UDAAN

2026

Quadratic Equations

MATHS LECTURE-9

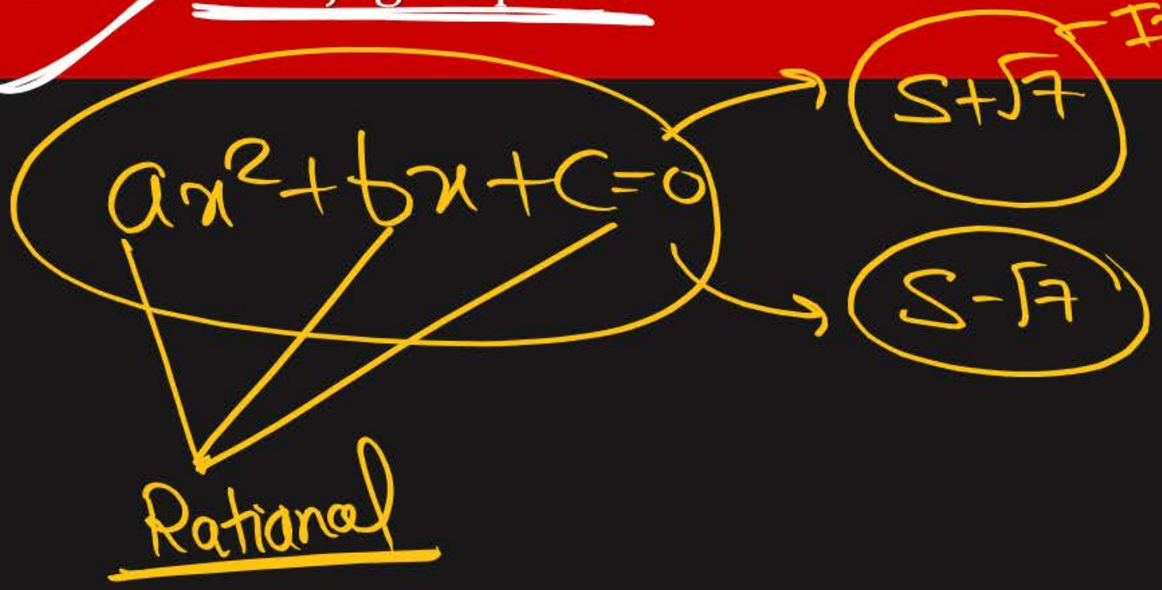
BY-RITIK SIR

Topics *to be covered*

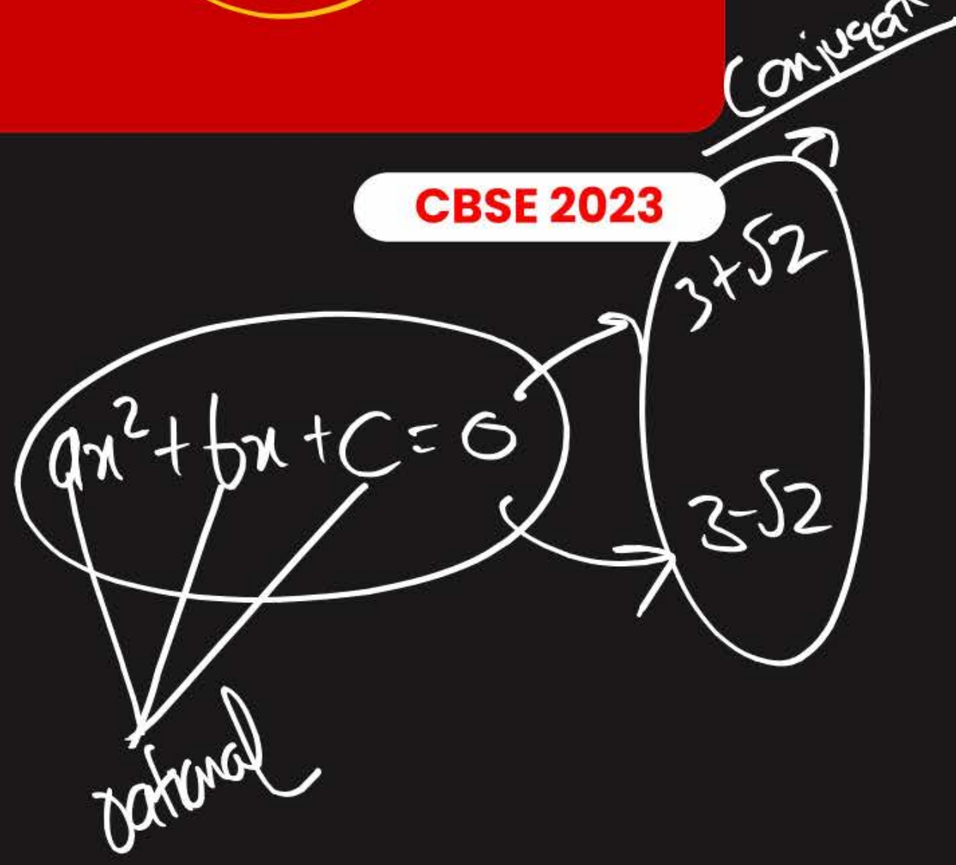
A Word Problems Part 4

#Q. Statement-1 : If $5 + \sqrt{7}$ is a root of a quadratic equation with rational coefficients, then its other root is $5 - \sqrt{7}$.

Statement-2 : surd roots of a quadratic equation with rational coefficients occur in conjugate pairs.



CBSE 2023



#Q. The least positive value of k, for which the quadratic equation $2x^2 + kx - 4 = 0$, has rational roots, is:

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

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

$D = b^2 - 4ac$

$D = k^2 - 4(2)(-4)$

$D = k^2 + 32$

$k = 2$

A $\pm 2\sqrt{2}$

B 2

C ± 2

D $\sqrt{2}$

#Q. Write whether the following statements are true or false. Justify your answers.

(i) If the coefficient of x^2 and the constant term of a quadratic equation has opposite signs, then the quadratic equation has real roots.

True

$ax^2+bx+c=0$

a c → opposite sign

$D=b^2-4ac$

#Q. Write whether the following statements are true or false. Justify your answers.

True

(ii) If the coefficient of x^2 and the constant term have the same sign and if the coefficient of x term is zero, then the quadratic equation has no real roots.

$ax^2+bx+c=0$

a, c → same sign

$b=0$

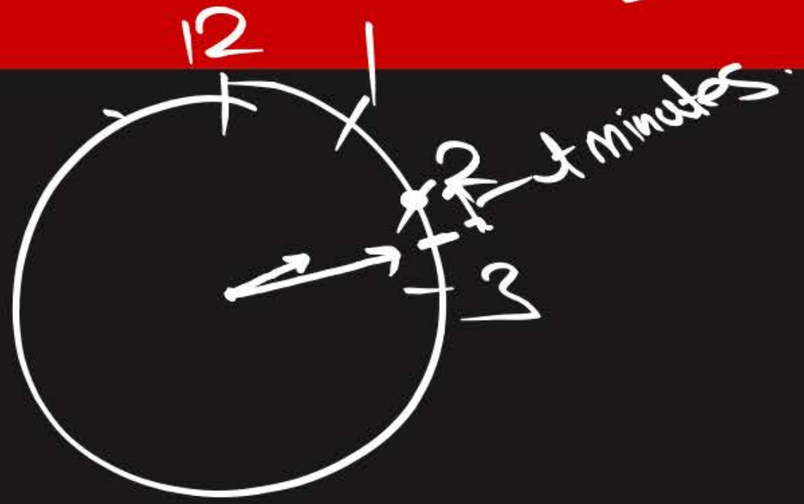
$D=b^2-4ac$

$=0-4ac$

$D=-4ac$

$D=-ve$

#Q. At t minutes past 2 pm the time needed by the minutes hand and a clock to show 3 pm was found to be 3 minutes less than $t^2/4$ minutes. Find t.



$$60 - t = \frac{t^2}{4} - 3$$

NCERT EXAMPLER

Ans. 14 minutes

#Q. In a class test, the sum of Shefali's marks in Mathematics and English is 30. Had she got 2 marks more in Mathematics and 3 marks less in English, the product of her marks would have been 210. Find her marks in two subjects.

CBSE 2008, 14, 19

C.I

M → x

E → y

$x+y=30$

C.II

M → $x+2$

E → $y-3$

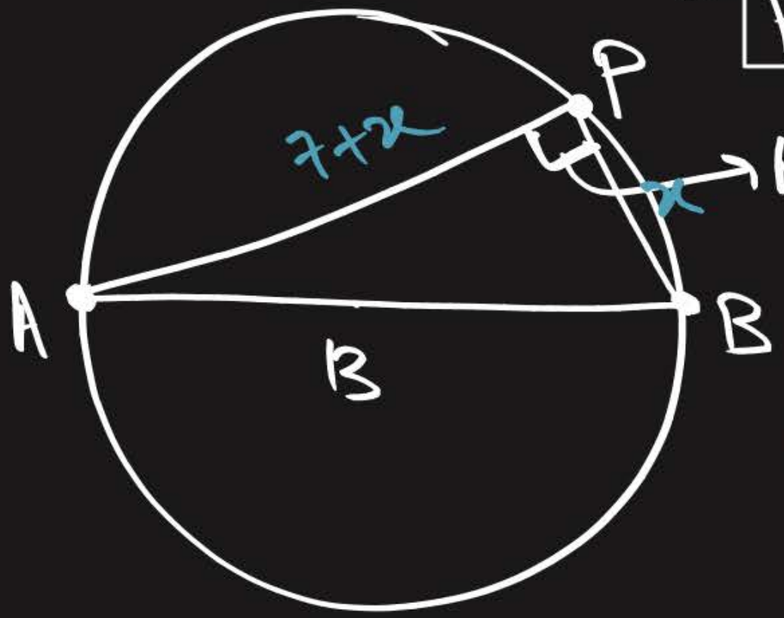
$(x+2)(y-3)=210$

Ans. M=12, E=18
or M=13, E=17

#Q. A pole has to be erected at a point on the boundary of a circular park of diameter 13 metres in such a way that the difference of its distances from two diametrically opposite fixed gates A and B on the boundary is 7 metres. Is it the possible to do so? If yes, at what distances from the two gates should the pole be erected?

Nature of Roots

CBSE 2016



Let's

$PA - PB = 7$

$PB - PA = 7$

Angle in the semi-circle $= 90^\circ$

$\therefore \angle APB = 90^\circ$

$PA = 7 + PB$

$PA = 7 + x$

$(13)^2 = (x)^2 + (7+x)^2$

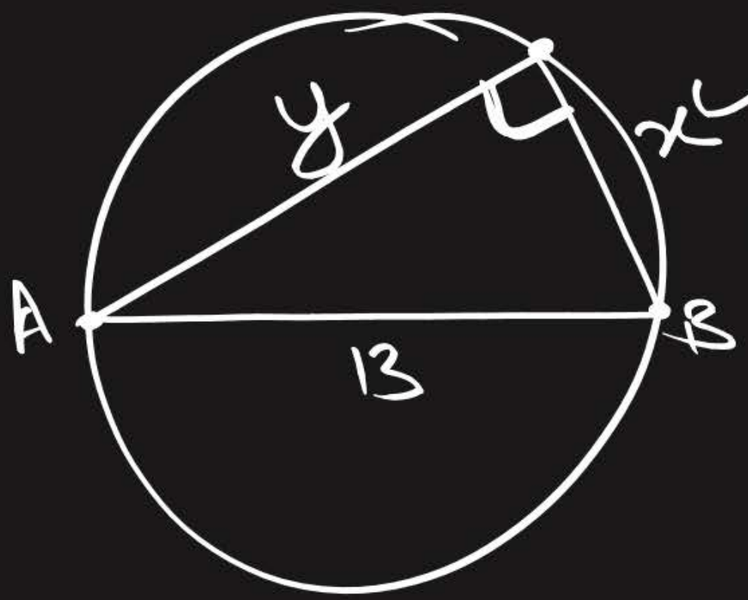
Ans. 5 m from gate B

M.II

Ques

$y - x = 7$

$x - y = 7$



$y^2 + x^2 = 13^2$

$y = 7 + x$

$y = 7 + 5$

$y = 12$

$(7+x)^2 + x^2 = 13^2$

$49 + x^2 + 14x + x^2 = 169$

$2x^2 + 14x - 120 = 0$

$x^2 + 7x - 60 = 0$

$12, -5$

$x = -12$

$x = 5$

Total = no. of things × cost of one thing

#Q. A cottage industry produces a certain number of pottery articles in a day. It was observed on a particular day that the cost of production of each article (in rupees) was 3 more than twice the number of articles produced on that day. If the total cost of production on that day was 90, find the number of articles produced and the cost of each article.

Cost of production of each article = $3+2x$

no. of articles produced = x

Total = Cost of each × no. of articles.

$$90 = (3+2x)(x)$$

M.II

NCERT

Cost of each = y

no. of articles = x

Total = yx

$90 = xy$ ... (1)

$y = 3+2x$ ... (2)

Ans. 6, 15 Rupees

#101

#Q. Seven years ago Varun's age was five times the square of Swati's age. Three years hence Swati's age will be two fifth of Varun's age. Find their present ages.

CBSE 2006

	Past	Present	Future
Varun	$x-7$	x	$x+3$
Swati	$y-7$	y	$y+3$

$$x-7 = 5(y-7)^2 \quad \text{①}$$

$$y+3 = \frac{2}{5}(x+3) \quad \text{②}$$

$$5y+15 = 2x+6$$

$$5y+9 = 2x$$

$$\frac{5y+9}{2} = x$$

$$x-7 = 5(y^2+49-14y)$$

$$x-7 = 5y^2+245-70y$$

$$\frac{5y+9}{2} - 7 = 5y^2+245-70y$$

$$\frac{5y+9-14}{2} = 5y^2+245-70y$$

$$5y-5 = 10y^2+490-140y$$

$$10y^2-145y+495=0$$

$$2y^2-29y+99=0$$

Ans. 9 years, 27 years

#Q. Is the following situation possible? If so, determine their present ages.

The sum of the ages of two friends is 20 years. Four years ago, the product of their ages in years was 48.

NCERT

	Past	Pr.	Fut.
A	$x-4$	x	
B	$y-4$	y	

$x+y=20$ ①

$(x-4)(y-4)=48$ ②

Ans. No

#Q. A girl is twice as old as her sister. Four years hence, the product of their ages (in years) will be 160. Find their present ages.

CBSE 2010

$x = 2y$ ... (1)

$(x+4)(y+4) = 160$ ... (2)

	Pr.	Pr.	Fu.
girl		x	$x+4$
Sister		y	$y+4$

Ans. 6 years, 12 years

#Q. The sum of the reciprocals of Rehman's ages (in years) 3 years ago and 5 years from now is 1/3. Find his present age.

NCERT

	Past	Pr	Fut
Reh man.	$x-3$	x	$x+5$

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

Ans. 7 years

#Q. If Zeba were younger by 5 years than what she really is, then the square of her age (in years) would have been 11 more than 5 times her actual age. What is her age now?

$$(x-5)^2 = 11 + 5(x)$$

	Past	Pr	Fut
Zeba	$x-5$	x	

$$x^2 + 25 - 10x = 11 + 5x$$

$$x^2 - 15x + 14 = 0$$

$-14, -1$

$x = 14, 1$ — 1 is not possible.

Ans. 14 years

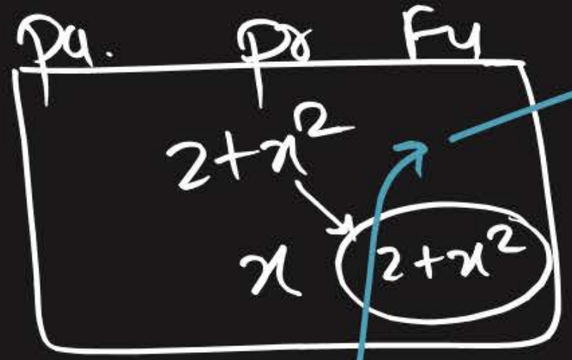
#Q. A peacock is sitting on the top of a pillar, which is 9 m high. From a point 27 m away from the bottom of the pillar, a snake is coming to its hole at the base of the pillar. Seeing the snake the peacock pounces on it. If their speeds are equal, at what distance from the whole is the snake caught?

#GPT

#Chat gpt

#google

#Anushka's doubt



$(2+x^2)+(2+x^2-x)$

x main kya odd karein ki $2+x^2$ aajaye!?

$x + ? = 2+x^2$

$? = 2+x^2-x$

eqn

Asha's age
$= 10x-1$

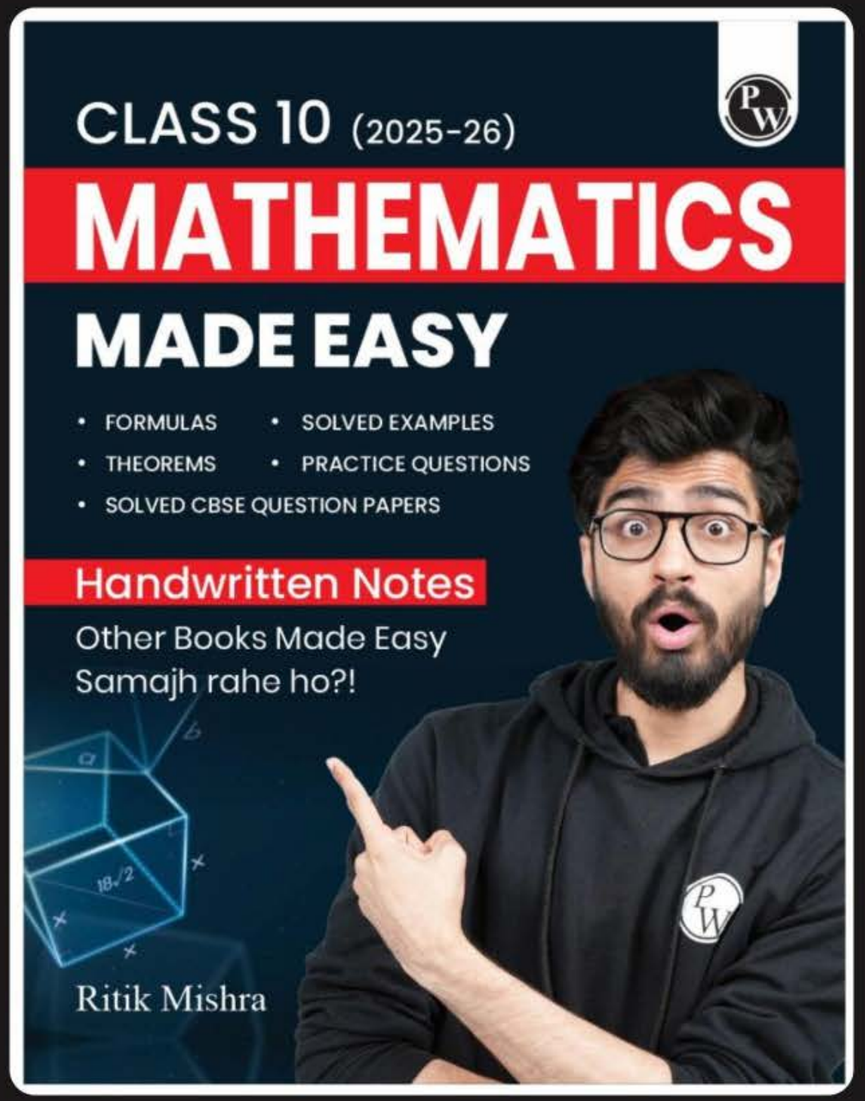
$2+x^2+2+x^2-x$
$= 10x-1$

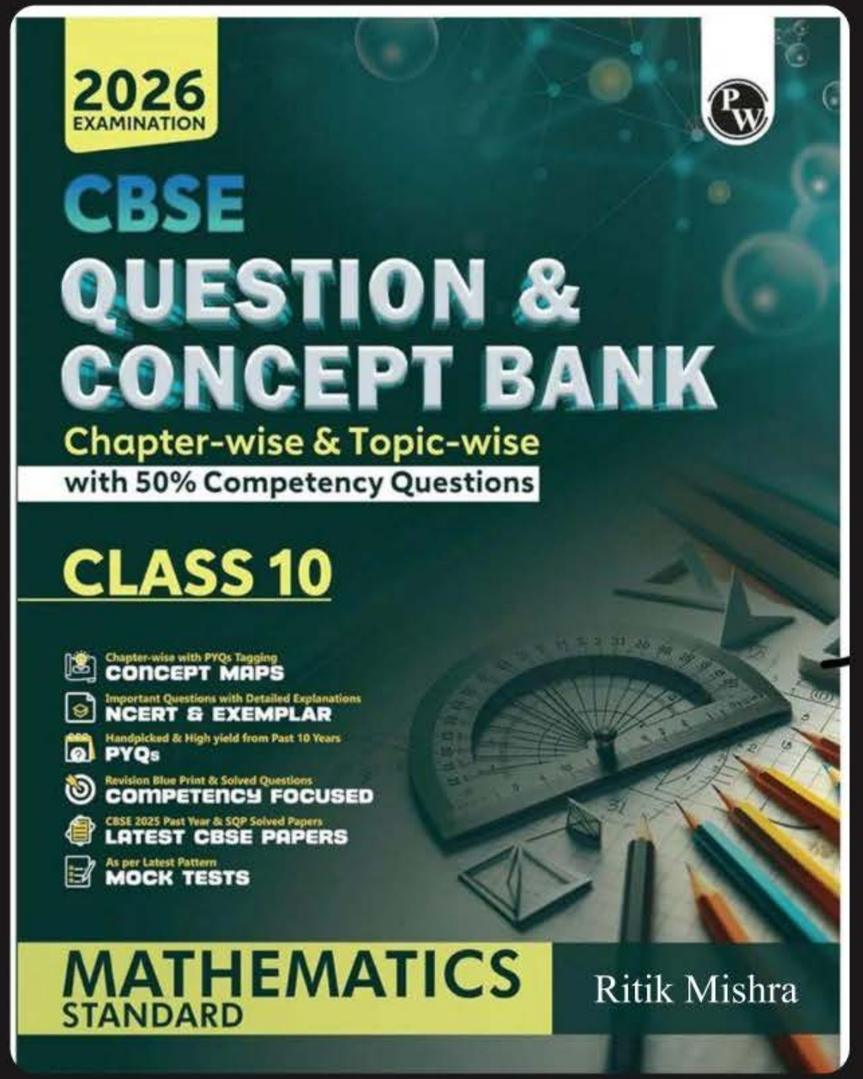
Solve

Ans: $N=5, A=27$

Notes + DPPs

100%





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