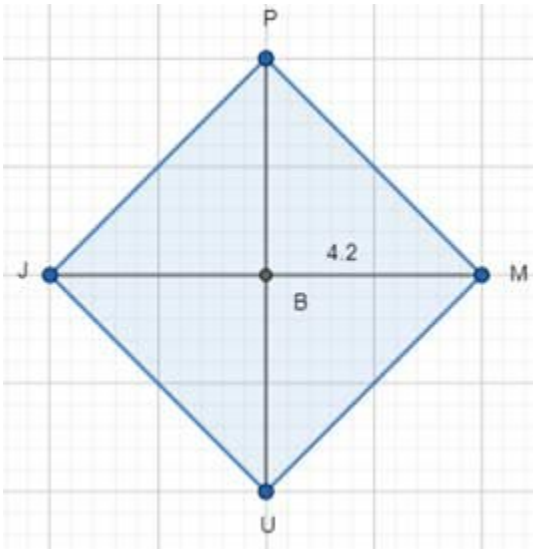
Diagonal is 4.2 cm ie. JM = UP = 4.2cm

PROCEDURE :

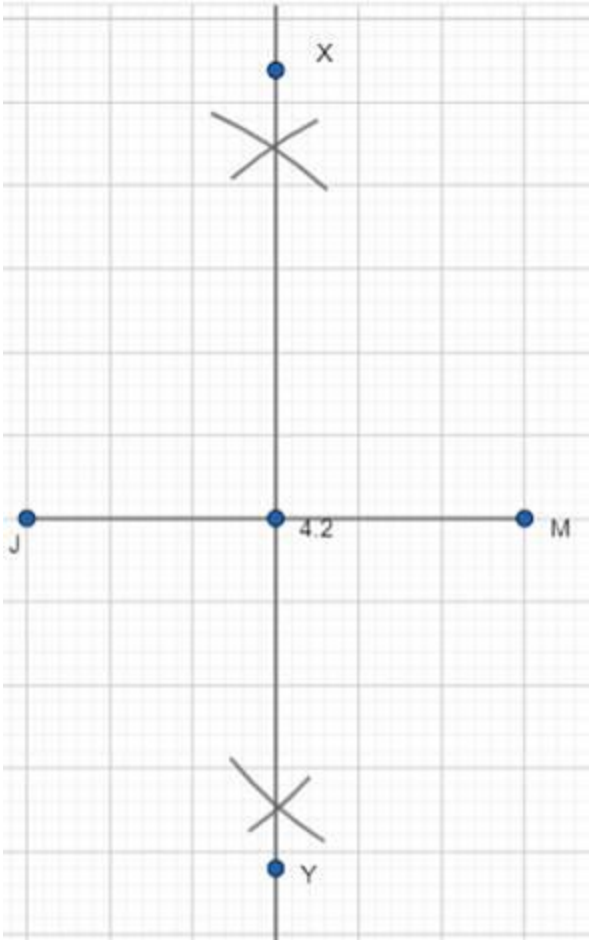
Step 1 : draw a rough sketch of square JUMP and mark th given measurements.

The diagonals of a rhombus bisect each other perpendicularly.

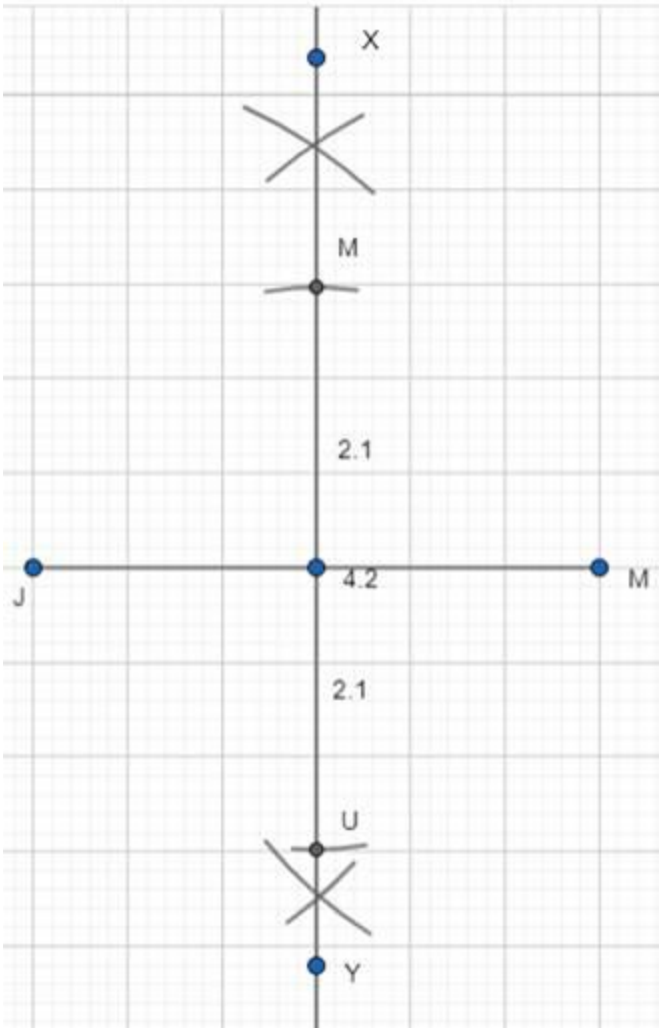
JM and UP are diagonals of the square JUMP which bisect each other at ‘B ie. ∠JBU = 90° and UB = BP = $\frac{UP}{2} = \frac{4.2}{2}$ = 2.1cm.



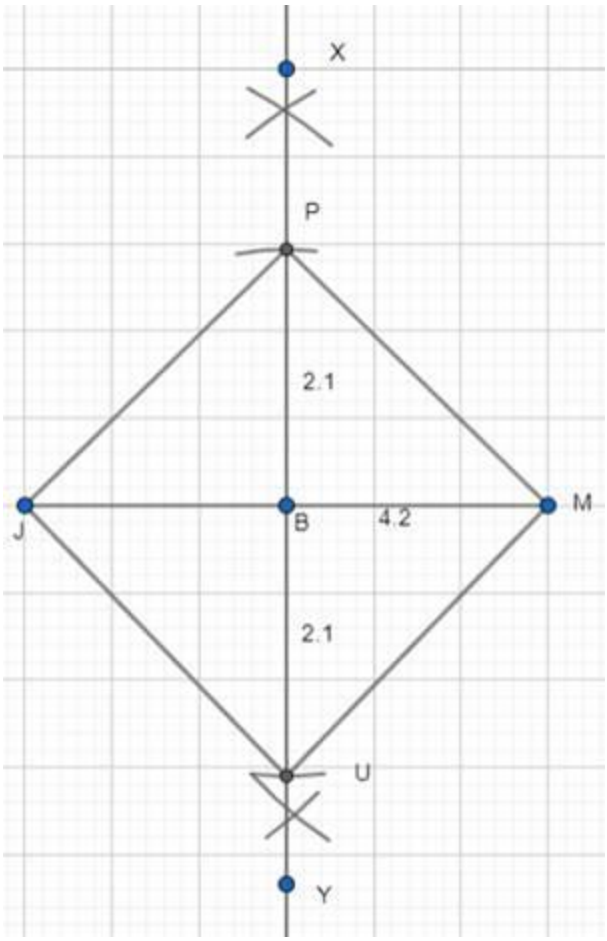
Step 2 : draw JM = 4.2cm (one diagonal of the square JUMP) and draw a perpendicular bisector XY of it and mark the point of intersection as ‘B’.



Step 3 : as the other diagonal UP is perpendicular to JM , UP is a part of XY. So, with center ‘B’ and radius 2.1 cm (OU = BP = 2.1cm) draw 2 arcs on either sides of JM to cut XY at U and P.



Step 4 : join J,U ;U,M ; M,P ; J,P to complete the required square JUMP.


X
P
2.1
J
B
4.2
M
2.1
U
Y