

Math 9 – Unit 2: Algebra One

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Lesson #2: Adding and Subtracting Polynomials

Learning Goal: We are learning to add and subtract polynomials.

Now that we know what terms, coefficients, variables, and constants are, we can start to work on the arithmetic of algebra. Today we will add and subtract polynomials. Essentially, we are just collecting like terms.

Examples: Add the polynomials, putting the answer in descending order.

$$\begin{array}{l} \text{a) } (x^3 + 7x) + (2x^3 - 5x - 2) \\ = 3x^3 + 2x - 2 \end{array} \quad \begin{array}{l} \text{b) } (3p^2 + 4 + 3p) + (3p^2 - 8p + 7) + (2p^2 - 4) \\ = 8p^2 - 5p + 7 \end{array}$$

Subtracting polynomials requires more effort. Given the statement, $(5x + 4) - (3x - 2)$, every term inside the brackets after the minus sign need to be subtracted. What you do is $5x - (3x)$ then $4 - (-2)$, resulting in: $2x + 6$

Examples: Subtract the polynomials, putting the answer in descending order.

$$\begin{array}{l} \text{a) } (m^4 - 5 + 7m^2) - (6m^4 + 3 + 4m^2) \\ = -5m^4 + 3m^2 - 8 \end{array} \quad \begin{array}{l} \text{b) } (x^2 - 2x^3) - (6x^2 - 4x^4 + 5x^3) \\ = -5x^2 - 7x^3 + 4x^4 \end{array}$$

Method one: just subtract

Method two: If subtracting, change all the signs in the subtracted bracket then add instead.

$$\begin{array}{l} \text{c) } (7x + 7) - (7x^2 + 8x^3 + 4x^4) - (3x^4 + 8) \\ = (7x + 7) + (-7x^2 - 8x^3 - 4x^4) + (-3x^4 - 8) \\ = 7x - 1 - 7x^2 - 8x^3 - 7x^4 \\ = -7x^4 - 8x^3 - 7x^2 + 7x - 1 \end{array}$$

Method one

$$\begin{array}{l} \text{d) } (8u^3v^4 + 2v^4) + (6v^4 + 7u^2v^4 + 3u^3v^4) + (8u^2v^4 - 8u^3v^4) \\ = 3u^3v^4 - 4v^4 + 1u^2v^4 \end{array}$$

Method two:

$$\begin{array}{l} 8 - (-3) + (-8) \\ 0 - (7) + (8) \end{array}$$

Note: If you were to be asked to subtract 6 from 9, how would you answer? Essentially, you are doing $9 - 6$. The same holds true with polynomials:

Example: Subtract $(4x^2 + 5x - 3)$ from $(9x^2 + 3x - 7)$ -- this is not an expression. Turn it into an expression by writing $(2^{\text{nd}} \text{ polynomial}) - (1^{\text{st}} \text{ polynomial})$

$$= (9x^2 + 3x - 7) + (-4x^2 - 5x + 3)$$

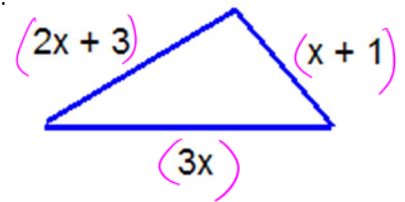
$$= 5x^2 - 2x - 4$$

→ adding the outside edges.

Example: a) Given the following triangle, determine an expression for the perimeter.

$$= (2x + 3) + (x + 1) + (3x)$$

$$= 6x + 4 \text{ cm}$$



b) Let $x = 6 \text{ cm}$, determine the perimeter of the triangle.

$$P = 6(x) + 4$$

$$P = 6(6) + 4$$

$$P = 40 \text{ cm}$$

∴ The perimeter of the \triangle is 40 cm.

Success Criteria:

- I can add/subtract polynomials by grouping like terms
- I can distribute the negative into a polynomial
- I can arrange polynomials in descending order