A = b•h [handwritten]

The *area* of a polygon is the amount of surface it covers. You can find the area of a parallelogram in much the same way as you can find the area of a rectangle.
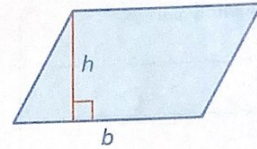
Key Idea

Area of a Parallelogram

The base of a parallelogram does not have to be horizontal. Any side of a parallelogram can be the base.

Words The area A of a parallelogram is the product of its base b and its height h.
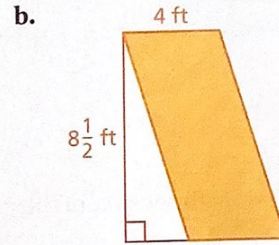
Algebra $A = bh$

Because a rhombus is a parallelogram, you can use the same formula to find the area of a rhombus.

Example 1 Finding Areas of Parallelograms

Find the area of each parallelogram.

a.

16 m
16 m   14 m   16 m
16 m
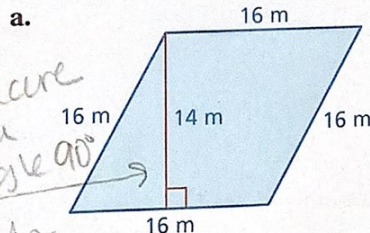
little square means a right angle 90° [handwritten]
the line with the right angle is the height [handwritten]

$A = bh$

$= 16(14)$ Write formula.

$= 224$ Substitute values.

Multiply.

Remember

Area is measured in square units.

▶ The area of the rhombus is 224 square meters.

b.

4 ft
$8\frac{1}{2}$ ft

$A = bh$

$= 4\left(8\frac{1}{2}\right)$

$= 34$

▶ The area of the parallelogram is 34 square feet.

Try It Find the area of the parallelogram.

1.

25 m
20 m

25•20 [handwritten]
A = 500 m² [handwritten]

2.

18 in.
7 in.

18•7 = [handwritten]
A = 126 in² [handwritten]

3.

30 yd
30 yd
20.5 yd
30 yd
30 yd
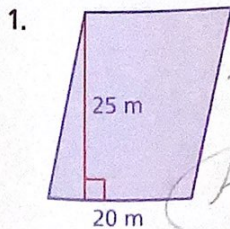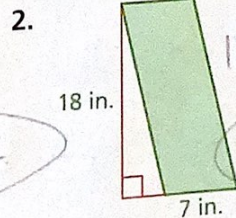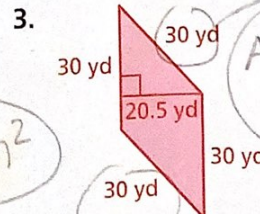
30•20.5 [handwritten]
A = 615 yd² [handwritten]
never use #s on the slanted line [handwritten]

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Example 2 Finding Missing Dimensions of Parallelograms

Find the missing dimension of each parallelogram.

4
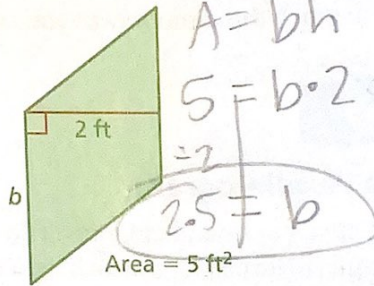**MTR**
CONSTRUCT AN ARGUMENT

Why can you be certain that the figure in part (b) is a rhombus, but not the figure in part (a)?

a.

$A = bh$
$5 = b \cdot 2$
$\div 2$
$2.5 = b$

2 ft

b

Area = 5 ft²

b.

$A = b \cdot h$
$30 = 7.5 \cdot h$
7.5
$H = h$

7.5 cm
7.5 cm
h
7.5 cm
7.5 cm

Area = 30 cm²

$A = bh$	Write formula.
$5 = b(2)$	Substitute values.
$\dfrac{5}{2} = \dfrac{b(2)}{2}$	Division Property of Equality
$2\dfrac{1}{2} = b$	Simplify.

▶ The base of the parallelogram is $2\dfrac{1}{2}$ feet.

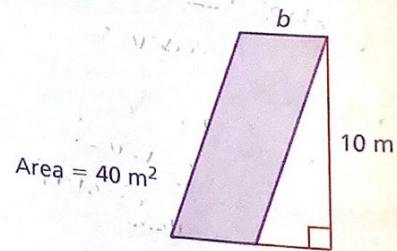|	
$A = bh$	
$30 = 7.5h$	
$\dfrac{30}{7.5} = \dfrac{7.5h}{7.5}$	
$4 = h$	

▶ The height of the rhombus is 4 centimeters.
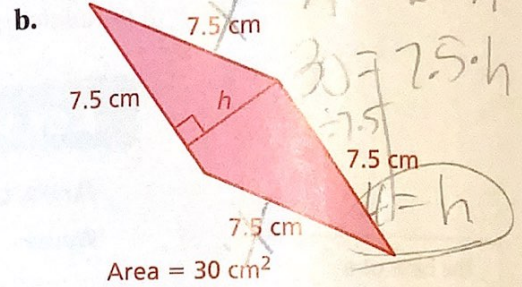
Try It

4. Find the missing dimension of the parallelogram.

$A = bh$
$40 = b \cdot 10$
$\div 10$
$4 = b$

b

10 m

Area = 40 m²

In-Class Practice
1 I don't understand yet.
2 I can do it with help.
3 I can do it on my own.
4 I can teach someone else.

5. **WRITING** Explain how to use the area of a rectangle to find the area of a parallelogram.

They have the same equation $A = b \cdot h$

FINDING AREA Find the area of the parallelogram.

6.

5 ft

16 ft

$16 \cdot 5 = 80 \, ft^2$

7.

4.8 km   4.8 km

3 km

4.8 km   4.8 km
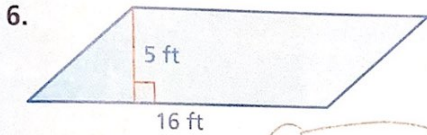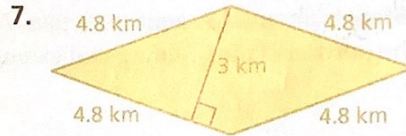
$4.8 \cdot 3 = 14.4 \, km^2$

8. **REASONING** Draw a parallelogram that has a base of 6 inches and an area of 24 square inches. What is the height of the parallelogram?

$A = bh$

$24 = 6 \cdot h$

$\div 6$

$4 = h$

Go to pg. 600

Example 3 Modeling Real Life 7 MTR

The area of the parallelogram-shaped forest bordered by roads is 99,000 square yards. What is the length of the deer trail?

Understand the problem.
You are given the area of a parallelogram-shaped forest, and the map shows the length of one of its bases. You are asked to find the length of the deer trail, which represents the height of the parallelogram.
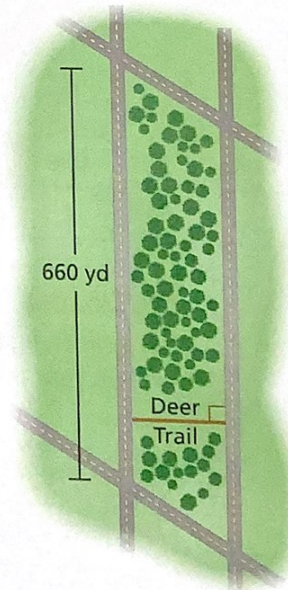
Make a plan.
Use the formula for the area of a parallelogram. Substitute for the area and the base, and then solve for the height.

660 yd

Deer Trail

Solve and check.

$A = bh$	Write formula for area of a parallelogram.
$99,000 = 660h$	Substitute 99,000 for A and 660 for b.
$\dfrac{99,000}{660} = \dfrac{660h}{660}$	Division Property of Equality
$150 = h$	Simplify.

▶ So, the deer trail is 150 yards long.

Check

$A = bh$

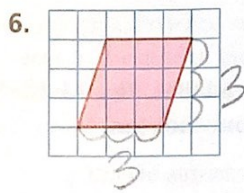$99,000 \overset{?}{=} 660(150)$

$99,000 = 99,000 \checkmark$

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Concepts, Skills, & Problem Solving

USING TOOLS Rearrange the parallelogram as a rectangle. Then find the area. (See Exploration 1.)

5.

2

6

$6 \cdot 2 = 12$ units²

6.

3

$3 \cdot 3 = 9$ units²

7.

8
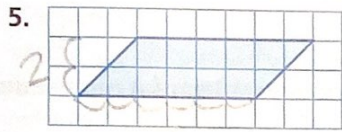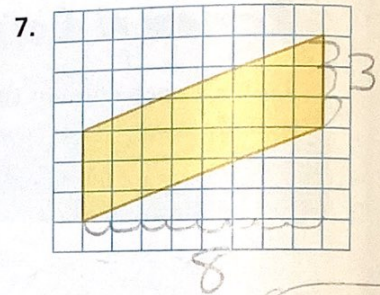
$8 \cdot 3 = 24$ units²

FINDING AREA Find the area of the parallelogram. (See Example 1.)

8.

6 ft

6 ft   3 ft   6 ft

6 ft

▶ **9.**

42 mm

20 mm

10.

17 km

17 km   11 km   17 km

17 km

11.

75 cm   50 cm

12.

18 in.   19 in.

13.5 in.

13.

32 mi

24 mi

$37\frac{1}{4}$ mi