Lesson Opener

Making Connections

 Invite students to tell you what they know about figures.

 What figures do you know? (Answers will vary.)

 What everyday things are quadrilaterals? (Answers will vary.)

 What everyday things are not quadrilaterals? (Answers will vary.)

 Using the Digital Lesson

 Model different figures with objects in the room. Have students identify the quadrilaterals.

 Learning Task

 What is the problem the students are trying to solve? Connect the story to the problem.

 • What is the problem asking you to find? (the differences between quadrilaterals and other polygons)

 • How many sides does a quadrilateral have? (4)

 • What are other closed figures that do not have four sides called? (polygons)

 Literacy and Mathematics

 View the lesson opener with the students. Then, choose one or more of the following activities.

 • Have students write a short story about a road trip that they took or would like to take. Have them mention different figures in their story.

 • Write the word sort on the board. Explain the different meanings of the word and have students write a sentence for each meaning of the word.
Unlock the Problem

Make sure students understand how to use a Venn diagram. This Venn diagram shows how sets of things, in this case, rectangles and rhombuses, are related. Discuss the attributes of rectangles: four right angles, two pairs of opposite sides that are parallel, and two pairs of sides of equal length.

- Which of these characteristics are also characteristics of rhombuses? 4 sides of equal length, 2 pairs of opposite sides that are parallel.
- What are some characteristics of rhombuses that do not apply to all rectangles? Possible answer: rectangles do not always have 4 sides of equal length.
- Why do squares fit in both categories? Squares have all the characteristics of both rhombuses and rectangles: 4 sides of equal length, 2 pairs of opposite sides that are parallel, and 4 right angles.

Go Deeper

Draw a different quadrilateral, such as a trapezoid, on the board. Ask students to discuss whether it fits into either side of the Venn diagram. Responses should include that a trapezoid has only 1 pair of opposite sides that are parallel and sides of different lengths. So it cannot be a rectangle or a rhombus.

**ELL Language Support**

**Strategy: Model Language**
- Teachers model language to teach pronunciation.
- Write Venn diagram on the board. Read the words and have students repeat.
- Draw a Venn diagram and label the circles **Quadrilaterals** and **Polygons with Parallel Sides**. Read the headings aloud and have students repeat.
- Work together to draw figures in each section. Have students name each figure aloud as it is entered.
- Discuss which figures might go in the section where the circles overlap. Possible answer: rectangle, square, rhombus, parallelogram, trapezoid
Try Another Problem

The Venn diagram at the right shows the figures Abbie used to make a picture. Where would the figure shown below be placed in the Venn diagram?

![Venn diagram with categories: Quadrilaterals, Polygons with Right Angles]

Read

What do I need to find?
where the figure shown would be placed in the Venn diagram

What information am I given?
the circles labeled Quadrilaterals and Polygons with Right Angles

Plan

What is my plan or strategy?
I will use what I know about two-dimensional figures to find where the figure should be placed.

Solve

What is true about all quadrilaterals?
They all have 4 sides and 4 angles.

What is true about all polygons?
They are closed figures made up of line segments.

Does the figure shown have right angles? Yes

Does the figure have 4 sides? Yes

So, the figure goes in the section where the circles overlap.

1. How many figures do not have right angles?
   ___ 3 figures ___

2. How many red figures have right angles but are not quadrilaterals?
   ___ 1 red figure ___

3. Analyze What is a different way to sort the figures?
   Possible answer: Polygons with Parallel Sides and Polygons with Right Angles

Try Another Problem

Make a table on the board. List the attributes of quadrilaterals in one column and the attributes of polygons with right angles in another column.

- Describe some differences between quadrilaterals and polygons with right angles. Possible answer: not all polygons with right angles will have 4 sides.

Discuss the characteristics of trapezoids that occur in both lists, and explain that they belong in the overlapping section of the Venn diagram.

Math Talk

Use Math Talk to focus on students’ understanding of polygon attributes.

Go Deeper

Demonstrate to students that Venn diagrams can be used to compare more than two sets of objects. Ask students to identify each category, and discuss why each figure fits the section it is in.

Enrich

Materials: paper, markers

- Draw a large Venn diagram on paper. Label the circles Polygons with Equal Side Lengths and Polygons with Parallel Sides.
- Each student should use a marker to draw a shape in one section at his turn.
- Challenge students to find as many shapes as possible to fit each section, and to explain why those in the overlapping section are correctly placed.
- If a student cannot think of a shape that fits any category, it is the next student’s turn.
- Have students draw a new diagram with new labels and repeat the activity.

Go to thinkcentral.com for additional enrichment activities in the Enrich Activity Guide.

COMMON ERRORS

Error Students may not look for all the correct attributes.

Example Students may forget to exclude the figures that do not share all the attributes of the labeled circle.

Springboard to Learning Remind students that they have to check for each attribute required in the problem. Encourage students to cross off figures as they are excluded and to check off each required attribute when they have met it.
What is true about all polygons in the section where the circles overlap?

1. Jordan is sorting the figures at the right in a Venn diagram. Where does the square go?
   - First, look at the sides and angles of the polygons.
   - Next, draw the polygons in the Venn diagram below.
   - The figure above has 4 sides of equal length and 0 right angles.
   - So, the figure goes in the circle labeled Polygons with All Sides Equal in Length.

2. Where in the Venn diagram would you place a square, a trapezoid, and a rhombus?
   - Only in the circle labeled Polygons with Right Angles.

Problem Solving

3. Multi-Step Use Math Language
   - Eva drew the Venn diagram at the right. What labels could she have used for the diagram?
   - Where would each label go?
   - Possible answer: Left circle: Quadrilaterals with Parallel Sides; Right circle: Polygons with Right Angles

4. Multi-Step Display
   - Draw and label a Venn diagram to show one way you can sort a parallelogram, a rectangle, a square, a trapezoid, and a rhombus. Check students’ drawings.

Differentiated Instruction

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Share and Show

Use the Venn diagram for 1–2.

1. First, look at the sides and angles of the polygons.
   - Next, draw the polygons in the Venn diagram below.
   - The figure above has 4 sides of equal length and 0 right angles.
   - So, the figure goes in the circle labeled Polygons with All Sides Equal in Length.

2. Where in the Venn diagram would you place a square, a trapezoid, and a rhombus?
   - Only in the circle labeled Polygons with Right Angles.

H.O.T. Problems

Problem 3 requires students to apply their knowledge of the attributes of figures to label the Venn diagram.

Problem 4 requires students to draw a Venn diagram and show one way a parallelogram, a rectangle, a square, a trapezoid, and a rhombus can be sorted.

Math on the Spot Video Tutor

Through the Math on the Spot Video Tutor, students will be guided through an interactive solving of this type of H.O.T. problem. Use this video to also help students solve the H.O.T. problem in the Interactive Student Edition. With these videos and the H.O.T. problems, students will build skills needed in the TEXAS assessment.

Math on the Spot videos are in the Interactive Student Edition and at thinkcentral.com.
Fill in the bubble for the correct answer choice.

5. Max classifies the street signs he sees by shape, and then sorts them in a Venn diagram. The circles are labeled “Polygons with Right Angles” and “Polygons with All Sides Equal in Length.” Which sign is in the section where the two circles overlap?

A  B  C  D

6. Multi-Step Jenna makes a design using pattern blocks. Which pattern block is placed incorrectly in the Venn diagram?

A  B  C  D

TEXAS Test Prep Coach

Test Prep Coach helps teachers to identify common errors that students can make.

In the Test Prep exercise, if students selected:

A  They overlooked the polygons with no right angles in Circle A.
B and C  They overlooked the triangle and pentagon in Circle A.

Essential Question

How can you use the strategy draw a diagram to classify plane figures? Possible answer: I can draw a Venn diagram to sort figures based on their side lengths, types of angles, and number of pairs of parallel sides. If a figure fits both categories, it goes in the section where the circles overlap.
15.3 Problem Solving • Classify

Use the Venn diagram for 1 and 2.

1. Draw the polygons in the Venn diagram.

2. Where in the Venn diagram would you place a ?

   only in the circle labeled Polygons with Right Angles

3. Tia wants to include the figures at the right in one circle of a Venn diagram. What label can she use?

   Possible answer: Quadrilaterals with Parallel Sides

4. Fran draws a Venn diagram with two circles and labels the circles “Polygons with Parallel Sides” and “Quadrilaterals with Parallel Sides.” Which figure belongs only in the circle labeled “Polygons with Parallel Sides?”

5. Sean draws a Venn diagram with two circles and labels the circles “Polygons with 4 Equal Sides” and “Polygons with Parallel Sides.” Which figure can he draw where the circles overlap?

6. Multi-Step Jessica draws this Venn diagram. Which of the following two figures can she place only in circle A?

   Possible answer: Quadrilaterals with Parallel Sides

Lesson Check

Fill in the bubble completely to show your answer.

Homework and Practice

Use the Homework and Practice pages to provide students with more practice on the concepts and skills of this lesson.