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SOLUTIONS: CHAPTER TEST - POLYNOMIALS

Mathematics | Class IX (2026/POLYN/09/003)

Section A (Multiple Choice Questions)

1. (b) 1.

$$p(0) = 0^2 - 0 + 1 = 1.$$

$$p(1) = 1^2 - 1 + 1 = 1.$$

$$\text{Product: } p(0) \times p(1) = 1 \times 1 = 1.$$

2. (d) Not defined.

The degree of a constant polynomial (like 5) is 0, but the degree of the zero polynomial (0) is specifically not defined.

3. (c) $x^{100} + x^{99}$.

A binomial has exactly two terms. Degree 100 means the highest power is 100.

4. (b) 9.

If $(x + 2)$ is a factor, then $p(-2) = 0$.

$$(-2)^2 + m(-2) + 14 = 0 \implies 4 - 2m + 14 = 0 \implies 18 = 2m \implies m = 9.$$

5. (c) 3, -4.

Set $(x - 3)(x + 4) = 0$. This gives $x - 3 = 0 \implies x = 3$ and $x + 4 = 0 \implies x = -4$.

6. (b) $x^4 - 1/x^4$.

$$(x - 1/x)(x + 1/x) = x^2 - 1/x^2.$$

$$\text{Then } (x^2 - 1/x^2)(x^2 + 1/x^2) = (x^2)^2 - (1/x^2)^2 = x^4 - 1/x^4.$$

7. (c) ax .

A line passing through the origin must have no constant term (y -intercept is 0). Thus $b = 0$ in $y = ax + b$.

8. (b) $(a + b)^2$.

$$(10.1)^2 = (10 + 0.1)^2. \text{ Using } (a + b)^2 = a^2 + 2ab + b^2 \text{ is most efficient.}$$

Section B (Very Short Answer Questions)

1. **Example of Trinomial (Degree 3):** $x^3 + x^2 + 1$.

Example of Monomial (Degree 0): 5 (any non-zero constant).

2. By Remainder Theorem, check $q(-1/2)$:

$$q(-1/2) = 4(-1/8) + 4(1/4) - (-1/2) - 1 = -1/2 + 1 + 1/2 - 1 = 0.$$

Since remainder is 0, $q(t)$ is a multiple of $2t + 1$.

3. $(105) \times (95) = (100 + 5)(100 - 5) = 100^2 - 5^2 = 10000 - 25 = 9975$.

4. $f(2) = 3(2)^2 - 4(2) + \sqrt{11} = 3(4) - 8 + \sqrt{11} = 12 - 8 + \sqrt{11} = 4 + \sqrt{11}$.

Section C (Short Answer Questions)

1. $(x + 1/x)^2 = x^2 + 1/x^2 + 2(x)(1/x) = 23 + 2 = 25$.

$$x + 1/x = \sqrt{25} = 5 \text{ (positive value).}$$

2. For $p(x) = 3 - x$:
 x -intercept (set $y = 0$): $0 = 3 - x \implies x = 3$. Point: $(3, 0)$.
 y -intercept (set $x = 0$): $y = 3 - 0 \implies y = 3$. Point: $(0, 3)$.
The **zero** of the polynomial is $x = 3$.
3. $(2a - 3b + 4c)^2 = (2a)^2 + (-3b)^2 + (4c)^2 + 2(2a)(-3b) + 2(-3b)(4c) + 2(4c)(2a)$
 $= 4a^2 + 9b^2 + 16c^2 - 12ab - 24bc + 16ca$.

Section D (Long Answer Questions)

1. (i) $x^2 + 9x + 18 = x^2 + (6 + 3)x + (6 \times 3) = (x + 6)(x + 3)$.
(ii) Since $(x - k)$ is a factor, k is a root for both:
 $k^2 + ak + b = 0 \implies k^2 = -ak - b$
 $k^2 + mk + n = 0 \implies k^2 = -mk - n$
Equating: $-ak - b = -mk - n \implies mk - ak = b - n \implies k(m - a) = b - n$.
 $k = \frac{b-n}{m-a} = \frac{n-b}{a-m}$. (Proved)
2. (i) $x^2 + y^2 = \frac{(x+y)^2 + (x-y)^2}{2} = \frac{10^2 + 2^2}{2} = \frac{104}{2} = 52$.
(ii) Graph $y = 2x + 3$: At $x = 0, y = 3$; at $x = -1.5, y = 0$.
(iii) The degree is 1, which means the graph is a **straight line**. Linear polynomials always represent a constant rate of change.

Section E: Case Study

1. (b) **9 thousand**. $R(5) = -(5^2) + 10(5) - 16 = -25 + 50 - 16 = 9$.
2. (a) $x = 2$ and $x = 8$.
 $-x^2 + 10x - 16 = 0 \implies x^2 - 10x + 16 = 0 \implies (x - 2)(x - 8) = 0$.
3. (b) **1**. A linear polynomial has degree 1.
4. (b) **-1**. From the term $-x^2$.
5. (b) **-16 thousand**. $R(0) = -0^2 + 10(0) - 16 = -16$. (This represents initial fixed costs/loss).