Warm-Up

Grab a copy of the guided notes from the table. Start working on it and do as much as you can on the front and back!!

Oct 3-7:50 AM

POLYNOMIAL FUNCTIONS

VOCABULARY

Monomial –a real number, a variable, or a product of real numbers and variables with whole number exponents

8 x $8x^2$

Degree of a monomial – the exponent of the variable if there is only one variable, or the sum of the exponents if there is more than one variable

$8x^3$ degree: 3 x^2y^3 deg 5

Polynomial – a monomial or the sum of monomials

4+ terms

Degree of a polynomial – the greatest degree among the monomial terms

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

Polynomial function – a polynomial in the variable *x*

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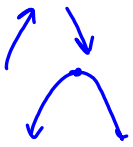
Standard form of a polynomial – arrange the terms by degree in descending numerical order. A polynomial function $P(x)$, where n is a nonnegative integer and $a_n, \ldots, a_0$ are real numbers.

$$P(x) = a_n x^n + a_{n-1} x^{n-1} + \ldots + a_1 x + a_0$$

Turning point –a point where the graph of a function changes direction from upwards to downwards or from downwards to upwards



End behavior – the direction of the graph of a function as you move to the left and to the right, away from the origin.

$x \to \infty$
$f(x) \to \ldots$

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Classifying Polynomials

Names By Degree

Degree	Name By Degree	Polynomial Example
0	constant	5
1	linear	$8x+1$
2	quadratic	$9x^2$; $2x^2-5x+3$
3	cubic	$8x^3+8x^2+8x+8$
4	quartic	$8x^4+8x^3+8x^2+8x+8$
5	quintic	$8x^5+4x^4-2x^3+4x^2-3x+1$

x^3

6+ → 6th degree
7th degree

$8x^{15} + 16x^2 - 5$

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Names By Terms

Number of Terms	Name By Terms	Polynomial Example
1	monomial	$8x^3$
2	binomial	$4x+1$; $8x^2-8$
3	trinomial	$3x^3+9x-2$
4 +	polynomial	$4x^{17}+8x^4+3x^2-7$

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Ex#1: $4 - 3x^2 + 2x + 3x^3$

1. Write in standard form (highest power to constant) $3x^3-3x^2+2x+4$
2. Determine degree Cubic = 3
3. Determine number of monomial terms 4
4. Name cubic polynomial
5. Leading Coefficient: 3

Oct 19-9:22 AM

Classifying Polynomials

EX #1: Write each polynomial in standard form.
Name the polynomial by degree and by number of terms.

A. $4x^2-3x+5x^4$ $5x^4+4x^2-3x$ Quartic trinomial

B. $2+x^3-3x^2+7x$ x^3-3x^2+7x+2 cubic polynomial

C. $8+3x$ $3x+8$ linear binomial

D. x^7 7th degree monomial

E. 11 constant monomial

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Determing Polynomials from equations

EX #2 Which equations are polynomial functions?

1. $f(x) = x^{15} + x^{10} + 7$
2. $f(x) = 2x^{\frac{1}{3}} + 7x - 1$
3. $f(m) = m + 2\sqrt{m}$
4. $f(x) = 12$
5. $f(x) = x - 6.7$
6. $f(x) = x^3 - 6x^2 + \frac{1}{2}$ $x^{-2} = \frac{1}{x^2}$
7. $f(x) = x^{-2} + 5$
8. $f(p) = p^2 - \frac{5}{p}$

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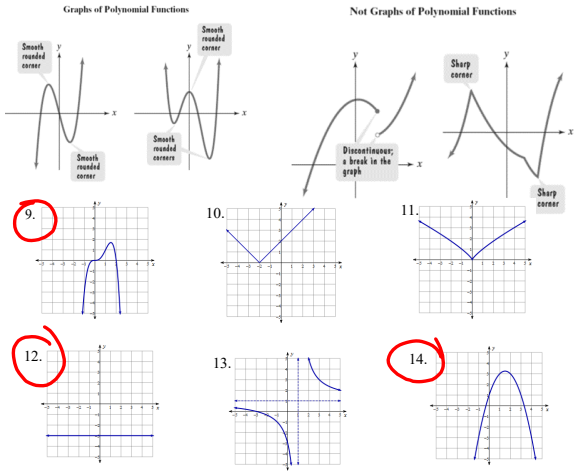
Determing Polynomials from graphs



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End-Behavior of a Polynomial

The degree of a polynomial affects the shape of its graph and determines the maximum number of **turning points**. It also affects the **end behavior** of a function.

Even Degree

Same end behavior
L.C. tells us direction.

4→

Degree -1 = max # of turning pts

2

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

$y = -x^2 + 4x$

End behavior -∞

LC: -1

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ODD Degree

Opposite end behaviors.

DOWN AND UP **UP AND DOWN**

LC determines direction for right side

$y = \frac{1}{3}x^3 - 2x$

LC: +1

$y = -0.5x^3 + 4x + 1$

LC: -½

$-3x^3 + 2x$ + ↑ -

LC → -3
$x \to -\infty$
$f(x) = \infty$
$x \to +\infty$
$f(x) \to -\infty$

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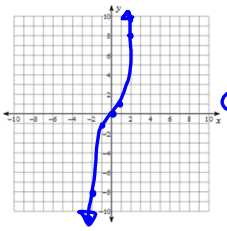
Graphing Cubic Functions

EX #4: 1. $y = x^3$ Parent Function Must know!!

x	y
-2	-8
-1	-1
0	0
1	1
2	8



0 turning points

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Graphing Cubic Functions

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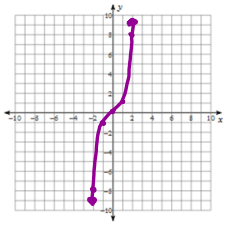

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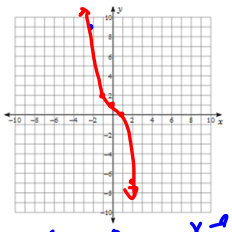
Graphing Cubic Functions

EX #4: 2. $y = -x^3 + 1$

Use transformations to graph.

reflects over x-axis

up



$x \to -\infty$ $f(x) \to +\infty$

$x \to +\infty$ $f(x) \to -\infty$

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Graphing Cubic Functions

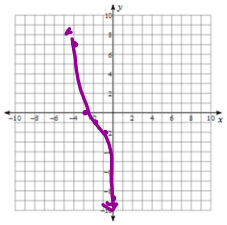
EX #4: 3. $y = -(x+2)^3 - 1$

Use transformations to graph.

reflect over x-axis

left 2

down 1



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