

POLYNOMIALS

PPT-5

SUBJECT : MATHEMATICS

CHAPTER NUMBER: 02

CHAPTER NAME : POLYNOMIALS

CHANGING YOUR TOMORROW

Learning outcome

- 1. Students will be able to know Division algorithm for polynomials
- 2. Students will be able to establish relationship among dividend, divisor, quotient and the remainder.
- 3. Students will be able to find the remaining zeroes of a polynomial when some of its zeroes are given.

PREVIOUS KNOWLEDGE TEST

Division algorithm for polynomials.

$p(x)$ 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 $r(x) < \text{degree of } g(x)$. This result is known as division algorithm for polynomials.

- Find all the zeroes of polynomial $2x^4 - 9x^3 + 5x^2 + 3x - 1$ if two of its zeroes are $2 + \sqrt{3}$ and $2 - \sqrt{3}$;
- <https://youtu.be/GPyeOXKoKGs>

Find all zeroes of the polynomial

$(2x^4 - 9x^3 + 5x^2 + 3x - 1)$ if two of its zeroes are $(2 + \sqrt{3})$ and $(2 - \sqrt{3})$.

Sol. Since, $(2 + \sqrt{3})$ and $(2 - \sqrt{3})$ are the two zeroes of the given polynomial $2x^4 - 9x^3 + 5x^2 + 3x - 1$,

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

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

$= (x^2 - 4x + 1)$ is the factor of the given polynomial.

$$\begin{array}{r}
 x^2 - 4x + 1 \overline{) 2x^4 - 9x^3 + 5x^2 + 3x - 1} \\
 \underline{2x^4 - 8x^3 + 2x^2} \\
 -x^3 + 3x^2 + 3x - 1 \\
 \underline{-x^3 + 4x^2 - x} \\
 -x^2 + 4x - 1 \\
 \underline{-x^2 + 4x - 1} \\
 0
 \end{array}$$

For other zeroes: $2x^2 - x - 1 = 0$

$$(x - 1)(2x + 1) = 0$$

$$\therefore x - 1 = 0 \quad \text{or} \quad 2x + 1 = 0$$

$$\Rightarrow x = 1 \quad \text{or} \quad 2x = -1 \Rightarrow x = \frac{-1}{2}$$

Therefore, other zeroes are 1 and $\frac{-1}{2}$.

Obtain all other zeroes of $3x^4 + 6x^3 - 2x^2 - 10x - 5$, if two of its zeros are $-\sqrt{5}/\sqrt{3}$ and $\sqrt{5}/\sqrt{3}$

<https://youtu.be/Oej2izbKZhU>

• Obtain all other zeroes of $3x^4 + 6x^3 - 2x^2 - 10x - 5$,

if two of its zeroes are $\sqrt{\frac{5}{3}}$ and $-\sqrt{\frac{5}{3}}$.

Polynomial is $3x^4 + 6x^3 - 2x^2 - 10x - 5 = p(x)$ (say)

Its two zeroes are $\sqrt{\frac{5}{3}}$ and $-\sqrt{\frac{5}{3}}$.

$$\therefore x = \sqrt{\frac{5}{3}} \text{ and } x = -\sqrt{\frac{5}{3}}$$

Now $x - \sqrt{\frac{5}{3}} = 0$ and $x + \sqrt{\frac{5}{3}} = 0$.

On multiplying we have $x^2 - \frac{5}{3} = 0$

$$\therefore 3x^2 - 5 = 0.$$

$$\therefore g(x) = 3x^2 - 5$$

On dividing $p(x)$ by $g(x)$

$$\begin{array}{r} \overline{) 3x^4 + 6x^3 - 2x^2 - 10x - 5} \\ \underline{- 3x^4} \\ \overline{) 6x^3 + 3x^2 - 10x - 5} \\ \underline{- 6x^3} \\ \overline{) 3x^2 - 5} \\ \underline{- 3x^2} \\ \overline{) 0} \\ \underline{- 0} \\ 0 \end{array}$$

$$\text{Hence, } 3x^4 + 6x^3 - 2x^2 - 10x - 5 = (3x^2 - 5)(x^2 + 2x + 1)$$

For zeroes, $3x^2 - 5 = 0$ or $x^2 + 2x + 1 = 0$

Other zeroes are

$$\Rightarrow x^2 + 2x + 1 = 0$$

$$x^2 + x + x + 1 = 0$$

$$x(x + 1) + 1(x + 1) = 0$$

$$\Rightarrow (x + 1)(x + 1) = 0$$

$$\Rightarrow x = -1, -1.$$

:HOME ASSIGNMENT - Ex. 2.3 Q. No 3 to 4.

AHA

1. If the zeroes of the polynomial $x^3 - 3x^2 + x + 1$ are $a - b$, a , $a + b$, find a and b .
2. If two zeroes of the polynomial $x^4 - 6x^3 - 26x^2 + 138x - 35$ are $2 \pm \sqrt{3}$ find other zeroes.

THANKING YOU
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