

Polynomials

MCQ Test, Set 03

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.

- $x^3y^2 - 7x^4$ is
 A. a binomial
 B. a polynomial of four terms
 C. a monomial
 D. a trinomial
- The degree of the monomial $-6x^5y^2z^6$ is
 A. 60
 B. 6
 C. 14
 D. 13
- The coefficient of x in $-9x - 6x^5 - 2$ is
 A. 1
 B. 9
 C. -9
 D. -2
- $-6x + 3x^3 + 7$ is a
 A. Bi-quadratic polynomial
 B. Linear polynomial
 C. Cubic polynomial
 D. Quadratic polynomial
- Which of the following is a polynomial?
 A. $3x^{-2} - 3$
 B. $-3x + 5\sqrt{5}x^4 + 5\sqrt{5}x^2$
 C. $-2x^{-2} - 6x$
 D. $-\frac{9}{x} - 2x^4 - 6x^2$
- If $px^{n-1} - qx^{n-2} - rx^{n-3}$ is a bi-quadratic polynomial ($n \in \mathbb{N}$), then $n =$
 A. 7
 B. 6
 C. 4
 D. 5
- The equation $9x^2 + 6 = 0$ is a
 A. Linear equation
 B. Quadratic equation
 C. Bi-quadratic equation
 D. Cubic equation
- If $p(x) = x^2 - 7x - 2$, then $p(-4) =$
 A. -14
 B. 10
 C. 46
 D. 42
- The zero of the polynomial $9x - 11$ is
 A. $-\frac{11}{9}$
 B. $-\frac{9}{11}$
 C. $\frac{11}{9}$
 D. $\frac{9}{11}$
- The roots of $x^2 + 16x + 63 = 0$ are
 A. 9, -7
 B. -9, -7
 C. 9, 7
 D. -9, 7

11. The discriminant of $x^2 - 4x + 1 = 0$ is
A. 15 **B.** 20 **C.** 12 **D.** -20
-
12. When $4x^3 + 9x^2 + 7x + 9$ is divided by $x + 1$, the quotient is
A. $4x^2 + 5x + 9$ **B.** $4x^2 + 5x + 2$ **C.** $4x^2 + 13x + 20$ **D.** $4x^2 - 5x + 2$
-
13. If $2x^3 + 2x^2 + ax + 8$ leaves the remainder -6 when divided by $x + 1$, then $a =$
A. 14 **B.** 2 **C.** -18 **D.** 8
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14. The remainder when $3x^3 - x^2 + 4x - 5$ is divided by $x + 1$ is
A. -5 **B.** 1 **C.** 13 **D.** -13
-
15. Which of the following is a factor of $x^3 + 4x^2 + x - 6$?
A. $x - 4$ **B.** $x - 2$ **C.** $x + 2$ **D.** $x + 1$
-
16. $12x^2 - 53x + 56 =$
A. $(4x - 8)(3x - 7)$ **B.** $(4x + 7)(3x + 8)$ **C.** $(4x - 7)(3x - 8)$ **D.** $(4x + 8)(3x + 7)$
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17. What must be added to $x^3 - 6x^2 - 3x + 1$ so that it is exactly divisible by $x - 2$?
A. -21 **B.** 21 **C.** -25 **D.** 25
-
18. If $x + 2$ and $x + 1$ are factors of $x^3 + ax^2 + bx + 8$, then
A. $a = 7, b = 14$ **B.** $a = -7, b = -14$ **C.** $a = 7, b = -14$ **D.** $a = -7, b = 14$
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19. A cubic polynomial has zeros 4, -4 and 3 and leading coefficient 2. The polynomial is
A. $2x^3 - 6x^2 - 32x + 96$ **B.** $x^3 - 3x^2 - 16x + 48$
C. $2x^3 + 6x^2 - 32x - 96$ **D.** $2x^3 - 22x^2 + 80x - 96$
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20. Given that $x - 3$ is a factor, $x^3 - 2x^2 - 23x + 60 =$
A. $(x - 3)(x^2 - x - 20)$ **B.** $(x - 3)(x^2 + x + 20)$ **C.** $(x - 3)(x^2 - 5x - 8)$ **D.** $(x - 3)(x^2 + x - 20)$
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21. $x^3 - 4x^2 - 11x + 30 =$
A. $(x - 3)(x + 5)(x + 2)$ **B.** $(x + 3)(x + 5)(x - 2)$ **C.** $(x + 3)(x - 5)(x - 2)$ **D.** $(x - 3)(x - 5)(x - 2)$
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22. Using synthetic division, the quotient when $3x^3 + 6x^2 + 4$ is divided by $x + 4$ is
A. $3x^2 - 6x + 24$ **B.** $3x - 6$
C. $3x^2 + 18x + 72$ **D.** $3x^3 - 6x^2 + 24x - 92$
-
23. A factor of $x^3 + 64$ is
A. $4x + 1$ **B.** $x + 64$ **C.** $x - 4$ **D.** $x + 4$
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24. When $\frac{27}{8}a^3 - \frac{81}{8}a^2x + \frac{81}{8}ax^2 - \frac{27}{8}x^3$ is divided by $\frac{3}{2}a - \frac{3}{2}x$, the quotient is

A. $\frac{9}{4}a^2 + \frac{9}{2}ax + \frac{9}{4}x^2$

B. $\frac{9}{4}a^2 - \frac{9}{2}ax + \frac{9}{4}x^2$

C. $\frac{9}{4}a^2 + \frac{9}{4}x^2$

D. $\frac{9}{4}a^2 - \frac{9}{2}ax - \frac{9}{4}x^2$

25. $x^2 + bx + c$ leaves the remainders 4 and 19 when divided by $x - 3$ and $x + 2$ respectively. Then

A. $b = -4, c = 7$

B. $b = 4, c = -7$

C. $b = 4, c = 7$

D. $b = -4, c = -7$

Key sheet

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

Solutions

1. $x^3y^2 - 7x^4$ is

$x^3y^2 - 7x^4$ has two terms, so it is a binomial.

Ans: (A) a binomial

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

Degree = sum of the exponents = $5 + 2 + 6 = 13$

Ans: (D) 13

3. The coefficient of x in $-9x - 6x^5 - 2$ is

The term with x is $-9x$, so the coefficient is -9 .

Ans: (C) -9

4. $-6x + 3x^3 + 7$ is a

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

Ans: (C) Cubic polynomial

5. Which of the following is a polynomial?

In $-3x + 5\sqrt{5}x^4 + 5\sqrt{5}x^2$, 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) $-3x + 5\sqrt{5}x^4 + 5\sqrt{5}x^2$

6. If $px^{n-1} - qx^{n-2} - rx^{n-3}$ is a bi-quadratic polynomial ($n \in \mathbb{N}$), then $n =$

The degree of a bi-quadratic polynomial is 4.

So the highest power: $n - 1 = 4$

$\Rightarrow n = 5$

Ans: (D) 5

7. The equation $9x^2 + 6 = 0$ is a

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

Ans: (B) Quadratic equation

8. If $p(x) = x^2 - 7x - 2$, then $p(-4) =$

$$p(-4) = (-4)^2 - 7(-4) - 2$$

$$= 16 + 28 - 2$$

$$= 42$$

Ans: (D) 42

9. The zero of the polynomial $9x - 11$ is

$$9x - 11 = 0 \Rightarrow 9x = 11 \Rightarrow x = \frac{11}{9}$$

Ans: (C) $\frac{11}{9}$

10. The roots of $x^2 + 16x + 63 = 0$ are

$$\begin{aligned}x^2 + 16x + 63 &= x^2 + 7x + 9x + 63 \\&= x(x + 7) + 9(x + 7) \\&= (x + 7)(x + 9) \\&\Rightarrow x = -9, -7\end{aligned}$$

Ans: (B) $-9, -7$

11. The discriminant of $x^2 - 4x + 1 = 0$ is

$$\Delta = b^2 - 4ac = (-4)^2 - 4(1)(1) = 12$$

Ans: (C) 12

12. When $4x^3 + 9x^2 + 7x + 9$ is divided by $x + 1$, the quotient is

$$\begin{aligned}4x^3 \div x &= 4x^2; 4x^2 \times (x + 1) = 4x^3 + 4x^2; \text{ subtract: } 5x^2 + 7x + 9 \\5x^2 \div x &= 5x; 5x \times (x + 1) = 5x^2 + 5x; \text{ subtract: } 2x + 9 \\2x \div x &= 2; 2 \times (x + 1) = 2x + 2; \text{ subtract: } 7\end{aligned}$$

Ans: (B) $4x^2 + 5x + 2$

13. If $2x^3 + 2x^2 + ax + 8$ leaves the remainder -6 when divided by $x + 1$, then $a =$

$$\begin{aligned}f(-1) &= 2(-1)^3 + 2(-1)^2 + a(-1) + 8 \\&= -2 + 2 - a + 8 \\&= -a + 8 \\-a + 8 &= -6 \Rightarrow a = 14\end{aligned}$$

Ans: (A) 14

14. The remainder when $3x^3 - x^2 + 4x - 5$ is divided by $x + 1$ is

$$\begin{aligned}\text{Remainder} &= f(-1) \\f(-1) &= 3(-1)^3 - (-1)^2 + 4(-1) - 5 \\&= -3 - 1 - 4 - 5 \\&= -13\end{aligned}$$

Ans: (D) -13

15. Which of the following is a factor of $x^3 + 4x^2 + x - 6$?

$$\begin{aligned}f(-2) &= (-2)^3 + 4(-2)^2 + (-2) - 6 \\&= -8 + 16 - 2 - 6 \\&= 0 \\f(-2) &= 0, \text{ so } x + 2 \text{ is a factor.}\end{aligned}$$

Ans: (C) $x + 2$

16. $12x^2 - 53x + 56 =$

$$\begin{aligned}12x^2 - 53x + 56 &= 12x^2 - 21x - 32x + 56 \\&= 3x(4x - 7) - 8(4x - 7) \\&= (4x - 7)(3x - 8)\end{aligned}$$

Ans: (C) $(4x - 7)(3x - 8)$

17. What must be added to $x^3 - 6x^2 - 3x + 1$ so that it is exactly divisible by $x - 2$?

Remainder = $f(2)$ (remainder theorem)

$$f(2) = (2)^3 - 6(2)^2 - 3(2) + 1$$

$$= 8 - 24 - 6 + 1$$

$$= -21$$

The remainder is -21 , so 21 must be added.

Ans: (B) 21

18. If $x + 2$ and $x + 1$ are factors of $x^3 + ax^2 + bx + 8$, then

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

$$f(-1) = 0 \Rightarrow a - b = -7 \dots (2)$$

$$(1) - (2): a = 7$$

$$\Rightarrow a = 7$$

$$\text{Put } a = 7 \text{ in (1): } 14 - b = 0 \Rightarrow b = 14$$

Ans: (A) $a = 7, b = 14$

19. A cubic polynomial has zeros 4, -4 and 3 and leading coefficient 2. The polynomial is

With zeros 4, -4 , 3 and leading coefficient 2: $2(x - 4)(x + 4)(x - 3)$

$$= 2x^3 - 6x^2 - 32x + 96$$

Ans: (A) $2x^3 - 6x^2 - 32x + 96$

20. Given that $x - 3$ is a factor, $x^3 - 2x^2 - 23x + 60 =$

$$x^3 \div x = x^2; x^2 \times (x - 3) = x^3 - 3x^2; \text{ subtract: } x^2 - 23x + 60$$

$$x^2 \div x = x; x \times (x - 3) = x^2 - 3x; \text{ subtract: } -20x + 60$$

$$-20x \div x = -20; (-20) \times (x - 3) = -20x + 60; \text{ subtract: } 0$$

$$\text{Quotient} = x^2 + x - 20$$

Ans: (D) $(x - 3)(x^2 + x - 20)$

21. $x^3 - 4x^2 - 11x + 30 =$

$$f(2) = 8 - 16 - 22 + 30 = 0$$

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

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

22. Using synthetic division, the quotient when $3x^3 + 6x^2 + 4$ is divided by $x + 4$ is

$$\text{Second row: } 0 \quad -12 \quad 24 \quad -96$$

$$\text{Bottom row: } 3 \quad -6 \quad 24 \mid -92$$

$$\text{Quotient} = 3x^2 - 6x + 24$$

Ans: (A) $3x^2 - 6x + 24$

23. A factor of $x^3 + 64$ is

$$x^3 + 64 = x^3 + 4^3 \text{ and 3 is odd, so } x + 4 \text{ is a factor.}$$

Ans: (D) $x + 4$

24. When $\frac{27}{8}a^3 - \frac{81}{8}a^2x + \frac{81}{8}ax^2 - \frac{27}{8}x^3$ is divided by $\frac{3}{2}a - \frac{3}{2}x$, the quotient is

$$\begin{aligned}\frac{27}{8}a^3 \div \frac{3}{2}a &= \frac{9}{4}a^2; \frac{9}{4}a^2 \times (\frac{3}{2}a - \frac{3}{2}x) = \frac{27}{8}a^3 - \frac{27}{8}a^2x; \text{ subtract: } -\frac{27}{4}a^2x + \frac{81}{8}ax^2 - \frac{27}{8}x^3 \\ -\frac{27}{4}a^2x \div \frac{3}{2}a &= -\frac{9}{2}ax; (-\frac{9}{2}ax) \times (\frac{3}{2}a - \frac{3}{2}x) = -\frac{27}{4}a^2x + \frac{27}{4}ax^2; \text{ subtract: } \frac{27}{8}ax^2 - \frac{27}{8}x^3 \\ \frac{27}{8}ax^2 \div \frac{3}{2}a &= \frac{9}{4}x^2; \frac{9}{4}x^2 \times (\frac{3}{2}a - \frac{3}{2}x) = \frac{27}{8}ax^2 - \frac{27}{8}x^3; \text{ subtract: } 0\end{aligned}$$

Ans: (B) $\frac{9}{4}a^2 - \frac{9}{2}ax + \frac{9}{4}x^2$

25. $x^2 + bx + c$ leaves the remainders 4 and 19 when divided by $x - 3$ and $x + 2$ respectively. Then

$$f(3) = 9 + 3b + c = 4 \Rightarrow 3b + c = -5 \dots (1)$$

$$f(-2) = 4 - 2b + c = 19 \Rightarrow 2b - c = -15 \dots (2)$$

$$(1) + (2): 5b = -20$$

$$\Rightarrow b = -4$$

$$\text{Put } b = -4 \text{ in (1): } -12 + c = -5 \Rightarrow c = 7$$

Ans: (A) $b = -4, c = 7$
