# Multiplying Binomials - FOIL

*Warm-Up:*

If You Can Multiply: $x(x+2)$ = $x^2+2x$

And You Can Multiply: $3(x+2)$ = $3x+6$

Then You Can Multiply: $(x+3)(x+2)$ How do you think you do this?

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

$= x^2+5x+6$

Are You Afraid You'll Forget???


$$(a+b)(c+d) = ac+ad+bc+bd$$

F O I L

When multiplying 2 binomials, remember this acronym:

F- IRST $a \cdot c$

O- UTSTIDE $a \cdot d$

I- NSIDE $b \cdot c$

L-AST $b \cdot d$

Basically:

- multiply each term in the first bracket by each term in the second bracket
- remember: when you multiply terms you multiply the coefficients and add the exponents
- collect like terms if applicable

Examples: ~~Simplify~~ (aka: expand and collect like terms)

a. $(2x+3)(x+4) = (2x)(x)+(2x)(4)+(3)(x)+(3)(4)$

$= 2x^2+8x+3x+12$

$2x^2+11x+12$

b. $(4x-3)(2x-1) = (4x)(2x)+(4x)(-1)+(-3)(2x)+(-3)(-1)$

$= 8x^2-4x-6x+3$

$= 8x^2-10x+3$

c. $(5-3z)(3z-2) =$

$= (5)(3z)+(5)(-2)+(-3z)(3z)+(-3z)(-2)$

$= 15z-10-9z^2+6z$

$= -9z^2+21z-10$

d. $(x+4y)(3x-5y) =$

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

$= 3x^2-5xy+12xy-20y^2$

$= 3x^2+7xy-20y^2$

Now, let's get more interesting:

e. $(x-5)^2 = (x-5)(x-5)$

RULE $(a+b)^2 = a^2+2ab+b^2$

$= (x)(x)+(x)(-5)+(-5)(x)+(-5)(-5)$

$= x^2-5x-5x+25$

$= x^2-10x+25$

f. $(2x+3)^2 = (2x)^2+2(2x)(3)+(3)^2$

$= 4x^2+12x+9$

Even more exciting:

g. $3(2x+4y)^2 =$

$= 3\left[(2x)^2+2(2x)(4y)+(4y)^2\right]$

$= 3(4x^2+16xy+16y^2)$

$= 12x^2+48xy+48y^2$

h. $(x-1)(3-2x)+(3x+1)(2x-1) =$

$= (x)(3)+(x)(-2x)+(-1)(3)+(-1)(-2x)+(3x)(2x)+(3x)(-1)+(1)(2x)+(1)(-1)$

$= 3x-2x^2-3+2x+6x^2-3x+2x-1$

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

i. $(2x+3)^2 - (3x+4)(x-2) = A - (B)$

Step 1: Simplify A and B separately

$A \Rightarrow (2x)^2 + 2(2x)(3) + (3)^2$

$A = 4x^2 + 12x + 9$

$B = (3x)(x) + (3x)(-2) + (4)(x) + (4)(-2)$

$= 3x^2 - 6x + 4x - 8$

$B = 3x^2 - 2x - 8$

Step 2: $A - (B)$

invisible 1 here. Do it distribution with "-1"!

$= 4x^2 + 12x + 9 - (3x^2 - 2x - 8)$

$= 4x^2 + 12x + 9 - 3x^2 + 2x + 8$

$= x^2 + 14x + 17$

j. A square has its length increased by 3cm and its width reduced by 5cm. Write an expression for the new area.

Let $x$ = the length of the original square

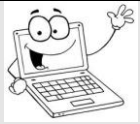
New length = $x + 3$ New width = $x - 5$

New area = $(x+3)(x-5)$

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

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

$= x^2 - 2x - 15$



Play the game on the website below
http://bit.ly/multiplyingbinomials