A Real English Medium School

VIDYA SHREE ACADEMY
SR. SEC. SCHOOL

An English Medium Co.Ed. School | Science & Commerce

Little Steps
Pre Primary wing of VSA

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Subject – Maths. Class- 9 Topic – Ch. 2 Polynomials

Refer to Video #10 and solve the following exercise:

Practice Exercise 2.3

1. Find the remainder when $x^3 + 3x^2 + 3x + 1$ is divided by :

   (i) $x + 1$ (ii) $x - \frac{1}{2}$ (iii) x (iv) $x + \pi$ (v) $5 + 2x$
2. Find the remainder when $x^3 - ax^2 + 6x - a$ is divided by $x - a$.
3. Check whether $7 + 3x$ is a factor of $3x^3 + 7x$.
4. Divide the polynomial $2x^4 + 7x^3 + 4x^2 - 7x - 9$ by $x + 1$.
5. Divide the polynomial $x^4 + 1$ by $x - 1$ and find the remainder. [NCERT Exemplar Problems]
6. If $p(x) = 4x^3 - 12x^2 + 14x - 3$, find the remainder when $p(x)$ is divided by $2x - 1$. Also, verify the result by actual division. [NCERT Exemplar Problems]
7. When $x^3 - ax^2 + 11x - 6$ is divided by $(x - 4)$, the remainder is 6. Find the value of a.
8. When $4x^3 + 18x^2 + 14x + k$ is divided by $2x + 5$, the remainder is 0. Find the value of k.
9. If the polynomials $az^3 + 4z^2 + 3z - 4$ and $z^3 - 4z + a$ leave the same remainder when divided by $z - 3$, find the value of a.
10. If the polynomial $p(x) = x^4 - 3x^3 + x^2 + ax + b$ is divided by $(x - 1)$ and $(x + 1)$ leaves the remainders 13 and 9 respectively, find the values of a and b. Hence, find the remainder when $p(x)$ is divided by $(x - 2)$.
11. The polynomial $p(x) = 3x^3 + kx^2 - 10$ when divided by $(x + 3)$ leaves a remainder which is double the remainder left by the polynomial $q(x) = x^4 - 3x^3 - 3x^2 + kx - 5$ when divided by $(x - 3)$. Find the value of k.
12. Let R_1 and R_2 be the remainders when the polynomials $kx^3 + 3x^2 - 14x + 5$ and $x^3 - 5x^2 + kx + 12$ are divided by $(x + 3)$ and $(x - 2)$ respectively. If $R_1 - R_2 = 16$, then find the value of k.
13. Use the factor theorem to determine whether $g(x)$ is a factor of $f(x)$ or not.

    (i) $f(x) = x^3 + x^2 - 10x + 8$; $g(x) = x + 4$

    (ii) $f(x) = x^3 - 7x - 6$; $g(x) = x - 3$

    (iii) $f(x) = 2x^3 - 3x^3 - 5x$; $g(x) = x + 1$

    (iv) $f(x) = 2x^2 - 2\sqrt{2}x^2 + \sqrt{2}x + 4$; $g(x) = x - \sqrt{2}$
14. Without actual division, prove that $x^4 - 5x^3 + 7x^2 - 5x + 6$ is exactly divisible by $x^2 - 5x + 6$.
15. If both $(x - 2)$ and $\left(x - \frac{1}{2}\right)$ are factors of $px^2 + 5x + r$, then show that $p = r$. [NCERT Exemplar Problems]
16. What must be added to $2x^3 + 13x^2 + 17x + 7$ to obtain a polynomial which is exactly divisible by $(x + 5)$.
17. What must be subtracted from $3x^3 - 11x^2 + 11x - 10$ to obtain a polynomial which is exactly divisible by $(x - 3)$.
18. Divide the polynomial $3x^4 - 2x^3 - x^2 - 9x + 14$ by $x - 2$.
19. Divide the polynomial $x^3 - 3x^2 + 4x + 5$ by $x + 1$.
20. Divide the polynomial $x^5 + 1$ by $x + 1$.
21. If $p(x) = 2x^4 - 3x^3 - 5x^2 + 8x - 3$, find the remainder when $p(x)$ is divided by $\left(x - \frac{3}{2}\right)$. Also, verify the result by actual division.
22. When $ax^3 - 11x^2 + 19x - 10$ is divided by $\left(x - \frac{5}{2}\right)$, the remainder is 0. Find the value of a.
23. If the polynomial $p(x) = x^4 - 3x^3 - x^2 + ax - b$ is divided by $(x + 2)$ and $(x - 2)$ leaves the remainders -10 and -6 respectively. Find the values of a and b. Hence, find the remainder when $p(x)$ is divided by $(x - 1)$.
24. The polynomial $kx^4 - 4x^2 + 8$ when divided by $(x - 2)$, leaves a remainder which is double the remainder left by the polynomial $2x^3 + kx^2 - 5x + 6$ when divided by $(x + 2)$. Find the value of k.
25. If $(x + 2a)$ is a factor of $x^5 - 4a^2x^3 + 2x + 2a + 3$, find a. [NCERT Exemplar Problems]
26. Find the value of m so that $(2x - 1)$ be a factor of $8x^4 + 4x^3 - 16x^2 + 10x + m$. [NCERT Exemplar Problems]
27. Determine the values of h and k, such that $2x^2 - 11x + 5$ is a factor of the polynomial $2x^3 - 9x^2 + hx + k$.
28. Without actual division, prove that $2x^4 - 5x^3 + 2x^2 - x + 2$ is divisible by $x^2 - 3x + 2$. [NCERT Exemplar Problems]
29. Given that $(x - 3)$ is a factor of $x^4 - x^3 - 8x^2 + ax + 12$. Show that $(x + a)$ is a factor of $x^3 - 2x + 4$.
30. If both $(x - 3)$ and $\left(x - \frac{1}{3}\right)$ are the factors of $px^2 + 5x + r$, then show that $p - r = 0$.

2.9. FACTORISATION OF POLYNOMINALS

In this reaction, we shall use factor theorem for the factorisation of polynomials with integral coefficients. To find the rational roots of the polynomials with integeral coefficients, the theorems given below, will be used :

Theorem 1 : *If $f(x)$ is a polynomial with integral polynomial coefficient and leading coefficient 1, then an integeral root of $f(x)$ is a factor of constant term.*