

Symmetry Moves

Find motions that match a figure to itself.

HIGH SCHOOL • HSG-CO.A.3

CCSS.Math.Content.HSG-CO.A.3 "Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself."

NAME _____

DATE _____

SYMMETRY RULES

A symmetry move lands a figure exactly on itself. A regular n -gon has n reflection lines and rotations by multiples of $360/n$ degrees.

WORKED EXAMPLE

How many reflection lines does a regular 11-gon have?

1. A regular n -gon has n reflection lines.
2. Here, $n = 11$.

Answer: 11 reflection lines

PRACTICE 5 problems

- 1** A rectangle is not a square. List its nonidentity rotations.

ANSWER _____

- 2** A parallelogram is neither a rectangle nor a rhombus. How many reflection lines does it have?

ANSWER _____

- 3** How many reflection lines does an isosceles trapezoid have?

ANSWER _____

- 4** List the nonidentity rotations of a regular hexagon.

ANSWER _____

- 5** How many reflection lines does a regular triangle have?

ANSWER _____

APPLY IT Show your work

- 1** A phone wallpaper is a non-square rectangle. List its nonidentity rotations and state its number of reflection lines.

WORK SPACE

ANSWER _____

- 2** A skate club uses a regular pentagon for its badge. List its nonidentity rotations and state its number of reflection lines.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A regular polygon has exactly 6 nonidentity rotations. What polygon is it? List its nonidentity rotations and its number of reflection lines. Explain your reasoning.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	A rectangle is not a square. List its nonidentity rotations.	180 degrees
2	A parallelogram is neither a rectangle nor a rhombus. How many reflection lines does it have?	0 reflection lines
3	How many reflection lines does an isosceles trapezoid have?	1 reflection line
4	List the nonidentity rotations of a regular hexagon.	60, 120, 180, 240, and 300 degrees
5	How many reflection lines does a regular triangle have?	3 reflection lines

PART 2 • APPLY IT

- 1. 180 degrees; 2 reflection lines** A non-square rectangle matches after a half-turn. Its horizontal and vertical center lines are reflection lines.
- 2. 72, 144, 216, and 288 degrees; 5 reflection lines** Divide a full turn by the number of sides to get 72 degrees. Use the nonzero multiples of that angle, and a regular pentagon has one reflection line per side.

CHALLENGE

It is a regular heptagon. Its nonidentity rotations are $360/7$, $720/7$, $1080/7$, $1440/7$, $1800/7$, and $2160/7$ degrees, and it has 7 reflection lines. A regular n-gon has $n - 1$ nonidentity rotations, so $n - 1 = 6$.

Accept rotations written as fractional turns when equivalent. For reflection lines, accept correct descriptions such as lines through the center and opposite vertices or sides.