

LEARNING MODULE 4

Add and Subtract Simple Monomials



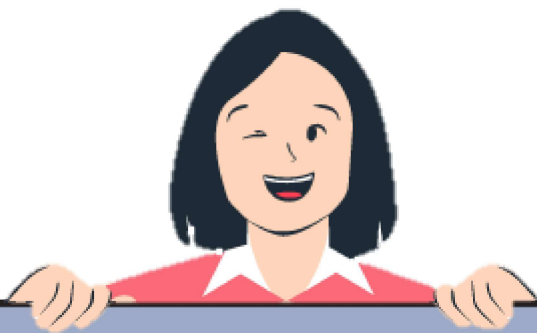
GRADE 8



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ADDING AND SUBTRACTING MONOMIALS



Hey there, fantastic eighth graders! Welcome to an exciting journey into the world of adding and subtracting monomials. Throughout this course, we'll embark on an adventure filled with fun and practical math challenges. Get ready to dive into the fascinating realm of monomials, where we'll learn how to add and subtract these algebraic expressions like pros! So, let's dive in and discover the wonders of monomials together!

Learning Objectives:

At the end of this lesson, students will be able to:

1. evaluate the accuracy of the process of adding and subtracting monomials;
2. create your own sets of monomials and apply the process of addition and subtraction; and
3. recognize the importance of knowing how to add and subtract monomials in solving real-world problems.





Evaluating the Process of Adding and Subtracting Monomials

In algebra, monomials are expressions with a single term. Adding and subtracting monomials involves combining like terms to simplify expressions. Let's explore this process.

Example 1: $3x^2 + 4x + 2x^2 - 5x$

Incorrect Solution:

$$\begin{aligned} &= 3x^2 + 2x^2 + 4x - 5x \\ &= 4xx^2 \end{aligned}$$



Mistake:

The mistake in the incorrect solution is that we didn't properly combine the coefficients of the like terms. In the above solution, we added all the terms regardless of their variables and exponents. The coefficients of x^2 such as 3 and 2 were added to the coefficients of the x terms, 2 and (-5). Then, the variables and exponents were just copied which is wrong. This is typically the common mistake in adding and subtracting monomials.

Correct Solution:

Combine the coefficients of the like terms:

- $3x^2 + 2x^2 = 5x^2$
- $4x - 5x = -x$

Combine the results:

$$= 5x^2 - x$$





Example 2: Given: $4x^2 - 3x^2$

Incorrect solution:

$$4x^2 - 3x^2 = 7x^4$$



Mistake:

The mistake here is twofold. First, the coefficients of like terms were incorrectly added instead of subtracted. Second, the exponent was incorrectly doubled.

Correct solution:

$$4x^2 - 3x^2 = x^2$$



When subtracting monomials, you subtract the coefficients (the numbers in front of the variable) of like terms. The variable and its exponent remain the same. In this case, $4x^2$ and $3x^2$ are like terms because they have the same variable and exponent. So, you subtract the coefficients 4 and 3 to get 1, and the variable part x^2 remains the same.



Solving World Problems Involving Monomials

Monomials are algebraic expressions with only one term. They often appear in various contexts, and understanding how to manipulate them is crucial for problem-solving

Scenario 1: Rectangular Garden

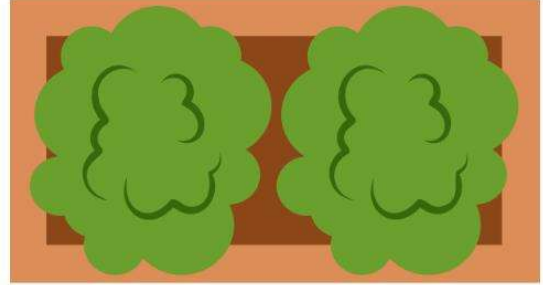
You have a rectangular garden, and you know that half of its perimeter is 36 meters. The length of the garden is 4 meters more than its width. Find the dimensions of the garden.





1. Identify Monomials:

- Let's denote the width of the garden as (W) (in meters).
- The length of the garden can be expressed as ($L = W + 4$) (since it's 4 meters more than the width).



2. Apply Operations:

- We know that half of the perimeter is 36 meters. So, the full perimeter is ($2 \times 36 = 72$) meters.
- The perimeter of a rectangle is given by: ($P = 2L + 2W$).
- Substituting the expressions for length and width: [$72 = 2(W + 4) + 2W$]

3. Solve for Width:

- Distribute the 2 on the left side: [$72 = 2W + 8 + 2W$]
- Combine like terms: [$72 = 4W + 8$]
- Subtract 8 from both sides: [$64 = 4W$]
- Divide both sides by 4: [$W = 16$]

4. Find Length:

- Using the expression for length: [$L = W + 4 = 16 + 4 = 20$]

5. Final Answer:

- The width of the rectangular garden is 16 meters, and the length is 20 meters.

Therefore, the dimensions of the garden are:

Width: **16 meters**

Length: **20 meters**



Scenario 2: Bakery Inventory Management

A bakery prepares for a busy weekend by stocking up on ingredients. Initially, they have 15 pounds of flour and 10 dozen eggs. Over the weekend, they use 8 pounds of flour and sell 5 dozen eggs to eager customers. Determine the total amount of ingredients remaining in the bakery's inventory.



1. Identify Monomials:

In this scenario, the monomials represent the quantities of flour and eggs. The initial quantities are 15 pounds of flour and 10 dozen eggs.



2. Apply Operations:

To find out the total amount of ingredients remaining, we need to subtract the amounts used and sold from the initial inventory. However, since pounds of flour and dozens of eggs are unlike terms, they cannot be combined or simplified further.

Flour: $15 \text{ pounds} - 8 \text{ pounds} = 7 \text{ pounds}$ (remaining flour)

Eggs: $10 \text{ dozen} - 5 \text{ dozen} = 5 \text{ dozen}$ (remaining eggs)

3. Analyze and Simplify:

After performing the subtraction, we determine that there are 7 pounds of flour and 5 dozen eggs remaining in the bakery's inventory.

4. Final Answer:

After the busy weekend, the bakery has 7 pounds of flour and 5 dozen eggs left in stock.



Summary

Adding and subtracting monomials involves combining or separating terms that have the same variables raised to the same powers. When adding monomials, simply combine the coefficients while keeping the variables unchanged. The subtraction of monomials is similar, but it involves subtracting the coefficients while again keeping the variables unchanged. Unlike terms cannot be combined further and should remain separate. By understanding the rules of addition and subtraction of monomials, one can efficiently simplify algebraic expressions and solve equations.

