

## Section 5.3: Adding and Subtracting Polynomials

### Learning Targets - day 2:

1. Determining the "opposite" of a given expression.
2. Subtract polynomials horizontally by "**adding the opposite**"
  - create the opposite expression for the second polynomial
  - drop the brackets
  - group the like terms
  - combine like terms
  - write our answers in descending degree

# Opposites

What is the opposite of a number like 5?

-5

What is the opposite of a number like -3?

3

What is the opposite of a monomial like 5x?

-5x

What is the opposite of a monomial like -3x?

3x

# Opposites

What is the opposite of a binomial like  $5x + 4$ ?  $-5x - 4$

What is the opposite of a binomial like  $-3x - 2$ ?  $3x + 2$

What is the opposite of a trinomial like  $2x^2 + 3x - 4$ ?

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

# Opposites

**The process of forming the "opposite" of a polynomial requires that we take the original polynomial and change all of the signs:**

- terms that had positive coefficients will have negative coefficients in the opposite expression
- terms that had negative coefficients will have positive coefficients in the opposite expression
- positive constants become negative constants in the opposite expression
- negative constants become positive constants in the opposite expression

# You Try:

What is the opposite of each of these expressions:

1)  $x$

$$-x$$

2)  $5 - 3x$

$$-5 + 3x$$

$$3x - 5$$

3)  $7x^2 - 5x + 1$

$$-7x^2 + 5x - 1$$

# Subtraction

It's the same as "adding the opposite".

With integers, suppose we wanted to calculate  $8 - 15$

We can write this problem as  $8 + (-15)$  and it means the same thing and will give us the same answer:  $-7$

We have changed "**subtracting 15**" into "**adding -15**".  
*(adding the opposite of 15)*

# Examples:

Subtract the polynomials horizontally by adding the opposite:

1)  $(2x - 3) - (-x + 2)$

# Examples:

Subtract the polynomials horizontally by adding the opposite:

$$\begin{aligned} 1) \quad & (2x - 3) - (-x + 2) \\ & = (2x - 3) + (x - 2) \end{aligned}$$

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

$$= \frac{2x + x}{\downarrow} - \frac{3 + 2}{\downarrow}$$

$$= 3x - 5$$

"**adding the opposite**" means that rather than subtracting  $(-x + 2)$ , we will add the opposite,  $(x - 2)$ , instead



# Examples:

Subtract the polynomials horizontally by adding the opposite:

$$2) \quad (5x^2 - x + 4) - (2x^2 - 3x - 1)$$

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

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

$$= 3x^2 + 2x + 5$$

# Examples:

Subtract the polynomials horizontally by adding the opposite:

$$3) \quad (-2a^2 - 4a + 1) - (-5a + 9)$$

$$= (-2a^2 - 4a + 1) + (5a - 9)$$

$$= (-2a^2) (-4a) (+1) (+5a) (-9)$$

$$= -2a^2 + a - 8$$

## You Try:

Subtract the following polynomials horizontally by adding the opposite. Write your answer in descending degree.

$$(n^2 + 2n - 6) - (4n^2 - 2n + 1)$$

$$= (n^2 + 2n - 6) + (-4n^2 + 2n - 1)$$

$$= (+n^2) + (2n) + (-6) + (-4n^2) + (2n) + (-1)$$

$$= -3n^2 + 4n - 7$$

# Check your understanding:

## Addition and Subtraction of Polynomials

Worksheet 1 - #2, 4, 5, 6, 9

Worksheet 2 - #2, 4, 5, 6, 9

Textbook pg. 195-199

#10, 11, 14, 15, 21

## Answer Key:

**Worksheet #1:**

2.	$7x^2 + 6x$	4.	$-x - 6$
5.	$3x^2 - x$	6.	$4x^2$
9.	$6x^2 - x$		

**Worksheet #2:**

2.	$5x^2 + 4x$	4.	$4x$
5.	$7x^2 - 2x$	6.	$x^2$
9.	$3x^2 - 5x$		