Vidya Bhawan, Balika Vidyapith

Shakti Utthan Ashram, Lakhisarai - 811311 (Bihar)

विद्यापति		
Class: -X Jop	io: - Polynomial Subject: -Mathematics	
Sraph of Quadratic Polynomial		
Graph of Quadratic Polynomial ax ² + b	px + c Let $p(x) = y$	
$P(x) = ax^2 + bx + c$	Given $P(x) = y = ax^2 + bx + c$	
$= a \left[x^2 + \frac{b}{a} x + \frac{c}{a} \right]$	Putting $x = \frac{-b}{2a}$	
$= a \left[x^2 + 2 x \frac{b}{2a} + \frac{c}{a} \right]$	$\mathbf{y} = \mathbf{a} \left(\frac{-b}{2a}\right)^2 + \mathbf{b} \left(\frac{-b}{2a}\right) + \mathbf{c} = \left[\frac{ab^2}{4a^2} - \frac{b^2}{2a} + \mathbf{c}\right]$	
$= a \left[x^{2} + 2 x \frac{b}{2a} + \frac{b^{2}}{4a^{2}} - \frac{b^{2}}{4a^{2}} + \frac{c}{a} \right]$	$= \left[\frac{ab^2 - 2ab^2 + 4a^2c}{4a^2}\right]$	
(Adding and subtracting $\frac{b^2}{4a^2}$)	$= -a\left(\frac{b^2-4ac}{4a^2}\right) = -\left(\frac{b^2-4ac}{4a}\right) = \frac{-D}{4a}.$	
$= a \left[\left(x + \frac{b}{2a} \right) - \frac{b^2}{4a^2} + \frac{c}{a} \right] \qquad \text{(let } \mathbf{k} = \frac{-b}{4a^2}$	$(\text{ where } D = b^2 - 4ac)$	
$= a \left[\left(x + \frac{b}{2a} \right)^2 + k \right]$	$\therefore y = \frac{b}{4a}$	
Now Zeroes $p(x) = 0$	Hence $(x, y) = (\frac{3}{2a}, \frac{3}{4a})$	
$= a \left[\left(x + \frac{b}{2a} \right)^2 + k \right] = 0$	Now Y- intercept	
$\left(x+\frac{b}{2a}\right)^2=0 \text{or} \mathbf{k}=0$	$y = ax^2 + bx + c$ {coordinate of Y-axis = (0, y)}	
$(\mathbf{r} + \frac{\mathbf{b}}{\mathbf{b}}) = 0$ $\cdot \mathbf{v} = \frac{-\mathbf{b}}{\mathbf{b}}$	$y = a (0)^2 + b(0) + c = c$	
$(x + 2a)^{-0}$ $(x - 2a)^{-2}$	Y- intercept = (0, c) =(0, constant)	
Q. Draw the graph of the polynomial	$\mathbf{v} = \frac{-\mathbf{D}}{-\mathbf{D}} = \frac{-(\mathbf{b}^2 - 4\mathbf{a}\mathbf{c})}{-(\mathbf{b}^2 - 4\mathbf{a}\mathbf{c})} = -\frac{[(-2)^2 - 4 \times 1 \times -8]}{-(-2)^2 - 4 \times 1 \times -8]}$	
$p(x) = x^2 - 2x - 8$	^y 4a 4×1 4	
Solution: $-p(x) = x^2 - 2x - 8$ 1. The value of $x = 1$ is positive than	$=-\left[\frac{4+32}{4}\right]=-9$	
narabola opens upward	4. Vertex of Develops $(x, y) = (-b, -D) = (-1, 0)$	
$p(x) = x^2 - 2x - 8 = x^2 - 4x + 2x - 8$	4. vertex of Parabola $(x, y) = (\frac{1}{2a}, \frac{1}{4a}) = (1, -9)$ Y- intercept = $(0, c) = (0, \text{ constant}) = (0, -8)$	
= x(x-4) + 2(x-4) = (x-4)(x+2)		
p (x) = 0		
\therefore (x - 4) = 0 or (x + 2) = 0		
$\therefore x = 4 \text{ or } x = -2$		
2. The parabola cuts X -axis at two		
distinct points (4, 0) and (-2, 0)		
3. Comparing $ax^2 + bx + c = x^2 - 2x - 8$;		
a=1, b = -2, c = -8	-\\$t /	
$x = \frac{-b}{2a} = \frac{-(-2)}{2 \times 1} = \frac{2}{2} = 1$	-8 -9 -10	

Cubic Polynomial: A polynomial having highest degree of three is called a cubic polynomial. In general, a quadratic polynomial can be expressed in the form $ax^3 + bx^2 + cx + d$, where $a \neq 0$ and a, b, c, d are real numbers.

 $P(x) = 3x^3 - x^2 - 3x + 5$, $P(x) = 3x^3 - 3x + 5$, $P(x) = 3x^3 + 5$ Zeroes Cubic Polynomial: In general, it can be proved that if α , β , γ are the zeroes of the cubic polynomial $ax^3 + bx^2 + cx + d$, then, Coefficient of $x^3 = a$, Coefficient of $x^2 = b$, Coefficient of x = c, Coefficient of x^0 (constant) = d **RELATION BETWEEN COEFFICIENT AND ZEROES** Sum of Zeroes = $\alpha + \beta + \gamma = \frac{-\text{Coefficient of } x^2}{\text{Coefficient of } x^3} = \frac{-b}{a}$ Comparing the terms according to exponent Therefore a = k, $x^3 = x^3$, Sum of the products of zeroes taken two at a $\frac{b}{a}x^2 = -(\alpha + \beta + \gamma)x^2 \Longrightarrow \alpha + \beta + \gamma = \frac{-b}{\alpha}$ time = $\alpha\beta$ + $\beta\gamma$ + $\gamma\alpha$ = = $\frac{\text{Coefficient of } x}{\text{Coefficient of } x^3}$ = $\frac{c}{a}$ $\frac{c}{2}x = (\alpha\beta + \beta\gamma + \gamma\alpha)x \Longrightarrow \alpha\beta + \beta\gamma + \gamma\alpha = \frac{c}{2}$ Product of zeroes $\alpha \beta \gamma = \frac{-\text{constant}}{\text{Coefficient of } x^3} = \frac{-d}{a}$ $\frac{d}{d} = -(\alpha\beta\gamma) \implies \alpha\beta\gamma = \frac{-d}{2}$ **Proof**: - if α , β , γ are the zeroes of the cubic polynomial $ax^3 + bx^2 + cx + d$, then, If α , β , γ are the zeroes, then cubic polynomial $ax^3 + bx^2 + cx + d = k(x - \alpha) (x - \beta) (x - \gamma)$ $= k[x^{3} - (\alpha + \beta + \gamma)x^{2} + (\alpha\beta + \beta\gamma + \gamma\alpha)x - (\alpha\beta\gamma)]$ $a(x^{3} + \frac{b}{x}x^{2} + \frac{c}{x}x + \frac{d}{x})$ $=k[x^3 - (Sum of Zeroes)x^2 +$ $= k[x^{3} - (\alpha + \beta + \gamma)x^{2} + (\alpha\beta + \beta\gamma + \gamma\alpha)x - (\alpha\beta\gamma)]$ (Sum of the products of zeroes taken two at a time)x -

Q. Verify that -1, $\frac{-1}{3}$, 3 are the zeroes of the cubic polynomial $p(x) = 3x^3 - 5x^2 - 11x - 3$, and then verify the relationship between the zeroes and the coefficients.

(Product of zeroes)]

Solution: $p(x) = 3x^3 - 5x^2 - 11x - 3$ Verify the relationship between the zeroes and the coefficients. If $-1, \frac{-1}{3}$, 3 are zeroes of p(x) then leaves $ax^{3} + bx^{2} + cx + d = 3x^{3} - 5x^{2} - 11x - 3$ remainder p(x) = 0a = 3, b = -5, c = -11 & d = -3 $p(x) = 3x^3 - 5x^2 - 11x - 3$ Let $\alpha = -1$, $\beta = \frac{-1}{3}$ & $\gamma = 3$ $p(-1) = 3(-1)^3 - 5(-1)^2 - 11(-1) - 3$ Putting x = -1 $\alpha + \beta + \gamma = \frac{-b}{a} \Longrightarrow -1 + (\frac{-1}{3}) + 3 = \frac{-3-1+9}{3} = \frac{5}{3}$ = -3 - 5 + 11 - 3 = 11 - 11 = 0 $p(\frac{-1}{2}) = 3(\frac{-1}{2})^3 - 5(\frac{-1}{2})^2 - 11(\frac{-1}{2}) - 3$ Putting $x = \frac{-1}{2}$ $\therefore \frac{5}{2} = \frac{5}{2}$ $=\frac{-1}{9}-\frac{5}{9}+\frac{11}{3}-3=\frac{-1-5+33-27}{9}=\frac{33-33}{9}=0$ $\alpha\beta + \beta\gamma + \gamma\alpha = \frac{c}{2} \Longrightarrow -1 \times \frac{-1}{3} + \left(\frac{-1}{3}\right) \times 3 + 3 \times -1$ $p(3) = 3(3)^3 - 5(3)^2 - 11(3) - 3$ Putting x = 1 $=\frac{1}{2}+(-1)-3=\frac{-11}{2}$ $\therefore \frac{-11}{3}=\frac{-11}{3}$ = 81 - 45 - 33 - 3 = 81 - 81 = 0 $\alpha\beta\gamma = \frac{-d}{2} \implies -1 \times (\frac{-1}{2}) \times 3 = \frac{3}{2} \therefore 1 = 1$ *Overified* $\therefore -1, \frac{-1}{2} \& 3$ are the zeroes of p(x) <u>*Hnswer*</u>

Division Algorithm for Polynomials : If p(x) and g(x) are any two polynomials with $g(x) \neq 0$, then we can find polynomials q(x) and r(x) such that $p(x) = g(x) \times q(x) + r(x)$, where r(x) = 0 or degree of r(x) < degree of g(x).

verify the division algorithm. On dividing $3x^2 - x^3 - 3x + 5$ by $x - 1 - x^2$, we get, $x^{-x^2} + x^{-1}\int_{-x^2}^{x^2} + x^2 - 3x^2 + 5$ $x^{-x^2} + x^{-1}\int_{-x^2}^{x^2} + x^2 + 2x^2 - 2x + 5}$ $2x^2 - 2x + 5$ $2x^2 - 2x + 5$ $2x^2 - 2x + 2$ $3x^2 - x^3 - 3x + 5 = (-x^2 + x - 1)(x - 2) + 3$ $= (-x^3 + x^2 - x + 2x^2 - 2x + 2 + 3)$ $= (-x^3 + 3x^2 - 3x + 5) = (-x^3 + 3x^2 - 3x + 5)$ $(-x^3 + 3x^2 - 3x + 5) = (-x^3 + 3x^2 - 3x + 5)$ $(-x^3 + 3x^2 - 3x + 5) = (-x^3 + 3x^2 - 3x + 5)$ \therefore LHS = RHS \therefore Division algorithm is verified. <i>Outlod</i> 9. On dividing $x^3 - 3x^2 + x + 2$ by a polynomial of its zeroes are $\sqrt{\frac{5}{3}}$ and $-\sqrt{\frac{5}{3}}$. Since two zeroes are $\sqrt{\frac{5}{3}}$ and $-\sqrt{\frac{5}{3}}$ so these are the factors of the given polynomial. Now, $(x - \sqrt{\frac{5}{3}})(x + \sqrt{\frac{5}{3}}) = x^2 - \frac{5}{3}$ $[Rough x^2 - \frac{5}{3} = 0, 3x^2 - 5 = 0]$ $\Rightarrow (3x^2 - 5)$ is a factor of the given polynomial. Applying the division algorithm to the given polynomial and $3x^2 - 5$, we have $3x^2 - 5^3 - \frac{x^2 + 2x^2}{3x^4 - 5x^2} - \frac{10x - 5}{3x^4 - 5x^2} - 10x $
On dividing $3x^2 - x^3 - 3x + 5$ by $x - 1 - x^2$, we get, $ \begin{aligned} y(x) = -x^2 + x - 1, q(x) = x - 2 & r(x) = 3 \\ p(x) = g(x) & x q(x) + r(x), \\ 3x^2 - x^3 - 3x + 5 = (-x^2 + x - 1)(x - 2) + 3 \\ = (-x^3 + x^2 - x + 2x^2 - 2x + 2 + 3) \\ = (-x^3 + 3x^2 - 3x + 5) = (-x^3 + 3x^2 - 3x + 5) \\ \therefore LHS = RHS \end{aligned} $ $ \therefore Uvision algorithm is verified. Output Now, as per the division algorithm Q. Obtain all the zeroes of 3x^4 + 6x^3 - 2x^2 - 10x - 5 if twoof its zeroes are \sqrt{\frac{5}{3}} and -\sqrt{\frac{5}{3}}.Since two zeroes are \sqrt{\frac{5}{3}} and -\sqrt{\frac{5}{3}}.Since two zeroes are \sqrt{\frac{5}{3}} and -\sqrt{\frac{5}{3}}.Since two zeroes are \sqrt{\frac{5}{3}} = 0, 3x^2 - 5 = 0]\Rightarrow (3x^2 - 5) is a factor of the given polynomial.Applying the division algorithm to the givenpolynomial and 3x^2 - 5, we havey(x - 2) \times g(x) + (-2x + 4) = x^3 - 3x^2 + x + 2 by a - 2) and (-2x + 4) respectively.y(x - 2) \times g(x) + (-2x + 4) = x^3 - 3x^2 + x + 2 by a - 2) and (-2x + 4) respectively.y(x - 2) \times g(x) + (-2x + 4) = x^3 - 3x^2 + x + 2 by a - 2) and (-2x + 4) respectively.y(x - 2) \times g(x) + (-2x + 4) = x^3 - 3x^2 + x + 2 by a - 2) and (-2x + 4) respectively.y(x - 2) \times y(x) + (-2x + 4) = x^3 - 3x^2 + x + 2 by a - 2) and (-2x + 4) respectively.y(x - 2) \times y(x) + (-2x + 4) = x^3 - 3x^2 + x + 2 by a - 2) and (-2x + 4) respectively.y(x - 2) \times y(x) + (-2x + 4) = x^3 - 3x^2 + x + 2 by a - 2) and (-2x + 4) respectively.y(x - 2) \times y(x) + (-2x + 4) = x^3 - 3x^2 + x + 2 by a - 2) and (-2x + 4) respectively.y(x - 2) \times y(x) = x^3 - 3x^2 + x + 2 + 2x - 4 + 2x + 2x + 2x - 4 + 2x + 2x - 4 + 2x + 2x + 4 + 2x + 2x - 4 + 2x + 2x + 4 + 2x + 2x - 4 + 2x + 2x + 4 + 2x + 4x + 4x + 4x + 4$
$\int_{-x^{2} + x - 1} \int_{-x^{2} + 3x^{2} - 3x + 5} = (-x^{3} + 3x^{2} - x + 2x^{2} - 2x + 2 + 3)$ $= (-x^{3} + x^{2} - x + 2x^{2} - 2x + 2 + 3)$ $= (-x^{3} + x^{2} - x + 2x^{2} - 2x + 2 + 3)$ $= (-x^{3} + x^{2} - x + 2x^{2} - 2x + 2 + 3)$ $= (-x^{3} + 3x^{2} - 3x + 5) = (-x^{3} + 3x^{2} - 3x + 5)$ $(-x^{3} + 3x^{2} - 3x + 5) = (-x^{3} + 3x^{2} - 3x + 5)$ $\therefore LHS = RHS$ $\therefore Division algorithm is verified. Oright Q. Obtain all the zeroes of 3x^{4} + 6x^{3} - 2x^{2} - 10x - 5 if twoof its zeroes are \sqrt{\frac{5}{3}} and -\sqrt{\frac{5}{3}}.Since two zeroes are \sqrt{\frac{5}{3}} and -\sqrt{\frac{5}{3}}.Solution. Since on dividing x^{3} - 3x^{2} + x + 2 by a polynomial(x. -\sqrt{\frac{5}{3}})(x + \sqrt{\frac{5}{3}}) = x^{2} - \frac{5}{3}.Now, (x - \sqrt{\frac{5}{3}})(x + \sqrt{\frac{5}{3}}) = x^{2} - \frac{5}{3}.(x - 2) \times g(x) + (-2x + 4) = x^{3} - 3x^{2} + x + 2) and(-2x + 4)$ respectively. Find quotient and remainder were $(x - 2)$ and (-2x + 4) respectively. Quotient x Divisor $x^{3} - 3x^{2} + x + 2$ by a polynomial ($x - 2$) $\times g(x)$. The quotient and remainder $x - 2$ and (-2x + 4) respectively. Quotient x Divisor $x^{3} - 3x^{2} + x + 2$ by a $(x - 2) \times g(x) + (-2x + 4) = x^{3} - 3x^{2} + x + 2$ $\Rightarrow (x - 2) \times g(x) + (-2x + 4) = x^{3} - 3x^{2} + x + 2$ $\Rightarrow (x - 2) \times g(x) = x^{3} - 3x^{2} + x + 2 + 2x - 4$ $\Rightarrow g(x) = x^{3} - 3x^{2} + 3x - 2 / (x - 2)$ (1) Let us divide $x^{3} - 3x^{2} + 3x - 2 / (x - 2)$ (1) Let us divide $x^{3} - 3x^{2} + 3x - 2 / (x - 2)$ (1)
$\frac{-x^{2} + x - 1}{2x^{2} - 2x + 5}$ $\frac{-x^{2} + x - 1}{2x^{2} - 2x + 5}$ $\frac{-x^{2} + x^{2} - x}{3}$ $(-x^{3} + x^{2} - x + 2x^{2} - 2x + 2 + 3)$ $= (-x^{3} + x^{2} - x + 2x^{2} - 2x + 2 + 3)$ $= (-x^{3} + x^{2} - x + 2x^{2} - 2x + 2 + 3)$ $= (-x^{3} + x^{2} - x + 2x^{2} - 2x + 2 + 3)$ $= (-x^{3} + 3x^{2} - 3x + 5)$ $(-x^{3} + 3x^{2} - 3x + 5) = (-x^{3} + 3x^{2} - 3x + 5)$ $\therefore LHS = RHS$ $\therefore Division algorithm is verified. Observed Now, as per the division algorithm Q. Obtain all the zeroes of 3x^{4} + 6x^{3} - 2x^{2} - 10x - 5 if twoof its zeroes are \sqrt{\frac{5}{3}} and -\sqrt{\frac{5}{3}}.Since two zeroes are \sqrt{\frac{5}{3}} and -\sqrt{\frac{5}{3}}.Since two zeroes are \sqrt{\frac{5}{3}} and -\sqrt{\frac{5}{3}}, so these are thefactors of the given polynomial.Now, (x - \sqrt{\frac{5}{3}})(x + \sqrt{\frac{5}{3}}) = x^{2} - \frac{5}{3}[Rough x^{2} - \frac{5}{3} = 0, 3x^{2} - 5 = 0] \Rightarrow (3x^{2} - 5) is a factor of the given polynomial.Applying the division algorithm to the givenpolynomial and 3x^{2} - 5, we have[x^{2} - x^{2} + 1] \frac{x^{2} - 2x^{2} - 10x - 5}{3x^{4} - 5x^{2} - 10x - 5} \frac{x^{2} - 2x^{2} - 10x - 5}{3x^{4} - 5x^{2} - 10x - 5} \frac{x^{2} - x + 1}{2x^{2} - 2x^{2} - 10x - 5} \frac{x^{2} - x + 1}{2x^{2} - 2x^{2} - 10x - 5} \frac{x^{2} - x + 1}{2x^{2} - 2x^{2} - 10x - 5} \frac{x^{2} - x + 1}{2x^{2} - 2x^{2} - 10x - 5} \frac{x^{2} - x + 1}{2x^{2} - 2x^{2} - 10x - 5} \frac{x^{2} - x + 1}{2x^{2} - 2x^{2} - 10x - 5} \frac{x^{2} - x + 1}{2x^{2} - 2x^{2} - 10x - 5} \frac{x^{2} - x + 1}{2x^{2} - 2x^{2} - 10x - 5} \frac{x^{2} - x + 1}{2x^{2} - 2x^{2} - 10x - 5} \frac{x^{2} - x + 1}{2x^{2} - 2x^{2} - 10x - 5} \frac{x^{2} - x + 1}{2x^{2} - 2x^{2} - 10x - 5} \frac{x^{2} - x + 1}{2x^{2} - 2x^{2} - 10x - 5} \frac{x^{2} - x + 1}{2x^{2} - 2x^{2} - 10x - 5} \frac{x^{2} - x + 1}{2x^{2} - 2x^{2} - 10x - 5} \frac{x^{2} - x + 1}{2x^{2} - 2x^{2} - 10x - 5} \frac{x^{2} - x + 1}{2x^{2} - 2x^{2} - 2x^{2} - 10x - 5} \frac{x^{2} - x + 1}{2x^{2} - 2x^{2} - 2x^{$
$= (-x^3 + x^2 - x + 2x^2 - 2x + 2 + 3)$ $= (-x^3 + x^2 - x + 2x^2 - 2x + 2 + 3)$ $= (-x^3 + 3x^2 - 3x + 5)$ $= (-x^3 + 3x^2 - 3x + 5)$ $= (-x^3 + 3x^2 - 3x + 5)$ $(-x^3 + 3x^2 - 3x + 5) = (-x^3 + 3x^2 - 3x + 5)$ $\therefore LHS = RHS$ $\therefore Division algorithm is verified. Orights$ of its zeroes are $\sqrt{\frac{5}{3}}$ and $-\sqrt{\frac{5}{3}}$. Since two zeroes are $\sqrt{\frac{5}{3}}$ and $-\sqrt{\frac{5}{3}}$. Since two zeroes are $\sqrt{\frac{5}{3}}$ and $-\sqrt{\frac{5}{3}}$ so these are the factors of the given polynomial. Now, $(x - \sqrt{\frac{5}{3}})(x + \sqrt{\frac{5}{3}}) = x^2 - \frac{5}{3}$ $[Rough x^2 - \frac{5}{3} = 0, 3x^2 - 5 = 0]$ $\Rightarrow (3x^2 - 5)$ is a factor of the given polynomial. Applying the division algorithm to the given polynomial. polynomial and $3x^2 - 5$, we have $[3x^2 - 5], 5x + 6x^2 - 2x^2 - 10x - 5 + 2x^2 - 10x - 5 + 3x^2 - 5x + 2x^2 - 4x + $
$\frac{1}{2x^{2}-2x+5}$ $=(-x^{3}+3x^{2}-3x+5)$ $(-x^{3}+3x^{2}-3x+5)$ $(-x^{3}+3x^{2}-3x+2)$ $(x^{2}+4)$ $(x^{2}+4)$ $(x^{2}-2) \times g(x)$ $(x^{2}-3x^{2}+5)$ $(x^{2}-2) \times g(x) + (-2x+4) = x^{3}-3x^{2}+x+2$ $(x^{2}-3) - (x^{2}-3) + (x^{2}-3x^{2}+x+2) + (x^{2}-3) + (x^{2}-3) + (x^{2}-3x^{2}+x+2)$ $(x^{2}-3) + (x^{2}-3x^{2}+x+2) + (x^{2}-3x^{2}+x+2$
$\frac{2x^{2}-2x+2}{3}$ $\therefore \text{ Quotient is } (x-2) \text{ and remainder is 3. } \qquad (-x^{3} + 3x^{2} - 3x + 5) = (-x^{3} + 3x^{2} - 3x + 5)$ $\therefore \text{ LHS = RHS}$ $\therefore \text{ Division algorithm is verified. } \qquad (2 \text{ Order division algorithm is verified. }) \qquad (2 $
$\frac{1}{3x^{2}-5} = \frac{1}{3x^{4}-5x^{2}-10x-5}$ $\therefore LHS = RHS$ $\therefore LHS = RHS$ $\therefore Division algorithm is verified. 2\sqrt{2}\sqrt{2}\sqrt{2}\sqrt{2} \therefore Division algorithm is verified. 2\sqrt{2}\sqrt{2}\sqrt{2}\sqrt{2}\sqrt{2}\sqrt{2}\sqrt{2}\sqrt{2}\sqrt{2}2$
$\therefore \text{ Quotient is } (x - 2) \text{ and remainder is 3. } \underbrace{\text{Showey}}_{\text{Now, as per the division algorithm}} (x - 2) \text{ and remainder is 3. } \underbrace{\text{Showey}}_{\text{Now, as per the division algorithm}} (x - 2) \text{ and } \operatorname{remainder is 3. } \underbrace{\text{Showey}}_{\text{Now, as per the division algorithm}} (x - 2) \text{ and } \operatorname{remainder is 3. } \underbrace{\text{Showey}}_{\text{Solution all the zeroes of } 3x^4 + 6x^3 - 2x^2 - 10x - 5 \text{ if two}}_{\text{Since two zeroes are } \sqrt{\frac{5}{3}} \text{ and } -\sqrt{\frac{5}{3}}, \\ \text{Since two zeroes are } \sqrt{\frac{5}{3}} \text{ and } -\sqrt{\frac{5}{3}}, \\ \text{Since two zeroes are } \sqrt{\frac{5}{3}} \text{ and } -\sqrt{\frac{5}{3}}, \\ \text{Solution since on dividing } x^3 - 3x^2 + x + 2 \text{ by a polynomial}}_{\text{Solution. Since on dividing } x^3 - 3x^2 + x + 2 \text{ by a polynomial}}_{\text{Solution. Since on dividing } x^3 - 3x^2 + x + 2 \text{ by a polynomial}}_{\text{Solution. Since on dividing } x^3 - 3x^2 + x + 2 \text{ by a polynomial}}_{\text{Solution. Since on dividing } x^3 - 3x^2 + x + 2 \text{ by a polynomial}}_{\text{Solution. Since on dividing } x^3 - 3x^2 + x + 2 \text{ by a polynomial}}_{\text{Solution. Since on dividing } x^3 - 3x^2 + x + 2 \text{ by a polynomial}}_{\text{Core for the given polynomial.}}_{\text{Applying the division algorithm to the given polynomial and } 3x^2 - 5, \text{ we have}}_{\text{Solution algorithm to the given polynomial}}_{\text{Solution algorithm to the given polynomial}}_{\text{Solution } 3x^2 - 5, \text{ we have}}_{\text{Solution } 3x^2 - 5, \frac{x^2 + 2x + 1}{3x^2 - 5}, \frac{x^2 + 2x + 1}{3x^2 $
Now, as per the division algorithmQ. Obtain all the zeroes of $3x^4 + 6x^3 - 2x^2 - 10x - 5$ if twoof its zeroes are $\sqrt{\frac{5}{3}}$ and $-\sqrt{\frac{5}{3}}$.Since two zeroes are $\sqrt{\frac{5}{3}}$ and $-\sqrt{\frac{5}{3}}$.Since two zeroes are $\sqrt{\frac{5}{3}}$ and $-\sqrt{\frac{5}{3}}$ so these are thefactors of the given polynomial.Now, $(x - \sqrt{\frac{5}{3}})(x + \sqrt{\frac{5}{3}}) = x^2 - \frac{5}{3}$ $(3x^2 - 5)$ is a factor of the given polynomial.Applying the division algorithm to the givenpolynomial and $3x^2 - 5$, we have $x^2 + 2x + 1$ $3x^2 - 5/\frac{3x^4 + 6x^2 - 2x^2 - 10x - 5}{\frac{3x^4 - 5x^2 - 10x - 5}{\frac{5x^4 - 10x - 5}{\frac{5x^4 - 10x - 5}{5x^4 $
of its zeroes are $\sqrt{\frac{5}{3}}$ and $-\sqrt{\frac{5}{3}}$. Since two zeroes are $\sqrt{\frac{5}{3}}$ and $-\sqrt{\frac{5}{3}}$ so these are the factors of the given polynomial. Now, $(x - \sqrt{\frac{5}{3}})(x + \sqrt{\frac{5}{3}}) = x^2 - \frac{5}{3}$ $[Rough x^2 - \frac{5}{3} = 0, 3x^2 - 5 = 0]$ $\Rightarrow (3x^2 - 5)$ is a factor of the given polynomial. Applying the division algorithm to the given polynomial and $3x^2 - 5$, we have $3x^2 - 5/3x^2 + 6x^2 - 2x^2 - 10x - 5$ = - + - + + + + + + + + + + + + + + + +
Since two zeroes are $\sqrt{\frac{5}{3}}$ and $-\sqrt{\frac{5}{3}}$ so these are the factors of the given polynomial. Now, $(x - \sqrt{\frac{5}{3}})(x + \sqrt{\frac{5}{3}}) = x^2 - \frac{5}{3}$ [Rough $x^2 - \frac{5}{3} = 0$, $3x^2 - 5 = 0$] $\Rightarrow (3x^2 - 5)$ is a factor of the given polynomial. Applying the division algorithm to the given polynomial and $3x^2 - 5$, we have $\boxed{x^2 + 4}$ respectively. Find g(x). Solution. Since on dividing $x^3 - 3x^2 + x + 2$ by a polynomial $(x - 2) \times g(x)$, The quotient and remainder were $(x - 2)$ and (-2x + 4) respectively, Quotient × Divisor + Remainder = Dividend $\Rightarrow (x - 2) \times g(x) + (-2x + 4) = x^3 - 3x^2 + x + 2$ $\Rightarrow (x - 2) \times g(x) = x^3 - 3x^2 + x + 2 + 2x - 4$ $\Rightarrow g(x) = x^3 - 3x^2 + 3x - 2 / (x - 2) \qquad (1)$ Let us divide $x^3 - 3x^2 + 3x - 2$ by $x - 2$. We get $\frac{x^2 - x + 1}{x^2 - x + 1}$
Since two zeroes are $\sqrt{\frac{5}{3}}$ and $-\sqrt{\frac{5}{3}}$ so these are the factors of the given polynomial. Now, $(x - \sqrt{\frac{5}{3}})(x + \sqrt{\frac{5}{3}}) = x^2 - \frac{5}{3}$ [Rough $x^2 - \frac{5}{3} = 0$, $3x^2 - 5 = 0$] $\Rightarrow (3x^2 - 5)$ is a factor of the given polynomial. Applying the division algorithm to the given polynomial and $3x^2 - 5$, we have $\sqrt{\frac{x^2 - 2x^2 - 10x - 5}{3x^4} - 5\sqrt{\frac{3x^4 + 6x^2 - 2x^2 - 10x - 5}{3x^4} - 5x^4}}$ $= \frac{x^2 - x + 1}{3x^4 - 5\sqrt{\frac{3x^4 + 6x^2 - 2x^2 - 10x - 5}{3x^4} - 5x^4}}$ Solution. Since on dividing $x^3 - 3x^2 + x + 2$ by a polynomial $(x - 2) \times g(x)$. The quotient and remainder were $(x - 2)$ and $(-2x + 4)$ respectively, Quotient \times Divisor $+$ Remainder $=$ Dividend $\Rightarrow (x - 2) \times g(x) + (-2x + 4) = x^3 - 3x^2 + x + 2 + 2x - 4$ $\Rightarrow g(x) = x^3 - 3x^2 + 3x - 2 / (x - 2) \dots (1)$ Let us divide $x^3 - 3x^2 + 3x - 2$ by $x - 2$. We get $\frac{x^2 - x + 1}{x^2 - x + 1}$
factors of the given polynomial. Now, $(x - \sqrt{\frac{5}{3}})(x + \sqrt{\frac{5}{3}}) = x^2 - \frac{5}{3}$ [Rough $x^2 - \frac{5}{3} = 0$, $3x^2 - 5 = 0$] $\Rightarrow (3x^2 - 5)$ is a factor of the given polynomial. Applying the division algorithm to the given polynomial and $3x^2 - 5$, we have $x^2 + 2x + 1$ $3x^2 - 5\sqrt{\frac{3x^4 + 6x^2 - 2x^2 - 10x - 5}{3x^4 + 5x^2 - 5x^2 + 10x - 5}}$ $= \frac{x^2 - x + 1}{3x^2 - 5\sqrt{\frac{3x^4 + 6x^2 - 2x^2 - 10x - 5}{3x^4 - 5x^2 + 10x - 5}}}$ $polynomial (x - 2) \times g(x)$. The quotient and remainder were $(x - 2)$ and (-2x + 4) respectively, Quotient \times Divisor $+$ Remainder $=$ Dividend $\Rightarrow (x - 2) \times g(x) + (-2x + 4) = x^3 - 3x^2 + x + 2$ $\Rightarrow (x - 2) \times g(x) = x^3 - 3x^2 + x + 2 + 2x - 4$ $\Rightarrow g(x) = x^3 - 3x^2 + 3x - 2 / (x - 2) \dots (1)$ Let us divide $x^3 - 3x^2 + 3x - 2$ by $x - 2$. We get $x^2 - x + 1$
Now, $\left(x - \sqrt{\frac{5}{3}}\right)\left(x + \sqrt{\frac{5}{3}}\right) = x^2 - \frac{5}{3}$ [Rough $x^2 - \frac{5}{3} = 0$, $3x^2 - 5 = 0$] $\Rightarrow (3x^2 - 5)$ is a factor of the given polynomial. Applying the division algorithm to the given polynomial and $3x^2 - 5$, we have $\int_{3x^2 - 5}^{x^2 + 2x + 1} \int_{3x^4 - 6x^2 - 2x^2 - 10x - 5}^{x^2 + 2x + 1} \int_{3x^4 - 5\sqrt{\frac{3x^4 + 6x^2 - 2x^2 - 10x - 5}{3x^4 - 5x^2}}} \int_{3x^4 - 5\sqrt{\frac{3x^4 - 5x^2 - 10x - 5}{3x^4 - 5x^2}}} \int_{3x^4 - 5\sqrt{\frac{3x^4 - 5x^2 - 10x - 5}{3x^4 - 5x^2}}} \int_{3x^4 - 5\sqrt{\frac{3x^4 - 5x^2 - 10x - 5}{3x^4 - 5x^2}}} \int_{3x^4 - 5\sqrt{\frac{3x^4 - 5x^2 - 10x - 5}{3x^4 - 5x^2}}} \int_{3x^4 - 5\sqrt{\frac{3x^4 - 5x^2 - 10x - 5}{3x^4 - 5x^2}}} \int_{3x^4 - 5\sqrt{\frac{3x^4 - 5x^2 - 10x - 5}{3x^4 - 5x^2}}} \int_{3x^4 - 5\sqrt{\frac{3x^4 - 5x^2 - 10x - 5}{3x^4 - 5x^2}}} \int_{3x^4 - 5\sqrt{\frac{3x^4 - 2x^2 - 10x - 5}{3x^4 - 5x^2}}}} \int_{3x^4 - 5\sqrt{\frac{3x^4 - 5x^2 - 10x - 5}{3x^4 - 5x^2}}} \int_{3x^4 - 5\sqrt{\frac{3x^4 - 5x^2 - 10x - 5}{3x^4 - 5x^2}}}} \int_{3x^4 - 5\sqrt{\frac{3x^4 - 5x^2 - 10x - 5}{3x^4 - 5x^2}}} \int_{3x^4 - 5\sqrt{\frac{3x^4 - 5x^2 - 10x - 5}{3x^4 - 5x^2}}} \int_{3x^4 - 5\sqrt{\frac{3x^4 - 5x^2 - 10x - 5}{3x^4 - 5x^2}}} \int_{3x^4 - 5\sqrt{\frac{3x^4 - 5x^2 - 10x - 5}{3x^4 - 5x^2}}} \int_{3x^4 - 5\sqrt{\frac{3x^4 - 5x^2 - 10x - 5}{3x^4 - 5x^2}}} \int_{3x^4 - 5\sqrt{\frac{3x^4 - 5x^2 - 10x - 5}{3x^4 - 5x^2}}} \int_{3x^4 - 5\sqrt{\frac{3x^4 - 5x^2 - 10x - 5}{3x^4 - 5x^2}}} \int_{3x^4 - 5\sqrt{\frac{3x^4 - 5x^2 - 10x - 5}{3x^4 - 5x^2}}} \int_{3x^4 - 5\sqrt{\frac{3x^4 - 5x^2 - 10x - 5}{3x^4 - 5x^2}}} \int_{3x^4 - 5\sqrt{\frac{3x^4 - 5x^2 - 10x - 5}{3x^4 - 5x^4}}}} \int_{3x^4 - 5\sqrt{\frac{3x^4 - 5x^4 - 10x - 5}{3x^4 - 5x^4}}} \int_{3x^4 - 5\sqrt{\frac{3x^4 - 5x^4 - 10x - 5}{3x^4 - 5x^4}}} \int_{3x^4 - 5\sqrt{\frac{3x^4 - 5x^4 - 10x - 5}{3x^4 - 5x^4}}} \int_{3x^4 - 5\sqrt{\frac{3x^4 - 5x^4 - 10x - 5}{3x^4 - 5x^4}}} \int_{3x^4 - 5\sqrt{\frac{3x^4 - 5x^4 - 10x - 5}{3x^4 - 5x^4}}} \int_{3x^4 - 5\sqrt{\frac{3x^4 - 5x^4 - 10x - 5}{3x^4 - 5x^4}}} \int_{3x^4 - 5\sqrt{\frac{3x^4 - 5x^4 - 10x - 5}{3x^4 - 5x^4}}} \int_{3x^4 - 5\sqrt{\frac{3x^4 - 5x^4 - 10x - 5}{3x^4 - 5x^4}}} \int_{3x^4 - 5\sqrt{\frac{3x^4 - 5x^4 - 10x - 5}{3x^4 - 5x^4}}} \int_{3x^4 - 5\sqrt{\frac{3x^4 - 5x^4 - 10x - 5}{3x^4 - 5x^4}}} \int_{3x^4 - 5\sqrt{\frac{3x^4 - 5x^4 - 10x - 5}{3x^4 - 5x^4}}} \int_{3x^4 - 5x^4 - 5x^4$
$[\operatorname{Rough} x^{2} - \frac{5}{3} = 0, 3x^{2} - 5 = 0]$ $\Rightarrow (3x^{2} - 5) \text{ is a factor of the given polynomial.}$ Applying the division algorithm to the given polynomial and $3x^{2} - 5$, we have $[x^{2} + 2x + 1]$ $3x^{2} - 5 \int \frac{3x^{4} + 6x^{3} - 2x^{2} - 10x - 5}{3x^{4} - 5x^{2}}$ $= - + + + + + + + + + + + + + + + + + + $
$\Rightarrow (3x^{2}-5) \text{ is a factor of the given polynomial.} Applying the division algorithm to the given polynomial and 3x^{2}-5, we have\boxed{x^{2}+2x+1}3x^{2}-5) \overrightarrow{3x^{4}+6x^{5}-2x^{2}-10x-5}= - + + + + + + + + + + + + + + + + + + $
Applying the division algorithm to the given polynomial and $3x^2-5$, we have $ = \frac{x^2+2x+1}{3x^2-5\sqrt{3x^4+6x^2-2x^2-10x-5}} = \frac{x^2+2x+1}{-x^2-10x-5} = \frac{x^2-2x^2-10x-5}{-x^2-10x-5} = \frac{x^2-x+1}{-x^2-10x-5} = \frac{x^2-x+1}{-x^2-x^2-10x-5} = x^2-x+$
polynomial and $3x^2-5$, we have $\Rightarrow (x-2) \times g(x) = x^3 - 3x^2 + x + 2 + 2x - 4$ $\Rightarrow g(x) = x^3 - 3x^2 + 3x - 2 / (x - 2) \qquad \dots (1)$ Let us divide $x^3 - 3x^2 + 3x - 2$ by $x-2$. We get $\boxed{x^2 - x + 1}$
$3x^{2} - 5 \overline{\smash{\big)}_{3x^{4} + 6x^{2} - 2x^{2} - 10x - 5}^{3x^{4} + 6x^{2} - 2x^{2} - 10x - 5}_{ + +$
Let us divide $x^3 - 3x^2 + 3x - 2$ by $x-2$. We get
$\frac{-}{x^2 - x + 1}$
6x' + 3x' - 10x
$ \begin{array}{c} 6x^{2} - 3x^{2} + 3x - 2 \\ 6x^{2} - 10x \end{array} $
$\frac{-}{3x^2}$ - 5 $\frac{-}{x^2}$ + 3x
$3x^3 - 5$ $- x^2 + 2x$
$\frac{-}{0}$ $\frac{x - 2}{x - 2}$
$3x^{4}+6x^{3}-2x^{2}-10x-5 = (3x^{2}-5)(x^{2}+2x+1)+0$ Now, $x^{2}+2x+1 = x^{2}+x+x+1$ $\Rightarrow \sigma(x) = x^{3}-3x^{2}+3x-2/(x-2)$
=x(x+1)+1(x+1)=(x+1)(x+1) $\Rightarrow g(x)=(x-2)(x^2-x+1)/(x-2)$
So, its other zeroes are -1 and -1 .
polynomial are. $-\begin{bmatrix} 5\\-1 \end{bmatrix}$ and -1 . -1 and -1 .
$\sqrt{3}, \sqrt{3}, \sqrt{3}$



SUBJECT ENRICHMENT		
Draw Graph of Given Quadratic Polynomials		
(a) $x^2 - 2x - 8$	(b) - x^2 - 2x + 3	
(c) $3x^2 - 6x + 3$	(d) $-4x^2 + 4x - 1$	
(e) $3x^2 + 2x + 1$	(f) $-3x^2 + 2x - 2$	
Solve in Project Copy		