

Quadrilaterals – Measures of Sides and Angles

- Strand:** Measurement and Geometry
- Topic:** Determine unknown side lengths or angle measures of quadrilaterals.
- Primary SOL:** 7.6 The student will
- b) determine unknown side lengths or angle measures of quadrilaterals.
- Related SOL:** 7.5, 7.6a

Materials

- Properties of Quadrilaterals Cards (attached)
- Side Lengths and Angle Measures of Quadrilaterals: Part 1 activity sheet (attached)
- Side Lengths and Angle Measures of Quadrilaterals: Part 2 activity sheet (attached)

Vocabulary

congruent, parallel, parallelogram, quadrilateral, rectangle, rhombus, square, trapezoid (earlier grades)
Corresponding (7.5)

Student/Teacher Actions: What should students be doing? What should teachers be doing?

1. Invite students to tell you what they know about quadrilaterals by asking, “*What is a quadrilateral?*”
2. Ask students to provide you with some examples of quadrilaterals that they see in the classroom. Possible answers could be the top of the students’ desks, the whiteboard, the front of the classroom door, or the cover of a textbook. Using one of the examples given, ask, “*If you knew one side length, how could you find the other side lengths of the quadrilateral?*” Take the exercise further, and ask students to provide examples of quadrilaterals that they see in real life. Possible answers could be a purse in the shape of a trapezoid, bridges, a baseball diamond, or the wing of an airplane. Ask, “*If you knew one side length, how could you find the opposite side length of the quadrilateral?*”
3. Distribute the Properties of Quadrilaterals Cards. Discuss how the properties could be used to find an unknown side or an unknown angle measure.
4. Distribute the Side Lengths and Angle Measures of Quadrilaterals activity sheets and complete them as a group with students.

Assessment

- **Questions**
 - How is finding the unknown side length of a square like finding the unknown side length of a rectangle?
 - How is finding the unknown side length of a square different from finding the unknown side length of a rectangle?

- **Journal/writing prompts**
 - Explain whether an unknown angle measure can be found with only one corresponding angle given.
 - Give a practical example of when you would use the properties of quadrilaterals to find the unknown angle measure or unknown side length.
- **Other Assessments**
 - Have students create a rhombus with an unknown angle measure and show the steps for finding the unknown angle.
 - Have students create a trapezoid with an unknown side length and show the steps for finding the unknown length.

Extensions and Connections (for all students)

- Have students find a practical application for finding the unknown side length and unknown angle measure for a quadrilateral using its properties.

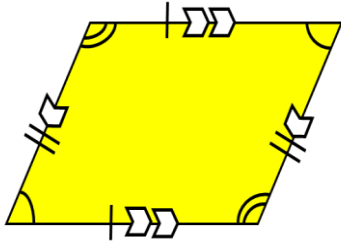
Strategies for Differentiation

- Students can color-code the corresponding angles and side lengths when completing the activity as a group.
- Have students review the concepts of area and perimeter and show how they can find the unknown side lengths and angle measures if given the area and perimeter of the quadrilateral.
- Provide students with a picture of a rhombus with perpendicular diagonals and a side length given. Ask them to find the other sides.
- Provide students with a picture of a rectangle with bisected diagonals and a side length given. Ask them to find the opposite side.

Note: The following pages are intended for classroom use for students as a visual aid to learning.

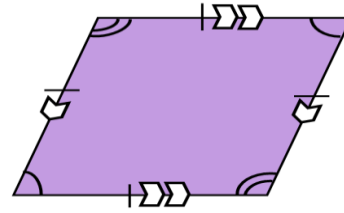
Properties of Quadrilaterals Cards

Parallelogram



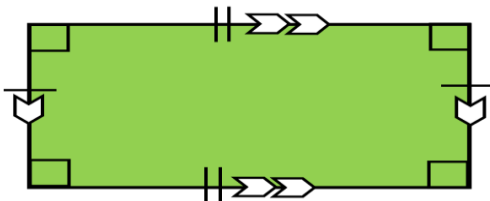
- Opposite sides are parallel and congruent.
- Opposite angles are congruent.
- Diagonals bisect each other and divide the figure into two congruent triangles.
- The parallelogram has no lines of symmetry.

Rhombus



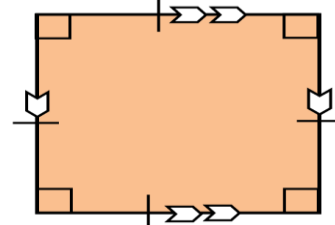
- Opposite angles are congruent.
- Four congruent sides.
- Opposite sides are parallel.
- Diagonals bisect each other at right angles.
- The rhombus has two lines of symmetry.

Rectangle



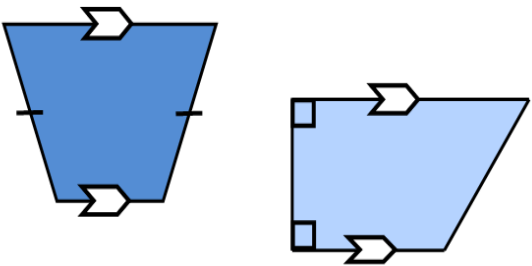
- Opposite sides are parallel and congruent.
- All four angles are congruent.
- Each angle measures 90 degrees.
- Diagonals are congruent and bisect each other.
- The rectangle has two lines of symmetry.

Square



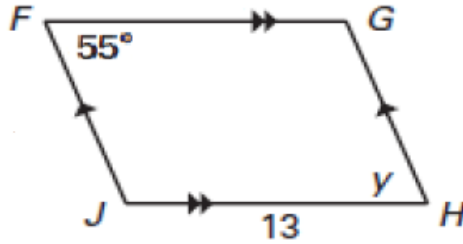
- Opposite sides are parallel.
- All sides are congruent.
- All four angles are congruent.
- Each angle measures 90 degrees.
- Diagonals are congruent and bisect each other at right angles.
- The square has four lines of symmetry.

Properties of Quadrilaterals Cards

Trapezoid	
	
<ul style="list-style-type: none">• May have two or zero right angles.• Exactly one pair of parallel sides• May have one pair of congruent sides.• The isosceles trapezoid has one line of symmetry.	

Side Lengths and Angle Measures of Quadrilaterals: Part 1

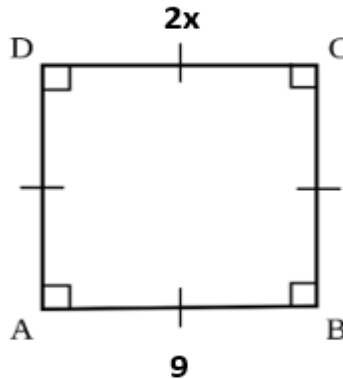
Directions: Use the properties of quadrilaterals to find the value of $\angle H$ and \overline{FG} .



1. What type of quadrilateral is illustrated in the figure?
2. What angle does $\angle H$ correspond to?
3. What side does \overline{FG} correspond to?
4. How can you find the missing side length and missing angle measure? Explain.
5. $\angle H = \underline{\hspace{2cm}}$ and $\overline{FG} = \underline{\hspace{2cm}}$

Side Lengths and Angle Measures of Quadrilaterals: Part 2

Directions: Use properties of quadrilaterals to find the value of $\angle A$ and the value of x .



- 1) What type of quadrilateral is illustrated in the figure?
- 2) What angle does $\angle A$ correspond to?
- 3) What side does \overline{DC} correspond to?
- 4) How can you find the missing side length and missing angle measure? Explain.
- 5) $\angle A = \underline{\hspace{2cm}}$ and $x = \underline{\hspace{2cm}}$
- 6) If \overline{CA} is about 13 units, what other length can you determine?
- 7) How many lines of symmetry are in the quadrilateral?