6.5 Symmetries of Quadrilaterals
A Develop Understanding Task

A line that reflects a figure onto itself is called a line of symmetry. A figure that can be carried onto itself by a rotation is said to have rotational symmetry.

Every four-sided polygon is a quadrilateral. Some quadrilaterals have additional properties and are given special names like squares, parallelograms and rhombuses. A diagonal of a quadrilateral is formed when opposite vertices are connected by a line segment. In this task you will use rigid-motion transformations to explore line symmetry and rotational symmetry in various types of quadrilaterals.

1. A rectangle is a quadrilateral that contains four right angles. Is it possible to reflect or rotate a rectangle onto itself?

For the rectangle shown below, find

- any lines of reflection, or
- any centers and angles of rotation

that will carry the rectangle onto itself.

Describe the rotations and/or reflections that carry a rectangle onto itself. (Be as specific as possible in your descriptions.)
2. A parallelogram is a quadrilateral in which opposite sides are parallel. Is it possible to reflect or rotate a parallelogram onto itself?

For the parallelogram shown below, find

- any lines of reflection, or
- any centers and angles of rotation

that will carry the parallelogram onto itself.

Describe the rotations and/or reflections that carry a parallelogram onto itself. (Be as specific as possible in your descriptions.)
3. A rhombus is a quadrilateral in which all sides are congruent. Is it possible to reflect or rotate a rhombus onto itself?

For the rhombus shown below, find

- any lines of reflection, or
- any centers and angles of rotation

that will carry the rhombus onto itself.

Describe the rotations and/or reflections that carry a rhombus onto itself. (Be as specific as possible in your descriptions.)
4. A square is both a rectangle and a rhombus. Is it possible to reflect or rotate a square onto itself?

For the square shown below, find

- any lines of reflection, or
- any centers and angles of rotation

that will carry the square onto itself.

![Square diagram]

Describe the rotations and/or reflections that carry a square onto itself. (Be as specific as possible in your descriptions.)
5. A trapezoid is a quadrilateral with one pair of opposite sides parallel. Is it possible to reflect or rotate a trapezoid onto itself?

Draw a trapezoid based on this definition. Then see if you can find

- any lines of symmetry, or
- any centers of rotational symmetry

that will carry the trapezoid you drew onto itself.

If you were unable to find a line of symmetry or a center of rotational symmetry for your trapezoid, see if you can sketch a different trapezoid that might possess some type of symmetry.