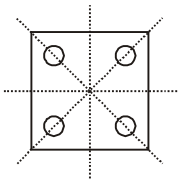
Chapter 17 : Symmetry

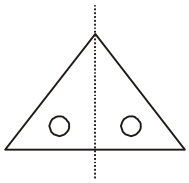
ANSWER KEYS

EXERCISE 17.1

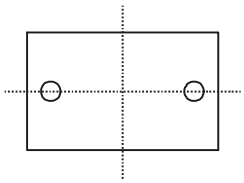
1.



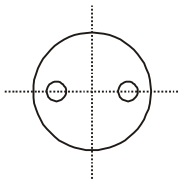
4 lines of symmetry



1 line of symmetry

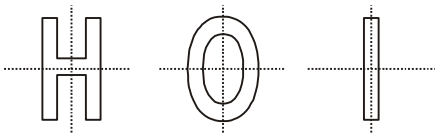


2 lines of symmetry

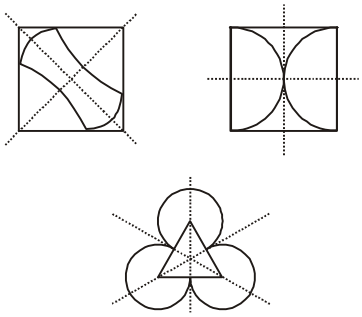


2 lines of symmetry

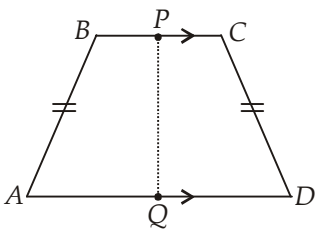
2.



3.

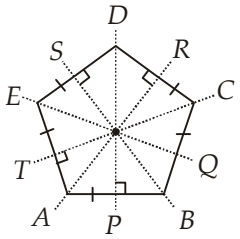


4. (*i*) Isosceles trapezium



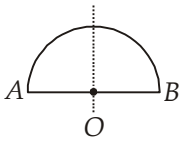
1 line of symmetry through the mid-points of two parallel sides.

(*ii*) Regular pentagon



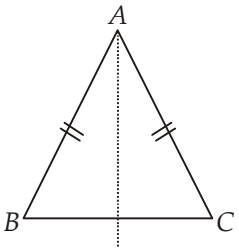
5 lines of symmetry through the lines joining the vertices and mid-points of opposite sides.

(*iii*) Semi-circle



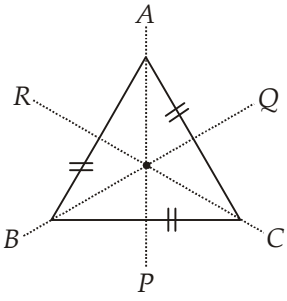
1 line of symmetry through the perpendicular bisector of diameter.

(*iv*) Isosceles triangle



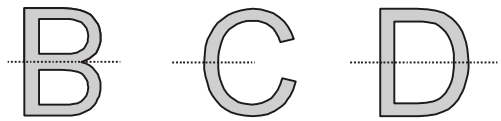
1 line of symmetry through the line joining the common vertex of equal sides and mid-point of opposite side or median through vertical angle.

(*v*) Equilateral triangle

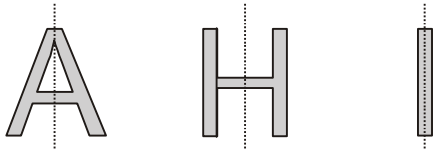


3 lines of symmetry through the angle bisectors of interior angles of the triangle.

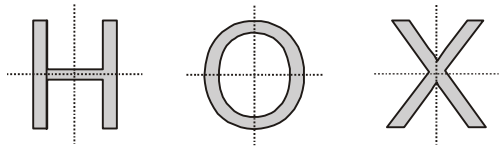
5. (*i*) B, C and D are the letters having reflectional symmetry about a horizontal mirror.



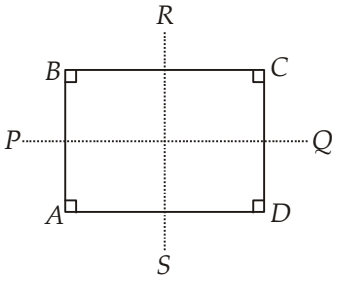
(*ii*) A, H and I are the letters having a reflectional symmetry about a vertical mirror.



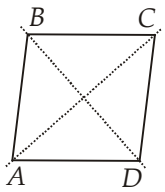
(*iii*) H, O and X are the letters having a reflectional symmetry about both the vertical mirror and the horizontal mirror.



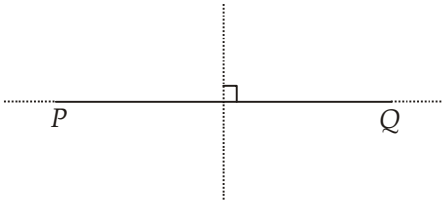
6.



Rectangle



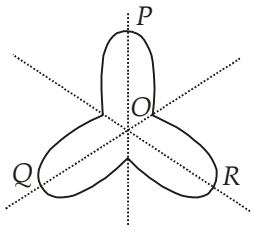
Rhombus



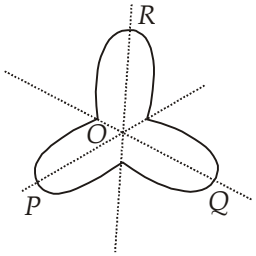
Line segment

EXERCISE 17.2

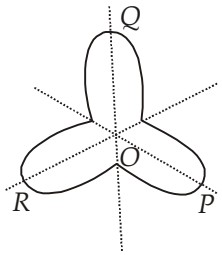
1. The figure has 3 lines of symmetry.



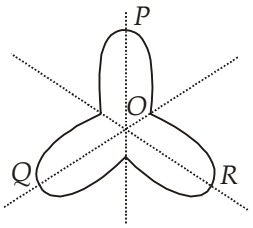
Original form



Rotation through 120°



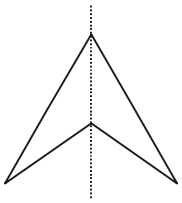
Rotation through 240°



Rotation through 360°

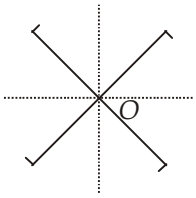
Thus, the figure has 3 lines of symmetry and rotational symmetry of order 3.

2.

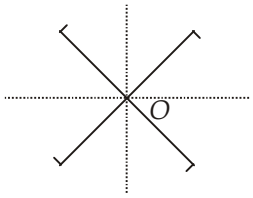


(*i*) The number of line of symmetry = 1
(*ii*) The order of rotational symmetry = 0.

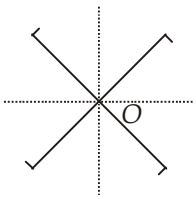
3. (*i*)



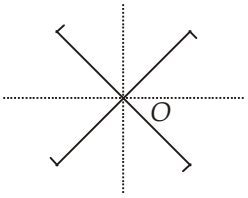
Original form



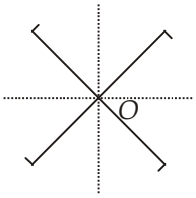
Rotation through 90°



Rotation through 180°



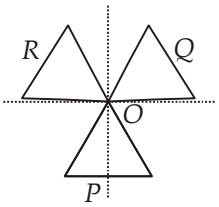
Rotation through 270°



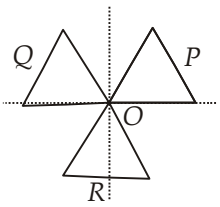
Rotation through 360°

Thus, order of rotational symmetry = 4(90°, 180°, 270°, 360°)

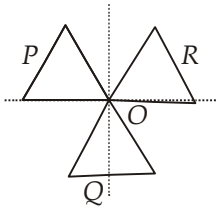
(*ii*)



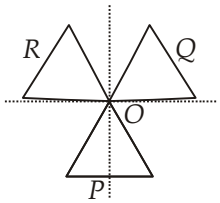
Original form



Rotation through 120°



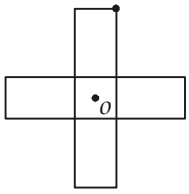
Rotation through 240°



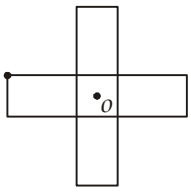
Rotation through 360°

Thus, the order of rotational symmetry = 3(120°, 240°, 360°)

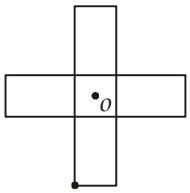
4. (*i*)



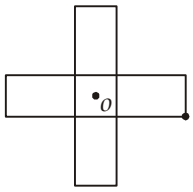
Original form



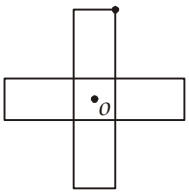
Rotation through 90°



Rotation through 180°



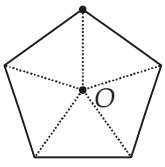
Rotation through 270°



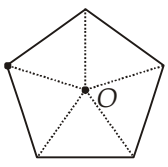
Rotation through 360°

Hence, the order of rotational symmetry is 4.

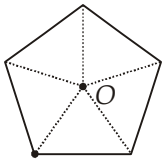
(*ii*)



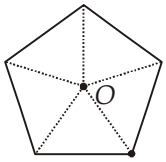
Original form



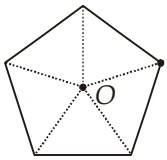
Rotation through 72°



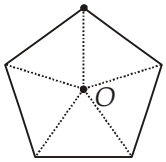
Rotation through 144°



Rotation through 216°



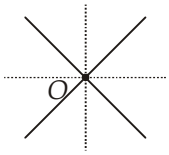
Rotation through 288°



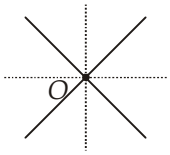
Rotation through 360°

Hence, the order of rotational symmetry is 5.

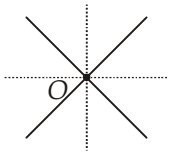
(*iii*)



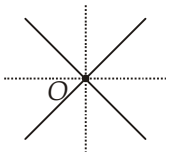
Original form



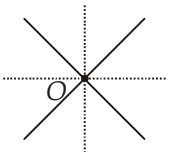
Rotation through 90°



Rotation through 180°



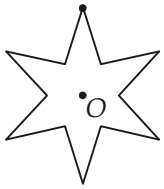
Rotation through 270°



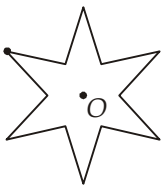
Rotation through 360°

Hence, the order of rotational symmetry is 4.

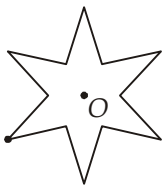
(*iv*)



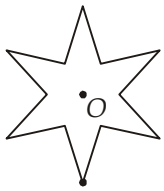
Original form



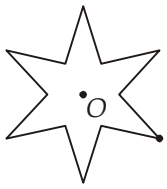
Rotation through 60°



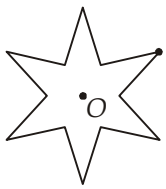
Rotation through 120°



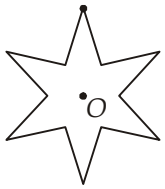
Rotation through 180°



Rotation through 240°



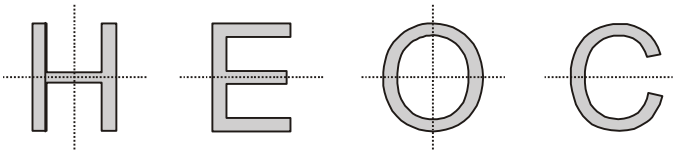
Rotation through 300°



Rotation through 360°

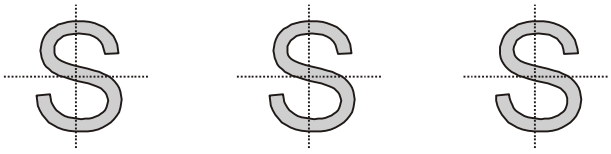
Hence, the order of rotational symmetry is 6.

5. Lines of symmetry:

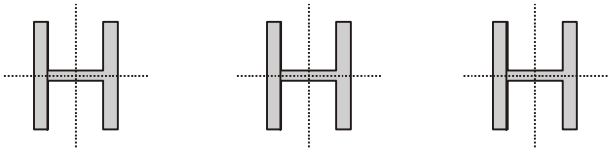


The letters S, N and Z have no lines of symmetry.

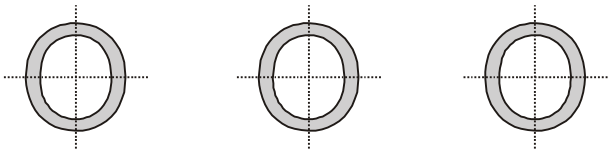
Rotational symmetry:



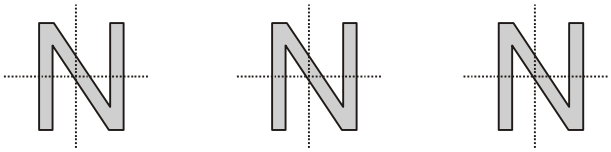
Original form | Rotation through 180° | Rotation through 360°



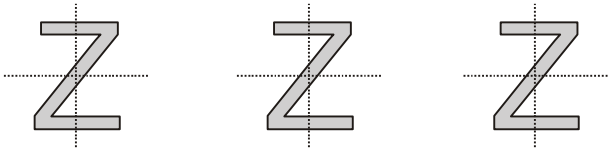
Original form | Rotation through 180° | Rotation through 360°



Original form | Rotation through 180° | Rotation through 360°



Original form | Rotation through 180° | Rotation through 360°



Original form | Rotation through 180° | Rotation through 360°

English alphabet letters	Line symmetry	No. of lines of symmetry	Rotational symmetry	Order of rotational symmetry
S	**No**	0	**Yes**	**2**
H	**Yes**	**2**	Yes	**2**
E	Yes	**1**	**No**	**0**
O	**Yes**	**2**	**Yes**	**2**
N	No	**0**	**Yes**	2
C	**Yes**	1	**No**	**0**
Z	**No**	**0**	**Yes**	2

MULTIPLE CHOICE QUESTIONS

1. "A rectangle is symmetric about lines joining mid points of its opposite sides."

Hence, option (*b*) is correct.

2. "An equilateral triangle has three lines of symmetry."

Hence, option (*d*) is correct.

3. "A circle has unlimited lines of symmetry."

Hence, option (*c*) is correct.

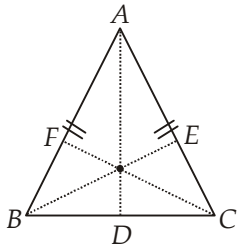
4. "A square has 4 lines of symmetry."

Hence, option (*a*) is correct.

5. "A rhombus has two lines of symmetry."

Hence, option (*b*) is correct.

6.



Hence, option (*b*) is correct.

7. "A parallelogram has no line of symmetry."

Hence, option (*d*) is correct.

8. "A rhombus is symmetric about each of its diagonals."

Hence, option (*c*) is correct.

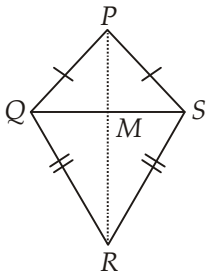
9. "The letter *Z* of English alphabet has no line of symmetry."

Hence, option (*c*) is correct.

10. "The letter *O* of English alphabet has two lines of symmetry."

Hence, option (*c*) is correct.

11.



It is symmetric about bigger diagonal *PR*.

Hence, option (*a*) is correct.

MENTAL MATHS CORNER

A. Name of the following:

1. Two figures which have a line of symmetry but does not have a rotational symmetry are **semi-circle and isosceles triangle.**

2. A quadrilateral which have both line and rotational symmetry of order more than one is **square**.

3. A geometrical figure which has neither a line of symmetry nor a rotational symmetry is a **scalene triangle**.

4. A letter of English alphabet which has no line of symmetry but has rotational symmetry of order 2 is **Z**.

5. A letter of English alphabet which has rotational symmetry of order 2 is **N**.

6. A geometrical figure which has no rotational symmetry is **scalene triangle**.

7. Two letters of English alphabet, which have more than one line of symmetry are **H and O**.

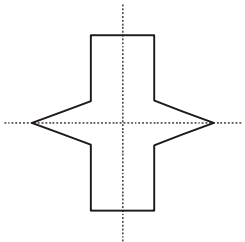
8. Three shapes each having two lines of symmetry are **rectangle, rhombus and line segment**.

9. The line of symmetry of an isosceles triangle is **Median**.

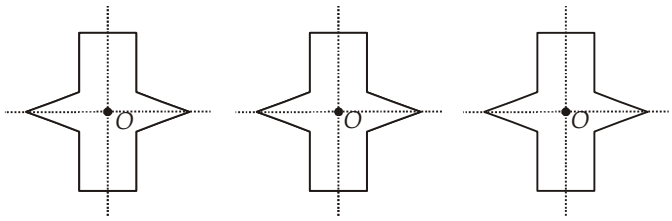
10. The line of symmetry of a circle is **Diameter**.

B. Answer the following:

(*i*) The given figure has 2 lines of symmetry as shown below:



(*ii*)

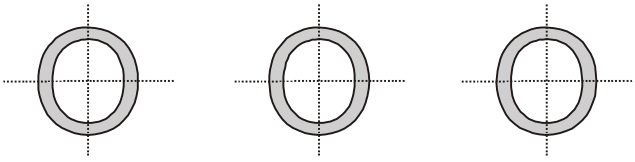


Original form | Rotation through 180° | Rotation through 360°

Hence, the order of rotational symmetry of the given figure is 2.

REVIEW EXERCISE

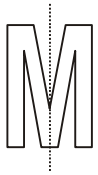
1. The rotational symmetry of the letter *O* of English alphabet is of order 2 *i.e.,* 180° and 360°.



Original form | Rotation through 180° | Rotation through 360°

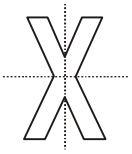
2. (*i*)

(*ii*)

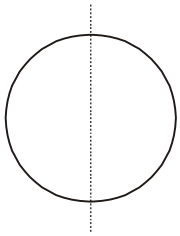


(*iii*)

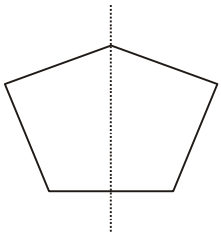
(*iv*)



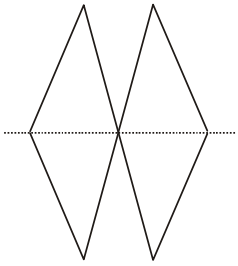
3. (*i*)



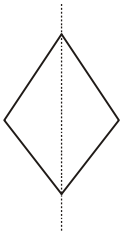
(*ii*)

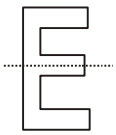
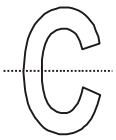
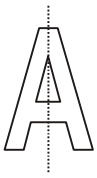


(*iii*)



(*iv*)



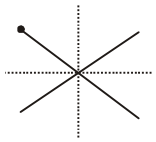
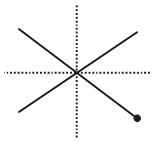
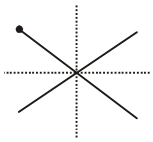
4. (*i*)  (*ii*)  (*iii*) 

5. (*i*)  

Original form | Rotation through 360°

Thus, the order of rotational symmetry is 1.

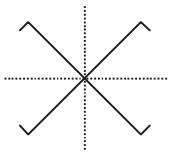
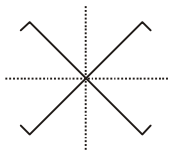
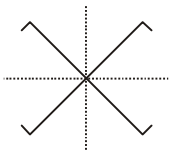
(*ii*)

Original form | Rotation through 180° | Rotation through 360°

Thus, order of rotational symmetry is 2. (180° and 360°)

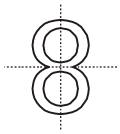
(*iii*)

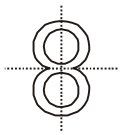
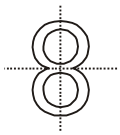
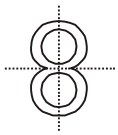
Original form | Rotation through 180° | Rotation through 360°

Thus, order of rotational symmetry is 2. (180° and 360°)

HOTS QUESTIONS

1. 

The number 8 has 2 lines of symmatry.

Original form | Rotation through 180° | Rotation through 360°

Thus, the order of rotational symmetry is 2 (180°, 360°).