

Special Products

There are a few special types of products that are handy to keep in your back pocket for use in a hurry. These are not necessary to memorize, but they can help you perform multiplication of polynomials rapidly, in the cases where they apply.

Special Product #1

$$(a + b)^2 = a^2 + 2ab + b^2$$

Example

$$(6 + y)^2 = 6^2 + 2(6)(y) + y^2 = 36 + 12y + y^2$$

Special Product #2

$$(a - b)^2 = a^2 - 2ab + b^2$$

Example:

$$(6 - y)^2 = 6^2 - 2(6)(y) + y^2 = 36 - 12y + y^2$$

Special Product #3

$$(a + b)(a - b) = a^2 - b^2$$

Example:

$$(3 + c)(3 - c) = 3^2 - c^2$$

Further Examples using the Special Product Rules

$$(8 + 2y)^2 = 8^2 + 2(8)(2y) + (2y)^2 = 64 + 32y + 4y^2$$

$$(4m^3n^2 - \frac{1}{2})^2 = (4m^3n^2)^2 - 2(4m^3n^2)(\frac{1}{2}) + (\frac{1}{2})^2 = 16m^6n^4 - 4m^3n^2 + \frac{1}{4}$$

$$(3x^2 - 2y^3)(3x^2 + 2y^3) = (3x^2)^2 - (2y^3)^2 = 9x^4 - 4y^6$$