Quadrilaterals Hierarchy

Grade Range: Elementary School **Lesson Time: 30 minutes**

Key Terms	
Attribute	Trapezoid
Parallelogram	
Quadrilateral	
Rectangle	
Rhombus (Rhombi)	
Square	

Activity Overview

The beauty of the world and of art is that there is not just one type of shape. There are many types. For example, there are six special types of quadrilaterals: trapezoid, parallelogram, rectangle, rhombus, square, and kite. In this activity students will explore trapezoids, parallelograms, rectangles, rhombi, and squares. They will make observations about the attributes of each. They will use these observations to make connections about how each type of quadrilateral is related in order to determine a hierarchy of quadrilaterals.

Essential Questions

1. What are the attributes of 2D figures?
2. How are 2D shapes classified?

Objectives

- Identify all four-sided polygons as quadrilaterals
- Classify different types of quadrilaterals based on their attributes
- Recognize that one type of quadrilateral may share an attribute with another type of quadrilateral
- Determine the hierarchy of quadrilaterals (i.e., a rectangle, square, and rhombus are all types of parallelograms, because they have 2 sets of parallel sides)

Introduction

Prior to beginning this activity, students must be familiar with the different types of quadrilaterals. They can gain this familiarity by completing the *Identify 2D Figures* activity in Studio. Begin this activity by asking students where they have seen quadrilaterals in the real world. As students respond, encourage their creativity by sharing some colorful examples, such as trapezoids on the faces of Mayan pyramids or a popcorn container at the movies. Rectangles can be found on buildings, dollar bills, television screens, and doors. Squares can be found on sidewalks, in tile patterns, and in the infield of a baseball field. Explain that students will explore these shapes and look for common attributes, then use their findings to construct a hierarchy of quadrilaterals. Point out that some quadrilaterals can be classified as more than one type.

zSpace Activity

Activity Questions Provided in Studio

Answers may vary. Sample answers are provided below.

1. Explore the 2D shapes. Do you see any similar attributes between any of the shapes? Write your observations.
   I noticed that 3 of the shapes each had 3 angles, 5 of the shapes had 4 angles, 1 shape had 6 angles, another shape had 5 angles, and 1 shape had no sides.
2. Delete all of the shapes that are NOT quadrilaterals. How are the remaining shapes similar?
   All of these shapes have 4 sides.
3. Add Notes to label each quadrilateral with its specific name. Take a photo.
   Photo of the square, rectangle, parallelogram, trapezoid, and the rhombus, all labeled with their names.
4. Delete all of the quadrilaterals that are NOT parallelograms. Take a photo. Explain why the remaining shapes are parallelograms.
   Photo of the square, rectangle, parallelogram, and rhombus. Answers will vary. Sample Answer: They are parallelograms because they have two sets of opposite sides that are parallel.
5. Why is the trapezoid not a parallelogram?
   The trapezoid is not a parallelogram because it only has one pair of opposite sides that are parallel. In this example of a trapezoid, only the top and bottom are parallel.
6. Delete all of parallelograms that are NOT rectangles. Take a photo. Explain why the remaining shapes are rectangles.
   Photo of the square and the rectangle. Answers will vary. Sample Answer: They are rectangles because they have four right angles.
7. Delete all of the parallelograms that are NOT rhombi. Take a photo. Explain why the remaining shapes are rhombi.
   Photo of the square and the rhombus. Answers will vary. Sample Answer: They are rhombi because they have four sides of equal length.
8. Why is the square both a type of rectangle and a type of rhombus?
   The square is both a rectangle and a rhombus because it has four right angles like the rectangle and four equal sides like the rhombus.

Closing

Questions for Discussion

1. Are all quadrilaterals the same? Why?
   No, because they don't all have the same attributes. A square has four equal sides, but a trapezoid does not.
2. Can a quadrilateral be classified in more than one category? Give an example.
   Yes, a square can be both a rhombus and a rectangle, because it has 4 equal sides like a rhombus and 4 right angles like a rectangle. A rectangle can be a quadrilateral and a parallelogram, because it has 4 sides like a quadrilateral and 2 pairs of opposite sides that are parallel like a parallelogram.
3. Why can all the shapes we looked at, except the trapezoid, be classified as parallelograms?
   All the quadrilaterals we looked at have two sets of opposite sides that are parallel, except the trapezoid, which has only one pair of opposite sides that are parallel.
4. In how many categories can a square be classified? Why?

Four: A square can be classified as a quadrilateral because it has 4 sides; a parallelogram because it has two sets of opposite sides that are parallel; a rectangle because it has 4 right angles; and a rhombus because it has 4 sides that are equal in length.

Extension Activity: Explain why a rectangle, square, and/or rhombus could be classified as another type of quadrilateral.

Follow-up Activity: *3D Solids* - Studio

Differentiation

- Group students heterogeneously to allow students with a strong command of the English language to assist in reading or interpreting questions
- Provide paper copies of diagrams for students to use as a reference
- Provide a handout with a list of vocabulary terms and definitions that will appear in the activity
- Allow students to provide answers that are handwritten, typed, or verbal
- Have students work as partners or in small groups (younger children could partner with older buddies)
- Use text-to-speech if needed
- Enrichment: Students could work on the discussion questions and lead the class discussion
- Enrichment: Students could build a model of a key concept