# reas of Trapezoids, Rhombi, and Kites

1 Areas of Trapezoids
In Lesson 6-6, you learned that a *trapezoid* is a quadrilateral with exactly one pair of parallel sides. These parallel sides are called *bases*. The **height of a trapezoid** is the perpendicular distance between its bases.
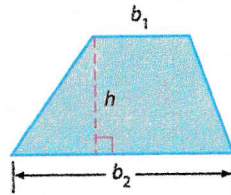
In the figure below, a translation and rotation of the first trapezoid results in two congruent trapezoids that fit together to form a parallelogram.
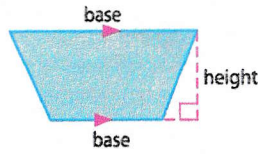
KeyConcept Area of a Trapezoid

The area A of a trapezoid is one half the product of the height h and the sum of its bases, b_1 and b_2.

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

Real-World Example 1 Area of a Trapezoid

CRAFTS One of Brianna's trapezoid-shaped totes is shown. Find the amount of material used to make the side shown.

$A = \frac{1}{2}h(b_1 + b_2)$ Area of a trapezoid

$= \frac{1}{2}(30)(28 + 58)$ $h = 30, b_1 = 28, b_2 = 58$

$= 1290$ Simplify.

The tote requires 1290 square centimeters.

[handwritten: b₁, h→, b₂]
28 cm / 30 cm / 58 cm

GuidedPractice

1. **AUTOMOBILES** Find the area of glass used to make the windshield of a van shown at the right.

72 in. / 38 in. ←h / 85 in.
[handwritten: b₁, b₂]

[handwritten: $A = \frac{1}{2}(72+85)38$]
[handwritten: $\frac{1}{2}(157)38 = 2983\,in^2$]

2 Areas of Rhombi and Kites
Recall from Lessons 6-5 and 6-6 that a *rhombus* is a parallelogram with all four sides congruent and a *kite* is a quadrilateral with exactly two pairs of consecutive congruent sides.
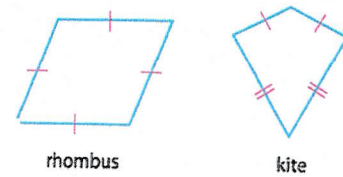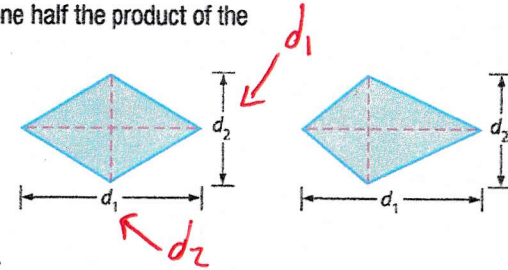
rhombus   kite
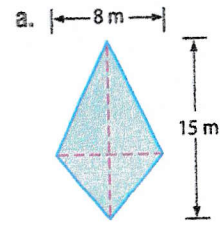
KeyConcept Area of a Rhombus or Kite

Words   The area A of a rhombus or kite is one half the product of the lengths of its diagonals, d_1 and d_2.

Symbols $A = \frac{1}{2}d_1d_2$

[handwritten: ✳ Doesn't matter which is d_1 or d_2]

Find the area of each rhombus or kite.

a.
8 m / 15 m

$A = \frac{1}{2}d_1d_2$ Area of a kite

$= \frac{1}{2}(8)(15)$ $d_1 = 8$ and $d_2 = 15$
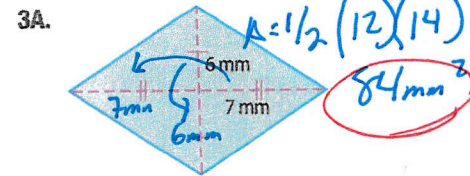
$= 60 \text{ m}^2$ Simplify.

b.
10 ft / 12 ft
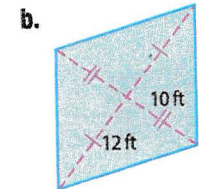
Step 1 Find the length of each diagonal.

Since the diagonals of a rhombus bisect each other, then lengths of the diagonals are $12 + 12$ or 24 feet and $10 + 10$ or 20 feet.
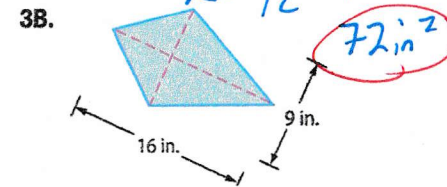
Step 2 Find the area of the rhombus.

$A = \frac{1}{2}d_1d_2$ Area of a rhombus

$= \frac{1}{2}(24)(20)$ $d_1 = 24$ and $d_2 = 20$

$= 240 \text{ ft}^2$ Simplify.

Find the area of each rhombus or kite.

3A.
6 mm / 7 mm
[handwritten: 7mm, 6mm, $A = \frac{1}{2}(12)(14)$, $84\,mm^2$]

3B.
16 in. / 9 in.
[handwritten: $A = \frac{1}{2}\,9\cdot 16$, $72\,in^2$]