

Section 4.2 Notes

Objective: Adding and Subtracting Polynomials

Constant: A monomial that contains no variables, like 23 or -1 .

EXAMPLES: $7, 18, -6, \frac{2}{3}, -\frac{4}{9}, \frac{18}{5}$

Coefficient: The numerical part of a monomial (the number being multiplied by the variables.)

EXAMPLES: $3x$ 3 is the coefficient
 $7x^5$ 7 is the coefficient

Variable: A letter that represents an unknown number

EXAMPLES: $x, y, 9, 8x$ ← x is the variable

Expression: A term or terms (there is no equal sign)

EXAMPLES: $x^2 + 3x$ x^3 $3x^4 + 7x - 6$
 ↑ ↑ ↑ ↑
 term term 1 term 3 terms

Terms: The monomials that make up a polynomial. Terms are separated by + or - signs.

Monomial: An expression that is a number, a variable, or numbers and variables multiplied together. Monomials only have variables with whole number exponents and never have variables in the denominator of a fraction or variables under roots.

Monomials: $5b$, $\frac{xyz}{8}$, $-w$, 23 , x^2 , $\frac{1}{3}x^3y^4$

Not Monomials: $\frac{1}{x^4}$, $\sqrt[3]{x}$, a^{-1} , $z^{\frac{1}{5}}$

Binomial: A polynomial with two unlike terms.

EXAMPLE $x^2 + 3x$

x^2 and $3x$ cannot be added.

Trinomial: A polynomial with three unlike terms.

EXAMPLE: $x^2 - 4x + 2$

Polynomial: A monomial or several monomials joined by + or - signs.

EXAMPLE: $5x^3 - 2x^2 + 7x - 8$

Like Terms: Terms whose variables and exponents are exactly the same

$3x, 5x$ $3x + 5x = 8x$

$4x^2, -15x^2$

I could add these to get $8x$

Standard form: Terms are in descending order (highest power first to lowest power and at the end is the constant)

EXAMPLE $3x^2 - 2x - 5$

$4x^5 - 7x^3 + 3x + 4$

How to find the degree of a polynomial: Find the term with the highest exponent....that's the degree of the polynomial


$4x^5 - 7x^3 - 3x + 4$ degree is 5.

Reasons for not a polynomial: Negative exponent, variable in the denominator, exponent is a fraction, variable under a radical sign.

EXAMPLES \sqrt{x} ; $\frac{3}{x^5}$ $4x^{-3}$
 $x^{\frac{1}{5}}$; $x^{\frac{3}{4}}$

Examples: Decide whether each expression is a polynomial. If it is, state the degree of the polynomial. If it is not, explain why not.

a) $5x^4 + 2x^3 + 6x$
yes degree 4

b) $-\frac{4}{3}a - a^5$ 
yes degree 5

c) $\frac{12}{m+2}$
no

m is a variable
in the denominator

d) $6c^{-2} + c - 1$

no; "c" a variable
has a negative
power

e) $6z^{\frac{1}{2}} + 5z^2 - 2$

no "z" has a
power that is a fraction

f) 7

yes
degree 0

g) $-8n - 3$

yes
degree is 1

h) $3\sqrt{x+2}$

no
 x is in radicand
 x is in $\sqrt{\quad}$

Adding and Subtracting Polynomials

To add or subtract polynomials, combine like terms. Add or subtract the coefficients. The variables and exponents do not change. **Remember to subtract everything inside the parentheses after a minus sign.** Subtract means "add the opposite," so change the minus sign to a plus sign and then change the signs of all the terms inside the parentheses.

Examples: Simplify each expression.

a) $(5n^2 - 2) + (7 - 3n^2)$

$$5n^2 - 2 + 7 - 3n^2$$

$$-2 + 7 = 5$$

$$5n^2 - 3n^2 = 2n^2$$

answer $\boxed{2n^2 + 5}$

c) $(4x^2 - 3x + 1) + (-2x^2 + 5x - 6)$

$$\underline{4x^2} - \underline{3x} + \underline{1} + \underline{-2x^2} + \underline{5x} - \underline{6}$$

$$4x^2 - 2x^2 - 3x + 5x + 1 - 6$$

$$\boxed{2x^2 + 2x - 5}$$

b) $(2r^2 + 5r) + (r^2 - 4r)$

$$2r^2 + 5r + r^2 - 4r$$

$$2r^2 + r^2 + 5r - 4r$$

$$\boxed{3r^2 + r}$$

d) $(7z^2 + 12z - 5) + (6z - 4z^2 - 3)$

$$7z^2 + 12z - 5$$

$$+ \underline{-4z^2} + \underline{6z} - \underline{3}$$

$$\boxed{3z^2 + 18z - 8}$$

$$e) (2w^2 + 3w) - (4w^2 + w)$$

$$2w^2 + 3w - 4w^2 - w$$

$$2w^2 - 4w^2 + 3w - w$$

$$\boxed{-2w^2 + 2w}$$

$$f) (u^3 - 4u^2 + u) - (2u^2 - 5u^3)$$

$$u^3 - 4u^2 + u - 2u^2 + 5u^3$$

$$1u^3 + 5u^3 - 4u^2 - 2u^2 + u$$

$$\boxed{6u^3 - 6u^2 + u}$$

$$g) (-6x^2 - 3x + 2) - (-4x^2 - x + 3)$$

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

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

$$\boxed{-2x^2 - 2x - 1}$$

$$h) (4y^2 + 12y - 7) - (20y + 5y^2 - 8)$$

$$4y^2 + 12y - 7 - 20y - 5y^2 + 8$$

$$4y^2 - 5y^2 + 12y - 20y - 7 + 8$$

$$\boxed{-1y^2 - 8y + 1}$$

$$i) (6m^2 + 5m) - (4m^2 - 2m) + (3m^2 - 7m)$$

$$\underline{6m^2} + \underline{5m} - \underline{4m^2} + \underline{2m} + \underline{3m^2} - \underline{7m}$$

$$6m^2 - 4m^2 + 3m^2 + 5m + 2m - 7m$$

$$5m^2 + (7m - 7m)$$

$$\boxed{5m^2}$$

$$j) (-2k + 5) + (k^2 - 3k) - (-4k^2 + 8)$$

$$-2k + 5 + k^2 - 3k + 4k^2 - 8$$

$$1k^2 + 4k^2 - 2k - 3k + 5 - 8$$

$$\boxed{5k^2 - 5k - 3}$$