Warm Up

Evaluate.

1. -2^4 $= -\ 2 \cdot 2 \cdot 2 \cdot 2$
$= -16$

2. $(-2)^4$ $= -2 \cdot -2 \cdot -2 \cdot -2$
16

Simplify each expression.

3. $x - 2(3x - 1)$ $x - 6x + 2$

4. $3(y^2 + 6y)$ $3y^2 + 18y$

6-1 Polynomials

Objectives

Identify, evaluate, add, and subtract polynomials.

Classify and graph polynomials.

6-1 Polynomials

Vocabulary

monomial
polynomial
degree of a monomial
degree of a polynomial
leading coefficient
binomial
trinomial
polynomial function

6-1 Polynomials

A **monomial** is a number or a product of numbers and variables with whole number exponents. A **polynomial** is a monomial or a sum or difference of monomials. Each monomial in a polynomial is a term. Because a monomial has only one term, it is the simplest type of polynomial.

Polynomials have no variables in denominators or exponents, no roots or absolute values of variables, and all variables have whole number exponents.

Polynomials: $3x^4$ $2z^{12} + 9z^3$ $\frac{1}{2}a^7$ $0.15x^{101}$ $3t^2 - t^3$

Not polynomials: 3^x $|2b^3 - 6b|$ $\frac{8}{5y^2}$ $\frac{1}{2}\sqrt{x}$ $m^{0.75} - m$

The **degree of a monomial** is the sum of the exponents of the variables.

Identify the degree of each monomial.

A. z^6

6

B. 5.6^1

1

C. $8^1x^1y^3$

5

D. $a^2b^1c^3$

6

Identify the degree of each monomial.

a. x^3

3

b. 7

1

c. $5^1x^3y^2$

6

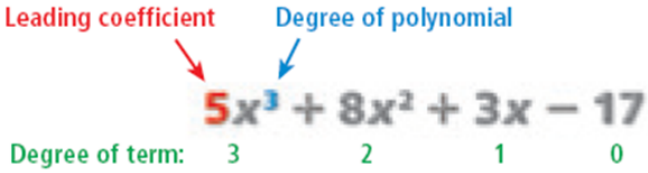
d. a^6bc^2

9

6-1 Polynomials

An **degree of a polynomial** is given by the term with the greatest degree. A polynomial with one variable is in standard form when its terms are written in descending order by degree. So, in standard form, the degree of the first term indicates the degree of the polynomial, and the **leading coefficient** is the coefficient of the first term.

Standard Form



6-1 Polynomials

A polynomial can be classified by its number of terms. A polynomial with two terms is called a **binomial**, and a polynomial with three terms is called a **trinomial**. A polynomial can also be classified by its degree.

Classifying Polynomials by Degree		
Name	Degree	Example
Constant	0	-9
Linear	1	$x - 4$
Quadratic	2	$x^2 + 3x - 1$
Cubic	3	$x^3 + 2x^2 + x + 1$
Quartic	4	$2x^4 + x^3 + 3x^2 + 4x - 1$
Quintic	5	$7x^5 + x^4 - x^3 + 3x^2 + 2x - 1$

Rewrite each polynomial in standard form. Then identify the leading coefficient, degree, and number of terms. Name the polynomial.

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

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

LC: -2

D: 2

#: 3

Quadratic trinomial

b. $-18x^2 + x^3 - 5 + 2x$

x^3-18x^2+2x-5

LC: 1

D: 3

#: 4

Cubic polynomial w/ 4 terms

Rewrite each polynomial in standard form. Then identify the leading coefficient, degree, and number of terms. Name the polynomial.

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

B. $3x^2 - 4 + 8x^4$

$8x^4+3x^2-4$

LC: 8

D: 4

#: 3

Quartic trinomial

We already know how to add/subtract polynomials, you have been doing it without even knowing! Just combine your like terms!

Add or subtract. Write your answer in standard form.

A. $(2x^3 + 9 - x) + (5x^2 + 4 + 7x + x^3)$

$3x^3 + 13 + 6x + 5x^2$

$3x^3 + 5x^2 + 6x + 13$

Add or subtract. Write your answer in standard form.

B. $(3 - 2x^2) - (x^2 + 6 - x)$

$-3 - 3x^2 + x$

$-3x^2 + x - 3$

Add or subtract. Write your answer in standard form.

$(-36x^2 + 6x - 11) + (6x^2 + 16x^3 - 5)$

$-30x^2 + 6x - 16 + 16x^3$

$16x^3 - 30x^2 + 6x - 16$

Add or subtract. Write your answer in standard form.

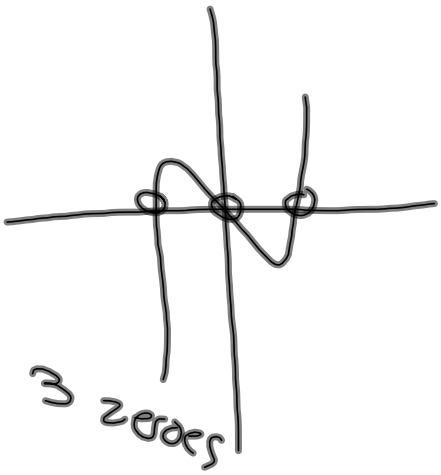
$(5x^3 + 12 + 6x^2) - (15x^2 + 3x - 2)$

The cost of manufacturing a certain product can be approximated by $f(x) = 3x^3 - 18x + 45$, where x is the number of units of the product in hundreds. Evaluate $f(0)$ and $f(200)$ and describe what the values represent.

Graph each polynomial function on a calculator. Describe the graph and identify the number of real zeros.

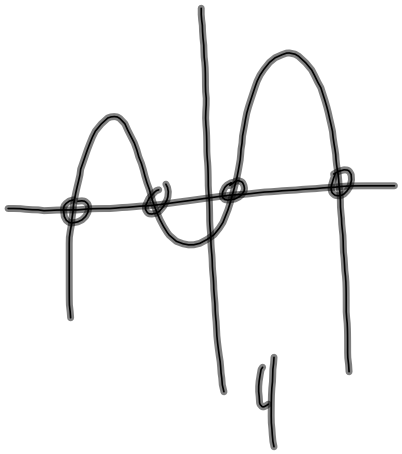
A. $f(x) = 2x^3 - 3x$

2X^3-3X



3 zeroes

B. $f(x) = -\frac{1}{6}x^4 + 2x^2 - 2$



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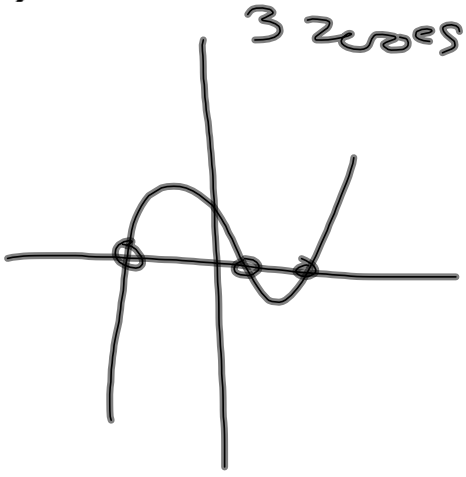
Graph each polynomial function on a calculator. Describe the graph and identify the number of real zeros.

a. $f(x) = 6x^3 + x^2 - 5x + 1$

3 zeroes



b. $f(x) = 3x^2 - 2x + 2$

Graph each polynomial function on a calculator. Describe the graph and identify the number of real zeros.

c. $g(x) = x^4 - 3$

d. $h(x) = 4x^4 - 16x^2 + 5$

Homework:

p. 410 #19-30, 32-40, 47-49, 54-58