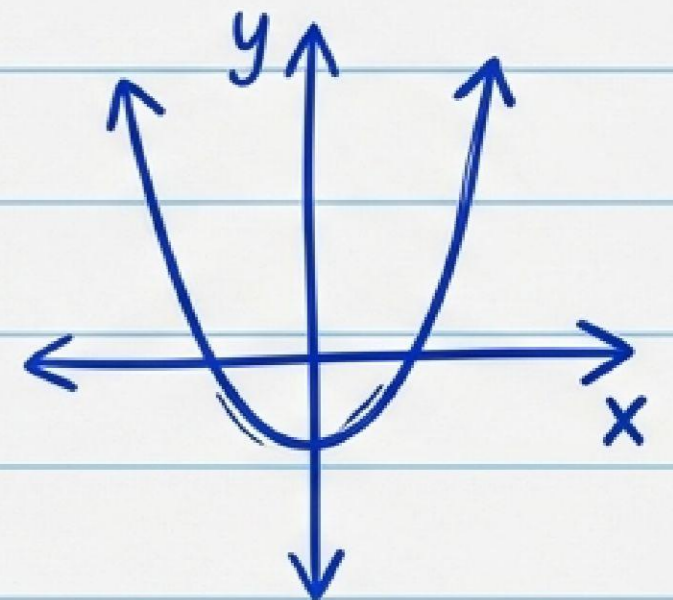


Class 10 Algebra: Study Notes

Revision, Formulas & Examples



1. What is Algebra?

A branch of mathematics that uses **symbols** (letters) to represent numbers and quantities. These symbols form **expressions**, equations, and **formulas**.

Why is it important?

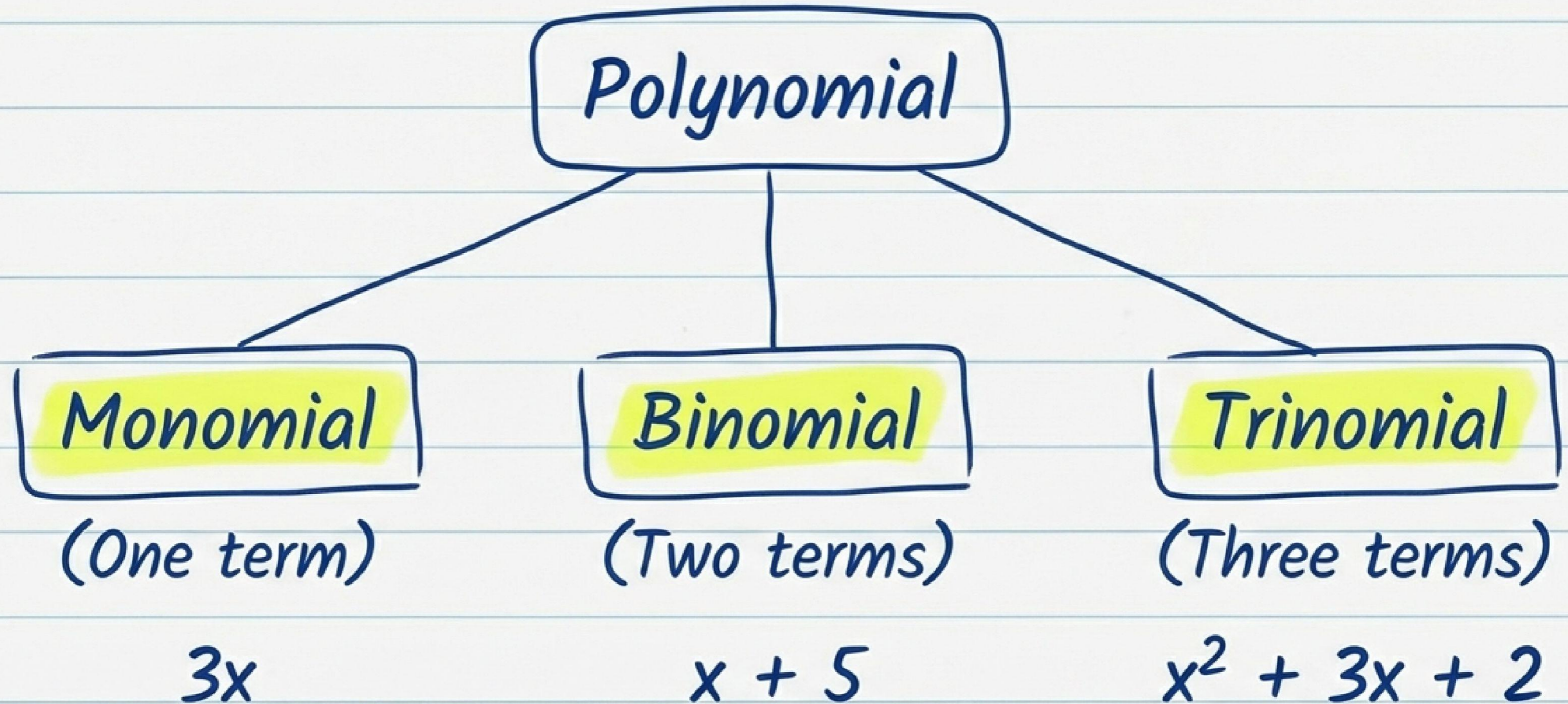
- Helps to generalise arithmetic.
- Used in science, engineering, economics, and daily-life problem solving.

2. Polynomials: Definition & Form

An algebraic expression made up of variables, coefficients, and constants, using only **non-negative integer powers** of variables.

$$P(x) = a_n x^n + a_{n-1} x^{n-1} + \dots + a_1 x + a_0$$

Types of Polynomials



Properties: Degree & Zeroes

Degree

The **highest power** of the variable.

$$4x^3 + 2x^2 - x + 7$$

↖ Degree = 3

Zeroes

A value of x for which **$P(x) = 0$** .

If $P(x) = x - 3$,
then $P(3) = 0$

↖ Zero is 3

3. Pair of Linear Equations (Two Variables)

Two linear linear equations involving two variables (x and y).

$$a_1x + b_1y + c_1 = 0$$

$$a_2x + b_2y + c_2 = 0$$

} System of Equations

Methods of Solving

→ 1. Graphical Method

→ 2. Algebraic Methods

- Substitution Method

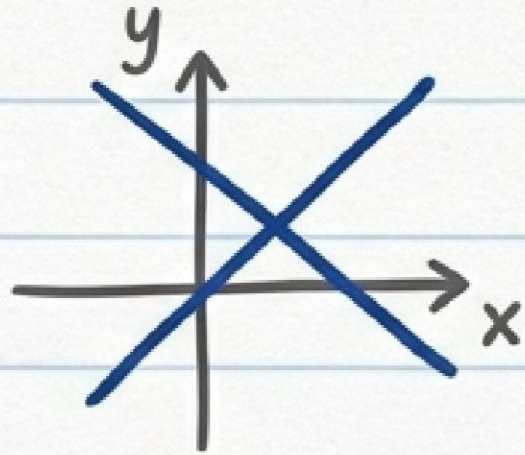
- Elimination Method

Ex: $x + y = 5$ and $x - y = 1$.

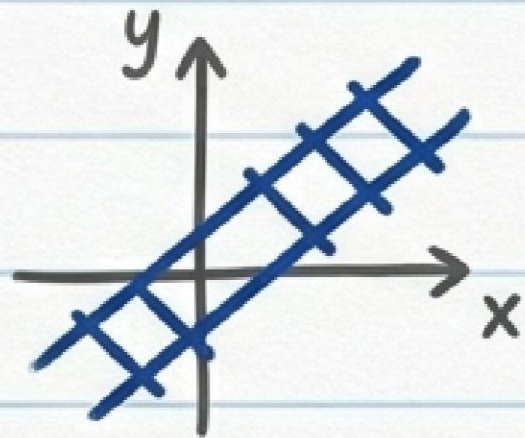
Add them $\rightarrow 2x = 6 \rightarrow x = 3$.

Sub $x \rightarrow y = 2$.

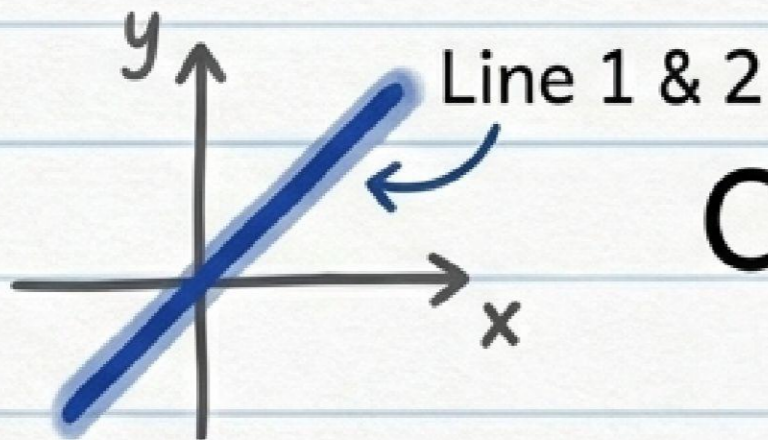
Nature of Solutions (Graphical View)



Intersecting Lines = One Solution



Parallel Lines = No Solution



Coincident Lines = Infinite Solutions

4. Quadratic Equations

$$ax^2 + bx + c = 0 \quad (\text{where } a \neq 0)$$

Methods of Solving:

1. Factorization Method
2. Completing the Square Method
3. Quadratic Formula Method

The Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Discriminant (D):

$$D = b^2 - 4ac$$

Nature of Roots: The Discriminant Rules

1. If $D > 0$ \rightarrow Two real roots.
 2. If $D = 0$ \rightarrow Equal roots.
 3. If $D < 0$ \rightarrow No real roots.
-

Example:

$$x^2 - 5x + 6 = 0$$

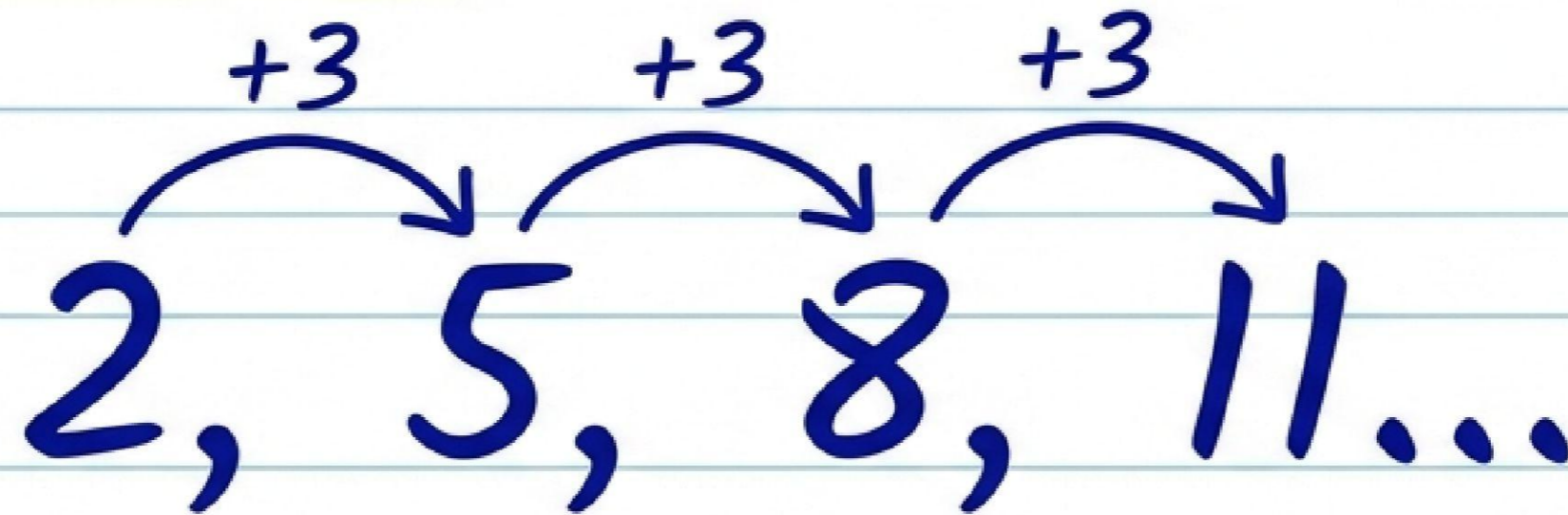
$$\text{Factorised: } (x - 2)(x - 3) = 0$$

$$\text{Roots: } x = 2, 3$$

5. Arithmetic Progressions (AP)

A sequence of numbers where the difference between consecutive terms is constant.

Constant difference



Key Terms:

First term = a

Common difference = d

n th term = a_n

AP Formulas

nth Term

$$a_n = a + (n - 1)d$$

Sum of n Terms

$$S_n = \frac{n}{2} [2a + (n - 1)d]$$

Example: Find 5th term of 2, 5, 8...

Here $a=2$, $d=3$, $n=5$

$$a_5 = 2 + (5 - 1)3 = 14$$

Practice MCQs: Part 1

Q1: Degree of polynomial $5x^3 + 2x - 1$ is:

- A) 1 B) 2 C) 3 D) 4

Q2: Number of solutions of parallel lines is:

- A) 1
B) 2
C) Infinite
D) 0

Answers: Q1(C), Q2(D)

Practice MCQs: Part 2 & Summary

Q3: Discriminant of $x^2 - 4x + 4 = 0$ is:

A) 0 B) 4 C) -4 D) 8

Q4: Common difference of AP: 7, 10, 13... is:

A) 2 B) 3 C) 4 D) 5

Key Takeaways

- Polynomials = Expressions
- Linear = Straight Lines
- Quadratic = Square Terms
- AP = Fixed Pattern

 Good Luck!

Answers: Q3(A), Q4(B)