Multiplying Polynomials

Distributive Property:

$2(4x-8)$

$= 8x-16$

$3a^2(5-4a-a^2)$

$= 15a^2-12a^3-3a^4$

$(5x-2)(4x+5)$

$= 20x^2+17x-10$

Expand and simplify:

Example 1 $-2x(3x^2-4x+6)$

$= -6x^3+8x^2-12x$

Example 2 $2(3m-5)-4(2m-1)$

$= 6m-10-8m+4$

$= -2m-6$

Example 3 $7(x^2-3x-4)-3(4x^2+5x-6)-2$

$= 7x^2-21x-28-12x^2-15x+18-2$

$= -5x^2-36x-12$

Example 4 $4m(3m-(6m-1))+2m(3m+2)$

$= 4m(3m-6m+1)+2m(3m+2)$

$= 12m^2-24m^2+4m+6m^2+4m$

$= -6m^2+8m$

Example 5 $4(y-2)(2y+5)$

FOIL FIRST!

$= 4(2y^2+5y-4y-10)$

$= 4(2y^2+y-10)$

$= 8y^2+4y-40$

Example 6 $(4x-2y)^2$

$= (4x-2y)(4x-2y)$

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

$= 16x^2 - 16xy + 4y^2$

Example 7 $\underbrace{(a+2)(a-5)}_{\text{FOIL}} - 2\underbrace{(a-3)(a+4)}_{\text{FOIL}}$

$= (a^2 - 5a + 2a - 10) - 2(a^2 + 4a - 3a - 12)$

$= a^2 - 5a + 2a - 10 - 2a^2 - 8a + 6a + 24$

$= -a^2 - 5a + 14$

Example 8 $-3(x^2-y^2)-(2x+y)^2$

$-3(x^2-y^2) - \underbrace{(2x+y)(2x+y)}_{\text{FOIL}}$

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

$= -3x^2 + 3y^2 - 4x^2 - 2xy - 2xy - y^2$

$= -7x^2 - 4xy + 2y^2$

Example 9 $4 + 2\underbrace{(m-4k)(2m+k)}_{\text{FOIL}} - 3\underbrace{(5m-k)^2}_{\text{FOIL}}$

$4 + 2\underbrace{(m-4k)(2m+k)}_{\text{FOIL}} - 3\underbrace{(5m-k)(5m-k)}_{\text{FOIL}}$

$= 4 + 2(2m^2 - 7mk - 4k^2) - 3(25m^2 - 10mk + k^2)$

$= 4 + 4m^2 - 14mk - 8k^2 - 75m^2 + 30mk - 3k^2$

$= -71m^2 + 16mk - 11k^2 + 4$

Example 10 $(y-3)(2y^2-4y+8)$

$= 2y^3 - 4y^2 + 8y - 6y^2 + 12y - 24$

$= 2y^3 - 10y^2 + 20y - 24$

Example 11 $(y-3)\underbrace{(2y-4)(y+1)}_{\text{FOIL}}$

$= (y-3)(2y^2 + 2y - 4y - 4)$

$= (y-3)(2y^2 - 2y - 4)$

$= 2y^3 - 2y^2 - 4y - 6y^2 + 6y + 12$

$= 2y^3 - 8y^2 + 2y + 12$