

Polynomials

MCQ Test, Set 01

Time: 30 minutes

Maximum marks: 25

Name: _____ Class: _____ Date: _____

- There are 25 questions. Each has exactly one correct answer: choose A, B, C or D.
- Each correct answer carries 1 mark. There is no negative marking.
- The key sheet and worked solutions are at the end of this test.

1. Which of the following is a monomial?

- A. $2x^4$ B. $-9x^{\frac{1}{3}}y^2$ C. $-\frac{3}{x^3}$ D. $-6x^{\frac{2}{3}}y^3$

2. The degree of the monomial $2x^6y^6z^5$ is

- A. 6 B. 180 C. 18 D. 17

3. The coefficient of x^2 in $-4x + 4 - 2x^3 + 8x^5 + 5x^2$ is

- A. 2 B. -2 C. 5 D. -5

4. $3 - 2x^2$ is a

- A. Linear polynomial B. Bi-quadratic polynomial
C. Cubic polynomial D. Quadratic polynomial

5. Among the following, the polynomial is

- A. $-6x^4 - 2\sqrt{x}$ B. $\frac{5}{3}x^3 + 2\sqrt{5}x^4 - 9$
C. $-8x - 4\sqrt{x}$ D. $-3\sqrt{5}x^4 + 4x^3 - 7x^{-3}$

6. If $px^{n-10} - qx^{n-11} - rx^{n-12}$ is a cubic polynomial ($n \in N$), then $n =$

- A. 3 B. 13 C. 15 D. 14

7. The equation $-5x^3 - 7x^2 + 7x = -5$ is a

- A. Quadratic equation B. Linear equation
C. Cubic equation D. Bi-quadratic equation

8. If $p(x) = 3x^2 + 3x + 8$, then $p(-4) =$

- A. 68 B. -52 C. 44 D. 28

9. The zero of the polynomial $-8x - 6$ is

- A. $-\frac{3}{4}$ B. $-\frac{4}{3}$ C. $\frac{4}{3}$ D. $\frac{3}{4}$

10. The roots of $x^2 + 12x + 35 = 0$ are

- A. 7, 5 B. 7, -5 C. -7, -5 D. -7, 5

11. The discriminant of $x^2 - 10x - 8 = 0$ is
A. 132 **B.** -68 **C.** 68 **D.** 108
-
12. When $x^3 - 6x^2 - 6x + 7$ is divided by $x + 1$, the quotient is
A. $x^2 + 7x + 1$ **B.** $x^2 - 5x - 11$ **C.** $x^2 - 7x + 1$ **D.** $x^2 - 7x + 7$
-
13. The remainder when $x^4 + 2x^3 - 11x^2 - 14x + 24$ is divided by $x^2 - 4$ is
A. $6x + 4$ **B.** $6x - 4$ **C.** $-6x + 4$ **D.** $-6x - 4$
-
14. The remainder when $3x^3 - x^2 - 4x - 6$ is divided by $x + 3$ is
A. -6 **B.** 84 **C.** -84 **D.** 54
-
15. Which of the following is a factor of $x^3 + 3x^2 - 10x - 24$?
A. $x - 4$ **B.** $x - 1$ **C.** $x + 1$ **D.** $x + 4$
-
16. $6x^2 - 17x - 45 =$
A. $(2x - 5)(3x + 9)$ **B.** $(3x + 5)(2x - 9)$ **C.** $(2x + 9)(3x - 5)$ **D.** $(2x + 5)(3x - 9)$
-
17. What must be subtracted from $x^3 + 2x^2 + 8x + 1$ so that it is exactly divisible by $x - 3$?
A. 70 **B.** -70 **C.** -32 **D.** 32
-
18. If $x - 3$ and $x - 1$ are factors of $x^3 + ax^2 + bx - 12$, then
A. $a = 8, b = 19$ **B.** $a = -8, b = 19$ **C.** $a = 8, b = -19$ **D.** $a = -8, b = -19$
-
19. A quadratic polynomial has zeros -2 and $\frac{5}{2}$ and leading coefficient 2. The polynomial is
A. $2x^2 + 9x + 10$ **B.** $2x^2 + x - 10$ **C.** $2x^2 - x - 10$ **D.** $x^2 - \frac{1}{2}x - 5$
-
20. Given that $x - 5$ is a factor, $x^3 - 8x^2 + 11x + 20 =$
A. $(x - 5)(x^2 - 3x - 4)$ **B.** $(x - 5)(x^2 - 3x + 4)$
C. $(x - 5)(x^2 + 3x - 4)$ **D.** $(x - 5)(x^2 - 13x + 76)$
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21. $x^3 - 6x^2 - x + 30 =$
A. $(x + 3)(x - 2)(x + 5)$ **B.** $(x - 3)(x + 2)(x - 5)$ **C.** $(x + 3)(x + 2)(x - 5)$ **D.** $(x - 3)(x - 2)(x - 5)$
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22. Using synthetic division, the quotient when $x^3 - x - 6$ is divided by $x - 1$ is
A. $x^2 - x$ **B.** $x^2 + x$ **C.** $x^3 + x^2 - 6$ **D.** x
-
23. $27y^3 + 8 = (3y + 2) \times$
A. $9y^2 - 6y + 2$ **B.** $y^2 - 2y + 4$ **C.** $9y^2 + 6y + 4$ **D.** $9y^2 - 6y + 4$
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24. When $8a^3 + 24a^2x + 24ax^2 + 8x^3$ is divided by $2a + 2x$, the quotient is
A. $4a^2 + 8ax + 4x^2$ **B.** $4a^2 + 4x^2$ **C.** $4a^2 + 8ax - 4x^2$ **D.** $4a^2 - 8ax + 4x^2$
-
25. $x^2 + bx + c$ leaves the remainders -9 and -10 when divided by $x + 1$ and $x + 2$ respectively. Then
A. $b = -4, c = -6$ **B.** $b = 4, c = 6$ **C.** $b = -4, c = 6$ **D.** $b = 4, c = -6$
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Key sheet

1. A	2. D	3. C	4. D	5. B
6. B	7. C	8. C	9. A	10. C
11. A	12. C	13. D	14. C	15. D
16. B	17. A	18. B	19. C	20. A
21. B	22. B	23. D	24. A	25. D

Solutions

1. Which of the following is a monomial?

$2x^4$: the powers of x are 4, non-negative integers, so it is a monomial.
Each of the others has a negative or fractional power.

Ans: (A) $2x^4$

2. The degree of the monomial $2x^6y^6z^5$ is

Degree = sum of the exponents = $6 + 6 + 5 = 17$

Ans: (D) 17

3. The coefficient of x^2 in $-4x + 4 - 2x^3 + 8x^5 + 5x^2$ is

The term with x^2 is $5x^2$, so the coefficient is 5.

Ans: (C) 5

4. $3 - 2x^2$ is a

The highest power of x is 2, so it is a quadratic polynomial.

Ans: (D) Quadratic polynomial

5. Among the following, the polynomial is

In $\frac{5}{3}x^3 + 2\sqrt{5}x^4 - 9$, all powers of x are whole numbers, so it is a polynomial.
Each other option has a negative or fractional power of x .

Ans: (B) $\frac{5}{3}x^3 + 2\sqrt{5}x^4 - 9$

6. If $px^{n-10} - qx^{n-11} - rx^{n-12}$ is a cubic polynomial ($n \in \mathbb{N}$), then $n =$

The degree of a cubic polynomial is 3.

So the highest power: $n - 10 = 3$

$\Rightarrow n = 13$

Ans: (B) 13

7. The equation $-5x^3 - 7x^2 + 7x = -5$ is a

The highest power of x is 3, so it is a cubic equation.

Ans: (C) Cubic equation

8. If $p(x) = 3x^2 + 3x + 8$, then $p(-4) =$

$$p(-4) = 3(-4)^2 + 3(-4) + 8$$

$$= 48 - 12 + 8$$

$$= 44$$

Ans: (C) 44

9. The zero of the polynomial $-8x - 6$ is

$$-8x - 6 = 0 \Rightarrow -8x = 6 \Rightarrow x = -\frac{3}{4}$$

Ans: (A) $-\frac{3}{4}$

10. The roots of $x^2 + 12x + 35 = 0$ are

$$\begin{aligned}x^2 + 12x + 35 &= x^2 + 5x + 7x + 35 \\&= x(x + 5) + 7(x + 5) \\&= (x + 5)(x + 7) \\&\Rightarrow x = -7, -5\end{aligned}$$

Ans: (C) $-7, -5$

11. The discriminant of $x^2 - 10x - 8 = 0$ is

$$\Delta = b^2 - 4ac = (-10)^2 - 4(1)(-8) = 132$$

Ans: (A) 132

12. When $x^3 - 6x^2 - 6x + 7$ is divided by $x + 1$, the quotient is

$$\begin{aligned}x^3 \div x &= x^2; x^2 \times (x + 1) = x^3 + x^2; \text{ subtract: } -7x^2 - 6x + 7 \\-7x^2 \div x &= -7x; (-7x) \times (x + 1) = -7x^2 - 7x; \text{ subtract: } x + 7 \\x \div x &= 1; 1 \times (x + 1) = x + 1; \text{ subtract: } 6\end{aligned}$$

Ans: (C) $x^2 - 7x + 1$

13. The remainder when $x^4 + 2x^3 - 11x^2 - 14x + 24$ is divided by $x^2 - 4$ is

$$\begin{aligned}x^4 \div x^2 &= x^2; x^2 \times (x^2 - 4) = x^4 - 4x^2; \text{ subtract: } 2x^3 - 7x^2 - 14x + 24 \\2x^3 \div x^2 &= 2x; 2x \times (x^2 - 4) = 2x^3 - 8x; \text{ subtract: } -7x^2 - 6x + 24 \\-7x^2 \div x^2 &= -7; (-7) \times (x^2 - 4) = -7x^2 + 28; \text{ subtract: } -6x - 4 \\ \text{Remainder} &= -6x - 4\end{aligned}$$

Ans: (D) $-6x - 4$

14. The remainder when $3x^3 - x^2 - 4x - 6$ is divided by $x + 3$ is

$$\begin{aligned}\text{Remainder} &= f(-3) \\f(-3) &= 3(-3)^3 - (-3)^2 - 4(-3) - 6 \\&= -81 - 9 + 12 - 6 \\&= -84\end{aligned}$$

Ans: (C) -84

15. Which of the following is a factor of $x^3 + 3x^2 - 10x - 24$?

$$\begin{aligned}f(-4) &= (-4)^3 + 3(-4)^2 - 10(-4) - 24 \\&= -64 + 48 + 40 - 24 \\&= 0 \\f(-4) &= 0, \text{ so } x + 4 \text{ is a factor.}\end{aligned}$$

Ans: (D) $x + 4$

16. $6x^2 - 17x - 45 =$

$$\begin{aligned}6x^2 - 17x - 45 &= 6x^2 + 10x - 27x - 45 \\&= 2x(3x + 5) - 9(3x + 5) \\&= (3x + 5)(2x - 9)\end{aligned}$$

Ans: (B) $(3x + 5)(2x - 9)$

17. What must be subtracted from $x^3 + 2x^2 + 8x + 1$ so that it is exactly divisible by $x - 3$?

Remainder = $f(3)$ (remainder theorem)

$$f(3) = (3)^3 + 2(3)^2 + 8(3) + 1$$

$$= 27 + 18 + 24 + 1$$

$$= 70$$

The remainder is 70, so 70 must be subtracted.

Ans: (A) 70

18. If $x - 3$ and $x - 1$ are factors of $x^3 + ax^2 + bx - 12$, then

$$f(3) = 0 \Rightarrow 3a + b = -5 \dots (1)$$

$$f(1) = 0 \Rightarrow a + b = 11 \dots (2)$$

$$(1) - (2): 2a = -16$$

$$\Rightarrow a = -8$$

$$\text{Put } a = -8 \text{ in (1): } -24 + b = -5 \Rightarrow b = 19$$

Ans: (B) $a = -8, b = 19$

19. A quadratic polynomial has zeros -2 and $\frac{5}{2}$ and leading coefficient 2. The polynomial is

$$\text{With zeros } -2, \frac{5}{2} \text{ and leading coefficient 2: } 2(x + 2)(x - \frac{5}{2})$$

$$= 2x^2 - x - 10$$

Ans: (C) $2x^2 - x - 10$

20. Given that $x - 5$ is a factor, $x^3 - 8x^2 + 11x + 20 =$

$$x^3 \div x = x^2; x^2 \times (x - 5) = x^3 - 5x^2; \text{ subtract: } -3x^2 + 11x + 20$$

$$-3x^2 \div x = -3x; (-3x) \times (x - 5) = -3x^2 + 15x; \text{ subtract: } -4x + 20$$

$$-4x \div x = -4; (-4) \times (x - 5) = -4x + 20; \text{ subtract: } 0$$

$$\text{Quotient} = x^2 - 3x - 4$$

Ans: (A) $(x - 5)(x^2 - 3x - 4)$

21. $x^3 - 6x^2 - x + 30 =$

$$f(-2) = -8 - 24 + 2 + 30 = 0$$

Dividing and splitting the quotient gives $f(x) = (x - 3)(x + 2)(x - 5)$.

Ans: (B) $(x - 3)(x + 2)(x - 5)$

22. Using synthetic division, the quotient when $x^3 - x - 6$ is divided by $x - 1$ is

$$\text{Second row: } 0 \quad 1 \quad 1 \quad 0$$

$$\text{Bottom row: } 1 \quad 1 \quad 0 \mid -6$$

$$\text{Quotient} = x^2 + x$$

Ans: (B) $x^2 + x$

23. $27y^3 + 8 = (3y + 2) \times$

$$27y^3 + 8 = (3y + 2)(9y^2 - 6y + 4)$$

Signs alternate; the powers of 2 go up as the powers of $3y$ go down.

Ans: (D) $9y^2 - 6y + 4$

24. When $8a^3 + 24a^2x + 24ax^2 + 8x^3$ is divided by $2a + 2x$, the quotient is

$$8a^3 \div 2a = 4a^2; 4a^2 \times (2a + 2x) = 8a^3 + 8a^2x; \text{ subtract: } 16a^2x + 24ax^2 + 8x^3$$

$$16a^2x \div 2a = 8ax; 8ax \times (2a + 2x) = 16a^2x + 16ax^2; \text{ subtract: } 8ax^2 + 8x^3$$

$$8ax^2 \div 2a = 4x^2; 4x^2 \times (2a + 2x) = 8ax^2 + 8x^3; \text{ subtract: } 0$$

$$\text{Ans: (A) } 4a^2 + 8ax + 4x^2$$

25. $x^2 + bx + c$ leaves the remainders -9 and -10 when divided by $x + 1$ and $x + 2$ respectively. Then

$$f(-1) = 1 - b + c = -9 \Rightarrow b - c = 10 \dots (1)$$

$$f(-2) = 4 - 2b + c = -10 \Rightarrow 2b - c = 14 \dots (2)$$

$$(1) - (2): -b = -4$$

$$\Rightarrow b = 4$$

$$\text{Put } b = 4 \text{ in (1): } 4 - c = 10 \Rightarrow c = -6$$

$$\text{Ans: (D) } b = 4, c = -6$$
