# Algebraic Expressions

Variable: A quantity which can take various numerical values is known as a variable (or a literal). Variables can be denoted by using the letters *a, b, c, x, y, z*, etc.

Constant: A quantity which has a fixed numerical value is called a constant.
For example, 3, 25, and 8.9 are constants.

Expression: A number or a combination of numbers formed by using the arithmetic operations is called a numerical expression or an arithmetic expression.
For example, 3 + (4 × 5), 5 – (4 × 2), (7 × 9) ÷ 5 and (3 × 4) – (4 × 5 – 7) are numerical expressions.

Algebraic Expression**:** An algebraic expression is a combination of variables and constants connected by arithmetic operations.

| **Statement** | **Expressions** |
|---|---|
| (i) 5 added to $y$ | $y + 5$ |
| (ii) 8 subtracted from $n$ | $n – 8$ |
| (iii) 12 multiplied by $x$ | $12\ x$ |
| (iv) $p$ divided by 3 | $p/3$ |

**Term**

A term is a constant or a variable or a product of a constant and one or more variables.
$3x^2$, $6x$ and – 5 are called the terms of the expression $3x^2 + 6x – 5$
A term could be
(i) a constant (ii) a variable (iii) a product of constant and a variable (or variables)
(iv) a product of two or more variables
In the expression $4a^2 + 7a + 3$, the terms are $4a^2$ , $7a$ and 3. The number of terms is 3.
In the expression $-6p^2 + 18pq + 9q^2 - 7$, the terms are $-6p^2$, $18pq$ , $9q^2$ *and* $- 7$ . The number of terms is 4.

The degree of an expression : In one variable the highest value of the exponent of the variable. The degree of an expression of more than one variable is the highest value of the sum of the exponents of the variables in different terms.
The degree of the expression: (i) $5a^2 - 6a + 10$ is 2 (ii) $3x^3 + 7 + 6xy^2$ is 3 (iii) $m^2 n^2 + 3mn + 8$ is 4

# 7th Algebraic expression

1 Find the product of the following :

(i) $(a+b)(2a^2-5ab+3b^2)$ (ii) $(2x+3y)(x^2-xy+y^2)$

(iii) $(x+y+z)(x+y-z)$ (iv) $(a+b)(a^2+2ab+b^2)$ (v) $(m-n)(m^2+mn+n^2)$

2 (i) Add $2x(x-y-z)$ and $2y(z-y-x)$

(ii) Subtract $3a(a-2b+3c)$ from $4a(5a+2b-3c)$

3 Using a suitable identity, find each of the following products:

(i) $(x+3)(x+3)$ (ii) $(2m+3)(2m+3)$ (v) $(3x+2)(3x-2)$

(iii) $(2x-5)(2x-5)$ (iv) $\left(a-\frac{1}{a}\right)\left(a-\frac{1}{a}\right)$ (vii) $(2l-3m)(2l+3m)$

(vi) $(5a-3b)(5a-3b)$ (ix) $\left(\frac{1}{x}+\frac{1}{y}\right)\left(\frac{1}{x}-\frac{1}{y}\right)$

(viii) $\left(\frac{3}{4}-x\right)\left(\frac{3}{4}+x\right)$ (x) $(100+3)(100-3)$

4. Show that (i) $(a-b)(a+b)+(b-c)(b+c)+(c-a)(c+a)=0$

(ii) $(3x+7)^2-84x=(3x-7)^2$

5. If $a+b=5$ and $a-b=4$, find $a^2+b^2$ and $ab$.

6. (i) If the values of $a+b$ and $ab$ are 12 and 32 respectively, find the values of $a^2+b^2$ and $(a-b)^2$.

(ii) If the values of $(a-b)$ and $ab$ are 6 and 40 respectively, find the values of $a^2+b^2$ and $(a+b)^2$.

7. Factorize the following expressions:

(i) $2x+6$ (ii) $4x^2+20xy$ (iii) $3x^2-12xy$ (iv) $a^2b-ab^2$

(v) $3x^3-5x^2+6x$ (vi) $7l^3m^2-21lm^2n+28lm$

8. If $(a+b)=10$ and $ab=20$, find $a^2+b^2$ and $(a-b)^2$.

9. If the values of $a+b$ and $a-b$ are 7 and 4 respectively, find the values of $a^2+b^2$ and $ab$.

10. Evaluate the following using the identity $(a+b)(a-b)=a^2-b^2$

(i) $(x+3)(x-3)$ (ii)$(5a+3b)(5a-3b)$ (iii)$52\times48$ (iv)$997^2-3^2$.

11. Expand (i) $(x+5)^2$ (ii) $(x+2y)^2$ (iii) $(2x+3y)^2$ (iv) $105^2$.