ALBERT

Name _____ Date _____

Rotations and Reflections of Polygons Worksheet

Geometry · Common Core HSG-CO.A.3

> Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.

Practice

Builds the skill step by step.

1. What is the smallest rotation greater than 0° that carries a square onto itself?

2. What is the smallest rotation greater than 0° that carries a regular hexagon onto itself?

3. How many reflections carry a rectangle that is not a square onto itself?

4. What is the smallest rotation greater than 0° that carries a regular pentagon onto itself?

5. Which rotation about its center carries a parallelogram onto itself?

   A. 90°

   B. 45°

   C. 180°

   D. 120°

6. How many reflections carry a regular octagon onto itself?

7. What is the smallest rotation greater than 0° that carries an equilateral triangle onto itself?

8. Which transformation carries an isosceles trapezoid onto itself?

   A. A reflection across the line through the midpoints of the two bases

   B. A rotation of 180° about its center

   C. A reflection across a diagonal

   D. A rotation of 90° about its center

9. How many reflections carry an equilateral triangle onto itself?

10. What is the smallest rotation greater than 0° that carries a regular decagon (10 sides) onto itself?

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On Level

Grade-level practice.

1. List every rotation between 0° and 360° (not including 0° or 360°) that carries a square onto itself.

2. Does a rotation of 135° about its center carry a regular octagon onto itself?

   A. Yes, because every rotation does.

   B. No, because 135° is not a multiple of 90°.

   C. No, because octagons have no rotational symmetry.

   D. Yes, because 135° is a multiple of 45°.

3. The smallest rotation that carries a regular polygon onto itself is 40°. How many sides does it have?

4. Which figure has rotational symmetry but no line of symmetry?

   A. A rectangle

   B. A parallelogram with no right angles and unequal adjacent sides

   C. A rhombus

   D. An isosceles trapezoid

5. How many reflections carry a rhombus that is not a square onto itself?

6. How many different rotations from 0° up to (but not including) 360° carry a regular hexagon onto itself? Count 0°.

7. Square ABCD has its vertices labeled clockwise. It is rotated 270° clockwise about its center. Where does vertex A land?

   A. where A was
   B. where B was
   C. where C was
   D. where D was

8. What is the smallest rotation greater than 0° that carries a regular 12-sided polygon onto itself?

9. Does a reflection across a diagonal carry a rectangle that is not a square onto itself?

   A. Only the longer diagonal works.
   B. No. The halves don't match because adjacent sides have different lengths.
   C. Yes, always.
   D. Yes, if it is long and thin.

10. How many lines of reflection carry a regular pentagon onto itself?

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Challenge

Multi-step and word problems that stretch it.

1. A regular polygon is carried onto itself by a 24° rotation. What is the fewest number of sides it can have?

2. Regular hexagon ABCDEF is labeled counterclockwise. It is rotated 240° counterclockwise about its center. Where does vertex A land?

   A. where E was

   B. where C was

   C. where D was

   D. where F was

3. Count all the rotations (including 0°, less than 360°) and reflections that carry a square onto itself. How many are there in all?

4. Which rotation does NOT carry a regular hexagon onto itself?

   A. 180°

   B. 120°

   C. 150°

   D. 300°

5. A quadrilateral has all sides equal, no right angles, 180° rotational symmetry and exactly two lines of symmetry. What is it?

   A. an isosceles trapezoid

   B. a rectangle

   C. a square

   D. a rhombus

6. A regular polygon has 10 lines of symmetry. What is the smallest rotation greater than 0° that carries it onto itself?

7. A regular octagon is rotated 315° counterclockwise. This is the same as a clockwise rotation of how many degrees?

8. Which describes all the symmetries of a kite that is not a rhombus (other than the 360° rotation)?

   A. two reflections only

   B. no symmetries

   C. one reflection only

   D. a 180° rotation only

9. Add every rotation angle from 0° up to (but not including) 360° that carries an equilateral triangle onto itself. What is the sum?

10. Explain why a 90° rotation about its center does not carry a regular pentagon onto itself.