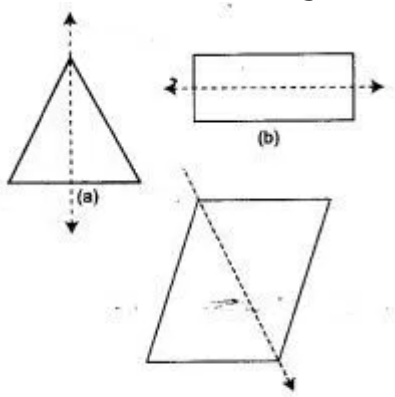
Chapter 12. Symmetry

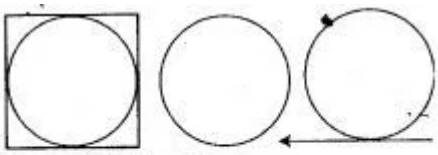
Figure Based Questions

Question 1. In each of the figure below, an additional line is indicated by dots. Observe, name the figure and state if the figure is symmetrical about the dotted line.



Solution : (a) Triangles, yes
(b) Rectangle, yes
(c) Parallelogram, no.

Question 2. Every diameter of circle is an axis of the symmetry for the circle. Each of the figure below contain a circle or a part of a circle. State the number of axis of symmetry in each case and also indicate them.

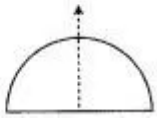


Solution : (a) Yes, Four.

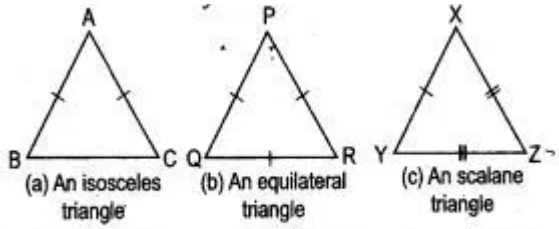
Yes, infinite since every diameter of a circle is an axis at symmetry for the circle and there are an infinite number of diameter in a circle. Ans.

Question 3. Draw a line of symmetry of semi-circle.

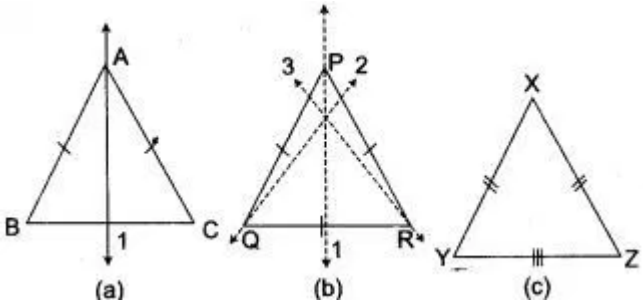
Solution :



Question 4. In the figure below are:
(a) an isosceles triangle;
(b) an equilateral triangle; and
(c) a scalene triangle state in each case if the triangle is a symmetrical figure. If a figure is symmetrical, state the number of axis of symmetry and indicate them by dotted line.

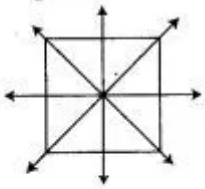


Solution : (a) Yes, one, (b) Yes, three, (c) No.

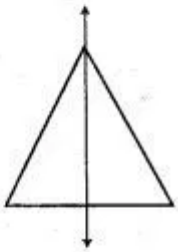


Question 5. Draw a diagram and name the figure in the following:
(i) A quadrilateral having four lines of symmetry, two of which contain its diagonals.
(ii) A triangle with only one line of symmetry.
(iii) A quadrilateral having only one line of symmetry.

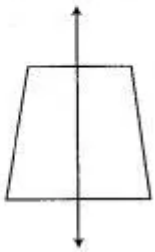
Solution : (i) Square



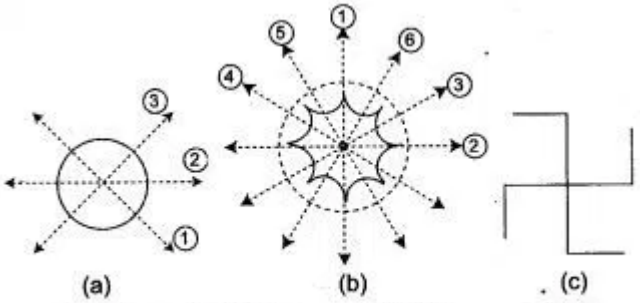
(ii) Isosceles triangle



(iii) Isosceles trapezium



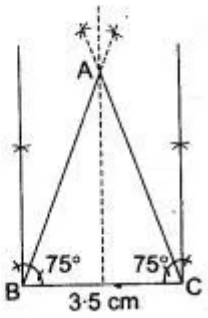
Question 6. In each of the figure below, state the number of axes of symmetry, if any.



Solution : (a) Three (b) Six (c) No.

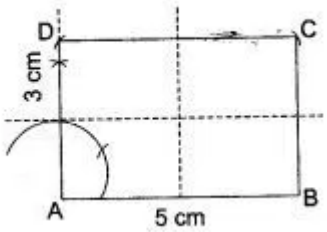
Question 7. Draw an isosceles ΔABC, where BC = 3.5 cm, the base angles C and B = 75°. Use ruler and compass only. Draw all lines of symmetry of the triangle.

Solution :



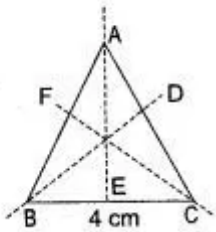
Question 8. Construct a rectangle ABCD with AB = 5 cm and AD = 3 cm. Construct its lines of symmetry.

Solution :



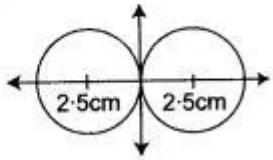
Question 9. Draw an equilateral triangle each of whose side is 4 cm. Draw all its lines of symmetry.

Solution :



Question 10. Draw two circles each of radius 2.5 cm touching each other. Construct the lines of symmetry of these circles.

Solution :

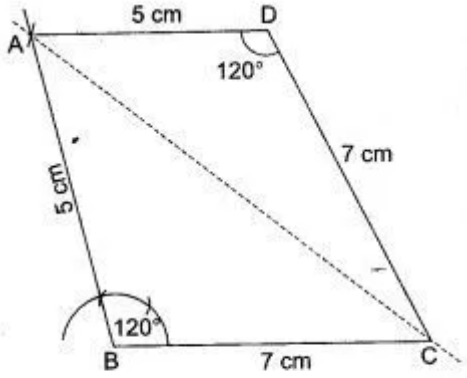


Question 11. Use a ruler and compass only in this question.
(i) Construct the quadrilateral ABCD in which AB = 5 cm, BC = 7 cm and angle ABC = 120°, given that AC is its only line of symmetry.
(ii) Write down the geometrical name of the quadrilateral.

Solution : (i) Steps of construction :

(1) Draw BC = 7 cm and at B make ∠ABC = 120°.

(2) With B as centre and radius = 5 cm, cut BX at A.

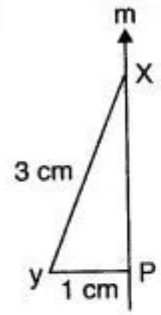


(3) With A as centre and radius = 5 cm draw an arc and with C as centre and radius = 7 cm draw another arc. The arcs meet at D.

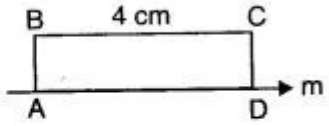
Thus ABCD is the required quadrilateral.

(ii) Rhombus.

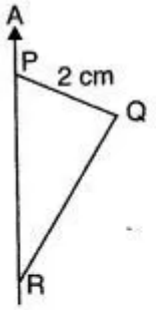
Question 12. Part of geometrical figure is given in each of the diagrams below. Complete the figures, so that the line 'm', in each case, is the line of symmetry, of the completed figure. Recognizable free hand sketches, would be awarded full marks.



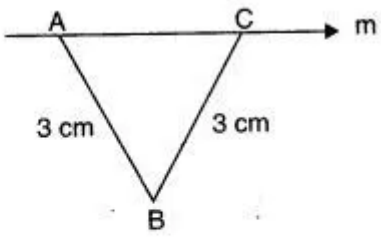
(i)



(ii)

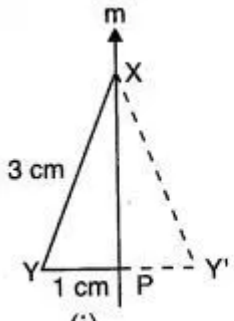


(iii)

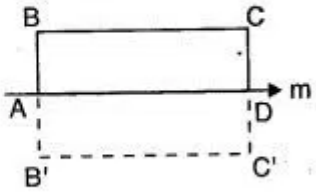


(iv)

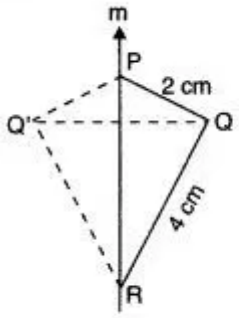
Solution : Taking the line '*m*' in each case as the line of symmetry, the completed figures will be as under :



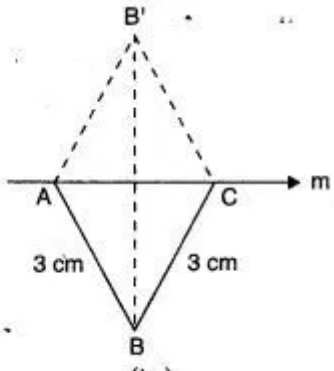
(i)



(ii)



(iii)

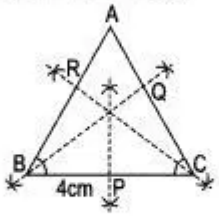


(iv)

Question 13. (i) Draw an equilateral triangle each of whose sides is 4 cm. Draw all its lines of symmetry.
(ii) Construct a ΔABC, in which AB = AC = 3 cm and BC = 2cm. Using a ruler and compasses only, draw the reflection of A'BC of ΔABC, in BC. Draw the lines of symmetry in the figure

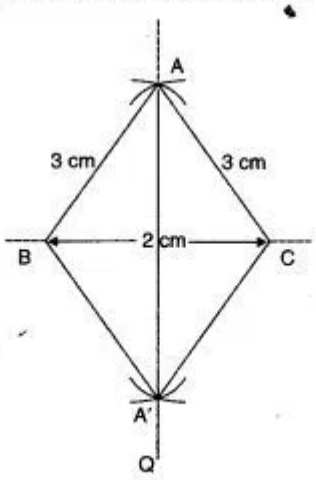
ABA'C.

Solution : (i) Three lines of symmetry (medians or altitudes or right bisectors).



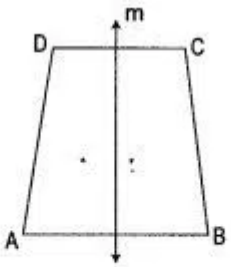
Ans.

(ii) AA' and BC are the two lines of symmetry.



Ans.

Question 14. A quadrilateral ABCD has exactly one axis of symmetry, which is not a diagonal. Show that the quadrilateral is an isosoeles trapezium.



Solution : Consider a quadrilateral ABCD.

Let m be a line which is not a diagonal of quad. ABCD.

Let the quad. ABCD have this line only as its axis of symmetry.

Then A, B and D, C are the two pairs of points, each pair symmetric w.r.t., line m.

$\therefore$ Line m is the perpendicular bisector of AB as well as DC.

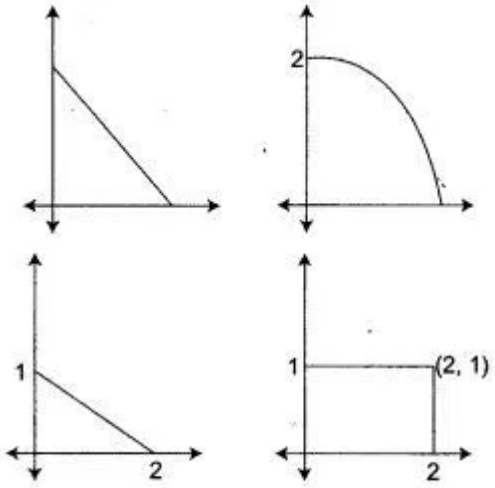
$\Rightarrow$ $AB \parallel DC$ ...(1)

Also AD and BC are symmetric w.r.t., line m.

$\therefore$ $AD = BC$ ...(2)

In view of (1) and (2), quadrilateral ABCD is an isosceles trapezium. Hence proved.

Question 15. Part of a geometrical figure is given in each of the diagram below. Complete the figures so that both the X-axis and the Y-axis are lines of symmetry of the completed figure.

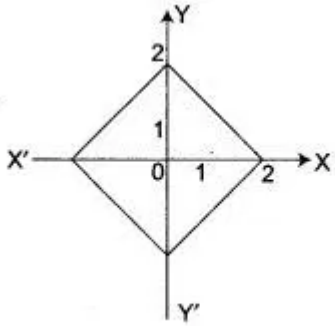


Ans.

Give the geometrical name of the completed figure.

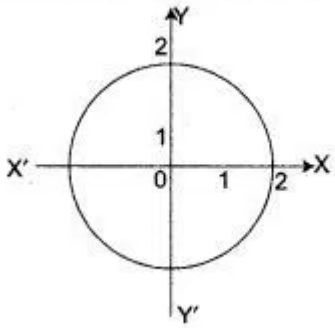
(You may use graph paper if required). Freehand sketches would be sufficient.

Solution : (i) The geometrical name of the completed figure is Square.



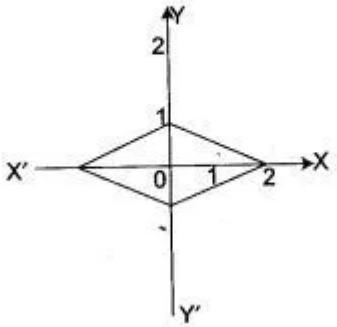
Ans.

(ii) The name of the completed figure is Circle.



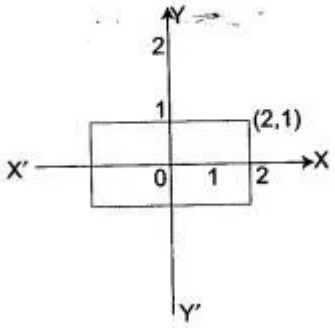
Ans.

(iii) The name of the completed figure is Rhombus.



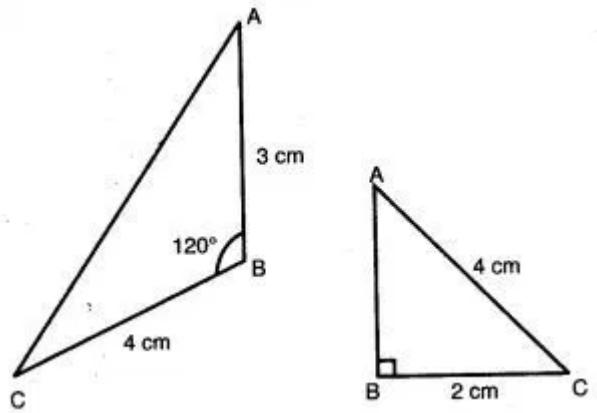
Ans.

(iv) The name of the completed figure is Rectangle.



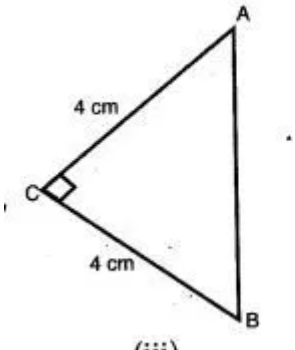
Ans.

Question 16. Part of a geometrical figure is given in each of the diagrams below. Complete the figures so. that the line AB in each case is a line of symmetry of the completed figure. Give also the geometrical name for the completed figure. Recognizable free hand Sketches would be awarded full marks.

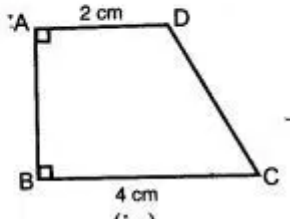


(i)

(ii)

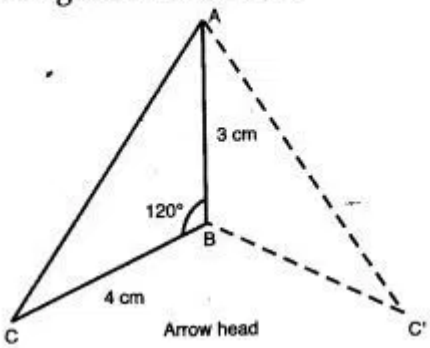


(iii)



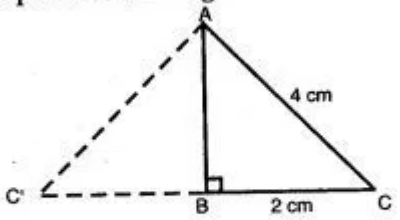
(iv)

Solution : (i) The geometrical name of the completed figure is arrow head.



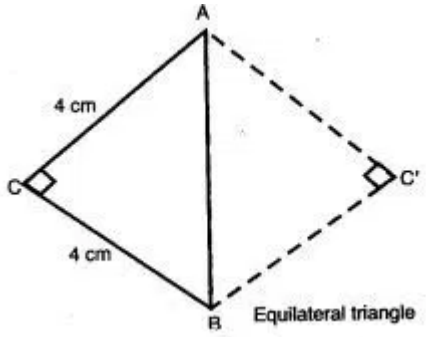
Arrow head Ans.

(ii) The geometrical name of the completed figure is equilateral triangle.



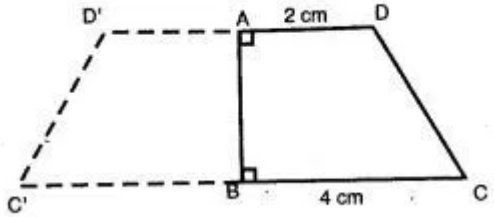
Equilateral triangle Ans.

(iii) The geometrical name of the completed figure is square.



Equilateral triangle Ans.

(iv) The geometrical name of the completed figure is isosceles trapezium.



Isosceles trapezium Ans.