LESSON 6.2

NAME _____ DATE _____

Reteaching with Practice

For use with pages 330–337

GOAL **Use some properties of parallelograms**

VOCABULARY

A **parallelogram** is a quadrilateral with both pairs of opposite sides parallel.

Theorem 6.2
If a quadrilateral is a parallelogram, then its opposite sides are congruent.

Theorem 6.3
If a quadrilateral is a parallelogram, then its opposite angles are congruent.

Theorem 6.4
If a quadrilateral is a parallelogram, then its consecutive angles are supplementary.

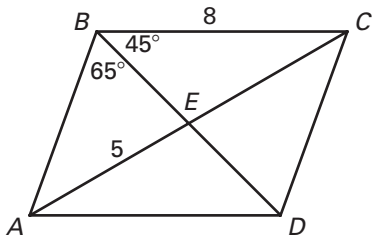
Theorem 6.5
If a quadrilateral is a parallelogram, then its diagonals bisect each other.

EXAMPLE 1 Using Properties of Parallelograms

ABCD is a parallelogram. Find the lengths and angle measures.

a. AD **b.** EC

c. $m\angle ADC$ **d.** $m\angle BCD$



SOLUTION

a. $AD = BC$ from Theorem 6.2. So, $AD = 8$.

b. From Theorem 6.5, the two diagonals of *ABCD* bisect each other. Therefore, $AE = EC$. So, $EC = 5$.

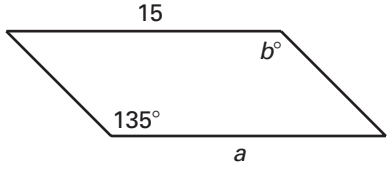
c. $m\angle ABC = m\angle ADC$ from Theorem 6.3.
$m\angle ABC = m\angle ABE + m\angle CBE$ by the Angle Addition Postulate.
Substituting, $m\angle ADC = 65° + 45° = 110°$.

d. $m\angle BCD + m\angle ADC = 180°$ by Theorem 6.4. So
$m\angle BCD = 180° - m\angle ADC$ by the Subtraction Property of Equality. By substituting and simplifying, $m\angle BCD = 70°$.

Exercises for Example 1

Find the value of each variable in the parallelogram.

1.



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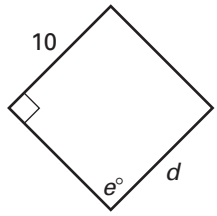

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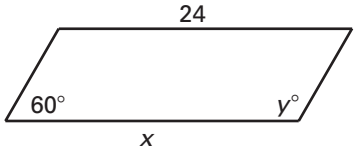
3.



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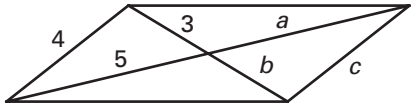

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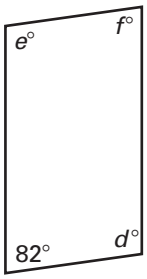

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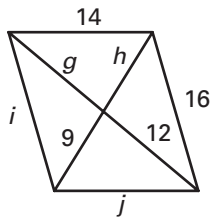
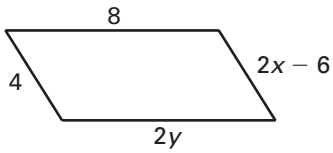


EXAMPLE 2 Using Algebra with Parallelograms

Use algebra to find the value of each variable in the parallelogram.

a.



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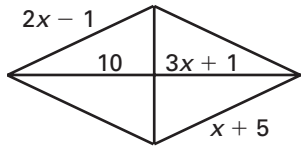


SOLUTION

Set up equations based upon the properties of parallelograms provided in Theorems 6.2 through 6.5.

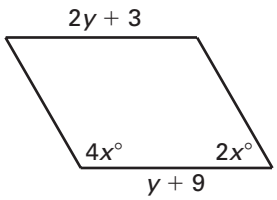
a. Because opposite sides of a parallelogram are congruent (Theorem 6.2), $2x - 6 = 4$. Solving for x yields $2x = 10$ which means $x = 5$. Also by Theorem 6.2, $2y = 8$, so $y = 4$.

b. From Theorem 6.2, $2x - 1 = x + 5$. Thus, $x = 6$.
From Theorem 6.5, $3x + 1 = 10$. Thus, $3x = 9$ which means $x = 3$.

Exercises for Example 2

Find the value of each variable in the parallelogram.

7.



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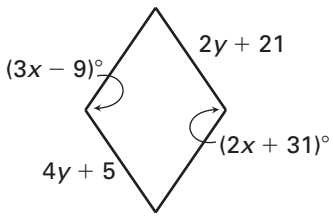

9.