UDAAN

2025

Quadratic Equation

Mathematics | Lecture - 01

By – Ritik Sir

Topics *to be covered*

1. What is quadratic a equation
2. Roots of a quadratic equation
3. Methods of solving quadratic equation
   - Factorization method
   - Completing the square method
   - Quadratic formula

Overall padhai kaisan ba?

A) towards → 95% (48%)

B) towards → (80-90)% (22%)

C) towards → (70-80)% (15%)

D) Pichle saal sey behtar Karna hai (14%)

Khazana

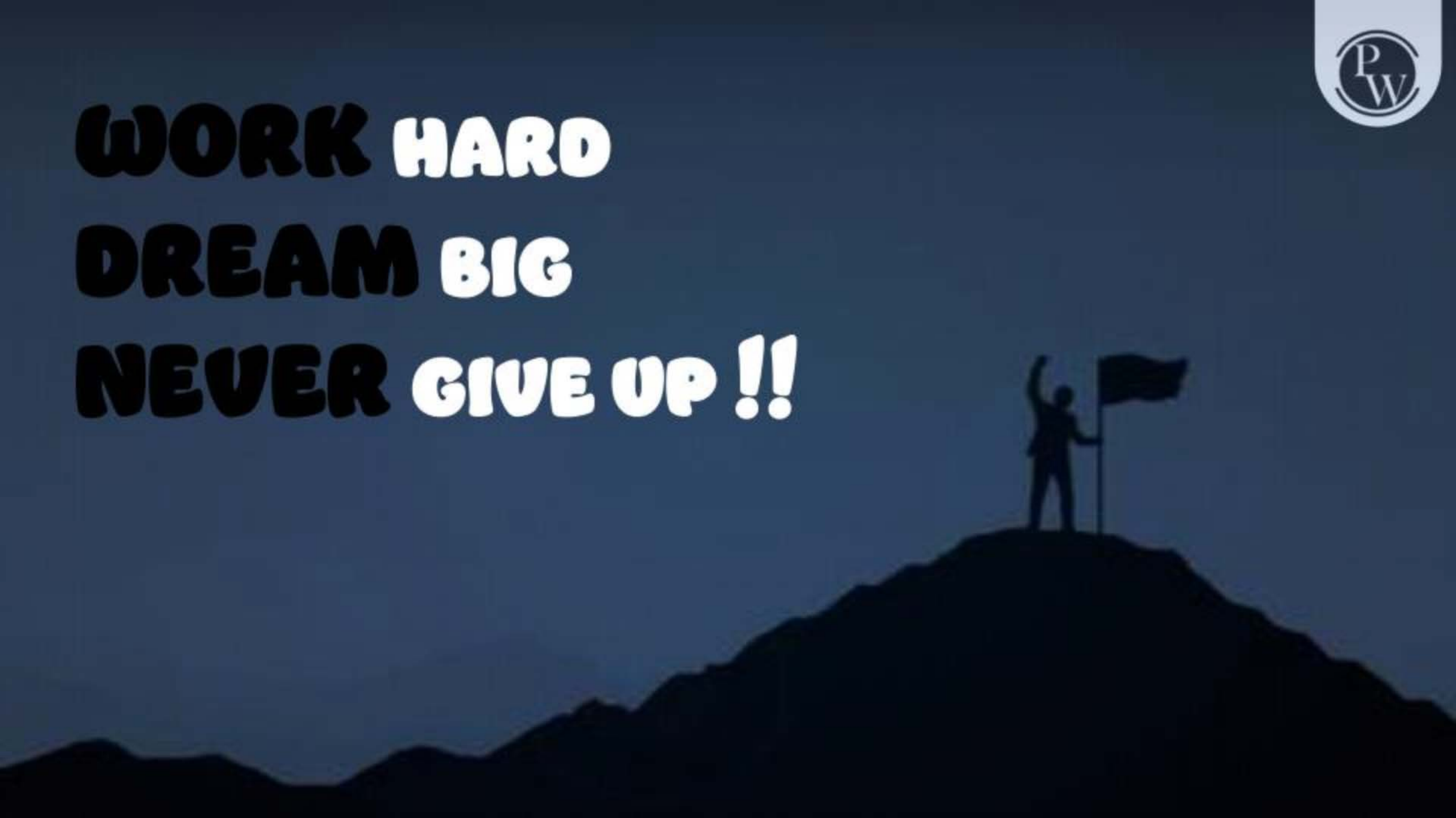
Resources kyo use Karo aap ho?

A) Lectures + NCERT 46%

B) " + NCERT + koi book.

C) " + NCERT + Question Bank.

D) NOTA


WORK HARD
DREAM BIG
NEVER GIVE UP !!

Topic: Quadratic Equation

If p(x) is a quadratic polynomial, then p(x) = 0 is called a quadratic equation.

The general form a quadratic equation is $ax^2 + bx + c = 0$, where a, b, c ∈ R and $a \neq 0$.

$P(x) = 3x^2 + 5x - 2$ → Degree = 2

$3x^2 - 5x - 2 = 0$ → Quadratic equation.

$ax^2 + bx + c = 0$

$a \neq 0$

$a, b, c \in R$

$ax^2+bx+c=0$

$a \neq 0$
$a, b, c \in R$

Q. $-2x^2-5x=-4$ → $-2x^2-5x+4=0$

$a=-2$
$b=-5$
$c=4$

Q. $5x^2+4x-9=0$

$a=5$
$b=4$
$c=-9$

Q. $2x^2=5x-4x+3$

$2x^2-1x-3=0$

$a=2$
$b=-1$
$c=-3$

Topic : Quadratic Equation

#Q. Which of the following are quadratic equation?

(i) $x^2 - 6x + 4 = 0$

(ii) $2x^2 - 7x = 0$

$ax^2+bx+c=0$

is Form main likh pao agar hain.

$2x^2-7x+0=0$

$a=2$

$b=-7$

$c=0$

Topic : Quadratic Equation

#Q. Which of the following are quadratic equation?

(iii) $x + \frac{3}{x} = x^2$

$\frac{x}{1} + \frac{3}{x} = x^2$

$\frac{x^2+3}{x} = x^2$

$x^2 + 3 = x^3$

$-x^3 + x^2 + 3 = 0$ ✗

(iv) $x^2 + \frac{1}{x^2} = 2$

$\frac{x^2}{1} + \frac{1}{x^2} = 2$

$\frac{x^4+1}{x^2} = 2$

$x^4 + 1 = 2x^2$

$x^4 - 2x^2 + 1 = 0$

d = 4

Quadratic eqn

Biquadratic equation.

Topic : Quadratic Equation

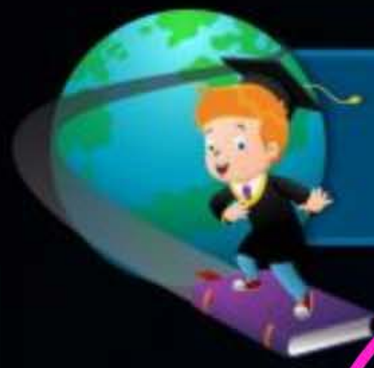
#Q. Which of the following are quadratic equation?

(v) $x^2 + 2\sqrt{x} - 3 = 0$

$ax^2+bx+c=0$

(vi) $3x^2 - 4x + 2 = 2x^2 - 2x + 4$

$1x^2-2x-2=0$



Topic : Roots of Quadratic Equation

$P(x) = ax^2 + bx + c = 0$

Quadratic polynomial.

no. of zeroes = 'Maximum 2'

Quadratic equation

Exactly two Roots

$x^2 - 4 = 0$

$x^2 = 4$

$x = \pm\sqrt{4}$

$x = \pm 2$

Roots

Variable ki value

eqn Satisfy

L.H.S = R.H.S

Topic : Solution of a Quadratic Equation

#Q. In each of the following determine whether the given values are solution of the given equation or not:

(i) $3x^2 - 2x - 1 = 0, x = 1$

$3x^2 - 2x - 1 = 0$

$x = 1$

$3(1)^2 - 2(1) - 1 = 0$

$3 - 2 - 1 = 0$

$3 - 3 = 0$

$0 = 0$

L.H.S. = R.H.S

Topic : Solution of a Quadratic Equation

#Q. In each of the following determine whether the given values are solution of the given equation or not:

(ii) $x^2 + \sqrt{2}x - 4 = 0; x = \sqrt{2}, x = -2\sqrt{2}$

$x^2 + \sqrt{2}x - 4 = 0$

$x = \sqrt{2}$

$(\sqrt{2})^2 + \sqrt{2}(\sqrt{2}) - 4 = 0$

$2 + 2 - 4 = 0$

$4 - 4 = 0$

$0 = 0$

$x^2 + \sqrt{2}x - 4 = 0$

$x = -2\sqrt{2}$

$(-2\sqrt{2})^2 + \sqrt{2}(-2\sqrt{2}) - 4 = 0$

$8 - 4 - 4 = 0$

$8 - 8 = 0$

$0 = 0$

Topic : Solution of a Quadratic Equation

#Q. In each of the following, determine the value of k for which the given value is a solution of the equation

(i) $kx^2 + 2x - 3 = 0, x = 2$

$k(2)^2+2(2)-3=0$

$4k+4-3=0$

$4k+1=0$

$4k=-1$

$k=-1/4$

(ii) $x^2 + 2ax - k = 0, x = -a$

$x^2+2ax-k=0$

$(-a)^2+2a(-a)-k=0$

$a^2-2a^2-k=0$

$-a^2-k=0$

$-a^2=k$

Topic : Solution of a Quadratic Equation

#Q. If $x = 2$ and $x = 3$ are roots of the equation $3x^2 - 2kx + 2m = 0$, find the value of k and m.

$3x^2-2kx+2m=0$

$x=2$

$3(2)^2-2k(2)+2m=0$

$12-4k+2m=0$

$-4k+2m=-12$ ①

$3x^2-2kx+2m=0$

$x=3$

$3(3)^2-2k(3)+2m=0$

$27-6k+2m=0$

$-6k+2m=-27$ ②

$-4k+2m=-12$

$-6k+3m=-27$

$(-)\ (+)\ (-)\ (+)$

$2k=15$

$k=\frac{15}{2}$

$-4k+2m=-12$

$-2\cancel{4}\left(\frac{15}{\cancel{2}}\right)+2m=-12$

$-30+2m=-12$

$2m=-12+30$

$2m=18$

$m=9$

4. The coefficient of x^0 in the quadratic equation $x(x-1)-5=0$ is: (Cr)

(a) 5 (b) –5 (c) 1 (d) 1/2

Constant term

Question Term

$x(x-1)-5=0$

$x^2-x-5x^0=0$

Topic : Factorisation Method

#Q. Solve the following quadratic equations by factorization:

(i) $x^2 + 6x + 5 = 0$ (ii) $8x^2 - 22x - 21 = 0$

$x^2 + 6x + 5 = 0$

Product = 5
Sum = 6

5, 1

5	5
1	1

$x^2 + 5x + 1x + 5 = 0$

$x(x+5) + 1(x+5) = 0$

$(x+5)(x+1) = 0$

$x + 5 = 0$

$\Rightarrow x = -5$

$x + 1 = 0$

$x = -1$

Q. $8x^2 - 22x - 21 = 0$

$P = (-21)(8) = \boxed{-168}$

$S = \boxed{-22}$

$-28, 6$

$8x^2 - 22x - 21 = 0$

$8x^2 - 28x + 6x - 21 = 0$

$4x[2x-7] + 3[2x-7] = 0$

$(2x-7)(4x+3) = 0$

$2x - 7 = 0$

$\Rightarrow x = \frac{7}{2}$

$4x + 3 = 0$

$\Rightarrow x = -\frac{3}{4}$

2	168
2	84
2	42
3	21
7	7
	1

Topic : Factorisation Method

#Q. Solve the following quadratic equations by factorization:

(i) $x^2 + 2\sqrt{2}x - 6 = 0$

$P = -6$

$S = 2\sqrt{2}$

$3\sqrt{2}, -\sqrt{2}$

$x^2 + 3\sqrt{2}x - \sqrt{2}x - 6 = 0$

$x(x + 3\sqrt{2}) - \sqrt{2}(x + 3\sqrt{2}) = 0$

$(x + 3\sqrt{2})(x - \sqrt{2}) = 0$

$x = -3\sqrt{2}$

$x = \sqrt{2}$

Topic : Middle Term Splitting

#Q. Factorise :

(i) $x^2 + 5\sqrt{3}x + 12$

$P = 12$, $S = 5\sqrt{3}$ → $4\sqrt{3}, \sqrt{3}$

$x^2 + 5\sqrt{3}x + 12 = 0$

$x^2 + 4\sqrt{3}x + \sqrt{3}x + 12 = 0$

$x(x + 4\sqrt{3}) + \sqrt{3}(x + 4\sqrt{3}) = 0$

$(x + 4\sqrt{3})(x + \sqrt{3}) = 0$

$x = -4\sqrt{3}, \; x = -\sqrt{3}$

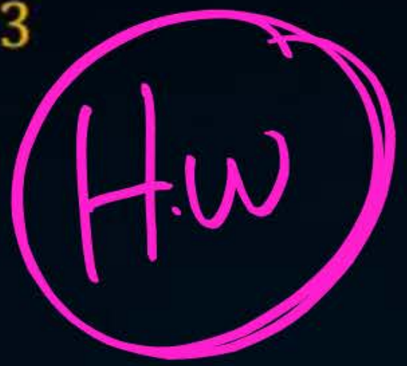
(ii) $x^2 + 3\sqrt{3}x - 30$

$P = -30$, $S = 3\sqrt{3}$ → $5\sqrt{3}, -2\sqrt{3}$

H.W

Topic : Factorisation using middle term splitting

#Q. Factorise: $4\sqrt{3}x^2 + 5x - 2\sqrt{3}$



Homework

DPP-02

THANK YOU