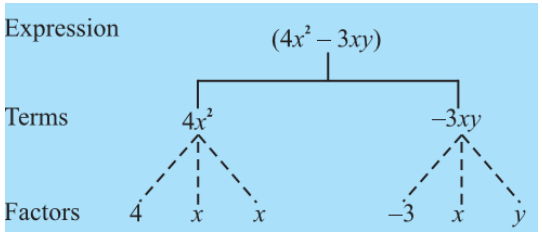
Framing Algebraic Expressions - Including Evaluation



In words	Expression
A number x is increased by 7	$x + 7$
A number y is decreased by 7	$y - 7$
A number a is multiplied by 7	$a \times 7$
A number k is divided by 7	$k \div 7$

- Algebraic expression : Combination of variables and constants
- Term: Terms are parts of an algebraic expression separated by + and - signs . Each term in an algebraic expression is a product of one or more number(s) and (or) literals .These numbers and /or literal(s) are called as factors of the term. The term –3xy is a product of the factors –3, x and y.
- 1 is not taken as a separate factor ; 1 is a factor of every term
- Expressions are formed by adding terms.
- Constant: symbol having a fixed numerical value
- Variable : a symbol that has no fixed or constant value and takes on various numerical values
- constant factor: numerical factor or numerical coefficient
- variable factor: literal factor
- Polynomial: an expression with one or more terms with having whole numbers as exponents
- Like terms ; terms with same variables and powers of variables also same ; same literal factors ; 3a, -8a
- Unlike terms ; terms having different variables or even if they have same variables, they are raised to different powers ; different literal factors;2a, 2b, $3a^2$
- Like terms can be added / subtracted ; Coefficients of like term need not be same

- Constant term: term having no literal factor
- Coefficient : in the term of an expression, any of the factors with the sign of the term is called coefficient of the product of other factors
- While simplifying an algebraic expression, first gather all like terms together and them simplify them and then move on to unlike terms

Classification of expressions based on number of terms	
Special name	Number of terms
Monomial	1
Binomial	2 unlike
Trinomial	3 unlike
Quadranomial	4 unlike

Steps to identify like terms

- Ignore the numerical coefficients.
- Check the variables in the terms. They must be the same.
- Next, check the powers of each variable in the terms. They must be the same.

in deciding like terms, two things do not matter

- the numerical coefficients of the terms and
- order in which the variables are multiplied in the term

Addition and subtraction of Algebraic expressions

- Sum of two or more like terms is a like term with a numerical coefficient equal to the sum of the numerical coefficients of all the like terms
- Difference between two like terms is a like term with a numerical coefficient equal to the difference between the numerical coefficients of the two like terms.
- subtracting a term is the same as adding its inverse.
- unlike terms cannot be added or subtracted the way like terms are added or subtracted: when 5 is added to x, we write the result as (x+ 5). both the terms 5 and x are retained

value of an algebraic expression

- Depends on the values of the variables forming the expression.
- To find the value of an expression, substitute the values of the variables in the expression and then simplify

Perimeter Formulas:

- The perimeter of an equilateral triangle = 3l where l denotes the length of the side of the equilateral triangle
- Perimeter of square = 4l where l= the length of the side of the square.
- Perimeter of a regular pentagon = 5l, where l= the length of the side of the pentagon

Area formulas

- If l denotes the length of a square , then area of the square = l^2
- If we denote the length of a rectangle by l and its breadth by b, then the area of the rectangle = l× b= lb.
- If b stands for the base and h for the height of a triangle, then the

  area of the triangle =

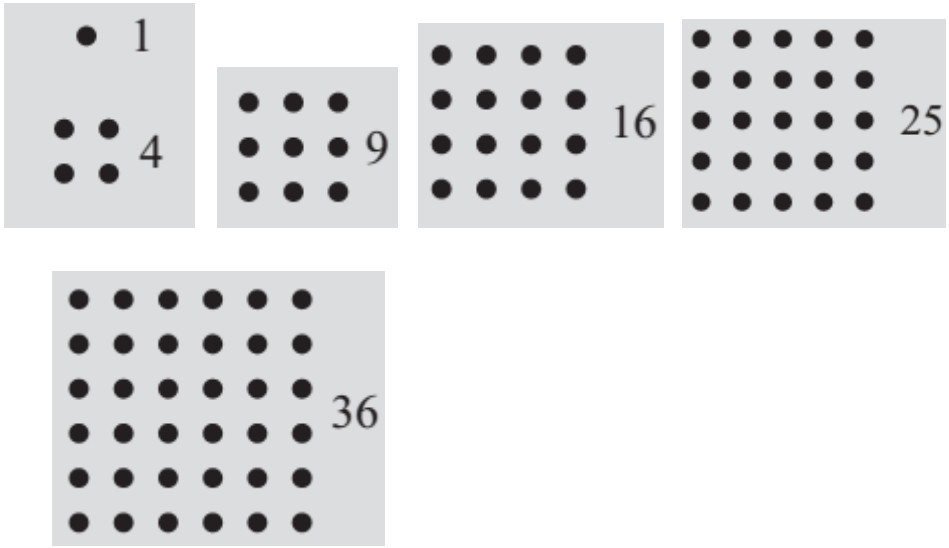
Once a formula is known, that is, the algebraic expression for a given quantity is known, value of the quantity can be computed as required.

- For a square of length 3 cm, the perimeter is obtained by putting the value l= 3 cm in the expression of the perimeter of a square;
  The perimeter of the given square = (4 × 3) cm = 12 cm.
- area of the square is obtained by putting the value of l(= 3 cm) in the expression for the area of a square, that is, $l^2 = 9\ cm^2$

Rules for number patterns

- If a natural number is denoted by n, its successor is (n + 1)
- If a natural number is denoted by n, 2n is an even number and (2n + 1) an odd number.
- 1, 4, 9, 16, 25, ... square numbers.
- The general (nth) term of a number pattern (or a sequence) is an expression in n.

Dotted patterns with square numbers :



Pattern in geometry

- The number of diagonals we can draw from one vertex of a polygon of n sides is (n-3)
- The number diagonals that can be drawn from one vertex divide the n sided polygon into n-2 non overlapping triangles