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Tender Heart High School, Sec-33 B, Chd.

Class - VI

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Subject - Mathematics

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Ch-12 Fundamental Concepts of Algebra

Numerical Expressions :→

A combination of numbers connected by one or more of the symbols $+$, $-$, $\times$ and $\div$ is called a numerical expression.

Algebra:- It is generalised arithmetic, in which numbers are represented by letter a, b, c, x, y, z , etc., called literal numbers or simply literals.

There are two types of symbols, namely Constants and Variables.

Constants :→ A symbol having a fixed value is called a constant.

eg:- each of the symbols $4, -5, \frac{1}{3}, \frac{4}{7}$, etc, is a constant.

Variables :→ A symbol which can be assigned various values, is called a variable.

Power of a Literal :-

- (i) $x \times x = x^2$ (read as x square)
- (ii) $x \times x \times x = x^3$ (read as x cube)
- (iii) $x \times x \times x \times x = x^4$ (read as x to the power four and so on.

In general, we write

$$x \times x \times x \times \dots \text{ taken } n \text{ times} = x^n$$

(read as x to the power n)

In x^n , x is the base

n is the exponent or index or power

x^n is called the exponential form of a number

- $x^1 = x$
- $x^0 = 1$

Exercise 12 A

Q1. Write the following in mathematical form using signs and symbols:

- (i) x increased by 23 $\rightarrow x + 23$
- (ii) y decreased by 15 $\rightarrow y - 15$

- iii) x minus thrice y . $\rightarrow x - 3y$
- iv) x taken away from 20 $\rightarrow 20 - x$
- v) Four times x decreased by five times y . $\rightarrow 4x - 5y$
- vi) Sum of x and quotient of y by 10.
 $\rightarrow x + \frac{y}{10}$
- vii) Product of a and b subtracted from their sum $\rightarrow (a+b) - ab$
- viii) Quotient of a by 3, multiplied by the sum of b and 3. $\rightarrow \frac{a}{3}(b+3)$

Q.2. Write the following statements in mathematical form using signs and symbols.

- (i) x exceeds 14 by 5
 $= x - 14 = 5$
- (ii) Twice x decreased by 9 gives 11.
 $= 2x - 9 = 11$
- (iii) 45 decreased by y gives 29.
 $= 45 - y = 29$
- (iv) One third of the sum of x and 4 equals 10
 $= \frac{1}{3}(x+4) = 10$

v) 16 less than the quotient of a by 2 equals 8.

$$\frac{a}{2} - 16 = 8$$

vi) Nine times m is greater than 18.

$$9m > 18$$

vii) 7 is greater than twice p .

$$7 > 2p$$

viii) The quotient of 'a' by 6 is less than 1.

$$\frac{a}{6} < 1$$

(ix) Three times x is 12 less than twice y .

$$3x = 2y - 12$$

Q.3. Write each of the following in exponential form:

(i) $a \times a \times a \times \dots$ taken 10 times. $= a^{10}$

(ii) $x \times x \times x \times \dots$ taken 6 times. $= x^6$

(iii) $2 \times m \times m \times n \times n \times n = 2m^2n^3$

(iv) $3 \times 5 \times p \times p \times p \times q \times q \times r = 15p^3q^2r$

Q4. Write the following in product form:-

$$(i) 6x^2y^3 = 6 \times x \times x \times y \times y \times y$$

$$(ii) 3a^2b^3c^4 = 3 \times a \times a \times b \times b \times b \times c \times c \times c \times c$$

$$(iii) 2p^3q^3r^3 = 2 \times p \times p \times p \times q \times q \times q \times r \times r \times r$$

Algebraic Expressions:-

A combination of literals and numbers connected by one or more of the symbols $+$, $-$, $\times$ and $\div$ is called an algebraic expression.

The several parts of an algebraic expression separated by $+$ or $-$ sign are called the terms of the expression.

Types of Algebraic Expressions:-

1. Monomial! $\rightarrow$ An algebraic expression having only one term is called a monomial.
eg:- $5a$, $-4b$, $6ab$.

2. Binomial! $\rightarrow$ An algebraic expression having two terms is called a binomial.
eg:- $5x-3$, a^2b+8ab^2c , $4x-\frac{5}{y}$

Trinomial $\rightarrow$ An algebraic expression having three terms is called a trinomial.

eg:- $6p - 13q + 2r$, $3a - \frac{2}{b} + \frac{4}{c^2}$.

Multinomial $\rightarrow$ An algebraic expression having two or more than two terms is called a multinomial.

eg:- $a^2 + b^2 - 2ab + 8$.

Exercise 12B

Q1 Write all the terms of each of the following algebraic expressions:-

(i) $2 + 3x$

$\rightarrow 2, 3x$

(ii) $3x^2 - 5x + \frac{2}{x} - \frac{3}{x^2}$

$\rightarrow 3x^2, -5x, \frac{2}{x}, -\frac{3}{x^2}$

(iii) $2xy + 3yz - 5zx + \frac{1}{9}$

$\rightarrow 2xy, 3yz, -5zx, \frac{1}{9}$

Q2. Write down the coefficient of:-

(i) a in $-5ab^2 \rightarrow -5b^2$

(ii) xz in $-3xyz$
 $\rightarrow -3y$

(iii) x^2y in $8abx^2yz$
 $\rightarrow 8abz$

(iv) y^2 in $-6axy^2$
 $\rightarrow -6ax$

Qn Write down the numerical as well as literal coefficient of each of the following monomials:-

	Numerical	literal coefficient
(i) $9a^2b$	9	a^2b

ii) $-3xyz^2$	-3	xyz^2
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iii) $\frac{3}{5}apq$	$\frac{3}{5}$	apq
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iv) $-\frac{7}{2}pqr$	$-\frac{7}{2}$	pqr
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Qn Write all the factors of:-

(i) $3a$
 $\rightarrow 3, a$

(ii) $-x$
 $-1, x, -x$

(iii) ab
 $\rightarrow a, b, ab$

(iv) $3pq^2$
 $3, p, q, pq, pq^2$