QUADRATIC RELATIONS: Multiplying Binomials

Date: Notes

Multiplying Variables: When multiplying numbers with the same variable, multiply the numbers, keep the variable, ADD the exponents.

EXAMPLES: Expand and simplify the following

a) $2(x+1)$

$= 2x+2$

b) $2x(3x-1)$

$= 6x^2-2x$

c) $4x(x^2-3)$

$= 4x^3-12x$

NOW YOU TRY!

a) $4(x+2)$

$= 4x+8$

b) $3x(x-2)$

$= 3x^2-6x$

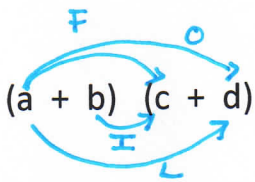
c) $6x(x^2-3)$

$= 6x^3-18x$

Binomials are: Two-termed expressions in the form $(a+b)(c+d)$

To multiply binomials we use: FOIL

F	First terms
O	Outer terms
I	Inner terms
L	Last terms



$ac+ad+bc+bd$.

Example 1: Expand and Simplify

a) $(x+3)(x+4)$

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

$= x^2+7x+12$.

b) $(x+1)(x+4)$

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

$= x^2+5x+4$

NOW YOU TRY!

c) $(x+2)(x+6)$

$= x^2+6x+2x+12$

$= x^2+8x+12$

d) $(x+4)(x+2)$

$= x^2+2x+4x+8$

$= x^2+6x+8$

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Example 2: Expand and Simplify:

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

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

$= 2x^2 - 3x - 2$

b) $(3x - 7)(2x + 5)$

$= 6x^2 + 15x - 14x - 35$

$= 6x^2 + x - 35$

NOW YOU TRY!

c) $(3x + 2)(x - 6)$

$= 3x^2 - 18x + 2x - 12$

$= 3x^2 - 16x - 12$

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

$= 8x^2 + 4x - 16x - 8$

$= 8x^2 - 12x - 8$

Collecting Like Terms:

"Like Terms" have exactly the same variable raised to the same exponent.

Simplify equations by collecting like terms. A simplified expression will have NO like terms.

Example 3: Expand and Simplify

a) $(x + 4)^2$

$= (x+4)(x+4)$

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

$= x^2 + 8x + 16$

b) $3(x + 1)(x + 2) + 2(x + 4)(x + 5)$

$= (3x+3)(x+2) + (2x+8)(x+5)$

$= 6x^2 + 6x + 3x + 6 + 2x^2 + 10x + 8x + 40$

$= 8x^2 + 27x + 46$

NOW YOU TRY!

c) $(x + 2)^2$

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

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

$= x^2 + 4x + 4$

d) $2(x + 3)(x + 2) + 3(x + 1)(x + 4)$

$= (2x+6)(x+2) + (3x+3)(x+4)$

$= 2x^2 + 4x + 6x + 4 + 3x^2 + 12x + 3x + 12$

$= 5x^2 + 25x + 16.$