*** Choose The Right Answer From The Given Options.** [6]

1. The shortest distance between two points is called _____ .

   (A) line segment (B) line (C) ray (D) point

   Ans. : A. line segment

2. Which one of the following instruments is used to draw arcs and circles?

   (A) a ruler (B) a pair of compasses

   (C) a divider (D) a set-square

   Ans. : B. a pair of compasses

3. Which one of the following statements is not true for constructions using a ruler and compass?

   (A) Draw thin line and mark the point lightly.

   (B) Draw thick line and mark the point in bold.

   (C) Instruments should have sharp tips.

   (D) Instruments should have fine edges.

   Ans. : B. Draw thick line and mark the point in bold.

4. Which of the following is not a property of a rectangle?

   (A) Opposite sides are equal in length (B) All angles are right angle

   (C) All sides are equal (D) None of these

   Ans. : C. All sides are equal

5. Which of the following cannot be the name of the rectangle shown?

   Image

   (A) ABCD (B) BCDA (C) CDAB (D) ACDB

   Ans. : D. ACDB

6. Which of the following statements is true for both a square and a rectangle?

   (A) All sides are equal (B) Opposite sides are equal

   (C) All angles are 90° (D) None of these

   Ans. : C. All angles are 90°

*** a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option.** [2]

7. Assertion (A): A square can be thought of as a special rectangle.
   Reason (R): All sides of a square are equal, and a rectangle has opposite sides equal. Imediumj

(A) Both A and R are true

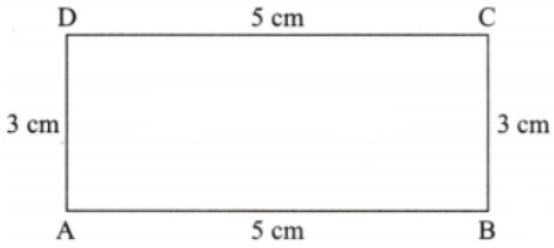
(B) Both A and R are false

(C) A is true but R is false

(D) A is false but R is true

Ans.: (A) Both A and R are true

8. Assertion: In the given figure, ABCD is a rectangle.



Reason: In a rectangle, the opposite sides are equal in length and all the angles are 90° .

In the given question, a statement of Assertion is followed by a statement of Reason. Choose the correct option as:

(A) Both assertion and reason are true and the reason is the correct explanation of assertion.

(B) Both assertion and reason are true but the reason is not the correct explanation of the assertion.

(C) Assertion is true and the reason is false.

(D) Assertion is false and the reason is true.

Ans. : A. Both assertion and reason are true and the reason is the correct explanation of assertion.

*** Fill In The Blanks With Correct Alternative.** [12]

9. The compass is used to draw circles and _____

Ans. : arcs

10. Protractor is an instrument which helps us to _____ and draw angles.

Ans. : measure

11. A compass has _____ hands.

Ans. : two

12. A geometry box has _____ types of set-squares.

Ans. : two

13. A protractor is a half circle which is divided into _____ equal parts.

Ans. : 180

14. The centre of the protractor is called _____

Ans. : central point

15. The line joining the 0° and 180° marks on a protractor is called the _____ line.

Ans. : base

16. To measure an angle using a protractor, the centre of the base line coincide with the _____ of the given angle whereas the base line coincide with one of the arms of the angle.

Ans. : vertex

17. Fixed distance to the center of a circle to circle is called _____ .

Ans. : Radius

18. Fixed point in a circle is called _____ .

Ans. : Centre

19. In a rectangle opposite sides are _____ .

Ans. : Equal

20. In a rhombus all sides are _____ .

Ans. : Parallel and equal

*** Answer The Following Questions In One Sentence.[1 Marks Each]** **[9]**

21. Angles are measured using an instrument called _____

Ans. : protractor

22. An angle is measured in _____

Ans. : degree

23. An arc or a curve that is drawn during the construction of a figure is a part of a _____

Ans. : circle

24. Two intersecting lines are perpendicular if the angle between them is _____

Ans. : 90°

25. The distance between the centre and any point on the circle is called the _____ of the circle.

Ans. : radius

26. Rotating a square does not change its _____ and _____

Ans. : sides and angles

27. A compass can be used to construct a _____ and its parts.

Ans. : circle

28. To make an arc, one should keep the point of the _____ fixed and move only the pencil arm.

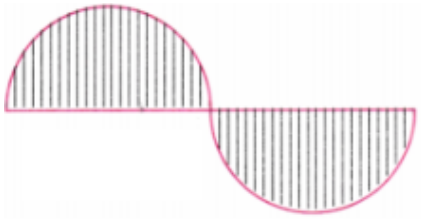
Ans. : compass

29. A 4-sided figure in which all the sides are equal in length but is not a square is _____

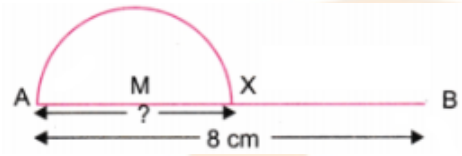
Ans. : a rhombus

*** Questions With Calculation.[3 Marks Each]** **[12]**

30. Consider the following figure of a "Wave".



As the length of the central line is not specified, we can take it to be of any length. Let us take AB to the central line such that the length of AB is 8 cm. Here the first wave is drawn as a half circle.



What radius should be taken in the compass to get this half-circle? What should be the length of AX?

Ans. : We have AB = 8 cm.

Since the "Wavy Wave" has two equal half circles, we have AX = XB.

∴ X is the mid-point of AB.

$\therefore AX = \frac{8}{2} = 4cm$

∴ The length of AX is 4 cm.

Let M be the mid-point of AX.

$\therefore AM = MX = \frac{8}{2} = 2cm$

The center of the half circle is M.

∴ Radius of half circle = AM = 2 cm

∴ The radius of the half circle is 2 cm.

31. Try to recreate the figure where the waves are smaller than a half circle (as appears in the neck of the figure 'A Person'). The challenge here is to get both the waves to be identical.

Ans. : self

32. Construct a rectangle one of whose sides is 3 cm and the diagonal is of length 7 cm.

Ans. : self

33. Try to recreate 'A Person', 'Wavy Wave', and 'Eyes' from the section Artwork, using ideas involved in the 'House' construction.

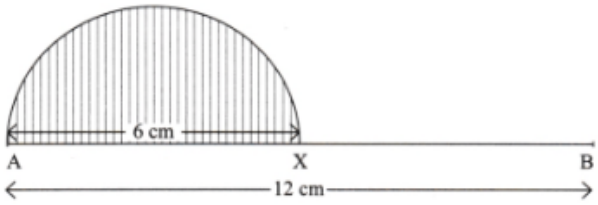
Ans. : self

*** Questions With Calculation.[5 Marks Each]** [75]

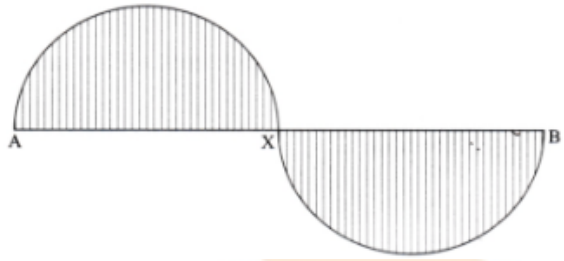
34. Take a central line of a different length and try to draw the wave on it.

Ans. : Let us take AB to be the central line such that the length of AB is 12 cm. That is, AB = 12 cm.

Now, the first wave is drawn as a half circle, using the diameter half of the central line AB, i.e., the radius half 6 of AX = $\frac{6}{2}cm = 3cm2$



Now, the second wave is drawn as the half circle with radius half of XB = 6 cm, i.e., of 3 cm in opposite direction to the first wave.

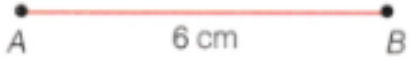


35. Draw a rectangle with sides of length 4 cm and 6 cm. After drawing, check if it satisfies both the rectangle properties.

Ans. : Rectangle with sides 4 cm and 6 cm.

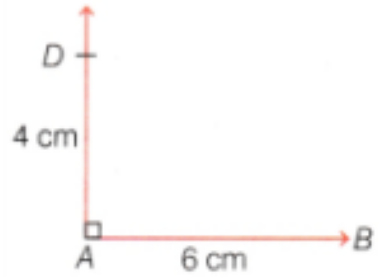
Steps

(i) Draw a,straight line AB = 6 cm using a ruler.



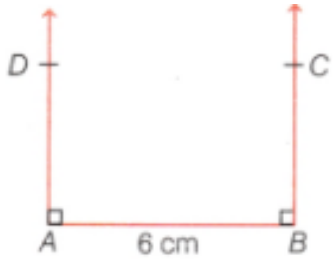
(ii) Place the protractor on point A and mark a 90° angle from AB.

(iii) Draw a line from A along this angle and measure AD 4 cm.

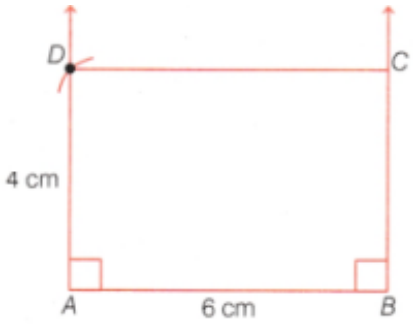


(iv) Repeat the same process at point B to draw a line BC perpendicular to AB and

also 4 cm long.



(v) Join points D and C to complete the rectangle ABCD.



(vi) Verify that AB and CD are equal as well as AD and BC and all angles are 90°.

36. Construct a rectangle that can be divided into 3 identical squares.

Ans. : We shall draw a rectangle of the form shown in Fig. 1.

Fig. 1

Step 1. Let us keep the vertical side of the rectangle to 3 cm. Since the rectangle is to be divided into three identical squares, the length of the rectangle must be 3 cm + 3 cm + 3 cm = 9 cm.

Step 2. Using a ruler, draw a line AB equal to 9 cm. (Fig. 2).

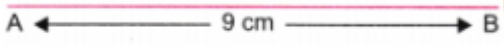


Fig. 2

Step 3. Using a ruler, find points P and Q on AB such that AP = 3 cm and PQ = 3 cm. Here, QB is also 3 cm. (Fig. 3).

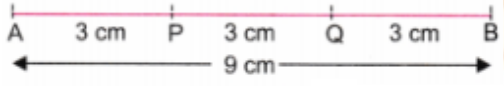


Fig. 3

Step 4. Using a protractor, draw perpendicular lines at A, P, Q, and B. (Fig. 4).

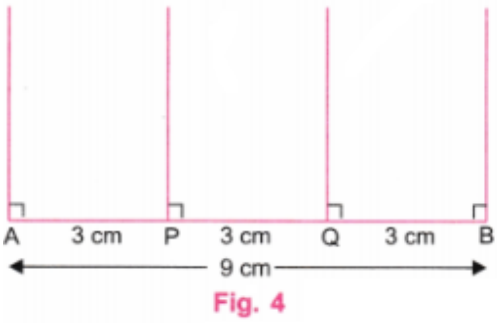


Fig. 4

Step 5. Using a ruler, mark points A', P', Q', and B' on perpendiculars at A, P, Q, and B respectively such that AA' = PP' = QQ' BR' = 3 cm. (Fig. 5).

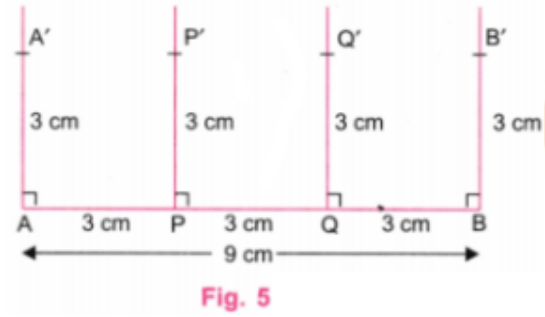


Fig. 5

Step 6. Join A' and P', P' and Q', and Q' and B' using a ruler. Erase the lines above A', P', Q', and B'. (Fig. 6).

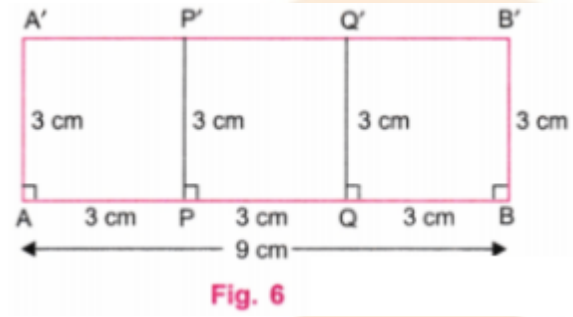


Fig. 6

Step 7. ABB'A' is the required rectangle which is divided into 3 identical squares APP'A', PQQ'P', and QBB'Q'.

37. Give the lengths of the sides of a rectangle that cannot be divided into: (Page 201)
(i) Two identical squares
(ii) Three identical squares.

Ans. : (i) Let the smaller side of a rectangle be x cm. If the larger side of the rectangle is 2x cm (x cm + x cm), then this rectangle can be divided into two identical squares of side x cm. (Fig. 1)

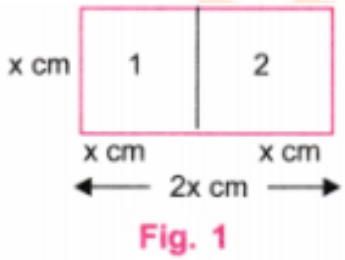


Fig. 1

Let us consider a rectangle of sides 4 cm and 6 cm. Here, 6 is not equal to 8 (4 + 4),

so, it cannot be divided into two identical squares as shown in Fig. 2

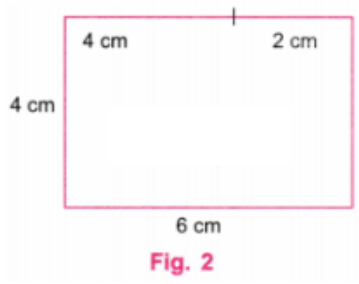


Fig. 2

(ii) Let the smaller side of a rectangle be x cm. If the larger side of the rectangle is 3x cm (x cm + x cm + x cm), then this rectangle can be divided into three identical squares of side x cm. (Fig. 3)

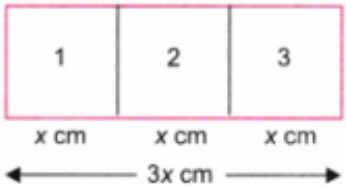


Fig. 3

Let us consider a rectangle of sides 3 cm and 8 cm. Here, 8 is not equal to 9 (3 + 3 + 3), so, it cannot be divided into three identical squares as shown in Fig. 4.

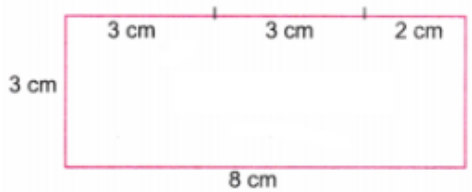
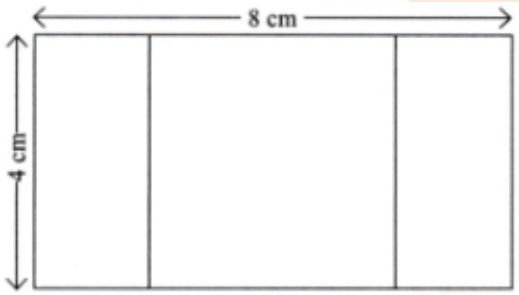


Fig. 4

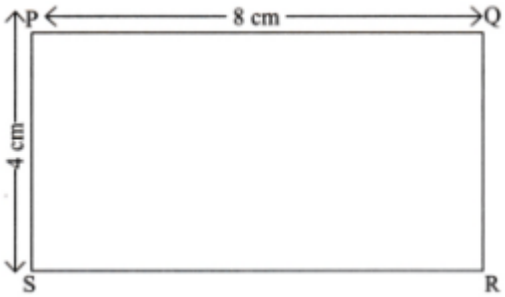
38. Construct a rectangle of sides 8 cm and 4 cm. How will you construct a square inside, as shown in the figure, such that the centre of the square is the same as the centre of the rectangle ?



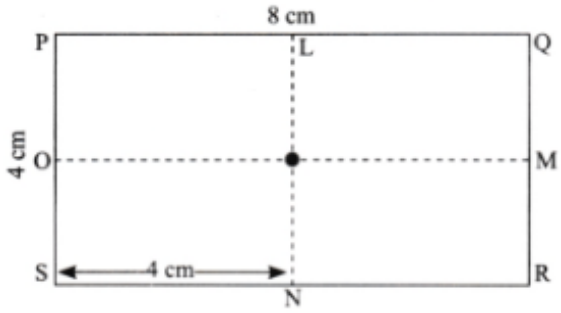
Hint.

Draw a rough figure. What will be the sidelength of the square? What will be the distance between the comers of the square and the outer rectangle?

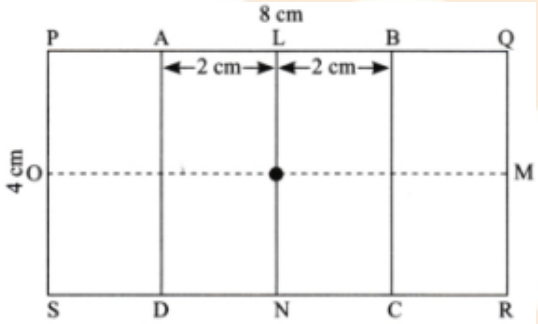
Ans. : Draw a rectangle PQRS of sides 8 cm and 4 cm.



Next, draw lines LN and MO from the midpoints of opposite sides such that they intersect side PQ at L, QR at M, RS at N, and PS at O respectively.

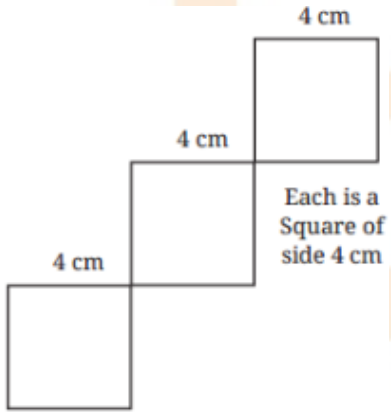


Since the centre of square and rectangle is same and the width of rectangle is 4 cm, so we draw a square of side 4 cm with the centre of rectangle and named as ABCD.

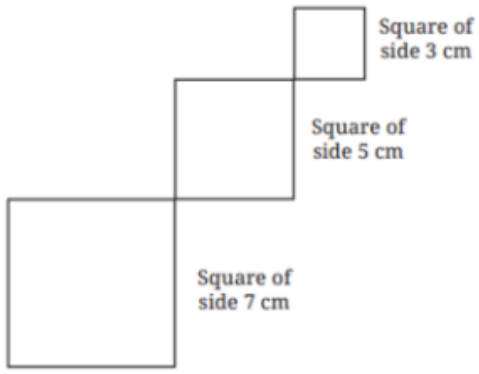


∴ The side length of the square is 4 cm and the distance between the comers of the square and the outer rectangle = PL – AL = 4 cm – 2 cm = 2 cm.

39. Construct the 'Falling Squares" figure shown below:



Make sure that the squares are aligned the way they are shown. Now, try this.



Ans. : In the given figure, there are three falling squares and the side of each square is 4 cm.

Step 1. Using a ruler, draw a line AB equal to 4 cm. Using a protractor, draw perpendicular lines at A and B.

Using a ruler, mark point C on a perpendicular line at A such that AC = 4 cm.

Using a ruler, mark points D and E on a perpendicular line at B such that BD = 4 cm and DE = 4 cm. (Fig. 1)

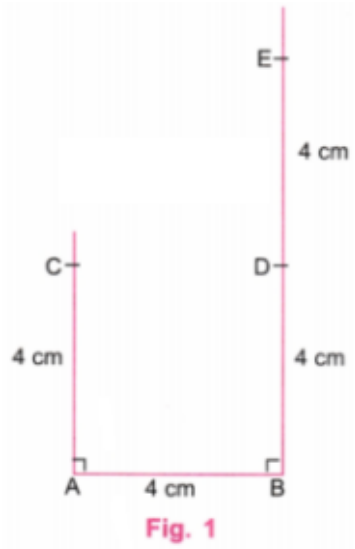


Fig. 1

Step 2. Join C and D. Produce CD to F such that DF = 4 cm. Using a protractor, draw a perpendicular line at F. Using a ruler, mark points G and H on a perpendicular line at F such that FG = 4 cm and GH = 4 cm. (Fig. 2).

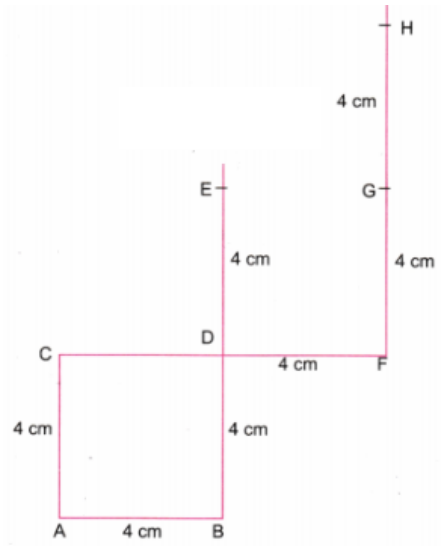


Fig. 2

Step 3. Join E and G. Produce EG to I such that GE = 4 cm. Using a protractor, draw a perpendicular line at I. Using a ruler, mark point J on the perpendicular line at I such that IJ = 4 cm. Join H and J. Erase extra lines in the figure. (Fig. 3).

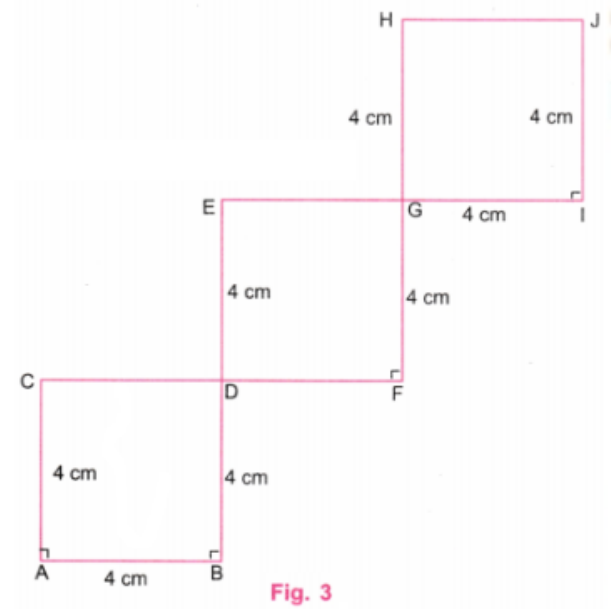
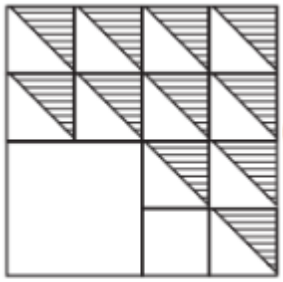


Fig. 3

Step 4. Fig. 3 is the required figure of three "falling squares" each of side 4 cm.

40. Construct the figure given below. Choose the measurement of your choice. Note that the larger 4-sided figure is square and so tire the smaller ones.



Ans. : Step 1. Using a ruler, draw a line AB equal to 8 cm. Because, 8 ÷ 4 = 2, we shall draw smaller squares of side 2 cm. Using a protractor, draw perpendicular lines at A and B. Using a ruler, mark point P on the perpendicular line at A such that AP = 8

cm. Using a ruler, mark point Q on the perpendicular line at B such that BQ = 8 cm. Join P and Q using a ruler. Erase the lines above P and Q (Fig. 1).

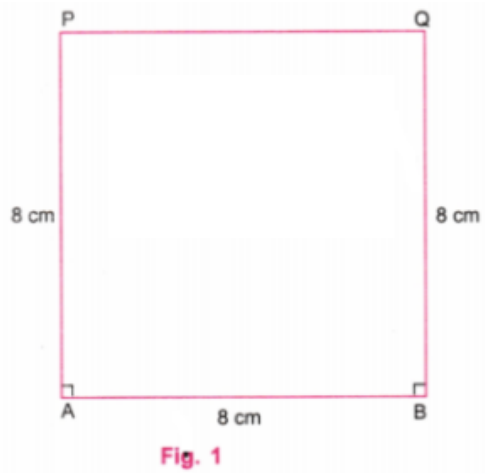


Fig. 1

Step 2. On the lines AB, BQ, QP, and PA, mark points at distances of 2 cm, using a ruler. Draw horizontal lines and vertical lines to get 16 squares. (Fig. 2)

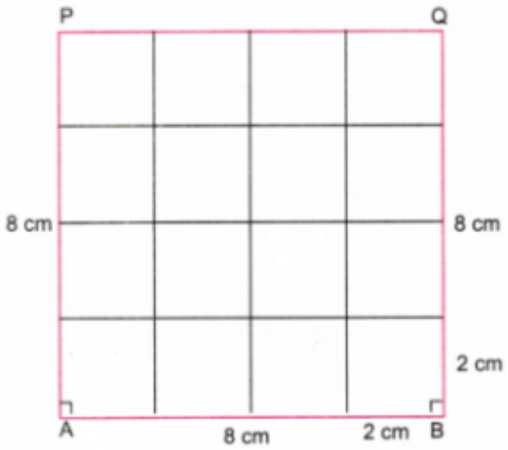


Fig. 2

Step 3. From comer A, erase the inner sides of four squares to get a square of side 4 cm with one comer at A. Draw parallel diagonals of the remaining 12 small squares of side 2 cm each. (Fig. 3)

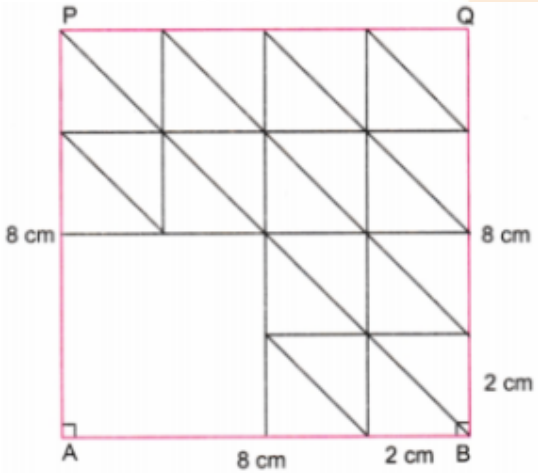


Fig. 3

Step 4. In the 12 small squares, draw horizontal lines in the portion above the diagonals. (Fig. 4)

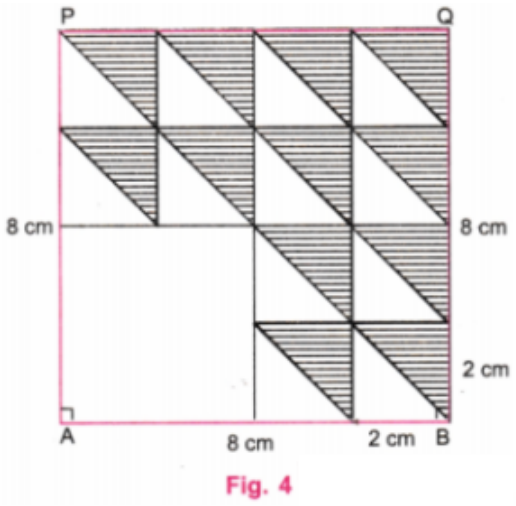
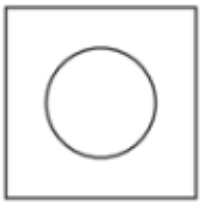


Fig. 4

Step 5. Fig. 4 is the required figure having 12 small squares in a square.

41.



Observe that the circular hole is the same as the centre of the square.
Construct a "Square with a Hole" as shown in the given figure. The centre of the hole is the same as the center of the square.
Hint: Think where the centre of the circle should be.

Ans. : The centre of a square is the point of intersection of its diagonals. This centre is also the centre of the hole in the figure.

Step 1. Using a ruler, draw a line AB equal to 5 cm, say. Using a protractor, draw perpendicular lines at A and B. Using a ruler, mark point P on the perpendicular line at A such that AP = 5 cm. Using a ruler, mark point Q on the perpendicular line at B such that BQ = 5 cm. Join P and Q using a ruler. Erase the lines above P and Q (Fig. 1).

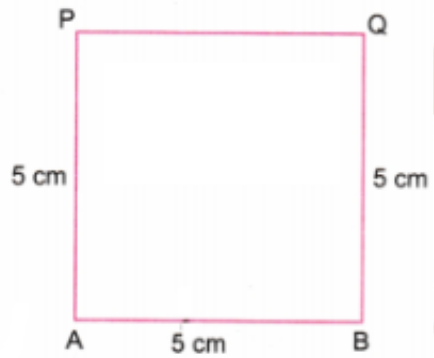


Fig. 1

Step 2. Draw diagonals AQ and BP using a ruler. Let the diagonals intersect at C. This point is the centre of the square ABQP. Erase the diagonals AQ and BP. (Fig. 2).

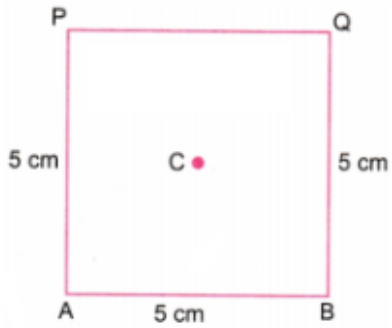


Fig. 2

Step 3. With centre at C and a radius of 1.5 cm, say, draw a circle using a compass. (Fig. 3)

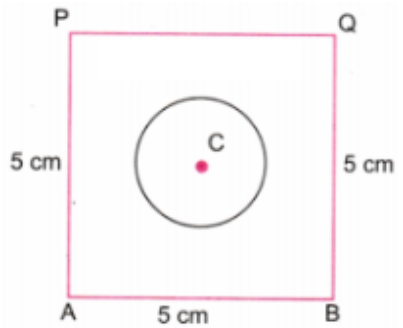
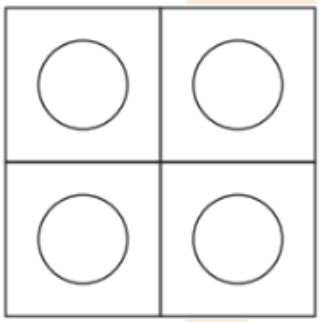


Fig. 3

Step 4. Fig. 3 is the required "Square with a Hole".

42. Construct a "Square with Four Holes" as shown in the given figure. Construct a "Square with Four Holes" as shown in the given figure.



Ans. : In the figure, the centre of a circle is the same as that of the corresponding square.

Step 1. Using a ruler, draw a line AB equal to 8 cm, say. Using a protractor, draw perpendicular lines at A and B. Using a ruler, mark point P on the perpendicular line at A such that AP = 8 cm. Using a ruler, mark point Q on the perpendicular line at B such that BQ = 8 cm. Join P and Q using a ruler. Erase the lines above P and Q. (Fig. 1)

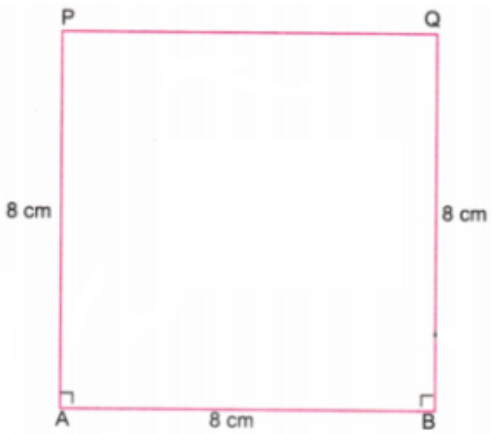


Fig. 1

Step 2. Using a ruler, find points C, D, E, and F such that AC = 4 cm, BD = 4 cm, QE = 4 cm, and PF = 4 cm. Join C and E and also F and D. (Fig. 2)

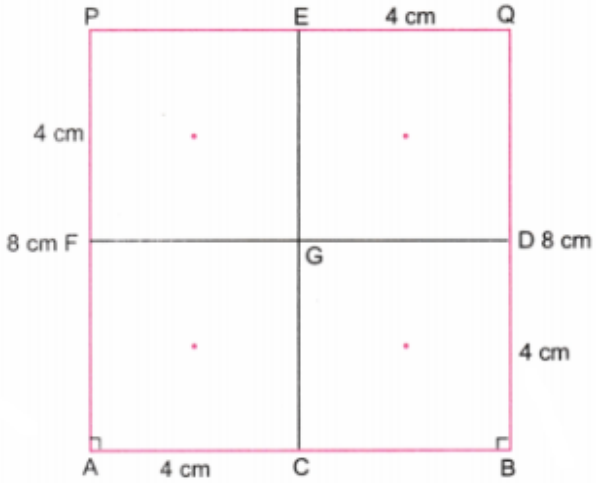


Fig. 2

Step 3. Let G be the intersection of lines FD and CE. Find the centres of squares ACGF, CBDG, DQEG, and GEPF by joining their respective diagonals. (Fig. 3)

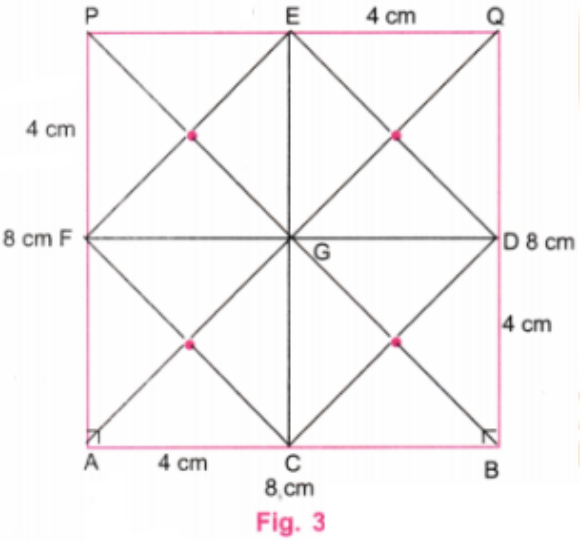


Fig. 3

Step 4. Erase the extra lines used for finding the centres of the smaller circles. With centre at centres of small squares, draw four circles of radius 1.3 cm, say. (Fig. 4)

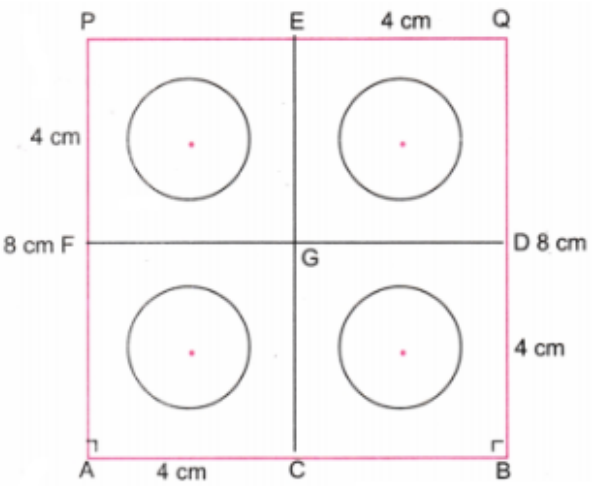
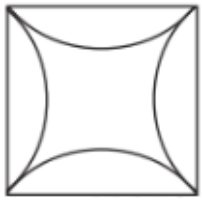


Fig. 4

Step 5. Fig. 4 is the required "'Square with Four Holes".

43. This is a square with 8 cm sidelengths.



Construct a "Square with Curves ", taking a square of side 8 cm as shown in the figure.

Hint: Think where the tip of the compass can be placed to get all 4 arcs to bulge uniformly from each of the sides. Try it out!

Ans. : In the given figure, the centres of the four arcs are outside the square.

Step 1. Using a ruler, draw a line AB equal to 8 cm. Using a protractor, draw perpendicular lines at A and B. Using a ruler, mark point P on the perpendicular line at A such that AP = 8 cm. Using a ruler, mark point Q on the perpendicular line at B such that BQ = 8 cm. Join P and Q using a ruler. Erase the lines above P and Q. (Fig. 1)

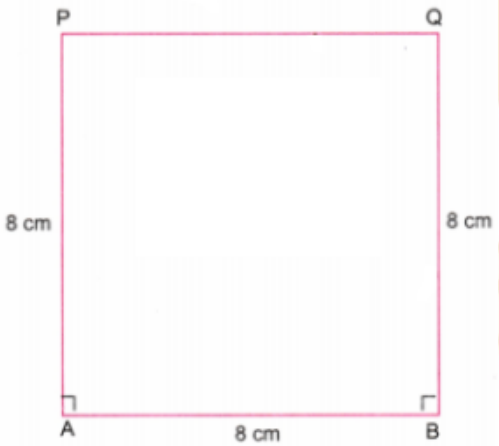


Fig. 1

Step 2. Using a ruler, mark points C, D, E, and F such that AC = 4 cm, BD = 4 cm, QE = 4 cm, and PF = 4 cm. Join C and E and also D and F. Extend these lines outside the

square. (Fig. 2)

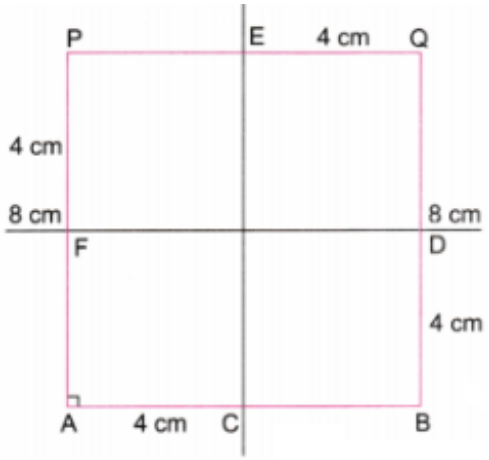


Fig. 2

Step 3. Extend DF and take points G and H on it so that DG and FH are equal to 4 cm. Extend CE and take points I and J on it so that Cl and EJ are equal to 4 cm. The distance 4 cm can be taken slightly less than or greater than 4 cm. Join B and G. (Fig. 3)

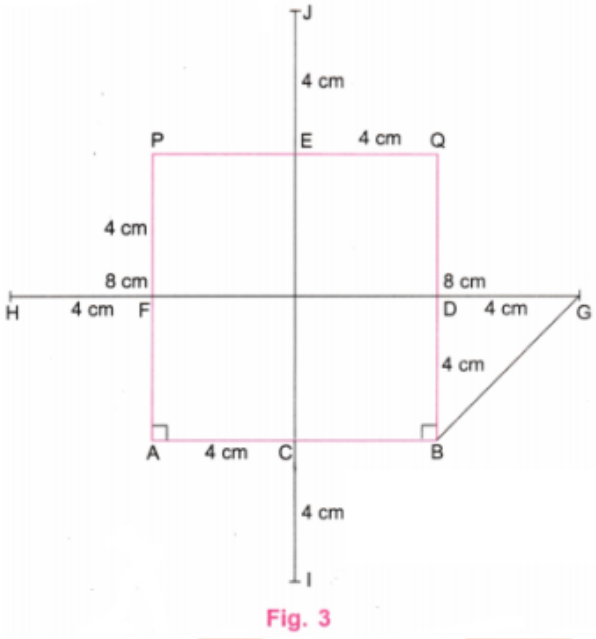


Fig. 3

Step 4. With centres at G, H, I, and J and a radius equal to BG, draw four arcs inside the square as shown in the given figure. Erase the extra lines. (Fig. 4).

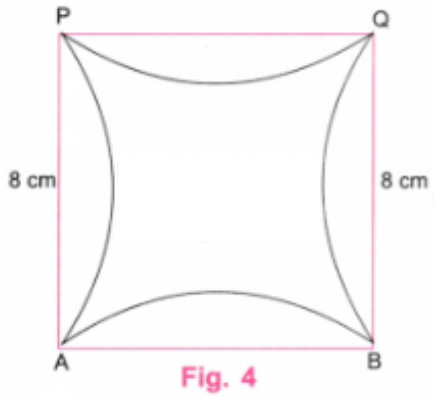


Fig. 4

Step 5. Fig. 4 is the required “Square with Curves” with the square of side 8 cm.

44. Construct a rectangle in which one of the diagonals divides the opposite angles into 50° and 40°.

Ans. : We shall draw a rectangle of the form shown in Fig. 1.

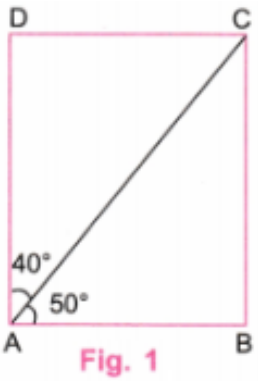


Fig. 1

Step 1. Using a ruler, draw a line AB equal to 4 cm, say. (Fig. 2.)

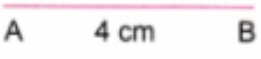


Fig. 2

Step 2. Using a protractor, mark dots C and D at angles 50° and 90° (50° + 40°), keeping the central point of the protractor at A. (Fig. 3)

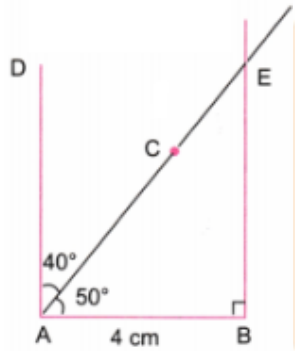


Fig. 3

Step 3. Using a protractor, draw a perpendicular line to AB at B and let it intersect the extended line AC at E. (Fig 3)

Step 4. Using a protractor, draw a perpendicular line to BE at E and let it intersect the extended line AD at F. (Fig 4)

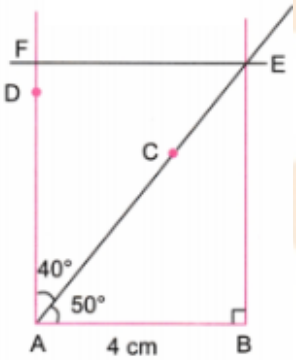


Fig. 4

Step 5. Erase the extra lines in Fig. 4. (Fig. 5)

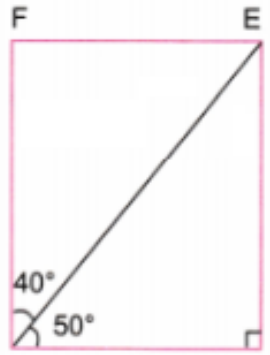


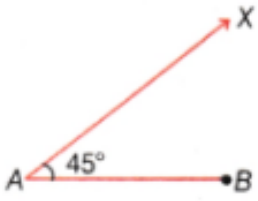
Fig. 5

Step 6. Fig. 5 is the required rectangle in which one of the diagonals divides the opposite angles into 50° and 40°.

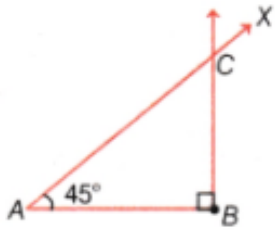
45. Construct a rectangle in which one of the diagonals divides the opposite angles into 45° and 45°. What do you observe about the sides?

Ans. : Draw a horizontal line segment AB. This will be one side of the rectangle.

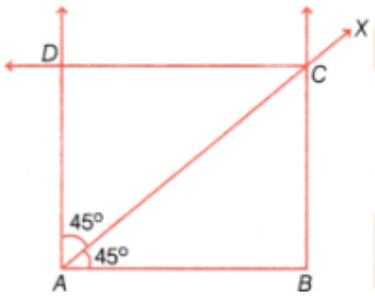
(i) At point A, use a protractor to measure and draw AX a 45° angle.



(ii) At point B, measure and draw a 90° angle. Draw a line segment BC extending from B at this angle meeting AX at C.



(iii) At Point A and C, Draw a 90° angle which meets at the point D.

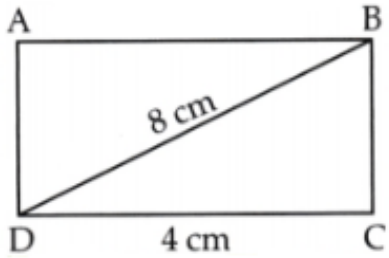


ABCD is the required rectangle. Here, diagonal AC divides the opposite angles A and C into 45° and 45°.

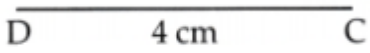
Observation You will notice that when the diagonals divide the opposite angles into 45° and 45°, so the sides of the rectangle will be equal, forming a square.

46. Construct a rectangle one of whose sides is 4 cm and the diagonal is of length 8 cm.

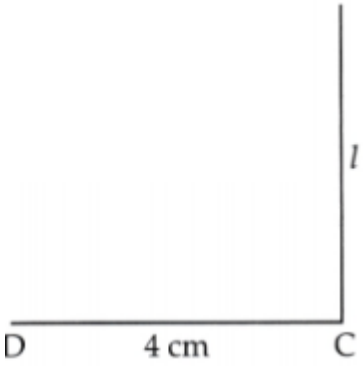
Ans. : First, draw a rough diagram



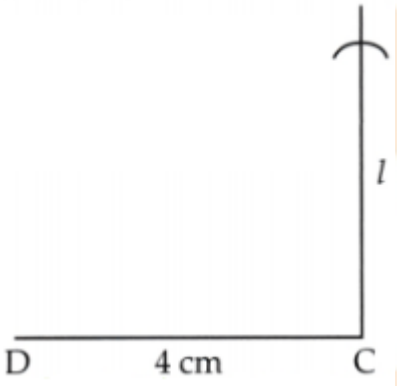
Step 1: The base CD measuring length 4 cm can be easily constructed.



Step 2: Draw a perpendicular to line DC at the point C. Let us call this line l.

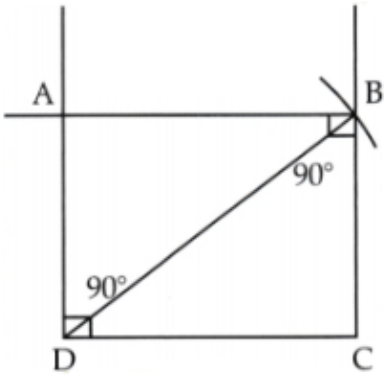


Step 3: Draw an arc of radius 8 cm with point D as the center.



To locate the point B,

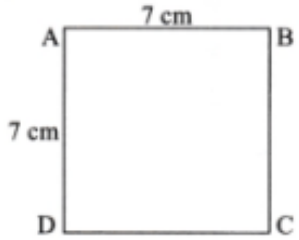
Step 4: Draw perpendiculars to DC and BC passing through D and B, respectively. The point where these lines intersect is the fourth point A.



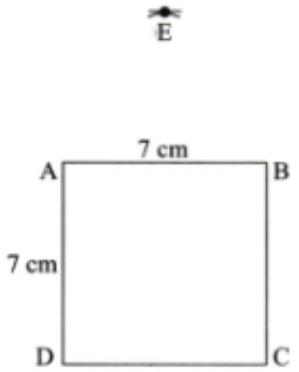
It satisfies all conditions of the rectangle.

47. Construct a bigger house in which all the sides are of length 7 cm.

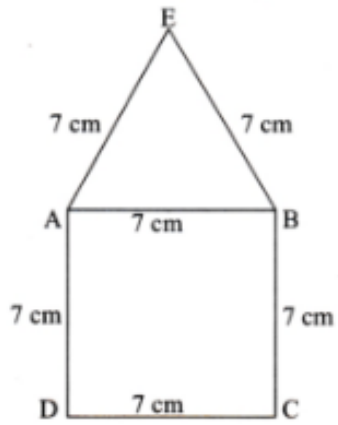
Ans. : First draw a square of side 7 cm, named as ABCD.



Now, using a compass draw arcs above the side AB of radius 7 cm from points A and B. Let the arcs intersect at point E.

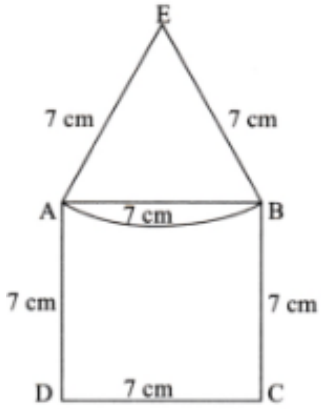


Joint A to E and B to E by straight lines



Now, take 7 cm radius in the compass and from E, draw the arc touching A and B as

shown in the figure.



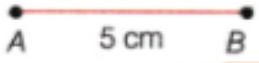
48. Is there a 4-sided figure in which all the sides are equal in length but is not a square? if such a figure exists, can you construct it?

Ans. : Yes, there is a 4-sided figure where all sides are equal in length but is not a square. This figure is known as a rhombus.

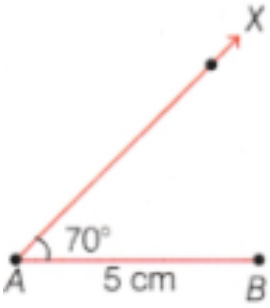
Steps

(i) Draw a line segment AB of any length.

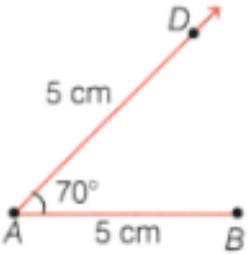
Let it will be 5 cm.



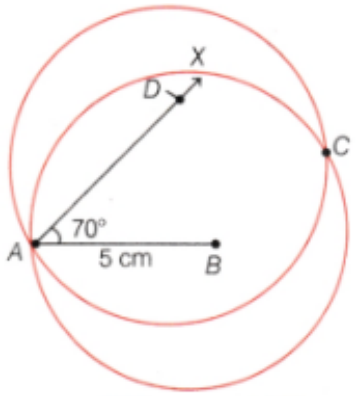
(ii) Draw any angle less than 90° at point A. Let will be 70°.



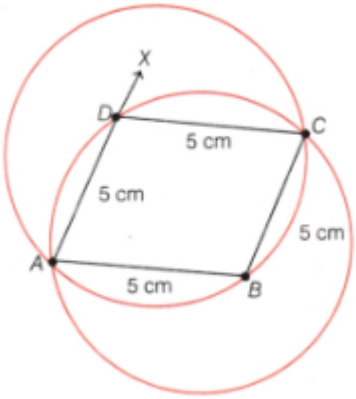
(iii) Mark the point D using ruler of length 5 cm and ray AX.



(iv) Now, draw two circles of radius 5 cm at point D and B and they will intersect at point C.



(v) Join BC and DC.



ABCD is required 4-sided figure.

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