10.3 Areas of Parallelograms and Trapezoids

Goal: Find the areas of parallelograms and trapezoids.

Vocabulary

Base of a parallelogram:

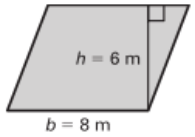
Height of a parallelogram:

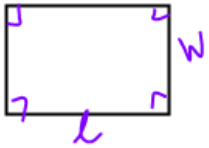
Base of a trapezoid:

Height of a trapezoid:

Area of a Parallelogram

Words The area A of a parallelogram is the product of the base b and the height h.



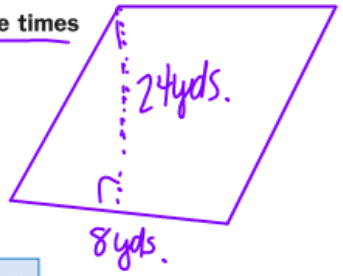


Algebra $A = bh$

Numbers $A = 8 \cdot 6 = 48 m^2$

Example 1 *Finding the Area of a Parallelogram*

The base of a parallelogram is 8 yards. The height is three times the base. Find the area of the parallelogram.



1. Find the height.

$h = 3b$

$= 3(8)$

$= 24 \text{ yds.}$

2. Find the area.

$A = bh$

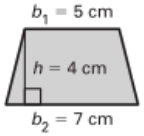
$= 8 \cdot 24$

$= 192 \text{ yds.}^2$

Answer: The parallelogram has an area of 192 square yards.

Area of a Trapezoid

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



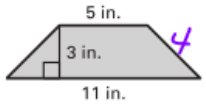
Algebra $A = \frac{1}{2}(b_1 + b_2)h$

Numbers $A = \frac{1}{2} \cdot (5 + 7) \cdot 4 = 24 \text{ cm}^2$

$= \frac{1}{2} \cdot 12 \cdot 4 = 24$

Example 2 *Finding the Area of a Trapezoid*

The diagram shows one of the trapezoids in a floor design. Find the area of the trapezoid.



Solution

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

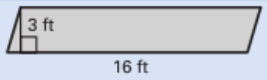
$= \frac{1}{2}(5 + 11) \cdot 3$ Substitute values.

$= \frac{1}{2} \cdot 16 \cdot 3$ Simplify.

Answer: The trapezoid has an area of 24 in.^2

Checkpoint Find the area of the parallelogram or trapezoid.

1.



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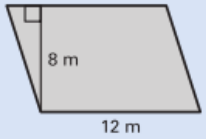

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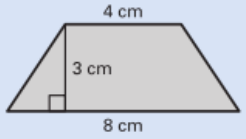

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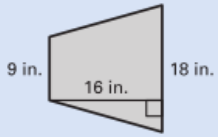
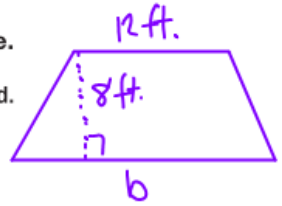


Example 3 *Finding an Unknown Length*

The height of a trapezoid is 8 feet. One of its bases is 12 feet. The area of the trapezoid is 108 square feet. Find the other base.



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

$108 = \frac{1}{2}(12 + b)8$ Substitute values.

$108 = 4(12 + b)$ Multiply.

$108 = 48 + 4b$ Distributive property

$60 = 4b$ Subtract 48 from each side.

$15 = b$ Divide each side by 4.

Answer: The other base is 15ft.