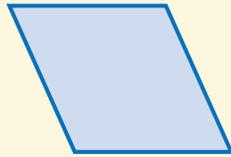


 Use What You Know

In Lesson 31, you compared shapes and put them into groups. In this lesson, you will learn how to group quadrilaterals. Take a look at this problem.

A rhombus is one kind of quadrilateral. A rectangle is another kind of quadrilateral. How are a rhombus and a rectangle the same? How are they different?



rhombus



rectangle

a. Which of the two shapes has 4 sides and 4 angles?

b. Which of the two shapes has 2 pairs of sides that are the same length?

c. Which of the two shapes has 4 sides that are the same length?

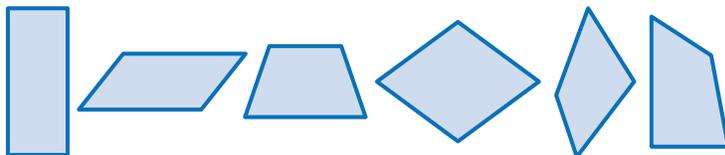
d. Which of the two shapes has 4 square corners? _____

e. How are the rhombus and the rectangle shown above alike? How are they different?



Find Out More

A **quadrilateral** is any shape with 4 sides and 4 angles.



You can name quadrilaterals using their attributes. An **attribute** is a way to describe a shape, like number of sides, or length of sides. One attribute is "4 sides." Another attribute is "at least 1 square corner."

- A quadrilateral is a **parallelogram** if it has 2 pairs of parallel sides and 2 pairs of sides that are the same length. Sides are **parallel** if they are always the same distance apart.

These are parallelograms:



These are not parallelograms:



- A quadrilateral is a **rectangle** if it has 4 square corners. A rectangle also has 2 pairs of parallel sides and 2 pairs of sides that are the same length.

These are rectangles:



These are not rectangles:

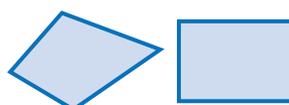


- A quadrilateral is a **rhombus** if it has 2 pairs of parallel sides and 4 sides that are all the same length.

These are rhombuses:



These are not rhombuses:



Reflect

- 1 A square is a quadrilateral. Explain what a square is by writing about its sides and its corners.

Learn About Comparing Quadrilaterals

Read the problem below. Then explore different ways to compare quadrilaterals.

Is a square a rectangle?

Is a rectangle a square?

 **Picture It** You can use a drawing to compare quadrilaterals.

All quadrilaterals have 4 sides and 4 angles.



4 square corners
2 pairs of parallel sides
4 sides the same length



4 square corners
2 pairs of parallel sides
2 pairs of sides the same length

 **Model It** You can use a table to compare quadrilaterals.

Shape	4 sides 4 angles	4 square corners	2 pairs of parallel sides	2 pairs of sides that are the same length	4 sides that are the same length
Square	✓	✓	✓	✓	✓
Rectangle	✓	✓	✓	✓	sometimes

Connect It Now you will solve the problem from the previous page by comparing attributes.

2 What is an attribute of a square that is NOT an attribute of every rectangle?

3 Does every rectangle have all the attributes of a square? _____

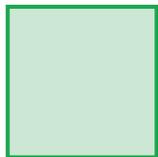
4 Does every square have all the attributes of a rectangle? _____

5 Is every square a rectangle? Explain why or why not.

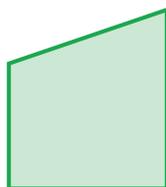
6 Is every rectangle a square? Explain why or why not.

Try It Use what you just learned about comparing quadrilaterals to solve these problems. Show your work on a separate sheet of paper.

7 Circle all the quadrilaterals below that are squares.



8 Circle all the quadrilaterals below that are rectangles.



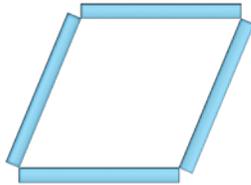
Learn About  **Naming and Drawing Quadrilaterals**

Read the problem below. Then explore different ways to name and draw quadrilaterals.

I have a quadrilateral. It has 4 sides that are all the same length. It does not have any square corners. What is the name of my shape?

▶ Model It You can make a model to help name a quadrilateral.

Cut 4 strips of paper all the same length. Arrange them to look like a quadrilateral. Make sure there are no square corners.



It does not have any square corners, so it is not a square.

▶ Solve It You can make a list of the attributes to help you name a quadrilateral.

Look at the model above. Think about everything you know about this shape.

- It is a quadrilateral, so it has 4 sides and 4 angles.
- It has 4 sides that are all the same length.
- It does not have any square corners, so it is not a square.

Using this list of attributes, you know that the shape is a rhombus.

Connect It Now you will solve a problem like the one on the previous page. Name the shape shown below.



9 Write the number of sides and angles the shape has. _____ sides _____ angles

10 Does the shape have parallel sides? _____

11 Does the shape have square corners? _____

12 Does the shape have 2 pairs of sides the same length? _____

13 Is the shape a quadrilateral? Explain why or why not.

14 Is the shape a parallelogram? Is it a rectangle? Is it a square? Explain.

Try It Use what you just learned about naming quadrilaterals to solve these problems. Show your work on a separate sheet of paper.

15 Circle all the quadrilaterals below that have 2 pairs of sides the same length, but are NOT rectangles.



16 Draw a quadrilateral that has at least 1 square corner, but is NOT a rectangle.

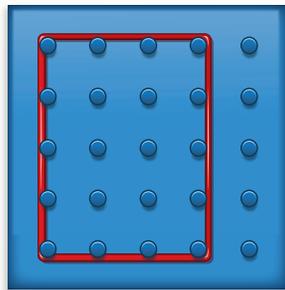
Practice  **Classifying Quadrilaterals**

Study the example below. Then solve problems 17–19.

Example

A patio has 2 pairs of parallel sides and 2 pairs of sides that are the same length. There are 4 square corners. What shape is the patio?

Look at how you could show your work using a model.



Solution The patio is a rectangle.



The student used a geoboard to model the shape. Now you can see what the shape looks like.

**Pair/Share**

How else could you model the shape?

- 17** Draw a quadrilateral that has no sides the same length, no parallel sides, and no square corners.

Show your work.

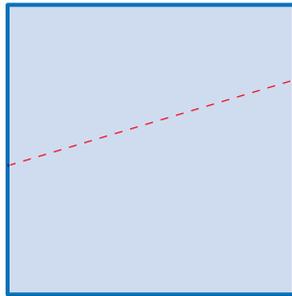


The shape you draw will not be a rectangle or a square. It will not be a parallelogram or a rhombus.

**Pair/Share**

What is a different shape you can draw to solve the problem?

- 18 Friona cut along the dashed line shown on the shape below. She knows that she made two quadrilaterals.



It may help to list the attributes of a parallelogram.

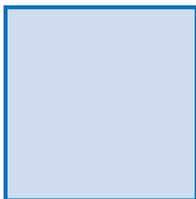
Is either of Friona's quadrilaterals a parallelogram? Explain why or why not.

Solution _____

Pair/Share

List the attributes of each of Friona's quadrilaterals.

- 19 Which shape is NOT a rectangle? Circle the letter of the correct answer.



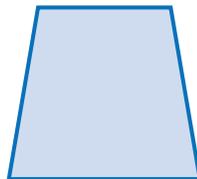
A



C



B



D



What are the attributes of each shape?

Ari chose **A** as the correct answer. How did he get that answer?

Pair/Share

What are four ways to name the shape Ari chose?

Practice  **Classifying Quadrilaterals****Solve the problems.****1** A rhombus must have all of these attributes except which one?

- A** 4 sides that are the same length
- B** 2 pairs of parallel sides
- C** 4 square corners
- D** 4 sides and 4 angles

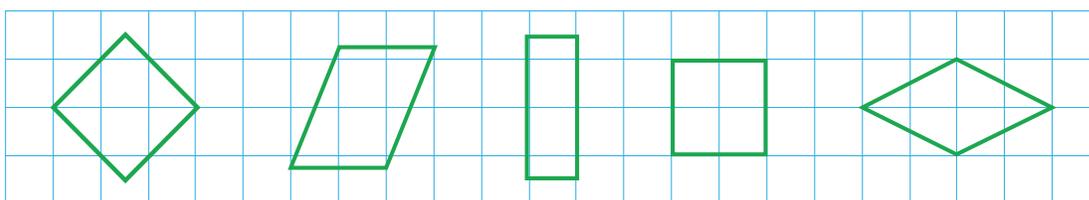
2 Which of these shape names can NOT be used to name the shape below?

- A** quadrilateral
- B** parallelogram
- C** rhombus
- D** rectangle

3 Tell whether each sentence is *True* or *False*.

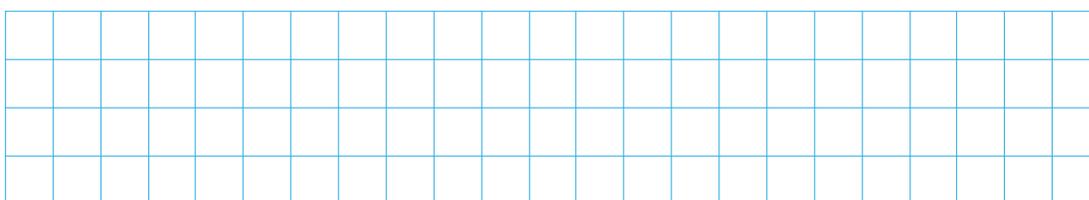
- | | | |
|--|-------------------------------|--------------------------------|
| a. All rhombuses are quadrilaterals. | <input type="checkbox"/> True | <input type="checkbox"/> False |
| b. All rectangles are squares. | <input type="checkbox"/> True | <input type="checkbox"/> False |
| c. All parallelograms are rectangles. | <input type="checkbox"/> True | <input type="checkbox"/> False |
| d. All quadrilaterals are parallelograms. | <input type="checkbox"/> True | <input type="checkbox"/> False |
| e. All squares are rhombuses. | <input type="checkbox"/> True | <input type="checkbox"/> False |

4 What is the BEST name that describes all the shapes below? _____



5 Use the grid below. Draw a quadrilateral that belongs to at least two of these groups: parallelogram, rectangle, or square. Explain why your shape belongs to these groups.

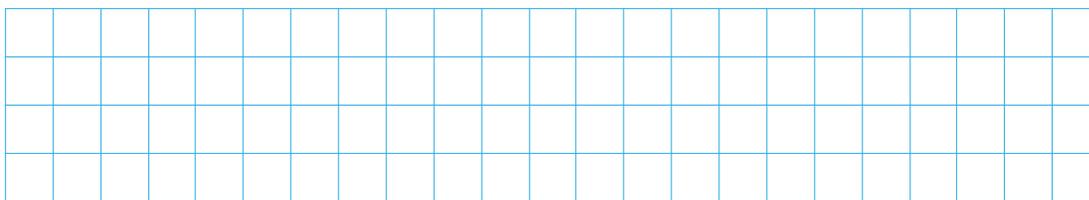
Show your work.



Solution _____

6 Use the grid below. Draw a quadrilateral that does not belong to any of these groups: parallelogram, rectangle, or square. Explain why your shape does not belong to any of these groups.

Show your work.



Solution _____

✓ Self Check Go back and see what you can check off on the Self Check on page 329.