

6-4

Properties of Rhombuses, Rectangles, and Squares

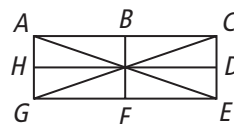


Vocabulary

Review

1. Circle the segments that are *diagonals*.

\overline{AG}	\overline{AC}	\overline{HD}	\overline{GC}
\overline{BF}	\overline{AE}	\overline{EG}	\overline{EF}



2. Is a *diagonal* ever a line or a ray?
3. The *diagonals* of quadrilateral $JKLM$ are and .

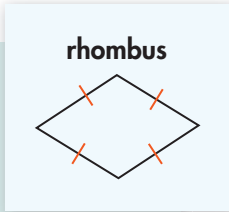
Vocabulary Builder

rhombus (noun) RAHM bus

Definition: A rhombus is a parallelogram with four congruent sides.

Main Idea: A rhombus has four congruent sides but not necessarily four right angles.

Examples: diamond, square



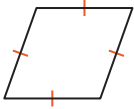
Use Your Vocabulary

Complete each statement with *always*, *sometimes*, or *never*.

- A rhombus is ? a parallelogram.
- A parallelogram is ? a rhombus.
- A rectangle is ? a rhombus.
- A square is ? a rhombus.
- A rhombus is ? a square.
- A rhombus is ? a hexagon.

Key Concept Special Parallelograms

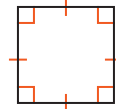
A *rhombus* is a parallelogram with four congruent sides.



A *rectangle* is a parallelogram with four right angles.

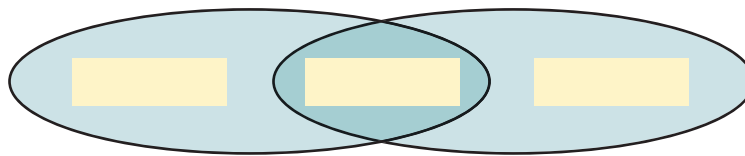


A *square* is a parallelogram with four congruent sides and four right angles.



10. Write the words *rectangles*, *rhombuses*, and *squares* in the Venn diagram below to show that one special parallelogram has the properties of the other two.

Special Parallelograms



Problem 1 Classifying Special Parallelograms

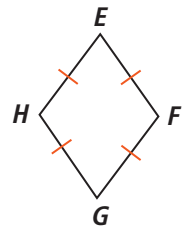
Got It? Is $\square EFGH$ a rhombus, a rectangle, or a square? Explain.

11. Circle the number of sides marked congruent in the diagram.

1 2 3 4

12. Are any of the angles right angles?

13. Is $\square EFGH$ a rhombus, a rectangle, or a square? Explain.



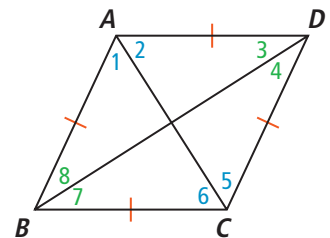
Theorems 6-13 and 6-14

Theorem 6-13 If a parallelogram is a rhombus, then its diagonals are perpendicular.

Theorem 6-14 If a parallelogram is a rhombus, then each diagonal bisects a pair of opposite angles.

Use the diagram at the right for Exercises 14–18.

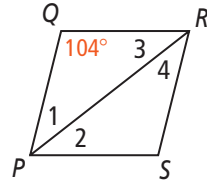
14. If $ABCD$ is a rhombus, then $\overline{AC} \perp$.
15. If $ABCD$ is a rhombus, then \overline{AC} bisects \angle and \angle .
16. If $ABCD$ is a rhombus, then $\angle 1 \cong \angle 2 \cong \angle$ $\cong \angle$.
17. If $ABCD$ is a rhombus, then \overline{BD} bisects \angle and \angle .
18. If $ABCD$ is a rhombus, then $\angle 3 \cong \angle$ $\cong \angle$ $\cong \angle$.





Problem 2 Finding Angle Measures

Got It? What are the measures of the numbered angles in rhombus $PQRS$?



19. Circle the word that describes $\triangle PQR$ and $\triangle RSP$.

equilateral isosceles right

20. Circle the congruent angles in $\triangle PQR$. Underline the congruent angles in $\triangle RSP$.

$\angle 1$ $\angle 2$ $\angle 3$ $\angle 4$ $\angle Q$ $\angle S$

21. $m\angle 1 + m\angle 2 + 104 = \square$

22. $m\angle 1 + m\angle 2 = \square$

23. $m\angle 1 = \square$

24. Each diagonal of a rhombus a pair of opposite angles.

25. Circle the angles in rhombus $PQRS$ that are congruent.

$\angle 1$ $\angle 2$ $\angle 3$ $\angle 4$

26. $m\angle 1 = \square$, $m\angle 2 = \square$, $m\angle 3 = \square$, and $m\angle 4 = \square$.

take note

Theorem 6-15

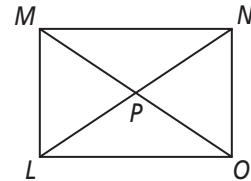
Theorem 6-15 If a parallelogram is a rectangle, then its diagonals are congruent.

27. If $RSTU$ is a rectangle, then $\overline{RT} \cong \square$.



Problem 3 Finding Diagonal Length

Got It? If $LN = 4x - 17$ and $MO = 2x + 13$, what are the lengths of the diagonals of rectangle $LMNO$?



Underline the correct word to complete each sentence.

28. $LMNO$ is a rectangle / rhombus.

29. The diagonals of this figure are congruent / parallel.

30. Complete.

$LN = \square$, so $4x - 17 = \square$.

31. Write and solve an equation to find the value of x .

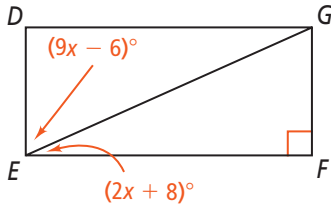
32. Use the value of x to find the length of \overline{LN} .

33. The diagonals of a rectangle are congruent, so the length of each diagonal is \square .



Lesson Check • Do you UNDERSTAND?

Error Analysis Your class needs to find the value of x for which $\square DEFG$ is a rectangle. A classmate's work is shown below. What is the error? Explain.



$$\begin{aligned} \cancel{2x + 8} &= \cancel{9x - 6} \\ \cancel{14} &= \cancel{7x} \\ 2 &= x \end{aligned}$$

Write T for true or F for false.

34. If a parallelogram is a rectangle, then each diagonal bisects a pair of opposite angles.

35. If a parallelogram is a rhombus, then each diagonal bisects a pair of opposite angles.

36. If $DEFG$ is a rectangle, $m\angle D = m\angle$ $= m\angle$ $= m\angle$.

37. $m\angle F =$.

38. What is the error? Explain.

39. Find the value of x for which $\square DEFG$ is a rectangle.

40. The value of x for which $\square DEFG$ is a rectangle is .



Math Success

Check off the vocabulary words that you understand.

parallelogram

rhombus

rectangle

square

diagonal

Rate how well you can *find angles and diagonals of special parallelograms*.

Need to review

0

2

4

6

8

10



Now I get it!