

PRINCIPLES - LESSON 11B

MULTIPLYING POLYNOMIALS

Recall: Multiplying a monomial by a monomial

Simplify.

$$\text{ex1) } 7a \cdot 4 = 7 \cdot 4 \cdot a = \boxed{28a}$$

$$\text{ex2) } 4k \cdot 3k = 4 \cdot 3 \cdot k \cdot k = \boxed{12k^2}$$

$$\begin{aligned} \text{ex3) } (-3m^4n)(-1m^5n^2) &= -3 \cdot -1 \cdot m^4 \cdot m^5 \cdot n \cdot n^2 \\ &= \boxed{3m^9n^3} \end{aligned}$$

MULTIPLYING POLYNOMIALS

We have also multiplied monomials by larger polynomials in the past.

Simplify.

$$\text{ex4) } 4(x + 5) = 4x + 20$$

$$\text{ex5) } -2(2a^2 - 4a + 6) = -4a^2 + 8a - 12$$

MULTIPLYING POLYNOMIALS

Simplify.

$$\text{ex6)} \quad -2a(2a^2 - 4a + 6) = -4a^3 + 8a^2 - 12a$$

$$\text{ex7)} \quad 5x^2(10x + 7) = 50x^3 + 35x^2$$

$$\text{ex8)} \quad 3a^2b(2ab - b) = 6a^3b^2 - 3a^2b^2$$

MULTIPLYING POLYNOMIALS

Simplify.

$$\text{ex9) } x(x+4) = \boxed{x^2 + 4x}$$

$$\text{ex10) } (x+2)(x+4) = x^2 + 4x + 2x + 8$$

Distribute the x ,
then distribute the 2 .

$$= \boxed{x^2 + 6x + 8}$$

FOIL METHOD

FOIL is a way to remember how to multiply two binomials together. It is really just double distributing.

**FOIL ONLY WORKS WHEN
MULTIPLYING TWO BINOMIALS**

First

Outside

Inside

Last

ex11) $(n + 5)(n + 7)$

$$= n^2 + 7n + 5n + 35$$

$$= \boxed{n^2 + 12n + 35}$$

FOIL METHOD

Simplify.

ex12) $(a - 4)(a + 9)$

$$= a^2 + 9a - 4a - 36 = \boxed{a^2 + 5a - 36}$$

ex13) $(k - 4)(k - 1)$

$$= k^2 - 1k - 4k + 4 = \boxed{k^2 - 5k + 4}$$

FOIL METHOD

Simplify.

ex14) $(2h + 3)(2h - 3)$

$$= 4h^2 - 6h + 6h - 9$$

$$= \boxed{4h^2 - 9}$$

MULTIPLYING POLYNOMIALS

Simplify.

$$\text{ex15)} \quad (3y - 7)^2 = (3y - 7)(3y - 7)$$

Diagram illustrating the FOIL method for multiplying the binomials $(3y - 7)(3y - 7)$. The first terms are labeled 'F' (purple), the outer terms are labeled 'O' (red), the inner terms are labeled 'I' (yellow), and the last terms are labeled 'L' (blue). Arched lines connect the corresponding terms: a purple line from the first '3y' to the first '3y', a red line from the first '3y' to the second '-7', a yellow line from the second '-7' to the first '3y', and a blue line from the second '-7' to the second '-7'.

$$= 9y^2 - 21y - 21y + 49$$

$$= \boxed{9y^2 - 42y + 49}$$

MULTIPLYING POLYNOMIALS

Simplify.

ex16) $(r + 1)(2r^2 - 3r + 4)$

Since we are not multiplying 2 binomials, this is not FOIL. Just distribute the r and the 1 .

$$= 2r^3 - 3r^2 + 4r + 2r^2 - 3r + 4$$

$$= \boxed{2r^3 - r^2 + r + 4}$$

MULTIPLYING POLYNOMIALS

Simplify.

ex17) $(a^2 - 3ab + b^2)(a + b)$

Since we are not multiplying 2 binomials, this is not FOIL. Just distribute all 3 terms of the trinomial through the binomial.

$$= a^3 + a^2b - 3a^2b - 3ab^2 + ab^2 + b^3$$

$$= \boxed{a^3 - 2a^2b - 2ab^2 + b^3}$$