

7-1
Adding and Subtracting Polynomials
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EXPLORE & REASON

Each year the Student Council conducts a food drive. At the end of the drive, the members report on the items collected.



A. Describe two different ways that the students can sort the items that were collected.

Sort by Item

Can vs. Bagged Foods
(Sort by Packaging)

B. Model with Mathematics Write two expressions to represent the number and type of items collected. © MP.4

$$30 + 6P + 3M + 5B + 6C + 4R$$

$$(6 + 3 + 5 + 6)C + (3 + 4)R$$

can

$$\rightarrow 20C + 7R$$

C. Share your expression with classmates. How are the expressions similar? How are they different? Why are they different?

LOL 😊

HABITS OF MIND

Use Structure How does the structure of each expression relate the way you think about the items? © MP.7

Ordering / Sorting Items

monomial - #, variable, product of #'s & variables
 one ex) 7, x, $-3x^2y$

degree of a monomial - sum of the exponents of the variables of a monomial.

Notes
 EXAMPLE 1
 ex) 7, x^1 , $-3x^2y^1$
 degree: 0 degree: 1 degree: 3
 $7x^0$

Try It! Understand Polynomials

1. Name each polynomial based on its degree and number of terms.

a. $-2xy^2 + 1 + 2$: degree

1 term → 3rd degree monomial

polynomial - sum/diff of two or more monomials ...

• separated by +'s & -'s

ex) $2x - 3$, $3x^2 + 7x - 5$

"2" binomial "3" trinomial

b. $6xy - 3x + y$
 degree: 2 → 2nd degree trinomial

degree of a polynomial

• highest amongst the degrees of the monomials

ex) $4x^3 - 2x^2y^2 + 5 - 6y$
 deg: 3 deg: 4 deg: 0 deg: 1

EXAMPLE 2 Try It! Write Polynomials in Standard Form

2. Write each polynomial in standard form.

a. $7 - 3x^3 + 6x^2$

→ $-3x^3 + 6x^2 + 7$

b. $2y - 3 - 8y^2$

→ $-8y^2 + 2y - 3$

standard form of a polynomial

• descending order by degree (decreasing) (power)
 → one variable...

EXAMPLE 3 Try It! Add and Subtract Monomials

Combine Like-Terms

add/subst • same # of variables

$3x$ $\frac{1}{5}x$ x^3
 $7y$ $-4y$ z $\frac{14}{9}$ y

3. Combine like terms and write each expression in standard form.

a. $4x^2 - 3x - x^2 + 3x$

$3x^2$

b. $7y^3 - 3y + 5y^2 - 2y + 7$

$7y^3 - 5y + 7$

HABITS OF MIND

Reason Why is it important to combine like terms and rewrite the polynomial in standard form before determining the name and number of terms of a polynomial? MP2

EXAMPLE 4

Try It! Add Polynomials

4. Simplify. Write each answer in standard form.

a. $(3x^2 + 2x) + (-x + 9)$

$$3x^2 + 1x + 9$$

b. $(-2x^2 + 5x - 7) + (3x + 7)$

$$-2x^2 + 8x$$

EXAMPLE 5

Try It! Subtract Polynomials

5. Simplify. Write each answer in standard form.

a. $(3x^2 + 4x + 2) - (-x + 4)$

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

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

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

$$-5x - 6 - 4x^2 - 6$$

$$-4x^2 - 5x - 12$$

EXAMPLE 6

Try It! Apply Polynomials

6. What expression models the difference between the total area of the large solar panels and the total area of the small solar panels?



HABITS OF MIND

Communicate Precisely A student claims that the difference of the expression $(3x^2 + 5x - 2) - (3x^2 + 5x - 2x)$ is zero. Is the student correct? Explain. © MP.6

Do You UNDERSTAND?

- ESSENTIAL QUESTION** How does adding or subtracting polynomials compare to adding or subtracting integers?
- Communicate Precisely** How does the definition of the prefixes *mono-*, *bi-*, and *tri-* help when naming polynomials? © MP.6
- Vocabulary** Describe the relationship between the *degree of a monomial* and the *standard form a polynomial*.
- Use Structure** Explain why the sum $x + x$ is equal to $2x$ instead of x^2 . © MP.7
- Error Analysis** Rebecca says that all monomials with the same degree are like terms. Explain Rebecca's error. © MP.5

Do You KNOW HOW?

Name each polynomial based on its degree and number of terms.

6. $\frac{x}{4} + 2 \rightarrow \frac{1}{4}x + 2$
 1st degree binomial

7. $7x^3 + xy - 4$

3rd degree trinomial

Write each polynomial in standard form.

8. $2y - 3 - y^2$

$-y^2 + 2y - 3$

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

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

Simplify each expression.

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

$3x^2 - 3x - 7$

11. $(3x^2 - 5x - 8) - (-4x^2 - 2x - 1)$

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

$7x^2 - 3x - 7$

12. A square prism has square sides with area $x^2 + 8x + 16$ and rectangular sides with area $2x^2 + 15x + 28$. What expression represents the surface area of the square prism?

