Working with Polynomials

4-1 Polynomials

Objective To simplify, add, and subtract polynomials.

Here is a review of some terms you'll use when working with polynomials.

Definition	*Examples*
Constant: a number	$-2, \ \frac{3}{5}, \ 0$
Monomial: a constant, a variable, or a product of a constant and one or more variables	$-7, \ u, \ \frac{1}{3}m^2, \ -s^2t^3, \ 6xy^3$
Coefficient (or **numerical coefficient**): the constant (or numerical) factor in a monomial	The coefficient of $3m^2$ is 3. The coefficient of u is 1. The coefficient of $-s^2t^3$ is -1.
Degree of a variable in a monomial: the number of times the variable occurs as a factor in the monomial	$6xy^3$ The degree of x is 1. The degree of y is 3.
Degree of a monomial: the sum of the degrees of the variables in the monomial. A nonzero constant has degree 0. The constant 0 has *no degree.*	$6xy^3$ has degree $1 + 3$, or 4. $-s^2t^3$ has degree $2 + 3$, or 5. u has degree 1. -7 has degree 0.
Similar (or **like**) **monomials:** monomials that are identical or that differ only in their coefficients	$-s^2t^3$ and $2s^2t^3$ are similar. $6xy^3$ and $6x^3y$ are *not* similar.
Polynomial: a monomial or a sum of monomials. The monomials in a polynomial are called the **terms** of the polynomial.	$x^2 + (-4)x + 5$, or $x^2 - 4x + 5$ The terms are x^2, $-4x$, and 5.
Simplified polynomial: a polynomial in which no two terms are similar. The terms are usually arranged in order of decreasing degree of one of the variables.	$2x^3 - 5 + 4x + x^3$ is *not* simplified, but $3x^3 + 4x - 5$ is simplified.

I can Add and Subtract Polynomials

Easy :) : To Add two or more polynomials, write their sum and then simplify by combining similar terms

Example $(2x^2-3x+5)+(x^3-5x^2+2x-5)$

Since there is nothing to distribute I can drop both sets of parenthesis and Just combine like terms. Thats it

$\cancel{2x^2}\cancel{-3x}+5+\cancel{x^3}\cancel{-5x^2}+\cancel{2x}-5 = -3x^2-1x+x^3+0$

Then make sure to write your answer in decreasing order in terms of x. So final answer is

$\boxed{x^3-3x^2-1x+0}$

#2 $(2x^3-7)+(5x^2-x^3+3x-x^3)$

$\cancel{2x^3}-7+\cancel{5x^2}\cancel{-x^3}+3x\cancel{-x^3} = 2x^3-x^3+5x^2+3x-7 =$

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

I can subtract Polynomials.

* Key Point

make sure to distribute the "subtraction" sign that is in front of the parenethesis

Example: $(2x^2-3x+5)-(x^3-5x^2+2x-5)$

$\cancel{2x^2}-\cancel{3x}\cancel{+5}-\cancel{x^3}+\cancel{5x^2}-\cancel{2x}\cancel{+5}$

I distributed the negative sign

now I just combine like terms like the addition examples

$\boxed{-x^3+7x^2-5x+10}$

You got it!!

#2 $2x^2-3x+5-(x^3-5x^2+2x-5)$

$\cancel{2x^2}-\cancel{3x}+5-\cancel{x^3}+\cancel{5x^2}-\cancel{2x}+5$

Distribute the negative

$7x^2-5x-x^3+10$

$\boxed{-x^3+7x^2-5x+10}$

#3 $(4x^3+5x^2-6x)-(3x^3+2x^2-6x+10)$

$\cancel{4x^3}+\cancel{5x^2}-\cancel{6x}-\cancel{3x^3}-\cancel{2x^2}+\cancel{6x}-10$

Distribute the negative sign

$\boxed{1x^3+3x^2+0x-10}$

* I can use the finite differences method to analyze a table

All you have to do is subtract until you find a constant amount

Thats it :) I know everybody can subtract :)

Example of procedure

x	y	1st	2nd differences
0	6		
		2	
1	8		-2
		0	
2	8		-2
		-2	
3	6		-4-2= -2
		-4	
4	2		-2
		-6	
5	-4		

Look the differences are all constant!
It took me 2 times to get this Result.

we did
8-6=2   0-2=-2
8-8=0   -2-0= -2
6-8=-2   -4--2= -2
2-6=-4   -6--4= -2
-4-2= -6

∴ Since it took 2 times, the pattern is Quadratic

Example #2

x	y	1st	2nd	3rd
0	10			
		-1		
1	9		22	
		+21		18
2	30		40	
		61		18
3	91		58	
		119		18
4	210		76	
		195		18
5	405			

"oh look" on the 3rd try all the differences are the same.
This means it is a Cubic

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Date__________________

Advanced Algebra

Unit 5 Finite Difference Tables

Learning Target #3:I can determine if a relationship is quadratic, linear or cubic, by examining tables, and rates of change.

Method: use the finite differences method to tell if a table is a linear pattern, quadratic pattern, or cubic pattern.

Use the finite differences method to analyze the tables to see if they are linear, quadratic, cubic.

1)

X values	Y vales
5	32
6	38
7	44
8	50
9	56
10	62
11	68

2)

X values	Y values
5	382
6	657
7	1040
8	1549
9	2202
10	3017
11	4012

3)

X values	Y values
5	69
6	96
7	127
8	162
9	201
10	244
11	291

4)

X values	Y values
5	50.5
6	62
7	74.5
8	88
9	102.5
10	118
11	134.5

5)

X values	Y values
5	245
6	424
7	675
8	1010
9	1441
10	1980
11	2639

I can Multiply Polynomials

Key Point: Use the Box!

Example #1: I can distribute

$3(x^2-2x+4) + 2(5x^2-7)$ — Distribute the number infront of the parenthesis

$\cancel{3x^2}-6x+12+\cancel{10x^2}-14$ — combine like terms

$\boxed{13x^2-6x-2}$

I can multiply Polynomials - Use the Box

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

	$2x^2$	$+3x$	-6
$5x^3$	$10x^5$	$15x^4$	$-30x^3$
$-2x^2$	$-4x^4$	$-6x^3$	$12x^2$
$2x$	$4x^3$	$6x^2$	$-12x$

now combine like Terms

$\boxed{10x^5+11x^4-32x^3+18x^2-12x}$

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Advanced Algebra

Unit 5: Polynomials: Assignment #3a

First use the distributive property and then combine like terms

1) $2(x^3 + 3x^2 - 6x + 2) + 4(x^2 - 8x)$

2) $.5(x^4 + 3x2 + 6) - (2x^2 + 4x)$

3) $\frac{1}{4}(x^5 - 3x^4 + 2x - 6) - (3x^4 + 8x - 12)$

Transform the following into General Form (Use your box skills)

1) $y = 4(x-2)(x+8)(x+9)$

2) $y = -3(x+5)(x+8)(x-7)$

3) $y = 6(x-5)(x-2)(x+6)$

4) $y = -.9(x+6)(x-8)(x+1)$

5) $y = \frac{1}{4}(4x+8)(2x-3)(x+5)$