

Factorization

MCQ Test, Set 05

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. The factors of $a^4b^4 - 1$ are

- A.** $(a^2b^2 + 1)(ab + 1)^2$ **B.** $(a^2b^2 + 1)(ab + 1)(ab - 1)$
C. $(a^2b^2 - 1)(ab + 1)(ab - 1)$ **D.** $(a^2b^2 + 1)(ab - 1)^2$

2. $64m^2 - 121n^2 =$

- A.** $(8m + 11n)^2$ **B.** $(8m + 11n)(8m - 11n)$ **C.** $(64m + 11n)(64m - 11n)$ **D.** $(8m - 11n)^2$

3. Factorize $x^2 + 12xz + 36z^2$.

- A.** $(6x + z)^2$ **B.** $(x - 6z)^2$ **C.** $(x + 6z)^2$ **D.** $(x + 6z)(x - 6z)$

4. On factorizing, $4m^2 - 28m + 49 =$

- A.** $(2m + 7)(2m - 7)$ **B.** $(7m - 2)^2$ **C.** $(2m + 7)^2$ **D.** $(2m - 7)^2$

5. On factorizing, $4x^2 + 4x + 1 - 16y^2 =$

- A.** $(2x + 1 - 4y)^2$ **B.** $(2x + 1 + 4y)(2x + 1 - 4y)$
C. $(2x - 1 + 4y)(2x - 1 - 4y)$ **D.** $(2x + 1 + 4y)(2x - 1 - 4y)$

6. To factorize $2x^2 + 21x + 40$ by splitting the middle term, we need two numbers whose product is 2×40 and whose sum is 21. They are

- A.** 5 and 16 **B.** -5 and -16 **C.** 8 and 10 **D.** 4 and 20

7. $4z^2 - 25z + 6 =$

- A.** $(4z - 1)(z + 6)$ **B.** $(4z - 6)(z - 1)$ **C.** $(4z - 1)(z - 6)$ **D.** $(4z + 1)(z + 6)$

8. The factors of $5z^2 - 17z + 14$ are

- A.** $(5z - 7)(z - 2)$ **B.** $(5z + 7)(z + 2)$ **C.** $(5z - 2)(z - 7)$ **D.** $(5z + 7)(z - 2)$

9. The factors of $10z^2 - 37z - 36$ are

- A.** $(2z + 9)(5z - 4)$ **B.** $(2z - 9)(5z + 4)$ **C.** $(2z + 4)(5z - 9)$ **D.** $(2z - 9)(5z - 4)$

10. $11t^2 - 50t + 51 =$

- A.** $(11t - 3)(t - 17)$ **B.** $(11t - 17)(t - 3)$ **C.** $(11t + 17)(t + 3)$ **D.** $(11t + 17)(t - 3)$

11. $a + 30 - a^2 =$
A. $(6 - a)(a + 5)$ **B.** $(a + 5)(a - 6)$ **C.** $(a + 6)(a - 5)$ **D.** $(5 - a)(6 - a)$
-
12. Factorize $(p - 3q)^2 - 3(p - 3q) - 18$.
A. $(p - 3q + 3)(p - 3q + 6)$ **B.** $(p - 3q + 6)(p - 3q - 3)$ **C.** $(p - 3q + 3)(p - 3q - 6)$ **D.** $(p - 3q - 3)(p - 3q - 6)$
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13. To factorize $7x^2 + 5xy - 2y^2$ by splitting the middle term, we need two numbers whose product is $7 \times (-2)$ and whose sum is 5. They are
A. -14 and 1 **B.** -1 and 14 **C.** -2 and 7 **D.** 2 and -7
-
14. To factorize $16x^2 + 8xz - 3z^2$ by splitting the middle term, we need two numbers whose product is $16 \times (-3)$ and whose sum is 8. They are
A. -4 and 12 **B.** -6 and 8 **C.** -3 and 16 **D.** 4 and -12
-
15. On factorizing, $4\sqrt{2}y^2 - 31y - 4\sqrt{2} =$
A. $(4\sqrt{2}y + 1)(y - 4\sqrt{2})$ **B.** $(4\sqrt{2}y - 1)(y + 4\sqrt{2})$
C. $(4\sqrt{2}y + 1)(y + 4\sqrt{2})$ **D.** $(4\sqrt{2}y - 1)(y - 4\sqrt{2})$
-
16. Factorize $3t^2 + \frac{43}{10}t - \frac{3}{10}$.
A. $(3t - \frac{1}{2})(t + \frac{3}{5})$ **B.** $(3t + \frac{1}{5})(t - \frac{3}{2})$
C. $(3t + \frac{1}{5})(t + \frac{3}{2})$ **D.** $(3t - \frac{1}{5})(t + \frac{3}{2})$
-
17. The factors of $4(p + 4)^2 - 5(p + 4)(q - 4) - 6(q - 4)^2$ are
A. $(4p + 3q - 4)(p - 2q + 12)$ **B.** $(4p + 3q)(p - 2q)$
C. $(4p + 3q + 4)(p - 2q - 12)$ **D.** $(4p + 3q + 4)(p - 2q + 12)$
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18. Factorize $x^2 + 9y^2 + 9z^2 + 6xy - 18yz - 6zx$.
A. $(-x + 3y + 3z)^2$ **B.** $(x + 3y + 3z)^2$ **C.** $(x + 3y - 3z)^2$ **D.** $(x + 9y - 9z)^2$
-
19. $b^3 + 6b^2 + 12b + 8 =$
A. $(b - 2)^3$ **B.** $(b + 2)(b^2 - 2b + 4)$ **C.** $(b + 2)^2(b - 2)$ **D.** $(b + 2)^3$
-
20. $216x^3y^3 - 1 =$
A. $(36x^2y^2 + 6xy + 1)(6xy - 1)$ **B.** $(36x^2y^2 + 12xy + 1)(6xy - 1)$
C. $(36x^2y^2 - 6xy + 1)(6xy + 1)$ **D.** $(36x^2y^2 - 6xy + 1)(6xy - 1)$
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21. Factorize $216 + p^3$.
A. $(p + 6)(p^2 + 6p + 36)$ **B.** $(6 - p)(p^2 + 6p + 36)$ **C.** $(p + 6)(p^2 - 12p + 36)$ **D.** $(p + 6)(p^2 - 6p + 36)$
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22. The factors of $4x^4 + 81$ are
A. $(2x^2 + 9)^2$ **B.** $(6x + 9 - 2x^2)(9 - 2x^2 - 6x)$
C. $(2x^2 + 3x + 9)(2x^2 - 3x + 9)$ **D.** $(2x^2 + 6x + 9)(2x^2 - 6x + 9)$
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23. $(2m - n)^3 + (n - 5)^3 + (5 - 2m)^3 =$

A. $(2m - n)(n - 5)(5 - 2m)$

C. 0

B. $3(2m - n)(n - 5)(5 - 2m)$

D. $-3(2m - n)(n - 5)(5 - 2m)$

24. $405x - 80x^5 =$

A. $5x(3 - 2x)^2(4x^2 + 9)$

C. $5x(2x + 3)(3 - 2x)(4x^2 + 9)$

B. $5x(2x + 3)^2(3 - 2x)^2$

D. $5x(2x + 3)^2(4x^2 + 9)$

25. Factorize $9x^2 + (3x^2 + 4)x + 12$.

A. $(3x^2 + 3)(x + 4)$

B. $(3x^2 - 4)(x + 3)$

C. $(3x^2 + 4)(x - 3)$

D. $(3x^2 + 4)(x + 3)$

Key sheet

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

Solutions

1. The factors of $a^4b^4 - 1$ are

$$\begin{aligned}a^4b^4 - 1 &= (a^2b^2)^2 - 1^2 \\&= (a^2b^2 + 1)(a^2b^2 - 1) \\&= (a^2b^2 + 1)[(ab)^2 - 1^2] \\&= (a^2b^2 + 1)(ab + 1)(ab - 1) \\ \text{Ans: (B)} \quad &(a^2b^2 + 1)(ab + 1)(ab - 1)\end{aligned}$$

2. $64m^2 - 121n^2 =$

$$\begin{aligned}64m^2 - 121n^2 &= (8m)^2 - (11n)^2 \\&= (8m + 11n)(8m - 11n) \\ \text{using } a^2 - b^2 &= (a + b)(a - b) \\ \text{Ans: (B)} \quad &(8m + 11n)(8m - 11n)\end{aligned}$$

3. Factorize $x^2 + 12xz + 36z^2$.

$$\begin{aligned}x^2 + 12xz + 36z^2 &= x^2 + (6z)^2 + 2(x)(6z) \\&= (x + 6z)^2 \\&= (x + 6z)(x + 6z) \\ \text{using } a^2 + b^2 + 2ab &= (a + b)^2 \\ \text{Ans: (C)} \quad &(x + 6z)^2\end{aligned}$$

4. On factorizing, $4m^2 - 28m + 49 =$

$$\begin{aligned}4m^2 - 28m + 49 &= (2m)^2 + 7^2 - 2(2m)(7) \\&= (2m - 7)^2 \\&= (2m - 7)(2m - 7) \\ \text{using } a^2 + b^2 - 2ab &= (a - b)^2 \\ \text{Ans: (D)} \quad &(2m - 7)^2\end{aligned}$$

5. On factorizing, $4x^2 + 4x + 1 - 16y^2 =$

$$\begin{aligned}4x^2 + 4x + 1 - 16y^2 &= (2x + 1)^2 - (4y)^2 \\&= (2x + 1 + 4y)(2x + 1 - 4y) \\ \text{using } a^2 + 2ab + b^2 &= (a + b)^2 \text{ and } a^2 - b^2 = (a + b)(a - b) \\ \text{Ans: (B)} \quad &(2x + 1 + 4y)(2x + 1 - 4y)\end{aligned}$$

6. To factorize $2x^2 + 21x + 40$ by splitting the middle term, we need two numbers whose product is 2×40 and whose sum is 21. They are

$$\begin{aligned}2 \times 40 &= 80 \\ 5 \times 16 &= 80 \text{ and } 5 + 16 = 21 \\ \text{So the numbers are } &5 \text{ and } 16. \\ \text{Ans: (A)} \quad &5 \text{ and } 16\end{aligned}$$

7. $4z^2 - 25z + 6 =$

$$\begin{aligned} 4 \times 6 = 24: (-1) \times (-24) &= 24 \text{ and } -1 - 24 = -25 \\ &= 4z^2 - z - 24z + 6 \\ &= z(4z - 1) - 6(4z - 1) \\ &= (4z - 1)(z - 6) \end{aligned}$$

Ans: (C) $(4z - 1)(z - 6)$

8. The factors of $5z^2 - 17z + 14$ are

$$\begin{aligned} 5 \times 14 = 70: (-7) \times (-10) &= 70 \text{ and } -7 - 10 = -17 \\ &= 5z^2 - 7z - 10z + 14 \\ &= z(5z - 7) - 2(5z - 7) \\ &= (5z - 7)(z - 2) \end{aligned}$$

Ans: (A) $(5z - 7)(z - 2)$

9. The factors of $10z^2 - 37z - 36$ are

$$\begin{aligned} 10 \times (-36) = -360: 8 \times (-45) &= -360 \text{ and } 8 - 45 = -37 \\ &= 10z^2 + 8z - 45z - 36 \\ &= 2z(5z + 4) - 9(5z + 4) \\ &= (5z + 4)(2z - 9) \end{aligned}$$

Ans: (B) $(2z - 9)(5z + 4)$

10. $11t^2 - 50t + 51 =$

$$\begin{aligned} 11 \times 51 &= 561 \\ 561 &= 3 \times 11 \times 17 = 17 \times 33, \text{ and } -17 - 33 = -50 \\ &= 11t^2 - 17t - 33t + 51 \\ &= t(11t - 17) - 3(11t - 17) \\ &= (11t - 17)(t - 3) \end{aligned}$$

Ans: (B) $(11t - 17)(t - 3)$

11. $a + 30 - a^2 =$

Writing the terms in order: $-a^2 + a + 30$

$$\begin{aligned} (-1) \times 30 = -30: (-5) \times 6 &= -30 \text{ and } -5 + 6 = 1 \\ &= -a^2 - 5a + 6a + 30 \\ &= -a(a + 5) + 6(a + 5) \\ &= (a + 5)(6 - a) \end{aligned}$$

Ans: (A) $(6 - a)(a + 5)$

12. Factorize $(p - 3q)^2 - 3(p - 3q) - 18$.

$$\text{Let } p - 3q = t$$

$$(p - 3q)^2 - 3(p - 3q) - 18 = t^2 - 3t - 18$$

$$1 \times (-18) = -18; 3 \times (-6) = -18 \text{ and } 3 - 6 = -3$$

$$= t^2 + 3t - 6t - 18$$

$$= t(t + 3) - 6(t + 3)$$

$$= (t + 3)(t - 6)$$

$$= [(p - 3q) + 3][(p - 3q) - 6]$$

$$= (p - 3q + 3)(p - 3q - 6)$$

$$\text{Ans: (C) } (p - 3q + 3)(p - 3q - 6)$$

13. To factorize $7x^2 + 5xy - 2y^2$ by splitting the middle term, we need two numbers whose product is $7 \times (-2)$ and whose sum is 5. They are

$$7 \times (-2) = -14$$

$$(-2) \times 7 = -14 \text{ and } -2 + 7 = 5$$

So the numbers are -2 and 7 .

$$\text{Ans: (C) } -2 \text{ and } 7$$

14. To factorize $16x^2 + 8xz - 3z^2$ by splitting the middle term, we need two numbers whose product is $16 \times (-3)$ and whose sum is 8. They are

$$16 \times (-3) = -48$$

$$(-4) \times 12 = -48 \text{ and } -4 + 12 = 8$$

So the numbers are -4 and 12 .

$$\text{Ans: (A) } -4 \text{ and } 12$$

15. On factorizing, $4\sqrt{2}y^2 - 31y - 4\sqrt{2} =$

$$4\sqrt{2} \times (-4\sqrt{2}) = 4 \times (-4) \times 2 = -32; 1 \times (-32) = -32 \text{ and } 1 - 32 = -31$$

$$= 4\sqrt{2}y^2 + y - 32y - 4\sqrt{2}$$

$$= y(4\sqrt{2}y + 1) - 4\sqrt{2}(4\sqrt{2}y + 1)$$

$$= (4\sqrt{2}y + 1)(y - 4\sqrt{2})$$

$$\text{Ans: (A) } (4\sqrt{2}y + 1)(y - 4\sqrt{2})$$

16. Factorize $3t^2 + \frac{43}{10}t - \frac{3}{10}$.

$$3t^2 + \frac{43}{10}t - \frac{3}{10} = \frac{30t^2 + 43t - 3}{10}$$

$$= \frac{1}{10}(30t^2 + 43t - 3)$$

$$30 \times (-3) = -90; (-2) \times 45 = -90 \text{ and } -2 + 45 = 43$$

$$= \frac{1}{10}[30t^2 - 2t + 45t - 3]$$

$$= \frac{1}{10}[2t(15t - 1) + 3(15t - 1)]$$

$$= \frac{1}{10}(15t - 1)(2t + 3)$$

$$= \left(t + \frac{3}{2}\right)\left(3t - \frac{1}{5}\right)$$

$$\text{Ans: (D) } \left(3t - \frac{1}{5}\right)\left(t + \frac{3}{2}\right)$$

17. The factors of $4(p+4)^2 - 5(p+4)(q-4) - 6(q-4)^2$ are

Let $p+4 = x$ and $q-4 = y$

$$4(p+4)^2 - 5(p+4)(q-4) - 6(q-4)^2 = 4x^2 - 5xy - 6y^2$$

$$4 \times (-6) = -24; 3 \times (-8) = -24 \text{ and } 3 - 8 = -5$$

$$= 4x^2 + 3xy - 8xy - 6y^2$$

$$= x(4x + 3y) - 2y(4x + 3y)$$

$$= (4x + 3y)(x - 2y)$$

$$= [4(p+4) + 3(q-4)][(p+4) - 2(q-4)]$$

$$= (4p + 16 + 3q - 12)(p + 4 - 2q + 8)$$

$$= (4p + 3q + 4)(p - 2q + 12)$$

Ans: (D) $(4p + 3q + 4)(p - 2q + 12)$

18. Factorize $x^2 + 9y^2 + 9z^2 + 6xy - 18yz - 6zx$.

$$x^2 + 9y^2 + 9z^2 + 6xy - 18yz - 6zx = x^2 + (3y)^2 + (3z)^2 + 2(x)(3y) - 2(3y)(3z) - 2(3z)(x)$$

$$= (x + 3y - 3z)^2$$

$$\text{using } a^2 + b^2 + c^2 + 2ab - 2bc - 2ca = (a + b - c)^2$$

Ans: (C) $(x + 3y - 3z)^2$

19. $b^3 + 6b^2 + 12b + 8 =$

$$b^3 + 6b^2 + 12b + 8 = b^3 + 2^3 + 3(b)^2(2) + 3(b)(2)^2$$

$$= (b + 2)^3$$

$$\text{using } (a + b)^3 = a^3 + b^3 + 3ab(a + b)$$

Ans: (D) $(b + 2)^3$

20. $216x^3y^3 - 1 =$

$$216x^3y^3 - 1 = (6xy)^3 - 1^3$$

$$= (6xy - 1)[(6xy)^2 + (6xy)(1) + 1^2]$$

$$= (6xy - 1)(36x^2y^2 + 6xy + 1)$$

$$\text{using } a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

Ans: (A) $(36x^2y^2 + 6xy + 1)(6xy - 1)$

21. Factorize $216 + p^3$.

$$216 + p^3 = 6^3 + p^3$$

$$= (6 + p)[6^2 - (6)(p) + p^2]$$

$$= (p + 6)(p^2 - 6p + 36)$$

$$\text{using } a^3 + b^3 = (a + b)(a^2 - ab + b^2)$$

Ans: (D) $(p + 6)(p^2 - 6p + 36)$

22. The factors of $4x^4 + 81$ are

$$\begin{aligned}4x^4 + 81 &= 9^2 + (2x^2)^2 + 2(9)(2x^2) - 36x^2 \\&= (2x^2 + 9)^2 - (6x)^2 \\&= (2x^2 + 9 + 6x)(2x^2 + 9 - 6x) \\&= (2x^2 + 6x + 9)(2x^2 - 6x + 9)\end{aligned}$$

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

23. $(2m - n)^3 + (n - 5)^3 + (5 - 2m)^3 =$

$$\text{Here } (2m - n) + (n - 5) + (5 - 2m) = 0$$

$$\text{If } a + b + c = 0, \text{ then } a^3 + b^3 + c^3 = 3abc$$

$$\therefore (2m - n)^3 + (n - 5)^3 + (5 - 2m)^3 = 3(2m - n)(n - 5)(5 - 2m)$$

Ans: (B) $3(2m - n)(n - 5)(5 - 2m)$

24. $405x - 80x^5 =$

$$\begin{aligned}405x - 80x^5 &= 5x(81 - 16x^4) \\&= 5x[9^2 - (4x^2)^2] \\&= 5x(4x^2 + 9)(9 - 4x^2) \\&= 5x(4x^2 + 9)[3^2 - (2x)^2] \\&= 5x(4x^2 + 9)(2x + 3)(3 - 2x)\end{aligned}$$

Ans: (C) $5x(2x + 3)(3 - 2x)(4x^2 + 9)$

25. Factorize $9x^2 + (3x^2 + 4)x + 12$.

$$\begin{aligned}9x^2 + (3x^2 + 4)x + 12 &= 9x^2 + 3x^3 + 4x + 12 \\&= 3x^3 + 9x^2 + 4x + 12 \\&= 3x^2(x + 3) + 4(x + 3) \\&= (x + 3)(3x^2 + 4)\end{aligned}$$

Ans: (D) $(3x^2 + 4)(x + 3)$
