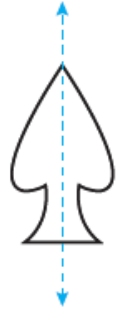


Geometry Lesson 76

Objective: TSW identify and use symmetry.

_____ – A property illustrated when the image of a transformation of a figure coincides with the preimage. There are several different kinds of symmetry.

A figure has line symmetry if the figure can be reflected across a line so that the image _____ with the preimage. The line that divides the figure into two congruent, reflected halves is a line of symmetry. The figure at the right has a vertical line of symmetry.

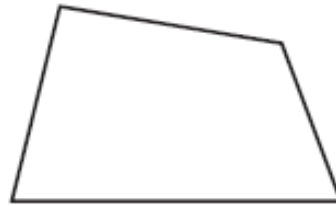


Example 1 Identifying Lines of Symmetry

Identify whether each figure has a line of symmetry. If it does, draw the line of symmetry.



a.
SOLUTION



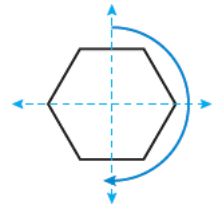
b.
SOLUTION



_____ symmetry is a type of symmetry which describes a figure that can be rotated about a point by an angle less than 360° so that the image coincides with the preimage.

The smallest angle through which a figure can be rotated in order to coincide with itself is an angle of rotational symmetry. The diagram shows half of a spade that has been rotated 180° . The angle of rotational symmetry is 180° .

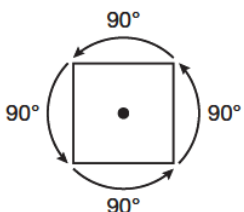
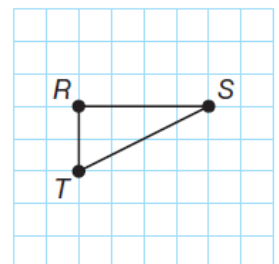
The regular hexagon shown has both _____ symmetry and _____ symmetry. It is symmetrical across a vertical line, a horizontal line, and any line drawn through opposite vertices. It also has a 60° angle of symmetry.



Example 2 Creating Symmetrical Figures Using Transformations

Rotate $\triangle RST$ 180° around point R . Does the new composite figure have symmetry? What type? Does it matter if you rotate the figure clockwise or counterclockwise?

SOLUTION

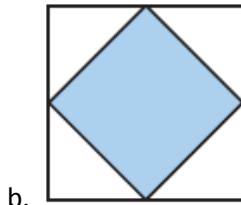


_____ of Rotational Symmetry - The number of times a figure with rotational symmetry coincides with itself as it rotates 360° . A square has an order of 4, as shown in the diagram.

The order of rotational symmetry is equal to 360° divided by the angle of rotational symmetry.

Example 3 Finding Orders of Rotational Symmetry

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



SOLUTION

Example 4 Application: Tiling

a. Tiles often have many lines of symmetry so they can fit easily into patterns. How many lines of symmetry does each regular polygon with up to ten sides have?

SOLUTION

Make a chart to answer this question.

b. How many lines of symmetry does a 15-sided tile have?

SOLUTION

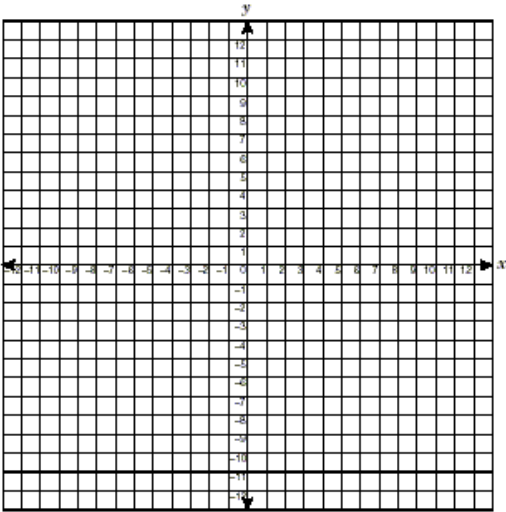
You Try!!!!

a. Does the star have any lines of symmetry? If so, how many?



b. What is the order of rotational symmetry of the star? What is the angle of rotational symmetry?

c. Triangle ABC has vertices $A(0, 0)$, $B(2, 0)$, and $C(2, 3)$. If the triangle is reflected over the x -axis, will the first triangle and the reflected triangle have a line of symmetry? If so, where is the line?



d. If there were a regular polygon with 50 sides, how many lines of symmetry would it have?