

Polynomials

MCQ Test, Set 07

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. Pick the monomial from the following.

A. $-\frac{5}{x^2}$

B. $-\frac{6}{x^3}$

C. $-8x^{\frac{1}{3}}y^4$

D. $-\frac{4}{3}x^2$

2. The degree of the monomial $5x^5y^4z^4$ is

A. 14

B. 5

C. 13

D. 80

3. The coefficient of x^3 in $-4 + 2x^2 + 8x - 9x^3$ is

A. 2

B. -9

C. 3

D. 9

4. $6 + 4x$ is a

A. Bi-quadratic polynomial

B. Quadratic polynomial

C. Cubic polynomial

D. Linear polynomial

5. Pick the polynomial from the following.

A. $-4\sqrt{5}x^5 - 3x$

B. $3\sqrt{2}x^3 - 2\sqrt{x}$

C. $2x^2 - 6\sqrt{x} + \frac{1}{3}$

D. $-\frac{7}{3}x^3 - 5x^{\frac{1}{3}}$

6. If $ax^{n-6} - bx^{n-7} - cx^{n-8}$ is a cubic polynomial ($n \in \mathbb{N}$), then $n =$

A. 11

B. 10

C. 9

D. 3

7. The equation $-6x + 4 = 0$ is a

A. Quadratic equation

B. Bi-quadratic equation

C. Linear equation

D. Cubic equation

8. If $p(x) = -x^3 - 4x^2 - 2x + 6$, then $p(-2) =$

A. -6

B. 2

C. 34

D. -22

9. The zero of the polynomial $7x + 5$ is

A. $-\frac{7}{5}$

B. $-\frac{5}{7}$

C. $\frac{7}{5}$

D. $\frac{5}{7}$

10. If -1 is a zero of $p(x) = x^3 - x^2 + ax - 2$, then $a =$

A. -3

B. 4

C. 2

D. -4

11. The roots of $6x^2 - 17x + 7 = 0$ are
A. $-\frac{1}{2}, -\frac{7}{3}$ **B.** $\frac{1}{2}, \frac{7}{3}$
C. $2, \frac{3}{7}$ **D.** $1, 7$
-
12. The roots of $2x^2 + 6x + 1 = 0$ are
A. $\frac{3 \pm \sqrt{7}}{2}$ **B.** $\frac{-3 \pm \sqrt{7}}{2}$
C. $-3 \pm \sqrt{7}$ **D.** $\frac{-3 \pm \sqrt{11}}{2}$
-
13. The remainder when $2x^4 - 5x^3 - 11x^2 - 11x - 7$ is divided by $x^2 - 4x - 1$ is
A. $4x - 4$ **B.** $-4x + 4$ **C.** $4x + 4$ **D.** $-4x - 4$
-
14. The remainder when $24x^3 - 8x^2 - 8x + 5$ is divided by $2x - 1$ is
A. 2 **B.** -2 **C.** 4 **D.** 13
-
15. If $x + 1$ is a factor of $x^3 - 3x^2 + x + a$, then $a =$
A. 4 **B.** -5 **C.** 1 **D.** 5
-
16. $5x^2 + 46x + 9 =$
A. $(x + 1)(5x + 9)$ **B.** $(x - 1)(5x - 9)$ **C.** $(5x + 1)(x + 9)$ **D.** $(x - 9)(5x - 1)$
-
17. What must be added to $x^3 + 2x^2 + 9x + 5$ so that it is exactly divisible by $x + 3$?
A. -31 **B.** 77 **C.** 31 **D.** -77
-
18. If $x - 4$ and $x - 2$ are factors of $x^3 + ax^2 + bx - 24$, then
A. $a = -9, b = 26$ **B.** $a = 9, b = -26$ **C.** $a = -9, b = -26$ **D.** $a = 9, b = 26$
-
19. A cubic polynomial has zeros $1, 3$ and -1 and leading coefficient 3 . The polynomial is
A. $x^3 - 3x^2 - x + 3$ **B.** $3x^3 + 9x^2 - 3x - 9$ **C.** $x^3 + 3x^2 - x - 3$ **D.** $3x^3 - 9x^2 - 3x + 9$
-
20. Given that $x - 2$ is a factor, $x^3 - 12x^2 + 44x - 48 =$
A. $(x - 2)(x^2 - 10x + 24)$ **B.** $(x - 2)(x^2 - 14x + 72)$
C. $(x - 2)(x^2 - 10x - 24)$ **D.** $(x - 2)(x^2 + 10x + 24)$
-
21. $x^3 - 6x^2 + 5x + 12 =$
A. $(x + 3)(x + 4)(x - 1)$ **B.** $(x - 3)(x - 4)(x + 1)$ **C.** $(x + 3)(x - 4)(x + 1)$ **D.** $(x - 3)(x + 4)(x + 1)$
-
22. Using synthetic division, the quotient when $5x^3 - 2x - 8$ is divided by $x - 3$ is
A. $5x^3 + 15x^2 + 43x + 121$ **B.** $5x + 13$
C. $5x^2 + 15x + 43$ **D.** $5x^2 - 15x + 43$
-
23. $27x^3 + 1 = (3x + 1) \times$
A. $9x^2 - 3x + 2$ **B.** $x^2 - x + 1$ **C.** $9x^2 - 3x + 1$ **D.** $9x^2 + 3x + 1$
-

24. When $\frac{27}{8}a^3 + \frac{81}{4}a^2x + \frac{81}{2}ax^2 + 27x^3$ is divided by $\frac{3}{2}a + 3x$, the quotient is

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

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

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

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

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

A. $b = -6, c = 7$

B. $b = 6, c = 7$

C. $b = -6, c = -7$

D. $b = 6, c = -7$

Key sheet

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

Solutions

1. Pick the monomial from the following.

$-\frac{4}{3}x^2$: the powers of x are 2, non-negative integers, so it is a monomial.
Each of the others has a negative or fractional power.

Ans: (D) $-\frac{4}{3}x^2$

2. The degree of the monomial $5x^5y^4z^4$ is

Degree = sum of the exponents = $5 + 4 + 4 = 13$

Ans: (C) 13

3. The coefficient of x^3 in $-4 + 2x^2 + 8x - 9x^3$ is

The term with x^3 is $-9x^3$, so the coefficient is -9 .

Ans: (B) -9

4. $6 + 4x$ is a

The highest power of x is 1, so it is a linear polynomial.

Ans: (D) Linear polynomial

5. Pick the polynomial from the following.

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

Ans: (A) $-4\sqrt{5}x^5 - 3x$

6. If $ax^{n-6} - bx^{n-7} - cx^{n-8}$ is a cubic polynomial ($n \in \mathbb{N}$), then $n =$

The degree of a cubic polynomial is 3.

So the highest power: $n - 6 = 3$

$\Rightarrow n = 9$

Ans: (C) 9

7. The equation $-6x + 4 = 0$ is a

The highest power of x is 1, so it is a linear equation.

Ans: (C) Linear equation

8. If $p(x) = -x^3 - 4x^2 - 2x + 6$, then $p(-2) =$

$$p(-2) = -(-2)^3 - 4(-2)^2 - 2(-2) + 6$$

$$= 8 - 16 + 4 + 6$$

$$= 2$$

Ans: (B) 2

9. The zero of the polynomial $7x + 5$ is

$$7x + 5 = 0 \Rightarrow 7x = -5 \Rightarrow x = -\frac{5}{7}$$

Ans: (B) $-\frac{5}{7}$

10. If -1 is a zero of $p(x) = x^3 - x^2 + ax - 2$, then $a =$

$$\begin{aligned} p(-1) &= (-1)^3 - (-1)^2 + a(-1) - 2 \\ &= -1 - 1 - a - 2 \\ &= -a - 4 \\ -a - 4 &= 0 \Rightarrow a = -4 \end{aligned}$$

Ans: (D) -4

11. The roots of $6x^2 - 17x + 7 = 0$ are

$$\begin{aligned} 6x^2 - 17x + 7 &= 6x^2 - 3x - 14x + 7 \\ &= 3x(2x - 1) - 7(2x - 1) \\ &= (2x - 1)(3x - 7) \\ \Rightarrow x &= \frac{1}{2}, \frac{7}{3} \end{aligned}$$

Ans: (B) $\frac{1}{2}, \frac{7}{3}$

12. The roots of $2x^2 + 6x + 1 = 0$ are

$$\begin{aligned} a &= 2, b = 6, c = 1 \\ x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-6 \pm \sqrt{36 - 4(2)(1)}}{2(2)} \\ &= \frac{-3 \pm \sqrt{7}}{2}, \frac{-3 - \sqrt{7}}{2} \end{aligned}$$

Ans: (B) $\frac{-3 \pm \sqrt{7}}{2}$

13. The remainder when $2x^4 - 5x^3 - 11x^2 - 11x - 7$ is divided by $x^2 - 4x - 1$ is

$$\begin{aligned} 2x^4 \div x^2 &= 2x^2; 2x^2 \times (x^2 - 4x - 1) = 2x^4 - 8x^3 - 2x^2; \text{ subtract: } 3x^3 - 9x^2 - 11x - 7 \\ 3x^3 \div x^2 &= 3x; 3x \times (x^2 - 4x - 1) = 3x^3 - 12x^2 - 3x; \text{ subtract: } 3x^2 - 8x - 7 \\ 3x^2 \div x^2 &= 3; 3 \times (x^2 - 4x - 1) = 3x^2 - 12x - 3; \text{ subtract: } 4x - 4 \\ \text{Remainder} &= 4x - 4 \end{aligned}$$

Ans: (A) $4x - 4$

14. The remainder when $24x^3 - 8x^2 - 8x + 5$ is divided by $2x - 1$ is

$$\begin{aligned} 2x - 1 = 0 &\Rightarrow x = \frac{1}{2}; \text{ remainder} = f\left(\frac{1}{2}\right) \\ &= 2 \end{aligned}$$

Ans: (A) 2

15. If $x + 1$ is a factor of $x^3 - 3x^2 + x + a$, then $a =$

$$\begin{aligned} f(-1) &= (-1)^3 - 3(-1)^2 + (-1) + a \\ &= -1 - 3 - 1 + a \\ &= a - 5 \\ a - 5 &= 0 \Rightarrow a = 5 \end{aligned}$$

Ans: (D) 5

16. $5x^2 + 46x + 9 =$

$$5x^2 + 46x + 9 = 5x^2 + x + 45x + 9$$

$$= x(5x + 1) + 9(5x + 1)$$

$$= (5x + 1)(x + 9)$$

Ans: (C) $(5x + 1)(x + 9)$

17. What must be added to $x^3 + 2x^2 + 9x + 5$ so that it is exactly divisible by $x + 3$?

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

$$f(-3) = (-3)^3 + 2(-3)^2 + 9(-3) + 5$$

$$= -27 + 18 - 27 + 5$$

$$= -31$$

The remainder is -31 , so 31 must be added.

Ans: (C) 31

18. If $x - 4$ and $x - 2$ are factors of $x^3 + ax^2 + bx - 24$, then

$$f(4) = 0 \Rightarrow 4a + b = -10 \dots (1)$$

$$f(2) = 0 \Rightarrow 2a + b = 8 \dots (2)$$

$$(1) - (2): 2a = -18$$

$$\Rightarrow a = -9$$

$$\text{Put } a = -9 \text{ in (1): } -36 + b = -10 \Rightarrow b = 26$$

Ans: (A) $a = -9, b = 26$

19. A cubic polynomial has zeros 1, 3 and -1 and leading coefficient 3. The polynomial is

With zeros 1, 3, -1 and leading coefficient 3: $3(x - 1)(x - 3)(x + 1)$

$$= 3x^3 - 9x^2 - 3x + 9$$

Ans: (D) $3x^3 - 9x^2 - 3x + 9$

20. Given that $x - 2$ is a factor, $x^3 - 12x^2 + 44x - 48 =$

$$x^3 \div x = x^2; x^2 \times (x - 2) = x^3 - 2x^2; \text{ subtract: } -10x^2 + 44x - 48$$

$$-10x^2 \div x = -10x; (-10x) \times (x - 2) = -10x^2 + 20x; \text{ subtract: } 24x - 48$$

$$24x \div x = 24; 24 \times (x - 2) = 24x - 48; \text{ subtract: } 0$$

$$\text{Quotient} = x^2 - 10x + 24$$

Ans: (A) $(x - 2)(x^2 - 10x + 24)$

21. $x^3 - 6x^2 + 5x + 12 =$

$$f(-1) = -1 - 6 - 5 + 12 = 0$$

Dividing and splitting the quotient gives $f(x) = (x - 3)(x - 4)(x + 1)$.

Ans: (B) $(x - 3)(x - 4)(x + 1)$

22. Using synthetic division, the quotient when $5x^3 - 2x - 8$ is divided by $x - 3$ is

Second row: 0 15 45 129

Bottom row: 5 15 43 | 121

Quotient = $5x^2 + 15x + 43$

Ans: (C) $5x^2 + 15x + 43$

23. $27x^3 + 1 = (3x + 1) \times$

$27x^3 + 1 = (3x + 1)(9x^2 - 3x + 1)$

Signs alternate; the powers of 1 go up as the powers of $3x$ go down.

Ans: (C) $9x^2 - 3x + 1$

24. When $\frac{27}{8}a^3 + \frac{81}{4}a^2x + \frac{81}{2}ax^2 + 27x^3$ is divided by $\frac{3}{2}a + 3x$, the quotient is

$\frac{27}{8}a^3 \div \frac{3}{2}a = \frac{9}{4}a^2$; $\frac{9}{4}a^2 \times (\frac{3}{2}a + 3x) = \frac{27}{8}a^3 + \frac{27}{4}a^2x$; subtract: $\frac{27}{2}a^2x + \frac{81}{2}ax^2 + 27x^3$

$\frac{27}{2}a^2x \div \frac{3}{2}a = 9ax$; $9ax \times (\frac{3}{2}a + 3x) = \frac{27}{2}a^2x + 27ax^2$; subtract: $\frac{27}{2}ax^2 + 27x^3$

$\frac{27}{2}ax^2 \div \frac{3}{2}a = 9x^2$; $9x^2 \times (\frac{3}{2}a + 3x) = \frac{27}{2}ax^2 + 27x^3$; subtract: 0

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

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

$f(1) = 1 + b + c = 2 \Rightarrow b + c = 1 \dots (1)$

$f(2) = 4 + 2b + c = -1 \Rightarrow 2b + c = -5 \dots (2)$

$(1) - (2): -b = 6$

$\Rightarrow b = -6$

Put $b = -6$ in (1): $-6 + c = 1 \Rightarrow c = 7$

Ans: (A) $b = -6, c = 7$
