

Multiplying Polynomials

Multiplying polynomials is mostly a trial in keeping things lined up and not missing any parts of the problem.

Technique to multiply polynomials

Break into several simple problems using distribution

Multiply each part

Combine like terms

Ex.

$$(3x^2 + 2)(3x - 1) \quad \text{use distribution of first term}$$

$$3x^2(3x - 1) + 2(3x - 1) \quad \text{distribute again}$$

$$3x^2(3x) - 3x^2(1) + 2(3x) - 2(1) \quad \text{Multiply terms}$$

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

Ex.

$$(6x + 2y + 1)(2x - 3y - 2)$$

$$6x(2x - 3y - 2) + 2y(2x - 3y - 2) + 1(2x - 3y - 2)$$

$$6x(2x) - 6x(3y) - 6x(2) + 2y(2x) - 2y(3y) - 2y(2) + 1(2x) - 1(3y) - 1(2)$$

$$12x^2 - 18xy - 12x + 4xy - 6y^2 - 4y + 2x - 3y - 2$$

$$12x^2 - 18xy + 4xy - 12x + 2x - 4y - 3y - 6y^2 - 2$$

$$12x^2 - 14xy - 10xy - 7y - 6y^2 - 2$$

FOIL Method

If you are multiplying a binomial by a binomial you can use a variation of the above technique call **F**irst **O**utside **I**nside **L**ast (FOIL)

$$(ax + b)(cx + d)$$

First	$(ax)(cx) = acx^2$
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Outside	$ax(d)$
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Inside	$b(cx)$
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Last	bd
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$$acx^2 + (ad + bc)x + bd$$

Ex.

$$(x + 2)(x + 3)$$

First	$x(x)$
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Outside	$x(3)$
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Inside	$2(x)$
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Last	$2(3)$
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$$x^2 + 3x + 2x + 6$$

$$x^2 + 5x + 6$$