

Factorization

MCQ Test, Set 08

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. $1 - 16p^4 =$

A. $(-2p + 1)(-4p^2 + 1)(2p + 1)$

B. $(-2p + 1)^2(4p^2 + 1)$

C. $(1 + 2p)(1 + 4p^2)(1 - 2p)$

D. $(2p + 1)^2(4p^2 + 1)$

2. $4p^2 + 36pq + 81q^2 =$

A. $(2p - 9q)^2$

B. $(2p + 9q)(2p - 9q)$

C. $(9p + 2q)^2$

D. $(2p + 9q)^2$

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

A. $(7t + 2)^2$

B. $(7t - 2)^2$

C. $(7t + 2)(7t - 2)$

D. $(2t - 7)^2$

4. On factorizing, $a^2 - 12a + 36 - b^2 =$

A. $(a - 6 + b)(a - 6 - b)$

B. $(a + 6 + b)(a + 6 - b)$

C. $(a + 6 - b)(a - 6 + b)$

D. $(a - 6 - b)^2$

5. To factorize $15b^2 + 26b + 7$ by splitting the middle term, we need two numbers whose product is 15×7 and whose sum is 26. They are

A. 5 and 21

B. 3 and 35

C. -5 and -21

D. 7 and 15

6. The factors of $3t^2 + 25t + 8$ are

A. $(3t - 1)(t - 8)$

B. $(3t + 8)(t + 1)$

C. $(3t + 1)(t + 8)$

D. $(3t - 1)(t + 8)$

7. To factorize $12z^2 - 19z + 4$ by splitting the middle term, we need two numbers whose product is 12×4 and whose sum is -19. They are

A. -8 and -6

B. 3 and 16

C. -12 and -4

D. -3 and -16

8. Factorize $5x^2 + 22x - 15$.

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

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

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

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

9. Factorize $6n^2 + n - 15$.

A. $(2n + 5)(3n - 3)$

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

C. $(2n + 3)(3n - 5)$

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

10. On factorizing, $17t^2 - 98t - 147 =$

A. $(17t - 7)(t + 21)$

B. $(17t - 21)(t + 7)$

C. $(17t - 21)(t - 7)$

D. $(17t + 21)(t - 7)$

11. The factors of $-11n - 3n^2 + 42$ are
A. $(6 - n)(7 - 3n)$ **B.** $(3n - 7)(n + 6)$ **C.** $(7 - 3n)(n + 6)$ **D.** $(3n + 7)(n - 6)$
-
12. On factorizing, $3(2a + 3b)^2 + 28(2a + 3b) + 49 =$
A. $(2a + 3b - 7)(6a + 9b - 7)$ **B.** $(2a + 3b + 7)(6a + 9b + 7)$
C. $(2a + 3b + 7)(6a + 9b - 7)$ **D.** $(2a + 3b - 7)(6a + 9b + 7)$
-
13. On factorizing, $12x^2 - 13xy - 4y^2 =$
A. $(3x + 4y)(4x - y)$ **B.** $(3x + 4y)(4x + y)$ **C.** $(3x - 4y)(4x + y)$ **D.** $(3x + y)(4x - 4y)$
-
14. To factorize $21x^2 + 13xz + 2z^2$ by splitting the middle term, we need two numbers whose product is 21×2 and whose sum is 13. They are
A. -6 and -7 **B.** 6 and 7 **C.** 3 and 14 **D.** 2 and 21
-
15. On factorizing, $3\sqrt{2}t^2 + 19t + 10\sqrt{2} =$
A. $(3t - 2\sqrt{2})(\sqrt{2}t - 5)$ **B.** $(3t + 2\sqrt{2})(\sqrt{2}t + 5)$
C. $(3t + 2\sqrt{2})(\sqrt{2}t - 5)$ **D.** $(3t - 2\sqrt{2})(\sqrt{2}t + 5)$
-
16. The factors of $4t^2 - 6t + \frac{9}{4}$ are
A. $(4t - 3)(t - \frac{3}{4})$ **B.** $(4t + 3)(t + \frac{3}{4})$
C. $(4t - 3)(t - 3)$ **D.** $(4t + 3)(t - \frac{3}{4})$
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17. Factorize $10(a + 5)^2 + (a + 5)(c - 3) - 3(c - 3)^2$.
A. $(2a - c + 13)(5a + 3c - 16)$ **B.** $(2a - c + 2)(5a + 3c + 2)$
C. $(2a - c + 13)(5a + 3c + 16)$ **D.** $(2a - c - 13)(5a + 3c + 16)$
-
18. Factorize $a^2 + 4b^2 + 16c^2 + 4ab - 16bc - 8ca$.
A. $(a + 2b - 4c)^2$ **B.** $(a + 2b + 4c)^2$ **C.** $(-a + 2b + 4c)^2$ **D.** $(a + 4b - 16c)^2$
-
19. Factorize $y^3 - 9y^2z + 27yz^2 - 27z^3$.
A. $(y + 3z)^3$ **B.** $(y + 3z)(y - 3z)^2$
C. $(y - 3z)(y^2 + 3yz + 9z^2)$ **D.** $(y - 3z)^3$
-
20. $8m^3 - 12m^2 + 6m - 9 =$
A. $(2m - 3)(4m^2 - 8m + 7)$ **B.** $(2m - 3)(4m^2 - 4m + 5)$ **C.** $(2m + 1)(4m^2 - 8m + 7)$ **D.** $(2m - 3)(4m^2 + 3)$
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21. On factorizing, $27a^3b^3 + 64 =$
A. $(3ab - 4)(9a^2b^2 + 12ab + 16)$ **B.** $(3ab + 4)(9a^2b^2 + 12ab + 16)$
C. $(3ab + 4)(9a^2b^2 - 12ab + 16)$ **D.** $(3ab + 4)(9a^2b^2 - 24ab + 16)$
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22. On factorizing, $y^4 + 16y^2 + 256 =$
A. $(y^2 + 16)^2$ **B.** $(y^2 + 4y - 16)(y^2 - 4y - 16)$
C. $(y^2 + 8y + 16)(y^2 - 8y + 16)$ **D.** $(y^2 + 4y + 16)(y^2 - 4y + 16)$
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23. On factorizing, $(m - 3n)^3 + (3n - 2)^3 + (2 - m)^3 =$
- A. $3(m - 3n)(3n - 2)(2 - m)$ B. 0
C. $(m - 3n)(3n - 2)(2 - m)$ D. $-3(m - 3n)(3n - 2)(2 - m)$
-
24. The factors of $16y - 81y^5$ are
- A. $y(3y + 2)^2(9y^2 + 4)$ B. $y(2 - 3y)(3y + 2)(9y^2 + 4)$
C. $y(2 - 3y)^2(3y + 2)^2$ D. $y(2 - 3y)^2(9y^2 + 4)$
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25. The factors of $25m^2 + (5m^2 + 4)m + 20$ are
- A. $(5m^2 + 4)(m - 5)$ B. $(5m^2 + 5)(m + 4)$ C. $(5m^2 - 4)(m + 5)$ D. $(5m^2 + 4)(m + 5)$
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Key sheet

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

Solutions

1. $1 - 16p^4 =$

$$\begin{aligned}1 - 16p^4 &= 1^2 - (4p^2)^2 \\&= (1 + 4p^2)(1 - 4p^2) \\&= (1 + 4p^2)[1^2 - (2p)^2] \\&= (1 + 4p^2)(1 + 2p)(1 - 2p)\end{aligned}$$

Ans: (C) $(1 + 2p)(1 + 4p^2)(1 - 2p)$

2. $4p^2 + 36pq + 81q^2 =$

$$\begin{aligned}4p^2 + 36pq + 81q^2 &= (2p)^2 + (9q)^2 + 2(2p)(9q) \\&= (2p + 9q)^2 \\&= (2p + 9q)(2p + 9q) \\&\text{using } a^2 + b^2 + 2ab = (a + b)^2\end{aligned}$$

Ans: (D) $(2p + 9q)^2$

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

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

Ans: (B) $(7t - 2)^2$

4. On factorizing, $a^2 - 12a + 36 - b^2 =$

$$\begin{aligned}a^2 - 12a + 36 - b^2 &= (a - 6)^2 - b^2 \\&= (a - 6 + b)(a - 6 - b) \\&\text{using } a^2 - 2ab + b^2 = (a - b)^2 \text{ and } a^2 - b^2 = (a + b)(a - b)\end{aligned}$$

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

5. To factorize $15b^2 + 26b + 7$ by splitting the middle term, we need two numbers whose product is 15×7 and whose sum is 26. They are

$$15 \times 7 = 105$$

$$5 \times 21 = 105 \text{ and } 5 + 21 = 26$$

So the numbers are 5 and 21.

Ans: (A) 5 and 21

6. The factors of $3t^2 + 25t + 8$ are

$$\begin{aligned}3 \times 8 = 24: 1 \times 24 = 24 \text{ and } 1 + 24 = 25 \\&= 3t^2 + t + 24t + 8 \\&= t(3t + 1) + 8(3t + 1) \\&= (3t + 1)(t + 8)\end{aligned}$$

Ans: (C) $(3t + 1)(t + 8)$

7. To factorize $12z^2 - 19z + 4$ by splitting the middle term, we need two numbers whose product is 12×4 and whose sum is -19 . They are

$$12 \times 4 = 48$$

$$(-3) \times (-16) = 48 \text{ and } -3 - 16 = -19$$

So the numbers are -3 and -16 .

Ans: (D) -3 and -16

8. Factorize $5x^2 + 22x - 15$.

$$5 \times (-15) = -75: (-3) \times 25 = -75 \text{ and } -3 + 25 = 22$$

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

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

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

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

9. Factorize $6n^2 + n - 15$.

$$6 \times (-15) = -90: (-9) \times 10 = -90 \text{ and } -9 + 10 = 1$$

$$= 6n^2 - 9n + 10n - 15$$

$$= 3n(2n - 3) + 5(2n - 3)$$

$$= (2n - 3)(3n + 5)$$

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

10. On factorizing, $17t^2 - 98t - 147 =$

$$17 \times (-147) = -2499$$

$$2499 = 3 \times 7 \times 7 \times 17 = 21 \times 119, \text{ and } 21 - 119 = -98$$

$$= 17t^2 + 21t - 119t - 147$$

$$= t(17t + 21) - 7(17t + 21)$$

$$= (17t + 21)(t - 7)$$

Ans: (D) $(17t + 21)(t - 7)$

11. The factors of $-11n - 3n^2 + 42$ are

Writing the terms in order: $-3n^2 - 11n + 42$

$$(-3) \times 42 = -126: (-18) \times 7 = -126 \text{ and } -18 + 7 = -11$$

$$= -3n^2 - 18n + 7n + 42$$

$$= -3n(n + 6) + 7(n + 6)$$

$$= (n + 6)(7 - 3n)$$

Ans: (C) $(7 - 3n)(n + 6)$

12. On factorizing, $3(2a + 3b)^2 + 28(2a + 3b) + 49 =$

$$\text{Let } 2a + 3b = p$$

$$3(2a + 3b)^2 + 28(2a + 3b) + 49 = 3p^2 + 28p + 49$$

$$3 \times 49 = 147: 7 \times 21 = 147 \text{ and } 7 + 21 = 28$$

$$= 3p^2 + 7p + 21p + 49$$

$$= p(3p + 7) + 7(3p + 7)$$

$$= (3p + 7)(p + 7)$$

$$= [3(2a + 3b) + 7][(2a + 3b) + 7]$$

$$= (6a + 9b + 7)(2a + 3b + 7)$$

$$\text{Ans: (B) } (2a + 3b + 7)(6a + 9b + 7)$$

13. On factorizing, $12x^2 - 13xy - 4y^2 =$

$$12 \times (-4) = -48: 3 \times (-16) = -48 \text{ and } 3 - 16 = -13$$

$$= 12x^2 + 3xy - 16xy - 4y^2$$

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

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

$$\text{Ans: (C) } (3x - 4y)(4x + y)$$

14. To factorize $21x^2 + 13xz + 2z^2$ by splitting the middle term, we need two numbers whose product is 21×2 and whose sum is 13. They are

$$21 \times 2 = 42$$

$$6 \times 7 = 42 \text{ and } 6 + 7 = 13$$

So the numbers are 6 and 7.

$$\text{Ans: (B) 6 and 7}$$

15. On factorizing, $3\sqrt{2}t^2 + 19t + 10\sqrt{2} =$

$$3\sqrt{2} \times 10\sqrt{2} = 3 \times 10 \times 2 = 60: 15 \times 4 = 60 \text{ and } 15 + 4 = 19$$

$$= 3\sqrt{2}t^2 + 15t + 4t + 10\sqrt{2}$$

$$= 3t(\sqrt{2}t + 5) + 2\sqrt{2}(\sqrt{2}t + 5)$$

$$= (\sqrt{2}t + 5)(3t + 2\sqrt{2})$$

$$\text{Ans: (B) } (3t + 2\sqrt{2})(\sqrt{2}t + 5)$$

16. The factors of $4t^2 - 6t + \frac{9}{4}$ are

$$4t^2 - 6t + \frac{9}{4} = \frac{16t^2 - 24t + 9}{4}$$

$$= \frac{1}{4}(16t^2 - 24t + 9)$$

$$= \frac{1}{4}[(4t)^2 + 3^2 - 2(4t)(3)]$$

$$= \frac{1}{4}(4t - 3)^2$$

$$= \left(t - \frac{3}{4}\right)(4t - 3)$$

$$\text{Ans: (A) } (4t - 3)\left(t - \frac{3}{4}\right)$$

17. Factorize $10(a+5)^2 + (a+5)(c-3) - 3(c-3)^2$.

Let $a+5 = x$ and $c-3 = y$

$$10(a+5)^2 + (a+5)(c-3) - 3(c-3)^2 = 10x^2 + xy - 3y^2$$

$$10 \times (-3) = -30; (-5) \times 6 = -30 \text{ and } -5 + 6 = 1$$

$$= 10x^2 - 5xy + 6xy - 3y^2$$

$$= 5x(2x - y) + 3y(2x - y)$$

$$= (2x - y)(5x + 3y)$$

$$= [2(a+5) - (c-3)][5(a+5) + 3(c-3)]$$

$$= (2a + 10 - c + 3)(5a + 25 + 3c - 9)$$

$$= (2a - c + 13)(5a + 3c + 16)$$

Ans: (C) $(2a - c + 13)(5a + 3c + 16)$

18. Factorize $a^2 + 4b^2 + 16c^2 + 4ab - 16bc - 8ca$.

$$a^2 + 4b^2 + 16c^2 + 4ab - 16bc - 8ca = a^2 + (2b)^2 + (4c)^2 + 2(a)(2b) - 2(2b)(4c) - 2(4c)(a)$$

$$= (a + 2b - 4c)^2$$

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

Ans: (A) $(a + 2b - 4c)^2$

19. Factorize $y^3 - 9y^2z + 27yz^2 - 27z^3$.

$$y^3 - 9y^2z + 27yz^2 - 27z^3 = y^3 - (3z)^3 - 3(y)^2(3z) + 3(y)(3z)^2$$

$$= (y - 3z)^3$$

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

Ans: (D) $(y - 3z)^3$

20. $8m^3 - 12m^2 + 6m - 9 =$

$$8m^3 - 12m^2 + 6m - 9 = (2m)^3 - 3(2m)^2(1) + 3(2m)(1)^2 - 1^3 - 8$$

$$= (2m - 1)^3 - 2^3$$

$$= (2m - 1 - 2)[(2m - 1)^2 + (2m - 1)2 + 2^2]$$

$$= (2m - 3)[4m^2 - 4m + 1 + 4m - 2 + 4]$$

$$= (2m - 3)(4m^2 + 3)$$

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

Ans: (D) $(2m - 3)(4m^2 + 3)$

21. On factorizing, $27a^3b^3 + 64 =$

$$27a^3b^3 + 64 = (3ab)^3 + 4^3$$

$$= (3ab + 4)[(3ab)^2 - (3ab)(4) + 4^2]$$

$$= (3ab + 4)(9a^2b^2 - 12ab + 16)$$

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

Ans: (C) $(3ab + 4)(9a^2b^2 - 12ab + 16)$

22. On factorizing, $y^4 + 16y^2 + 256 =$

$$\begin{aligned}y^4 + 16y^2 + 256 &= (y^2)^2 + 2(y^2)(16) + 16^2 - 16y^2 \\&= (y^2 + 16)^2 - (4y)^2 \\&= (y^2 + 16 + 4y)(y^2 + 16 - 4y) \\&= (y^2 + 4y + 16)(y^2 - 4y + 16)\end{aligned}$$

Ans: (D) $(y^2 + 4y + 16)(y^2 - 4y + 16)$

23. On factorizing, $(m - 3n)^3 + (3n - 2)^3 + (2 - m)^3 =$

$$\text{Here } (m - 3n) + (3n - 2) + (2 - m) = 0$$

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

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

Ans: (A) $3(m - 3n)(3n - 2)(2 - m)$

24. The factors of $16y - 81y^5$ are

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

Ans: (B) $y(2 - 3y)(3y + 2)(9y^2 + 4)$

25. The factors of $25m^2 + (5m^2 + 4)m + 20$ are

$$\begin{aligned}25m^2 + (5m^2 + 4)m + 20 &= 25m^2 + 5m^3 + 4m + 20 \\&= 5m^3 + 25m^2 + 4m + 20 \\&= 5m^2(m + 5) + 4(m + 5) \\&= (m + 5)(5m^2 + 4)\end{aligned}$$

Ans: (D) $(5m^2 + 4)(m + 5)$
