

2. Polynomials

Q 1 Check, whether 1 is the zero of the polynomial $9x^3 - 5x + 20$.

Mark (1)

Q 2 Factorise $\frac{2x^2}{8} - \frac{2y^2}{8}$.

Mark (1)

Q 3 Show that $x = 1$ is a zero of the polynomial $3x^3 - 4x^2 + 8x - 7$.

Mark (1)

Q 4 Is $(y^2)^{\frac{1}{2}} + 2\sqrt{3}$ a polynomial ?

Mark (1)

Q 5 Check whether $\sqrt[3]{x} - \sqrt{2}x$ is a polynomial.

Mark (1)

Q 6 Find the degree of polynomial $30x^5 - 15x^2 + 40$.

Mark (1)

Q 7 Find the degree of the polynomial $4x+5$.

Mark (1)

Q 8 **If $\left(a + \frac{1}{a}\right) = b$, then find the value of $a^3 + \frac{1}{a^3} + 3\left(a + \frac{1}{a}\right)$.**

Mark (1)

Q 9 Find the remainder when $6x^3 - 5x^2 + 2x - 9$ is divided by $(x - 1)$.

Mark (1)

Q 10 Find the zeroes of the polynomial $6x^2 - 3$.

Mark (1)

Q 11 Find the zeroes of the quadratic polynomial $x^2 - 4x + 3$.

Mark (1)

Q 12 Find the zeroes of the quadratic polynomial $x^2 + 7x + 10$.

Mark (1)

Q 13 Given a polynomial $p(x)$. The graph of $y = p(x)$ intersects the x -axis at three points. Find the number of zeroes of $p(x)$.

Mark (1)

Q 14 Find the zeroes of polynomial $2x^2 - 8$.

Marks (2)

Q 15 Using a suitable identity, factorise the following expressions:

(i) $\frac{x^2}{4} - \frac{y^2}{4}$

(ii) $x^2 - \frac{y^2}{100}$

Marks (2)

Q 16 Factorise: $4y^2 - 4y + 1$.

Marks (2)

Q 17 Show that $x = 1$ is a zero of the polynomial $2x^3 - 3x^2 + 7x - 6$.

Marks (2)

Q 18 Give one example each of a binomial of degree 35 and a monomial of degree 100.

Marks (2)

Q 19 Classify the following polynomials as linear, quadratic, cubic & bi-quadratic polynomials:

(i) $x + x^2 + 4$

(ii) $3x - 2$

(iii) $3y$

(iv) $7t^4 + 4t^3 + 3t - 2$

Marks (2)

Q 20 Write the degrees of each of the following polynomials:

(i) $7x^3 + 4x^2 - 3x + 12$

(ii) $12 - x + 2x^3$

(iii) $5x - \sqrt{2}$

(iv) 7

Marks (2)

Q 21 Write the coefficient of x^2 in each of the following:

(1) $17 - 2x + 7x^2$

(2) $9 - 12x + x^3$

(3) $\frac{\pi}{6}x^2 - 3x + 4$

(4) $\sqrt{3}x - 7$

Marks (2)

Q 22 Find the zeroes of the quadratic polynomial $x^2 - 4x + 3$.

Marks (2)

Q 23 Resolve into factors: $27x^3 + y^3 + z^3 - 9xyz$.

Marks (3)

Q 24 Factorise: $64a^3 - 27b^3 - 144a^2b + 108ab^2$.

Marks (3)

Q 25 If $p = 2 - a$, then show that $a^3 + 6ap + p^3 - 8 = 0$.

Marks (3)

Q 26 If $x + y + z = 6$, $xy + yz + zx = 11$. Find the value of $x^2 + y^2 + z^2$.

Marks (3)

Q 27 Factorise:

(i) $27y^3 + 125z^3$

(ii) $64m^3 - 343n^3$

Marks (3)

Q 28 Factorise:

$$27p^3 - \frac{1}{216} - \frac{9}{2}p^2 + \frac{1}{4}p$$

Marks (3)

Q 29 Find the value of k, if $(x - 1)$ is a factor of the following expression:

$$p(x) = kx^2 - \sqrt{2}x + 1$$

Marks (3)

Q 30 Divide the polynomial $3x^4 - 4x^3 - 3x - 1$ by $x - 1$.

Marks (3)

Q 31 Check whether $7 + 3x$ is a factor of $3x^3 + 7x$.

Marks (3)

Q 32 Find the zero of the polynomial in each of the following cases:

(i) $h(x) = 2x$

(ii) $p(x) = cx + d, c \neq 0$

(iii) $p(x) = ax, a \neq 0$

Marks (3)

Q 33 If $x = 4/3$ is a zero of the polynomial $f(x) = 2x^3 - 11x^2 + kx - 20$, find the value of k.

Marks (3)

Q 34 Identify constant, linear, quadratic & cubic polynomials from the following polynomials:

(i) $f(x) = 0$

(ii) $g(x) = 2x^3 - 7x + 4$

(iii) $h(x) = -3x + \frac{1}{2}$

(iv) $p(x) = 2x^2 - x + 4$

(v) $q(x) = 4x + 3$

(vi) $r(x) = 3x^3 + 4x^2 + 5x - 7$

Marks (3)

Q 35 Give possible expressions for the length & breadth of the rectangle whose area is given by $A = 25a^2 - 35a + 12$.

Marks (4)

Q 36 Factorise the polynomial $x^3 - 23x^2 + 142x - 120$.

Marks (4)

Q 37 Factorise:

(i) $12x^2 - 7x + 1$

(ii) $f(x) = 2x^2 + 7x + 3$

Marks (4)

Q 38 Write each of the following expressions, as a product of linear factors, with integer coefficient:

(i) $5x^2 + 16x + 3$

(ii) $24p^2 - 41p + 12$

Marks (4)

Q 39 Use the factor theorem to determine whether $g(x)$ is a factor of $f(x)$ in each of the following cases:

(i) $f(x) = x^3 - 3x^2 + 4x - 4$, $g(x) = x - 2$

(ii) $f(x) = 2\sqrt{2}x^2 + 5x + \sqrt{2}$, $g(x) = x + \sqrt{2}$ Marks (4)

Q 40 Check whether the following polynomials have $(x + 1)$ as a factor.

(i) $x^3 + x^2 + x + 1$

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

Marks (4)

Q 41 Find the remainder when $x^3 + 3x^2 + 3x + 1$ is divided by

(i) $x + 1$

(ii) $x - \frac{1}{2}$

Marks (4)

Q 42 Which of the following expressions are polynomial and which are not? State reasons for your answer.

(1) $3x^2 - 4x + 15$

(2) $y^2 + 2\sqrt{3}$

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

Marks (4)

Q 43 If $f(x) = 2x^3 - 13x^2 + 17x + 12$, find

(i) $f(2)$

(ii) $f(-3)$

Marks (4)

Most Important Questions

Q 1 Find the degree of the following polynomials.

a) $x^3 + 4x^5 + 3x - 7$ b) $x^2 - 5x + 7$

Q 2 Identify the following polynomials as linear, Quadratic or cubic.

a) $5x+7$

b) x^3-8

Q 3 Identify which if the following are polynomials?

a) $x^3 - \sqrt{(2)x + 5x^2 + 7}$ b) $x + (1/x)$

Q 4 Find the coefficient of x^2 in the following expressions.

a) $x^3 - 2x^2 + 5x - 9$ b) $-\pi x^2 + x - 5$

Q 5 Find the value of $\sqrt{2x^2 - 5x + 3}$ at $x = 0$.

Q 6 Verify whether $x = -4$ is a Zero of the polynomial $x^2 - 5x + 36$.

$$x = -\frac{2}{\sqrt{3}}$$

Q 7 Verify if $x = -\frac{2}{\sqrt{3}}$ is a root (Zero) of the polynomial $f(x) = 3x^2 - 2$.

Q 8 If $x = 2$ is a root of the polynomial $f(x) = 2x^2 - 3x + 7a$, find the value of 'a'.

Q 9 If $x = -(1/2)$ is a zero of the polynomial $f(x) = 2x^3 + ax^2 - 3x + 2$, find the value of 'a'.

Q 10 Find one integral roots of the polynomial $f(x) = x^3 + 6x^2 + 11x + 6$.

Q 11 If $x = 0$ and $x = -2$ be the zeros of the polynomial $p(x) = x^3 - 2x^2 + 3ax + b$. Find the values of a and b.

Q 12 Check whether 2, 3, $-1/2$ are the rational roots of the polynomial $2x^3 + 3x^2 - 11x - 6$.

Q 13 If $x = 4/3$ is a root of the polynomial $f(x) = 6x^3 - 11x^2 + kx - 20$, find the value of k.

Q 14 Define a polynomial. Are all algebraic expressions polynomials. Explain with the help of examples.

Q 15 Find all the rational roots of the polynomial $f(x) = 2x^3 + x^2 - 7x - 6$.

Q 16 Using remainder theorem find the remainder when $x = 0$ of the polynomial $2x^2 + 7x + 5$.

Q 17 Check if $x + 3$ is a factor of the polynomial $3x^2 + 7x - 6$.

Q 18 Find the remainder when $(x - 1/2)$ is divided by the polynomial $4x^2 - 2x + 1$.

Q 19 Show that $(x-1)$ is a factor of $x^{10}-1$.

Q 20 Find the remainder when $x^3 + 3x^2 + 3x + 1$ is divided by $x + \pi$.

Q 21 Find the remainder when $x^3 + 3x^2 + 3x + 1$ is divided by $x + \pi$.

Q 22 Find a and b, if $x + 1$ and $x + 2$ are the factors of $x^3 + 3x^2 - 2ax + b$.

Q 23 What should be subtracted from the polynomial $x^3 - 6x^2 - 15x + 80$ so that the result is exactly divisible by $x^2 + x - 12$.

Q 24 What is the value of k, if $x - 3$ is a factor of the polynomial $k^2x^3 - kx^2 + 3kx - k$?

Q 25 The polynomials $ax^3 + 3x^2 - 13$ and $2x^3 - 5x + a$ are divided by $x + 2$. If the remainder in each case is the same, find the value of 'a'.

Q 26 Factorize $x^3 - 2x^2y + x$.

Q 27 Evaluate: $23^3 - 17^3$.

Q 28 Write the expanded form of $(3x + 2y - z)^2$.

Q 29 Factorize the following $8a^3 + b^3 + 12a^2b + 6ab^2$.

Q 30 Factorize $3 - 12(a - b)$.

Q 31 Factorize the following $x^3 + x - 3x^2 - 3$.

Q 32 Factorize $a^2 + b^2 + 2(ab + bc + ca)$.

$$\begin{aligned}
 27a^3 + 125b^3 &= (3a)^3 + (5b)^3 \\
 &= (3a + 5b)\{(3a)^2 - 15ab + (5b)^2\} \\
 &= (3a + 5b)(9a^2 - 15ab + 25b^2)
 \end{aligned}$$

Q 33 Factorize $27a^3 + 125b^3$.

Q 34 Factorize $10x^4y - 10xy^4$.

Q 35 Factorize $x^3 - 12x(x - 4) - 64$.

Q 36 Factorize $8x^3 + 27y^3 + z^3 - 18xyz$.

Q 37 Factorize $(a^2 - b^2)^3 + (b^2 - c^2)^3 + (c^2 - a^2)^3$.

Q 38 Factorize $32a^3 + 108b^3$.

$$155 \times 155 \times 155 - 55 \times 55 \times 55$$

Q 39 Simplify the following $155 \times 155 + 155 \times 55 + 55 \times 55$

Q 40 Factorize $x^8 - y^8$.

Q 41 Using factor theorem factorize the following expression $x^3 - 6x^2 + 3x + 10$.