9.6 Identify Symmetry

Goal • Identify line and rotational symmetries of a figure.

Your Notes

VOCABULARY

Line symmetry A figure in the plane has line symmetry if the figure can be mapped onto itself by a reflection in a line.

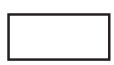
Line of symmetry In line symmetry, a line of reflection is called a line of symmetry.

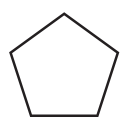
Rotational symmetry A figure in a plane has rotational symmetry if the figure can be mapped onto itself by a rotation of 180° or less about the center of the figure.

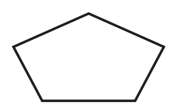
Center of symmetry In rotational symmetry, the center of a figure is called the center of symmetry.

Example 1 ***Identify lines of symmetry***

How many lines of symmetry does the figure have?

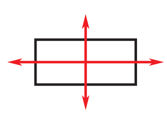
a. 

b. 

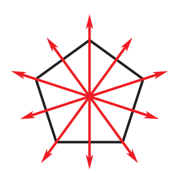
c. 

Solution

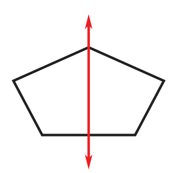
a. Two lines of symmetry



b. Five lines of symmetry



c. One line of symmetry

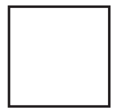


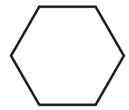
Notice that the lines of symmetry are also lines of reflection.

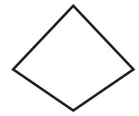
Your Notes

Example 2 ***Identify rotational symmetry***

Does the figure have rotational symmetry? If so, *describe* any rotations that map the figure onto itself.

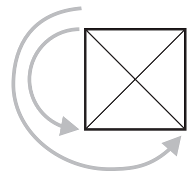
a. Square 

b. Regular hexagon 

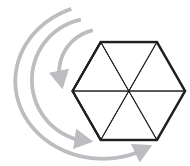
c. Kite 

Solution

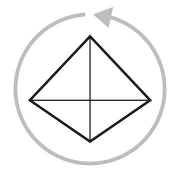
a. The square has rotational symmetry. The center is the intersection of the diagonals. Rotations of 90° or 180° about the center map the square onto itself.



b. The regular hexagon has rotational symmetry. The center is the intersection of the diagonals. Rotations of 60°, 120°, or 180° about the center all map the hexagon onto itself.

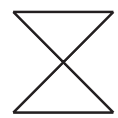


c. The kite does not have rotational symmetry because no rotation of 180° or less maps the kite onto itself.



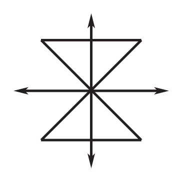
Example 3 ***Identify symmetry***

Identify the line symmetry and rotational symmetry of the figure at the right.

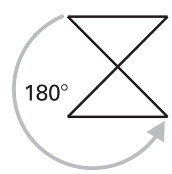


Solution

The figure has line symmetry. Two lines of symmetry can be drawn for the figure.

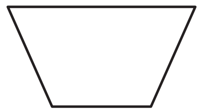


For a figure with *s* lines of symmetry, the smallest rotation that maps the figure onto itself has the measure $\frac{360°}{s}$. So, the figure has $\frac{360°}{2}$, or 180° rotational symmetry.

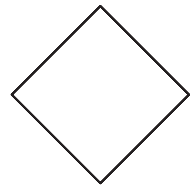


Your Notes

✔ *Checkpoint* How many lines of symmetry does the figure have?

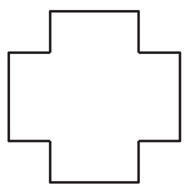
1. 

1

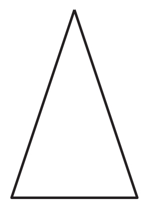
2. 

4

In Exercises 3 and 4, does the figure have rotational symmetry? If so, *describe* any rotations that map the figure onto itself.

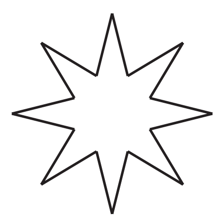
3. 

yes; 90° or 180° about the center

4. 

no

5. Describe the lines of symmetry and rotational symmetry of the figure at the right.



8 lines of symmetry, 4 through the convex vertices and 4 through the concave vertices; 45°, 90°, 135°, or 180° about the center

Homework