Math 7 Notes (Section 5-4) The Distributive Property

Examples: 4(5x + 3)

$4 \cdot 5x + 4 \cdot 3$

$\boxed{20x + 12}$

(8 - 2y)(-7)

(8 + -2y)(-7)

8(-7) + (-2y)(-7)

-56 + 14y

$-7(8 - 2y)$

$-7(8 + -2y)$

$-7(8) + -7(-2y)$

$\boxed{-56 + 14y}$

Words: To multiply a sum or difference (in parentheses) by a number, multiply the number by each term inside the parentheses.

For differences remember to change subtraction to "add the opposite" first.

Def of subtraction $a - b = a + -b$

Equivalent Algebraic Expressions

* have the same value no matter what value is substituted for the variable(s)

Example:

8(x + 4)   "is equivalent to"   8x + 32

Let x = 3

8(3 + 4)   8(3) + 32
8(7)   24 + 32
$\boxed{56}$ $\boxed{56}$

Let x = -5

8(x+4)   8x + 32
8(-5 + 4)   8(-5) + 32
8(-1)   -40 + 32
$\boxed{-8}$ $\boxed{-8}$

Examples of Multiplying by a sum

Directions: Use the distributive property to rewrite each expression with an equivalent one.

-5(2x + 3)	$\frac{1}{3}$(3x + -6)
$-5(2x) + -5(3)$	$\frac{1}{3} \cdot 3x + \frac{1}{3}(-6)$
-10x + ⁻15	x + ⁻2
$\boxed{-10x - 15}$	$\boxed{x - 2}$
-4(3x + -2)	(3x + -5)7
$-4(3x) + -4(-2)$	$7(3x + -5)$
$\boxed{-12x + 8}$	$7(3x) + 7(-5)$
	21x + ⁻35
	$\boxed{21x - 35}$

More Examples of Multiplying by a sum

Directions: Use the distributive property to rewrite each expression with an equivalent one.

-7(-2x + 4)	$\frac{1}{2}$(x + 8)
$-7(-2x) + -7(4)$	$\frac{1}{2}x + \frac{1}{2}(8)$
14x + ⁻28	$\boxed{\frac{1}{2}x + 4}$
$\boxed{14x - 28}$	
(4x + 1)(-6)	$-\frac{1}{2}$(6x + 10)
$-6(4x + 1)$	$-\frac{1}{2}(6x) + -\frac{1}{2}(10)$
$-6(4x) + -6(1)$	-3x + ⁻5
-24x + ⁻6	$\boxed{-3x - 5}$
$\boxed{-24y - 6}$	

Examples of Multiplying by a difference:

**If it is a subtraction problem inside the parentheses ALWAYS start by rewriting the related addition problem for the subtraction problem

$8(x - 5)$

$8(x + {}^-5)$

$8x + 8(-5)$

$8x + {}^-40$

$\boxed{8x - 40}$

$-3(x - {}^-7)$

$-3(x + 7)$

$-3x + {}^-3(7)$

$-3x + {}^-21$

$\boxed{-3x - 21}$

$-4(x - 6)$

$-4(x + {}^-6)$

$-4x + {}^-4(-6)$

$\boxed{-4x + 24}$

$(2x - 3)4$

$4(2x + {}^-3)$

$4(2x) + 4(-3)$

$8x + {}^-12$

$\boxed{8x - 12}$

More Examples of Multiplying by a difference

Directions: Use the distributive property to rewrite each expression with an equivalent one.

$5(4x - {}^-1)$

$5(4x + 1)$

$5 \cdot 4x + 5 \cdot 1$

$\boxed{20x + 5}$

$(3x - {}^-2)(-4)$

$-4(3x + 2)$

$-4(3x) + {}^-4(2)$

$-12x + {}^-8$

$\boxed{-12x - 8}$

$-6a(3b - 2c)$

$-6a(3b + {}^-2c)$

$-6a(3b) + {}^-6a({}^-2c)$

$\boxed{-18ab + 12ac}$

$(5n - 8)(6)$

$6(5n + {}^-8)$
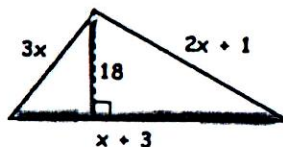
$6(5n) + 6(-8)$

$30n + {}^-48$

$\boxed{30n - 48}$

Admission to a baseball game is $12, and a hot dog costs $5. Find the total cost of 4 tickets and 4 hot dogs in two equivalent ways that show the distributive property.

$4(12 + 5) = 4(12) + 4(5)$

$4(17) \qquad\qquad 48 + 20$

$\$68 \qquad\qquad \$68$

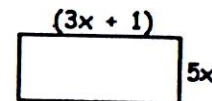Find the **area** of this triangle. Write two equivalent expressions.

3x   2x + 1
18
x + 3

$A = \frac{1}{2}bh$

$A = \frac{1}{2}(x+3)18$

$\boxed{A = 9(x+3)}$

$\boxed{A = 9x + 27}$

Find the **area** of this rectangle. Write two equivalent expressions.

$(3x + 1)$

5x

$A = \ell w$

$A = (3x+1)(5x)$

$\boxed{A = 5x(3x+1)}$

$A = 5x \cdot 3x + 5x \cdot 1$

$\boxed{A = 15x^2 + 5x}$