

9.1

Add and Subtract Polynomials

Goal • Add and subtract polynomials.

Your Notes

VOCABULARY

Monomial

Degree of a monomial

Polynomial

Degree of a polynomial

Leading coefficient

Binomial

Trinomial

Example 1 Rewrite a polynomial

Write $7 + 2x^4 - 4x$ so that the exponents decrease from left to right. Identify the degree and leading coefficient of the polynomial.

Solution

Consider the degree of each of the polynomial's terms.

Degree is ____ . Degree is ____ . Degree is ____ .

$$7 + 2x^4 - 4x$$

The polynomial can be written as _____. The greatest degree is ____, so the degree of the polynomial is ____, and the leading coefficient is ____.

Your Notes

✔ **Checkpoint** Write the polynomial so that the exponents decrease from left to right. Identify the degree and leading coefficient of the polynomial.

1. $5x + 13 + 8x^3$

2. $4y^4 - 7y^5 + 2y$

Example 2 *Identify and classify polynomials*

Tell whether the expression is a polynomial. If it is a polynomial, find its degree and classify it by the number of terms. Otherwise, tell why it is not a polynomial.

	Expression	Is it a polynomial?	Classify by degree and number of terms
a.	-6	_____	0 degree monomial
b.	$m^{-3} + 4$	_____ _____	
c.	$-h^3 + 4h^2$	Yes	_____ _____
d.	$9 - 5x^4 + 3x$	Yes	_____ _____
e.	$2w^3 + 4^w$	_____ _____	

✔ **Checkpoint** Tell whether the expression is a polynomial. If it is a polynomial, find its degree and classify it by the number of terms. Otherwise, tell why it is not a polynomial.

3. $4x - x^7 + 5x^3$

4. $v^3 + v^{-2} + 2v$

Your Notes

If a particular power of the variable appears in one polynomial but not the other, leave a space in that column, or write the term with a coefficient of 0.

Example 3 Add polynomials

Find the sum (a) $(4x^3 + x^2 - 5) + (7x + x^3 - 3x^2)$ and (b) $(x^2 + x + 8) + (x^2 - x - 1)$.

Solution

a. **Vertical format:** Align like terms in vertical columns.

$$\begin{array}{r} 4x^3 + x^2 - 5 \\ + x^3 - 3x^2 + 7x \\ \hline \end{array}$$

b. **Horizontal format:** Group like terms and simplify.

$$\begin{aligned} (x^2 + x + 8) + (x^2 - x - 1) \\ = (\quad) + (\quad) + (\quad) \\ = \quad \end{aligned}$$

Example 4 Subtract polynomials

Find the difference (a) $(4z^2 - 3) - (-2z^2 + 5z - 1)$ and (b) $(3x^2 + 6x - 4) - (x^2 - x - 7)$.

Solution

a.

$$\begin{array}{r} (4z^2 - 3) \\ - (-2z^2 + 5z - 1) \end{array} \longrightarrow \begin{array}{r} 4z^2 - 3 \\ \underline{+ 2z^2 - 5z + 1} \end{array}$$

b.

$$\begin{aligned} (3x^2 + 6x - 4) - (x^2 - x - 7) \\ = 3x^2 + 6x - 4 \quad \underline{\hspace{2cm}} \\ = \quad \underline{\hspace{2cm}} \\ = \quad \underline{\hspace{2cm}} \end{aligned}$$

Remember to multiply each term in the polynomial by -1 when you write the subtraction as addition.

Checkpoint Find the sum or difference.

Homework

5. $(3x^4 - 2x^2 - 1) + (5x^3 - x^2 + 9x^4)$

6. $(3t^2 - 5t + t^4) - (11t^4 - 3t^2)$