EXPRESSWALA ACADEMY

Polynomials

MCQ Test, Set 05

Time: 30 minutes | Maximum marks: 25

Name: _____ Class: _____ Date: _____

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

1. Which one of these is NOT a monomial?

A. $-\frac{7}{5}x^5y^3$ **B.** $6x^{\frac{1}{3}}y^3$ **C.** $2x^5y^4$ **D.** $-8x^2y^2$

2. The degree of the monomial $-2x^2y^3z^3$ is

A. 8 **B.** 3 **C.** 18 **D.** 9

3. The coefficient of x^2 in $9x^2 + 5x^3 + 2 - 9x^4$ is

A. 2 **B.** -9 **C.** 9 **D.** 5

4. $-7x + 6 + 9x^4 - x^3 - 7x^2$ is a

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

5. Which one of these expressions is a polynomial?

A. $8x^{\frac{1}{3}} - 2x^3 - \frac{5}{3}x$ **B.** $-2\sqrt{3}x^2 + \frac{5}{3}x + 7\sqrt{x}$
C. $2\sqrt{x} + 6$ **D.** $-3\sqrt{5}x^5 + 5$

6. If $5x^{n-9} + 5x^{n-10} - 6x^{n-11}$ is a quadratic polynomial ($n \in N$), then $n =$

A. 11 **B.** 12 **C.** 2 **D.** 13

7. The equation $-4x^4 + 7x^2 + 6x + 7 = 0$ is a

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

8. If $p(x) = 4x^2 + 7x + 10$, then $p(-3) =$

A. -47 **B.** 67 **C.** 25 **D.** 5

9. If $p(x) = -2x^3 - 5x^2 - 4x - 4$, then $p(-3) =$

A. 17 **B.** -115 **C.** -7 **D.** 107

10. The zero of the polynomial $4x + 11$ is

A. $-\frac{11}{4}$ **B.** $\frac{4}{11}$ **C.** $-\frac{4}{11}$ **D.** $\frac{11}{4}$

11. The roots of $15x^2 + 13x + 2 = 0$ are

A. $-2, -1$ **B.** $\frac{2}{3}, \frac{1}{5}$

C. $-\frac{2}{3}, -\frac{1}{5}$ **D.** $-\frac{3}{2}, -5$

12. The discriminant of $3x^2 + 10x - 11 = 0$ is

A. -32 **B.** 32 **C.** 133 **D.** 232

13. A polynomial of degree 6 is divided by a polynomial of degree 4. The degree of the quotient is

A. 4 **B.** 24 **C.** 10 **D.** 2

14. If $x^3 + ax^2 - 5x - 6$ leaves the remainder -2 when divided by $x - 1$, then $a =$

A. 0 **B.** 8 **C.** 12 **D.** 10

15. If $16x^4 + 4x^3 - ax^2 + 3x - 4$ is divisible by $1 - 2x$, then $a =$

A. 19 **B.** 4 **C.** -4 **D.** -20

16. $5x^2 + 37x - 24 =$

A. $(x + 3)(5x - 8)$ **B.** $(5x - 3)(x + 8)$ **C.** $(x - 3)(5x + 8)$ **D.** $(x - 8)(5x + 3)$

17. What must be subtracted from $x^3 - 2x^2 + x - 5$ so that it is exactly divisible by $x - 4$?

A. 31 **B.** -105 **C.** 105 **D.** -31

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

A. $a = 4, b = 1$ **B.** $a = 4, b = -1$ **C.** $a = -4, b = -1$ **D.** $a = -4, b = 1$

19. A quadratic polynomial has zeros 3 and $\frac{5}{3}$ and leading coefficient 3. The polynomial is

A. $3x^2 + 14x + 15$ **B.** $3x^2 - 14x + 15$

C. $3x^2 - 4x - 15$ **D.** $x^2 - \frac{14}{3}x + 5$

20. Given that $x - 4$ is a factor, $x^3 - 5x^2 + 2x + 8 =$

A. $(x - 4)(x^2 - 9x + 38)$ **B.** $(x - 4)(x^2 - x + 2)$ **C.** $(x - 4)(x^2 + x - 2)$ **D.** $(x - 4)(x^2 - x - 2)$

21. $x^3 + 8x^2 + 19x + 12 =$

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 $x^3 - 2x + 4$ is divided by $x - 4$ is

A. $x^3 + 4x^2 + 14x + 60$ **B.** $x + 2$

C. $x^2 - 4x + 14$ **D.** $x^2 + 4x + 14$

23. $22^{93} - 13^{93}$ is exactly divisible by

A. 13 **B.** 9 **C.** 22 **D.** 35

24. When $\frac{1}{8}a^3 - \frac{9}{4}a^2x + \frac{27}{2}ax^2 - 27x^3$ is divided by $\frac{1}{2}a - 3x$, the quotient is

A. $\frac{1}{4}a^2 + 3ax + 9x^2$ **B.** $\frac{1}{4}a^2 + 9x^2$

C. $\frac{1}{4}a^2 - 3ax + 9x^2$ **D.** $\frac{1}{4}a^2 - 3ax - 9x^2$

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25. $x^2 + bx + c$ leaves the remainders -4 and 5 when divided by $x - 1$ and $x + 2$ respectively. Then

A. $b = 2, c = -3$ **B.** $b = 2, c = 3$ **C.** $b = -2, c = -3$ **D.** $b = -2, c = 3$

Key sheet

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

Solutions

1. Which one of these is NOT a monomial?

The power $\frac{1}{3}$ of x is not a whole number.

So $6x^{\frac{1}{3}}y^3$ is not a monomial; the others have only non-negative integer powers.

Ans: (B) $6x^{\frac{1}{3}}y^3$

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2. The degree of the monomial $-2x^2y^3z^3$ is

Degree = sum of the exponents $= 2 + 3 + 3 = 8$

Ans: (A) 8

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3. The coefficient of x^2 in $9x^2 + 5x^3 + 2 - 9x^4$ is

The term with x^2 is $9x^2$, so the coefficient is 9.

Ans: (C) 9

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4. $-7x + 6 + 9x^4 - x^3 - 7x^2$ is a

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

Ans: (B) Bi-quadratic polynomial

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5. Which one of these expressions is a polynomial?

In $-3\sqrt{5}x^5 + 5$, all powers of x are whole numbers, so it is a polynomial.

Each other option has a negative or fractional power of x.

Ans: (D) $-3\sqrt{5}x^5 + 5$

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6. If $5x^{n-9} + 5x^{n-10} - 6x^{n-11}$ is a quadratic polynomial ($n \in N$), then $n =$

The degree of a quadratic polynomial is 2.

So the highest power: $n - 9 = 2$

$\Rightarrow n = 11$

Ans: (A) 11

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7. The equation $-4x^4 + 7x^2 + 6x + 7 = 0$ is a

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

Ans: (B) Bi-quadratic equation

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8. If $p(x) = 4x^2 + 7x + 10$, then $p(-3) =$

$p(-3) = 4(-3)^2 + 7(-3) + 10$

$= 36 - 21 + 10$

$= 25$

Ans: (C) 25

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9. If $p(x) = -2x^3 - 5x^2 - 4x - 4$, then $p(-3) =$

$p(-3) = -2(-3)^3 - 5(-3)^2 - 4(-3) - 4$

$= 54 - 45 + 12 - 4$

$= 17$

Ans: (A) 17

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10. The zero of the polynomial $4x + 11$ is

$4x + 11 = 0 \Rightarrow 4x = -11 \Rightarrow x = -\frac{11}{4}$

Ans: (A) $-\frac{11}{4}$

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11. The roots of $15x^2 + 13x + 2 = 0$ are

$15x^2 + 13x + 2 = 15x^2 + 3x + 10x + 2$

$= 3x(5x + 1) + 2(5x + 1)$

$= (5x + 1)(3x + 2)$

$\Rightarrow x = -\frac{2}{3}, -\frac{1}{5}$

Ans: (C) $-\frac{2}{3}, -\frac{1}{5}$

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12. The discriminant of $3x^2 + 10x - 11 = 0$ is

$\Delta = b^2 - 4ac = 10^2 - 4(3)(-11) = 232$

Ans: (D) 232

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13. A polynomial of degree 6 is divided by a polynomial of degree 4. The degree of the quotient is

$f(x) = g(x)q(x) + r(x)$: degree of $q(x)$ = degree of $f(x)$ − degree of $g(x)$

$= 6 - 4 = 2$

Ans: (D) 2

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14. If $x^3 + ax^2 - 5x - 6$ leaves the remainder -2 when divided by $x - 1$, then $a =$

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

$= 1 + a - 5 - 6$

$= a - 10$

$a - 10 = -2 \Rightarrow a = 8$

Ans: (B) 8

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15. If $16x^4 + 4x^3 - ax^2 + 3x - 4$ is divisible by $1 - 2x$, then $a =$

$1 - 2x = 0 \Rightarrow x = \frac{1}{2}$; $f\left(\frac{1}{2}\right) = 0$

$f\left(\frac{1}{2}\right) = 16\left(\frac{1}{2}\right)^4 + 4\left(\frac{1}{2}\right)^3 - a\left(\frac{1}{2}\right)^2 + 3\left(\frac{1}{2}\right) - 4$

$= 1 + \frac{1}{2} - \frac{1}{4}a + \frac{3}{2} - 4$

$= -\frac{1}{4}a - 1$

$-\frac{1}{4}a - 1 = 0 \Rightarrow a = -4$

Ans: (C) -4

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16. $5x^2 + 37x - 24 =$

$5x^2 + 37x - 24 = 5x^2 - 3x + 40x - 24$

$= x(5x - 3) + 8(5x - 3)$

$= (5x - 3)(x + 8)$

Ans: (B) $(5x - 3)(x + 8)$

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17. What must be subtracted from $x^3 - 2x^2 + x - 5$ so that it is exactly divisible by $x - 4$?

Remainder $= f(4)$ (remainder theorem)

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

$= 64 - 32 + 4 - 5$

$= 31$

The remainder is 31, so 31 must be subtracted.

Ans: (A) 31

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

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

$f(3) = 0 \Rightarrow 3a + b = -11$ ... (2)

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

$\Rightarrow a = -4$

Put $a = -4$ in (1): $-8 + b = -7 \Rightarrow b = 1$

Ans: (D) $a = -4, b = 1$

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19. A quadratic polynomial has zeros 3 and $\frac{5}{3}$ and leading coefficient 3. The polynomial is

With zeros 3, $\frac{5}{3}$ and leading coefficient 3: $3(x - 3)\left(x - \frac{5}{3}\right)$

$= 3x^2 - 14x + 15$

Ans: (B) $3x^2 - 14x + 15$

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20. Given that $x - 4$ is a factor, $x^3 - 5x^2 + 2x + 8 =$

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

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

$-2x \div x = -2$; $(-2) \times (x - 4) = -2x + 8$; subtract: 0

Quotient $= x^2 - x - 2$

Ans: (D) $(x - 4)(x^2 - x - 2)$

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21. $x^3 + 8x^2 + 19x + 12 =$

$f(-1) = -1 + 8 - 19 + 12 = 0$

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

Ans: (A) $(x + 3)(x + 4)(x + 1)$

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

Second row: $0 \quad 4 \quad 16 \quad 56$

Bottom row: $1 \quad 4 \quad 14 \mid 60$

Quotient $= x^2 + 4x + 14$

Ans: (D) $x^2 + 4x + 14$

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23. $22^{93} - 13^{93}$ is exactly divisible by

$n = 93$: $x - a$ is a factor of $x^n - a^n$ (n odd).

So $22 - 13 = 9$ divides it.

Ans: (B) 9

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24. When $\frac{1}{8}a^3 - \frac{9}{4}a^2x + \frac{27}{2}ax^2 - 27x^3$ is divided by $\frac{1}{2}a - 3x$, the quotient is

$\frac{1}{8}a^3 \div \frac{1}{2}a = \frac{1}{4}a^2$; $\frac{1}{4}a^2 \times (\frac{1}{2}a - 3x) = \frac{1}{8}a^3 - \frac{3}{4}a^2x$; subtract: $-\frac{3}{2}a^2x + \frac{27}{2}ax^2 - 27x^3$

$-\frac{3}{2}a^2x \div \frac{1}{2}a = -3ax$; $(-3ax) \times (\frac{1}{2}a - 3x) = -\frac{3}{2}a^2x + 9ax^2$; subtract: $\frac{9}{2}ax^2 - 27x^3$

$\frac{9}{2}ax^2 \div \frac{1}{2}a = 9x^2$; $9x^2 \times (\frac{1}{2}a - 3x) = \frac{9}{2}ax^2 - 27x^3$; subtract: 0

Ans: (C) $\frac{1}{4}a^2 - 3ax + 9x^2$

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25. $x^2 + bx + c$ leaves the remainders -4 and 5 when divided by $x - 1$ and $x + 2$ respectively. Then

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

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

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

$\Rightarrow b = -2$

Put $b = -2$ in (1): $-2 + c = -5 \Rightarrow c = -3$

Ans: (C) $b = -2, c = -3$