POLYNOMIALS

PPT-5

SUBJECT : MATHEMATICS
CHAPTER NUMBER: 02
CHAPTER NAME : POLYNOMIALS

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Learning outcome

- 1.Students will be able to know Division algorithm for polynomials

2. Students will be able to establish relationship among dividend,divisior,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 $r(x)$ < 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 zeors 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.

$$
\begin{array}{r|l}
 & 2x^2 - x - 1 \\
\hline
x^2 - 4x + 1 & 2x^4 - 9x^3 + 5x^2 + 3x - 1 \\
 & 2x^4 - 8x^3 + 2x^2 \\
 & - \quad + \quad - \\
\hline
 & -x^3 + 3x^2 + 3x - 1 \\
 & -x^3 + 4x^2 - x \\
 & + \quad - \quad + \\
\hline
 & -x^2 + 4x - 1 \\
 & -x^2 + 4x - 1 \\
 & + \quad - \quad + \\
\hline
 & 0
\end{array}
$$

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

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

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

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

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

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Changing your Tomorrow

Obtain all other zeroes of 3x4 +6x3 -2x2 -10x -5,if two of its zeros are - √5/$\sqrt{3}$ and √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 $-\sqrt{\frac{5}{3}}$.

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

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

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

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

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

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

$$
\begin{array}{r|l}
 & x^2 + 2x + 1 \\
3x^2 - 5 & 3x^4 + 6x^3 - 2x^2 - 10x - 5 \\
 & \underline{\overset{-}{3x^4} \qquad \overset{+}{-}5x^2} \\
 & 6x^3 + 3x^2 - 10x - 5 \\
 & \underline{\overset{-}{6x^3} \qquad \overset{+}{-}10x} \\
 & 3x^2 - 5 \\
 & \underline{\overset{-}{3x^2} \overset{+}{-} 5} \\
 & 0
\end{array}
$$

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

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

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

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

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

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

: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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