Chapter 5 Section 2
Multiplication of Polynomials

Multiplying Monomials

Multiply coefficients, and use the product rule for exponents.

Example 1: page 328
Multiply:
a) $\left(5x^3y^4\right)\left(-6x^7y^8\right)$

Solution:
Multiply coefficients, add exponents that have the same base

$\qquad$ (5)(-6) $\qquad\qquad\qquad \left(x^{3+7}\right)\left(y^{4+8}\right)$

$\qquad$ -30 $\qquad\qquad\qquad\qquad x^{10}y^{12}$

Try:
a) $\left(10x^4y^3z^6\right)\left(3x^6y^3z^2\right)$

Multiplying a Monomial and Polynomial (not a Monomial)
Use the distributive property
$3x^2\left(2x^3+5x\right)$
$3x^2\left(2x^3\right)+3x^2\left(5x\right)$
$\qquad 6x^5+15x^3$

Try:
a) $2x^4y^3\left(5xy^6-4x^3y^4-5\right)$

Multiply Polynomials When Neither is a Monomial
Several ways to find the product:

a) Use the distributive property
$\left(3x+7\right)\left(x^2+4x+5\right)$
$3x\left(x^2+4x+5\right)+7\left(x^2+4x+5\right)$

b) Vertical format

$$x^2 + 4x + 5$$
$$3x + 7$$

$$7x^2 + 28x + 35$$
$$3x^3 + 12x^2 + 15x$$
$$3x^3 + 19x^2 + 43x + 35$$

c) Area model

$$\left(3x + 7\right)\left(x^2 + 4x + 5\right)$$

Set up a grid, either 2 x 3 or 3 x 2 – number of terms in each polynomial

	x^2	4x	5
3x	$3x^3$	$12x^2$	15x
+7	$7x^2$	28x	35

Find the area of each region.

Add the like terms: $3x^3 + 19x^2 + 43x + 35$

Try:
$$\left(4xy^2 + 2y\right)\left(3xy^4 - 2xy^2 + y\right)$$

The Product of Two Binomials: FOIL

(7x + 2)(4x + 5)

FOIL method

F: product of the first terms in each binomial
O: product of the outside terms
I: product of inside terms
L: product of the last terms.

Try: (x + 3)(2x − 4)

The Square of a Binomial

$$\left(A+B\right)^2$$

Special-product formula
Square the first, +, multiply the two terms together then multiply by 2, +, square the second.

$$\left(A+B\right)^2 = A^2 + 2AB + B^2$$

Try: $\left(3x+2y\right)^2$

Multiplying the Sum and Difference of Two Terms(Binomials)
(A + B)(A – B)

Can use FOIL, Area model, formula

Square the first, -, square the second
(A + B)(A – B) = $A^2 - B^2$

Try: (2x + 3)(2x – 3)

Multiplication of Polynomial Functions
Chapter 2, defined the product of functions f and g as:

(fg)(x) = f(x) • g(x)

Example 10: page 335
If f(x) = x – 5, g(x) = x – 2, find
a) (fg)(x)   b) (fg)(1)

Evaluate Functions
Example 11

Given f(x) = $x^2 - 7x + 3$, find and simplify:
a) f(a + 4)