# Multiplying Polynomials

**A.APR.1** Add, subtract, and multiply polynomials; understand that polynomials form a system analogous to the integers in that they are closed under these operations.

### What am I learning today?

How to multiply polynomials

#### How will I show that I learned it?

Correctly distribute and simplify when multiplying two binomial expressions

## Vocabulary:

Polynomial - An expression of algebraic terms, especially the sum of several terms that contain different powers of the same variable. (Ex:  $5x^3 - 2x^2 + 7$ )

Monomial - A polynomial expression with one term. Example:  $5x^2y$ Binomial - A polynomial expression with two terms. Example: 3x - 2yTrinomial - A polynomial expression with three terms. Example:  $9x^2 + x - 1$ 

When multiplying monomials, multiply the coefficients.

(variable) · (variable) changes the  $\frac{\text{exponent}}{x \cdot x} = x^2$ 

Example: 
$$5x^3 \cdot 7x' = 35 \times 4$$

Ex. 2 $-7x \cdot 11x$ $-77x^2$	Ex. 4 9x·-4 - 36 x
Ex. 3 -6 · -12x 72x	Ex. 5 10xy · 8xy 80 x 2 2

For all multiplication problems which include addition and subtraction, we use the <u>distributive property!</u>

Example: 
$$5x(2x-3) = 10x^2 - 15x$$

$$5x \cdot 2x - (5x \cdot 3)$$

$$10x^2 - 15x$$

Ex. 2 
$$-3x(10x + 6)$$
 Ex. 4  $7x(3x + -4)$   $-30x^2 - 18x$   $2|x^2 - 28x$ 

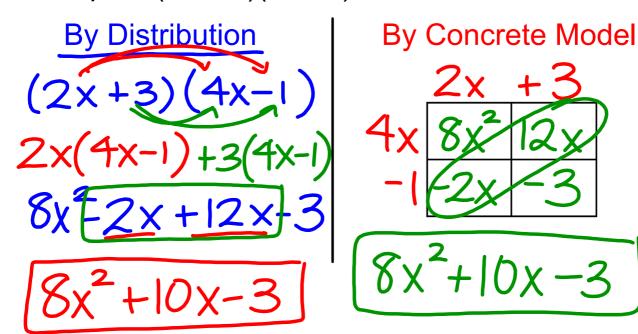
Ex. 4 
$$7x(3x + -4)$$
  
 $21x^2 - 28x$ 

$$12x^{2} + 24x$$

Ex. 3 
$$-6x(-2x-4)$$
 Ex. 5  $5xy(4x-y)$   $12x^2+24x$   $20x^2y-5xy^2$ 

For multiplying a binomial by a binomial, distribute each set of terms. Then, CLT! (combine like terms)

Example: (2x + 3)(4x - 1)



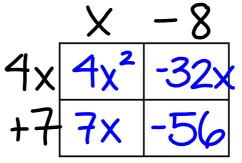
Example 2: 
$$(3x + 6)(2x + 5)$$

By Distribution 
$$(3x+6)(2x+5)$$
  
 $3x(2x+5)+6(2x+5)$ 
 $6x^2+15x+12x+30$ 
By Concrete Model  $3x+6$   
 $6x^2+15x+12x+30$ 
By Concrete Model  $3x+6$   
 $6x^2+15x+12x+30$ 
 $15x 30$ 

Example 3: 
$$(x - 8)(4x + 7)$$

By Distribution
$$(x-8)(4x+7)$$
 $(4x+7)-8(4x+7)$ 
 $4x^{2}(+7x-32x+56)$ 
 $4x^{2}-25x-56$ 

### By Concrete Model



Example 4: 
$$(3x^2 - 7)(2x - 7)$$
  
By Distribution By Concrete Model  $(3x^2-7)(2x-7)$   
 $3x^2-7$   
 $3x^2(2x-7)-7(2x-7)$   
 $3x^3(2x-7)-7(2x-7)$   
 $6x^3-2|x^2-14x+49$ 

Example 5: 
$$(3x+4)(3x-4)$$

By Distribution (3x+4)(3x-4)

 $3x + 4$ 
 $3x + 4$ 

Example 6: 
$$(2x-6)^2$$
  $\chi^2 = x \cdot x$ 

By Distribution  $(2x-6)(2x-6)$  By Concrete Model  $(2x-6)(2x-6)$   $2x - 6$ 
 $2x(2x-6)-6(2x-6)$   $2x - 6$ 
 $4x^2-12x-12x+36$ 
 $4x^2-24x+36$