L8-1 Adding and Subtracting Polynomials

Define the following:
* <u>monomial</u> - single term (-2, -2x^4)
* <u>polynomial</u> - an expression involving multiple terms (x-1, 12x^9+1x-8)
* <u>binomial</u> - polynomial with two terms
* <u>trinomial</u> - polynomial with three terms
* <u>degree of a monomial</u> - sum of the exponents of the variables (3xyz has a degree of 3)
* <u>degree of a polynomial</u> - the term with the greatest power (3x^8-2x^3+5 has a degree of 8)
* <u>standard form of a polynomial</u> - order the terms in ABC and descending power order
* <u>leading coefficient</u> - coefficient in front of the term with the greatest power

Identify Polynomials

State whether each expression is a polynomial. If it is a polynomial, identify it as a *monomial, binomial,* or *trinomial*.

Expression	Is it a polynomial?	Monomial, binomial, or trinomial?
a. $6x - 4$	Yes; $6x - 4$ is the difference of two monomials.	binomial
b. $x^2 + 2xy - 7$	Yes; $x^2 + 2xy - 7$ is the sum and difference of three monomials.	trinomial
c. $\dfrac{14d + 19e^3}{5d^4}$	No; $\dfrac{14d}{5d^5}$ and $\dfrac{19e^3}{5d^4}$ are not monomials.	none of these
d. $26b^2$	Yes; $26b^3$ has one term.	monomial

Degree	Name
0	constant
1	linear
2	quadratic
3	cubic
4	quartic
5	quintic
6 or more	6th degree, 7th degree, and so on

A. State whether $3x^2$ + 2*y* + *z* is a polynomial. If it is a polynomial, identify it as a *monomial, binomial,* or *trinomial*. State its degree.

3 terms ∴ trinomial

Degree is 2 because $3x^2$ is the greatest power.

B. State whether $4a^2 - b^{-2}$ is a polynomial. If it is a polynomial, identify it as a *monomial, binomial,* or *trinomial*. State its degree.

$$4a^2 - b^{-2} = \frac{4a^2}{-b^2}$$

not a polynomial because it involves division.

C. State whether $8r - 5s$ is a polynomial. If it is a polynomial, identify it as a *monomial, binomial,* or *trinomial*. Identify its degree.

$8r-5s$ binomial

degree of 1

D. State whether $3y^5$ is a polynomial. If it is a polynomial, identify it as a *monomial, binomial,* or *trinomial*. Identify its degree.

$3y^5$ monomial (one term)

degree of 5

Standard Form of a Polynomial

A. Write $9x^2 + 3x^6 - 4x$ in standard form. Identify the leading coeffic

$3x^6 + 9x^2 - 4x$

① ABC - (alpha order)

② Decreasing power

③ Constant always comes last

B. Write $12 + 5y + 6xy + 8xy^2$ in standard form. Identify the leading co

$8xy^2 + 6xy + 5y + 12$

Add Polynomials

A. Find $(7y^2 + 2y - 3) + (2 - 4y + 5y^2)$.

Horizontal Method

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

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

$$12y^2 + (-2y) + (-1) =$$

$$\boxed{12y^2 - 2y - 1}$$

① Combine like terms
② add
③ simplify equation

Vertical Method

$$+ \quad \begin{array}{c} 7y^2 + 2y - 3 \\ 5y^2 - 4y + 2 \end{array}$$
$$\boxed{12y^2 - 2y - 1}$$

① Put expression in standard form
② add
③ Simplify

Subtract Polynomials

A. Find $(6y^2 + 8y^4 - 5y) - (9y^4 - 7y + 2y^2)$.

Horizontal Method

$\left(6y^2 + 8y^4 - 5y\right) - \left(9y^4 - 7y + 2y^2\right)$

$\left(6y^2 + 8y^4 - 5y\right) + \left(-9y^4 + 7y - 2y^2\right)$

$\left(8y^4 - 9y^4\right) + \left(6y^2 - 2y^2\right) + \left(-5y + 7y\right)$

$-1y^4 + 4y^2 + 2y$

① add the opposite

② combine like terms

③ Simplify

Vertical Method

$\left(6x^2 + 8y^4 - 5y\right) - \left(9y^4 - 7y + 2y^2\right)$

$8y^4 + 6y^2 - 5y$

$+ \left(-9y^4 + 2y^2 + 7y\right)$
_____

$-1y^4 + 4y^2 + 2y$

① Standard form

② Add opposite

③ Simplify

Find $(6n^2 + 11n^3 + 2n) - (4n - 3 + 5n^2)$.

Horizontal Method

Vertical Method

VIDEO GAMES The total amount of toy sales *T* (in billions of dollars) consists of two groups: sales of video games *V* and sales of traditional toys *R*. In recent years, the sales of traditional toys and total sales could be modeled by the following equations, where *n* is the number of years since 2000.

$R = 0.46n^3 - 1.9n^2 + 3n + 19$
$T = 0.45n^3 - 1.85n^2 + 4.4n + 22.6$

A. Write an equation that represents the sales of video games *V*.

B. Use the equation to predict the amount of video game sales in the year 2009.

52. CCSS **REASONING** The perimeter of the triangle can be represented by the expression $3x^2 - 7x + 2$. Write a polynomial that represents the measure of the third side.

$x^2 - x - 4$

$2x^2 - 10x + 6$