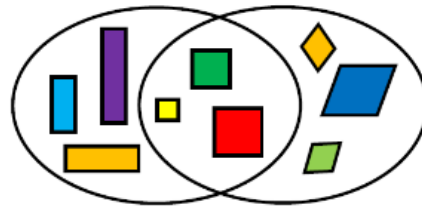


# Quadrilaterals



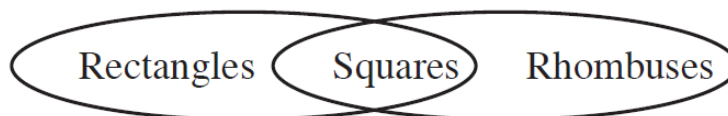
## Background Information

- Students will be using Venn diagrams to classify shapes. Review Venn diagrams with students beforehand by looking at the relationship between squares, rhombuses, and rectangles.

Have students look at the relationship between squares and rectangles. What are the characteristics of each? Is a square also a rectangle? (Yes, it has four equal angles.) Are all rectangles squares? (No, many rectangles do not have four equal angles AND four equal sides.)

Have students look at the relationship between squares and rhombuses. What are the characteristics of each? Is a square a rhombus? (Yes, it has four equal sides.) Are all rhombuses squares? (No, many rhombuses do not have four equal angles AND four equal sides.)

Use a Venn diagram to show that a square is both a rectangle and a rhombus.



- The goal of this task is for students to become familiar with the properties of quadrilaterals and their defining characteristics as a context for classifying shapes by the absence or presence of angles of a specific size and/or parallel and perpendicular lines. While students may sort the quadrilateral pieces in many ways, the focus is on the types of angles and types of lines used to make the sides of the quadrilaterals.
- Some properties of quadrilaterals that may be discussed are included below. As students determine the relationships between different figures, be sure they are able to explain their thinking and defend their conclusion. Most of the information below may come out as a result of students' explorations. This is information to look for and highlight at students explore quadrilaterals, not a list of understandings you must teach beforehand.

- A quadrilateral a polygon with 4 sides
- A polygon is a closed plane figure with at least three straight sides
- A trapezoid is a quadrilateral with at least one pair of parallel sides
- A parallelogram is a quadrilateral with two pairs of parallel sides
- A rectangle is a parallelogram with four right angles
- A rhombus is a parallelogram with four equal sides
- A square is a parallelogram with four equal angles AND four equal sides

### Task Directions

#### Part 1

Provide each pair of students a set of [Quadrilateral Pieces](#) and two or three pieces of string to make a Venn Diagram. They will use the labels from the [Label Sheet](#) to direct their sorts. Ask them to place the appropriate quadrilateral pieces in each ring according to the labels.

Ask students to justify their placement of different pieces. Use the following questions to help guide the discussion:

- What do all the shapes in this section of the Venn Diagram have in common?  
The other?
- How are the shapes in the sections different?
- Why did you place shapes in the intersection? What characteristics do they have?
- What different label would eliminate one or more shapes from a section?
- What different label for one of the sections would allow you to include a new shape?

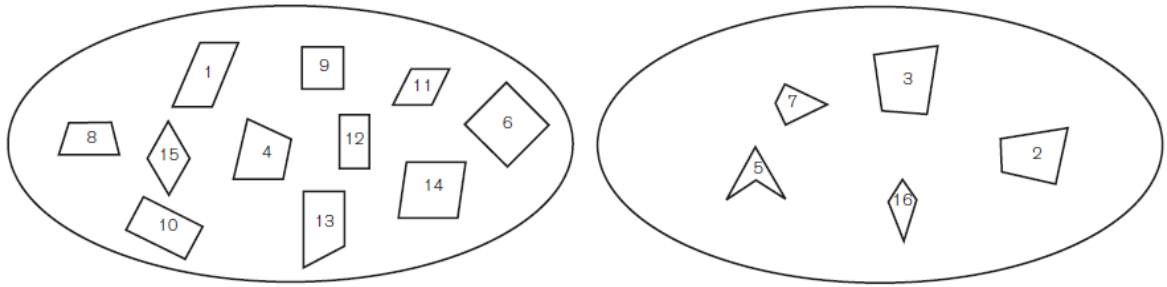
Possible [Solutions](#) for Venn diagram tasks.

#### Part 2

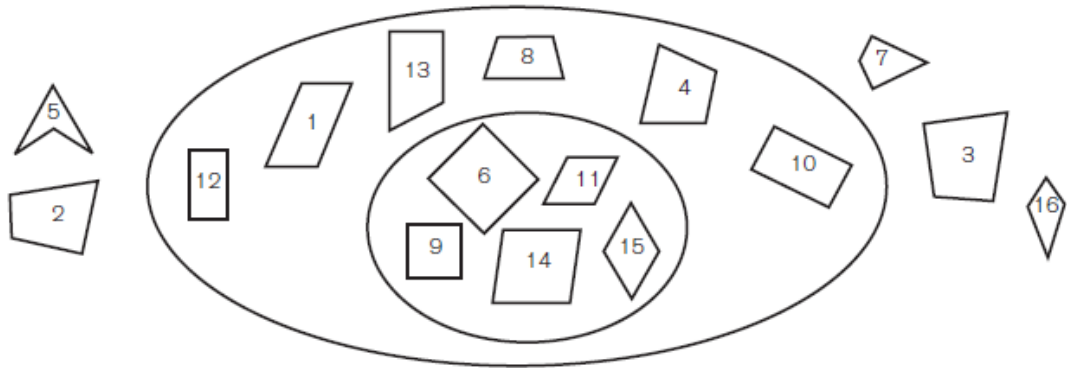
Give students the [Unknown Labels Sheet](#) to reverse the investigation. On this sheet, students are given pre-sorted shapes in sections of the Venn diagram and then asked to determine which label could go above each section. Students then use the properties of the shapes (angles and parallel or perpendicular lines) to defend their labels.

Possible Solutions for "Unknown Labels"

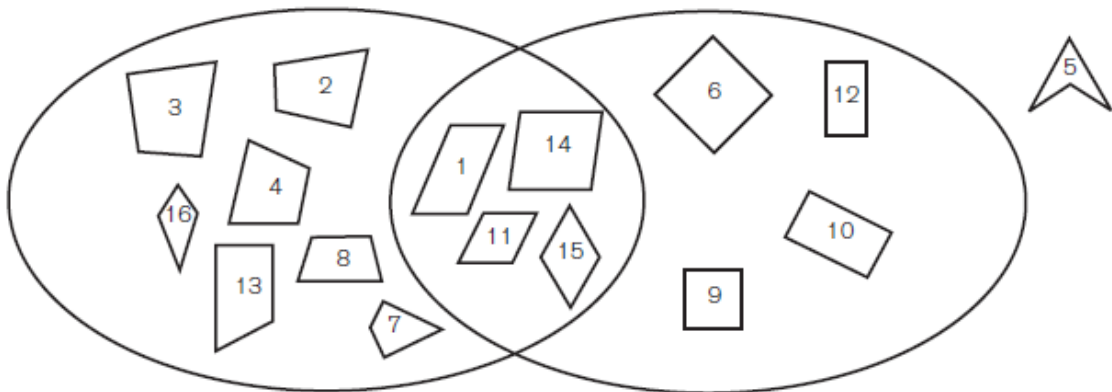
Set 1: At least one pair of parallel sides (left), no parallel sides (right)



Set 2: All sides the same length (inner ring), at least one pair of parallel sides (outer ring)



Set 3: At least one obtuse angle (left), both pairs of opposite angles equal (right)



### Extension

- Students can create their own labels and challenge a partner to use them to create quadrilateral rings.
- Students can create their own "Unknown Labels" for their partner to label. Simply sort quadrilaterals into the Venn diagram rings according to some characteristic and have a partner try to decide how the quadrilateral pieces have been sorted.

### Intervention

- Have students label each shape with its known properties (e.g., perpendicular lines, 1 right angle), etc. and use those as an aid when sorting.

### Family Connection

- Have students take home the [Quadrilateral Pieces](#) to share with their family. Show them how to sort the pieces in each ring according to the labels given. They may need to overlap some rings to form intersections. Make "Unknown Labels" for family members to solve.