#Quadratic Equations

#Syllabus.

- Standard form of a quadratic equation
- Solution of quadratic equation (only real roots) by factorization method & By Quadratic formula.
- Nature of Roots
- Relation between Roots and discriminant.
- Situational problems based on a quadratic formula.

Standard form of a Quadratic Equation.

General form:- $ax^2+bx+c=0,\ a\neq 0$
where a, b and c are real numbers.

Note:- If the given equation follows the form of quadratic equation (ax^2+bx+c), $a\neq 0$, then it is a quadratic equation otherwise not.

Solution of a Quadratic Equation by factorisation

step 1:> first write in General form $ax^2+bx+c=0, a\neq 0$

step 2> write product of a & c $(ac) = \alpha \times \beta$ and $\alpha+\beta = b$, where α and β are factors of ac.

step 3. $ax^2+bx+c = k(x\pm\alpha)(x\pm\beta)$
equate each factor to zero and find the value of x. i.e solution of quadratic equation.

Quadratic formula.

$ax^2+bx+c=0,\ a\neq 0.$

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

where $D=b^2-4ac$ is know as discriminant.
This result is know as Sridharacharya formula.

Nature of Roots

$\boxed{ax^2+bx+c=0,\ a\neq 0}$

$\Downarrow$

find Discriminant

1. when $D>0$
Roots are Real & Distinct

2. when $D=0$
Roots are Real and Equal

3. when $D<0$
No solution

Relation between Roots & Discriminant:

$\Rightarrow$ when $D=0$, $b^2-4ac=0$

$$x=\frac{-b}{2a},\ \frac{-b}{2a}$$

$\Rightarrow$ when $D>0$, $b^2-4ac>0$

$$x=\frac{-b+\sqrt{D}}{2a},\quad x=\frac{-b-\sqrt{D}}{2a}$$

$\Rightarrow$ when $D<0$, $b^2-4ac<0$
Does not exist.

— The end —