

Multiplying Two Binomials Using the FOIL Method

If we wish to multiply two binomials we could use the vertical method of multiplying or we can use what is known as the FOIL method. The FOIL method is useful because we use it as a basis for factoring.

FOIL Method

EXAMPLE: $(x+5)(x-10)$

This is the binomial $x+5$ times the binomial $x-10$.

The “F” of FOIL stands for multiplying the First terms of the 2 binomials.

$$\begin{array}{c}
 \text{F} \\
 \overleftarrow{\hspace{1.5cm}} \\
 \downarrow \quad \downarrow \\
 (x+5)(x-10) \\
 \\
 (x)(x) = x^2
 \end{array}$$

The “O” of FOIL stands for multiplying the Outside terms of the 2 binomials.

$$\begin{array}{c}
 \text{O} \\
 \overleftarrow{\hspace{1.5cm}} \\
 \downarrow \quad \downarrow \\
 (x+5)(x-10) \\
 \\
 (x)(-10) = -10x
 \end{array}$$

The “I” of FOIL stands for multiplying the Inside terms of the 2 binomials.

$$\begin{array}{c}
 (x+5)(x-10) \\
 \uparrow \quad \uparrow \\
 \text{I} \\
 (5)(x) = 5x
 \end{array}$$

The “L” of FOIL stands for multiplying the Last terms of the 2 binomials.

$$\begin{array}{c}
 (x+5)(x-10) \\
 \uparrow \quad \uparrow \\
 \text{L} \\
 (5)(-10) = -50
 \end{array}$$

If we put it together we get:

$$(x+5)(x-10)$$

$$x^2 - 10x + 5x - 50$$

F O I L

Notice that we have like terms to combine in the middle.

$$x^2 - 10x + 5x - 50$$

$$\quad \quad \quad \uparrow \quad \uparrow$$

$$\quad \quad \quad -5x$$

After simplifying we have $x^2 - 5x - 50$.

EXAMPLE: $(7x-2)(x+4)$

$$(7x-2)(x+4)$$

$$7x^2 + 28x - 2x - 8$$

F O I L

$$7x^2 + 28x - 2x - 8 = 7x^2 + 26x - 8$$

$$\quad \quad \quad \uparrow \quad \uparrow$$

$$\quad \quad \quad 26x$$

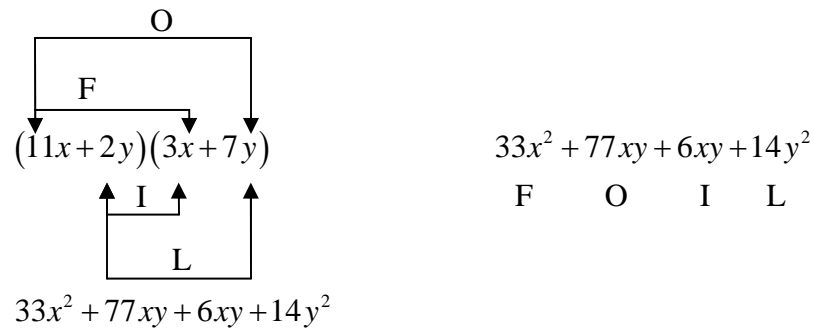
EXAMPLE: $(5a-12)(3a-7)$

$$(5a-12)(3a-7)$$

$$15a^2 - 35a - 36a + 84 = 15a^2 - 71a + 84$$

F O I L

EXAMPLE: $(11x+2y)(3x+7y)$



Simplify: $33x^2 + 77xy + 6xy + 14y^2 = 33x^2 + 83xy + 14y^2$

NOTE that the previous problem has two variables. The middle terms of the product contain both variables.

PRACTICE

Multiply each of the following pairs of binomials using FOIL.

a. $(y+9)(y-8)$

f. $(2x+3y)(3x-2y)$

b. $(2x+3)(x-7)$

g. $(4a+5)(3a+7)$

c. $(a-2)(4a-3)$

h. $(12a-5b)(a-4b)$

d. $(3x-5)(2x+4)$

i. $(y-2)(5y+11)$

e. $(a-b)(2a+b)$

j. $(7x+y)(4x+3y)$

This instructional aid was prepared by the Tallahassee Community College Learning Commons.

KEY:

a. $y^2 + y - 72$

b. $2x^2 - 11x - 21$

c. $4a^2 - 11a + 6$

d. $6x^2 + 2x - 20$

e. $2a^2 - ab - b^2$

f. $6x^2 + 5xy - 6y^2$

g. $12a^2 + 43a + 35$

h. $12a^2 - 53ab + 20b^2$

i. $5y^2 + y - 22$

j. $28x^2 + 25xy + 3y^2$