Name _____ Date _____

LESSON 11.2

Study Guide

For use with pages 729–736

GOAL **Find areas of other types of quadrilaterals.**

Vocabulary

The **height of a trapezoid** is the perpendicular distance between its bases.

Theorem 11.4 Area of a Trapezoid: The area of a trapezoid is one half the product of the height and the sum of the lengths of the bases.

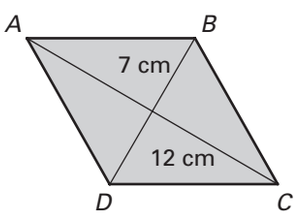
Theorem 11.5 Area of a Rhombus: The area of a rhombus is one half the product of the lengths of its diagonals.

Theorem 11.6 Area of a Kite: The area of a kite is one half the product of the lengths of its diagonals.

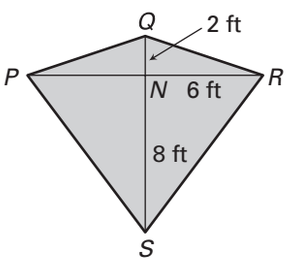
EXAMPLE 1 Find the area of a quadrilateral

Find the area of the quadrilateral.

a.



b.



Solution

a. The diagonals of a rhombus bisect each other, so $AC = 12 + 12 = 24$, and $BD = 7 + 7 = 14$.

$A = \frac{1}{2}d_1d_2 = \frac{1}{2}(24)(14) = 168$ square centimeters

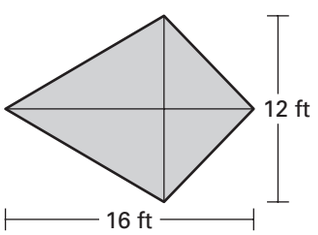
b. The length of diagonal $\overline{QS}$ is $QN + NS = 2 + 8 = 10$. Because $\triangle PQN \cong \triangle RQN$, $PN = RN = 6$. So the length of diagonal $\overline{PR}$ is $PN + RN = 6 + 6 = 12$.

$A = \frac{1}{2}d_1d_2 = \frac{1}{2}(10)(12) = 60$ square feet

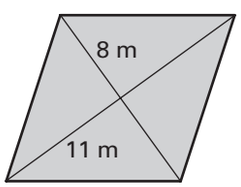
Exercises for Example 1

Find the area of the figure.

1.



2.



Name _____ Date _____

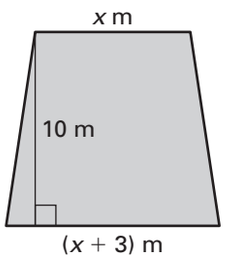
LESSON 11.2

Study Guide *continued*

For use with pages 729–736

EXAMPLE 2 Solve for an unknown measure

The height of a trapezoid is 10 meters and the area is 95 square meters. One base is 3 meters longer than the other base. What are the lengths of the bases?



Solution

Draw and label a diagram. Let x be the length of one base. The other base is 3 meters longer, so let $x + 3$ be the length of the other base.

$A = \frac{1}{2}h(b_1 + b_2)$ Formula for the area of a trapezoid

$95 = \frac{1}{2}(10)[x + (x + 3)]$ Substitute 95 for A, 10 for h, x for b_1, and $x + 3$ for b_2.

$95 = 10x + 15$ Simplify.

$8 = x$ Solve for x.

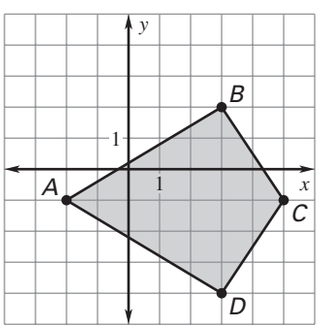
The lengths of the bases are 8 meters and $8 + 3 = 11$ meters.

EXAMPLE 3 Find an area in the coordinate plane

Find the area of the kite with vertices *A*(−2, −1), *B*(3, 2), *C*(5, −1), and *D*(3, −4).

Solution

STEP 1 Plot the vertices in the coordinate plane and draw line segments to form a kite.



STEP 2 Find the lengths of the diagonals by counting the number of units between opposite vertices.

$d_1 = AC = |5 - (-2)| = 7$ units

$d_2 = BD = |-4 - 2| = 6$ units

STEP 3 Find the area of the kite.

$A = \frac{1}{2}d_1d_2 = \frac{1}{2}(6)(7) = 21$ square units

Exercises for Examples 2 and 3

3. One diagonal of a kite is three times as long as the other diagonal. The area of the kite is 384 square inches. What are the lengths of the diagonals?

4. Find the area of a trapezoid with vertices $A(0, 1)$, $B(2, 3)$, $C(4, 3)$, and $D(5, 1)$.

5. Find the area of a rhombus with vertices $P(-4, 1)$, $Q(-1, 4)$, $R(2, 1)$, and $S(-1, -2)$.