Name: _____ Date: _____

MFM2P: Foundations of Mathematics 10 Numeracy and Algebra

Distributive Property Pt. 1: Monomial and Polynomial

1. Distributing a Constant Value

   Multiply the coefficient of each term by the constant. $4(2x+5)=4(2x)+4(5)=8x+20$
   Watch out for sign changes when constant is negative. $-3(3x-2)=-3(3x)-3(-2)=-9x+\mathbf{6}$

2. Distributing a Variable

   Add the exponents (Product Rule of exponents) $x^2(6x^3+2x^2)=x^2(6x^3)+x^2(2x^2)=6x^{5}+2x^{4}$
   Remember that x is the same as x^1. $x(4x-2)=x(4x)+x(-2)=4x^2-2x$

3. Distributing a Constant and a Variable

   Follow both rules for constants and variables. $3x(5x+2)=3x(5x)+3x(2)=15x^2+6x$

4. Examples

A. Expand $-5x(2x+7)$.
Multiply the coefficients, and update the exponents on the variables.

$$\begin{aligned} -5x(2x+7) &= -5x(2x)-5x(7) \\ &= -10x^2-35x \end{aligned}$$

B. Expand and simplify $2(x+3)+4(x-5)$.
Use the distributive property twice to fully expand the expression.

$$\begin{aligned} 2(x+3)+4(x-5) &= 2(x)+2(3)+4(x)+4(-5) \\ &= 2x+6+4x-20 \end{aligned}$$

Collect like terms to simplify the expression.

$$\begin{aligned} 2x+6+4x-20 &= 2x+4x+6-20 \\ &= 6x-14 \end{aligned}$$

C. Expand and simplify $3x(2x-1)-2(x+7)$.
Use the distributive property twice to fully expand the expression. Watch for sign changes.

$$\begin{aligned} 3x(2x-1)-2(x+7) &= 3x(2x)+3x(-1)-2(x)-2(7) \\ &= 6x^2-3x-2x-14 \end{aligned}$$

Collect like terms to simplify the expression.

$$6x^2-3x-2x-14=6x^2-5x-14$$

The expression cannot be simplified further, since x^2 and x are not like terms. The final expression, $6x^2-5x-14$, is known as a *quadratic*. These will be explored in more detail toward the end of this course.