LESSON MAKER PRO

Turn and Match

Rotations on a plane and around a center

HIGH SCHOOL · GDA.GM.D

GDA.GM.D "Applying geometric transformations to figures provides opportunities for describing the attributes of the figures preserved by the transformation and for describing symmetries by examining when a figure can be mapped onto itself."

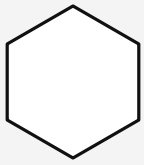
NAME _____ **DATE** _____

THE BIG IDEA

A rotation turns a figure around a center without changing its lengths or angles. A 90° counterclockwise turn about the origin sends (x, y) to (-y, x). For a regular figure with n sides, the smallest positive turn that maps it onto itself is 360°/n.

WORKED EXAMPLE

What is the smallest positive turn that maps this regular hexagon onto itself?



1. Count 6 sides.
2. Divide one full turn by 6: 360°/6 = 60°.

Answer: 60°

PRACTICE 4 problems

1 Rotate A(2, 1) 90° counterclockwise about the origin. Find A'.

ANSWER _____

2 A 90° counterclockwise turn sends B to B'(-2, -3). Find B.

ANSWER _____

3 A student says a 90° counterclockwise turn sends (1, -2) to (-2, -1). Is that correct? Explain.

ANSWER _____

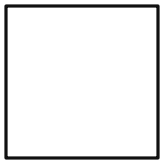
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4 A(0, 0) and B(3, 4) rotate 90° about the origin. What is the length of A'B'?

ANSWER _____

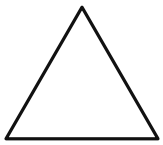
APPLY IT Show your work

1 A designer wants this square app icon to look unchanged after it spins. What is the smallest positive turn that will work?



ANSWER _____

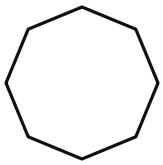
2 This equilateral game badge turns 240° about its center. Will it match its starting position? How many vertex positions does each corner move?



ANSWER _____

CHALLENGE One step up

This regular octagonal badge turns 135° about its center. Does it map onto itself? Explain using the angle between vertex positions.



WORK SPACE AND ANSWER

Turn and Match

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Rotate A(2, 1) 90° counterclockwise about the origin. Find A'.	**A'(-1, 2)**
2	A 90° counterclockwise turn sends B to B'(-2, -3). Find B.	**B(-3, 2)**
3	A student says a 90° counterclockwise turn sends (1, -2) to (-2, -1). Is that correct? Explain.	**No. The image is (2, 1).**
4	A(0, 0) and B(3, 4) rotate 90° about the origin. What is the length of A'B'?	**5 units**

PART 2 · APPLY IT

1. **90°** The square has 4 sides, so its smallest turn is 360°/4 = 90°.
2. **Yes; each corner moves 2 vertex positions.** Each vertex position is 360°/3 = 120° apart. Since 240°/120° = 2, the badge matches after moving 2 positions.

CHALLENGE

Yes. Each vertex position is 360°/8 = 45° apart, and 135° = 3 × 45°. Every vertex moves 3 positions onto another vertex.

For problem 3, accept any explanation showing that the correct image is (2, 1). For the badge questions, accept equivalent reasoning based on equal turns around the center.