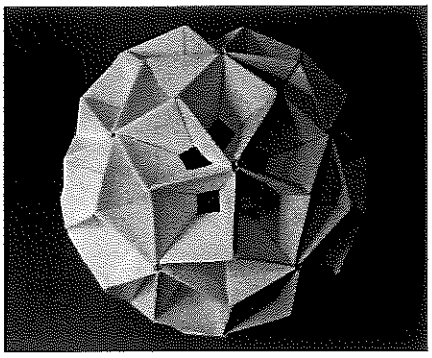


6. 5 Symmetries of Quadrilaterals

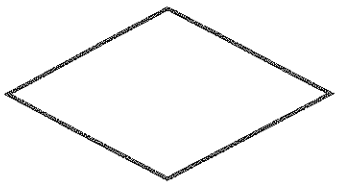
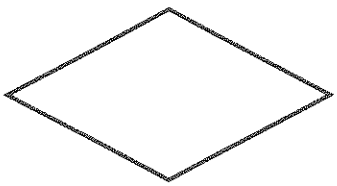
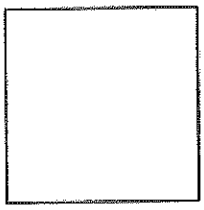
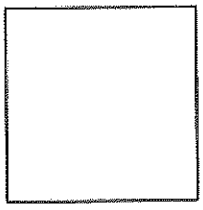
A Develop Understanding Task

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. Some quadrilaterals are symmetric about their diagonals. Some are symmetric about other lines. In this task you will use rigid-motion transformations to explore line symmetry and rotational symmetry in various types of quadrilaterals.

For each of the following quadrilaterals you are going to try to answer the question, "Is it possible to reflect or rotate this quadrilateral onto itself?" As you experiment with each quadrilateral, record your findings in the following chart. Be as specific as possible with your descriptions.

Defining features of the quadrilateral	**Lines of symmetry that reflect the quadrilateral onto itself**	**Center and angles of rotation that carry the quadrilateral onto itself**
A **rectangle** is a quadrilateral that contains four right angles.		
A **parallelogram** is a quadrilateral in which opposite sides are parallel.		

A **rhombus** is a quadrilateral in which all sides are congruent.		
A **square** is both a rectangle and a rhombus.		

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.

READY, SET, GO! Name Period Date

READY

Topic: Polygons, definition and names

1. What is a polygon? Describe in your own words what a polygon is.

2. Fill in the names of each polygon based on the number of sides the polygon has.

Number of Sides	Name of Polygon
3	
4	
5	
6	
7	
8	
9	
10	

SET

Topic: Kites, Lines of symmetry and diagonals.

3. One quadrilateral with special attributes is a kite. Find the geometric definition of a kite and write it below along with a sketch. (You can do this fairly quickly by doing a search online.)

4. Draw a kite and draw all of the lines of reflective symmetry and all of the diagonals.

Lines of Reflective Symmetry **Diagonals**

5. List all of the rotational symmetry for a kite.

6. Are lines of symmetry also diagonals in a polygon? Explain.

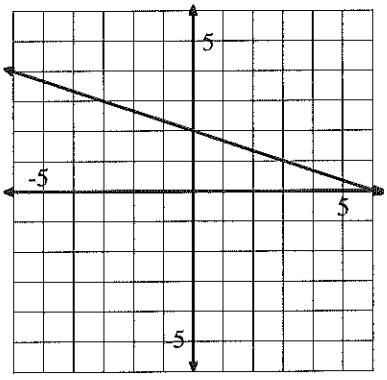
6. Are all diagonals also lines of symmetry in a polygon? Explain.

7. Which quadrilaterals have diagonals that are not lines of symmetry? Name some and draw them.

8. Do parallelograms have diagonals that are lines of symmetry? If so, draw and explain. If not draw and explain.

GO

Topic: Equations for parallel and perpendicular lines.

	Find the equation of a line PARALLEL to the given info and through the indicated y-intercept.	**Find the equation of a line PERPENDICULAR to the given line and through the indicated y-intercept.**
9. Equation of a line: $y = 4x + 1$.	a. Parallel line through point (0, -7):	b. Perpendicular to the line line through point (0 , -7):
10. Table of a line: x | y 3 | -8 4 | -10 5 | -12 6 | -14	a. Parallel line through point (0 , 8):	b. Perpendicular to the line through point (0 , 8):
11. Graph of a line: 	a. Parallel line through point (0 , -9):	b. Perpendicular to the line through point (0 , -9):