

## Multiplying Polynomials

The distributive property can be used to multiply polynomials as well as to multiply a monomial by a polynomial. To find the product of two binomials, use the distributive property twice.

### Example 1: Multiply $(2x + 3)(5x + 8)$

$$\begin{aligned}(2x + 3)(5x + 8) &= 2x(5x + 8) + 3(5x + 8) \\ &= 2x(5x) + 2x(8) + 3(5x) + 3(8) \\ &= 10x^2 + 16x + 15x + 24 \\ &= 10x^2 + 31x + 24\end{aligned}$$

Although two binomials can always be multiplied as shown above, the following shortcut called **FOIL method** is used frequently.

Multiply the **FIRST** terms.  $(2x + 3)(5x + 8)$   $2x \bullet 5x = 10x^2$

Multiply the **OUTER** terms.  $(2x + 3)(5x + 8)$   $2x \bullet 8 = 16x$

Multiply the **INNER** terms.  $(2x + 3)(5x + 8)$   $3 \bullet 5x = 15x$

Multiply the **LAST** terms.  $(2x + 3)(5x + 8)$   $3 \bullet 8 = 24$

$$(2x + 3)(5x + 8) = 10x^2 + 16x + 15x + 24 = 10x^2 + 31x + 24$$

### FOIL method for Multiplying Two Binomials

To multiply two binomials, find the sum of the products of

- F** the first terms
- O** the outer terms
- I** the inner terms
- L** the last terms

The distributive property can be used to multiply any two polynomials.