

Solve & Discuss It!

Students in the Art Club are designing a flag with the school's mascot and emblem. The flag has four sides, with two sides that are twice as long as the other two sides. What shape could the flag be, and what dimensions could it have? Make and label a scale drawing as part of your answer.



Make Sense and Persevere Is there more than one shape that could represent the flag?

Lesson 10-2

Draw Geometric Figures

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I can...
draw figures with given conditions.

Focus on math practices

Reasoning How did you decide what lengths to use for the four sides of the flag you drew? What lengths could the actual flag be, based on your drawing?

573

Essential Question How can a shape that meets given conditions be drawn?

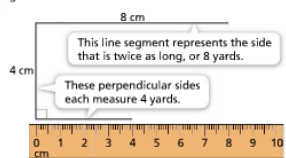
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EXAMPLE 1 Draw a Quadrilateral with Given Conditions

The school's landscaping club is designing a 4-sided patio and garden. The patio has 2 perpendicular sides that each measure 4 yards, and a third side that is perpendicular to one of the equal sides but twice as long. One angle of the patio measures 135° . Make a scale drawing of the patio using a scale of $1\text{ cm} = 1\text{ yd}$.

Use Appropriate Tools You can use rulers and protractors to construct precise drawings.

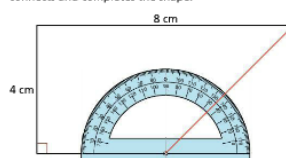
STEP 1 Use a ruler to draw three sides that meet the given conditions.



This line segment represents the side that is twice as long, or 8 yards.

These perpendicular sides each measure 4 yards.

STEP 2 Use a protractor to draw a 135° angle that connects and completes the shape.



The scale drawing shows that the patio is the shape of a trapezoid.

Try It!

Use a ruler and protractor to draw a quadrilateral with two equal sides that meet at a right angle, and two nonadjacent angles of the same measure. What is the name of the quadrilateral you drew?

The quadrilateral I drew is a

Convince Me!
Could you have drawn more than one shape that fits the given conditions? Explain.

574 10-2 Draw Geometric Figures

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EXAMPLE 2 Draw a Figure to Solve a Problem

Mr. Miller's classroom has desks shaped like equilateral triangles. He is planning to arrange the desks for a lunch for 10 people. If one person can sit at each edge of each desk, make a sketch to show how many desks he needs.



Use Appropriate Tools Why is a freehand drawing precise enough for the table arrangement?

ONE WAY Mr. Miller can arrange the desks in one row to make a long lunch table.



He will need 8 desks to make this arrangement.

ANOTHER WAY Mr. Miller can arrange the desks in two rows to make a wider lunch table.



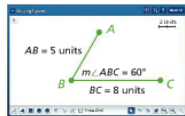
He will need 14 desks to make this arrangement.

EXAMPLE 3 Draw a Figure Using Technology

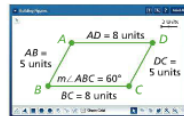
An engineer makes a scale drawing of the floor of a building. The floor has two pairs of parallel sides that are 50 feet and 80 feet. Two of the four angles measure 60° . Use geometry software to make a scale drawing. What is the name of the floor's shape?

Use Appropriate Tools Why would the engineer use technology, rather than a freehand sketch?

STEP 1 Draw two line segments at a 60° angle. Using a scale of 1 unit = 10 feet, the segments should be 5 units and 8 units long.



STEP 2 Duplicate each line segment to create pairs of parallel sides, and move them to construct a closed figure.



The floor shape of the building is a parallelogram.

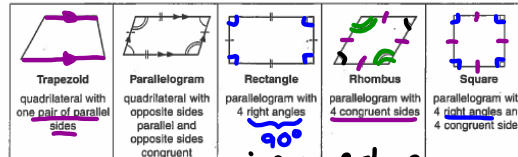
Try It!

- Make a sketch to show another way Mr. Miller can arrange the desks to seat 10 people for lunch.
- Use geometry software to make a rhombus with a side length of 6 units and two angles that measure 45° .

10-5 Study Guide and Intervention
Quadrilaterals → 4 sides

Quadrilaterals can be classified using their angles and sides. The best description of a quadrilateral is the one that is the most specific.

$90 \times 4 = 360^\circ$ ← Total in ANY Quad.



EXAMPLES Classify the quadrilateral using the name that *best* describes it.

- The quadrilateral is a parallelogram with 4 congruent sides. It is a rhombus.
- The quadrilateral has one pair of parallel sides. It is a trapezoid.
- The quadrilateral is a parallelogram with 4 right angles. It is a rectangle.

EXERCISES

Classify the quadrilateral using the name that *best* describes it.

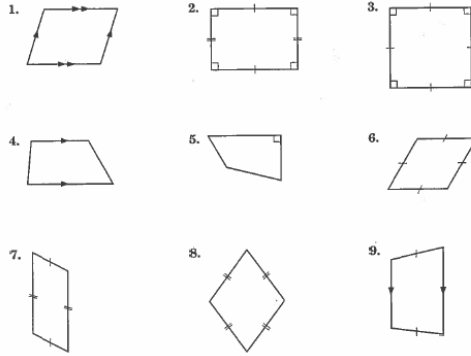
- quadrilateral
- rhombus
- parallelogram

Find the missing measure in each quadrilateral.

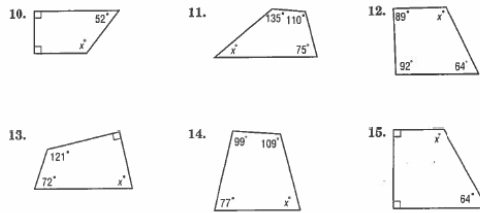
- -
 -
- $125 + 54 + 96 + x = 360$
 $275 + x = 360$
 $x = 85^\circ$

10-5 Practice: Skills
 Quadrilaterals

Classify the quadrilateral using the name that best describes it.



Find the missing angle measure of each quadrilateral.



KEY CONCEPT

You can draw shapes that meet given conditions freehand, with a ruler and protractor, or with technology. The given conditions may include properties of geometric figures and relationships between parts of the figures.

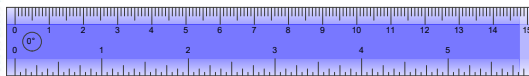
Use Appropriate Tools Deciding how precise the drawing of the shape should be will help you choose the method you use to draw the shape.

Do You Understand?

- Essential Question** How can a shape that meets given conditions be drawn?
- Use Appropriate Tools** How can you decide whether to draw a shape freehand, with a ruler and protractor, or using technology?
- Construct Arguments** Why can you draw more than one quadrilateral using four right angles?

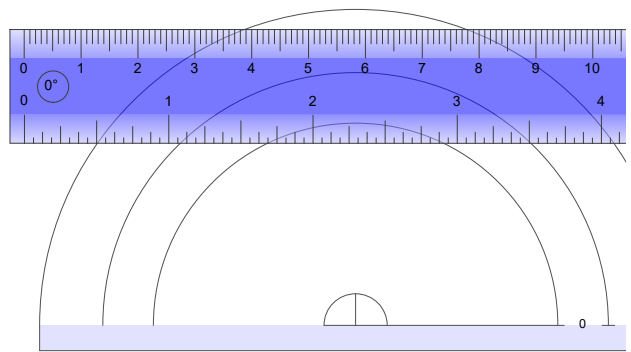
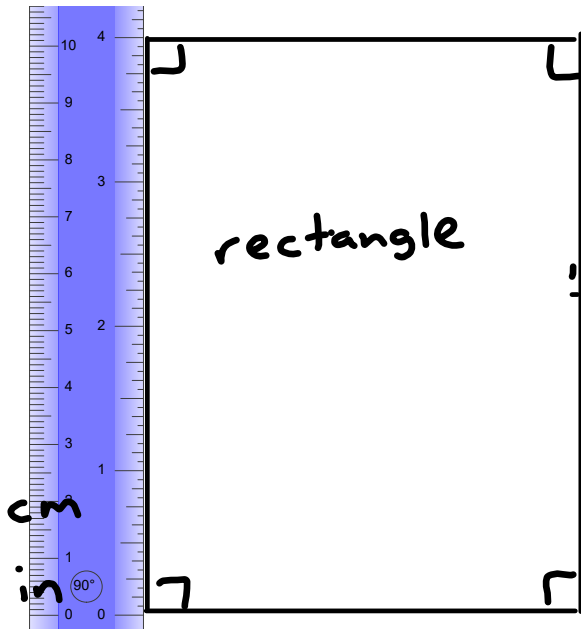
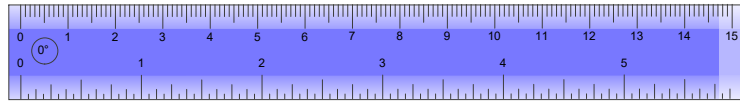
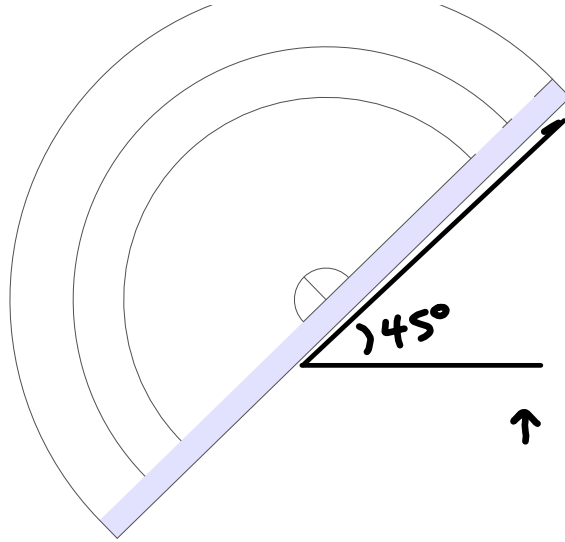
Do You Know How?

- Draw, freehand, a quadrilateral with exactly one pair of parallel sides and at least one angle measuring 45° .



- Use a ruler and protractor to draw a quadrilateral with four right angles, two side lengths each measuring 3 inches, and two side lengths each measuring 4 inches. What is the most descriptive name of the figure you drew?
- Use geometry software to draw a quadrilateral with two angles measuring 80° and two angles measuring 100° . What is the name of the figure you drew?

4)



Name: _____

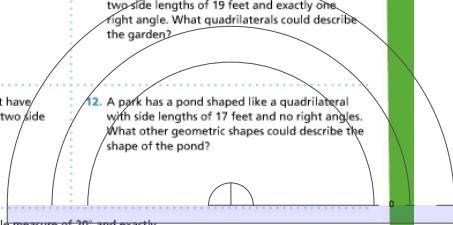


Practice & Problem Solving

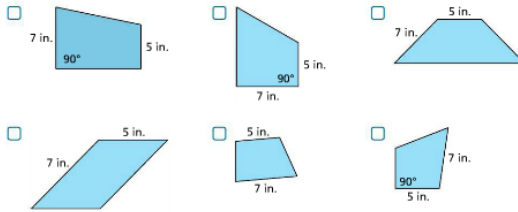


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- 7. What quadrilaterals can you draw that have exactly four right angles?
- 8. A four-sided sandbox has more than two right angles, two side lengths of 2 feet, and two side lengths of 5 feet. What geometric shape best describes the shape of the sandbox?
- 9. What quadrilateral can you draw that has exactly one pair of parallel sides?
- 10. A friend is building a 4-sided garden with two side lengths of 19 feet and exactly one right angle. What quadrilaterals could describe the garden?
- 11. What quadrilaterals can you draw that have two side lengths of 9 centimeters and two side lengths of 4 centimeters?
- 12. A park has a pond shaped like a quadrilateral with side lengths of 17 feet and no right angles. What other geometric shapes could describe the shape of the pond?
- 13. Draw a quadrilateral that has one angle measure of 20° and exactly one side length of 4 units.



- 14. Which of the following shapes are trapezoids that have side lengths of 7 inches and 5 inches and a right angle? Select all that apply.



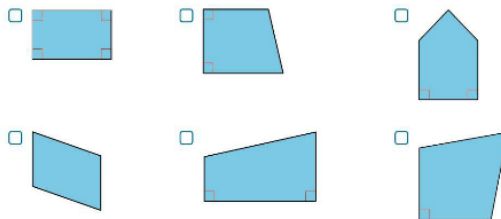
- 15. Using computer software, draw a quadrilateral with two sets of parallel sides and two angles measuring 135 degrees.
- 16. Higher Order Thinking Draw a rhombus with side lengths of 6 units and angle measures of 100° , 80° , 100° , and 80° .

Assessment Practice

- 17. Thomas is painting a geometry mural. He is painting quadrilaterals that have exactly two pairs of perpendicular sides.

PART A

Which could be a quadrilateral that Thomas painted? Select all that apply.





PART B


Explain how quadrilaterals with exactly two pairs of perpendicular sides must be the same and how they can vary.


10-5 Practice: Skills
 Quadrilaterals


Classify the quadrilateral using the name that best describes it.


1.  **parallelogram**


2.  **rectangle**


3.  **square**


4.  **trapezoid**

5.  **quadrilateral**

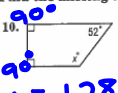
6.  **rhombus**

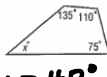
7.  **parallelogram**


8.  **rhombus**

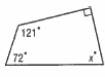
9.  **trapezoid**


Find the missing angle measure of each quadrilateral.


10.  **$x = 128^\circ$**

11.  **$x = 40^\circ$**

12.  **$x = 115^\circ$**

13.  **$x = 77^\circ$**

14.  **$x = 75^\circ$**

15.  **$x = 116^\circ$**

