UDAAN

2026

POLYNOMIALS

MATHS LECTURE-4

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Topics *to be covered*

A Questions on Relation between Zeroes and Coefficients of Quadratic Polynomial

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#Q. Find the zeroes of following quadratic polynomial.

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

Sum $= 2\sqrt{2}$

Product $= -6$

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

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

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

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

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

$x = -3\sqrt{2}$ $\quad$ $x = \sqrt{2}$

#HOT

#Q. Zeroes?

(i) $\sqrt{3}x^2 - 2\sqrt{2}x - 2\sqrt{3}$ (2014)

$S = -2\sqrt{2}$, $P = (2\sqrt{3})(\sqrt{3})$

$= -6$

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

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

$\sqrt{3}x\left[\frac{\sqrt{3}x^2}{\sqrt{3}x} - \frac{3\sqrt{2}x}{\sqrt{3}x}\right] + \sqrt{2}\left[\frac{\sqrt{3}x}{\sqrt{2}} - \frac{2\sqrt{3}}{\sqrt{2}}\right] = 0$

$\sqrt{3}x\left[x - \sqrt{6}\right] + \sqrt{2}\left[x - \sqrt{6}\right] = 0$

(ii) $3x^2 - 2\sqrt{6}x + 2$ (2012, 10) → #Graph

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

$x = \sqrt{6}$ $\quad x = -\frac{\sqrt{2}}{\sqrt{3}}$

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

Sum $= -2\sqrt{6}$, product $= 6$

$-\sqrt{6}, -\sqrt{6}$

#Gp4

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

#Gpu

#Q. If one zero of the quadratic polynomial $kx^2 + 3x + k$ is 2, then the value of k is

A $\frac{5}{6}$

B $-\frac{5}{6}$

C $\frac{6}{5}$

D $-\frac{6}{5}$

kx^2+3x+k

Zero = 2

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

$4k+6+k=0$

$5k=-6$

$k=-6/5$

Relationship between the zeroes and coefficients of a Quadratic Polynomial

$ax^2 + bx + c$

$a \neq 0$

$a, b, c \in R$

$\alpha + \beta = -\frac{b}{a}$ (sum)

$\alpha\,\beta = \frac{c}{a}$ (product)

Q $6x^2 - 7x + 2$

$a = 6$ $b = -7$ $c = 2$

Sum of zeroes $= -\frac{b}{a} = -\frac{-7}{6} = \frac{7}{6}$

Product of zeroes $= \frac{c}{a} = \frac{2}{6}$

#Q. If the product of the zeros of the polynomial $ax^2 - 6x - 6$ is 4, find the value of a.

CBSE 2008

$ax^2 - 6x - 6$

Sum $= -\frac{b}{a} = -\frac{-6}{a} = \frac{6}{a}$

Product $= \frac{c}{a} = \frac{-6}{a}$

Product $= -\frac{6}{a}$

$4 = -\frac{6}{a}$

$a = -6/4 = -3/2$

#Q. If one zero of the polynomial $2x^2 + 3x + \lambda$ is ½, find the value of λ and the other zero.

lemda

$2x^2 + 3x + d$ → α, β

$a = 2,\ b = 3,\ c = d$

$\alpha + \beta = -\frac{b}{a}$ | $\alpha\beta = \frac{c}{a}$

$\alpha + \beta = -\frac{3}{2}$ | $\alpha\beta = \frac{d}{2}$

but $\alpha = \frac{1}{2}$

$\frac{1}{2} + \beta = -\frac{3}{2}$

$\beta = -\frac{3}{2} - \frac{1}{2}$

$\beta = \frac{-4}{2}$

$\beta = -2$

$\alpha\beta = \frac{d}{2}$

$\frac{1}{2} \times -2 = \frac{d}{2}$

$-1 = \frac{d}{2}$

$-2 = d$

#Q. Find the value of k such that the polynomial $x^2 - (k + 6)x + 2(2k - 1)$ has sum of its Zeroes equal to half of their product.

CBSE 2019

α

β

$x^2-(k+6)x+2(2k-1)$

$a = 1$

$b = -(k+6)$

$c = 2(2k-1)$

$\alpha+\beta = -\frac{b}{a}$

$\alpha+\beta = -\frac{-(k+6)}{1}$

$\alpha+\beta = k+6$

$\alpha\beta = \frac{c}{a}$

$\alpha\beta = \frac{2(2k-1)}{1}$

$\alpha\beta = 4k-2$

Sum of zeroes equal to half of their product

$$\alpha+\beta = \frac{1}{2}\alpha\beta$$

$k+6 = \frac{4k-2}{2}$

$2k+12 = 4k-2$

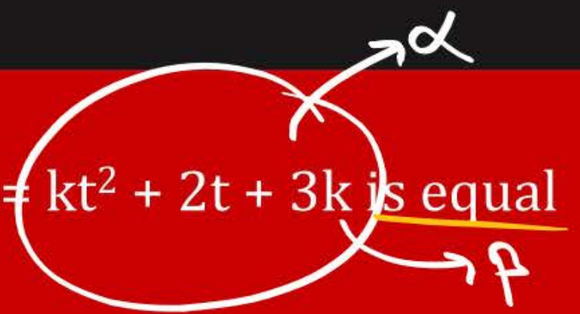
$12+2 = 4k-2k$

$14 = 2k$

$\frac{14}{2} = k$

$7 = k$

#Q. If the sum of the zeros of the quadratic polynomial $f(t) = kt^2 + 2t + 3k$ is equal to their product, find the value of k.



$\alpha + \beta = -\frac{b}{a}$

$\alpha + \beta = -\frac{2}{k}$

$\alpha\beta = \frac{c}{a}$

$\alpha\beta = \frac{3k}{k}$

$\alpha\beta = 3$

$\alpha + \beta = \alpha\beta$

$-\frac{2}{k} = 3$

$-\frac{2}{3} = k$

A. $-2/3$

B. $-3/2$

C. $2/3$

D. NOTA

ax^2+bx+c

#Q. If one zero of the polynomial $p(x) = 6x^2 + 37x - (k - 2)$ is reciprocal of the other, then find the value of k.

CBSE 2023

Let the zeroes be α and $\frac{1}{\alpha}$

$a=6,\ b=37,\ c=-(k-2)$

Sum $= -\frac{b}{a}$

$\alpha + \frac{1}{\alpha} = -\frac{37}{6}$

Product $= \frac{c}{a}$

$\alpha \times \frac{1}{\alpha} = \frac{-(k-2)}{6}$

$1 = \frac{-k+2}{6}$

$6 = -k+2$

$k = 2-6$

$k = -4$

$\alpha \times \frac{1}{\alpha} = \frac{(k-2)}{6}$

$1 = \frac{-k+2}{6}$

$6 = -k+2$

$k = 2-6$

$k = -4$

#Q. If one zero of the polynomial $(a^2 + 9)x^2 + 13x + 6a$ is reciprocal of the other, find the value of a.

CBSE 2008

$\alpha, \frac{1}{\alpha}$

$a = a^2+9, \ b = 13, \ c = 6a$

A 3

B 4

C −3

D NOTA

Sum $= -\frac{b}{a}$ | Product $= \frac{c}{a}$

$\alpha + \frac{1}{\alpha} = -\frac{13}{a^2+9}$ | $\alpha \times \frac{1}{\alpha} = \frac{6a}{a^2+9}$

$1 = \frac{6a}{a^2+9}$

$1(a^2+9) = 6a$

$a^2+9 = 6a$

$a^2 - 6a + 9 = 0$ — quadratic in 'a'.

Sum $= -6$, Product $= 9$

$-3, -3$

$a^2 - 3a - 3a + 9 = 0$

$a(a-3) - 3(a-3) = 0$

$(a-3)(a-3) = 0$

$a - 3 = 0$

$a - 3 = 0$

$a = 3$

#Q. If one zero of the quadratic polynomial $f(x) = 4x^2 - 8kx - 9$ is negative of the other, find the value of k.

$ax^2 + bx + c$

$a = 4, b = -8k, c = -9.$

Let the zeroes be α and $-\alpha$

A. -1

B. 1

C. 0

D. NOTA

Sum $= \frac{-b}{a}$

$\alpha + (-\alpha) = -\frac{-8k}{4}$

$0 = \frac{8k}{4}$

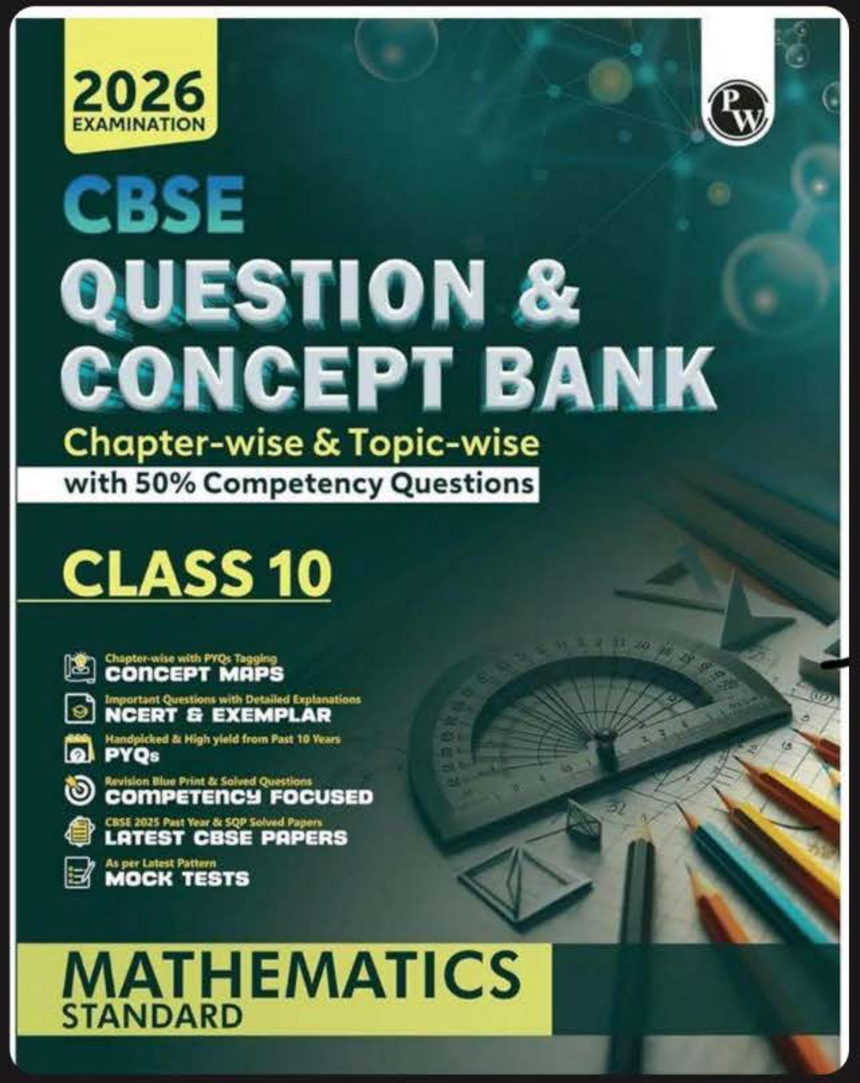
$0 = 2k$

$0 = k$

$0 = k$ //

Product $= \frac{c}{a}$

$\alpha \times -\alpha = -\frac{9}{4}$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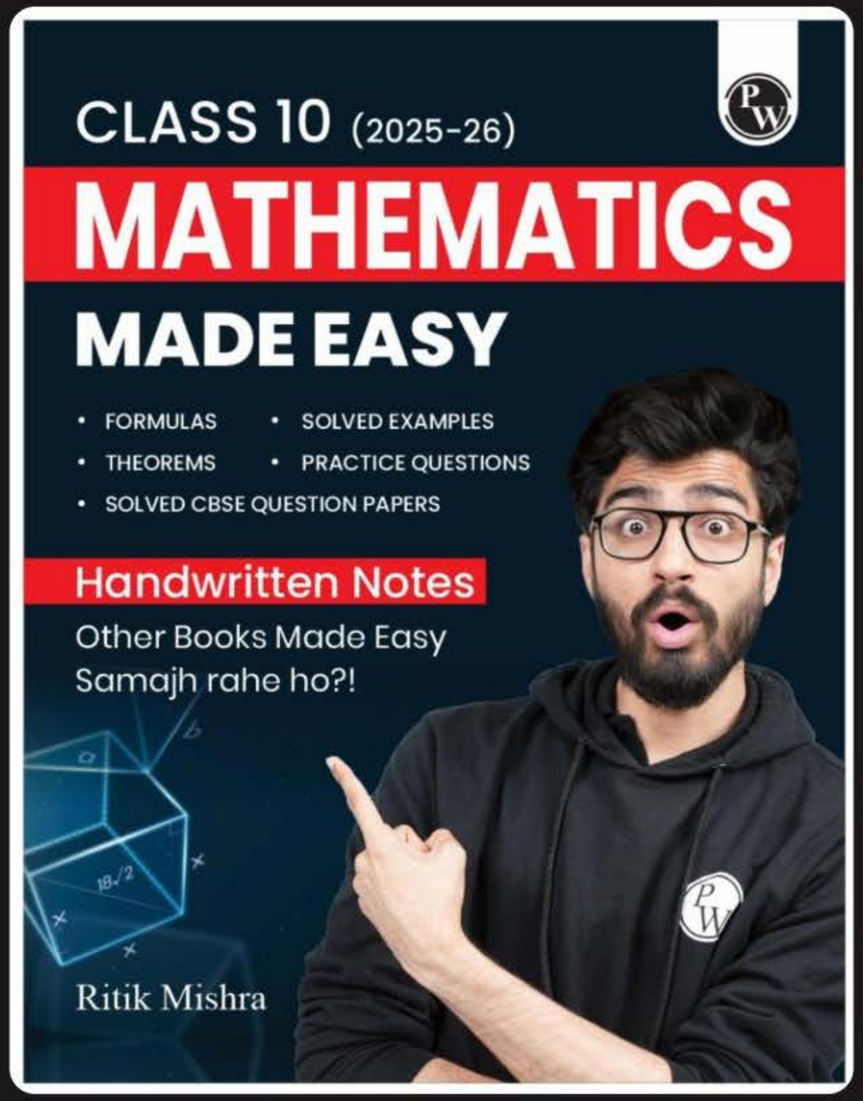
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