

End behavior and Polynomial Operations  
Springboard 14.2, 15.2  
11.16.16

Warm-up

Perform the operations

1)  $x + 3 - 5x + 2 =$

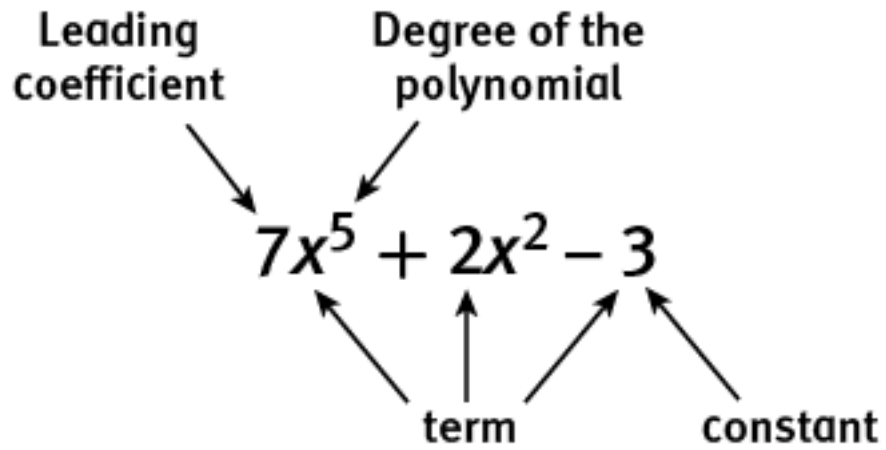
2)  $-15 - 6x + 2 - 5x =$

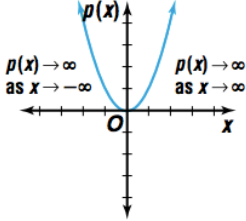
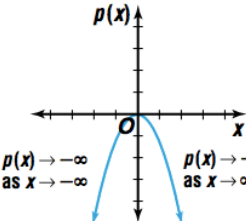
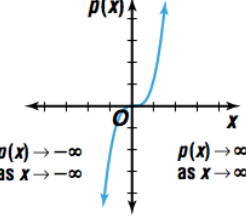
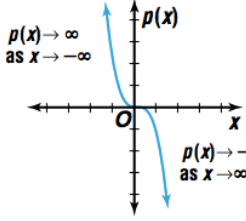
3)  $-10 - 50 - x + 5x =$

4)  $4x - 5x + 6x + 6 - 10 =$

5)  $5x + 2y + 10 - 3x - 7y + 4 =$

1. A **Polynomial** is an expression of more than two algebraic terms, especially the sum of several terms that contain different powers of the same variable(s).



<b>End Behavior of Polynomial Functions</b> $p(x) = a_n x^n + a_{n-1} x^{n-1} + a_{n-2} x^{n-2} + \dots + a_2 x^2 + a_1 x + a_0, n > 0$	
<b><math>a_n</math>: positive, <math>n</math>: even</b>	<b><math>a_n</math>: negative, <math>n</math>: even</b>
$p(x) = x^2$ 	$p(x) = -x^2$ 
<b><math>a_n</math>: positive, <math>n</math>: odd</b>	<b><math>a_n</math>: negative, <math>n</math>: odd</b>
$p(x) = x^3$ 	$p(x) = -x^3$ 

Stand up and find a partner!

Older Answer, Younger person listen.

What do you think of when you think of the word “even?”

What do you think of when you think of the word “odd?”

What do you think of when you hear the word “positive?”

What do you think of when you hear the word “negative?”

I Try:

Determine the end behavior.

$$y = x - 3x^5 - 2$$

Put in standard form	$y = -3x^5 + x - 2$
Identify leading term	$-3x^5$
Identify <b><i>a</i></b> and <b><i>n</i></b>	$a = -3, \text{negative}$ $n = 5, \text{odd}$
Reference chart and state end behavior.	$\text{as } x \rightarrow \infty, y \rightarrow -\infty$ $\text{as } x \rightarrow -\infty, y \rightarrow \infty$

We Try:

Determine the end behavior.

$$y = x^2 + 3x^4 - 2x - 15$$

Put in standard form	
Identify leading term	
Identify <b><i>a</i></b> and <b><i>n</i></b>	$a$ $n =$
Reference chart and state end behavior.	$as\ x \rightarrow \infty, y \rightarrow$ $as\ x \rightarrow -\infty, y \rightarrow$

We Try:

Determine the end behavior.

$$y = -4x^5 + 108x^3 - 2x$$

Put in standard form	
Identify leading term	
Identify <b><i>a</i></b> and <b><i>n</i></b>	$a$ $n =$
Reference chart and state end behavior.	$as\ x \rightarrow \infty, y \rightarrow$ $as\ x \rightarrow -\infty, y \rightarrow$

You Try with a partner on the whiteboards:

Determine the end behavior.

Left Talk, Right Write.

$$y = -4 + 12x^2 - 2x^3$$

Put in standard form	
Identify leading term	
Identify <b><i>a</i></b> and <b><i>n</i></b>	$a$ $n =$
Reference chart and state end behavior.	$as x \rightarrow \infty, y \rightarrow$ $as x \rightarrow -\infty, y \rightarrow$

You Try with a partner on the whiteboards:

Determine the end behavior.

Right Talk, Left Write.

$$y = -5x^5 + 12x^3 - 2x^2$$

Put in standard form	
Identify leading term	
Identify <b><i>a</i></b> and <b><i>n</i></b>	$a$ $n =$
Reference chart and state end behavior.	$as x \rightarrow \infty, y \rightarrow$ $as x \rightarrow -\infty, y \rightarrow$

You Try SOLO:

Determine the end behavior.

$$y = -10x^4 + 12x - 2x^2$$

Put in standard form	
Identify leading term	
Identify <b><i>a</i></b> and <b><i>n</i></b>	$a$ $n =$
Reference chart and state end behavior.	$as\ x \rightarrow \infty, y \rightarrow$ $as\ x \rightarrow -\infty, y \rightarrow$