[Aim: 100/100 in Maths]

अभय CLASS 10

POLYNOMIALS

CHAPTER - 2

$$\boxed{P(x) = ax + b}$$

[variable] x, y, z - - -

constant

$$P(y) = ay + b$$

$$P(t) = pt + b$$

$$\boxed{\begin{aligned} P(3) &= a(3) + b \\ P(\text{shobhit}) &= a(\text{shobhit}) + b \end{aligned}}$$

✲ Value of Polynomial :-

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

$$P(1) = 3(1)^2 - (1) + 4 \Rightarrow 3 - 1 + 4 \Rightarrow 6$$

$$P(2) = 3(2)^2 - (2) + 4 \Rightarrow 12 - 2 + 4 \Rightarrow 14$$

$$P(\pi) = 3\pi^2 - \pi + 4$$

Degree of Polynomial :-

→ variable की highest power available.

✓ $3x^3 - 4x^2 + 2 \longrightarrow D = ?$ 3

✓ $4x^4 - 3x^3 + 17x^{17} \longrightarrow D = 17$

✓ $17t^2 + 14t \longrightarrow D = 2$

⇒ Classification of Polynomial on basis of degree

D=1

ax^1+b

Linear Polynomial

D=2

$[ax^2+bx+c]$

Quadratic Polynomial

D=3

$[ax^3+bx^2+cx+d]$

cubic poly

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Bheja to Maar Le!

LP : The degree of the polynomial $(x+1)(x^2 - x - x^4 + 1)$ is

A. 4 30.79%

B. 1 5.65%

C. 5 57.83%

D. 2 5.73%

$\Rightarrow x^3 - \cancel{x^2} - x^5 + \cancel{x} + \cancel{x^2} - \cancel{x} - x^4 - 1$

$\Rightarrow -x^5 - x^4 + x^3 - 1$

Roots / Solution

Zeroes of polynomials :

→ variable की वो value जिससे Poly = 0 हो जाए

$P(x) = 3x - 3$

$3x - 3 = 0$

$3x = 3$

$x = 1$ ✓

LP : Geometric meaning of zeroes and polynomials :

LP : If one of the zeroes of the quadratic polynomial $(k+1)x^2 + kx + 1$ is $\underbrace{-3}$, then the value of 'k' is :

$p(x) = (k+1)x^2 + kx + 1$

$p(-3) = 0$

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

$(k+1)(9) - 3k + 1 = 0$

$9k + 9 - 3k + 1 = 0$

$6k + 10 = 0$

$k = -\frac{\cancel{10}\ 5}{\cancel{6}\ 3} \Rightarrow -5/3$

Relation between zeroes and coefficients of Quadratic polynomial :

$D = 2$

x^2 का coeff = a
x का coeff = b

$ax^2 + bx + c$ → α, β

मत भूलना

$$\boxed{S.O.R = \alpha + \beta = -\frac{b}{a}} = -\frac{(\text{coeff of } x)}{\text{coeff of } x^2}$$

$$\boxed{P.O.R = \alpha \cdot \beta = \frac{c}{a}} = \frac{\text{constant}}{\text{coeff of } x^2}$$

$D = 1 \rightarrow$ max 1 zero
$D = 2 \rightarrow$ max 2
$D = 3 \rightarrow$ max 3 zeroes
⋮

$x^2 - 3x + 4 <^{\alpha}_{\beta}$

$SOR = \alpha + \beta = -\frac{(-3)}{1} \Rightarrow 3$

$POR = \alpha \cdot \beta = \frac{c}{a} = \frac{4}{1} \Rightarrow 4$

$\frac{7}{8}x^2 - 4x + 3 <^{\alpha}_{\beta}$

$SOR = \alpha + \beta = \frac{-b}{a} = -\frac{(-4)}{7/8} \Rightarrow \frac{32}{7}$

$POR = \alpha \cdot \beta = \frac{c}{a} = \frac{3}{7/8} \Rightarrow \frac{24}{7}$ ✓

LP : Find the zeroes of the quadratic polynomial and verify the relationship between the zeroes of the coefficients .

$[3x^2 - x - 4] \leftarrow$ Quad. Eq^n. $\leftarrow$ Splitting the middle term

$\boxed{\alpha = -1 \quad \beta = \frac{4}{3}}$

$3x^2 - 1x - 4$

$\Rightarrow 3x^2 + 3x - 4x - 4$

$p + q = -1$ ✓

$p \cdot q = -12$ ✓

$\Rightarrow 3x(x+1) - 4(x+1)$

$(x+1)(3x-4) = 0$

$x + 1 = 0 \qquad 3x - 4 = 0$

$x = -1 \qquad x = 4/3$

2	12
2	6
3	3
	1

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

$-\frac{(-1)}{3} \rightarrow \frac{1}{3}$

$-1 + \frac{4}{3} \Rightarrow \frac{-3+4}{3} \rightarrow \frac{1}{3}$

LHS = RHS ✓

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

LHS $\alpha \cdot \beta = -1 \times \frac{4}{3} = \frac{-4}{3}$

RHS $\Rightarrow \frac{c}{a} = \frac{-4}{3}$

LHS = RHS

LP : Find the zeroes of the following quadratic polynomial :

i. $\sqrt{3}x^2 + 10x + 7\sqrt{3}$

$\sqrt{3}x^2 + 10x + 7\sqrt{3}$

$(\sqrt{3} \times \sqrt{3})$

$\Rightarrow \sqrt{3}x^2 + 7x + 3x + 7\sqrt{3}$

$\Rightarrow x(\sqrt{3}x + 7) + \sqrt{3}[\sqrt{3}x + 7]$

$\Rightarrow (\sqrt{3}x + 7)(x + \sqrt{3}) = 0$

$\sqrt{3}x + 7 = 0$

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

$x + \sqrt{3} = 0$

$x = -\sqrt{3}$

HW

ii. $x^2 + 2\sqrt{2}x - 6$

p q

$p + q = 2\sqrt{2}$

$p \cdot q = -6$

#K³B ⇒ Quad के question में zeroes की बात हो तो SOR & POR side में लिख के रख लेना

LP : If α and β are the zeroes of the quadratic polynomial f (t) = t² - 4t + 3, then the value of $\alpha^4\beta^3 + \alpha^3\beta^4$ is :

A. 104
B. 108
C. 122
D. 5

$t^2 - 4t + 3$ → α, β

✓ $\alpha+\beta = \frac{-b}{a} = -\frac{(-4)}{1} \Rightarrow 4$

✓ $\alpha\cdot\beta = \frac{c}{a} = \frac{3}{1} \Rightarrow 3$

$\alpha^4\beta^3 + \alpha^3\beta^4$

$\Rightarrow \alpha^3\beta^3[\alpha+\beta]$

$\Rightarrow (\alpha\beta)^3(\alpha+\beta)$

$\Rightarrow (3)^3(4)$

$\Rightarrow (27)(4)$

$\Rightarrow 108$

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LP : If a , β are the zeroes of the polynomial $f(x) = x^2 - p(x+1) - c = 0$ such that $(a+1)(\beta+1) = 0$ then find the value of c ?

$x^2 - p(x+1) - c = 0 < \alpha, \beta$

$x^2 - px - p - c = 0$

$\boxed{x^2 - px - (p+c) = 0} < \alpha, \beta$

$\alpha+\beta = -\frac{b}{a} = -\frac{(-p)}{1} \Rightarrow p$

$\alpha \cdot \beta = \frac{c}{a} = \frac{-(p+c)}{1} = -(p+c)$

given,

$(\alpha+1)(\beta+1) = 0$

$\alpha\beta + \underbrace{\alpha+\beta} + 1 = 0$

$\Rightarrow -(p+c) + p + 1 = 0$

$\Rightarrow \cancel{-p} - c + \cancel{p} + 1 = 0$

$1 = c$

ax^2+bx+c

$3x^2-(x+1)2+4$

$3x^2-2x-2+4$

$3x^2-2x+2$

LP : If a and β are the zeroes of the polynomial $f(x) = x^2 - 6x + k$, find the value of k such that $a^2 + \beta^2 = 40$.

$x^2 - 6x + k$ — α, β

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

$\alpha \cdot \beta = \frac{c}{a} = \frac{k}{1} = k$

given $\alpha^2 + \beta^2 = 40$

$(\alpha+\beta)^2 - 2\alpha\beta = 40$

$(6)^2 - 2(k) = 40$

$36 - 2k = 40$

$36 - 40 = 2k$

$-\cancel{4}^{2} = \cancel{2}k$

$k = -2$

$(\alpha+\beta)^2 = \alpha^2 + \beta^2 + 2\alpha\beta$

$(\alpha+\beta)^2 - 2\alpha\beta = \alpha^2 + \beta^2$

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LP : If one zero of the polynomial $3x^2 - 8x + 2k + 1$ is seven time the other , find the value of 'k' .

$3x^2 - 8x + (2k+1) \begin{cases} \alpha \\ 7\alpha \end{cases}$

SOR $\Rightarrow$ $\alpha + 7\alpha = -\frac{(-8)}{3}$

$\cancel{8}\alpha = \frac{\cancel{8}}{3}$

$\alpha = \frac{1}{3}$

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

$\alpha \cdot 7\alpha = \frac{(2k+1)}{3}$

$\Rightarrow 7\alpha^2 = \frac{(2k+1)}{3}$

$\Rightarrow 7\left(\frac{1}{3}\right)^{\cancel{2}} = \frac{2k+1}{\cancel{3}}$

$\frac{7}{3} = 2k+1 \Rightarrow 7 = 6k+3$

$4 = 6k$

$k = \cancel{4/6} \Rightarrow 2/3$

[CBSE 2025] ⊛

FORMATION OF QUAD. POLY.

K^5D Goal → 'S' और 'P' find करना।

If we know SOR(S) and POR(P)

$\downarrow$ S $\downarrow$ P

then, quad poly ⇒ $\boxed{k[x^2 - Sx + P]}$

Eg:- SOR = 2, POR = 4] → Quad. poly] → $x^2 - Sx + P$

$\boxed{x^2 - 2x + 4}$

LP : Find a quadratic polynomial where zeroes are 5 - 3√2 and 5 + 3√2.

$5-3\sqrt{2}\ ,\ 5+3\sqrt{2}$

$S = (5-\cancel{3\sqrt{2}}) + (5+\cancel{3\sqrt{2}})$

$S = 10$

$P = (5-3\sqrt{2})(5+3\sqrt{2})$

$= (5)^2 - (3\sqrt{2})^2$

$= 25 - 18$

$\boxed{P = 7}$

Now, Quad Poly is

$x^2 - Sx + P$

$\boxed{x^2 - 10x + 7}$

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LP : If a and ß are the zeroes of the quadratic polynomial $f(x) = x^2 - x - 2$, find a polynomial whose zeroes are a $2a + 1$ and $2ß + 1$.

$x^2 - x - 2 < \alpha, \beta$

$\alpha + \beta = -\frac{b}{a} \Rightarrow -\frac{(-1)}{1} \Rightarrow 1$

$\alpha \cdot \beta = \frac{c}{a} = \frac{-2}{1} \Rightarrow -2$

$2\alpha + 1, \; 2\beta + 1$

$S = 2\alpha + 1 + 2\beta + 1$

$= 2\alpha + 2\beta + 2 \Rightarrow 2(\alpha + \beta) + 2$

$\Rightarrow 2(1) + 2 \Rightarrow 4$

$P = (2\alpha + 1)(2\beta + 1)$

$= 4\alpha\beta + 2\alpha + 2\beta + 1$

$\Rightarrow 4(-2) + 2(\alpha + \beta) + 1$

$\Rightarrow -8 + 2(1) + 1 \Rightarrow -8 + 3$

$\Rightarrow -5$

$x^2 - Sx + P$

$\boxed{x^2 - 4x - 5}$

LP : Find a quadratic polynomial whose zeroes are reciprocals of the zeroes of the polynomial f(x) = ax² + bx + c.

$\xrightarrow{} S, P$

$ax^2+bx+c \to \alpha, \beta$

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

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

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

$S = \frac{1}{\alpha} + \frac{1}{\beta} \Rightarrow \frac{\alpha+\beta}{\alpha\beta} = \frac{-b/\cancel{a}}{c/\cancel{a}} \Rightarrow -\frac{b}{c}$

$P = \frac{1}{\alpha} \cdot \frac{1}{\beta} = \frac{1}{\alpha\beta} = \frac{1}{c/a} \Rightarrow \frac{a}{c}$

Now, poly $\Rightarrow x^2 - Sx + P$

$\Rightarrow x^2 - \left(-\frac{b}{c}\right)x + \frac{a}{c}$

$\Rightarrow x^2 + \frac{b}{c}x + \frac{a}{c}$

HW

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If the zeroes of the polynomial $x^2 + px + q$ double values to the zeroes of $2x^2 - 5x - 3$, find the value of p and q.

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#LP: Assertion (A): $(2 - \sqrt{3})$ is one zero of the quadratic polynomial then other zero will be $(2 + \sqrt{3})$ T

Reason (R): Irrational zeroes always occurs in pairs. T

✓ $(2-\sqrt{3}, 2+\sqrt{3})$

A & R → both true

Reason is also right

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THANK YOU

COODIES 🥰