How Do We Multiply Two Binomials?

Binomials are FUN!
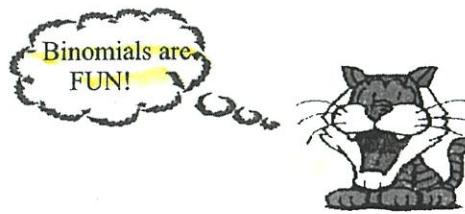
To multiply a binomial by a binomial we can use one of three methods:
1. Simple multiplication
2. The Table Method (Geometric Approach)
**3. FOIL (Double Distributive)   F = First   O = Outer   I = Inner   L = Last

Example: $(x + 3)(x + 2) =$

means to multiply

Method 1	Method 2	**Method 3
Simple Multiplication	The Table/Box Method	Double Distributive
$x + 3$ $x + 2$ $2x + 6$ $x^2 + 3x + 0$ $x^2 + 5x + 6$		$(x+3)(x+2)$ $x^2 + 2x + 3x + 6$ $x^2 + 5x + 6$

$x^2 + 2x + 3x + 6$

$x^2 + 5x + 6$

(left margin work)
12
x 1 t
1 2
1 2 0
+
1 3 2

Practice: Double Distribute

1) $(d + 9)(d - 3) =$

$d^2 \boxed{-3d + 9d} - 27$

$\boxed{d^2 + 6d - 27}$

2) $(2x + 2)(x + 3) =$

$2x^2 + 6x + 2x + 6$

$\boxed{2x^2 + 8x + 6}$

3) $(5y - 2)(3y + 1) =$

$15y^2 \boxed{+5y - 6y} - 2$

$\boxed{15y^2 - y - 2}$

4) $(8 - e)(5 - e) =$

$40 \boxed{-8e - 5e} + e^2$

$\boxed{e^2 - 13e + 40}$

★★ Conjugate: Same binomial w/ different signs. They will always produce binomials

5) Will a binomial times a binomial always yield a trinomial answer? No!

★★(a) $(x + 7)(x - 7) =$

$x^2 \underline{-7x + 7x} - 49$

$\boxed{x^2 - 49}$

★(b) $(10 - p)(10 + p) =$

$100 + \underline{10p - 10p} - p^2$

$\boxed{-p^2 + 100}$

★ NOT conjugates ★

6) $(x + 4)^2 = (x + 4)(x + 4)$

$(4)^2 = 4 \cdot 4$

$(x)^2 = x \cdot x$

$(x+4)^2 = (x+4)(x+4)$

$x^2 + 4x + 4x + 16$

$\boxed{x^2 + 8x + 16}$

7) $(3x - 7)^2 = (3x - 7)(3x - 7)$

$9x^2 - 21x - 21x + 49$

$\boxed{9x^2 - 42x + 49}$

8) Find the area of a square whose side measure $(y + 4)$.

$y + 4$

$A = s^2 \quad S \text{ (side)}$

$A = (y + 4)^2$

$A = (y + 4)(y + 4)$

$A = y^2 + 4y + 4y + 16$

$\boxed{A = y^2 + 8y + 16}$

9) A rectangle has a length of $(3x - 4)$ units and a width of $(4x + 5)$ units. Write a trinomial that represents the area of the rectangle.

$4x + 5$

$3x - 4$
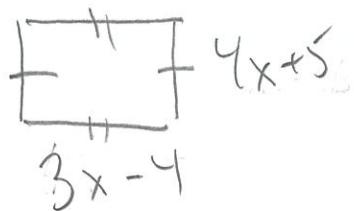
$A = L \cdot W$

$A = (3x - 4)(4x + 5)$

$A = 12x^2 + 15x - 16x - 20$

$\boxed{A = 12x^2 - x - 20}$

10) Find the area of a rectangle whose base is $(c^2 - 2c + 4)$ and whose height is $(c + 2)$.
(Can FOIL be used in this example? __NO__ Explain. FOIL only works w/ a binomial · binomial only

means Double distribute

$c + 2$
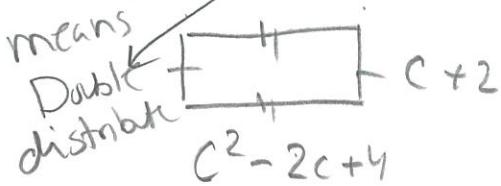
$c^2 - 2c + 4$

$A = L \cdot W$

$A = (c^2 - 2c + 4)(c + 2)$

$A = c^3 + 2c^2 - 2c^2 - 4c + 4c + 8$

$\boxed{A = c^3 + 8}$

11) $(x - 2)(x^2 - x + 4)$

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

$\boxed{x^3 - 3x^2 + 6x - 8}$

Triple Distribute

Use the following table to help you evaluate the following products

12) $(x + 3)(x + 5)$

	X	5
X	x^2	$5x$
3	$3x$	15

$x^2 + 3x + 5x + 15$

$\boxed{x^2 + 8x + 15}$

13) $(x - 3)(x + 4)$

	X	-3
X	x^2	$-3x$
4	$4x$	-12

$x^2 + 4x - 3x - 12$

$\boxed{x^2 + x - 12}$

Create a box diagram and then use it to find the following products

14) $(x - 2)(x - 2)$

	X	-2
X	x^2	$-2x$
-2	$-2x$	4

$x^2 - 2x - 2x + 4$

$\boxed{x^2 - 4x + 4}$

15) $(x + 1)(2x - 1)$

	X	+1
2x	$2x^2$	$+2x$
-1	$-x$	-1

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

$\boxed{2x^2 + x - 1}$

16) Use the following table to help evaluate the following product

$(x-2)(3x^2 - 4x + 7) =$

	$3x^2$	$-4x$	7
x	$3x^3$	$-4x^2$	$7x$
-2	$-6x^2$	$8x$	-14

$3x^3 - 4x^2 - 6x^2 + 7x + 8x - 14$

$\boxed{3x^3 - 10x^2 + 15x - 14}$

$$x + 3 \overline{\smash{\big)}\, x^2 + 6x + 4}$$