

CHAPTER – 4

QUADRATIC EQUATIONS

S.no	Terms	Descriptions
1	<u>Quadratic Polynomial</u>	$P(x) = ax^2 + bx + c$ where $a \neq 0$
2	<u>Quadratic equation</u>	$ax^2 + bx + c = 0$ where $a \neq 0$
3	<u>Solution or root of the Quadratic equation</u>	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 n can have max n 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	<p>This method we factorize the equation by splitting the middle term b</p> <p>In $ax^2+bx+c=0$</p> <p>Example</p> <p>$6x^2-x-2=0$</p> <p>1) First we need to multiple the coefficient a and c. In this case $=6 \times -2 = -12$</p> <p>2) Splitting the middle term so that multiplication is 12 and difference is the coefficient b</p> <p>$6x^2 + 3x - 4x - 2 = 0$</p> <p>$3x(2x+1) - 2(2x+1) = 0$</p> <p>$(3x-2)(2x+1) = 0$</p> <p>3) Roots of the equation can be find equating the factors to zero</p> <p>$3x-2=0 \Rightarrow x=2/3$</p> <p>$2x+1=0 \Rightarrow x=-1/2$</p>

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

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