Extra Example 8.1

The sum of the measures of the interior angles of a convex regular polygon is 1260°. Classify the polygon by the number of sides. What is the measure of each interior angle? **nonagon, 140°**

8 CHAPTER REVIEW

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- Multi-Language Glossary
- Vocabulary practice

REVIEW KEY VOCABULARY

For a list of postulates and theorems, see pp. 926–931.

- diagonal, *p. 507*
- parallelogram, *p. 515*
- rhombus, *p. 533*
- rectangle, *p. 533*
- square, *p. 533*
- trapezoid, *p. 542*
- bases of a trapezoid, *p. 542*
- base angles of a trapezoid, *p. 542*
- legs of a trapezoid, *p. 542*
- isosceles trapezoid, *p. 543*
- midsegment of a trapezoid, *p. 544*
- kite, *p. 545*

VOCABULARY EXERCISES

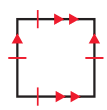
In Exercises 1 and 2, copy and complete the statement.

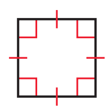
1. The _?_ of a trapezoid is parallel to the bases. **midsegment**

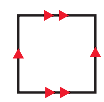
2. A(n) _?_ of a polygon is a segment whose endpoints are nonconsecutive vertices. **diagonal**

3. WRITING *Describe* the different ways you can show that a trapezoid is an isosceles trapezoid. **if the trapezoid has a pair of congruent base angles or if the diagonals are congruent**

In Exercises 4–6, match the figure with the most specific name.

4.  **C**

5.  **A**

6.  **B**

A. Square **B.** Parallelogram **C.** Rhombus

REVIEW EXAMPLES AND EXERCISES

Use the review examples and exercises below to check your understanding of the concepts you have learned in each lesson of Chapter 8.

8.1 Find Angle Measures in Polygons *pp. 507–513*

EXAMPLE

The sum of the measures of the interior angles of a convex regular polygon is 1080°. Classify the polygon by the number of sides. What is the measure of each interior angle?

Write and solve an equation for the number of sides n.

$(n - 2) \cdot 180° = 1080°$ **Polygon Interior Angles Theorem**

$n = 8$ **Solve for *n*.**

The polygon has 8 sides, so it is an octagon.

A regular octagon has 8 congruent interior angles, so divide to find the measure of each angle: $1080° \div 8 = 135°$. The measure of each interior angle is 135°.

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Chapter Review Practice

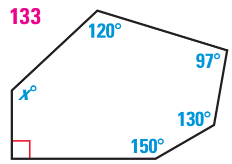
EXERCISES

EXAMPLES 2, 3, 4, and 5 on pp. 508–510 for Exs. 7–11

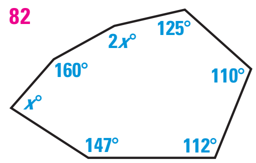
7. The sum of the measures of the interior angles of a convex regular polygon is 3960°. Classify the polygon by the number of sides. What is the measure of each interior angle? **24-gon; 165°**

In Exercises 8–10, find the value of x.

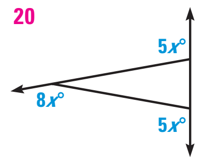
8. **133**



9. **82**



10. **20**

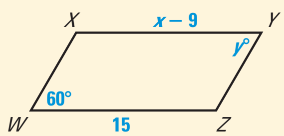


11. In a regular nonagon, the exterior angles are all congruent. What is the measure of one of the exterior angles? *Explain.* **40°; the sum of the measures of the exterior angles is always 360°, and there are nine congruent external angles in a nonagon.**

8.2 Use Properties of Parallelograms *pp. 515–521*

EXAMPLE

Quadrilateral *WXYZ* is a parallelogram. Find the values of x and y.



To find the value of x, apply Theorem 8.3.

$XY = WZ$	**Opposite sides of a ▱ are ≅.**
$x - 9 = 15$	**Substitute.**
$x = 24$	**Add 9 to each side.**

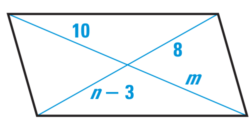
By Theorem 8.4, $\angle W \cong \angle Y$, or $m\angle W = m\angle Y$. So, $y = 60$.

EXERCISES

EXAMPLES 1, 2, and 3 on pp. 515, 517 for Exs. 12–17

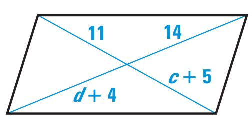
Find the value of each variable in the parallelogram.

12.



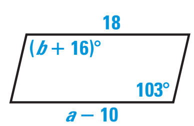
$m = 10$, $n = 11$

13.



$c = 6$, $d = 10$

14.



$a = 28$, $b = 87$

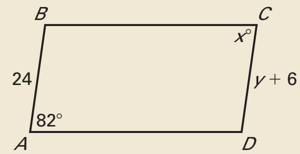
15. In ▱*PQRS*, $PQ = 5$ centimeters, $QR = 10$ centimeters, and $m\angle PQR = 36°$. Sketch *PQRS*. Find and label all of its side lengths and interior angle measures. **See margin.**

16. The perimeter of ▱*EFGH* is 16 inches. If *EF* is 5 inches, find the lengths of all the other sides of *EFGH*. *Explain* your reasoning. **See margin.**

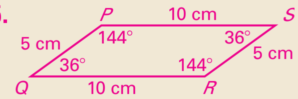
17. In ▱*JKLM*, the ratio of the measure of ∠*J* to the measure of ∠*M* is 5 : 4. Find $m\angle J$ and $m\angle M$. *Explain* your reasoning. **100°, 80°; solve $5x + 4x = 180$ for x.**

Extra Example 8.2

Quadrilateral *ABCD* is a parallelogram. Find the values of x and y.
82, 18



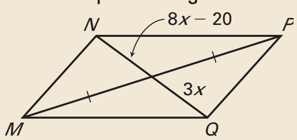
15.



16. $FG = 3$ in., $GH = 5$ in., $HE = 3$ in.; in a parallelogram opposite sides have the same measure, therefore $EF = GH = 5$ inches. This leaves 6 inches for both $\overline{FG}$ and $\overline{HE}$. Since $FG = HE$, they both are 3 inches in length.

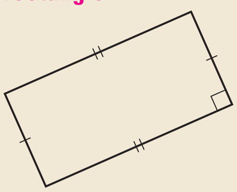
Extra Example 8.3

For what value of x is quadrilateral $MNPQ$ a parallelogram? **4**



Extra Example 8.4

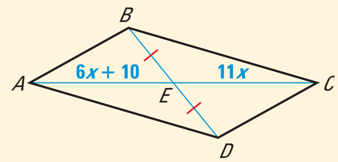
Classify the special quadrilateral.
rectangle



8.3 Show that a Quadrilateral is a Parallelogram *pp. 522–529*

EXAMPLE

For what value of x is quadrilateral $ABCD$ a parallelogram?



If the diagonals bisect each other, then $ABCD$ is a parallelogram. The diagram shows that $\overline{BE} \cong \overline{DE}$. You need to find the value of x that makes $\overline{AE} \cong \overline{CE}$.

$AE = CE$ — **Set the segment lengths equal.**

$6x + 10 = 11x$ — **Substitute expressions for the lengths.**

$x = 2$ — **Solve for x.**

When $x = 2$, $AE = 6(2) + 10 = 22$ and $CE = 11(2) = 22$. So, $\overline{AE} \cong \overline{CE}$.

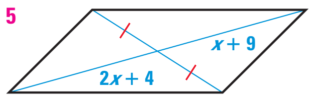
Quadrilateral $ABCD$ is a parallelogram when $x = 2$.

EXERCISES

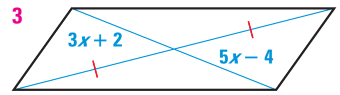
EXAMPLE 3
on p. 524
for Exs. 18–19

For what value of x is the quadrilateral a parallelogram?

18. **5**



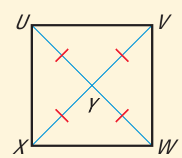
19. **3**



8.4 Properties of Rhombuses, Rectangles, and Squares *pp. 533–540*

EXAMPLE

Classify the special quadrilateral.



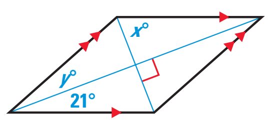
In quadrilateral $UVWX$, the diagonals bisect each other. So, $UVWX$ is a parallelogram. Also, $\overline{UY} \cong \overline{VY} \cong \overline{WY} \cong \overline{XY}$. So, $UY + YW = VY + XY$. Because $UY + YW = UW$, and $VY + XY = VX$, you can conclude that $\overline{UW} \cong \overline{VX}$. By Theorem 8.13, $UVWX$ is a rectangle.

EXERCISES

EXAMPLES 2 and 3
on pp. 534–535
for Exs. 20–22

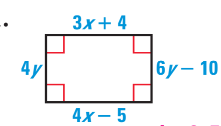
Classify the special quadrilateral. Then find the values of x and y.

20.



rhombus; 69, 21

21.



rectangle; 9, 5

22. The diagonals of a rhombus are 10 centimeters and 24 centimeters. Find the length of a side. *Explain.* **13 cm; the diagonals of a rhombus are perpendicular and form four 5-12-13 right triangles.**

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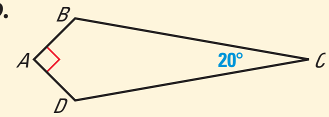
8.5 Use Properties of Trapezoids and Kites *pp. 542–549*

EXAMPLE

Quadrilateral *ABCD* is a kite. Find $m\angle B$ and $m\angle D$.



A kite has exactly one pair of congruent opposite angles. Because $\angle A \not\cong \angle C$, $\angle B$ and $\angle D$ must be congruent. Write and solve an equation.

$90° + 20° + m\angle B + m\angle D = 360°$ **Corollary to Theorem 8.1**

$110° + m\angle B° + m\angle D = 360°$ **Combine like terms.**

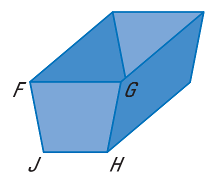
$m\angle B + m\angle D = 250°$ **Subtract 110° from each side.**

Because $\angle B \cong \angle D$, you can substitute $m\angle B$ for $m\angle D$ in the last equation. Then $m\angle B + m\angle B = 250°$, and $m\angle B = m\angle D = 125°$.

EXERCISES

EXAMPLES 2 and 3 on pp. 543–544 for Exs. 20–22

In Exercises 23 and 24, use the diagram of a recycling container. One end of the container is an isosceles trapezoid with $\overline{FG} \parallel \overline{JH}$ and $m\angle F = 79°$.



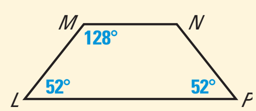
23. Find $m\angle G$, $m\angle H$, and $m\angle J$. **79°, 101°, 101°**

24. Copy trapezoid *FGHJ* and sketch its midsegment. If the midsegment is 16.5 inches long and $\overline{FG}$ is 19 inches long, find *JH*. **See margin for art; 14 in.**

8.6 Identify Special Quadrilaterals *pp. 552–557*

EXAMPLE

Give the most specific name for quadrilateral *LMNP*.



In *LMNP*, $\angle L$ and $\angle M$ are supplementary, but $\angle L$ and $\angle P$ are not. So, $\overline{MN} \parallel \overline{LP}$, but $\overline{LM}$ is not parallel to $\overline{NP}$. By definition, *LMNP* is a trapezoid.

Also, $\angle L$ and $\angle P$ are a pair of base angles and $\angle L \cong \angle P$. So, *LMNP* is an isosceles trapezoid by Theorem 8.15.

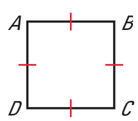
EXERCISES

EXAMPLE 2 on p. 553 for Exs. 25–28

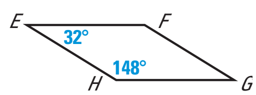
25. Rhombus; since all four sides are the same it is a rhombus. There are no known right angles.

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

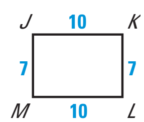
25.



26.



27.

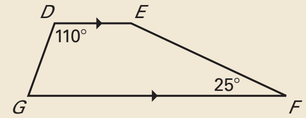


26, 27. See margin.

28. In quadrilateral *RSTU*, $\angle R$, $\angle T$, and $\angle U$ are right angles, and $RS = ST$. What is the most specific name for quadrilateral *RSTU*? *Explain.* **See margin.**

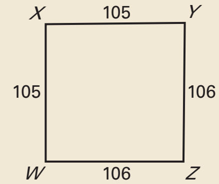
Extra Example 8.5

Quadrilateral *DEFG* is a trapezoid. Find $m\angle G$ and $m\angle E$. **70°, 155°**

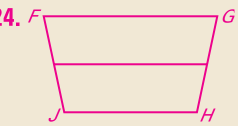


Extra Example 8.6

Give the most specific name for quadrilateral *XYZW*. **kite**



24.



26. Trapezoid; since consecutive interior angles are supplementary, $\overline{EF} \parallel \overline{HG}$ but you do not know that $\overline{EH}$ is parallel to $\overline{FG}$.

27. Parallelogram; since opposite pairs of sides are congruent, it is a parallelogram. There are no known right angles.

28. Square; since three interior angles measure 90°, the measure of the fourth angle is 90°. It is a parallelogram with consecutive sides congruent, so all 4 sides are congruent which makes it a square.