

Factorization

MCQ Test, Set 10

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. Factorize $144n^2 - 1$.

- A.** $(12n + 1)(12n - 1)$ **B.** $(12n - 1)^2$ **C.** $(12n + 1)^2$ **D.** $(144n + 1)(144n - 1)$

2. The factors of $49y^2 + 126y + 81$ are

- A.** $(7y + 9)(7y - 9)$ **B.** $(7y - 9)^2$ **C.** $(9y + 7)^2$ **D.** $(7y + 9)^2$

3. $49x^2 + 84x + 36 =$

- A.** $(7x + 6)^2$ **B.** $(7x + 6)(7x - 6)$ **C.** $(6x + 7)^2$ **D.** $(7x - 6)^2$

4. On factorizing, $25z^2 - 70z + 49 =$

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

5. Factorize $4p^2 - 20p + 25$.

- A.** $(2p + 5)(2p - 5)$ **B.** $(2p - 5)^2$ **C.** $(5p - 2)^2$ **D.** $(2p + 5)^2$

6. $4x^2 - 12xy + 9y^2 - 36 =$

- A.** $(2x - 3y + 6)(2x - 3y - 6)$ **B.** $(2x + 3y - 6)(2x - 3y + 6)$
C. $(2x - 3y - 6)^2$ **D.** $(2x + 3y + 6)(2x + 3y - 6)$

7. To factorize $8b^2 + 34b + 35$ by splitting the middle term, we need two numbers whose product is 8×35 and whose sum is 34. They are

- A.** -14 and -20 **B.** 8 and 35 **C.** 14 and 20 **D.** 10 and 28

8. On factorizing, $8n^2 - 10n + 3 =$

- A.** $(2n - 3)(4n - 1)$ **B.** $(2n - 1)(4n - 3)$ **C.** $(2n - 1)(4n + 3)$ **D.** $(2n + 1)(4n + 3)$

9. $6a^2 - 23a - 18 =$

- A.** $(2a + 2)(3a - 9)$ **B.** $(2a + 9)(3a - 2)$ **C.** $(2a - 9)(3a + 2)$ **D.** $(2a + 9)(3a + 2)$

10. On factorizing, $23x^2 + 159x - 200 =$

- A.** $(23x + 25)(x + 8)$ **B.** $(23x - 25)(x + 8)$ **C.** $(23x + 25)(x - 8)$ **D.** $(23x + 8)(x - 25)$

11. The factors of $11n^2 + 18n - 45$ are
A. $(11n - 15)(n + 3)$ **B.** $(11n + 3)(n - 15)$ **C.** $(11n + 15)(n - 3)$ **D.** $(11n + 15)(n + 3)$
-
12. Factorize $13z - 3z^2 - 4$.
A. $(-3z - 1)(4 - z)$ **B.** $(3z + 1)(z + 4)$ **C.** $(3z - 1)(z - 4)$ **D.** $(3z - 1)(4 - z)$
-
13. $-27 + 15t - 2t^2 =$
A. $(2t + 9)(t + 3)$ **B.** $(2t - 9)(t - 3)$ **C.** $(-t - 3)(9 - 2t)$ **D.** $(9 - 2t)(t - 3)$
-
14. On factorizing, $(x + 4z)^2 - (x + 4z) - 20 =$
A. $(x + 4z + 4)(x + 4z + 5)$ **B.** $(x + 4z - 4)(x + 4z - 5)$ **C.** $(x + 4z + 4)(x + 4z - 5)$ **D.** $(x + 4z + 5)(x + 4z - 4)$
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15. To factorize $10x^2 - xz - 2z^2$ by splitting the middle term, we need two numbers whose product is $10 \times (-2)$ and whose sum is -1 . They are
A. 4 and -5 **B.** -2 and 10 **C.** -4 and 5 **D.** -10 and 2
-
16. The factors of $x^2 - 9\sqrt{7}x + 126$ are
A. $(x + 3\sqrt{7})(x + 6\sqrt{7})$ **B.** $(x + 6\sqrt{7})(x - 3\sqrt{7})$
C. $(x - 3\sqrt{7})(x - 6\sqrt{7})$ **D.** $(x + 3\sqrt{7})(x - 6\sqrt{7})$
-
17. The factors of $2y^2 + \frac{10}{7}y + \frac{3}{14}$ are
A. $(2y + \frac{3}{7})(y - \frac{1}{2})$ **B.** $(2y - \frac{3}{7})(y - \frac{1}{2})$
C. $(2y + \frac{3}{2})(y + \frac{1}{7})$ **D.** $(2y + \frac{3}{7})(y + \frac{1}{2})$
-
18. The factors of $5(a - 4)^2 + 27(a - 4)(b + 3) + 10(b + 3)^2$ are
A. $(5a + 2b - 14)(a + 5b - 11)$ **B.** $(5a + 2b - 14)(a + 5b + 11)$
C. $(5a + 2b - 1)(a + 5b - 1)$ **D.** $(5a + 2b + 14)(a + 5b + 11)$
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19. The factors of $x^2 + 9y^2 + 4z^2 - 6xy - 12yz + 4zx$ are
A. $(x + 3y - 2z)^2$ **B.** $(x - 3y + 2z)^2$ **C.** $(x + 3y + 2z)^2$ **D.** $(x - 9y + 4z)^2$
-
20. Factorize $t^3 - 18t^2 + 108t - 216$.
A. $(t + 6)^3$ **B.** $(t + 6)(t - 6)^2$ **C.** $(t - 6)(t^2 + 6t + 36)$ **D.** $(t - 6)^3$
-
21. $27t^3 - 27t^2 + 9t - 65 =$
A. $(3t + 3)(9t^2 - 18t + 21)$ **B.** $(3t - 5)(9t^2 + 6t + 13)$
C. $(3t - 5)(9t^2 - 18t + 21)$ **D.** $(3t - 5)(9t^2 - 6t + 17)$
-
22. $125a^3b^3 + 8 =$
A. $(25a^2b^2 - 10ab + 4)(5ab + 2)$ **B.** $(25a^2b^2 + 10ab + 4)(5ab + 2)$
C. $(25a^2b^2 - 20ab + 4)(5ab + 2)$ **D.** $(25a^2b^2 + 10ab + 4)(5ab - 2)$
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23. On factorizing, $(4x - 3y)^3 + (3y - 5)^3 + (5 - 4x)^3 =$

A. 0

B. $(4x - 3y)(3y - 5)(5 - 4x)$

C. $-3(4x - 3y)(3y - 5)(5 - 4x)$

D. $3(4x - 3y)(3y - 5)(5 - 4x)$

24. The factors of $2x^5 - 32xz^4$ are

A. $2x(x - 2z)^2(x^2 + 4z^2)$

B. $2x(x + 2z)^2(x^2 + 4z^2)$

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

D. $2x(x + 2z)^2(x - 2z)^2$

25. On factorizing, $16m^2 + (4m^2 + 3)m + 12 =$

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

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

C. $(4m^2 + 3)(m + 4)$

D. $(4m^2 + 3)(m - 4)$

Key sheet

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

Solutions

1. Factorize $144n^2 - 1$.

$$\begin{aligned}144n^2 - 1 &= (12n)^2 - 1^2 \\&= (12n + 1)(12n - 1) \\&\text{using } a^2 - b^2 = (a + b)(a - b)\end{aligned}$$

Ans: (A) $(12n + 1)(12n - 1)$

2. The factors of $49y^2 + 126y + 81$ are

$$\begin{aligned}49y^2 + 126y + 81 &= (7y)^2 + 9^2 + 2(7y)(9) \\&= (7y + 9)^2 \\&= (7y + 9)(7y + 9) \\&\text{using } a^2 + b^2 + 2ab = (a + b)^2\end{aligned}$$

Ans: (D) $(7y + 9)^2$

3. $49x^2 + 84x + 36 =$

$$\begin{aligned}49x^2 + 84x + 36 &= (7x)^2 + 6^2 + 2(7x)(6) \\&= (7x + 6)^2 \\&= (7x + 6)(7x + 6) \\&\text{using } a^2 + b^2 + 2ab = (a + b)^2\end{aligned}$$

Ans: (A) $(7x + 6)^2$

4. On factorizing, $25z^2 - 70z + 49 =$

$$\begin{aligned}25z^2 - 70z + 49 &= (5z)^2 + 7^2 - 2(5z)(7) \\&= (5z - 7)^2 \\&= (5z - 7)(5z - 7) \\&\text{using } a^2 + b^2 - 2ab = (a - b)^2\end{aligned}$$

Ans: (B) $(5z - 7)^2$

5. Factorize $4p^2 - 20p + 25$.

$$\begin{aligned}4p^2 - 20p + 25 &= (2p)^2 + 5^2 - 2(2p)(5) \\&= (2p - 5)^2 \\&= (2p - 5)(2p - 5) \\&\text{using } a^2 + b^2 - 2ab = (a - b)^2\end{aligned}$$

Ans: (B) $(2p - 5)^2$

6. $4x^2 - 12xy + 9y^2 - 36 =$

$$\begin{aligned}4x^2 - 12xy + 9y^2 - 36 &= (2x - 3y)^2 - 6^2 \\&= (2x - 3y + 6)(2x - 3y - 6) \\&\text{using } a^2 - 2ab + b^2 = (a - b)^2 \text{ and } a^2 - b^2 = (a + b)(a - b)\end{aligned}$$

Ans: (A) $(2x - 3y + 6)(2x - 3y - 6)$

7. To factorize $8b^2 + 34b + 35$ by splitting the middle term, we need two numbers whose product is 8×35 and whose sum is 34. They are

$$8 \times 35 = 280$$

$$14 \times 20 = 280 \text{ and } 14 + 20 = 34$$

So the numbers are 14 and 20.

Ans: (C) 14 and 20

8. On factorizing, $8n^2 - 10n + 3 =$

$$8 \times 3 = 24; (-4) \times (-6) = 24 \text{ and } -4 - 6 = -10$$

$$= 8n^2 - 4n - 6n + 3$$

$$= 4n(2n - 1) - 3(2n - 1)$$

$$= (2n - 1)(4n - 3)$$

Ans: (B) $(2n - 1)(4n - 3)$

9. $6a^2 - 23a - 18 =$

$$6 \times (-18) = -108; 4 \times (-27) = -108 \text{ and } 4 - 27 = -23$$

$$= 6a^2 + 4a - 27a - 18$$

$$= 2a(3a + 2) - 9(3a + 2)$$

$$= (3a + 2)(2a - 9)$$

Ans: (C) $(2a - 9)(3a + 2)$

10. On factorizing, $23x^2 + 159x - 200 =$

$$23 \times (-200) = -4600$$

$$4600 = 2 \times 2 \times 2 \times 5 \times 5 \times 23 = 25 \times 184, \text{ and } -25 + 184 = 159$$

$$= 23x^2 - 25x + 184x - 200$$

$$= x(23x - 25) + 8(23x - 25)$$

$$= (23x - 25)(x + 8)$$

Ans: (B) $(23x - 25)(x + 8)$

11. The factors of $11n^2 + 18n - 45$ are

$$11 \times (-45) = -495$$

$$495 = 3 \times 3 \times 5 \times 11 = 15 \times 33, \text{ and } -15 + 33 = 18$$

$$= 11n^2 - 15n + 33n - 45$$

$$= n(11n - 15) + 3(11n - 15)$$

$$= (11n - 15)(n + 3)$$

Ans: (A) $(11n - 15)(n + 3)$

12. Factorize $13z - 3z^2 - 4$.

Writing the terms in order: $-3z^2 + 13z - 4$

$(-3) \times (-4) = 12$: $1 \times 12 = 12$ and $1 + 12 = 13$

$$= -3z^2 + z + 12z - 4$$

$$= -z(3z - 1) + 4(3z - 1)$$

$$= (3z - 1)(4 - z)$$

Ans: (D) $(3z - 1)(4 - z)$

13. $-27 + 15t - 2t^2 =$

Writing the terms in order: $-2t^2 + 15t - 27$

$(-2) \times (-27) = 54$: $6 \times 9 = 54$ and $6 + 9 = 15$

$$= -2t^2 + 6t + 9t - 27$$

$$= -2t(t - 3) + 9(t - 3)$$

$$= (t - 3)(9 - 2t)$$

Ans: (D) $(9 - 2t)(t - 3)$

14. On factorizing, $(x + 4z)^2 - (x + 4z) - 20 =$

Let $x + 4z = p$

$$(x + 4z)^2 - (x + 4z) - 20 = p^2 - p - 20$$

$1 \times (-20) = -20$: $4 \times (-5) = -20$ and $4 - 5 = -1$

$$= p^2 + 4p - 5p - 20$$

$$= p(p + 4) - 5(p + 4)$$

$$= (p + 4)(p - 5)$$

$$= [(x + 4z) + 4][(x + 4z) - 5]$$

$$= (x + 4z + 4)(x + 4z - 5)$$

Ans: (C) $(x + 4z + 4)(x + 4z - 5)$

15. To factorize $10x^2 - xz - 2z^2$ by splitting the middle term, we need two numbers whose product is $10 \times (-2)$ and whose sum is -1 . They are

$$10 \times (-2) = -20$$

$$4 \times (-5) = -20 \text{ and } 4 - 5 = -1$$

So the numbers are 4 and -5 .

Ans: (A) 4 and -5

16. The factors of $x^2 - 9\sqrt{7}x + 126$ are

Product = 126, sum = $-9\sqrt{7}$: $(-3\sqrt{7}) \times (-6\sqrt{7}) = 126$ and $-3\sqrt{7} + (-6\sqrt{7}) = -9\sqrt{7}$

$$= x^2 - 3\sqrt{7}x - 6\sqrt{7}x + 126$$

$$= x(x - 3\sqrt{7}) - 6\sqrt{7}(x - 3\sqrt{7})$$

$$= (x - 3\sqrt{7})(x - 6\sqrt{7})$$

Ans: (C) $(x - 3\sqrt{7})(x - 6\sqrt{7})$

17. The factors of $2y^2 + \frac{10}{7}y + \frac{3}{14}$ are

$$2y^2 + \frac{10}{7}y + \frac{3}{14} = \frac{28y^2 + 20y + 3}{14}$$

$$= \frac{1}{14}(28y^2 + 20y + 3)$$

$$28 \times 3 = 84: 6 \times 14 = 84 \text{ and } 6 + 14 = 20$$

$$= \frac{1}{14}[28y^2 + 6y + 14y + 3]$$

$$= \frac{1}{14}[2y(14y + 3) + 1(14y + 3)]$$

$$= \frac{1}{14}(14y + 3)(2y + 1)$$

$$= (2y + \frac{3}{7})(y + \frac{1}{2})$$

$$\text{Ans: (D) } (2y + \frac{3}{7})(y + \frac{1}{2})$$

18. The factors of $5(a - 4)^2 + 27(a - 4)(b + 3) + 10(b + 3)^2$ are

$$\text{Let } a - 4 = x \text{ and } b + 3 = y$$

$$5(a - 4)^2 + 27(a - 4)(b + 3) + 10(b + 3)^2 = 5x^2 + 27xy + 10y^2$$

$$5 \times 10 = 50: 2 \times 25 = 50 \text{ and } 2 + 25 = 27$$

$$= 5x^2 + 2xy + 25xy + 10y^2$$

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

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

$$= [5(a - 4) + 2(b + 3)][(a - 4) + 5(b + 3)]$$

$$= (5a - 20 + 2b + 6)(a - 4 + 5b + 15)$$

$$= (5a + 2b - 14)(a + 5b + 11)$$

$$\text{Ans: (B) } (5a + 2b - 14)(a + 5b + 11)$$

19. The factors of $x^2 + 9y^2 + 4z^2 - 6xy - 12yz + 4zx$ are

$$x^2 + 9y^2 + 4z^2 - 6xy - 12yz + 4zx = x^2 + (3y)^2 + (2z)^2 - 2(x)(3y) - 2(3y)(2z) + 2(2z)(x)$$

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

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

$$\text{Ans: (B) } (x - 3y + 2z)^2$$

20. Factorize $t^3 - 18t^2 + 108t - 216$.

$$t^3 - 18t^2 + 108t - 216 = t^3 - 6^3 - 3(t)^2(6) + 3(t)(6)^2$$

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

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

$$\text{Ans: (D) } (t - 6)^3$$

21. $27t^3 - 27t^2 + 9t - 65 =$

$$27t^3 - 27t^2 + 9t - 65 = (3t)^3 - 3(3t)^2(1) + 3(3t)(1)^2 - 1^3 - 64$$

$$= (3t - 1)^3 - 4^3$$

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

$$= (3t - 5)[9t^2 - 6t + 1 + 12t - 4 + 16]$$

$$= (3t - 5)(9t^2 + 6t + 13)$$

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

$$\text{Ans: (B) } (3t - 5)(9t^2 + 6t + 13)$$

22. $125a^3b^3 + 8 =$

$$125a^3b^3 + 8 = (5ab)^3 + 2^3$$

$$= (5ab + 2)[(5ab)^2 - (5ab)(2) + 2^2]$$

$$= (5ab + 2)(25a^2b^2 - 10ab + 4)$$

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

Ans: (A) $(25a^2b^2 - 10ab + 4)(5ab + 2)$

23. On factorizing, $(4x - 3y)^3 + (3y - 5)^3 + (5 - 4x)^3 =$

$$\text{Here } (4x - 3y) + (3y - 5) + (5 - 4x) = 0$$

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

$$\therefore (4x - 3y)^3 + (3y - 5)^3 + (5 - 4x)^3 = 3(4x - 3y)(3y - 5)(5 - 4x)$$

Ans: (D) $3(4x - 3y)(3y - 5)(5 - 4x)$

24. The factors of $2x^5 - 32xz^4$ are

$$2x^5 - 32xz^4 = 2x(x^4 - 16z^4)$$

$$= 2x[(x^2)^2 - (4z^2)^2]$$

$$= 2x(x^2 + 4z^2)(x^2 - 4z^2)$$

$$= 2x(x^2 + 4z^2)[x^2 - (2z)^2]$$

$$= 2x(x^2 + 4z^2)(x + 2z)(x - 2z)$$

Ans: (C) $2x(x + 2z)(x - 2z)(x^2 + 4z^2)$

25. On factorizing, $16m^2 + (4m^2 + 3)m + 12 =$

$$16m^2 + (4m^2 + 3)m + 12 = 16m^2 + 4m^3 + 3m + 12$$

$$= 4m^3 + 16m^2 + 3m + 12$$

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

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

Ans: (C) $(4m^2 + 3)(m + 4)$
