Terms in Expressions

i. Definition and Explanation

An algebraic expression is a mathematical phrase that can contain ordinary numbers, variables (like x or y), and operators (like add, subtract, multiply, and divide). A term is a single part of an algebraic expression. Terms are the "building blocks" that are separated by addition (+) or subtraction (−) signs.

Key Idea: Think of the + and − signs as separators that divide the expression into individual terms. The sign to the left of a number or variable is part of that term.

Example: In the expression 4x + 7 - 2y

- The separators are + and −.
- The individual terms are: 4x, +7, and -2y. We usually just write the positive term as 7.

ii. Key Points and Important Terms

To fully understand terms, you need to know their components:

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

Examples: x, a, n

Coefficient: The number that is multiplied by a variable. It's written in front of the variable.

Example: In the term 5y, the coefficient is 5.

- **Important:** If a variable stands alone, like x, its coefficient is 1 (because x is the same as 1x).
- **Important:** If a variable has a negative sign, like -a, its coefficient is -1 (because -a is the same as -1a).

Constant: A term that is just a number without any variable attached. Its value never changes.

Example: In the expression 2x + 8, the constant is 8.

Like Terms: Terms that have the exact same variable(s) raised to the exact same power(s). The coefficients can be different. Constants are also like terms with each other.

Examples of like terms:

- 7x and -2x (both have the variable x)
- $5a^2$ and a^2 (both have the variable a^2)
- 9 and -4 (both are constants)

Unlike Terms: Terms that do not have the same variable or the same power.

Examples of unlike terms:

- 3x and 3y (different variables)
- 4n and 6 (one has a variable, one is a constant)
- 5x and $5x^2$ (same variable, but different powers/exponents)

iii. Detailed Examples with Solutions

Let's break down some expressions to identify their parts.

Example 1: 5x - 3y + 8

Terms: There are three terms. Remember to include the sign!

- 5x
- -3y
- 8

Coefficients: Look for numbers in front of variables.

- The coefficient of x is 5.
- The coefficient of y is -3.

Variables:

- x
- y

Constant: The number by itself.

- 8

Example 2: $a^2 + b - 7 - 4a^2$

Terms:

- a^2
- b
- -7

- $-4a^2$

Coefficients:

- The coefficient of a^2 is 1.
- The coefficient of b is 1.
- The coefficient of the other a^2 term is -4.

Constant:

- -7

Like Terms:

- a^2 and $-4a^2$ are like terms.
- b is by itself (an unlike term to the others).
- -7 is a constant.

iv. Summary of Main Concepts

- **Expression:** A mathematical phrase with numbers, variables, and operators.
- **Term:** A single part of an expression, separated by + or − signs. The sign is part of the term.
- **Coefficient:** The number multiplied by a variable (e.g., in -6x, the coefficient is -6).
- **Constant:** A number on its own, with no variable.
- **Variable:** A letter representing an unknown value.
- **Like Terms:** Terms with the exact same variable and exponent. They can be combined (added or subtracted).
- **Unlike Terms:** Terms that cannot be combined because their variable parts are different.