LESSON 5.12

Exercise Set A

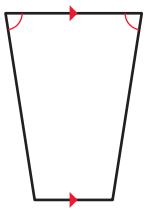
MM1G3d Understand, use, and prove properties of and relationships among special quadrilaterals: parallelogram, rectangle, rhombus, square, trapezoid, and kite.

Copy and complete the chart. Put an X in the box if the shape *always* has the given property.

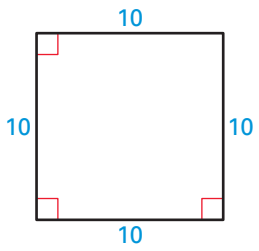
	Property	▱	Rectangle	Rhombus	Square	Kite	Trapezoid
1.	Both pairs of opposite sides are congruent.	?	?	?	?	?	?
2.	Both pairs of opposite angles are congruent.	?	?	?	?	?	?
3.	Exactly one pair of opposite sides are congruent.	?	?	?	?	?	?
4.	Exactly one pair of opposite sides are parallel.	?	?	?	?	?	?
5.	Exactly one pair of opposite angles are congruent.	?	?	?	?	?	?
6.	Consecutive angles are supplementary.	?	?	?	?	?	?

Give the most specific name for the quadrilateral. *Explain*.

7.



8.



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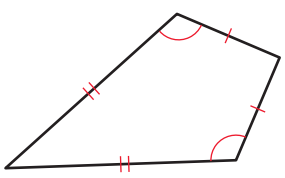
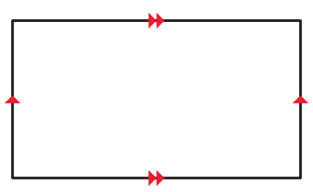


10.

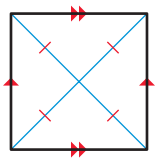


UNIT 5

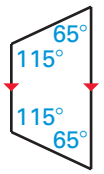
Exercise Set A *(continued)*

Tell whether enough information is given in the diagram to classify the quadrilateral by the indicated name.

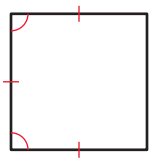
11. Rectangle



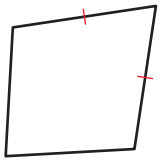
12. Isosceles trapezoid



13. Rhombus



14. Kite



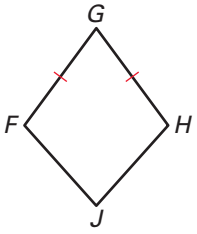
Points *A*, *B*, *C*, and *D* are the vertices of a quadrilateral. Give the most specific name for *ABCD*. *Justify* your answer.

15. $A(2, 2)$, $B(4, 6)$, $C(6, 5)$, $D(4, 1)$

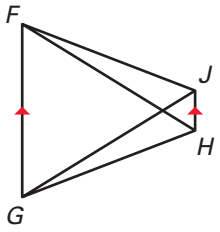
16. $A(-5, 1)$, $B(0, -6)$, $C(5, 1)$, $D(0, 3)$

In Exercises 17 and 18, which two segments or angles must be congruent so that you can prove that *FGHJ* is the indicated quadrilateral? There may be more than one right answer.

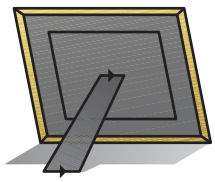
17. Kite



18. Isosceles trapezoid



19. Picture Frame What type of special quadrilateral is the stand of the picture frame at the right?



20. Painting A painter uses a quadrilateral shaped piece of canvas. The artist begins by painting lines that represent the diagonals of the canvas. If the lengths of the painted lines are congruent, what types of quadrilaterals could represent the shape of the canvas? If the painted lines are also perpendicular, what type of quadrilateral represents the shape of the canvas?

LESSON 5.12

Exercise Set B

MM1G3d Understand, use, and prove properties of and relationships among special quadrilaterals: parallelogram, rectangle, rhombus, square, trapezoid, and kite.

Draw the sides or diagonals of *ABCD* as described. What special type of quadrilateral is *ABCD*?

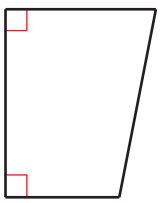
1. $\overline{AC} \cong \overline{BD}$, $\overline{AC}$ and $\overline{BD}$ bisect one another, but $\overline{AC}$ is not perpendicular to $\overline{BD}$.
2. $\overline{AB} \cong \overline{BC}$ and $\overline{CD} \cong \overline{DA}$, but $\overline{BC} \ncong \overline{CD}$.
3. $\overline{AB} \parallel \overline{CD}$ and $\overline{BC} \cong \overline{DA}$.
4. $\overline{AC} \perp \overline{BD}$, $\overline{AC}$ and $\overline{BD}$ bisect one another, but $\overline{AC} \ncong \overline{BD}$.
5. $\overline{AC} \perp \overline{BD}$, $\overline{AC}$ and $\overline{BD}$ bisect one another, and $\overline{AC} \cong \overline{BD}$.

Determine whether the statement is *always*, *sometimes*, or *never* true.

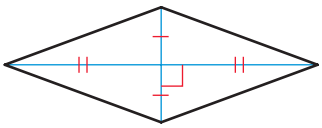
6. Diagonals of a trapezoid are congruent.
7. Opposite sides of a rectangle are congruent.
8. A square is a rectangle.
9. A square is not a rhombus.
10. All angles of a parallelogram are congruent.
11. Opposite angles of an isosceles trapezoid are congruent.
12. The diagonals of a parallelogram are perpendicular.

Tell whether enough information is given in the diagram to classify the quadrilateral by the indicated name. *Explain.*

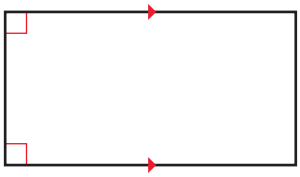
13. Trapezoid



14. Rhombus



15. Rectangle



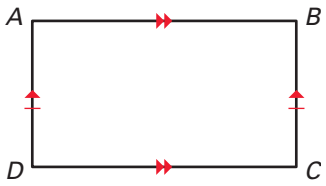
Points *P*, *Q*, *R*, and *S* are the vertices of a quadrilateral. Give the most specific name for *PQRS*. *Justify* your answer.

16. $P(-1, 3)$, $Q(4, 2)$, $R(1, -1)$, $S(-4, 0)$
17. $P(-3, 5)$, $Q(-7, 6)$, $R(-9, -2)$, $S(-5, -3)$
18. $P(-2, 9)$, $Q(-2, -1)$, $R(-5, 5)$, $S(-5, 7)$
19. Use the quadrilateral in Exercise 17. Find the midpoint of each side. Connect the midpoints to form a new quadrilateral. What kind of quadrilateral is formed?

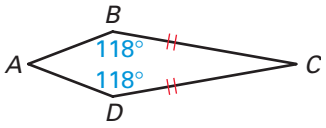
Exercise Set B *(continued)*

Which pairs of segments or angles must be congruent so that you can prove that *ABCD* is the indicated quadrilateral? *Explain*. There may be more than one right answer.

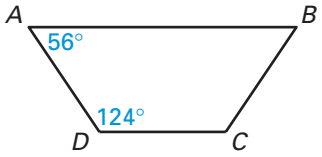
20. Rectangle



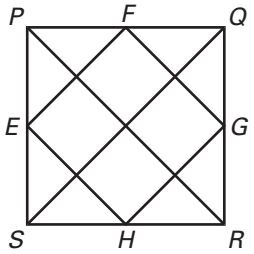
21. Kite



22. Isosceles Trapezoid



23. *PQRS* is a square. The midpoints of the sides of the square are *E*, *F*, *G*, and *H*. Is quadrilateral *EFGH* a rhombus? Verify your answer by completing the proof.



Statements	Reasons
1. *PQRS* is a square.	**1.** ?
2. *E*, *F*, *G*, and *H* are midpoints of the sides of the square.	**2.** ?
3. $\overline{EF}$, $\overline{FG}$, $\overline{GH}$, and $\overline{EH}$ are midsegments of $\triangle PQS$, $\triangle PQR$, $\triangle QRS$, and $\triangle RSP$, respectively.	**3.** ?
4. $EF = \frac{1}{2}QS$, $GH = \frac{1}{2}QS$, $EH = \frac{1}{2}PR$, $FG = \frac{1}{2}PR$	**4.** ?
5. ?	**5.** Diagonals of a square are congruent.
6. ?	**6.** Definition of congruent segments
7. $EF = \frac{1}{2}PR$, $GH = \frac{1}{2}PR$,	**7.** ?
8. $EF = GH = EH = FG$	**8.** ?
9. *EFGH* is a rhombus.	**9.** ?

UNIT 5