

EXERCISE 18.3

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

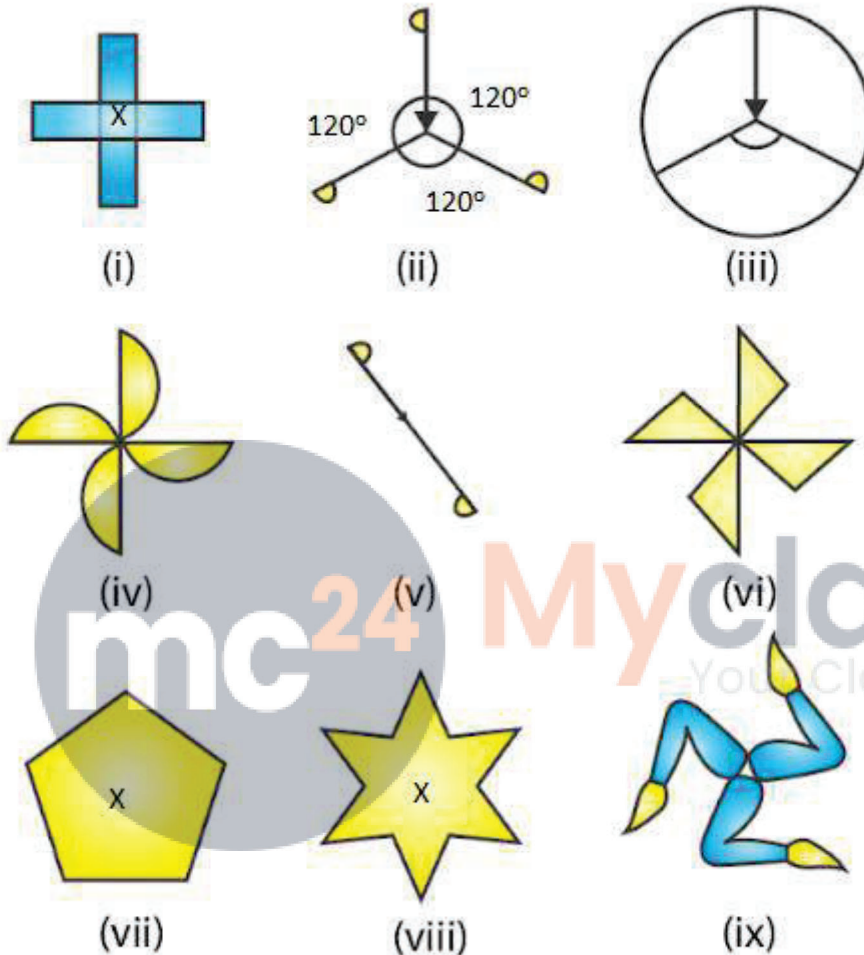


Fig. 51

**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  $360^\circ$

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  $360^\circ$

Therefore the given figure has its rotational symmetry as 3.

(iii) A figure is said to have rotational symmetry if it fits onto itself more than once during a full turn that is rotation through  $360^\circ$

Therefore the given figure has its rotational symmetry as 3.

(iv) A figure is said to have rotational symmetry if it fits onto itself more than once during a full turn that is rotation through  $360^\circ$

Therefore the given figure has its rotational symmetry as 4.

(v) A figure is said to have rotational symmetry if it fits onto itself more than once during a full turn that is rotation through  $360^\circ$

Therefore the given figure has its rotational symmetry as 2.

(vi) A figure is said to have rotational symmetry if it fits onto itself more than once during a full turn that is rotation through  $360^\circ$

Therefore the given figure has its rotational symmetry as 4.

(vii) A figure is said to have rotational symmetry if it fits onto itself more than once during a full turn that is rotation through  $360^\circ$

Therefore the given figure has its rotational symmetry as 5.

(viii) A figure is said to have rotational symmetry if it fits onto itself more than once during a full turn that is rotation through  $360^\circ$

Therefore the given figure has its rotational symmetry as 6.

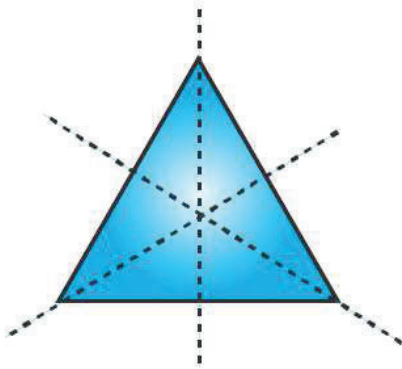
(ix) A figure is said to have rotational symmetry if it fits onto itself more than once during a full turn that is rotation through  $360^\circ$

Therefore the given figure has its rotational symmetry as 3.

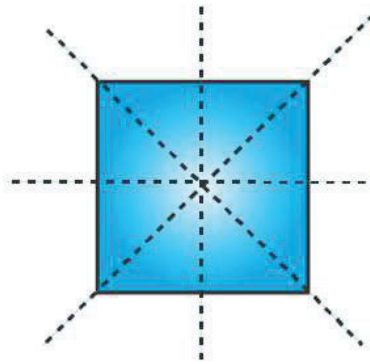
**2. Name any two figures that have both line symmetry and rotational symmetry.**

**Solution:**

An equilateral triangle and a square have both lines of symmetry and rotational symmetry.



Equilateral triangle

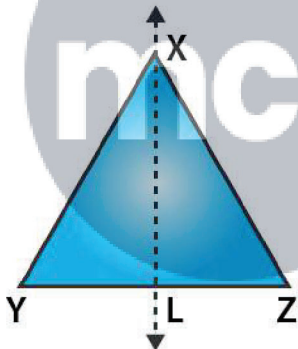


Square

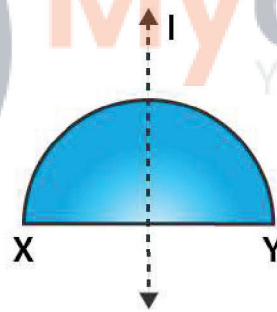
3. Give an example of a figure that has a line of symmetry but does not have rotational symmetry.

**Solution:**

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



Isosceles triangle

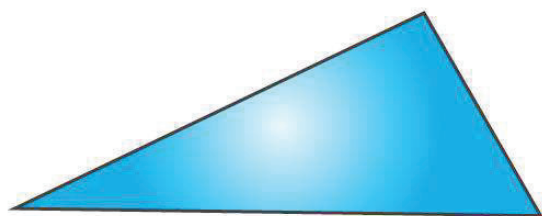


Semi-circle

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:**

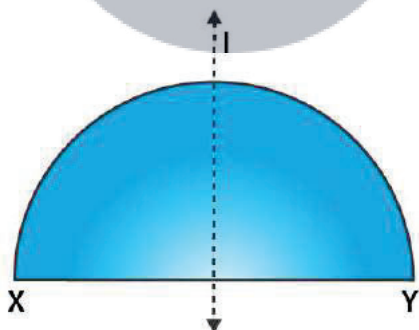
(i) The letter of the English alphabet which has no line of symmetry is Z.

(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  $l$  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.

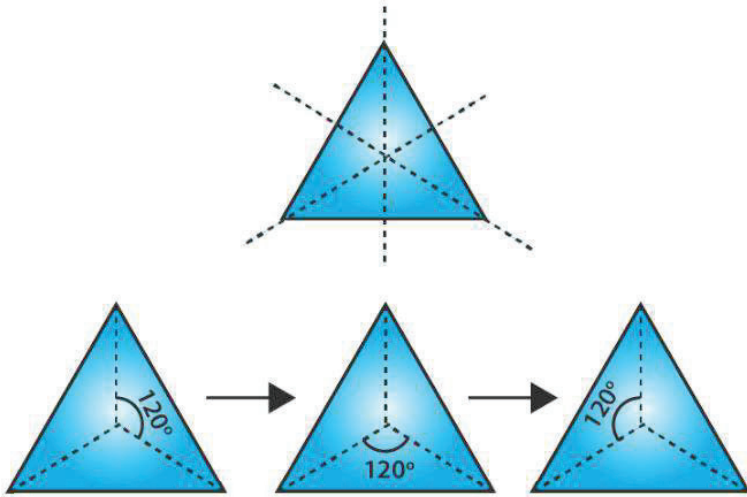
(ii) a triangle with only line symmetry and no rotational symmetry.

(iii) a quadrilateral with a rotational symmetry but not a line of symmetry.

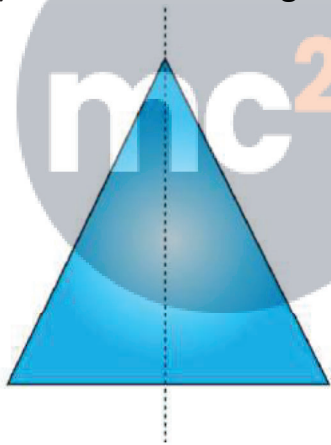
(iv) a quadrilateral with line symmetry but not a rotational symmetry.

**Solution:**

(i) An equilateral triangle has 3 lines of symmetry and a rotational symmetry of order 3.

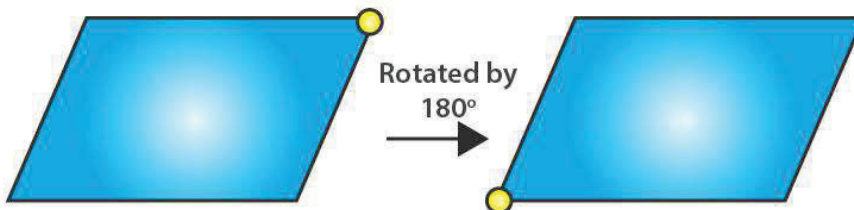


(ii) An isosceles triangle has only 1 line of symmetry and no rotational symmetry.

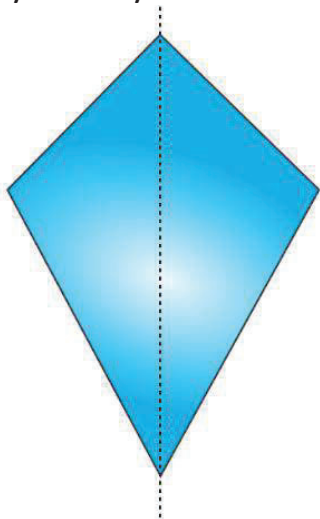


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(iii) A parallelogram is a quadrilateral which has no line of symmetry but a rotational symmetry of order 2.



(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	$90^\circ$
Rectangle	Point of intersection of the line segments joining the mid-points of opposite sides	2	$180^\circ$
Rhombus	Point of intersection of diagonals	2	$180^\circ$
Equilateral Triangle	Point of intersection of angle bisectors i.e., centroid	3	$120^\circ$
Regular	Centre of the hexagon	6	$60^\circ$

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