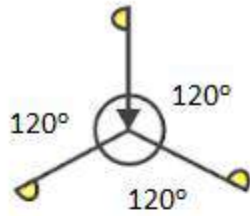EXERCISE 18.3   PAGE NO: 18.16

1. Give the order of rotational symmetry for each of the following figures when rotated about the marked point (x):
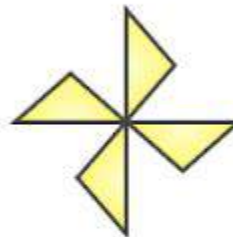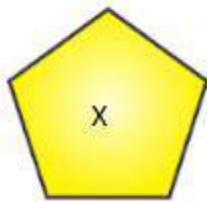

Fig. 51

Solution:
(i) A figure is said to have rotational symmetry if its fits onto itself more than once during a full turn that is rotation through $360°$
Therefore the given figure has its rotational symmetry as 4.

(ii) A figure is said to have rotational symmetry if its fits onto itself more than once during a full turn that is rotation through $360°$
Therefore the given figure has its rotational symmetry as 3.

(iii) A figure is said to have rotational symmetry if its fits onto itself more than once
during a full turn that is rotation through 360°
Therefore the given figure has its rotational symmetry as 3.

(iv) A figure is said to have rotational symmetry if its fits onto itself more than once
during a full turn that is rotation through 360°
Therefore the given figure has its rotational symmetry as 4.

(v) A figure is said to have rotational symmetry if its fits onto itself more than once
during a full turn that is rotation through 360°
Therefore the given figure has its rotational symmetry as 2.

(vi) A figure is said to have rotational symmetry if its fits onto itself more than once
during a full turn that is rotation through 360°
Therefore the given figure has its rotational symmetry as 4.

(vii) A figure is said to have rotational symmetry if its fits onto itself more than once
during a full turn that is rotation through 360°
Therefore the given figure has its rotational symmetry as 5.

(viii) A figure is said to have rotational symmetry if its fits onto itself more than once
during a full turn that is rotation through 360°
Therefore the given figure has its rotational symmetry as 6.

(ix) A figure is said to have rotational symmetry if its fits onto itself more than once
during a full turn that is rotation through 360°
Therefore the given figure has its rotational symmetry as 3.

2. Name any two figures that have both line symmetry and rotational symmetry.

Solution:
An equilateral triangle and a square have both lines of symmetry and rotational
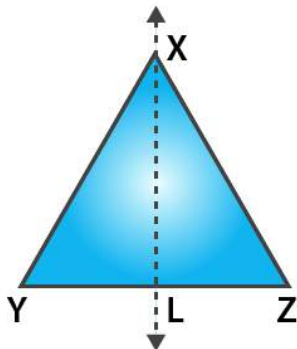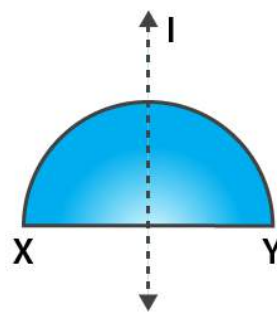symmetry.
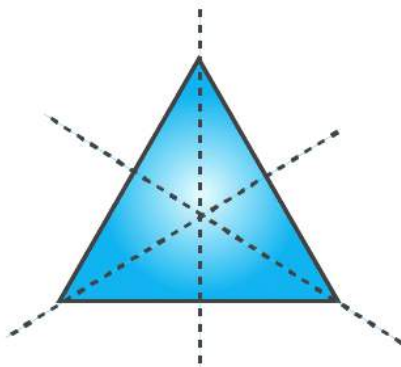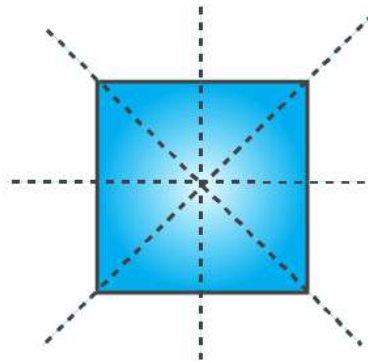
Equilateral triangle   Square

3. Give an example of a figure that has a line of symmetry but does not have rotational symmetry.

Solution:
A semicircle and an isosceles triangle have a line of symmetry but do not have rotational symmetry.
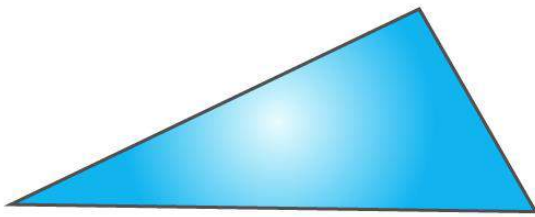

Isosceles triangle   Semi-circle

4. Give an example of a geometrical figure which has neither a line of symmetry nor a rotational symmetry.

Solution:
A scalene triangle has neither a line of symmetry nor a rotational symmetry.

Scalene triangle

5. Give an example of a letter of the English alphabet which has
(i) No line of symmetry
(ii) Rotational symmetry of order 2.

Solution:
(i) The letter of the English alphabet which has no line of symmetry is Z.

(ii) The letter of the English alphabet which has rotational symmetry of order 2 is N.

6. What is the line of symmetry of a semi-circle? Does it have rotational symmetry?

Solution:
A semicircle (half of a circle) has only one line of symmetry. In the figure, there is one line of symmetry. The figure is symmetric along the perpendicular bisector I of the diameter XY. A semi-circle does not have any rotational symmetry.
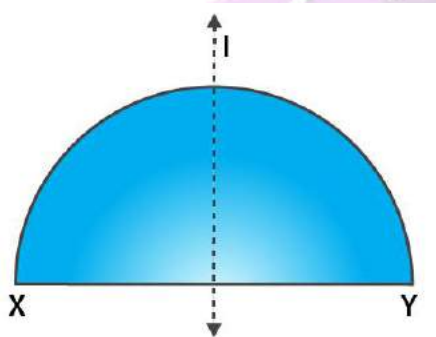

Semi-circle

**7. Draw, whenever possible, a rough sketch of**
(i) a triangle with both line and rotational symmetries.
(ii) a triangle with only line symmetry and no rotational symmetry.
(iii) a quadrilateral with a rotational symmetry but not a line of symmetry.
(iv) a quadrilateral with line symmetry but not a rotational symmetry.
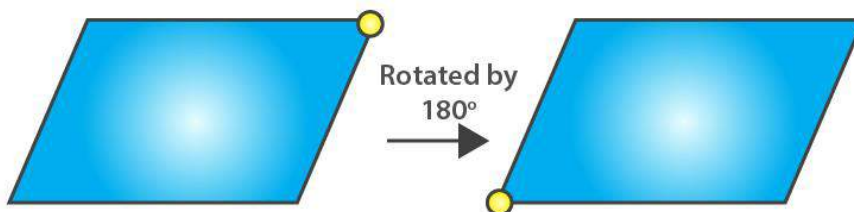
Solution:
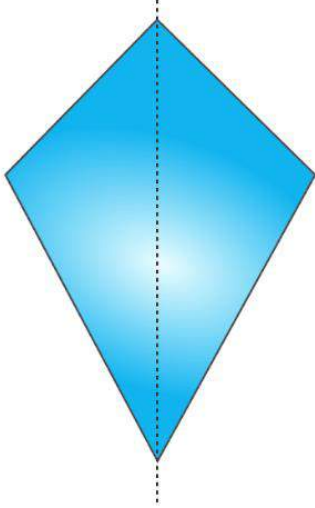(i) An equilateral triangle has 3 lines of symmetry and a rotational symmetry of order 3.
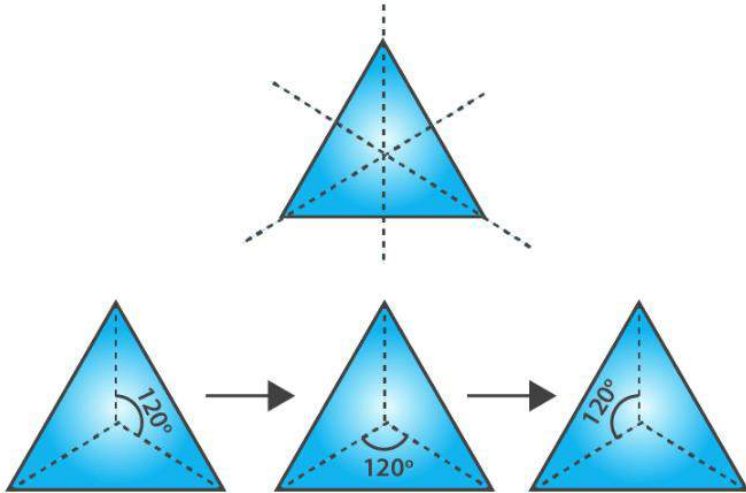
(ii) An isosceles triangle has only 1 line of symmetry and no rotational symmetry.
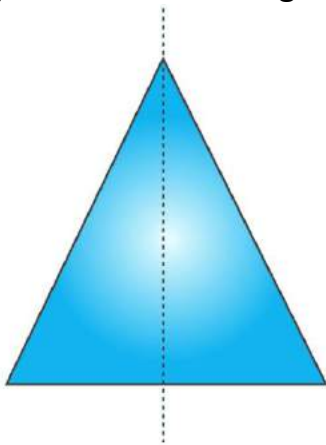
(iii) A parallelogram is a quadrilateral which has no line of symmetry but a rotational symmetry of order 2.

(iv) A kite is a quadrilateral which has only one line of symmetry and no rotational symmetry.

8. Fill in the blanks:

Figures	Centre of rotation	Order of rotation	Angle of rotation
Square			
Rectangle			
Rhombus			
Equilateral Triangle			
Regular hexagon			
Circle			
Semi-circle			

Solution:

Figures	Centre of rotation	Order of rotation	Angle of rotation
Square	Point of intersection of the line segments joining the mid-points of opposite sides.	4	90°
Rectangle	Point of intersection of the line segments joining the mid-points of opposite sides	2	180°
Rhombus	Point of intersection of diagonals	2	180°
Equilateral Triangle	Point of intersection of angle bisectors i.e., centroid	3	120^0
Regular	Centre of the hexagon	6	60°

hexagon			
Circle	Centre of the circle	Unlimited	Any angle
Semi-circle	Nil	Nil	Nil

9. Fill in the blanks:

English Alphabet Letter	Line Symmetry	Number of Lines of Symmetry	Rotational symmetry	Order of rotational symmetry
Z	**Nil**	**0**	**Yes**	**2**
S	-	-	-	-
H	**Yes**	-	**Yes**	-
O	**Yes**	-	**Yes**	-
E	**Yes**	-	-	-
N	-	-	**Yes**	-
C	-	-	**-**	-

Solution:

English Alphabet Letter	Line Symmetry	Number of Lines of Symmetry	Rotational symmetry	Order of rotational symmetry
Z	Nil	0	Yes	2
S	Nil	0	Yes	2
H	Yes	2	Yes	2
O	Yes	4	Yes	2
E	Yes	1	No	0
N	Nil	0	Yes	2
C	Yes	1	No	0