

Symmetry

Warm Up

Identify each transformation.

1.



2.



Rotate $\triangle ABC$ with the given vertices by the given angle.

3. $A(3, -4)$, $B(5, 1)$, $C(-4, 0)$; 180°

4. $A(1, -5)$, $B(7, -1)$, $C(3, 6)$; 90°



Symmetry

Diatoms are microscopic algae that are found in aquatic environments. Scientists use a system that was developed in the 1970s to classify diatoms based on their *symmetry*.

A figure has **symmetry** if there is a transformation of the figure such that the image coincides with the preimage.

Symmetry

Line Symmetry

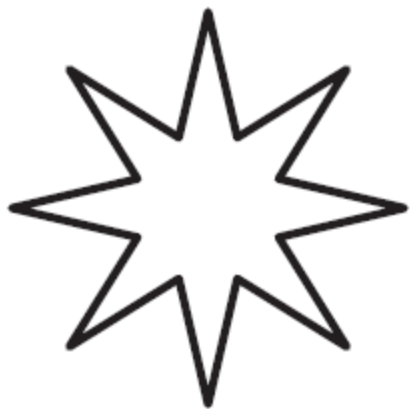
A figure has **line symmetry** (or reflection symmetry) if it can be reflected across a line so that the image coincides with the preimage. The **line of symmetry** (also called the axis of symmetry) divides the figure into two congruent halves.



Symmetry

Example 1A: Identifying line of symmetry

Tell whether the figure has line symmetry. If so, copy the shape and draw all lines of symmetry.



Symmetry

Example 1B: Identifying line of symmetry

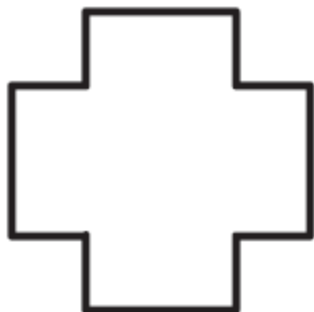
Tell whether the figure has line symmetry. If so, copy the shape and draw all lines of symmetry.



Symmetry

Example 1C: Identifying line of symmetry

Tell whether the figure has line symmetry. If so, copy the shape and draw all lines of symmetry.



Symmetry

Check It Out! Example 1

Tell whether each figure has line symmetry. If so, copy the shape and draw all lines of symmetry.

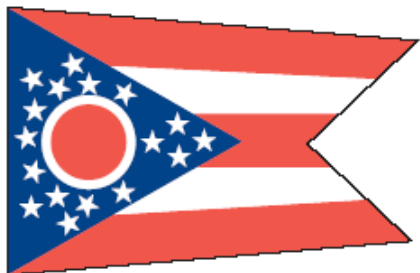
a.



b.



c.





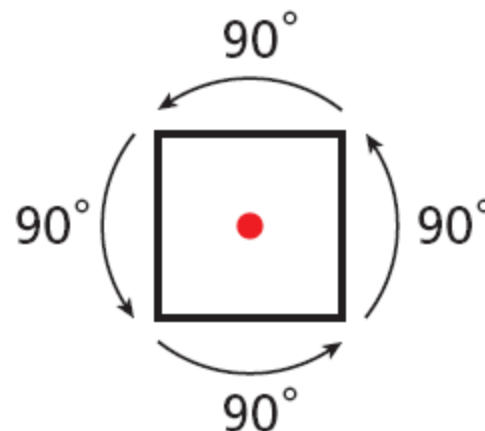
Symmetry

Rotational Symmetry

A figure has **rotational symmetry** (or *radial symmetry*) if it can be rotated about a point by an angle greater than 0° and less than 360° so that the image coincides with the preimage.

Symmetry

The *angle of rotational symmetry* is the smallest angle through which a figure can be rotated to coincide with itself. The number of times the figure coincides with itself as it rotates through 360° is called the *order* of the rotational symmetry.



Symmetry

Example 2: Identifying Rotational Symmetry

Tell whether each figure has rotational symmetry. If so, give the angle of rotational symmetry and the order of the symmetry.



Symmetry

Check It Out! Example 2

Tell whether each figure has rotational symmetry. If so, give the angle of rotational symmetry and the order of the symmetry.

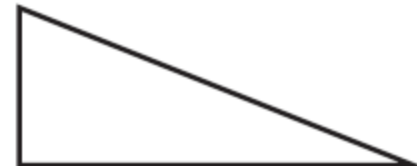
a.



b.



c.



Symmetry

Example 3A: Design Application

Describe the symmetry of each icon. Copy each shape and draw any lines of symmetry. If there is rotational symmetry, give the angle and order.



Symmetry

Example 3B: Design Application

Describe the symmetry of each icon. Copy each shape and draw any lines of symmetry. If there is rotational symmetry, give the angle and order.



Symmetry

Check It Out! Example 3

Describe the symmetry of each diatom. Copy the shape and draw any lines of symmetry. If there is rotational symmetry, give the angle and order.

a.

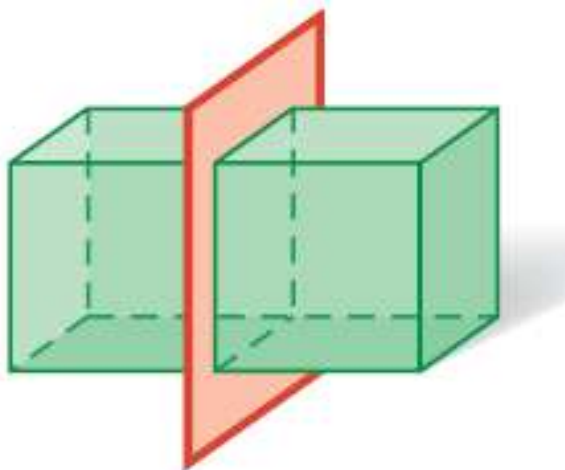


b.



Symmetry

A three-dimensional figure has *plane symmetry* if a plane can divide the figure into two congruent reflected halves.



Plane symmetry

Symmetry

A three-dimensional figure has *symmetry about an axis* if there is a line about which the figure can be rotated (by an angle greater than 0° and less than 360°) so that the image coincides with the preimage.



Symmetry about an axis

Symmetry

Example 4A: Identifying Symmetry in Three Dimensions

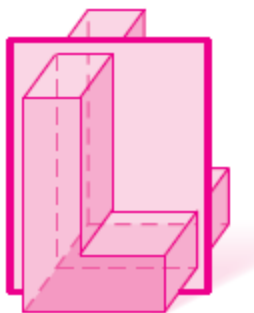
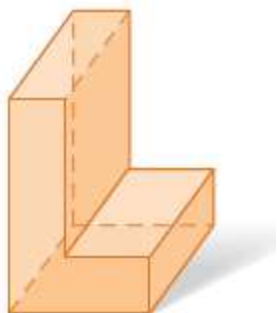
Tell whether the figure has plane symmetry, symmetry about an axis, or neither.



Symmetry

Example 4B: Identifying Symmetry in Three Dimensions

Tell whether the figure has plane symmetry, symmetry about an axis, or neither.

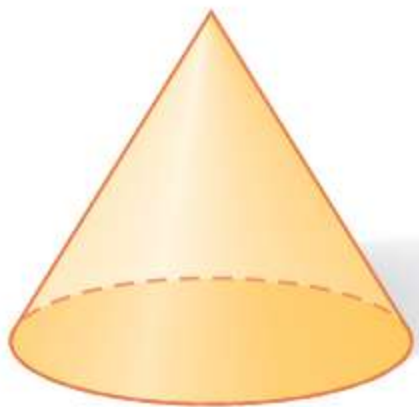


Symmetry

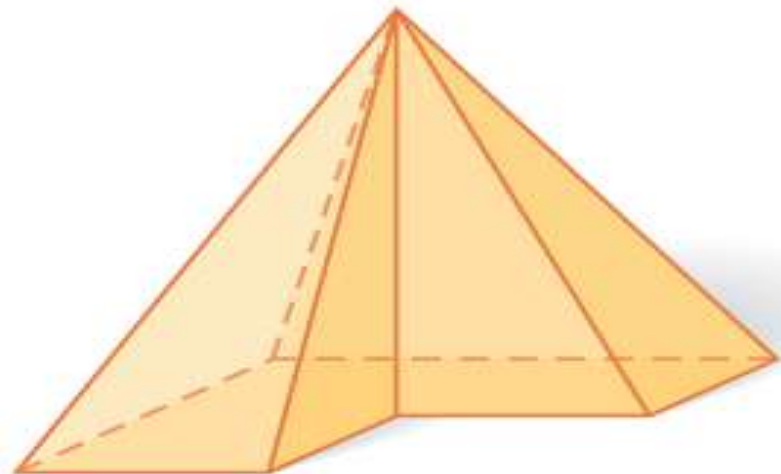
Check It Out! Example 4

Tell whether each figure has plane symmetry, symmetry about an axis, or no symmetry.

a. cone



b. pyramid



Symmetry

Lesson Quiz: Part I

Describe the symmetry of each figure. Draw any lines of symmetry. Give the angle and the order of any rotational symmetry.

1.



2.

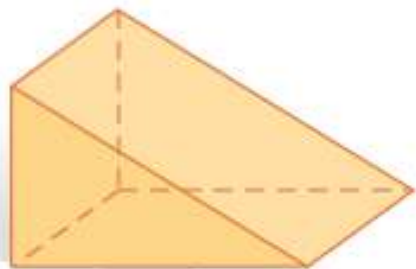


Symmetry

Lesson Quiz: Part II

Tell whether each figure has plane symmetry, symmetry about an axis, or neither.

3.



4.

