

Polynomials

MCQ Test, Set 09

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. $-4x^3y$ is

- A.** a polynomial of four terms
C. a trinomial

- B.** a monomial
D. a binomial

2. The degree of the monomial $8xy^2z$ is**A.** 2**B.** 3**C.** 5**D.** 43. The coefficient of x^2 in $3 - 6x^2 + 3x^3$ is**A.** 3**B.** -6**C.** 2**D.** 64. $5\sqrt{5}$ is a

- A.** Linear polynomial
C. Constant polynomial

- B.** Quadratic polynomial
D. Zero polynomial

5. Identify the polynomial among these.

A. $3x^5 - 2\sqrt{5}x^3$ **B.** $-3 - \frac{4}{x}$ **C.** $4\sqrt{2}x - 3\sqrt{x}$ **D.** $2x^{\frac{3}{2}} - 5x^4 + \frac{3}{2}x$ 6. If $px^{n-2} - qx^{n-3} - rx^{n-4}$ is a bi-quadratic polynomial ($n \in \mathbb{N}$), then $n =$ **A.** 8**B.** 6**C.** 7**D.** 47. The equation $-7x^4 + 4x^2 = 7$ is a

- A.** Cubic equation
C. Quadratic equation

- B.** Linear equation
D. Bi-quadratic equation

8. If $p(x) = 3x^3 - x^2 - 7x - 1$, then $p(-1) =$ **A.** -6**B.** -12**C.** 2**D.** 49. If 3 is a zero of $p(x) = x^2 + ax + 6$, then $a =$ **A.** -5**B.** 5**C.** -7**D.** -4

10. The roots of $2x^2 + x - 6 = 0$ are

A. $2, -\frac{3}{2}$
C. $-\frac{1}{2}, \frac{2}{3}$

B. $-2, 3$
D. $-2, \frac{3}{2}$

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

A. $\frac{-7 \pm \sqrt{137}}{2}$
C. $\frac{7 \pm \sqrt{137}}{2}$

B. $\frac{7 \pm \sqrt{137}}{4}$
D. $\frac{-7 \pm \sqrt{137}}{4}$

12. When $2x^3 + 6x^2 - 7x - 25$ is divided by $x + 3$, the quotient is

A. $2x^2 - 7$

B. $2x^2 + 12x + 29$

C. $2x^2 - 3$

D. $2x^2 - 11$

13. The remainder when $x^3 + 4x^2 - 5x - 6$ is divided by $x + 1$ is

A. -2

B. -6

C. 0

D. 2

14. Which of the following is a factor of $x^3 - 7x^2 + 7x + 15$?

A. $x + 1$

B. $x + 5$

C. $x - 1$

D. $x - 6$

15. $5x^2 + 22x - 15 =$

A. $(x + 3)(5x - 5)$

B. $(5x - 3)(x + 5)$

C. $(x - 5)(5x + 3)$

D. $(x - 3)(5x + 5)$

16. What must be added to $-4x^3 + 12x^2 - 8x + 15$ so that it is exactly divisible by $x^2 - 2x + 2$?

A. $-8x + 7$

B. $-8x - 7$

C. $-4x + 4$

D. $8x + 7$

17. If $x + 2$ and $x - 1$ are factors of $x^3 + ax^2 + bx + 6$, then

A. $a = 2, b = 5$

B. $a = -2, b = 5$

C. $a = 2, b = -5$

D. $a = -2, b = -5$

18. A quadratic polynomial has zeros -1 and $\frac{5}{2}$ and leading coefficient 4. The polynomial is

A. $4x^2 - 6x - 10$

B. $4x^2 + 6x - 10$

C. $4x^2 + 14x + 10$

D. $x^2 - \frac{3}{2}x - \frac{5}{2}$

19. Given that $x + 3$ is a factor, $x^3 + 11x^2 + 36x + 36 =$

A. $(x + 3)(x^2 + 14x + 78)$

B. $(x + 3)(x^2 - 8x + 12)$

C. $(x + 3)(x^2 + 8x - 12)$

D. $(x + 3)(x^2 + 8x + 12)$

20. $x^3 - x^2 - 17x - 15 =$

A. $(x - 3)(x + 1)(x - 5)$

B. $(x + 3)(x - 1)(x - 5)$

C. $(x + 3)(x + 1)(x - 5)$

D. $(x - 3)(x - 1)(x + 5)$

21. Using synthetic division, the quotient when $5x^3 - x^2 + 5$ is divided by $x + 4$ is

A. $5x^2 + 19x + 76$

B. $5x^3 - 21x^2 + 84x - 331$

C. $5x^2 - 21x + 84$

D. $5x - 21$

22. Using synthetic division, the remainder when $2x^3 + 3x^2 + 7$ is divided by $x + 1$ is

A. 8

B. 6

C. -8

D. 12

23. A factor of $8x^3 + 27$ is

A. $x + 3$

B. $3x + 2$

C. $2x + 3$

D. $2x - 3$

24. When $\frac{1}{8}a^3 + \frac{3}{16}a^2x + \frac{3}{32}ax^2 + \frac{1}{64}x^3$ is divided by $\frac{1}{2}a + \frac{1}{4}x$, the quotient is

A. $\frac{1}{4}a^2 - \frac{1}{4}ax + \frac{1}{16}x^2$

B. $\frac{1}{4}a^2 + \frac{1}{4}ax + \frac{1}{16}x^2$

C. $\frac{1}{4}a^2 + \frac{1}{4}ax - \frac{1}{16}x^2$

D. $\frac{1}{4}a^2 + \frac{1}{16}x^2$

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

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

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

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

D. $b = 7, c = 7$

Key sheet

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

Solutions

1. $-4x^3y$ is

$-4x^3y$ has one term, so it is a monomial.

Ans: (B) a monomial

2. The degree of the monomial $8xy^2z$ is

Degree = sum of the exponents = $1 + 2 + 1 = 4$

Ans: (D) 4

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

The term with x^2 is $-6x^2$, so the coefficient is -6 .

Ans: (B) -6

4. $5\sqrt{5}$ is a

$5\sqrt{5} = 5\sqrt{5} \times x^0$ has degree 0: a constant polynomial.

Ans: (C) Constant polynomial

5. Identify the polynomial among these.

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

6. If $px^{n-2} - qx^{n-3} - rx^{n-4}$ is a bi-quadratic polynomial ($n \in \mathbb{N}$), then $n =$

The degree of a bi-quadratic polynomial is 4.

So the highest power: $n - 2 = 4$

$\Rightarrow n = 6$

Ans: (B) 6

7. The equation $-7x^4 + 4x^2 = 7$ is a

The highest power of x is 4, so it is a bi-quadratic equation.

Ans: (D) Bi-quadratic equation

8. If $p(x) = 3x^3 - x^2 - 7x - 1$, then $p(-1) =$

$p(-1) = 3(-1)^3 - (-1)^2 - 7(-1) - 1$

$= -3 - 1 + 7 - 1$

$= 2$

Ans: (C) 2

9. If 3 is a zero of $p(x) = x^2 + ax + 6$, then $a =$

$$p(3) = (3)^2 + a(3) + 6$$

$$= 9 + 3a + 6$$

$$= 3a + 15$$

$$3a + 15 = 0 \Rightarrow a = -5$$

Ans: (A) -5

10. The roots of $2x^2 + x - 6 = 0$ are

$$2x^2 + x - 6 = 2x^2 - 3x + 4x - 6$$

$$= x(2x - 3) + 2(2x - 3)$$

$$= (2x - 3)(x + 2)$$

$$\Rightarrow x = -2, \frac{3}{2}$$

Ans: (D) $-2, \frac{3}{2}$

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

$$a = 2, b = 7, c = -11$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-7 \pm \sqrt{49 - 4(2)(-11)}}{2(2)}$$

$$= \frac{-7 + \sqrt{137}}{4}, \frac{-7 - \sqrt{137}}{4}$$

Ans: (D) $\frac{-7 \pm \sqrt{137}}{4}$

12. When $2x^3 + 6x^2 - 7x - 25$ is divided by $x + 3$, the quotient is

$$2x^3 \div x = 2x^2; 2x^2 \times (x + 3) = 2x^3 + 6x^2; \text{ subtract: } -7x - 25$$

$$-7x \div x = -7; (-7) \times (x + 3) = -7x - 21; \text{ subtract: } -4$$

Ans: (A) $2x^2 - 7$

13. The remainder when $x^3 + 4x^2 - 5x - 6$ is divided by $x + 1$ is

$$\text{Remainder} = f(-1)$$

$$f(-1) = (-1)^3 + 4(-1)^2 - 5(-1) - 6$$

$$= -1 + 4 + 5 - 6$$

$$= 2$$

Ans: (D) 2

14. Which of the following is a factor of $x^3 - 7x^2 + 7x + 15$?

$$f(-1) = (-1)^3 - 7(-1)^2 + 7(-1) + 15$$

$$= -1 - 7 - 7 + 15$$

$$= 0$$

$$f(-1) = 0, \text{ so } x + 1 \text{ is a factor.}$$

Ans: (A) $x + 1$

15. $5x^2 + 22x - 15 =$

$$5x^2 + 22x - 15 = 5x^2 - 3x + 25x - 15$$

$$= x(5x - 3) + 5(5x - 3)$$

$$= (5x - 3)(x + 5)$$

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

16. What must be added to $-4x^3 + 12x^2 - 8x + 15$ so that it is exactly divisible by $x^2 - 2x + 2$?

$$-4x^3 \div x^2 = -4x; (-4x) \times (x^2 - 2x + 2) = -4x^3 + 8x^2 - 8x; \text{ subtract: } 4x^2 + 15$$

$$4x^2 \div x^2 = 4; 4 \times (x^2 - 2x + 2) = 4x^2 - 8x + 8; \text{ subtract: } 8x + 7$$

$$\text{Remainder} = 8x + 7, \text{ so } -8x - 7 \text{ must be added.}$$

Ans: (B) $-8x - 7$

17. If $x + 2$ and $x - 1$ are factors of $x^3 + ax^2 + bx + 6$, then

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

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

$$(1) + (2): 3a = -6$$

$$\Rightarrow a = -2$$

$$\text{Put } a = -2 \text{ in (1): } -4 - b = 1 \Rightarrow b = -5$$

Ans: (D) $a = -2, b = -5$

18. A quadratic polynomial has zeros -1 and $\frac{5}{2}$ and leading coefficient 4. The polynomial is

$$\text{With zeros } -1, \frac{5}{2} \text{ and leading coefficient 4: } 4(x + 1)\left(x - \frac{5}{2}\right)$$

$$= 4x^2 - 6x - 10$$

Ans: (A) $4x^2 - 6x - 10$

19. Given that $x + 3$ is a factor, $x^3 + 11x^2 + 36x + 36 =$

$$x^3 \div x = x^2; x^2 \times (x + 3) = x^3 + 3x^2; \text{ subtract: } 8x^2 + 36x + 36$$

$$8x^2 \div x = 8x; 8x \times (x + 3) = 8x^2 + 24x; \text{ subtract: } 12x + 36$$

$$12x \div x = 12; 12 \times (x + 3) = 12x + 36; \text{ subtract: } 0$$

$$\text{Quotient} = x^2 + 8x + 12$$

Ans: (D) $(x + 3)(x^2 + 8x + 12)$

20. $x^3 - x^2 - 17x - 15 =$

$$f(-1) = -1 - 1 + 17 - 15 = 0$$

$$\text{Dividing and splitting the quotient gives } f(x) = (x + 3)(x + 1)(x - 5).$$

Ans: (C) $(x + 3)(x + 1)(x - 5)$

21. Using synthetic division, the quotient when $5x^3 - x^2 + 5$ is divided by $x + 4$ is

$$\text{Second row: } 0 \quad -20 \quad 84 \quad -336$$

$$\text{Bottom row: } 5 \quad -21 \quad 84 \mid -331$$

$$\text{Quotient} = 5x^2 - 21x + 84$$

Ans: (C) $5x^2 - 21x + 84$

22. Using synthetic division, the remainder when $2x^3 + 3x^2 + 7$ is divided by $x + 1$ is

Second row: 0 - 2 - 1 1

Bottom row: 2 1 - 1 | 8

Remainder = 8

Ans: (A) 8

23. A factor of $8x^3 + 27$ is

$8x^3 + 27 = (2x)^3 + 3^3$ and 3 is odd, so $2x + 3$ is a factor.

Ans: (C) $2x + 3$

24. When $\frac{1}{8}a^3 + \frac{3}{16}a^2x + \frac{3}{32}ax^2 + \frac{1}{64}x^3$ is divided by $\frac{1}{2}a + \frac{1}{4}x$, the quotient is

$\frac{1}{8}a^3 \div \frac{1}{2}a = \frac{1}{4}a^2$; $\frac{1}{4}a^2 \times (\frac{1}{2}a + \frac{1}{4}x) = \frac{1}{8}a^3 + \frac{1}{16}a^2x$; subtract: $\frac{1}{8}a^2x + \frac{3}{32}ax^2 + \frac{1}{64}x^3$

$\frac{1}{8}a^2x \div \frac{1}{2}a = \frac{1}{4}ax$; $\frac{1}{4}ax \times (\frac{1}{2}a + \frac{1}{4}x) = \frac{1}{8}a^2x + \frac{1}{16}ax^2$; subtract: $\frac{1}{32}ax^2 + \frac{1}{64}x^3$

$\frac{1}{32}ax^2 \div \frac{1}{2}a = \frac{1}{16}x^2$; $\frac{1}{16}x^2 \times (\frac{1}{2}a + \frac{1}{4}x) = \frac{1}{32}ax^2 + \frac{1}{64}x^3$; subtract: 0

Ans: (B) $\frac{1}{4}a^2 + \frac{1}{4}ax + \frac{1}{16}x^2$

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

$f(2) = 4 + 2b + c = -3 \Rightarrow 2b + c = -7 \dots (1)$

$f(-2) = 4 - 2b + c = 25 \Rightarrow 2b - c = -21 \dots (2)$

$(1) + (2): 4b = -28$

$\Rightarrow b = -7$

Put $b = -7$ in (1): $-14 + c = -7 \Rightarrow c = 7$

Ans: (C) $b = -7, c = 7$
