Symmetry

Line Symmetry

The word symmetry comes from the Greek word symmetros, which means even.
A figure has line symmetry if a line can be drawn dividing it into two identical parts. The line is called the line of symmetry or axis of symmetry.

Line symmetry is also known as reflection symmetry because a mirror line resembles the line of symmetry, where one half is the mirror image of the other half. While looking at a mirror, an object placed on the right appears to be on the left, and vice versa.

- The line of symmetry of a line segment is its perpendicular bisector.
- The lines of symmetry of an equilateral triangle are the bisectors of the internal angles.
- The lines of symmetry of a square are the diagonals and the lines joining the mid-points of the opposite sides.
- The lines of symmetry of a rectangle are the lines joining the mid-points of the opposite sides.
- The lines of symmetry of a rhombus are the diagonals.
- The line of symmetry of an isosceles triangle is the perpendicular bisector of the non-equal side.
- A scalene triangle, has no line of symmetry.
- A circle has unlimited lines of symmetry.

Lines of symmetry for regular polygons
A polygon is said to be a regular polygon if all its sides are equal in length and all its angles are equal in measure. If a polygon is not a regular polygon, then it is said to be an irregular polygon.

Regular and irregular polygons have lines of symmetry. The number of lines of symmetry in a regular polygon is equal to the number of sides that it has. A regular pentagon has five lines of symmetry. Similarly, a regular octagon has eight lines of symmetry, while a regular decagon has ten lines of symmetry.

Lines of symmetry for Irregular polygons
Most irregular polygons do not have line symmetry. However, some of the irregular polygons have lines of symmetry. A rectangle has two lines of symmetry, and an isosceles triangle has one line of symmetry.

Lines of symmetry for letters
Some letters have line symmetry. The letters A, B, C, D, E, I, K, M, T, U, V, W and Y have one line of symmetry. The letters H and S have two lines of symmetry. The letters F, G, J, L, N, P, Q, R, S and Z have no line of symmetry.

Rotational Symmetry

Symmetry

Any object or shape is said to have rotational symmetry if it looks exactly the same at least once during a complete rotation through 360°.

Centre of rotation

The fixed point about which an object rotates is called the centre of rotation. During the rotation, the shape and size of the object do not change. Rotation may be clockwise or anti-clockwise.
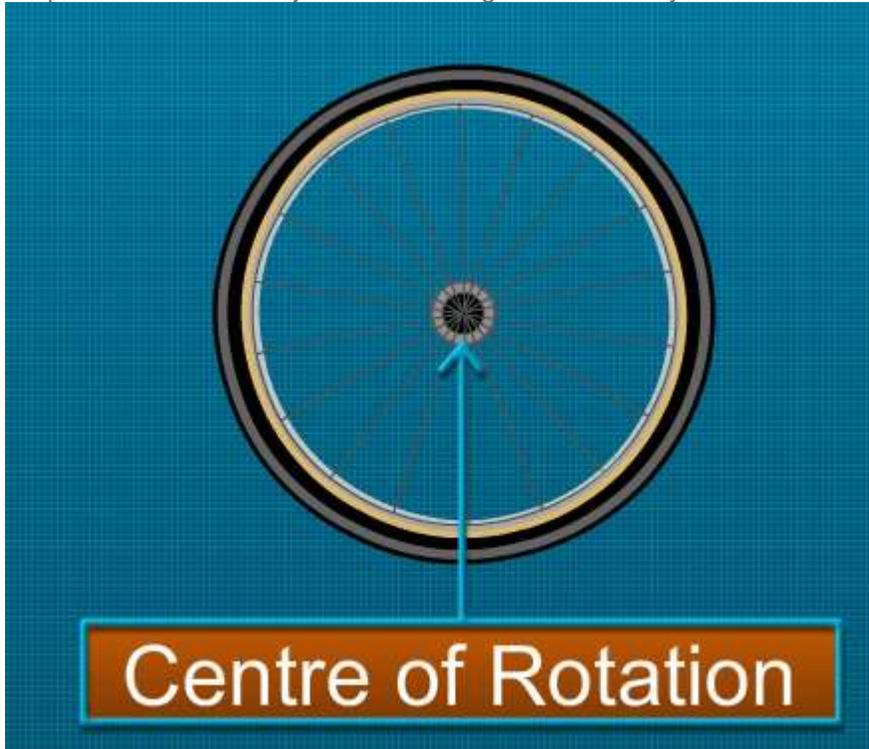
Centre of Rotation

A full turn refers to a rotation of 360°. A half turn refers to a rotation of 180°. A quarter turn refers to a rotation of 90°.
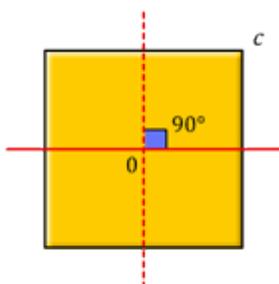
Angle of rotation

The angle at which a shape or an object looks exactly the same during rotation is called the angle of rotation.

Order of rotational symmetry

The order of rotational symmetry can be defined as the number of times that a shape appears exactly the same during a full 360° rotation. The centre of rotation of a square is the point of intersection of its diagonals and the angle of rotation is 90°. So, the order of rotational symmetry of a square is 4.

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Direction of rotation is clockwise

The angle of rotation = 90°

The centre of rotation of a circle is the centre of the circle and it has rotational symmetry around the centre for every angle.

There are many shapes that have only line symmetry and no rotational symmetry at all. Some objects and shapes have both, line symmetry as well as rotational symmetry.

The Ashok Chakra in the Indian national flag has both, line symmetry and rotational symmetry.

Symmetry can be seen in the English alphabet as well. The letter H has both line symmetry and rotational symmetry.

Letter	Line Symmetry	Rotational Symmetry
Z	No	Yes
H	Yes	Yes
O	Yes	Yes
E	Yes	No
N	No	Yes
C	Yes	No
A	Yes	No

Symmetry

B	Yes	No