

Lesson 10.1 Notes: Adding and Subtracting Polynomials

Polynomial Vocabulary:

- 1) A polynomial is an expression with one or more terms. If the expression has exactly one term, it is called a monomial. A polynomial that has two terms is called a binomial, while a polynomial that has three terms is called a trinomial.
- 2) The different parts or pieces of a polynomial are called the terms. If those terms have the same variables and the same exponents, they are called like terms. If the term has a variable, the number multiplying (directly in front of the variable) is called the coefficient. If the term does not have a variable, it is called a constant.
- 3) All polynomial expressions should be written in standard form, meaning that the terms are placed in descending order (exponents go from highest to lowest).

Vocabulary Examples:

1. Determine whether each polynomial is a monomial, binomial, or trinomial.

A) $4x^3 - 8x$

binomial

B) $-5xy^4$

monomial

C) $x^2 - 2x + 1$

trinomial

2. Determine whether each of the following pairs are like terms. Write yes or no.

A) $6x^2, x^2$

yes

B) $9x, -3y$

no

C) $8x, 2x^3$

no

D) $2xy, -3yx$

yes, $-3xy$

3. For each of the following expressions, identify the coefficients and the constants.

A) $7x + 1$

Coefficients: 7

Constants: 1

B) $-4x^2y$

Coefficients: -4

Constants: _____

C) -9

Coefficients: _____

Constants: -9

D) $x^2 - 5x + 4$

Coefficients: 1, -5

Constants: 4

4. Write the following polynomials in standard form. Then state the degree of the polynomial.

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

Standard form: $x^2 - 2x - 3$

Degree: 2

B) $8 - 7x$

Standard form: $-7x + 8$

Degree: 1

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

Standard form: $-9x^4 - x^3 + 6x^2 + x$

Degree: 4

Adding and Subtracting Polynomials:

- You can only add or subtract the like terms. When adding/subtracting like terms, you only add/subtract the coefficients. Do not add the exponents!
- You can use either a horizontal format or a vertical format.
- Write your final answer in standard form.

Examples:

5) $(4x - 3) + (7x + 8)$

$$11x + 5$$

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

$$3x - 4 - 2x - 6$$

$$x - 10$$

7) $(4x^2 - 8x + 3) + (2x^2 + 12x - 5)$

$$6x^2 + 4x - 2$$

8) $(5x^2 - 1) + (6x - 9x^2)$

$$-4x^2 + 6x - 1$$

9) $(x^2 - 8) - (7x + 4x^2)$

$$x^2 - 8 - 7x - 4x^2$$

$$-3x^2 - 7x - 8$$

10) $(5x^3 - x + 2x^2) + (7 - 4x) - (6x^2 + 5x^3 - 3)$

$$5x^3 - x + 2x^2 + 7 - 4x - 6x^2 - 5x^3 + 3$$

$$-4x^2 - 5x + 10$$

11) $2x^2 + x - 5$

$$(+)\ x^2 + x + 6$$

$$3x^2 + 2x + 1$$

12) $-2x^3 + 5x^2 - x + 8$

$$(-)\ -2x^3 + 3x - 4$$

$$\begin{array}{r} -2x^3 + 5x^2 - x + 8 \\ 2x^3 - 3x + 4 \\ \hline \end{array}$$

$$2x^2 - x + 12$$

Multiple Choice Practice:

13) Solve: $|3x - 4| = 8$

A) $x = 4$

B) $x = \frac{4}{3}$

C) $\left\{4, \frac{-4}{3}\right\}$

D) $\left\{\frac{4}{3}, -4\right\}$

Polynomial	number of Terms	Classification	Degree	Classification of Degree
9	1	monomial	0	constant
$4x^1$	1	monomial	1	linear.
$9x^1 + 2$	2	binomial	1	linear
$x^2 - 4x + 2$	3	trinomial	2	quadratic
$2x^3 - 4x^2 + x + 9$	4	polynomial	3	Cubic
$9x^4 - 9x + 2$	3	trinomial	4	quartic

7-1 Practice

Form G

Adding and Subtracting Polynomials

Find the degree of each monomial.

- | | | | |
|-------------------|--------------------------|----------------|-------------------|
| 1. $2b^2c^2$
4 | 2. $5x^1$
1 | 3. $7y^5$
5 | 4. $19ab^1$
2 |
| 5. 12
0 | 6. $\frac{1}{2}d^2$
2 | 7. t^1
1 | 8. $4d^2e^1$
3 |

Simplify.

- | | | |
|----------------------------|---------------------------------------|----------------------------------|
| 9. $2ab + 4ab$
6ab | 10. $5x^2 - 4x^2$
x^2 | 11. $3m^2n - 5m^2n$
$-2m^2n$ |
| 12. $-6ab + 3ab$
$-3ab$ | 13. $4c^2d^2 - 7c^2d^2$
$-3c^2d^2$ | 14. $315x^2 - 30x^2$
$285x^2$ |

Write each polynomial in standard form. Then name each polynomial based on its degree and number of terms.

- | | | |
|---|--|---|
| 15. $15x - x^3 + 3$
$-x^3 + 15x + 3$ cubic trinomial | 16. $5x^4 + 2x^2(-x) + 3x^4$
$3x^4 + 2x^2 - x + 3x^4$ quartic trinomial | 17. $9x^3$
monomial cubic |
| 18. $7b^2 + 4b$
$7b^2 + 4b$ binomial quadratic | 19. $-3x^2 + 11 + 10x$
$-3x^2 + 10x + 11$ trinomial quadratic | 20. $12t^2 + 1 - 3x + 8 - 2x$
$12t^2 - 5x + 9$ quadratic trinomial |

Simplify.

- | | | |
|---|---|--|
| 21. $\frac{8z - 12}{+ 6z + 9}$
$14z - 3$ | 22. $\frac{9x^2 + 3}{+ 4x^2 + 7}$
$13x^2 + 10$ | 23. $\frac{6j^2 - 2j + 5}{+ 3j^2 + 4j - 6}$
$9j^3 - 2j - 1$ |
| 24. $(3k^2 + 5) + (16x^2 + 7)$
$3k^2 + 16x^2 + 12$ | 25. $(g^2 - 4g) + 11 + (-g^2 + 8g)$
$4g + 11$ | |

26. A local deli kept track of the sandwiches it sold for three months. The polynomials below model the number of sandwiches sold, where s represents days the total number of days since the start of the three-day period.

Ham and Cheese: $28s^2 + 33s + 250$
Pastrami: $-7.4s^2 + 32s + 180$

Write a polynomial that models the total number of these sandwiches that were sold.

7-1 Practice (continued)

Form G

Adding and Subtracting Polynomials

Simplify.

$$27. \begin{array}{r} 11n-4 \\ -(5n+2) \\ \hline 6n-6 \end{array}$$

$$28. \begin{array}{r} 7x^2+9 \\ -(8x^2+2) \\ \hline -x^2+7 \end{array}$$

$$29. \begin{array}{r} 3d^2+8d-2 \\ -(2d^2-7d+6) \\ \hline d^2+15d-8 \end{array}$$

$$30. (28e^2 + 3e) + (19e^2 + e)$$

$$47e^2 + 4e$$

$$31. (-12h^2 + h) - (-6h^2 + 3h - 4)$$

32. A small town wants to compare the number of students enrolled in public and private schools. The polynomials below show the enrollment for each:

Public School: $-19c^2 + 980c + 48,989$

Private School: $40c + 4046$

Write a polynomial for how many more students are enrolled in public school than private school.

Simplify. Write each answer in standard form.

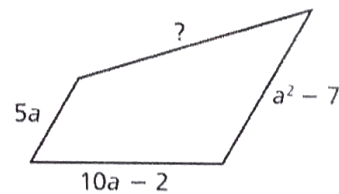
$$33. (3a^2 + a + 5) - (2a - 5)$$

$$34. (6d - 10d^2 + 3) - (5d^2 + 3d - 4)$$

$$35. (-4s^2 + 2s - 3) + (-2s^2 + s + 7)$$

$$36. (8p^2 - 6p + 2p^2) + (9p^2 - 5p - 11)$$

37. The fence around a quadrilateral-shaped pasture is $3a^2 + 15a + 9$ long. Three sides of the fence have the following lengths: $5a$, $10a - 2$, $a^2 - 7$. What is the length of the fourth side of the fence?



38. **Error Analysis** Describe and correct the error in simplifying the sum shown at the right.

$$\begin{array}{r} 6x^3 + 4x - 10 \\ + (-3x^2 + 2x + 8) \\ \hline 3x^3 + 6x - 2 \end{array}$$

39. **Open-Ended** Write three different examples of the sum of a quadratic trinomial and a cubic monomial.