LESSON 1.8

The Distributive Property

CA Standards AF 1.3

Goal: Use the distributive property.

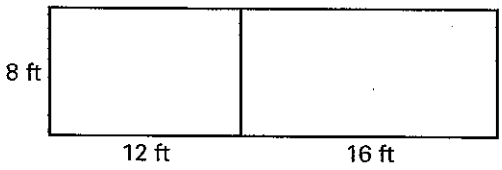
Vocabulary

Equivalent expressions: Numerical expressions that are equal, or algebraic expressions that are equal for all values of the variable(s)

EXAMPLE 1 Finding a Combined Area

Think: What formula do I need to find the area?

Gardening You are planting a vegetable garden and a flower garden. The diagram shows the dimensions of the two adjacent, rectangular gardens. How can you find the total area of the two gardens?



Solution

Method 1 Find the area of each garden, then find the total area.

Area = 8(12) + 8(16)

= 96 + 128

= 224 square feet

Method 2 Find the total length, then multiply by the common width.

Area = 8 (12 + 16)

= 8 (28)

= 224 square feet

Answer: The total area of the two gardens is 224 square feet.

The Distributive Property

Words You can multiply a number and a sum by multiplying the number by each part of the sum and then adding these products. The same property applies to subtraction.

Algebra $a(b + c) = ab + ac$ **Numbers** $9(2 + 6) =$ 9(2) + 9(6)

$a(b - c) = ab - ac$ $8(7 - 1) =$ 8(7) − 8(1)

EXAMPLE 2 Using the Distributive Property

a. $-4(a + 13) =$ [$-4a + (-4)(13)$] Distributive property

$=$ [$-4a$] $+$ [(-52)] Multiply.

b. $5[3 - 11 + (-7)] =$ [$5(3) - 5(11) + 5(-7)$] Distributive property

$=$ [15] $-$ [55] $+$ ([-35]) Multiply.

$=$ [15] $+$ ([-55]) $+$ ([-35]) Add the opposite of [55].

$=$ [-75] Add from left to right.

Guided Practice **Use the distributive property to evaluate or simplify the expression.**

1. $-3(8 + 16)$	**2.** $-5(-2 - 19)$	**3.** $2(x - 7)$	**4.** $-6(t + 15)$

Properties of Addition and Multiplication

Let a, b, and c be integers.

Property	Addition	Multiplication
[Commutative] Property	$a + b = b + a$	$ab = ba$
Associative Property	([$a + b$]) $+ c = a + (b + c)$	$(ab)c = a($[bc]$)$
[Identity] Property	$a + 0 = a$	$a(1) = a$
Inverse Property of Addition	$a +$ ([$-a$]) $= 0$	
Multiplication Property of Zero		$a \cdot 0 =$ [0]
Closure Property	$a + b$ is an [integer]	ab is an [integer]
[Distributive] Property	$a(b + c) = ab + ac$ and $a(b - c) = ab - ac$	

Homework