5-1 Polynomials Functions

By: Student 1

Classifying Polynomials

● Vocabulary Builder

polynomial (noun) **pahl ah NOH mee ul**

Related Words: monomial, binomial, trinomial

Definition: A polynomial is a monomial or the sum of monomials.

polynomial

$$\overbrace{3t - rt + r^3}$$

monomials

Things to remember

1. **Degree** of a polynomial Is the highest exponent
2. The number of **turning points** are found by subtracting 1 from the highest exponent.
3. Put polynomials in **Standard Form** also from highest to lowest exponents

Practice

Terms are the parts of a polynomial that are added or subtracted.

Write the number of terms in each *polynomial*.

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

5. $4b^5 - 3b^4 + 7b^3 + 8b^2 - b$

6. $3qr^2 + q^3r^2 - q^2r + 7$

Terms are the parts of a polynomial that are added or subtracted.

Write the number of terms in each *polynomial*.

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

3

Trinomial

5. $4b^5 - 3b^4 + 7b^3 + 8b^2 - b$

5

Quintic

6. $3qr^2 + q^3r^2 - q^2r + 7$

4

Quartic

Classifying Polynomials Chart

Degree	Name Using Degree	Polynomial Example	Number of Terms	Name Using Number of Terms
0	constant	5	1	monomial
1	linear	$x + 4$	2	binomial
2	quadratic	$4x^2$	1	monomial
3	cubic	$4x^3 - 2x^2 + x$	3	trinomial
4	quartic	$2x^4 + 5x^2$	2	binomial
5	quintic	$-x^5 + 4x^2 + 2x + 1$	4	polynomial of 4 terms

Degree	Degree	Example	Te
0	Constant	5	
1	Linear	$x^1 + 4$	
2	Quadratic	x^2	
3		$4x^3 \quad 2x^2 + x$	
4		$+ 5x^2$	
5		$-x^5 \quad x^2 + 2x + 1$	

Problem 1   Classifying Polynomials

Write each polynomial in form. What is the by number of terms
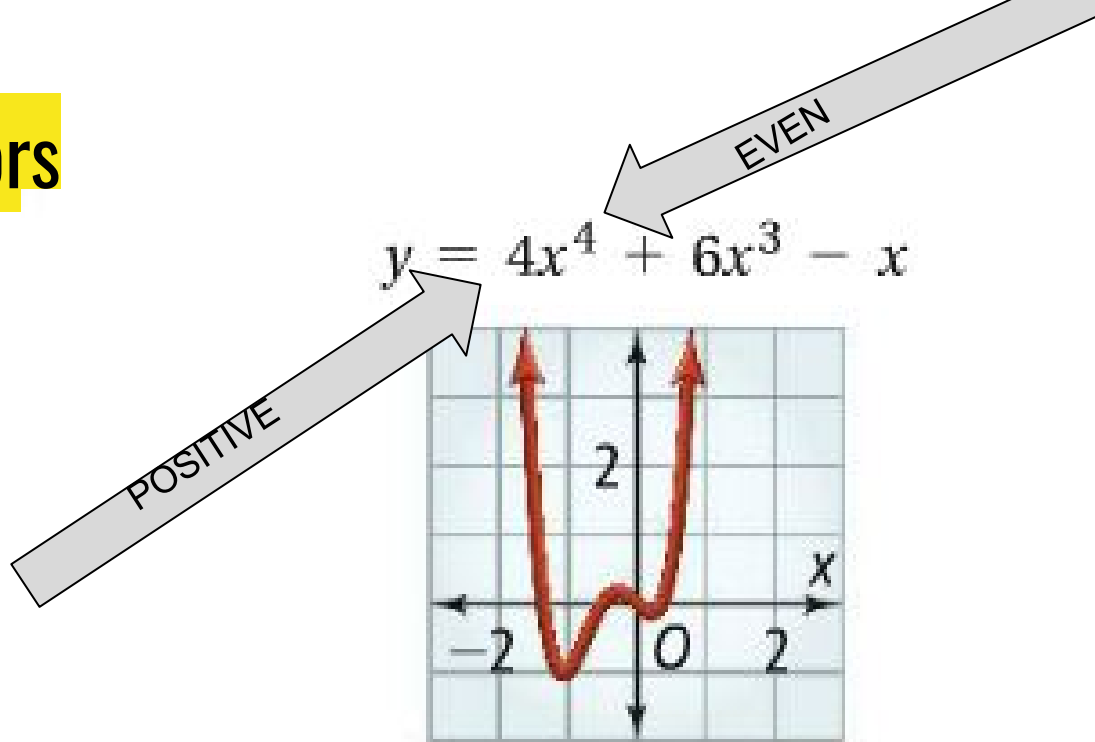
Practice

Do you know HOW?

Classify each polynomial by degree and by number of terms.

1. $5x^3$

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

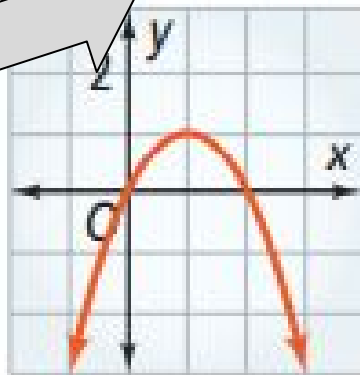# End Behavior of Graphs

End behaviors

EVEN

$$y = 4x^4 + 6x^3 - x$$

POSITIVE

End Behavior: Up and Up

End behaviors

EVEN

$$y = -x^2 + 2x$$

NEGATIVE

End Behavior: Down and Down

End behaviors

ODD

POSITIVE

$y = x^3$
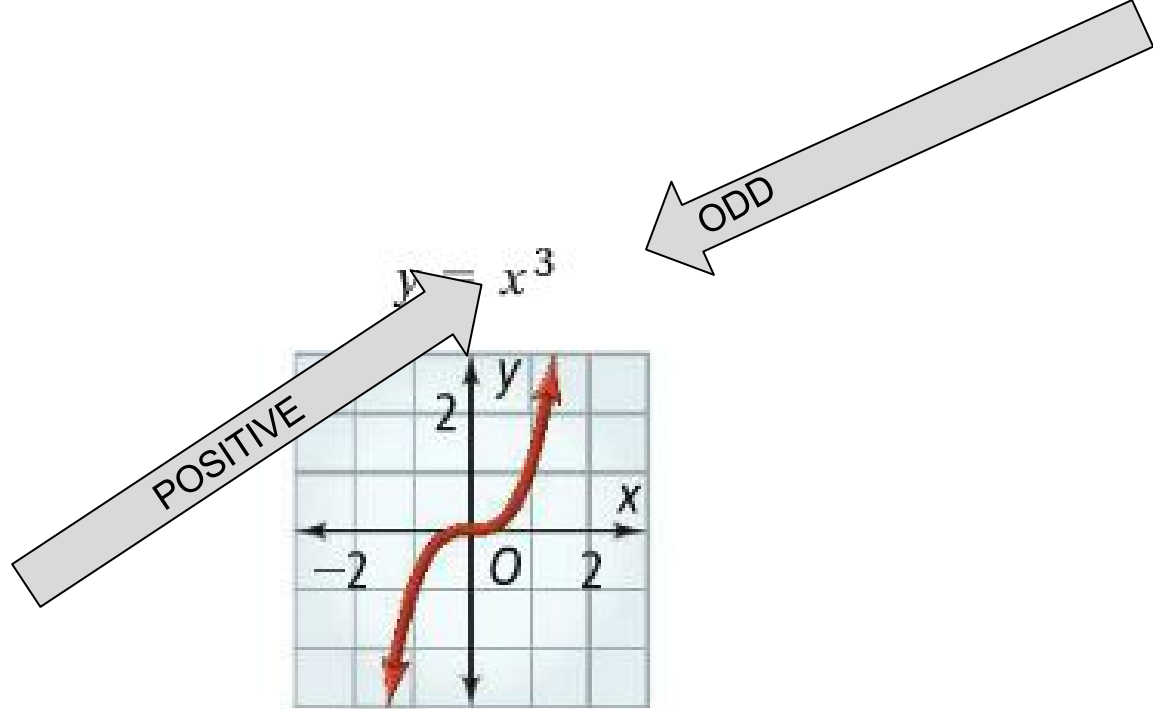
End Behavior: Down and Up

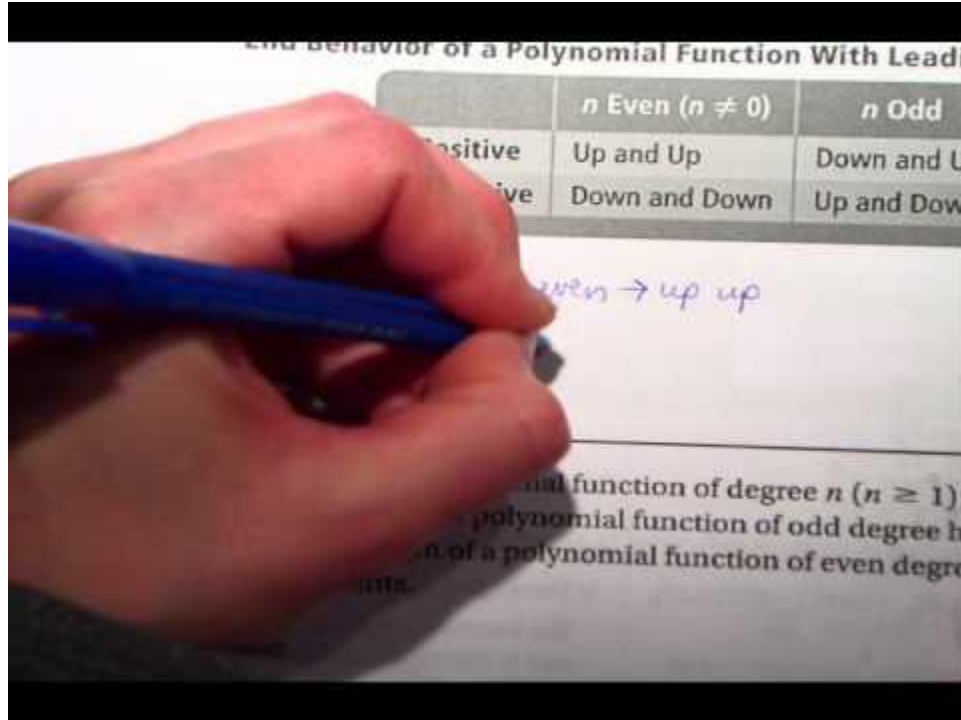Odd

$$y = -x^3 + 2x$$
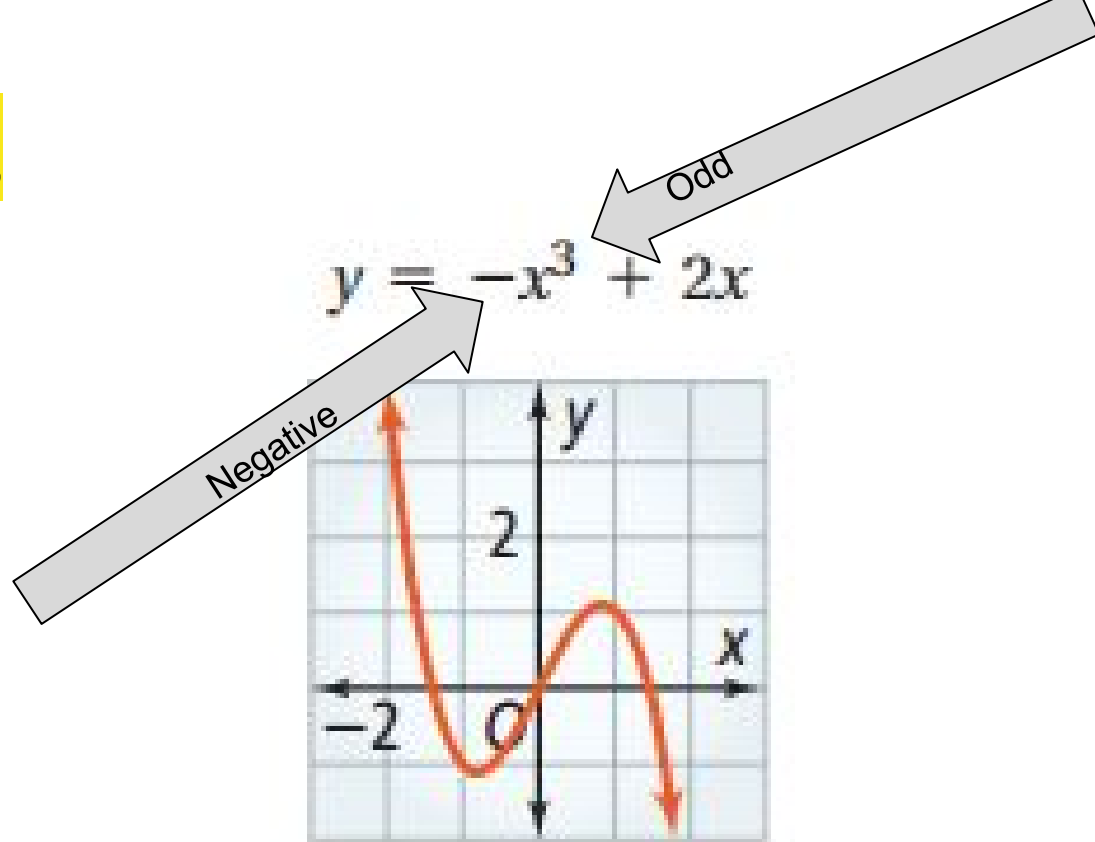
Negative

End Behavior: Up and Down

Things to remember

End Behavior of a Polynomial Function of Degree n with Leading Term ax^n

	n Even ($n \neq 0$)	n Odd
a Positive	Up and Up	Down and Up
a Negative	Down and Down	Up and Down

Video for End Behavior

Determine the end behavior of the graph of each polynomial function.

6. $y = 5x^3 - 2x^2 + 1$ **7.** $y = 5 - x + 4x^2$ **8.** $y = x - x^2 + 10$

Determining Degree Using Differences

Degree of a Polynomial

REMEMBER: Degree is the highest exponent of a polynomial.

$$y = -4x^3 + 2x^2 + 7$$

This is a third degree (cubic) polynomial.

You can tell degree of a polynomial without seeing the polynomial in standard form.

"What is the degree of the polynomial that generates the given data?"

x	y
−3	−1
−2	−7
−1	−3
0	5
1	11
2	9
3	−7

Degree of a Polynomial

x	y
−3	−1
−2	−7
−1	−3
0	5
1	11
2	9
3	−7

1. Use subtraction to find the difference between the y values
2. Repeat until the difference is constant (the same)
3. The number of time you have to repeat is the degree

Degree

x	y
−3	−1
−2	−7
−1	−3
0	5
1	11
2	9
3	−7

y-value	1st difference	2nd difference	3rd difference
−1			
	−6		
−7		10	
	4		−6
−3		4	
	8		−6
5		−2	
	6		−6
11		−8	
	−2		−6
9		−14	
	−16		
−7			
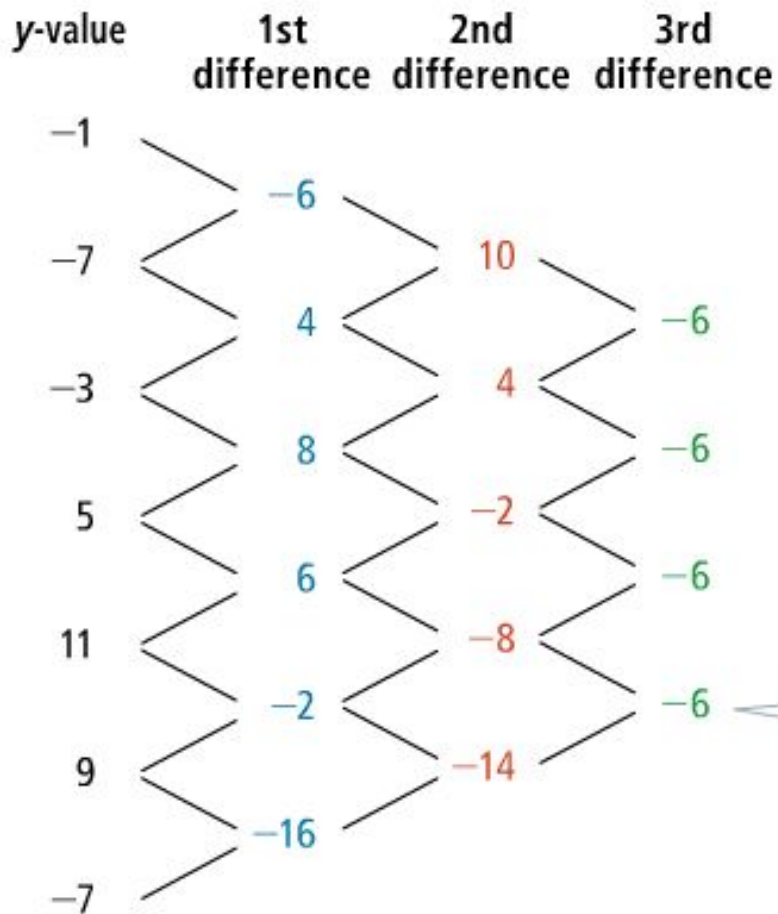
The third differences are constant.

The degree of the polynomial function is 3.

Practice Problems

Determine the degree of the polynomial function with the given data.

38.

x	−2	−1	0	1	2
y	16	7	2	1	4

39.

x	−2	−1	0	1	2
y	−15	−9	−9	−9	−3