

WARM UP

Rewrite $x^5 - x^2 + 3$ as an equivalent expression in standard form with a term for every power of x .

LESSON 4.2b

Multiplying Polynomials

Today you will:

- Multiply polynomials
- Practice using English to describe math processes and equations

Core Vocabulary:

- polynomial, p. 158
- polynomial function, p. 158

Describe the process/steps to follow in order to perform the following: $x(x^2 + 2x - 4)$

1. Multiply every term in $(x^2 + 2x - 4)$ by the x .
2. In other words, distribute the 1st into the 2nd.

$$\begin{aligned} & x(x^2 + 2x - 4) \\ = & x \cdot x^2 + x \cdot 2x + x \cdot (-4) \\ = & x^3 + 2x^2 - 4x \end{aligned}$$

Describe the process/steps to follow in order to perform the following: $(x + 1)(x^2 + 2x - 4)$

...it is exactly the same as the above example...

$$\begin{aligned} & (x + 1)(x^2 + 2x - 4) \\ = & (x + 1) \cdot x^2 + (x + 1) \cdot 2x + (x + 1) \cdot (-4) \\ = & x^3 + x^2 + 2x^2 + 2x - 4x - 4 \\ = & x^3 + 3x^2 - 2x - 4 \end{aligned}$$

Multiply 123 by 45 without using your calculator

...arrange the numbers vertically aligning by place value, then multiply the top number by each digit of the bottom one at a time, least significant to most significant.

$$\begin{array}{r} 123 \\ \times 45 \\ \hline 615 \\ + 4920 \\ \hline 5535 \end{array}$$

5x3, 5x2, 5x1
1st digit is a 0 for place holder, 4x3, 4x2, 4x1
add the rows together

...you can multiply polynomials using the same technique!

a. Multiply $-x^2 + 2x + 4$ and $x - 3$ in a vertical format.

b. Multiply $y + 5$ and $3y^2 - 2y + 2$ in a horizontal format.

SOLUTION

a.

$$\begin{array}{r} -x^2 + 2x + 4 \\ \times \quad \quad \quad x - 3 \\ \hline 3x^2 - 6x - 12 \\ -x^3 + 2x^2 + 4x \\ \hline -x^3 + 5x^2 - 2x - 12 \end{array}$$

Multiply $-x^2 + 2x + 4$ by -3 .

Multiply $-x^2 + 2x + 4$ by x .

Combine like terms.

b. $(y + 5)(3y^2 - 2y + 2)$

$$= 3y^3 + 15y^2 - 2y^2 - 10y + 2y + 10$$

$$= 3y^3 + 13y^2 - 8y + 10$$

REMEMBER

Product of Powers
Property

$$a^m \cdot a^n = a^{m+n}$$

a is a real number and
 m and n are integers.



Multiply $x - 1$, $x + 4$, and $x + 5$ in a horizontal format.

SOLUTION

$$\begin{aligned}(x - 1)(x + 4)(x + 5) &= (x^2 + 3x - 4)(x + 5) \\ &= (x^2 + 3x - 4)x + (x^2 + 3x - 4)5 \\ &= x^3 + 3x^2 - 4x + 5x^2 + 15x - 20 \\ &= x^3 + 8x^2 + 11x - 20\end{aligned}$$

Homework

Pg 170, #17-34