

✓✓ [Aim: 100/100 in Maths]

अभ्यास CLASS 10

POLYNOMIALS

CHAPTER - 2

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

{variable} $x, y, z, \dots$

constant

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

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

$$P(3) = a(3) + b$$

$$P(\text{shobhit}) = a(\text{shobhit}) + b$$

* Value of Polynomial:-

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

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

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

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

Degree of polynomial:-

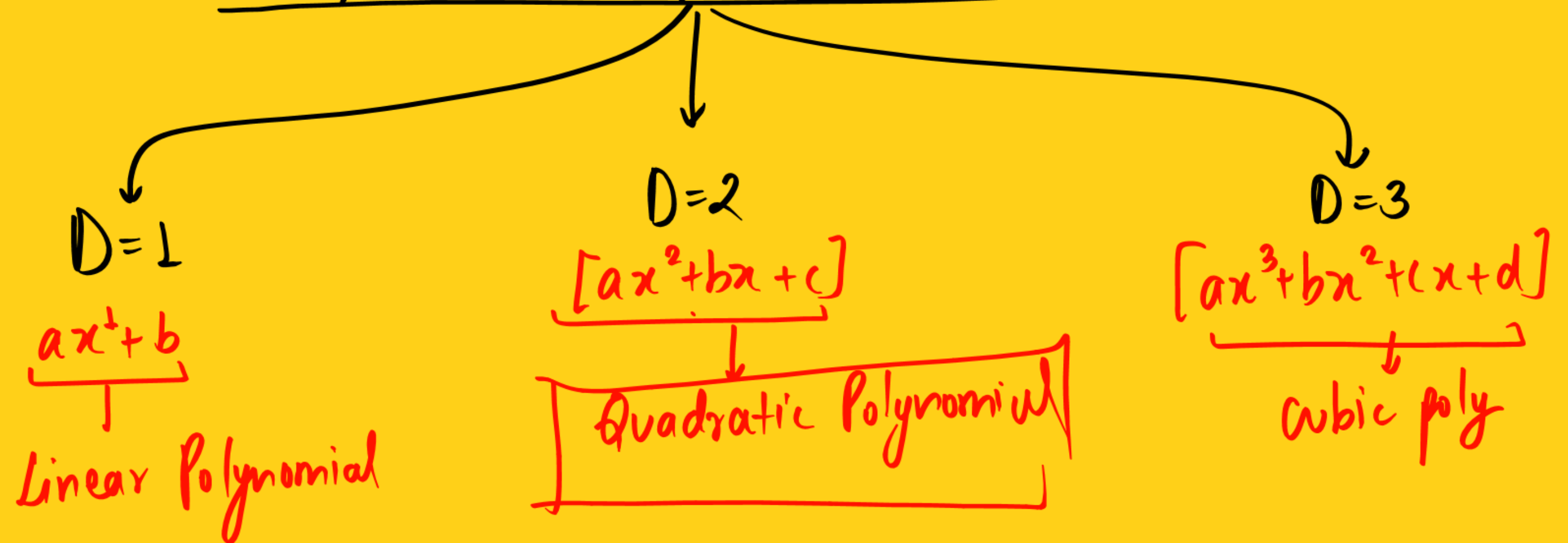
↳ variable की highest power available.

$$\checkmark 3x^3 - 4x^2 + 2 \longrightarrow D = ? \text{ (3)}$$

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

$$\checkmark 17t^2 + 14t \longrightarrow D = 2$$

⇒ Classification of Polynomial on basis of degree



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

Bhai at maa le!

A. 4

B. 1

C. 5

D. 2

30. 79.1.

5. 65.1.

57. 83.1.

5. 73.1.

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

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

Zeroes of polynomials :

Roots/Solution
variable की वो value जिससे

$Poly = 0$ हो जाय

$p(x) = 3x - 3$

$$3x - 3 = 0$$

$$3x = 3$$

$$x = 1$$



LP : Geometric meaning of zeroes and polynomials :



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

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

$$p(-3) = 0$$

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

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

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

$$6k + 10 = 0$$

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



Relation between zeroes and coefficients of Quadratic polynomial :

$$\rightarrow \boxed{D=2}$$

$$\boxed{ax^2 + bx + c}$$

α

β

x^2 ki coeft = a
 x ki coeft = b

$$S.O.R = \alpha + \beta = -\frac{b}{a}$$

$$P.O.R = \alpha \cdot \beta = \frac{c}{a}$$

↓ $\Rightarrow$ $\frac{\text{coeft of } x}{\text{coeft of } x^2}$

$= \frac{\text{constant}}{\text{coeft of } x^2}$

$D=1 \rightarrow \text{max } 1 \text{ zero}$
 $D=2 \rightarrow \text{max } 2$
 $D=3 \rightarrow \text{max } 3 \text{ zeroes}$

$$x^2 - 3x + 4 \begin{matrix} \nearrow \alpha \\ \searrow \beta \end{matrix}$$

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

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

$$\frac{7}{8}x^2 - 4x + 3 \begin{matrix} \nearrow \alpha \\ \searrow \beta \end{matrix}$$

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

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

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

$[3x^2 - x - 4]$ ← Quad. Eqⁿ. ← Splitting the middle term

$$\boxed{d = -1 \quad b = \frac{4}{3}}$$

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

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

$$\Rightarrow \underline{3x(x+1)} - \underline{4(x+1)}$$

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

$$x+1=0 \quad | \quad 3x-4=0$$

$$\boxed{x = -1}$$

$$\boxed{x = \frac{4}{3}}$$

$$p+q = -1$$

$$p \cdot q = -12$$

$$\textcircled{4} \begin{array}{r|l} 2 & 12 \\ \hline 6 & 6 \\ \hline 3 & 3 \end{array}$$

verify $d+b = -\frac{b}{a}$

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

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

$$LHS = RHS \checkmark$$

$$d \cdot b = \frac{c}{a}$$

$$LHS \quad d \cdot b = -1 \times \frac{4}{3} = \frac{-4}{3}$$

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

$$LHS = RHS$$

~~HP~~

LP : Find the zeroes of the following quadratic polynomial :

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

$$\begin{aligned} & \sqrt{3}x^2 + 10x + 7\sqrt{3} \\ & \Rightarrow \sqrt{3}x^2 + 7x + 3x + 7\sqrt{3} \quad (\sqrt{3} \times \sqrt{3}) \\ & \Rightarrow \underline{x(\sqrt{3}x + 7)} + \underline{\sqrt{3}(\sqrt{3}x + 7)} \\ & \Rightarrow (\sqrt{3}x + 7)(x + \sqrt{3}) = 0 \end{aligned}$$

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

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

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

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

(1/2)

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

$$\begin{array}{c} \swarrow \quad \searrow \\ p \quad q \end{array}$$

$\sqrt{2}$ و $\sqrt{2}$ جفت

$$\begin{aligned} p + q &= 2\sqrt{2} \\ p \cdot q &= -6 \end{aligned}$$



K³B ⇒ Quad. के question में zeroes की बात हो तें SOR & POR side में लिख के रख लेता अभय

LP : If α and β are the zeroes of the quadratic polynomial $f(t) = t^2 - 4t + 3$, then the value of $\alpha^4\beta^3 + \alpha^3\beta^4$ is :

A. 104

☒ B. 108

C. 122

D. 5

$$t^2 - 4t + 3$$

$$\checkmark \underline{\alpha + \beta} = -\frac{b}{a} = -\left(\frac{-4}{1}\right) \Rightarrow \underline{\textcircled{4}}$$

$$\checkmark \underline{\alpha \cdot \beta} = \frac{c}{a} = \frac{3}{1} \Rightarrow \underline{\textcircled{3}}$$

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

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

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

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

$$\Rightarrow (27)(4)$$

$$\Rightarrow \underline{\textcircled{108}}$$

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

$$x^2 - p(x+1) - c = 0 \quad \begin{matrix} \alpha \\ \beta \end{matrix}$$

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

$$\boxed{x^2 - px - (p+c) = 0} \quad \begin{matrix} \alpha \\ \beta \end{matrix}$$

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

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

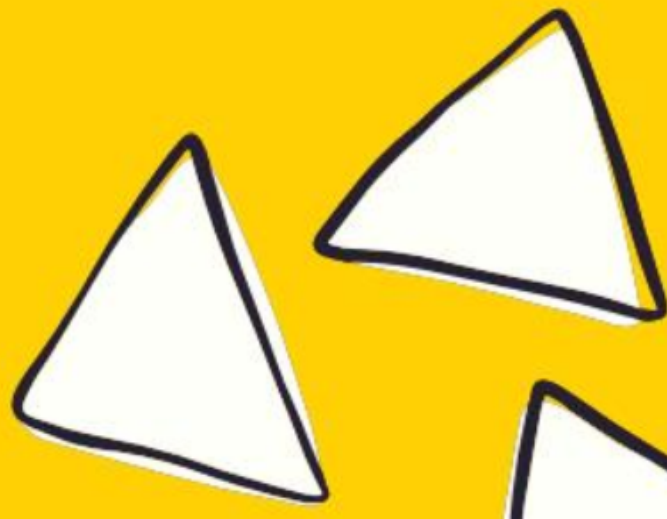
given, $(\alpha+1)(\beta+1) = 0$

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

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

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

$$1 = c$$



$$ax^2+bx+c$$

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

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

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

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

$$x^2 - 6x + k \begin{matrix} \alpha \\ \beta \end{matrix}$$

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

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

given,

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

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

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

$$36 - 2k = 40$$

$$36 - 40 = 2k$$

$$-4 = 2k$$

$$k = -2$$

अभ्यास

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

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

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

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

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

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

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

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

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

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

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

$$7 = 6k+3$$

$$4 = 6k$$

$$k = \frac{4}{6} = \frac{2}{3}$$

[CBSE
2025]

FORMATION OF QUAD. POLY.

Goal → 'S' 312
'P' find
trick

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

↓
S

↓
P

then, quad poly. ⇒ $k[x^2 - Sx + P]$

Eg:-

$SOR=2$

$POR=4$

→ Quad. poly →

$$\frac{x^2 - Sx + P}{x^2 - 2x + 4}$$

LP : Find a quadratic polynomial where zeroes are $5 - 3\sqrt{2}$ and $5 + 3\sqrt{2}$.

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

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

$$(S = 10)$$

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

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

$$= 25 - 18$$

$$\boxed{P = 7}$$

Now, Quad Poly is

$$x^2 - 5x + 7$$
$$\boxed{x^2 - 10x + 7}$$

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

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

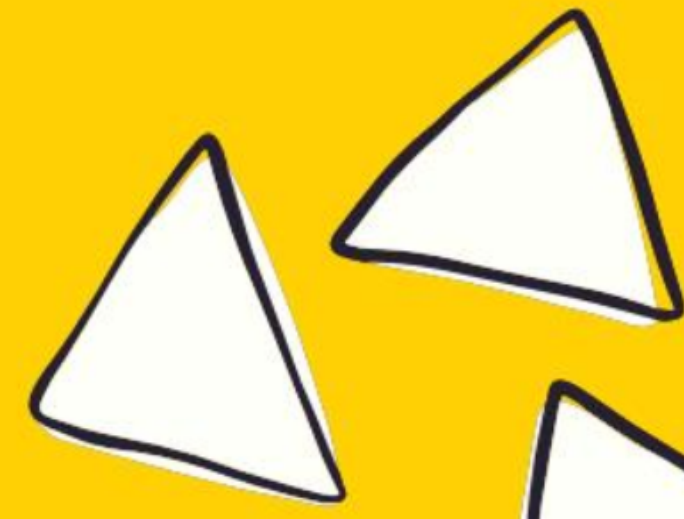
$$\alpha + \beta = -\frac{b}{a} \Rightarrow -\frac{(-1)}{1} \Rightarrow \underline{\underline{1}} \quad \text{①}$$

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

$$\begin{aligned} S &= 2\alpha + 1 + 2\beta + 1 \\ &= 2\alpha + 2\beta + 2 \Rightarrow 2(\alpha + \beta) + 2 \\ &\Rightarrow 2(1) + 2 \Rightarrow \underline{\underline{4}} \end{aligned}$$

$$\begin{aligned} P &= (2\alpha + 1)(2\beta + 1) \\ &= 4\alpha\beta + 2\alpha + 2\beta + 1 \\ &\Rightarrow 4(-2) + 2(\alpha + \beta) + 1 \\ &\Rightarrow -8 + 2(1) + 1 \Rightarrow -8 + 3 \\ &\Rightarrow \underline{\underline{-5}} \end{aligned}$$

$$\boxed{x^2 - 5x + 9}$$



→ S, P

LP : Find a quadratic polynomial whose zeroes are reciprocals of the zeroes of the polynomial $f(x) = ax^2 + bx + c$.

$$ax^2 + bx + c \quad \swarrow \begin{matrix} \alpha \\ \beta \end{matrix}$$

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

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

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

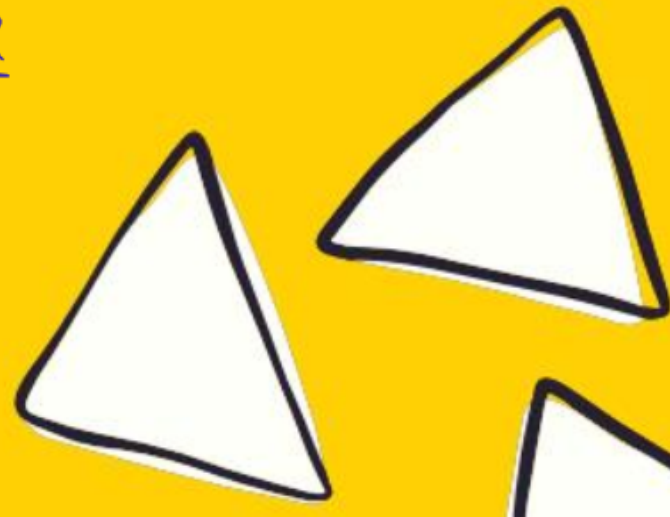
$$\textcircled{S} = \frac{1}{\alpha} + \frac{1}{\beta} \Rightarrow \frac{\alpha + \beta}{\alpha\beta} = \frac{-\frac{b}{a}}{\frac{c}{a}} \Rightarrow \textcircled{-\frac{b}{c}}$$

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

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

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

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



HW

अभ्यास

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 .



#LP: Assertion (A): $(2 - \sqrt{3})$ is one zero of the quadratic polynomial then other zero will be $(2 + \sqrt{3})$ ⑦
Reason (R): Irrational zeroes always occurs in pairs. ⑦

✓ $(2 - \sqrt{3}, 2 + \sqrt{3})$

A & R → both true
Reason is also right



आभार्य

THANK YOU

COODIES 🥰