Quadratic Equations – Methods & Formulas (Class 10)

1. Standard Form of Quadratic Equation

- A quadratic equation is written as: $ax^2 + bx + c = 0$
- Where a, b, c are real numbers and $a \neq 0$.

2. Factorization Method

- Step 1: Write the quadratic equation in standard form.
- Step 2: Factorize the quadratic expression.
- Step 3: Set each factor equal to zero.
- Step 4: Solve to obtain the roots.
- Example: $x^2 + 5x + 6 = 0 \rightarrow (x + 2)(x + 3) = 0 \rightarrow x = -2, -3$

3. Completing the Square Method

- Step 1: Write equation in form $ax^2 + bx + c = 0$.
- Step 2: Divide by a (if $a \neq 1$).
- Step 3: Move constant to RHS.
- Step 4: Add $(b/2)^2$ to both sides.
- Step 5: Write LHS as a perfect square and solve.
- Example: $x^2 + 6x + 5 = 0 \rightarrow x^2 + 6x = -5 \rightarrow (x + 3)^2 = 4 \rightarrow x = -1, -5$

4. Quadratic Formula Method

- Formula used to solve quadratic equation directly:
- $x = (-b \pm \sqrt{(b^2 – 4ac)}) / 2a$

5. Discriminant

- $D = b^2 – 4ac$
- If $D > 0 \rightarrow$ two distinct real roots
- If $D = 0 \rightarrow$ two equal roots
- If $D < 0 \rightarrow$ no real roots

6. Sum and Product of Roots

- If roots are α and β:
- $\alpha + \beta = –b/a$
- $\alpha\beta = c/a$

7. Important Tips

- Factorization is fastest when factors are obvious.

- Completing square is useful for deriving formula.
- Quadratic formula works for all quadratic equations.