

CHAPTER TEST: POLYNOMIALS
Mathematics | Class IX (2026/POLYN/09/001)

Time: 1.5 Hours

Max. Marks: 40

GENERAL INSTRUCTIONS

- All questions are compulsory.
 - The question paper consists of **five sections: A, B, C, D, and E.**
 - Section A contains **8 Multiple Choice Questions (MCQs)** of **1 mark each.**
 - Section B contains **4 Very Short Answer** questions of **2 marks each.**
 - Section C contains **3 Short Answer** questions of **3 marks each.**
 - Section D contains **2 Long Answer** questions of **5 marks each.**
 - Section E contains **1 Case Study–based question** of **5 marks.**
 - Use of calculators or any electronic devices is **not permitted**, unless stated otherwise.
 - All necessary working steps must be clearly shown for full marks.
 - The use of appropriate units and correct mathematical symbols is compulsory.
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Section A (Multiple Choice Questions)

1. Which of the following expressions is a polynomial in one variable?
 - (a) $x + \frac{2}{x} + 3$
 - (b) $\sqrt{3}x^2 + 5x - 1$
 - (c) $y^2 + \sqrt{y} + 7$
 - (d) $x^2 + y + 2$
2. The degree of the non-zero constant polynomial is:
 - (a) 0
 - (b) 1
 - (c) Not defined
 - (d) Any natural number
3. If $p(x) = x + 3$, then $p(x) + p(-x)$ is equal to:
 - (a) 3
 - (b) $2x$
 - (c) 0
 - (d) 6

4. A cubic polynomial can have at most how many zeroes?
- (a) 1
 - (b) 2
 - (c) 3
 - (d) 4
5. The value of the polynomial $5x - 4x^2 + 3$ at $x = -1$ is:
- (a) 6
 - (b) -6
 - (c) 2
 - (d) -2
6. If the graph of a linear polynomial $p(x) = ax + b$ intersects the x-axis at exactly one point, that point is:
- (a) $(b/a, 0)$
 - (b) $(-b/a, 0)$
 - (c) $(0, -b/a)$
 - (d) $(a/b, 0)$
7. The zero of the polynomial $q(y) = 3y - \pi$ is:
- (a) π
 - (b) $3/\pi$
 - (c) $\pi/3$
 - (d) 0
8. Which identity is used to evaluate $(102) \times (98)$ without direct multiplication?
- (a) $(a + b)^2$
 - (b) $(a - b)^2$
 - (c) $(a + b)(a - b)$
 - (d) $(x + a)(x + b)$

Section B (Very Short Answer Questions)

1. Classify the following as linear, quadratic, or cubic polynomials: (i) $4 - y^2$ (ii) $3t$ (iii) $x^3 - x$ (iv) $7x^2 + 4x + 1$ (2)
2. Find the value of k if $x = 2$ is a zero of the polynomial $p(x) = kx^2 - 3x + k$. (2)
3. Evaluate the following using a suitable algebraic identity: $(99)^2$. (2)
4. Write the coefficients of x^2 in each of the following: (i) $2 - x^2 + x^3$ (ii) $\frac{\pi}{2}x^2 + x$ (2)

Section C (Short Answer Questions)

1. Draw the graph of the linear polynomial $f(x) = 2x - 4$. From the graph, identify the point where the polynomial becomes zero. (3)
2. If $x + y = 12$ and $xy = 27$, find the value of $x^2 + y^2$. (3)
3. Verify whether the following are zeroes of the polynomial, indicated against them: (i) $p(x) = 3x^2 - 1, x = -1/\sqrt{3}, 2/\sqrt{3}$ (ii) $g(x) = lx + m, x = -m/l$ (3)

Section D (Long Answer Questions)

1. Expand the following using suitable identities: (i) $(2x - y + z)^2$ (Hint: use extension of $(a + b)^2$) (ii) Solve $(x + 4)(x + 10)$ and $(3 - 2x)(3 + 2x)$ stating the identity used. (5)
2. A polynomial $p(x) = ax^3 + bx^2 + x - 6$ has zeroes at $x = 1$ and $x = -2$. (i) Form two equations in a and b . (ii) Find the values of a and b . (iii) Determine the degree and type of the resulting polynomial. (5)

Section E (Case Study Based Question)

Case Study: The Architectural Arch

An architect is designing the entrance of a modern community center. The shape of the main entrance arch is modeled by a mathematical expression to ensure structural stability and aesthetic symmetry. The height of the arch at any distance x from the left pillar is represented by a polynomial $H(x)$. The arch meets the ground level at two points, which mathematically correspond to the zeroes of the polynomial. For a simpler section of the building, the architect uses a linear support beam whose height is given by $L(x) = 0.5x + 2$. The engineers need to calculate the "value" of these polynomials at specific points to determine the amount of material required. They also observe that the degree of the polynomial dictates the complexity of the curve—a linear polynomial results in a straight beam, while a quadratic one creates the characteristic curve of the arch.

Based on the above information, answer the following questions:

1. If the height of a specific arch is given by $H(x) = -x^2 + 6x - 5$, what is the height at $x = 2$ units?
 - (a) 1 unit
 - (b) 3 units
 - (c) 5 units
 - (d) 0 units
2. At what distance x from the origin will the linear support beam $L(x) = 0.5x + 2$ meet the ground (height = 0)?
 - (a) $x = 4$
 - (b) $x = -4$
 - (c) $x = 2$

- (d) $x = 0$
3. If a polynomial has the form $ax^2 + bx + c$, it is classified as a:
- (a) Linear polynomial
 - (b) Quadratic polynomial
 - (c) Cubic polynomial
 - (d) Constant polynomial
4. For the arch $H(x) = -x^2 + 6x - 5$, the points where it hits the ground ($H(x) = 0$) are $x = 1$ and $x = 5$. These values are called:
- (a) Coefficients
 - (b) Degrees
 - (c) Zeroes
 - (d) Terms
5. What is the coefficient of x in the linear beam polynomial $L(x) = 0.5x + 2$?
- (a) 2
 - (b) 0.5
 - (c) 0
 - (d) 1

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