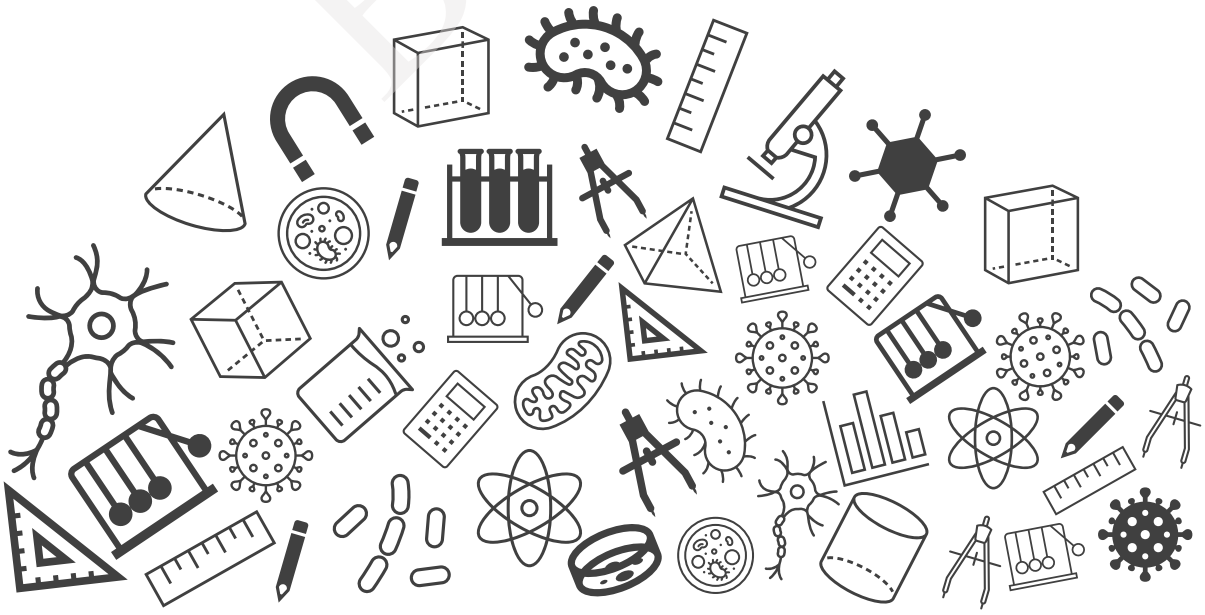
Grade 10
Mathematics Chapter Notes



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MATHEMATICS

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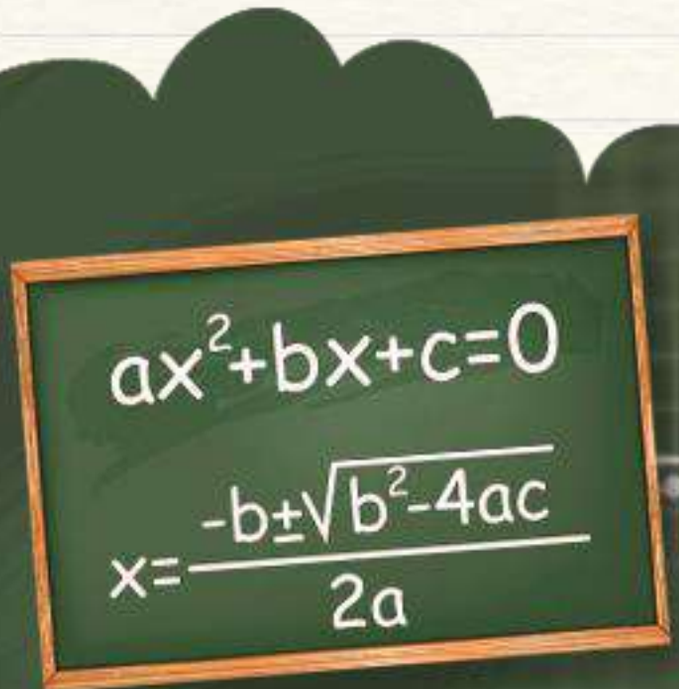
CHAPTER NOTES

Quadratic Equations

Topics

1. Standard Form of Quadratic Equations
2. Methods to Solve
3. Zeroes, Roots and Solutions
4. Nature of Roots



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Standard Form

Degree

$$ax^2 + bx + c = 0$$

Real numbers and $a \neq 0$

Important Terms

Zeroes

Zeroes are for quadratic polynomial $P(x)$

$P(x) = (x - 2)(x - 2)$

Zeroes, $x = 2$ & 2

Roots

Roots are for quadratic equation

$(x - 2)(x - 2) = 0$

Roots, $x = 2$ & 2

Solutions

Quadratic equation having equal and identical roots will have a unique solution.

$(x-2)(x - 2)=0$

$x = 2$ is the solution of the given equation

Methods to Solve Quadratic Equations

- Factorization
- Quadratic Formula

Factorization

General form:
$ax^2 + bx + c = 0.$

1. Split the middle term.

   Product of split terms = (a × c)

   $9x^2 - 3x - 2 = 0.$

   $9x^2 - 6x + 3x - 2 = 0.$

2. Factorize the equation

   $3x(3x - 2) + 1(3x - 2) = 0.$

   $(3x - 2)(3x + 1) = 0.$

3. Equate each factor to 0

   $(3x - 2)(3x + 1) = 0$

   $x = \frac{2}{3}$ or $x = -\frac{2}{3}$

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Quadratic Formula

$$ax^2 + bx + c = 0$$

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

i.e.

$$x = \frac{-b + \sqrt{b^2 - 4ac}}{2a} \quad \text{or} \quad x = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$

where, $b^2 - 4ac \geq 0$

Quadratic formula is used where factorization method is difficult to apply.

Nature of Roots

Discriminant (D) = "$b^2 - 4ac$".

Nature of Roots

	$b^2 - 4ac > 0$	$b^2 - 4ac = 0$	$b^2 - 4ac < 0$
Type of Roots	Real & Distinct Roots	Real & Equal Roots	No Real Roots
Value of Roots	$\frac{-b - \sqrt{D}}{2a}$, $\frac{-b + \sqrt{D}}{2a}$	$\frac{-b}{2a}, \frac{-b}{2a}$	Not Valid

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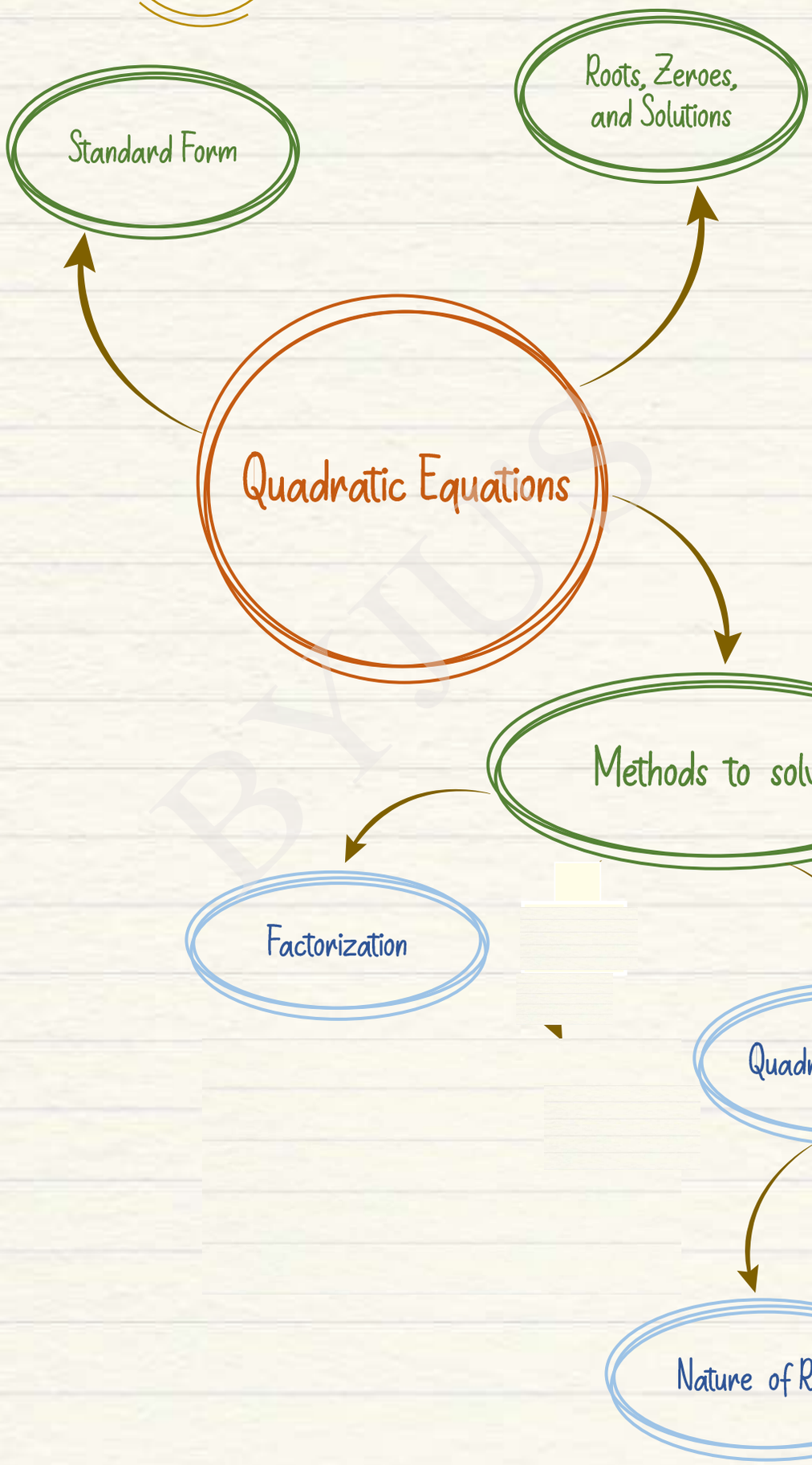
Mind Map



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