

P.4 Polynomials

GOALS:

1. Perform operation of addition, subtraction and multiplication of polynomials.
2. Review FOIL in mult of polynomials
3. Recognize and perform special products

Study P.4 CVC # 1 - 13;

#1-7;

9, 13, 17, ... 53

59, 63, 67, 71, 75, 79,

85, 87

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Homework Problems

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P.4 Polynomials

Monomial: product of a constant and one or more variables raised to **whole number** powers

3 $2a^2$ y^2 $5b^2c$ $1z$ $2x^2y$

Polynomial: monomial or sum of monomials

$2x^2y + 3x - 2xy + 9$

Degree:

top: left to right

Exponent: for term with one variable

0, 2, 2, 3, 1, 3

Sum of Exponents: for term with more than one variable

Degree of Polynomial:

polynomial above:

Highest degree of any term

3

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P.4 Polynomials

Term: product of a constant and one or more variables

$$3 \quad 2a^{1/3} \quad y^2 \quad b^{1/2} \quad 7z \quad 2x^2y$$

Like Terms: have same variables to same exponents

$4x^2 - 7x + 5x^2 + 9x$	$3x - x^{1/2}$
Polynomial?	
How many terms?	
Which are "like terms"?	
Simplify	

$$xz + z^6$$

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P.4 Polynomials

Term: product of a constant and one or more variables

$$3 \quad 2a^{1/3} \quad y^2 \quad b^{1/2} \quad 7z \quad 2x^2y$$

Like Terms: have same variables to same exponents

$4x^2 - 7x + 5x^2 + 9x$	$3x - x^{1/2}$
Polynomial?	Yes No
How many terms?	4 2
Which are "like terms"?	$[4x^2, 5x^2]$ $[-7x, 9x]$ —
Simplify	$9x^2 + 2x$

CLT

$$xz + z^6$$

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P.4 Polynomials

Simplify

$$-5x^3 - 8x^2 + 4 - 4x^3 + x - 9$$

$$9 - x + 8x^2 - 9x^3$$

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P.4 Polynomials

Simplify

$$\begin{array}{ccccccc} & \downarrow & & & \downarrow & & \\ -5x^3 & - & 8x^2 & + & 4 & - & 4x^3 + x - 9 \\ \hline & & & & = & & \hline \end{array}$$

$$-9x^3 - 8x^2 + x - 5$$

$$\rightarrow (-5-4)x^3 - 8x^2 + x + (4-9)$$

$$9 - x + 8x^2 - 9x^3$$

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Simplify

$$(x^3y - 5x^2y^2 + 2xy^3) + (5x^2y^2 - 4xy^3 + 7y^4)$$

$$x^3y - 5x^2y^2 + 2xy^3 + 5x^2y^2 - 4xy^3 + 7y^4$$

$$x^3y + 0x^2y^2 - 2xy^3 + 7y^4$$

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P.4 Polynomials

Simplify

$$(x^3y - 5x^2y^2 + 2xy^3) + (5x^2y^2 - 4xy^3 + 7y^4)$$

$$x^3y - \underline{5x^2y^2} + \underline{2xy^3} + \underline{5x^2y^2} - \underline{4xy^3} + 7y^4$$

correctly
remove
parenthesis

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

combine like terms (CLT)

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

$$x^3y + 0x^2y^2 - 2xy^3 + 7y^4$$

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Simplify

$$(a^3b - 5a^2b^2 + ab^3) - (5a^2b^2 - 7ab^3 + b^3)$$

$$a^3b - 10a^2b^2 + 8ab^3 - b^3$$

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P.4 Polynomials

Simplify

$$(a^3b - 5a^2b^2 + ab^3) - (5a^2b^2 - 7ab^3 + b^3)$$

$$a^3b - \underline{5a^2b^2} + \underline{ab^3} - \underline{5a^2b^2} + \underline{7ab^3} - b^3$$

$$a^3b - 10a^2b^2 + 8ab^3 - b^3$$

$$a^3b - 10a^2b^2 + 8ab^3 - b^3$$

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Simplify

$$(6x^4y + x^3y^2 - 3x^2y^3) - (4x^3y^2 - 3x^2y^3 - 5xy^4)$$

$$\begin{array}{r} 6x^4y + x^3y^2 - 3x^2y^3 \\ -4x^3y^2 + 3x^2y^3 + 5xy^4 \\ \hline \end{array}$$

$$6x^4y + x^3y^2 - 3x^2y^3$$

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P.4 Polynomials

Simplify

$$(6x^4y + x^3y^2 - 3x^2y^3) - (4x^3y^2 - 3x^2y^3 - 5xy^4)$$

$$\begin{array}{r} 6x^4y + x^3y^2 - 3x^2y^3 \\ -4x^3y^2 + 3x^2y^3 + 5xy^4 \\ \hline \end{array}$$

$$6x^4y - 3x^3y^2 + 5xy^4$$

$$6x^4y + x^3y^2 - 3x^2y^3$$

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P.4 Polynomials

Monomial x Monomial

$$(2a^3)(5a^6)$$

$$-9x(4x)$$

$$(3x^2)(xy)$$

$$(-4x)(-6xy)$$

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P.4 Polynomials

Monomial x Monomial

$$(2a^3)(5a^6)$$

$$10a^9$$

$$-9x(4x)$$

$$-36x^2$$

$$(3x^2)(xy)$$

$$3x^3y$$

$$(-4x)(-6xy)$$

$$24x^2y$$

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P.4 Polynomials

DP: $a(b+c) = ab+ac$

Monomial x Binomial

$2x(x+y)$

$3xy(5x-2y)$

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P.4 Polynomials

DP: $a(b+c) = ab+ac$

Monomial x Binomial

$$\begin{array}{r} 2x(x+y) \\ \hline 2x \cdot x + 2x \cdot y \end{array}$$

$$2x^2 + 2xy$$

$3xy(5x-2y)$

$$\begin{array}{r} 3xy \cdot 5x + 3xy(-2y) \\ \hline \end{array}$$

$$15x^2y - 6xy^2$$

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P.4 Polynomials

Binomial x Binomial

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

FOIL

First
Outer
Inner
Last

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P.4 Polynomials

Binomial x Binomial

$(x - 1)(x + 3)$

$$\begin{array}{r}
 x-1 \\
 x+3 \\
 \hline
 x^2 - x \\
 3x - 3 \\
 \hline
 x^2 + 2x - 3
 \end{array}$$

FOIL
First
Outer
Inner
Last

$(2x + 1)(x - 1)$

$$2x^2 - x - 1$$

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P.4 Polynomials

FOIL

Binomial x Binomial

$$(2x + y)(x + y)$$

$$(x - y)(x + 3y)$$

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P.4 Polynomials

FOIL

Binomial x Binomial

$$(2x + y)(x + y)$$

Handwritten FOIL process for $(2x + y)(x + y)$:
 - First: $2x \cdot x = 2x^2$
 - Outer: $2x \cdot y = 2xy$
 - Inner: $y \cdot x = xy$
 - Last: $y \cdot y = y^2$
 The terms $2xy$ and xy are circled together, indicating they will be combined.

$$\underline{2x^2} + \underline{3xy} + \underline{y^2}$$

$$(x - y)(x + 3y)$$

Handwritten FOIL process for $(x - y)(x + 3y)$:
 - First: $x \cdot x = x^2$
 - Outer: $x \cdot 3y = 3xy$
 - Inner: $-y \cdot x = -xy$
 - Last: $-y \cdot 3y = -3y^2$
 The terms $3xy$ and $-xy$ are circled together, indicating they will be combined.

$$\underline{x^2} + \underline{2xy} - \underline{3y^2}$$

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P.4 Polynomials**Monomial x Polyomial**

$$2x (x^3y - 5x^2y^2 + 2xy^3)$$

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$$2x (x^3y - 5x^2y^2 + 2xy^3)$$

$$2x^4y - 10x^3y^2 + 4x^2y^3$$

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P.4 Polynomials

Special Products: $(a + b)^2 = a^2 + 2ab + b^2$

$$(x + y)^2$$

$$(2x + y)^2$$

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P.4 Polynomials

Special Products: $(a + b)^2 = a^2 + 2ab + b^2$

$$(x + y)^2$$

$$x^2 + 2xy + y^2$$

or FOIL:

$$(x+y)(x+y)$$

$$\frac{(2x + y)^2}{\frac{a}{b}}$$

$$(2x)^2 + 2(2x)y + y^2$$

$$4x^2 + 4xy + y^2$$

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P.4 Polynomials

Special Products: $(a + b)^2 = a^2 + 2ab + b^2$

$$(x - y)^2$$

$$(x - 3y)^2$$

Special Products: $(a - b)^2 = a^2 - 2ab + b^2$

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P.4 Polynomials

Special Products: $(a + b)^2 = a^2 + 2ab + b^2$

$$(x - y)^2$$

$$(x - 3y)^2$$

$$a = x$$

$$b = -3y$$

$$x^2 - 2xy + y^2$$

$$x^2 + 2x(-3y) + (-3y)^2$$

$$x^2 - 6xy + 9y^2$$

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Special Products: $(a + b)(a - b) = a^2 - b^2$

$$(2x + y)(2x - y)$$

$$(3x + 5y)(3x - 5y)$$

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P.4 Polynomials

Special Products: $(a + b)(a - b) = a^2 - b^2$

$$(2x + y)(2x - y)$$

$$(3x + 5y)(3x - 5y)$$

$$4x^2 - y^2$$

$$9x^2 - 25y^2$$

$$\begin{array}{c} (a+b)(a-b) \\ a^2 \boxed{-ab+ab} - b^2 \\ a^2 - b^2 \end{array}$$

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$$(4-3x)(4+3x)$$

$$(x+8)(x+5)$$

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

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

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P.4 Polynomials

$$(4-3x)(4+3x)$$

$$(x+8)(x+5)$$

$$16-9x^2$$

$$x^2+13x+40$$

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

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

$$25x^4 + 2(5x^2)(3) + 9$$

$$\begin{array}{r} 8x^2-1+2x-4-x^2+1 \\ \hline 7x^2+2x-4 \end{array}$$

$$25x^4-30x^2+9$$

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