QUADRATIC EQUATIONS

S.no	Terms	Descriptions
1	*Quadratic Polynomial*	$P(x) = ax^2 + bx + c$ where $a \neq 0$
2	*Quadratic equation*	$ax^2 + bx + c = 0$ where $a \neq 0$
3	*Solution or root of the Quadratic equation*	A real number α is called the root or solution of the quadratic equation if $a\alpha^2 + b\alpha + c = 0$
4	zeroes of the polynomial p(x).	The root of the quadratic equation are called zeroes
5	Maximum roots of quadratic equations	We know from chapter two that a polynomial of degree can have max two zeroes. So a quadratic equation can have maximum two roots
6	Condition for real roots	A quadratic equation has real roots if $b^2 - 4ac > 0$

How to Solve Quadratic equation:

S.no	Method	Working
1	factorization	This method we factorize the equation by splitting the middle term b In $ax^2+bx+c=0$ Example $6x^2-x-2=0$ 1) First we need to multiple the coefficient a and c.In this case =6X-2=-12 2) Splitting the middle term so that multiplication is 12 and difference is the coefficient b $6x^2+3x-4x-2=0$ $3x(2x+1)-2(2x+1)=0$ $(3x-2)(2x+1)=0$ 3) Roots of the equation can be find equating the factors to zero $3x-2=0 \Rightarrow x=3/2$
		$2x+1=0 \Rightarrow x=-1/2$

2	Square method	In this method we create square on LHS and RHS and then find the value. $ax^2+bx+c=0$ 1) $x^2+(b/a)\,x+(c/a)=0$ 2) $(x+b/2a)^2-(b/2a)^2+(c/a)=0$ 3) $(x+b/2a)^2=(b^2-4ac)/4a^2$ 4) $x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$ Example $x^2+4x-5=0$ 1) $(x+2)^2-4-5=0$ 2) $(x+2)^2=9$ 3) Roots of the equation can be find using square root on both the sides $x+2=-3 \Rightarrow x=-5$ $x+2=3 \Rightarrow x=1$
3	Quadratic method	For quadratic equation $ax^2+bx+c=0$, roots are given by $x=\frac{-b+\sqrt{b^2-4ac}}{2a}$, $x=\frac{-b-\sqrt{b^2-4ac}}{2a}$
		For $b^2-4ac > 0$, Quadratic equation has two real roots of different value For $b^2-4ac=0$, quadratic equation has one real root For $b^2-4ac < 0$, no real roots for quadratic equation

Nature Of roots of Quadratic equation:

S.no	Condition	Nature of roots
1	$b^2 - 4ac > 0$	Two distinct real roots
2	$b^2 - 4ac = 0$	One real root
3	$b^2 - 4ac < 0$	No real roots