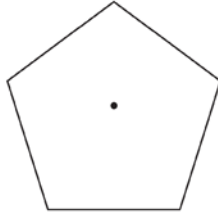


G.CO.A.3: Mapping a Polygon onto Itself

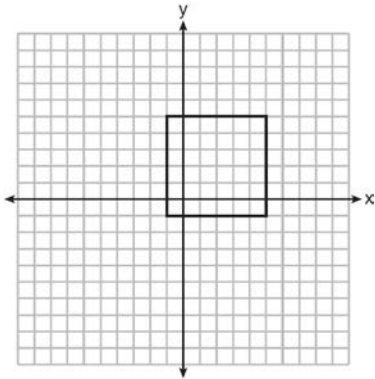
- 1 A regular pentagon is shown in the diagram below.



If the pentagon is rotated clockwise around its center, the minimum number of degrees it must be rotated to carry the pentagon onto itself is

- 1) 54°
 - 2) 72°
 - 3) 108°
 - 4) 360°
- 2 Which regular polygon has a minimum rotation of 45° to carry the polygon onto itself?
- 1) octagon
 - 2) decagon
 - 3) hexagon
 - 4) pentagon
- 3 Which rotation about its center will carry a regular decagon onto itself?
- 1) 54°
 - 2) 162°
 - 3) 198°
 - 4) 252°
- 4 A regular decagon is rotated n degrees about its center, carrying the decagon onto itself. The value of n could be
- 1) 10°
 - 2) 150°
 - 3) 225°
 - 4) 252°
- 5 Which transformation would *not* carry a square onto itself?
- 1) a reflection over one of its diagonals
 - 2) a 90° rotation clockwise about its center
 - 3) a 180° rotation about one of its vertices
 - 4) a reflection over the perpendicular bisector of one side
- 6 Which figure always has exactly four lines of reflection that map the figure onto itself?
- 1) square
 - 2) rectangle
 - 3) regular octagon
 - 4) equilateral triangle

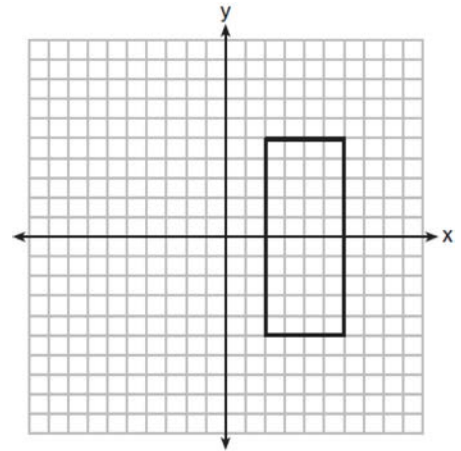
- 7 In the diagram below, a square is graphed in the coordinate plane.



A reflection over which line does *not* carry the square onto itself?

- 1) $x = 5$
- 2) $y = 2$
- 3) $y = x$
- 4) $x + y = 4$

- 8 As shown in the graph below, the quadrilateral is a rectangle.



Which transformation would *not* map the rectangle onto itself?

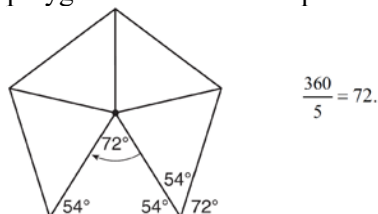
- 1) a reflection over the x -axis
 - 2) a reflection over the line $x = 4$
 - 3) a rotation of 180° about the origin
 - 4) a rotation of 180° about the point $(4, 0)$
- 9 A regular hexagon is rotated in a counterclockwise direction about its center. Determine and state the minimum number of degrees in the rotation such that the hexagon will coincide with itself.

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Answer Section

1 ANS: 2

Segments drawn from the center of the regular pentagon bisect each angle of the pentagon, and create five isosceles triangles as shown in the diagram below. Since each exterior angle equals the angles formed by the segments drawn from the center of the regular pentagon, the minimum degrees necessary to carry a regular polygon onto itself are equal to the measure of an exterior angle of the regular polygon.



REF: spr1402geo

2 ANS: 1

$$\frac{360^\circ}{45^\circ} = 8$$

REF: 061510geo

3 ANS: 4

$$\frac{360^\circ}{10} = 36^\circ \quad 252^\circ \text{ is a multiple of } 36^\circ$$

REF: 011717geo

4 ANS: 4

$$\frac{360^\circ}{10} = 36^\circ \quad 252^\circ \text{ is a multiple of } 36^\circ$$

REF: 081722geo

5 ANS: 3

REF: 011815geo

6 ANS: 1

REF: 061707geo

7 ANS: 1

REF: 081505geo

8 ANS: 3

The x -axis and line $x = 4$ are lines of symmetry and $(4, 0)$ is a point of symmetry.

REF: 081706geo

9 ANS:

$$\frac{360}{6} = 60$$

REF: 081627geo