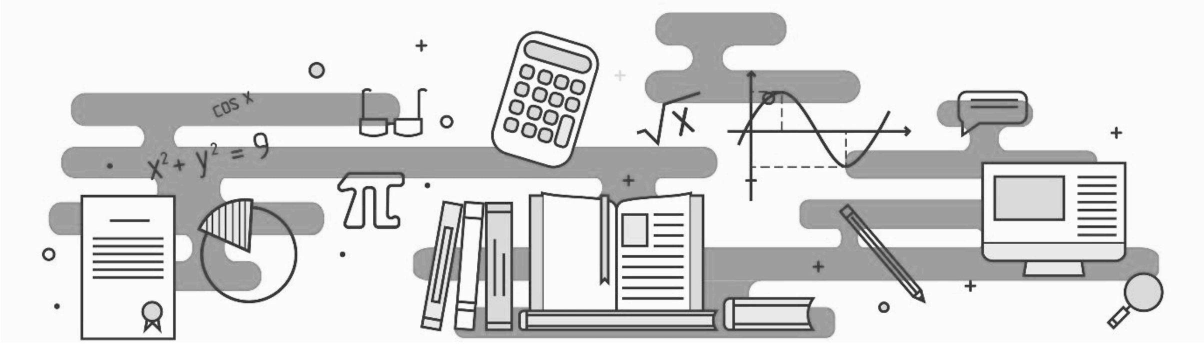


INTRODUCTION TO ALGEBRA

Concepts Covered

- Constants, Variables, Pattern Using Matchsticks, Algebraic Expressions, Rules from Arithmetic and geometry, Equations, and Solutions of Equations.

Introduction

The branch of mathematics in which we study general properties of numbers and their generalisations is called **Algebra**. In Arithmetic we were dealing only with numbers like integers, whole numbers, natural numbers, etc., and operations $+, -, \times$, and $\div$. But when we use these numbers with letters like a, b, c, x, y, z, l, m, n etc. and apply operations like $+, -, \times$, and $\div$, we call it Algebra.

Constants

Symbols in algebra having a fixed (that does not change) numerical value are called constants.

For Example: $0.3, \frac{5}{7}, -\frac{6}{9}$ are all fixed values and hence are called constants.

Variables

- A number which can take various numerical values is known as a variable.
  For Example: x, y, z, etc.
- A number which is the power of another variable where the power is not zero is also a variable.
  For Example: x^3, y^2, z^4, etc.
- A number which is the product of a constant and a variable is also a variable.
  For Example: $5x^4, 8x^3, -8x$, etc.
- A combination of two or more variables separated by a '+' sign or a '-' sign is also a variable.
  For Example: $x^2 - y^4 + z^6,\ x^3 + y^3 + z^2$, etc.

Example:

Complete the table.

Algebraic form	Constants	Variables
X + 5		
X + y + 2		
X – y		
2m + 3n + 7		
l – k – 3p		

Solution:

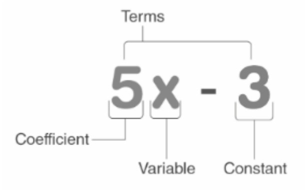
Algebraic form	Constants	Variables
X + 5	5	X
X + y + 2	2	X, y
X – y	0	X, y
2m + 3n + 7	7	m, n
l – k – 3p	0	l, k, p

Algebraic Expressions

A combination of constants and variables connected by the basic mathematical operators, i.e., +, –, ÷, × is called an algebraic expression.

For Example: $4xy$, $2x^2 - y$, $4x - 27y + 3z\frac{p}{q}$, $a^2 + b^2$ etc. are all algebraic expressions.

Coefficients: The numerical part is called the **numerical coefficient** and the literal part or the variable part is called the **literal coefficient.**
For Example: In 24xy, 24 is the numerical coefficient and xy is the literal coefficient.



Terms: The various parts of an algebraic expression connected by + or – sign are called terms of the expression.
For Example: $2x + 4y^2 - 3z$ has three terms, namely, $+ 2x$, $+ 4y^2$, $-3z$,
$2xy - 4y^2$ has two terms namely $+ 2xy$ and $4y^2$.

Like terms and Unlike algebraic terms: The terms having the same literal factors are called like terms and those having different literals factors are called unlike terms.

For Example: **(i)** $-6x^2y$ and $4yx^2$ are like terms, whereas $2xy$, $-3x^2$, $4xy^2$ are unlike terms.
(ii) In the algebraic expression $2a^2b + 3ab^2 - 7ab - 4ba^2$, we have $2a^2b$ and $-4ba^2$ as like terms, whereas $3ab^2$ and $-7ab$ are unlike terms.

Example:

Find the number of terms in the following expressions.
(I) $3x^2y$ **(II)** $4x^3 - y^3$ **(III)** $5x^5 + y - 2$
Solution: **(i)** $3x^2y$ has one term.
(ii) $4x^3 - y^3$ has two terms.
(iii) $5x^5 + y - 2$ has three terms.

Example:

Write the coefficient of x^2 in each of the following:
(i) $17 - 2x + 7x^2$ **(ii)** $9 - 12x + x^3$ **(iii)** $\frac{p}{6}x^2 - 3x + 4$ **(iv)** $\sqrt{3}x - 7$
Solution: **(i)** $17 - 2x + 7x^2$
Here, we have $+7x^2$ and +7 is the coefficient of x^2.
(ii) $9 - 12x + x^3$
Here, the x^2 term is missing. Therefore, there is no coefficient or coefficient = 0.
(iii) $\frac{p}{6}x^2 - 3x + 4$
Here, we have $+\frac{p}{6}x^2$ and $+\frac{p}{6}$ is the coefficient of x^2.
(iv) $\sqrt{3}x - 7$
Here, the x^2 term is missing. Therefore, there is no coefficient or coefficient = 0.

Example:

Convert the following statements into Algebraic expressions.
(i) 15 less than t.
(ii) 8 more than 12 times of x.
(iii) 12 taken away from z.
Solution: (i) $t - 15$
(ii) $12x + 8$
(iii) $z - 12$

Example:

Convert the following expressions into statements. Also, find variables and constants in each of the following.
(i) $15x + 4$ **(ii)** $3 - 2y$ **(iii)** $\frac{3}{5}p - 8$

Solution:

Algebraic expression	Statement	Constant	Variable
(i) $15x + 4$	4 more than 15 times of x	15,4	x
(ii) $3 - 2y$	Twice of y taken away from 3	$3, -2$	y
(iii) $\frac{3}{5}p - 8$	8 less than three – fifth of p	$\frac{3}{5}, -8$	p

Rules from Arithmetic

We will learn the relation between arithmetic and algebra with the help of variables and constants.
In general form, we have the following properties:
(i) $a + b = c$; where a, b and c are whole numbers and it represents the closure property of addition.
(ii) $a + b = b + a$; where a and b are whole numbers, and it represents commutative property of addition.
(iii) $a \times b = b \times a$; where a and b are whole numbers, and it represents the commutative property of multiplication.
(iv) $(a + b) + c = a + (b + c)$; where a, b and c are whole numbers, and it represents the associative property of addition.
(v) $a \times (b + c) = a \times b + a \times c$; where a, b and c are whole numbers, and it represents the distributive property of of multiplication over addition.

Rules from Geometry

Now, we will learn how to write common rule to find perimeter in geometry and in general form.
(i) In general form, perimeter of square can be expressed as:
Let perimeter $= P$, length of side of a square $= a$ units, then
Perimeter of a square, $P = 4 \times a$ units
(ii) Perimeter of rectangle can be expressed as:
Let perimeter $= P$, length $= l$ and breadth $= b$, then
Perimeter of rectangle, $P = 2(l + b)$

Example:

If the perimeter of a square is (8a + 16) units. Find the length of the side of the square (in terms of a).
Solution: Perimeter = (8a + 16) units
$\Rightarrow 4 \times$ Length of side $= 4 \times (2a + 4)$ [Distributive property]
$\Rightarrow$ Length of side = (2a + 4) units.

Example:

Find the perimeter of the rectangle, if its length is 5 times of a and breadth is 3 units.
Solution: Perimeter $= 2$(Length + Breadth)
$= 2[(5a) + 3]$
$= 2(5a + 3)$
$= 10a + 6$

Equations

We shall understand the various terms and concepts related to equations as given below.

Algebraic Expressions

Expressions of the form 4x, (x + 5), (4x + y) are algebraic expressions. x and 5 are the terms of (x + 5) and 4x and y are the terms of 4x + y. Algebraic expressions are made up of numbers, symbols and basic arithmetic operations.

Mathematical Sentence

Two expressions joined by the equality sign (=) or an inequality sign (≤, ≥) are mathematical sentences.
Examples: 2 + 5 = 7, 8 – 3 = 5, 7x – 8 = 4, 2 + 3 > 4, 6 – 2 > 2 are some mathematical sentences. Those which have the equality sign are equations and those which have an inequality sign are inequations.

Mathematical Statement

A mathematical sentence that can be verified as either true or false is a mathematical statement.
For Example: 15 + 8 = 12 + 11. This is a true statement. 14 – 3 ≥ 17, This is a false statement. All sentences involving only numerical expressions can be verified as either true or false. Hence, they are statements.

Open Sentences

Sentences which are true for some values of the variable and false for the other values of the variable are called open sentences. When a certain value is substituted for the variable, the sentence becomes a statement, regardless of whether it is true or false.
For Example: 2x – 3 = 7, is an open sentence. When we substitute 5 for x, we get a true statement. When we substitute any other value, we get a false statement.

Equation

An open sentence containing the equality sign is an equation. In other words, an equation is a sentence in which there is an equality sign between two algebraic expressions.
For Example: 2x – 5 = 8, 3y + 4 = 2, $x^2 - 7x + 12 = 0$ are equations. Here, x and y are unknown quantities and 2, 5, 8, 3, etc., are known quantities.

Linear Equation

An equation in which the highest exponent of the variable is one is a linear equation.
Example: 2x + 3 = 4, 3x + 4y = 8

Simple Equation

A linear equation which has only one unknown is a simple equation. 8x – 3 = 5 and 4x + 4 = 3x – 6 are examples of simple equations. The part of an equation which is to the left side of the equality sign is known as the left-hand side and it is abbreviated as LHS. The part of an equation which is to the right side of the equality sign is known as the right-hand side and it is abbreviated as RHS. The process of finding the value of an unknown in an equation is called solving the equation. The value/values of the unknown found after solving an equation is/are called the solution(s) or the root(s) of the equation. Before we learn how to solve an equation, let us review the basic properties of equality.

Properties of Equality

(1) Addition Property: If equal numbers are added to both sides of an equality, the equality remains the same. If x = y, then x + z = y + z.

(2) Subtraction Property: If equal numbers are subtracted from both sides of an equality, the equality remains the same. If x = y, then x – z = y – z.

(3) Multiplication property: If both sides of the equality are multiplied by the same number, the equality remains the same. If x = y, then (x)(z) = (y)(z).

(4) Division Property: If both sides of the equality are divided by a non-zero number, the equality remains the same. If x = y, then, x/z = y/z where z ≠ 0.

Solving an Equation

The value of a variable in an equation which satisfies the equation is called the solution of the equation.

Trial and error method

In this method, we have to evaluate the equation for different values of the variable. The value of the variable that satisfies the equation or at which L.H.S. is equal to R.H.S. is called the solution of the equation.

Example:

Find the solution of the equation $5m + 2 = 32$ using trial and error method.

Solution:

m	0	1	2	3	4	5	6
$5m + 2$	2	7	12	17	22	27	32

At $m = 6$, L.H.S. = R.H.S.

Hence, the solution of given equation is $m = 6$.

Example:

Find the solution of the equation using trial and error method.

$\mathbf{2x - 5 = (x + 4) + (3x - 9)}$

Solution: For $x = 0$,

L.H.S. $= 2(0) - 5 = -5$

R.H.S. $= (0 + 4) + [3(0) - 9]$

$= 4 - 9 = -5$

$\because$ L.H.S. = R.H.S.

$\therefore x = 0$ is the solution of the equation.

Systematic method

Any operation done on one side of an equation has to be done on the other side also for the equation to remain true. From this, following rules are obtained.

Rule 1: If you add a number to the L.H.S., then you should add the same number to the R.H.S. also.

Rule 2: If you subtract a number from the L.H.S., then you should subtract the same number from the R.H.S. also.

Rule 3: If you multiply the L.H.S. by a non-zero number, then you should multiply the R.H.S. also by the same number.

Rule 4: If you divide the L.H.S. by a non-zero number, then you should divide the R.H.S. also by the same number.

Example:

Solve the following equations.

(i) $\mathbf{x + 3 = 10}$ **(ii)** $\mathbf{x - 5 = 12}$ **(iii)** $\mathbf{\frac{x}{3} = 6}$ **(iv)** $\mathbf{12x = 24}$

Solution: (i) $x + 3 = 10$

Subtract 3 from both sides, $x + 3 - 3 = 10 - 3 \Rightarrow x = 7$

(ii) $x - 5 = 12$

Add 5 to both sides, $x - 5 + 5 = 12 + 5 \Rightarrow x = 17$

(iii) $\frac{x}{3} = 6$

Multiply both sides by 3, $\frac{x}{3} \times 3 = 6 \times 3 \Rightarrow x = 18$

(iv) $12x = 24$

Divide both sides by 12, $\frac{12x}{12} = \frac{24}{12} \Rightarrow x = 2$

Transposition Method

The following steps are involved in solving an equation.
Step 1: Always ensure that the unknown quantities are on the LHS and the known quantities or constants are on the RHS.
Step 2: Add all the terms containing the unknowns on the LHS and all the known values on the RHS so that each side of the equation contains only one term. On the LHS, the number with which the unknown is multiplied is called the coefficient.
Step 3: Divide both sides of the equation by the coefficient of the unknown.

Example:

Solve for x: $\mathbf{15x - 6 = 9}$
Solution: $15x - 6 = 9$

$\Rightarrow 15x = 9 + 6$

$\Rightarrow x = \frac{15}{15} \Rightarrow x = 1$

Example:

Solve for x: $\frac{\mathbf{3x}}{\mathbf{2}} + \frac{\mathbf{x}}{\mathbf{3}} = \mathbf{x} + \frac{\mathbf{x}}{\mathbf{6}} + \mathbf{6}$

Solution: $\frac{\mathbf{3x}}{\mathbf{2}} + \frac{\mathbf{x}}{\mathbf{3}} = \mathbf{x} + \frac{\mathbf{x}}{\mathbf{6}} + \mathbf{6}$

$\frac{3 \times 3x + 2 \times x - 6 \times x - 1 \times x}{6} = 6$

$\frac{9x + 2x - 6x - 1x}{6} = 6$

$11x - 7x = 6 \times 6$

$4x = 36$

Divide both sides by 4

$\frac{4x}{4} = \frac{36}{4} \Rightarrow x = 9$

Solved Examples

(1) The length of a rectangular hall is $\mathbf{5\ m}$ less than 4 times the breadth of the hall. What is the length if breadth is $\mathbf{x}$ metres?
Solution: Given breadth of a rectangular hall $= x$ metres.
According to question,
Length of rectangular hall $= (\mathbf{4x - 5})$ **metres**

(2) An apple cost ₹R. A mango costs ₹1 more than an apple. Find the total cost of 8 mangoes in terms of R.
Solution: Cost of an apple $=$ ₹R
Cost of a mango $=$ ₹$(R + 1)$
Total cost of 8 mangoes $=$ ₹$8(R + 1) =$ ₹$(\mathbf{8R + 8})$

(3) Solve for x: $\mathbf{5x - 6 = 9}$
Solution: $5x - 6 = 9$

$\Rightarrow \mathbf{5x = 9 + 6}$

$\Rightarrow \mathbf{x} = \frac{\mathbf{15}}{\mathbf{5}}$

$\Rightarrow \mathbf{x = 3}$

(4) Mother has made laddus. She gives some laddus to guests and family members; still 5 laddus remain. If the number of laddus mother gave away is $\boldsymbol{l}$, how many laddus did she make?
Solution: Number of laddus gave away $= \boldsymbol{l}$
Number of remaining laddus $= \mathbf{5}$
$\therefore$ Total number of laddus $= \boldsymbol{l} + \mathbf{5}$

(5) Write the following statement using arithmetical numbers, literal numbers and arithmetic operations. The father's present age is 4 years more than twice the age of his son.
Solution: Let the son's present age be $\mathbf{x}$ years and the father's present age be y years.
Then, twice the age of the son $= \mathbf{2x}$ years
4 years more than $\mathbf{2x}$ years $= (\mathbf{2x + 4})$ years
$\therefore$ Father's present age, $\mathbf{y = 2x + 4}$

(6) Give expression
(i) $\mathbf{20a}$ subtracted from 40
(ii) $\mathbf{-a}$ divided by 7
(iii) $\mathbf{x}$ multiplied by 8
Solution: (i) $40 - 20a$

(ii) $\frac{-a}{7}$
(iii) $8x$

(7) 7 increased by one-fifth of a number is 8 Write the expression and find the number.
Solution: Let the number be x.

According to question, $\frac{1}{5}(x) + 7 = 8$

Now, by hit and trial, we have

x	1	2	3	4	5
$\frac{1}{5}x + 7$	$\frac{36}{5}$	$\frac{37}{5}$	$\frac{38}{5}$	$\frac{39}{5}$	8

So, $x = 5$ is the solution.

(8) Cadets are marching in a parade. There are 5 cadets in a row. What is the rule which gives the number of cadets, given the number of rows? (Use $\mathbf{n}$ for the number of rows.)
Solution: Let number of rows $= \mathbf{n}$

Number of cadets in each row $= \mathbf{5}$

Therefore, total number of cadets $= \mathbf{5n}$

(9) A bird flies 1 kilometer in one minute. Can you express the distance covered by the bird in terms of its flying time in minutes? (Use $\mathbf{t}$ for flying time in minutes.)
Solution: Let flying time of the bird be t minutes. Distance covered by the bird in 1 minute $= 1$ km

∴ Distance covered by the bird in t minutes $= (1 \times t)$km $= t$ km

(10) Use algebraic expressions to complete the table.

S. No.	Series	Algebraic expression	Terms to be found	Term
(i)	$\mathbf{5, 8, 11, ...}$	$\mathbf{3y + 2}$	$\mathbf{75^{th}}$	
(ii)	$\mathbf{4, 6, 8, 10, ...}$	$\mathbf{2x + 2}$	$\mathbf{250^{th}}$	
(iii)	$\mathbf{4, 5, 6, ...}$	$\mathbf{n + 3}$	$\mathbf{195^{th}}$	
(iv)	$\mathbf{13, 21, 29, ...}$	$\mathbf{8p + 5}$	$\mathbf{68^{th}}$	
(v)	$\mathbf{2, 7, 12, ...}$	$\mathbf{5z - 3}$	$\mathbf{46^{th}}$	

Solution:

S.No.	Series	Algebraic expression	Terms to be Found	Term
(i)	$5, 8, 11, ...$	$3y + 2$	75^{th}	$3 \times 75 + 2 = 227$
(ii)	$4, 6, 8, 10, ...$	$2x + 2$	250^{th}	$2 \times 250 + 2 = 502$
(iii)	$4, 5, 6, ...$	$n + 3$	195^{th}	$195 + 3 = 198$
(iv)	$13, 21, 29, ...$	$8p + 5$	68^{th}	$8 \times 68 + 5 = 549$
(v)	$2, 7, 12, ...$	$5z - 3$	46^{th}	$5 \times 46 - 3 = 227$

(11) The sum of two consecutive odd numbers is 164. Find the numbers.
Solution: Let the two consecutive odd numbers be x and $x + 2$.

Given that: $(x) + (x + 2) = 164$

$\Rightarrow 2x + 2 = 164$

$\Rightarrow 2(x + 1) = 164$

$\Rightarrow x + 1 = \frac{164}{2}$

$\Rightarrow x + 1 = 82$

$\Rightarrow x = 82 - 1$

$\Rightarrow x = \mathbf{81}$

∴ The two consecutive odd numbers are **81** and **83**.

(12) The present age of a person is $\frac{1}{3}$ of the present age of his father. If the sum of their ages is 60 years, then find the age of the son.
Solution: Let the present age of the father be x years.

∴ The present age of the son = $\frac{x}{3}$ years.

Given that; $x + \frac{x}{3} = 60$

$\Rightarrow \frac{x}{1} + \frac{x}{3} = 60$

$\Rightarrow \frac{3 \times x + 1 \times x}{3} = 60$

$\Rightarrow \frac{3x + x}{3} = 60$

$\Rightarrow \frac{4x}{3} = 60$

$\Rightarrow 4x = 60 \times 3$

$\Rightarrow 4x = 180$

$\Rightarrow x = \frac{180}{4} \Rightarrow x = 45$

∴ The age of the son = $\frac{1}{3} \times 45 = \mathbf{15}$ **years.**

(13) Solve for x: $\frac{\mathbf{3x}}{\mathbf{2}} + \frac{\mathbf{x}}{\mathbf{3}} = \mathbf{x} + \frac{\mathbf{x}}{\mathbf{6}} + \mathbf{6}$

Solution: $\frac{3x}{2} + \frac{x}{3} = x + \frac{x}{6} + 6$

$\Rightarrow \frac{3x}{2} + \frac{x}{3} - x - \frac{x}{6} = 6$

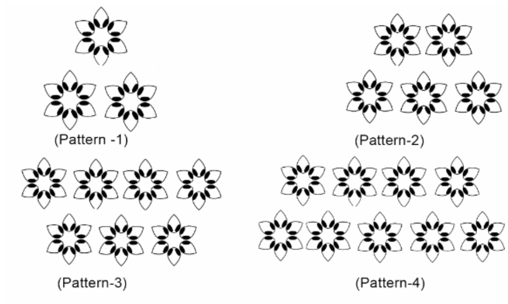
$\Rightarrow \frac{3 \times 3x + 2 \times x - 6 \times x - 1 \times x}{6} = 6$

$\Rightarrow \frac{9x + 2x - 6x - 1x}{6} = 6$

$\Rightarrow 11x - 7x = 6 \times 6$

$\Rightarrow 4x = 36 \Rightarrow x = \mathbf{9}$

(14) Study the patterns and identify the rule of $\mathbf{n^{th}}$ pattern.



Solution: For pattern 1, no. of flowers $= 2 \times 1 + 1 = 3$

For pattern 2, no. of flowers $= 2 \times 2 + 1 = 5$

For pattern 3, no. of flowers $= 2 \times 3 + 1 = 7$

For pattern 4, no. of flowers $= 2 \times 4 + 1 = 9$

In the same way, for n^{th} pattern,

No. of flowers $= \mathbf{2n + 1}$

(15) Classify the following into algebraic expression and arithmetic expression. Give reasons also.

(i) $\mathbf{9 \times 27 - 2}$

(ii) $\mathbf{11p - 5}$

(iii) $\mathbf{3s - 7}$

(iv) $\mathbf{35 - 8 \times 12}$

Solution:

S.No.	Expression	Expression	Reason
(i)	$9 \times 27 - 2$	Arithmetic expression	This expression is formed only by numbers.
(ii)	$11p - 5$	Algebraic expression	This expression is formed by constants and variables.
(iii)	$3s - 7$	Algebraic expression	This expression is formed by constants and variables.
(iv)	$35 - 8 \times 12$	Arithmetic expression	This expression is formed only by numbers.

(16) Express the following as algebraic expressions:

(i) Sum of two consecutive numbers is 15.

(ii) 5 is added to the product of two consecutive numbers.

Solution: (i) Let x be any number. Successor of $x = x + 1$

Now x and $x + 1$ are two consecutive numbers.

∴ The required expression is

$x + (x + 1) = 15$ or $2x + 1 = \mathbf{15}$

(ii) Since, x and $(x + 1)$ are two consecutive numbers.

∴ The product of x and $x + 1$ added to 5 is $\mathbf{x(x + 1) + 5}$

(17) Three friends Riya, Mini and Trisha are going up a flight of stairs. Riya is at step $\mathbf{x}$, Mini is four steps ahead of Riya and Trisha is three steps behind Riya.

(i) How many steps each Mini and Trisha have climbed?

(ii) If the total number of steps is 5 less than three times the number of steps climbed by Riya, find the total number of steps in terms of $\mathbf{x}$.

Solution: (i) Riya's position $= x$

Mini's position $= x + 4$

Trisha's position $= \mathbf{x - 3}$

(ii) Total number of steps $= \mathbf{3x - 5}$

(18) When 6 is subtracted from four times a number, the result is 10. Form the equation and find the solution using trial and error method.

Solution: Let the number be x. Then, $4x - 6 = 10$

Using trial and error method, we have

If $x = 1$, we have $4(1) - 6 = 4 - 6 = -2$

If $x = 2$, we have $4(2) - 6 = 8 - 6 = 2$

If $x = 3$, we have $4(3) - 6 = 12 - 6 = 6$

If $x = 4$, we have $4(4) - 6 = 16 - 6 = 10$

So, $\mathbf{x = 4}$ is the solution.

Exercise

FILL IN THE BLANKS

(1) The value of a variable for which the equation is satisfied is called ————.
(2) The symbol that has a fixed numerical value is called___________.
(3) A combination of variables and numbers connected by four different types of operations are called ————.
(4) Algebraic expressions are formed from ___________ and constants.
(5) The terms having the same literal coefficients are called _______.
(6) 2xy and $-5x^2$ are ______________ of the expression $2xy - 5x^2$.
(7) A condition on a variable such that two expressions in the variable should have equal value is called ———.
(8) The value of 2x – 12 is zero, when x = ________.
(9) Each factor together with the sign of the term is called the ________ of the other factor.
(10) The product of 2 and x is being added to the product of 3 and y is expressed as ________.

TRUE OR FALSE

(1) 5 times x subtracted from 8 times y is $5x - 8y$.
(2) The parts of an algebraic expression which are connected by $+$ or $-$ sign are called its terms.
(3) $4x^2$ y and $-4yx^2$ are like terms.
(4) A number having fixed value is called variable.
(5) The numerical coefficient of $-2x^2y$ is -2.
(6) The equations x + 1 = 0 and 2x + 2 = 0 have the same solution.
(7) A quantity which has no fixed value is called a constant.
(8) 0 is a solution of the equation x + 1 = 0
(9) In the equation 7k – 7 = 7, the variable is 7.
(10) The coefficient of x^2y in the expression $4x - x^2 y$ is 0.

OBJECTIVE TYPE QUESTIONS

(1) The length of a rectangular hall is 4 meters less than 3 times the breadth of the hall. What is the length, if the breadth is b meters?
(A) 12b (B) 3b – 4
(C) 3b + 4 (D) None of these

(2) If each match box contains 50 matchsticks, the number of matchsticks required to fill n such boxes is
(A) 50 + n (B) 50n
(C) 50 ÷ n (D) 50 – n

(3) Amulya is x years of age now. 5 years ago her age was
(A) (5 – x) years (B) (5 + x) years
(C) (x – 5) years (D) (5 ÷ x) years

(4) Which of the following equations does not have a solution in integers?
(A) x + 1 = 1 (B) x – 1 = 3
(C) 2x + 1 = 6 (D) 1 – x = 5

(5) In algebra, letters may stand for
(A) known quantities (B) unknown quantities
(C) fixed numbers (D) None of these

(6) 10 – x means
(A) 10 is subtracted x times (B) x is subtracted 10 times
(C) x is subtracted from 10 (D) 10 is subtracted from x

(7) The value of x for which (3x – 4) and (2x + 1) become equal is
(A) -3 (B) 0
(C) 5 (D) 1

(8) Three-fourth of a number is 9. Find the number. **(2015)**
(A) 24 (B) 12
(C) 36 (D) 27

(9) If one-third of y is subtracted from its half, find the result. **(2017)**
(A) $\frac{-y}{6}$ (B) $\frac{y}{5}$
(C) $\frac{y}{6}$ (D) $\frac{2y}{6}$

(10) If $x : y = 2 : 3$, then find the value of $3x + 2y : 9x + 5y$. **(2017)**
(A) $4 : 11$ (B) $5 : 14$
(C) $11 : 4$ (D) $15 : 7$

(11) One-third of x is added to its half, find the resulting sum. **(2015)**

(A) $\frac{5x}{6}$ (B) $\frac{6x}{5}$

(C) $\frac{11x}{6}$ (D) $\frac{11x}{5}$

(12) Savitri has a sum of Rs x. She spent Rs 1000 on grocery, Rs 500 on clothes and Rs 400 on education, and received Rs 200 as a gift. How much money (in Rs) is left with her?

(A) x – 1700 (B) x – 1900

(C) x + 200 (D) x – 2100

Answer Key

FILL IN THE BLANKS

(1)	Solution	**(6)**	Terms
(2)	Constant	**(7)**	Equation
(3)	Algebraic Expressions	**(8)**	6
(4)	Variables	**(9)**	Coefficient
(5)	Like terms	**(10)**	2x + 3y

TRUE OR FALSE

(1)	False	**(6)**	True
(2)	True	**(7)**	False
(3)	True	**(8)**	False
(4)	False	**(9)**	False
(5)	True	**(10)**	False

OBJECTIVE TYPE QUESTIONS

(1)	(B)	**(6)**	(C)	**(11)**	(A)
(2)	(B)	**(7)**	(C)	**(12)**	(A)
(3)	(C)	**(8)**	(B)		
(4)	(C)	**(9)**	(C)		
(5)	(B)	**(10)**	(A)		