



UDAAN



2026

Quadratic Equations

MATHS

LECTURE-4

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Topics *to be covered*

A

More Questions on factorization method

B

Quadratic Formula

#Q. Solve the following quadratic equations by factorization method:

$$4x^2 - 2(a^2 + b^2)x + a^2b^2 = 0$$

$$4x^2 - 2a^2x - 2b^2x + a^2b^2 = 0$$

$$2x[2x-a^2] - b^2[2x-a^2] = 0$$

$$(2x-a^2)(2x-b^2) = 0$$

$$2x-a^2=0, 2x-b^2=0$$

$$2x=a^2$$

$$x=a^2/2$$

$$2x=b^2$$

$$x=b^2/2$$

#Q. Solve the following quadratic equations by factorization method :

$$a^2b^2x^2 + b^2x - a^2x - 1 = 0$$

$$b^2x[a^2x+1] - 1[a^2x+1] = 0$$

$$(a^2x+1)(b^2x-1) = 0$$

$$x = -1/a^2, 1/b^2$$

#Q. Solve the following quadratic equations by factorization method :

$$\frac{1}{a+b+x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}, a+b \neq 0$$

$$\frac{1}{a+b+x} - \frac{1}{x} = \frac{1}{a} + \frac{1}{b}$$

$$\frac{x - (a+b+x)}{(a+b+x)x} = \frac{b+a}{ab}$$

$$\frac{x - a - b - x}{ax + bx + x^2} = \frac{a+b}{ab}$$

$$\frac{-a-b}{ax+bx+x^2} = \frac{a+b}{ab}$$

$$\frac{-\cancel{(a+b)}}{ax+bx+x^2} = \frac{\cancel{a+b}}{ab}$$

$$\frac{-1}{ax+bx+x^2} = \frac{1}{ab}$$

$$-ab = ax + bx + x^2$$

$$0 = x^2 + ax + bx + ab$$

$$\underline{x^2 + ax + bx + ab} = 0$$

$$x(x+a) + b(x+a) = 0$$

$$(x+a)(x+b) = 0$$

$$x = -a, \quad x = -b$$

#Q.

$$\frac{1}{2a + b + 2x} = \frac{1}{2a} + \frac{1}{b} - \frac{1}{2x}$$

#Gph**A**

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

B

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

C

$$a, \frac{b}{2}$$

D

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

#Q. Solve :



$$x = \frac{1}{2 - \frac{1}{2 - \frac{1}{2 - x}}}, x \neq 2$$

$$\frac{2-1}{1} \frac{1}{2-x}$$

$$\frac{2(2x)-1}{2-x} = \frac{4-2x-1}{2-x} = \frac{3-2x}{2-x}$$

$$x = \frac{1}{2 - \frac{1}{\frac{3-2x}{2-x}}} \quad \begin{array}{l} \text{+} \\ \text{---} \\ \text{3-2x} \end{array}$$

$$x = \frac{1}{\frac{2-(2-x)}{3-2x}}$$

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

$$x = \frac{3-2x}{6-4x-2+x}$$

$$x = \frac{3-2x}{4-3x}$$

$$x(4-3x) = 3-2x$$

$$4x-3x^2 = 3-2x$$

$$-3x^2 + 6x - 3 = 0$$

$$-3[x^2 - 2x + 1] = 0$$

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

~~HOT~~



#Q. Solve the following quadratic equations by factorization method:

$$\sqrt{2 + \sqrt{2 + \sqrt{2 + \dots}}} = x$$

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

Sum = -1, Product = 2

$$-2, 1$$

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

$$0 = x(x-2) + 1(x-2)$$

$$0 = (x-2)(x+1)$$

$$x = 2, -1$$

A 1, 2

~~B~~ 2

C -1, -2

D None of the above

$$\sqrt{2+x} = x$$

S.B.S

$$(\sqrt{2+x})^2 = x^2$$

$$\sqrt{y^2 - 4} = 2$$

$$\begin{aligned} & 2^2 - 4 \\ & \cancel{-2^2 + 4} \end{aligned}$$

$$\begin{aligned} & \text{A large circle with a smaller circle inside it.} \\ & = \text{hole} \end{aligned}$$



Solution of a Quadratic Equation by Quadratic Formula

Shreedharacharya's

$$ax^2 + bx + c = 0$$

$a \neq 0$
 $a, b, c \in \mathbb{R}$

$$x = \frac{-b \pm \sqrt{D}}{2a}$$

$$D = b^2 - 4ac$$

Discriminant

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

Nature of roots

$$D > 0$$

$$(D = +ve)$$

Real & distinct

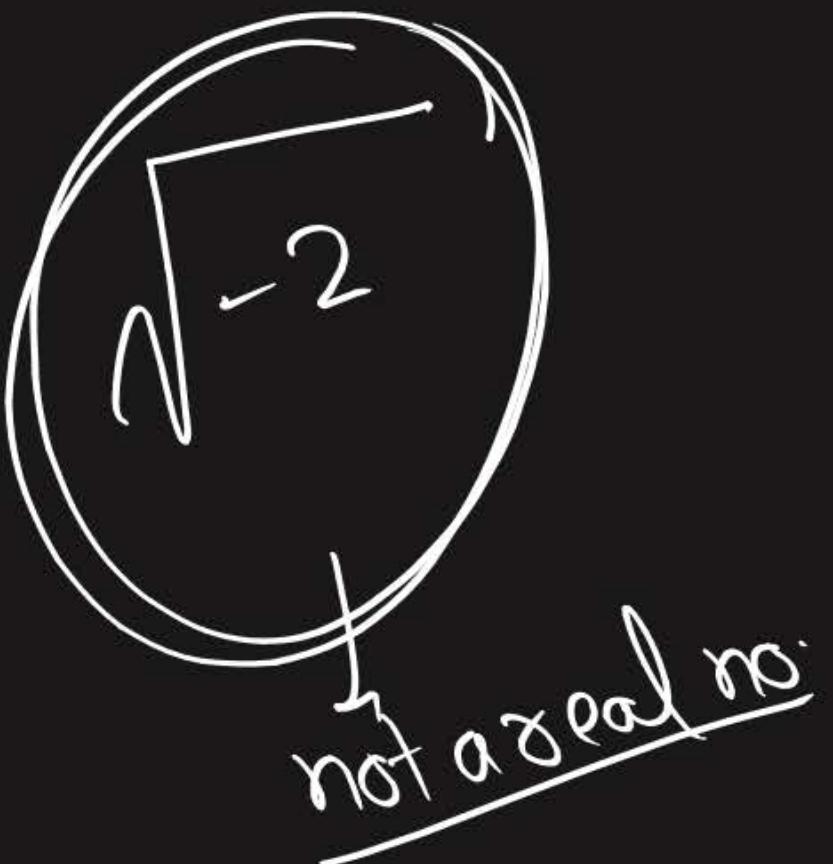
$$D = 0$$

Real & equal.

$$D < 0$$

$$(D = -ve)$$

no real roots.



#Q. Determine the nature of the roots of the following quadratic equations:

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

CBSE 2023

$$ax^2 + bx + c = 0$$

$$a=1, b=-4, c=4$$

$$D = b^2 - 4ac$$

$$=(-4)^2 - 4(1)(4)$$

$$= 16 - 16$$

$$D = 0$$

N = Real and equal.

#Q. Determine the nature of the roots of the following quadratic equations:

(ii)
$$x^2 + x + 1 = 0$$

$$a=1, b=1, c=1$$

$$D = b^2 - 4ac$$

$$= (1)^2 - 4(1)(1)$$

$$= 1 - 4$$

$$D = -3$$

N= No real roots / imaginary roots.

CBSE 2023

#Q. Determine the nature of the roots of the following quadratic equations:

CBSE 2023

(iii) $4x^2 - 5 = 0$

$$a=4, b=0, c=-5$$

$$D = b^2 - 4ac$$

$$D = (0)^2 - 4(4)(-5)$$

$$= 0 + 80$$

$$D = 80$$

Real & distinct

#Q. Write the discriminant of the following quadratic equation:

CBSE 2019

$$(x + 5)^2 = 2(5x - 3)$$

$$x^2 + 25 + 10x = 10x - 6$$

$$x^2 + 21 = 0$$

$$D = b^2 - 4ac$$

$$= (0^2 - 4(1)(21))$$

$$= 0 - 124$$

$$D = -124$$

#Q. Solve for x:

$$\frac{1}{x-3} - \frac{1}{x+5} = \frac{1}{6}, \quad x \neq 3, -5$$

$$\frac{1(x+5) - 1(x-3)}{(x-3)(x+5)} = \frac{1}{6}$$

$$\frac{x+5 - x+3}{x^2 + 5x - 3x - 15} = \frac{1}{6}$$

$$\frac{8}{x^2 + 2x - 15} = \frac{1}{6}$$

$$48 = x^2 + 2x - 15$$

$$0 = x^2 + 2x - 63$$

CBSE 2016

$$a=1, b=2, c=-63$$

$$D = b^2 - 4ac$$

$$D = (2)^2 - 4(1)(-63)$$

$$D = 4 + 252$$

$$D = 256$$

$$x = \frac{-b \pm \sqrt{D}}{2a}$$

$$x = \frac{-2 \pm \sqrt{256}}{2(1)}$$

$$x = \frac{-2 \pm 16}{2}$$

$$x = \frac{-2+16}{2}, \frac{-2-16}{2}$$

$$x = \frac{14}{2}, -\frac{18}{2}$$

$$x = 7, -9$$

$$\begin{aligned} & \sqrt{2 \times 2 \times 2 \times 2 \times 2 \times 2} \\ &= 2 \times 2 \times 2 \times 2 \\ &= 16 \end{aligned}$$

$$\begin{array}{r} 2 | 256 \\ 2 | 128 \\ 2 | 64 \\ 2 | 32 \\ 2 | 16 \\ 2 | 8 \\ 2 | 4 \\ 2 | 2 \\ 2 | 1 \end{array}$$

#Q. In the following, determine whether the given quadratic equations have real roots and if so, find the roots:

$$\sqrt{2}x^2 + 7x + 5\sqrt{2} = 0$$

$$a = \sqrt{2}, b = 7, c = 5\sqrt{2}$$

$$D = b^2 - 4ac$$

$$= (7)^2 - 4(\sqrt{2})(5\sqrt{2})$$

$$= 49 - 40$$

$$D = 9$$

Nature of roots = **Real and distinct**

$$x = \frac{-b \pm \sqrt{D}}{2a}$$

$$x = \frac{-7 \pm \sqrt{9}}{2(\sqrt{2})}$$

$$x = \frac{-2}{\sqrt{2}}, \frac{-5}{\sqrt{2}}$$

$$x = \frac{-7 \pm 3}{2\sqrt{2}}$$

$$x = \frac{-7+3}{2\sqrt{2}}, \frac{-7-3}{2\sqrt{2}}$$

$$x = \frac{-2\sqrt{2}}{\sqrt{2}}, \frac{-5\sqrt{2}}{\sqrt{2}}$$

$$x = \frac{-2\sqrt{2}}{2}, \frac{-5\sqrt{2}}{2}$$

$$x = -\sqrt{2}, -\frac{5\sqrt{2}}{2}$$

$$x = \frac{-4}{2\sqrt{2}}, \frac{-10}{2\sqrt{2}}$$

CBSE 2013

#Q. Solve for x:

#Gph

CBSE 2014

$$\frac{16}{x} - 1 = \frac{15}{x+1}, x \neq 0, -1$$

$$x = \frac{-b \pm \sqrt{D}}{2a}$$

$$\sqrt{9}$$

$$(3)^2 = 9$$

$$\sqrt{9} = 3$$

$\sqrt{+}$ Real.

$\sqrt{0}$ Real.

$\sqrt{-1}$ not real.

class 11^m

matlab

$$\sqrt{-9} = -3$$

i iota $\sqrt{-1}$

#Q. Using quadratic formula, solve the $abx^2 + (b^2 - ac)x - bc = 0$ equation for x.

$$abx^2 + (b^2 - ac)x - bc = 0$$

$$\begin{aligned}a &= ab \\b &= b^2 - ac \\c &= -bc\end{aligned}$$

$$D = b^2 - 4ac$$

$$D = (b^2 - ac)^2 - 4(ab)(-bc)$$

$$D = (b^2)^2 + (ac)^2 - 2b^2ac + 4b^2ac$$

CBSE 2005

$$D = (b^2)^2 + (ac)^2 + 2b^2ac$$

$$D = (b^2 + ac)^2$$

$$x = \frac{-b \pm \sqrt{D}}{2a}$$

$$x = \frac{-(b^2 + ac) \pm \sqrt{(b^2 + ac)^2}}{2(ab)}$$

Ans: $\frac{-b}{a}, -\frac{b}{a}$

$$x = \frac{-b^2 + ac \pm (b^2 + ac)}{2ab}$$

$$x = \frac{-b^2 + ac + (b^2 + ac)}{2ab}, \frac{-b^2 + ac - (b^2 + ac)}{2ab}$$

$$x = \frac{-b^2 + ac}{2ab}, \frac{-b^2}{2ab}$$

#Q. Using quadratic formula solve the following quadratic equations :

$$p^2x^2 + (p^2 - q^2)x - q^2 = 0$$

CBSE 2004

~~#60~~



CLASS 10 (2025-26)



MATHEMATICS MADE EASY

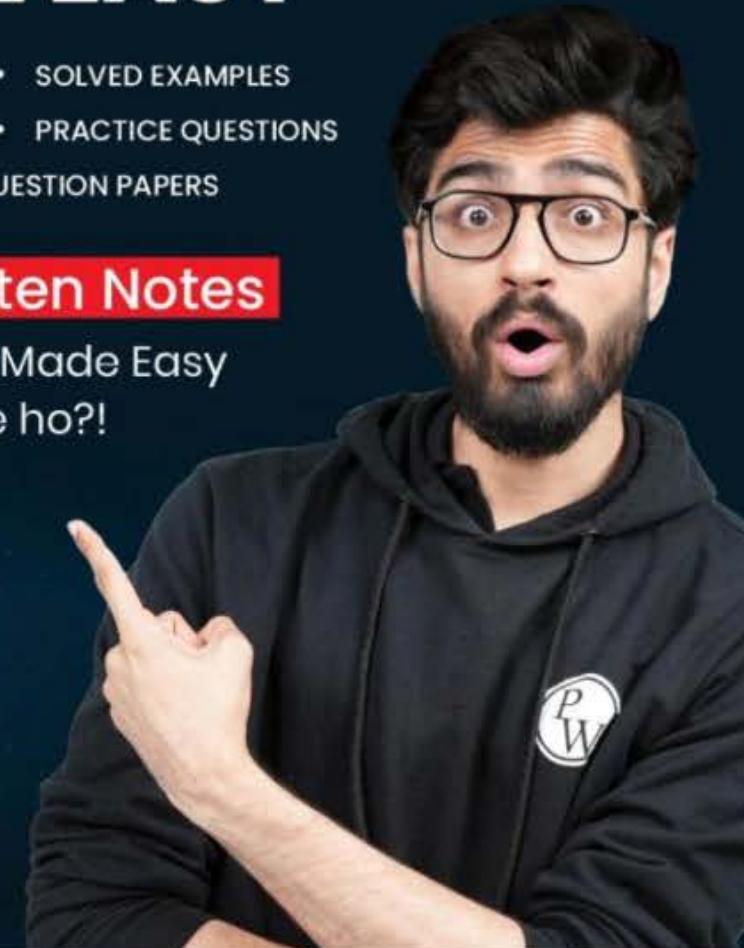
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Samajh rahe ho?!



Ritik Mishra



2026
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Chapter-wise & Topic-wise
with 50% Competency Questions

CLASS 10

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