Subject

MATHEMATICS

Topic

SIMPLIFICATIONS OF ALGEBRAIC EXPRESSIONS

Class

JSS1

Objectives

By the end of this lesson you should be able to:

- Identify variables, coefficients and the terms of a simple algebraic expressions
- Simplify algebraic expressions by grouping positive and negative terms together
- Simplify algebraic expressions by adding or subtracting like terms and unlike terms
- Simplify algebraic expressions by multiplying or dividing terms
- Solve word problems involving simple algebraic expressions.

VARIABLES AND COEFFICIENTS OF ALGEBRAIC EXPRESSIONS

- A variable is a letter such as x or y used to represent a number. They are known as variables because their values can vary (i.e. change).
- A coefficient is a number placed in front of a variable or group of variables or letters.

WORKED EXAMPLES

1. Write down the coefficients of the following expressions:

(a) $4d - 5f$ (b) $8x^2 + 5x$ (c) $-25x^2y^3z$ (d) $x^2 - xy^2$

SIMPLIFYING EXPRESSIONS

- To simplify an algebraic expression means to reduce it to its simplest form.

You can simplify an algebraic expression by carrying out addition or subtraction or multiplication or division or combined operations.

- In arithmetic we say, 1 apple + 1 apple + 1 apple = 3 apples
- Similarly in algebra we say 1a + 1a + 1a = 3a . But 1a means a so 1a + 1a + 1a = a + a+ a = 3a.

ALGEBRAIC EXPRESSIONS AND TERMS

- An algebraic statement, which is a collection of terms, is often called an expression e.g. $x + 2y + 3$ is an algebraic expression.

- A term is either a single number or a variable or product of numbers and variables e.g. $x + 2y – 7xyz + 3$. i.e. the terms are x,2y,7xyz and 3.

LIKE TERMS

Terms that have the same letter or arrangement of letters are called LIKE TERMS. In arithmetic you can add 7 yams, 8 yams and 2 yams together as follows: 7 yams + 8 yams + 2 yams = 17 yams. Note that the answer is 17 yams and not just 17.

WORKED EXAMPLES

1. Simplify the following:

(a) 5f + f + 3f + 2f (b) 15m – 9m

GROUPING POSITIVE AND NEGATIVE TERMS

- To simplify an expression containing both positive and negative terms, you need to group all the terms with a + sign before them together and all the terms with a – sign before them together.

WORKED EXAMPLES

- Simplify the following:

(a) $7x + 5x – 4x – 8x + x$ (b) $12y – y + 6y – 5y – 2y$ (c) $14v – 6v + 6v – 8v + 7v – 4v$

ALGEBRAIC SIMPLIFICATION

WORKED EXAMPLES

Simplify:

(a) $5z + 4x + 7z + z + 6x$ (b) $8y + 5s – 5y + 1$ (c) $2x – 5x – 3y + 7x + 6y + 2$ (d) $5f – b + 3y + 2f + 4b – 2y$

- **MULTIPLYING WITH LETTERS**

Multiplication of numbers is regarded as repeated addition

WORKED EXAMPLES

Simplify the following:

(a) $2 \times 3a$ (b) $7a \times 3b$ (c) $3p \times 5q \times 2r$ (d) $2xy \times 5b$

- **DIVISION OF ALGEBRAIC EXPRESSIONS**

This is done by dividing the numerator by the denominator.

WORKED EXAMPLES

Simplify the following:

(a) 15ab ÷ 5ab (b) 12xyz ÷ 8y (c) ⅓ 0f 18pq

4. Simplify the following:

(a) $x^2 \div y^2$ (b) $a^3 \div a^3$ (c) $5x^2y \div xy^2z$ (d) $18p^4q^2r \div 12p^2q^3$

Simplify the following:

(a)$5xy + 8xy + 2xy$ (b) $4abc + 7abc - 2abc$ (c) $2pqr + 6qpr + 3rpq$

(d) $7 - a^2b - yx + 6ba^2 + 4xy - 5 - 3 \div y^2 + 4s$

- **SUBSTITUTION INTO AN ALGEBRAIC EXPRESSIONS**

This is the process of replacing letters by numbers in a given algebraic expression.

WORKED EXAMPLES

(a) If $a = 2$, $y = 4$ and $z = 3$ evaluate:

(b) $2ayz^2$ (b) $3y^zz + 2a$ (c) $5a^3z - 15$ (d) $7z^2 - 3 \div y^2 + 4s$

EVALUATION

1. Write down the coefficients of the following:

(a) $2x + y$ (b) $-3x - 4y$ (c) $5a^2b - 4df$ (d) $7p^2 - 3xy^3$

2. Simplify the following:

(a) $a + a + a + a$ (b) $2x + 5x + x + x$ (c) $9x - 3x + 5x$ (d) $4xy - 2xy + xy$

(e) $7x + x - 2x + 4 + 8x - 10 - 7x + 2x$ (f) $9y - 11y + 13y + 4y - 6y + 5y + y$

3. Simplify the following:

(a) $14 \times a \times 2a$ (b) $3xy \times 4x$ (c) $18pq \div 2q$ (d) $3xy \times 4 \times 5z$

4. If $x = 0$, $y = 4$, $z = 5$, evaluate:

(a) $2x + 3y + z$ (b) $5z - xy + 2$ (c) $17xz - 4y + 6z$ (d) $5yz - 2x \div z^2$

5. Find the total cost of x apples at \$50 each and b mangoes at \$10 each.

[redacted]

THANK YOU

FOR WATCHING !!!