Math 10 Lecture Videos

Section 5.1:
Adding and Subtracting Polynomials

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OBJECTIVES:

1. Understand the vocabulary used to describe polynomials.
2. Add polynomials.
3. Subtract polynomials.
4. Graph equations defined by polynomials of degree 2.

Objective 1: Understand the vocabulary used to describe polynomials.

POLYNOMIAL: is a **single term** or **the sum of two or more terms** containing variables with **whole number exponents**.

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

It is customary to write the terms in order of **descending powers** of the variable. This is the **standard form** of a polynomial.

Objective 1: Understand the vocabulary used to describe polynomials.

The Degree of ax^n

If $a \neq 0$, and n is a whole number, the degree of ax^n is *n.* The degree of a nonzero constant term is 0 (i.e. $8x^0 = 8$). The constant 0 has no defined degree.

$$5x^3 - 7x^2 + 2x - 8$$

- Degree 3
- Degree 2
- Degree 1
- Degree of nonzero constant: 0

Objective 1: Understand the vocabulary used to describe polynomials.

The **DEGREE OF A POLYNOMIAL** is the degree of its highest order term.

Degree 3 Polynomial: $5x^3 - 7x^2 + 2x - 8$

Degree 4 Polynomial: $8x^4 - 3x + 6$

Objective 1: Understand the vocabulary used to describe polynomials.

Monomial: A polynomial with one term.
Binomial: A polynomial with two terms.
Trinomial: A polynomial with three terms.

$7x^5 - 3x^3 + 8$ 5th degree trinomial

Objective 1: Understand the vocabulary used to describe polynomials.

Examples:

Polynomial	Monomial, Binomial, Trinomial?	Degree of the Polynomial
$5x - 1$	Binomial	1
$9x^2$	Monomial	2
8	Monomial	0
$3x^2 - 2x + 1$	Trinomial	2

Objective 2: Add polynomials.

Adding Polynomials
Polynomials are added by removing the parentheses that surround each polynomial (if any) and then combining like terms.

Objective 2: Add polynomials.

Polynomials are added by combining ***like terms***.

Like terms are terms containing exactly the same variables to the same powers.

$$4x^2 + 6x^2 = (4+6)x^2 = 10x^2$$

These like terms both contain x to the second power.

Add the coefficients and keep the same variable factor.

Objective 2: Add polynomials.

Example 1:

$$(-7x^3 + 6x^2 - 11x + 13) + (19x^3 - 11x^2 + 7x - 17).$$

$= -7x^3 + 6x^2 - 11x + 13 + 19x^3 - 11x^2 + 7x - 17$

$= -7x^3 + 19x^3 + 6x^2 - 11x^2 - 11x + 7x + 13 - 17$

$= 12x^3 - 5x^2 - 4x - 4$

Objective 2: Add polynomials.

Example 2:

$$(-11x^3 + 7x^2 - 11x - 5) + (16x^3 - 3x^2 + 3x - 15)$$

$$= -11x^3 + 7x^2 - 11x - 5 + 16x^3 - 3x^2 + 3x - 15$$

$$= -11x^3 + 16x^3 + 7x^2 - 3x^2 - 11x + 3x - 5 - 15$$

$$= 5x^3 + 4x^2 - 8x - 20$$

Objective 2: Add polynomials.

Example 3: Add the following using the vertical format.

$$-11x^3+7x^2-11x-5 \qquad 16x^3-3x^2+3x-15$$

$$\begin{array}{r} -11x^3+7x^2-11x-5 \\ +16x^3-3x^2+3x-15 \\ \hline 5x^3+4x^2-8x-20 \end{array}$$

Objective 3: Subtract polynomials.

Subtracting Polynomials
To subtract two polynomials, add the first polynomial and the opposite of the polynomial being subtracted.

Objective 2: Subtract polynomials.

Example 1: Subtract $3x^3 - 8x^2 - 5x + 6$ from $10x^3 - 5x^2 + 7x - 2$

$$= 10x^3 - 5x^2 + 7x - 2 - (3x^3 - 8x^2 - 5x + 6)$$

$$= 10x^3 - 5x^2 + 7x - 2 - 3x^3 + 8x^2 + 5x - 6$$

$$= 10x^3 - 3x^3 - 5x^2 + 8x^2 + 7x + 5x - 2 - 6$$

$$= 7x^3 + 3x^2 + 12x - 8$$

Objective 2: Subtract polynomials.

Example 1: Perform the operation.

$$(8y^3 - 10y^2 - 14y - 2) - (5y^3 - 3y + 6)$$

$$= (8y^3 - 10y^2 - 14y - 2) - (5y^3 - 3y + 6)$$

$$= 8y^3 - 10y^2 - 14y - 2 - 5y^3 + 3y - 6$$

$$= 8y^3 - 5y^3 - 10y^2 - 14y + 3y - 2 - 6$$

$$= 3y^3 - 10y^2 - 11y - 8$$

Objective 4: Graph equations defined by polynomials of degree 2.

- Graphs of equations defined by polynomials of degree 2, such as $y = x^2 - 4$, have a mirror like quality.

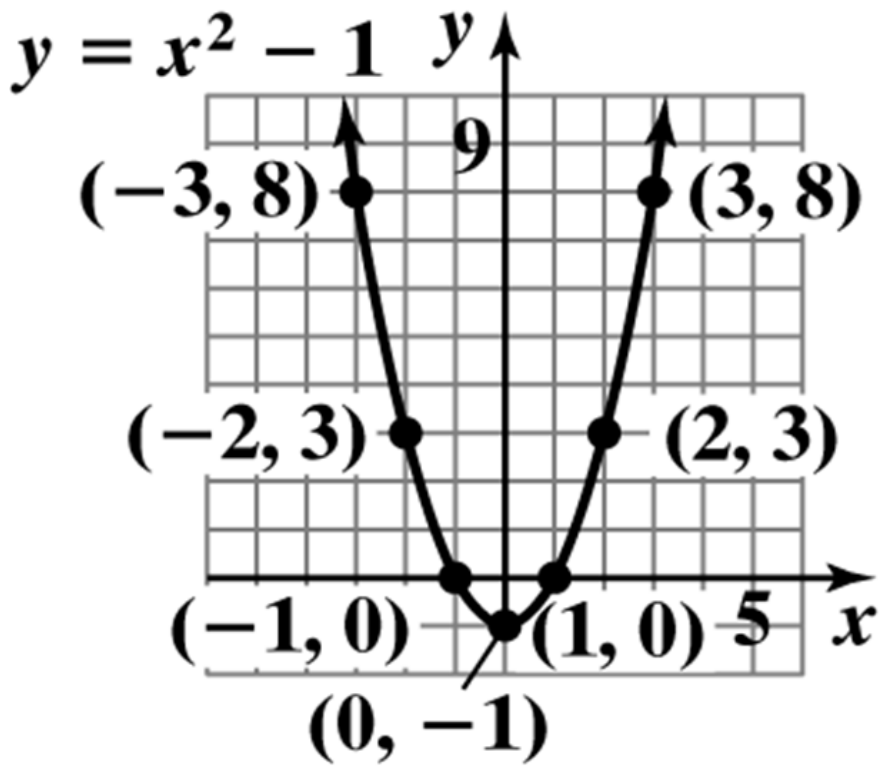
- We can obtain their graphs, shaped like bowls or inverted bowls, using the **point-plotting method** for graphing an equation in two variables.

Objective 4: Graph equations defined by polynomials of degree 2.

Example: Graph the equation $y = x^2 - 1$.

Make a table of values using integers from -3 to 3.

x	$y = x^2 - 1$	(x, y)
-3	$y = (-3)^2 - 1 = 8$	$(-3, 8)$
-2	$y = (-2)^2 - 1 = 3$	$(-2, 3)$
-1	$y = (-1)^2 - 1 = 0$	$(-1, 0)$
0	$y = (0)^2 - 1 = -1$	$(0, -1)$
1	$y = (1)^2 - 1 = 0$	$(1, 0)$
2	$y = (2)^2 - 1 = 3$	$(2, 3)$
3	$y = (3)^2 - 1 = 8$	$(3, 8)$



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