

Polynomials



Important Terms and Definitions:

- **Standard Form** – the terms of the polynomial are placed in descending order according to their degree
- **Leading Coefficient** *coeff. on 1st term when in SF*
- **Degree** *highest exponent on the variable (or sum of expo if more than 1 variable in term)*

Classifications

| Polynomial | Degree | Classification by Degree | Classification by Number of Terms |
|---|--------|--------------------------|-----------------------------------|
| 4 | 0 | constant | monomial |
| 3x | 1 | linear | monomial |
| 3x + 5 | 1 | linear | binomial |
| -8x ² + 3x + 5 | 2 | quadratic | trinomial |
| x ³ - 8x ² + 3x + 5 | 3 | * cubic | polynomial |
| 9x ⁴ - 7 | 4 | * quartic | binomial |

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Polynomials versus Non-Polynomials

$$2x^2y$$

$$5x - 10$$

$$3x^2y^3$$

$$\frac{1}{3}x^2$$

$$2x^2y^{-1} = \frac{2x^2}{y}$$

$$\frac{5}{x} - 10$$

$$\frac{3x^2}{y^3 \cdot 2}$$

$$\frac{1}{3x^2}$$

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$$\overset{\textcircled{2}}{7x^2} + \overset{\textcircled{0}}{3} - \overset{\textcircled{3}}{x^3}$$

Write in standard form:

$$-x^3 + 7x^2 + 3$$

What is the leading coefficient?

-1

What is the degree?

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$$5 + x^2$$

Write in standard form:

$$1x^2 + 5$$

What is the leading coefficient?

1

What is the degree?

2

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

Write in standard form:

$$-6x^4 + x^3 - x^2 + 3x^1$$

What is the leading coefficient?

$$-6$$

What is the degree?

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$$4.5x^2 - 11 + x$$

Write in standard form:

$$4.5x^2 + x - 11$$

What is the leading coefficient?

$$4.5$$

What is the degree?

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Adding and Subtracting Polynomials

The process – Write each polynomial in standard form (optional). If adding, just combine like terms. If subtracting, subtract each term in the second polynomial (or add the opposite). Write your final answer in standard form as well.

Examples:

$$1. (-8x^3+x-9x^2+2) + (8x^2-2x+4) + (4x^2-1-3x^3)$$

$$\begin{array}{r} -8x^3 + x - 9x^2 + 2 + 8x^2 - 2x + 4 + 4x^2 - 1 - 3x^3 \\ \hline -11x^3 + 3x^2 - x + 5 \end{array}$$

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

$$\begin{array}{r} 6x^2 - x + 3 - 2x + x^2 - 7 \\ \hline 7x^2 - 3x - 4 \end{array}$$

$$\begin{array}{r} 6x^2 - x + 3 \\ + \quad x^2 - 2x - 7 \\ \hline 7x^2 - 3x - 4 \end{array}$$

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$$3. (4x^2-1) - (3x-2x^2)$$

$$\begin{array}{r} \underbrace{4x^2 - 1} - \underbrace{3x + 2x^2} \\ \hline 6x^2 - 3x - 1 \end{array}$$

$$\begin{array}{r} 4x^2 + 0x - 1 \\ + 2x^2 + 3x \\ \hline 6x^2 - 3x - 1 \end{array}$$

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

$$\begin{array}{r} \underbrace{12x - 8x^2 + 6} + \underbrace{8x^2 + 3x - 4} \\ \hline 15x + 2 \end{array}$$

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$$5. (-6x^3 + 5x - 3) - (2x^3 + 4x^2 - 3x + 1)$$

$$-6x^3 + 5x - 3 - 2x^3 - 4x^2 + 3x - 1$$

$$-8x^3 - 4x^2 + 8x - 4$$

Try this one...

$$2x - [4 + 5x - (10 + 9x)]$$

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6.

A company produces x units of a product per month, where $C(x)$ represents the total cost and $R(x)$ represents the total revenue for the month. The functions are modeled by $C(x) = 300x + 250$ and $R(x) = -0.5x^2 + 800x - 100$. The profit is the difference between revenue and cost where $P(x) = R(x) - C(x)$. What is the total profit, $P(x)$, for the month?

(1) $P(x) = -0.5x^2 + 500x - 150$

(2) $P(x) = -0.5x^2 + 500x - 350$

(3) $P(x) = -0.5x^2 - 500x + 350$

(4) $P(x) = -0.5x^2 + 500x + 350$



$$\begin{aligned}
 & -0.5x^2 + 800x - 100 - (300x + 250) \\
 & -0.5x^2 + 800x - 100 - 300x - 250 \\
 & -0.5x^2 + 500x - 350
 \end{aligned}$$

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