

Lesson 4 Multiplying a Binomial by a Polynomial

There are 2 Methods to Multiply a Binomial times a Polynomial

- 1) Double Distribute lining up like terms
- 2) Double Distribute using a box (Diagram)

Method 1: Double Distribute lining up like terms

Step 1: Multiply first term by each term in the parentheses

$$(x + 2)(x^2 + 5x - 3)$$

Step 2: Multiply the second term by each term in the parentheses

$$(x + 2)(x^2 + 5x - 3)$$

$$\begin{array}{r} x^3 + 5x^2 - 3x \\ + 2x^2 + 10x - 6 \\ \hline x^3 + 7x^2 + 7x - 6 \end{array}$$

Step 3: Combine Like Terms

Method 2: Double Distribute using a box (Diagram)

Using the double distributive property:

$$(x + 2)(x^2 + 5x - 3)$$

	x^2	$5x$	-3
x	x^3	$5x^2$	$-3x$
2	$2x^2$	$10x$	-6

$$x^3 + 7x^2 + 7x - 6$$

Rules:

- Step 1: Distribute (multiply) the first term to each term in the second parentheses.
- Step 2: Distribute (multiply) the second term to each term in the second parentheses.
- Step 3: Be sure to line up LIKE terms under each other - Combine like terms.

Examples:

1) $(x + 4)(x^2 - 3x + 5)$

$$\begin{array}{r} x^3 - 3x^2 + 5x \\ + 4x^2 - 12x + 20 \\ \hline \end{array}$$

$$x^3 + 1x^2 - 7x + 20$$

2) $(2x + 3)(x^2 - 4x - 6)$

$$\begin{array}{r} 2x^3 - 8x^2 - 12x \\ + 3x^2 - 12x - 18 \\ \hline \end{array}$$

$$2x^3 - 5x^2 - 24x - 18$$

$$3) (x^2 - 2x + 5)(x - 7)$$

$$\begin{array}{r} \bigcirc x^3 - 14x^2 - 35x \\ = 2x^2 + 14x \\ + 5x - 35 \end{array}$$

$$x^3 - 9x^2 + 19x - 35$$

$$4) (w + 1)(w^2 - w + 1)$$

$$\begin{array}{r} w^3 - w^2 + w \\ + w^2 - w + 1 \end{array}$$

$$w^3 + 1$$

$$5) (x + 2)(x - 5)$$

$$\begin{array}{r} \bigcirc x^2 - 5x + 2x - 10 \\ x^2 - 3x - 10 \end{array}$$

$$6) (2y + 1)(3y^2 - 4y + 2)$$

$$\begin{array}{r} 6y^3 - 8y^2 + 4y \\ + 3y^2 - 4y + 2 \end{array}$$

$$6y^3 - 5y^2 + 2$$

Try These:

$$1) 2x^4(5x^3 - 3x^2 + x + 15)$$

$$\bigcirc 10x^7 - 6x^6 + 2x^5 + 30x^4$$

$$2) (3x - 8)(4x^2 + 2x + 3)$$

$$\begin{array}{r} 12x^3 + 6x^2 + 9x \\ - 32x^2 - 16x - 24 \end{array}$$

$$12x^3 - 26x^2 - 7x - 24$$

Draw a picture to represent the expression

$$3) (x + 8)(3x^2 + 5x - 6)$$

$$\begin{array}{r} 3x^3 + 5x^2 - 6x \\ + 24x^2 + 40x - 48 \end{array}$$

$$3x^3 + 29x^2 + 34x - 48$$

$$\bigcirc$$

	$3x^2$	$5x$	-6
x	$3x^3$	$5x^2$	$-6x$
8	$24x^2$	$40x$	-48

Typo?

$$4) (3x^2 + x - 1)(x^2 - 2x + 1)$$

$$\begin{array}{r} 3x^3 - 6x^3 + 3x^2 + x - 1 \\ + x^2 - 1x \\ - 2x^2 + 2x \end{array}$$

$$-3x^3 + 2x^2 + 2x - 1$$

$3x^2$		
x		
-1		