

10-2

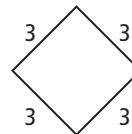
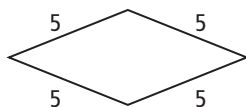
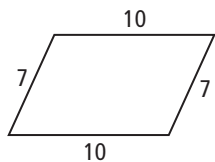
Areas of Trapezoids, Rhombuses, and Kites



Vocabulary

Review

1. Is a *rhombus* a parallelogram? Yes / No
2. Are all *rhombuses* squares? Yes / No
3. Are all squares *rhombuses*? Yes / No
4. Cross out the figure that is NOT a *rhombus*.



Vocabulary Builder

kite (noun) kyt

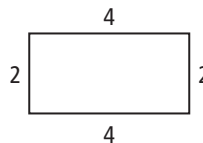
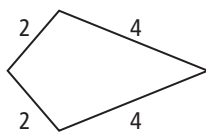
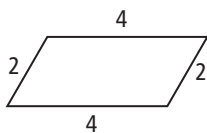
Definition: A **kite** is a quadrilateral with two pairs of congruent adjacent sides.

Main Idea: You can find the area of a **kite** when you know the lengths of its diagonals.

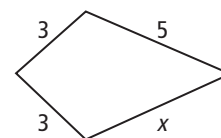
Word Origin: The name for this quadrilateral is taken from the name of the flying toy that it looks like.

Use Your Vocabulary

5. Circle the *kite*.



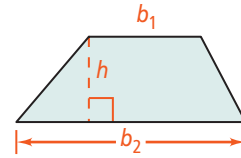
6. The figure at the right is a *kite*. What is the value of x ? Explain.



Theorem 10-4 Area of a Trapezoid

The area of a trapezoid is half the product of the height and the sum of the bases.

$$A = \frac{1}{2}h(b_1 + b_2)$$



Underline the correct word to complete each sentence.

- The bases of a trapezoid are parallel / perpendicular .
- The height / width of a trapezoid is the perpendicular distance between the bases.



Problem 1 Area of a Trapezoid

Got It? What is the area of a trapezoid with height 7 cm and bases 12 cm and 15 cm?

- Use the justifications below to find the area of the trapezoid.

$$\begin{aligned}
 A &= \frac{1}{2}h(b_1 + b_2) && \text{Use the formula for area of a trapezoid.} \\
 &= \frac{1}{2}(\text{ })(\text{ } + 15) && \text{Substitute.} \\
 &= \frac{1}{2}(\text{ })(\text{ }) && \text{Add.} \\
 &= \text{ } && \text{Simplify.}
 \end{aligned}$$

- The area of the trapezoid is cm^2 .



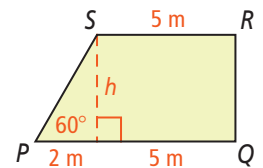
Problem 2 Finding Area Using a Right Triangle

Got It? Suppose h decreases in trapezoid $PQRS$ so that $m\angle P = 45$ while angles R and Q and the bases stay the same. What is the area of trapezoid $PQRS$?

- If $m\angle P = 45$, is the triangle still a 30° - 60° - 90° triangle? Yes / No
- Is the triangle a 45° - 45° - 90° triangle? Yes / No
- Are the legs of a 45° - 45° - 90° triangle congruent? Yes / No
- The height of the triangle is m.
- The area is found below. Write a justification for each step.

$$\begin{aligned}
 A &= \frac{1}{2}h(b_1 + b_2) && \text{ } \\
 &= \frac{1}{2}(2)(5 + 7) && \text{ } \\
 &= \frac{1}{2}(2)(12) && \text{ } \\
 &= 12 && \text{ }
 \end{aligned}$$

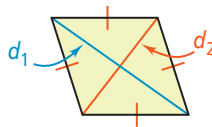
- The area of trapezoid $PQRS$ is m^2 .



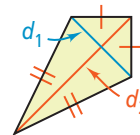
Theorem 10-5 Area of a Rhombus or a Kite

The area of a rhombus or a kite is half the product of the lengths of its diagonals.

$$A = \frac{1}{2}(d_1 d_2)$$



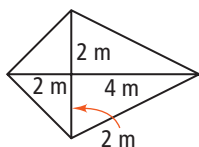
Rhombus



Kite

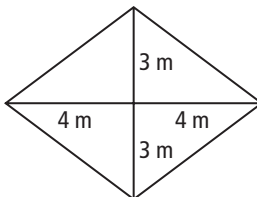
17. Describe one way that finding the area of rhombus or a kite is different from finding the area of a trapezoid.

18. Find the lengths of the diagonals of the kite and the rhombus below.



lengths of the diagonals of the kite:

m and m



lengths of the diagonals of the rhombus:

m and m



Problem 3 Finding the Area of a Kite

Got It? What is the area of a kite with diagonals that are 12 in. and 9 in. long?

19. **Error Analysis** Below is one student's solution. What error did the student make?

~~$$\begin{aligned}
 A &= \frac{1}{2}(12 + 9) \\
 &= \frac{1}{2}(21) \\
 &= 10.5
 \end{aligned}$$~~

20. Find the area of the kite.

21. The area of the kite is in.².



Problem 4 Finding the Area of a Rhombus

Got It? A rhombus has sides 10 cm long. If the longer diagonal is 16 cm, what is the area of the rhombus?

Underline the correct words to complete the sentence.

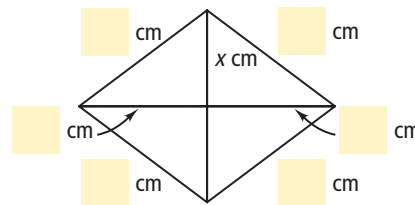
22. The diagonals of a rhombus bisect each other / side and are parallel / perpendicular.

23. Label the rhombus at the right.

24. The shorter diagonal is + , or .

25. Use the Pythagorean Theorem to find the value of x .

26. Find the area of the rhombus.



27. The area of the rhombus is cm^2 .



Lesson Check • Do you UNDERSTAND?

Reasoning Do you need to know the lengths of the sides to find the area of a kite? Explain.

28. Cross out the length you do NOT need to find the area of each triangle in a kite.

each leg hypotenuse

29. Now answer the question.



Math Success

Check off the vocabulary words that you understand.

kite

height of a trapezoid

Rate how well you can find the area of a trapezoid, rhombus, or kite.

