

LESSON 1

ADDING AND SUBTRACTING POLYNOMIALS

What is a polynomial ?

A polynomial is an expression composed of coefficients and variables under addition, subtraction and multiplication and exponents on those variables must be non-negative integers. A polynomial involves several special terms as can be seen from the definition. A coefficient is a constant which multiplies a variable, $5x$, or $3y$, 5 and 3 are the coefficients for x and y , respectively. An exponent is the power to which a number or variable is raised, $2x^2$, or x^3 , 2 and 3 are the exponents.

The four operations can be performed on polynomials. Addition, subtraction, multiplication, and division can all be performed on polynomials.

A. Adding Polynomials.

Example 1: Add

$$\begin{array}{r} (x^2 - x + 5) + (6x^2 + 2x - 1) \\ x^2 - x + 5 \\ + 6x^2 + 2x - 10 \\ \hline 7x^2 + x - 5 \end{array}$$

Example 2: Add

$$(2x^2 + 3x + 3) + (x^2 + 2x - 2)$$

$$\begin{array}{r} 2x^2 + 3x + 3 \\ + x^2 + 2x - 2 \\ \hline 3x^2 + 5x + 1 \\ \hline \end{array}$$

B. Subtracting Polynomials

Subtracting polynomials is quite similar to adding polynomials. We must, however, be very careful with the negative signs. If the subtraction is being done horizontally, then the negative signs will need to be taken carefully through the parentheses. If the subtraction is done vertically, then all that is needed is flipping all of the subtracted polynomial's signs to their opposites.

Example 3: Subtract

$$\begin{array}{r} (5x^2 - 2x + 1) - (x^2 + 2x - 4) = (5x^2 - 2x + 1) + (-x^2 - 2x + 4) \\ 5x^2 - 2x + 1 \\ + -x^2 - 2x + 4 \\ \hline 4x^2 - 4x + 5 \\ \hline \end{array}$$

Example 4: Subtract

$$\begin{aligned}
 & (3x^2 - 8x + 7) - (2x^2 - 6x + 12) \\
 &= (3x^2 - 8x + 7) + (-2x^2 + 6x - 12) \\
 &\quad \begin{array}{r} 3x^2 - 8x + 7 \\ + \quad -2x^2 + 6x - 12 \\ \hline x^2 - 2x - 5 \end{array}
 \end{aligned}$$

$$8) (12x^2 - 4x + 6) + (-5x^2 + 6x + 3)$$

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

$$10) (15x^2 - 10x + 6) + (-9x^2 + 5x + 5)$$

Subtract the following polynomial.

$$11. (14x^2 + 13x - 8) - (8x^2 - 15x + 6)$$

$$12. (12x^2 + 8x - 3) - (-5x^2 + 6x - 2)$$

$$13. (19x^2 + 9x - 16) - (7x^2 + 20x + 4)$$

$$14. (16x^2 - 8x + 3) - (-8x^2 - 5x - 12)$$

$$15. (-15x^2 - 6x - 5) - (-18x^2 - 10x - 8)$$

$$16. (18x^2 + 5x - 7) - (12x^2 + 3x - 9)$$

$$17. (-14x^2 - 10x + 8) - (-16x^2 - 8x - 6)$$

$$18. (17x^2 + 8x + 5) - (12x^2 - 5x + 3)$$

$$19. (3x^2 - 4x - 4) - (-6x^2 - 7x + 5)$$

$$20. (8x^2 + 7x + 2) - (4x^2 + 2x - 1)$$

LESSON 1 EXERCISE

Add the following polynomials.

$$1) (5x^2 - 6x + 5) + (3x^2 - 2x - 1)$$

$$2) (2x^2 + 3x - 4) + (4x^2 + 6x + 8)$$

$$3) (8x^2 - x + 10) + (-7x^2 + 4x - 6)$$

$$4) (7x^2 + 3x - 8) + (-4x^2 - x + 10)$$

$$5) (6x^2 - 7x + 4) + (2x^2 - 6x + 8)$$

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

$$7) (13x^2 + 7x - 7) + (5x^2 + 4x - 2)$$

$$1. 20x^2 - 29x + 6$$

$$2. 30x^2 - 14xy - 4y^2$$

$$3. 16u^2 + 10uv - 21v^2$$

$$4. 3x^2 + 13xy + 12y^2$$

$$5. 40u^2 - 34uv - 48v^2$$

$$6. 56x^2 + 61xy + 15y^2$$

$$7. 5a^2 - 7ab - 24b^2$$

$$8. 6r^3 - 43r^2 + 12r - 35$$

$$9. 16x^3 + 44x^2 + 44x + 40$$

$$10. 12n^3 - 20n^2 + 38n - 20$$

$$11. 8b^3 - 4b^2 - 4b - 12$$

$$12. 36x^3 - 24x^2y + 3xy^2 + 12y^3$$

$$13. 21m^3 + 4m^2n - 8n^3$$

$$14. 48m^4 - 16n^3 + 64n^2 - 6n + 36$$

$$15. 14a^4 + 30a^3 - 13a^2 - 12a + 3$$