

Section 4.3

Objective: Multiplying Polynomials

Multiplying Polynomials

1. To multiply two polynomials, multiply each term of one polynomial by each term of the other polynomial. Then combine any like terms.
2. When you are multiplying two binomials, this is sometimes called the **FOIL Method** because you multiply **F** the *first* terms, **O** the *outside* terms, **I** the *inside* terms, and **L** the *last* terms.

Examples: Multiply

a) $-xy(7x^2y + 3xy - 11)$

$$-1x'y'(7x^2y' + 3x'y' - 11)$$

$$-1 \cdot 7x'x^2y'y' + -1 \cdot 3x'x'y'y' - 1 \cdot 11$$

$$\boxed{-7x^3y^2 + -3x^2y^2 + 11x'y'}$$

b) $(m+3)(m-8)$

	m	+3
m	m^2	$3m$
-8	$-8m$	-24

$$m^2 + 3m - 8m - 24$$

$$\boxed{m^2 - 5m - 24}$$

$$(m+3)(m-8)$$

$$m^2 - 24 + 3m - 8m$$

$$m^2 - 24 - 5m$$

$$\boxed{m^2 - 5m - 24}$$

c) $(3x+1)(5x-2)$ FOIL

$$\begin{array}{l} (3x+1)(5x-2) \\ \color{red}{3x \cdot 5x} \quad \color{blue}{3x \cdot -2} \quad \color{green}{1 \cdot 5x} \quad 1 \cdot -2 \\ \color{red}{15x^2} \quad \color{blue}{-6x} \quad \color{green}{+5x} \quad -2 \\ \boxed{15x^2 - 1x - 2} \end{array}$$

d) $(-2z+5)(-5z-8)$

	$-2z$	$+5$
$-5z$	$10z^2$	$-25z$
-8	$16z$	-40

$$10z^2 - 25z + 16z - 40$$

$$\boxed{10z^2 - 9z - 40}$$

e) $(t^2-4)(2t+9)$

	t^2	-4
$2t$	$2t^3$	$-8t$
9	$9t^2$	-36

$$2t^3 - 8t + 9t^2 - 36$$

$$\boxed{2t^3 + 9t^2 - 8t - 36}$$

f) $(2u^2-1)(-5u^2+4)$

	$2u^2$	-1
$-5u^2$	$-10u^4$	$5u^2$
$+4$	$8u^2$	-4

$$-10u^4 + 5u^2 + 8u^2 - 4$$

$$\boxed{-10u^4 + 13u^2 - 4}$$

g) $(z+5)^2$

$$(z+5)(z+5)$$

$$z^2 + 25 + \underline{5z + 5z}$$

$$z^2 + 25 + 10z$$

$$\boxed{z^2 + 10z + 25}$$

h) $(2x-3)^2$

$$(2x-3)(2x-3)$$

$$2x \quad -3$$

2x	$4x^2$	$-6x$
-3	$-6x$	9

$$4x^2 - \underline{6x - 6x} + 9$$

$$\boxed{4x^2 - 12x + 9}$$

i) $(n+3)(n-3)$

	n	$+3$
n	n^2	$3n$
-3	$-3n$	-9

$$n^2 + 3n - 3n - 9$$

$$n^2 - 9$$

j) $(5y-2)(5y+2)$

	$5y$	-2
$5y$	$25y^2$	$-10y$
$+2$	$10y$	-4

$$25y^2 - 10y + 10y - 4$$

"0" opposites

$$25y^2 - 4$$

k) $(2x-3)(5x^2-6x+7)$

	$2x$	-3
$5x^2$	$10x^3$	$-15x^2$
$-6x$	$-12x^2$	$+18x$
7	$14x$	-21

$$10x^3 - 15x^2 - 12x^2 + 18x + 14x - 21$$

$$10x^3 - 27x^2 + 32x - 21$$

l) $(4x^2+7x-3)(x^2-2x+8)$

	$4x^2$	$7x$	-3
x^2	$4x^4$	$7x^3$	$-3x^2$
$-2x$	$-8x^3$	$-14x^2$	$6x$
8	$32x^2$	$56x$	-24

$$4x^4 - 1x^3 + 15x^2 + 62x - 24$$