MIND MAP

Quadratic Equations

Quadratic Equation

General Form of quadratic equation:

$ax^2 + bx + c = 0$

Where a, b, c are real numbers and $a \neq 0$

Roots of the Quadratic Equation

A real number α is said to be a root of the quadratic equation $ax^2 + bx + c = 0$, if $a\alpha^2 + b\alpha + c = 0$. The zeroes of the quadratic polynomial $ax^2 + bx + c$ and the roots of the quadratic equation $ax^2 + bx + c = 0$ are the same.

Quadratic formula:

For $ax^2 + bx + c = 0, a \neq 0$; then

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

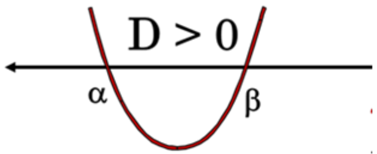
$$x = \frac{-b + \sqrt{D}}{2a} \text{ OR } x = \frac{-b - \sqrt{D}}{2a}$$

where, $D = b^2 - 4ac$, known as its discriminant & is denoted by Δ or D.

Nature of Roots

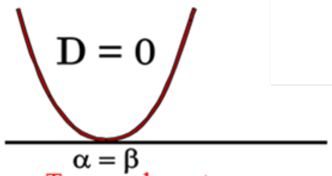
1. Two distinct real roots,

- If D>0 & is a perfect square the roots will be rational and unequal.
- If D>0 & is not a perfect square The roots will be irrational and occur in a pair of conjugate surds



Two equal roots Roots are Real and Distinct

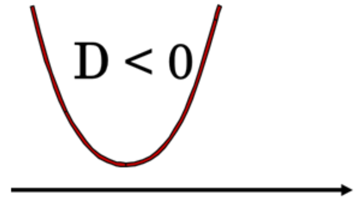
2. Two equal roots (i.e., coincident roots), if $b^2 - 4ac = 0$,



Two real roots

Roots are Real and Equal

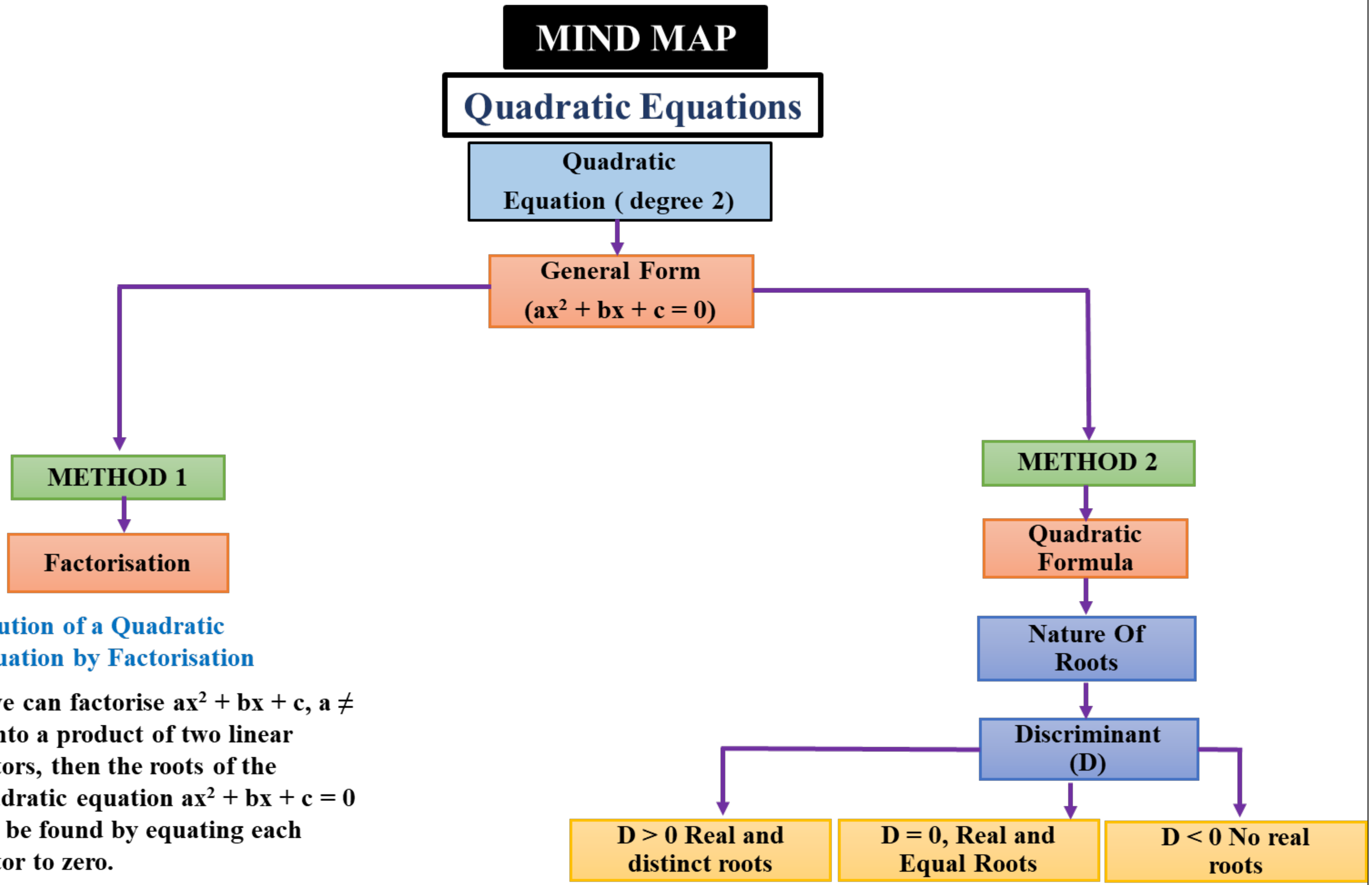
3. no real roots, if $b^2 - 4ac < 0$.



No real roots

Solution of a Quadratic Equation by Factorisation

If we can factorise $ax^2 + bx + c, a \neq 0$, into a product of two linear factors, then the roots of the quadratic equation $ax^2 + bx + c = 0$ can be found by equating each factor to zero.



Solution of a Quadratic Equation by Factorisation

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