

Class 6 Maths Symmetry

What is symmetry

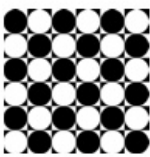
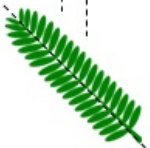
What is symmetry?

Symmetry comes from a Greek word which means 'to measure together'.

Symmetry means the situation where an object can be divided into at least two identical parts such that the identical parts cover each other completely when folded, turned or slided.



Symmetry is everywhere. It plays important role in the field of architecture. Nature has made abundant use of symmetry. Look at the following examples.



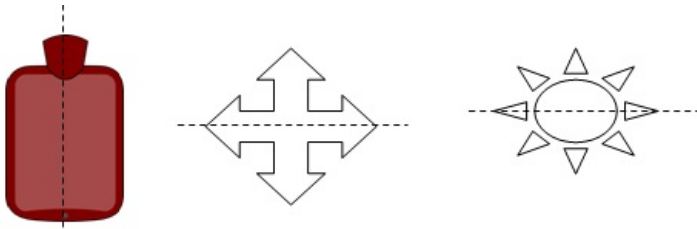
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Symmetric and Asymmetric figure

Symmetric and Asymmetric figure

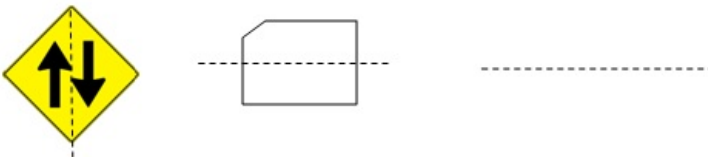
Symmetric figure

If a figure is folded in two parts such that two parts match exactly then such figure is known as a symmetric figure.



Asymmetric figure

If a figure is divided into two unequal parts, then such figure is known as an asymmetric figure.

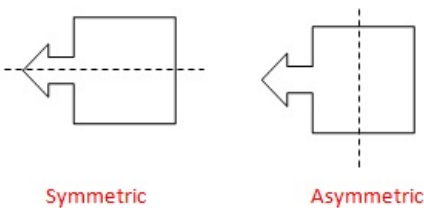


Some figures are symmetric in one way but asymmetric in another way.

If we fold this figure horizontally then it shows asymmetry. If we fold this figure vertically then it shows symmetry.



If we fold this figure horizontally then it shows symmetry but if we fold it vertically it won't show symmetry.



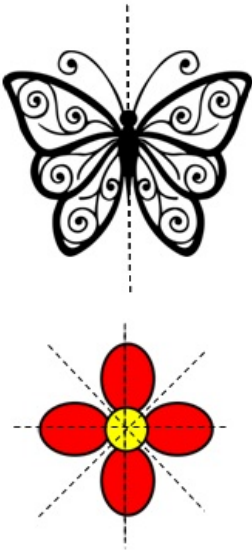
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Line of symmetry

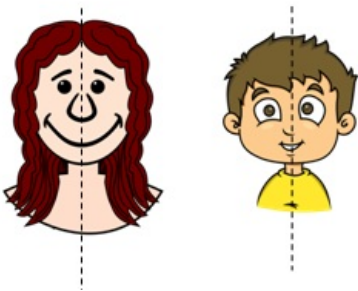
Line of symmetry

When a figure is folded along a line such a way that the two parts exactly fit on top of each other, then the figure is said to have a line symmetry.

Line of symmetry is the line which divides figure into two identical parts and these are mirror image of each others.



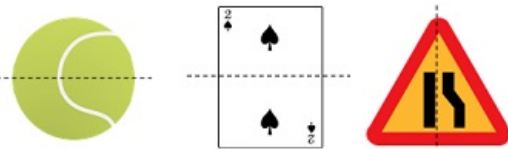
Sometimes human face can also show line of symmetry. But this is not applicable in all cases.



Sometimes, line of symmetry is neither vertical nor horizontal. The following figure shows line of symmetry but its not vertical or horizontal.



The dotted lines below are not lines of symmetry though they may cut the figures in halves, they don't create two exactly same parts.



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Alphabets words and numbers showing line of symmetry

Alphabets words and numbers showing line of symmetry

Some alphabets possess vertical line of symmetry while some show horizontal line of symmetry.



The following alphabets show both vertical as well as horizontal lines of symmetry.



The alphabet O has infinite number of lines of symmetry.



The following alphabets don't show any type of symmetry.

F G J L N P Q R S Z

There are few words which also show line of symmetry.



Some of the numbers also show line of symmetry.



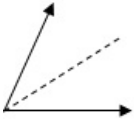
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Geometric shapes which show one line of symmetry

Geometric shapes which show one line of symmetry

Angle

An angle bisector is the only line of symmetry for a given angle



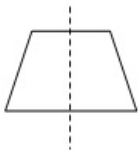
Isosceles triangle

The line containing the bisector of the vertex angle of an isosceles triangle is only line of symmetry for such a triangle.



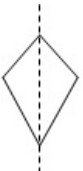
Trapezium

The perpendicular bisector of the parallel sides of an isosceles trapezium is the only line of symmetry.



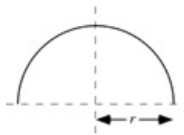
Kite

The line containing the ends of a kite is the only line of symmetry for a kite. It bisects the angles at the ends of the kite.

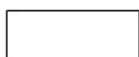


Semicircle

A semicircle has only one line of symmetry.



There are few geometric shapes which doesn't show any line of symmetry.

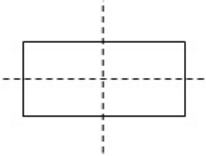


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Geometric shapes which show two line of symmetry

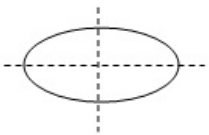
Geometric shapes which show two line of symmetry

Rectangle



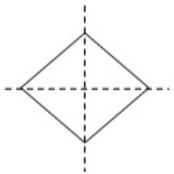
Both perpendicular bisectors of the sides of a rectangle are lines of symmetry.

Ellipse



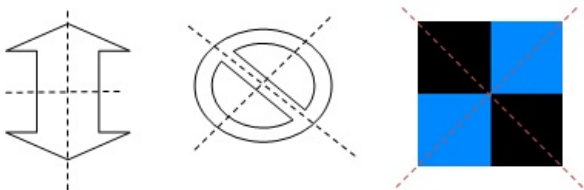
The major and minor axis of ellipse are lines of symmetry.

Rhombus



Both the bisectors of the angles of a rhombus are lines of symmetry.

More figures with two lines of symmetry



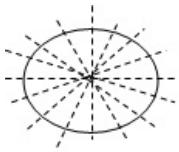
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Geometric shapes which show multiple line of symmetry

Geometric shapes which show multiple line of symmetry

Circle

The circle shows infinite line of symmetry.

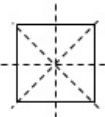


Regular polygons

Regular (Equilateral) triangle has 3 lines of symmetry.



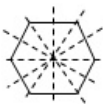
Regular quadrilateral (square) has 4 lines of symmetry.



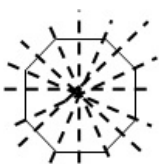
Regular pentagon has 5 lines of symmetry



Regular hexagon has 6 lines of symmetry.



Regular octagon has 8 lines of symmetry.



From above we can conclude that the number lines of symmetry for a regular polygon is equal to the number of sides of the regular polygon.

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Reflection and Symmetry

Reflection and Symmetry

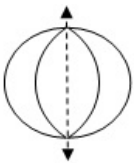
A reflection can be seen in mirror or water or any shine surface. Observe the following beautiful picture. We can see the reflection of the mountain, trees and clouds in water.



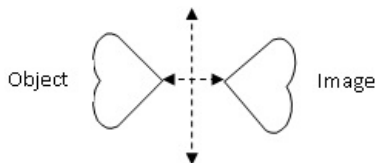
When we keep any object in front of the mirror we see the image of that object in the other side of the mirror. This image is known as reflection of that object and it is symmetrical in nature. Here the mirror line acts as a line of symmetry.

Any object and its reflection have same size, shape and but its orientation will be different from the object.

Case 1: Object is in contact with the mirror.



Case 2: Object is slightly away from the mirror.



Check whether following figures are reflections of each other?



In 1st example, the image looks exactly same as object. i.e its shape and size. But the reflected image should have opposite orientation as compared to the object. So this is not a reflection.

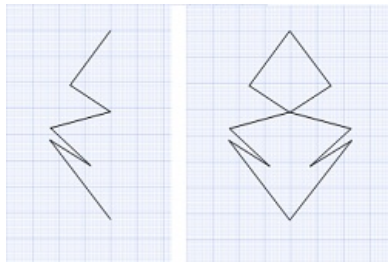
In the 2nd example, shape and size of the reflected image is exactly same as the object but its orientation is opposite as compared to the object. Hence this is a reflection.

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Applications of symmetry

Applications of symmetry

We can use the concept of symmetry to complete the pattern. See the following example. Here we have to observe the symmetrical pattern on the left and then we can complete the pattern on the right



Kaleidoscope

It is a cylindrical shaped device with mirrors containing different colored objects like pebbles and pieces of glass. When we view from one end, light entering the other side creates a colourful pattern, due to the reflection of the mirrors. We can see the following types of patterns.



Rangoli design

Rangoli can be created with the help of symmetry.

While drawing rangoli, initially we draw some design and then we keep drawing the mirror image of earlier design. In this way the whole rangoli design is created.

