Name: Key

Guided notes 2c.3
Math 9 – Wolfe

Distributive Property

Let's review something you definitely already know – we can write a multiplication equation in a bunch of different ways:

5(8) = 40
5(1+7) = 40
5(2+6) = 40
5(3+5) = 40
5(4+4) = 40

We can play with the order in which we do our multiplication and addition while still getting the same result:

5(8) = 40 5(2+6) or 5(2+6)

Order of operations: brackets first - 5(8) 40

Distribute 5(2) + 5(6) 10 + 30 40

The rule that says we can do this is called Distributive Property (or sometimes the Distributive Law)

But why would we want to do this? Remember, you can only add or subtract like terms, or terms that have exactly the same variables to the same powers. What if what's inside the parentheses aren't like terms? Then the only way to get rid of the parentheses is to distribute.

Examples:

$3(x+6)$
$3x + 3(6)$
$3x + 18$

$5(a-4)$
$5a - 5(4)$
$5a - 20$

$x(2x^2+6)$
$2x^3+6x$

Let's write the general form of this rule:

The Distributive Property

$a(b+c) = ab + ac$

The danger, as always, is in the details here – usually a minus sign or two that gets dropped, or adding when you should have multiplied. Let's look at a few examples so we know how to deal with specific situations:

$5(x+2)$ $5x + 5 \cdot 2$ $5x + 10$	$-3(x+4)$ $-3x + -3 \cdot 4$ $-3x + (-12)$ $-3x - 12$	$2(a-6)$ $2a - 2 \cdot 6$ $2a - 12$
$-9(b+3)$ $-9b + 3(-9)$ $-9b + -27$ $-9b - 27$	$4(3x+8)$ $4 \cdot 3x + 4 \cdot 8$ $12x + 32$	$2x(5x-10)$ $2x \cdot 5x + 2x(-10)$ $10x^2 - 20x$

You don't *have* to write out the middle step if you are comfortable doing the multiplication in your head. When I saw "show your work," I expect to see:

$3(x+9)$
$3x + 27$

So what do we do with this property? We use it to solve equations, of course! If you see an equation with brackets, the first thing to do is get rid of them (by distributing).

$6(x+4) = 42$ $6x + 6 \cdot 4$ $6x + 24 = 42$ $-24 \quad -24$ $\frac{6x}{6} = \frac{18}{6}$ $x = 3$ Check: $6(3+4) \stackrel{?}{=} 42$ $6(7) = 42$ ✓	Distribute the 6 Subtract 24 from both sides Divide both sides by 6 Check your answer by plugging it in