



Simple Expressions

i. Definition and Explanation

What is a Simple Expression? Think of a simple expression as a mathematical phrase. It's a combination of numbers, variables, and mathematical operations (+, -, \times , \div). It does not have an equals sign (=), which makes it different from an equation.

- **Phrase vs. Sentence:** An expression like $x + 5$ is like the phrase "a number plus five." An equation like $x + 5 = 8$ is like a complete sentence, "A number plus five equals eight."

In short: An expression represents a single value. For example, the expression $4 + 2$ represents the value 6. The expression $3x - 1$ represents a value that depends on what x is.

Examples of Simple Expressions:

- 8
- $y - 3$
- $4a$ (This means 4 times a)
- $2x + 10$

ii. Key Points and Important Terms

To understand expressions, you need to know their parts. Let's break down the expression: $5x - 2y + 7$

Variable: A letter or symbol that represents an unknown or changing number.

- In $5x - 2y + 7$, the variables are x and y .

Constant: A number that stands by itself. Its value never changes.

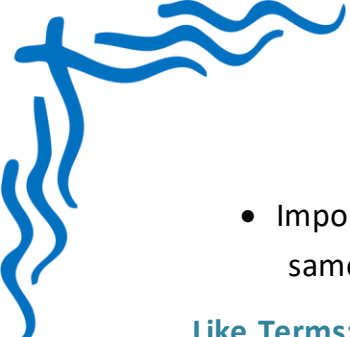
- In $5x - 2y + 7$, the constant is 7.

Term: A single part of an expression, separated by addition (+) or subtraction (-) signs. The sign in front of the number is part of the term.

- In $5x - 2y + 7$, the terms are $5x$, $-2y$, and 7.

Coefficient: The number that is multiplied by a variable.

- In the term $5x$, the coefficient is 5.
- In the term $-2y$, the coefficient is -2.

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- Important: If a variable stands alone, like x , its coefficient is 1 (because x is the same as $1x$). If it's $-x$, the coefficient is -1 .

Like Terms: Terms that have the exact same variable raised to the exact same power. Constants are also like terms.

- **Examples of Like Terms:** $3x$ and $7x$ | $4y$ and $-y$ | 12 and 5
- **Examples of Unlike Terms:** $3x$ and $3y$ (different variables) | $5a$ and 8 (one has a variable, one doesn't)

iii. Detailed Examples with Solutions

A. Writing Expressions from Word Phrases

Translate the words into a mathematical expression.

Example 1: "A number n increased by 12"

Solution: $n + 12$

Example 2: "The product of 6 and a number y "

Solution: $6y$ (In algebra, we write the number before the variable and don't need the \times sign).

Example 3: "9 less than a number k "

Solution: $k - 9$ (Be careful! "Less than" reverses the order).

Example 4: "Twice a number p , decreased by 4"

Solution: $2p - 4$

B. Evaluating Expressions

To evaluate an expression, you substitute a given number for the variable and find the result.

Example 1: Evaluate $x + 10$ if $x = 5$.

Solution:

Start with the expression: $x + 10$

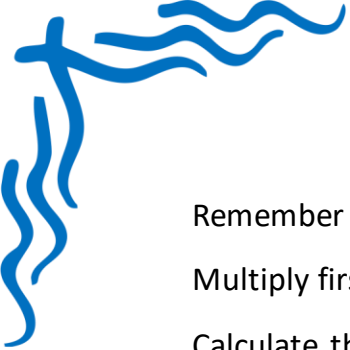
Replace x with 5: $(5) + 10$

Calculate the result: 15

Example 2: Evaluate $3a - 4$ if $a = 2$.

Solution:

Start with the expression: $3a - 4$



Remember $3a$ means $3 \times a$. Replace a with 2 : $3(2) - 4$

Multiply first: $6 - 4$

Calculate the result: 2

C. Simplifying Expressions (Combining Like Terms)

Simplifying means making the expression as short and simple as possible by combining like terms.

Example 1: Simplify $4x + 9x$

Solution:

Identify the like terms: Both $4x$ and $9x$ are like terms.

Add their coefficients: $4 + 9 = 13$.

Keep the variable: $13x$

Example 2: Simplify $8y + 5 - 3y + 2$

Solution:

Identify and group the like terms: $(8y - 3y)$ and $(5 + 2)$.

Combine the y terms: $8y - 3y = 5y$.

Combine the constants: $5 + 2 = 7$.

Write the simplified expression: $5y + 7$

Example 3: Simplify $6a + 4b - 2a + b$

Solution:

Identify and group like terms: $(6a - 2a)$ and $(4b + b)$.

Remember that b is the same as $1b$.

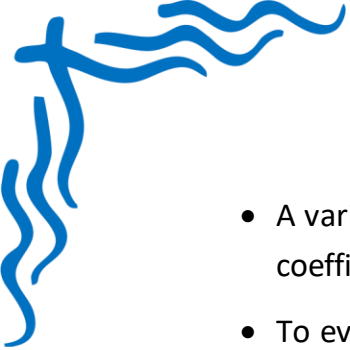
Combine the a terms: $6a - 2a = 4a$.

Combine the b terms: $4b + 1b = 5b$.

Write the simplified expression: $4a + 5b$

iv. Summary of Main Concepts

- An expression is a mathematical phrase with numbers, variables, and operations. It does not have an equals sign.
- Terms are the parts of an expression separated by $+$ or $-$.



- A variable is a letter (e.g., x). A constant is a number by itself (e.g., 5). A coefficient is a number multiplied by a variable (e.g., the 3 in $3x$).
- To evaluate an expression, you replace the variables with given numbers and calculate the result.
- To simplify an expression, you combine like terms.