

Factorization

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. On factorizing, $16m^2 - 25n^2 =$

- A.** $(4m + 5n)^2$ **B.** $(4m - 5n)^2$ **C.** $(4m + 5n)(4m - 5n)$ **D.** $(16m + 5n)(16m - 5n)$

2. The factors of $16x^4z^4 - 81$ are

- A.** $(2xz + 3)(2xz - 3)(4x^2z^2 + 9)$ **B.** $(2xz - 3)^2(4x^2z^2 + 9)$
C. $(2xz + 3)(2xz - 3)(4x^2z^2 - 9)$ **D.** $(2xz + 3)^2(4x^2z^2 + 9)$

3. $49z^2 + 56z + 16 =$

- A.** $(7z - 4)^2$ **B.** $(4z + 7)^2$ **C.** $(7z + 4)^2$ **D.** $(7z + 4)(7z - 4)$

4. On factorizing, $a^2 - 6ab + 9b^2 =$

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

5. Factorize $4x^2 - 28x + 49 - 36y^2$.

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

6. To factorize $3y^2 + 10y + 7$ by splitting the middle term, we need two numbers whose product is 3×7 and whose sum is 10. They are

- A.** -21 and -1 **B.** -3 and -7 **C.** 1 and 21 **D.** 3 and 7

7. On factorizing, $5a^2 - 11a + 2 =$

- A.** $(5a - 1)(a - 2)$ **B.** $(5a + 1)(a + 2)$ **C.** $(5a - 2)(a - 1)$ **D.** $(5a - 1)(a + 2)$

8. To factorize $9m^2 - 30m + 16$ by splitting the middle term, we need two numbers whose product is 9×16 and whose sum is -30. They are

- A.** 6 and 24 **B.** -18 and -8 **C.** -16 and -9 **D.** -6 and -24

9. To factorize $10a^2 + 33a - 7$ by splitting the middle term, we need two numbers whose product is $10 \times (-7)$ and whose sum is 33. They are

- A.** -5 and 14 **B.** -7 and 10 **C.** -2 and 35 **D.** 2 and -35

10. $17a^2 - 81a + 52 =$
A. $(17a - 13)(a - 4)$ **B.** $(17a + 13)(a - 4)$ **C.** $(17a - 4)(a - 13)$ **D.** $(17a + 13)(a + 4)$
-
11. Factorize $12n - 35 - n^2$.
A. $(-n - 5)(7 - n)$ **B.** $(n + 5)(n + 7)$ **C.** $(7 - n)(n - 5)$ **D.** $(n - 5)(n - 7)$
-
12. $(a - 2b)^2 - 11(a - 2b) + 30 =$
A. $(a - 2b + 6)(a - 2b - 5)$ **B.** $(a - 2b - 5)(a - 2b - 6)$ **C.** $(a - 2b + 5)(a - 2b - 6)$ **D.** $(a - 2b + 5)(a - 2b + 6)$
-
13. Factorize $4x^2 - 25xy + 6y^2$.
A. $(4x + y)(x - 6y)$ **B.** $(4x + y)(x + 6y)$ **C.** $(4x - y)(x - 6y)$ **D.** $(4x - 6y)(x - y)$
-
14. The factors of $7\sqrt{3}t^2 + 48t + 12\sqrt{3}$ are
A. $(7t - 2\sqrt{3})(\sqrt{3}t + 6)$ **B.** $(7t - 2\sqrt{3})(\sqrt{3}t - 6)$
C. $(7t + 2\sqrt{3})(\sqrt{3}t - 6)$ **D.** $(7t + 2\sqrt{3})(\sqrt{3}t + 6)$
-
15. Factorize $10y^2 + 6y + \frac{9}{10}$.
A. $(10y - 3)(y - \frac{3}{10})$ **B.** $(10y + 3)(y + \frac{3}{10})$
C. $(10y - 3)(y + \frac{3}{10})$ **D.** $(10y + 3)(y + 3)$
-
16. Factorize $5(a + 3)^2 - 27(a + 3)(c + 4) - 18(c + 4)^2$.
A. $(5a + 3c + 27)(a - 6c - 21)$ **B.** $(5a + 3c - 27)(a - 6c - 21)$
C. $(5a + 3c + 27)(a - 6c + 21)$ **D.** $(5a + 3c + 7)(a - 6c + 7)$
-
17. On factorizing, $9p^2 + q^2 + 9r^2 - 6pq - 6qr + 18rp =$
A. $(3p + q + 3r)^2$ **B.** $(3p - q + 3r)^2$ **C.** $(3p + q - 3r)^2$ **D.** $(9p - q + 9r)^2$
-
18. $27y^3 + 108y^2 + 144y + 64 =$
A. $(3y - 4)^3$ **B.** $(3y + 4)^3$
C. $(3y + 4)(9y^2 - 12y + 16)$ **D.** $(3y + 4)^2(3y - 4)$
-
19. Factorize $x^3 - 125$.
A. $(x + 5)(x^2 - 5x + 25)$ **B.** $(x - 5)(x^2 + 10x + 25)$ **C.** $(x - 5)(x^2 - 5x + 25)$ **D.** $(x - 5)(x^2 + 5x + 25)$
-
20. Factorize $8y^3 + 27$.
A. $(2y + 3)(4y^2 + 6y + 9)$ **B.** $(2y + 3)(4y^2 - 12y + 9)$ **C.** $(2y + 3)(4y^2 - 6y + 9)$ **D.** $(2y - 3)(4y^2 + 6y + 9)$
-
21. $x^3 - 21x - 20 =$
A. $(x + 1)(x + 5)(x - 4)$ **B.** $(x + 1)(x + 4)(x - 5)$ **C.** $(x + 4)(x - 1)(x - 5)$ **D.** $(x + 5)(x - 1)(x - 4)$
-

22. The factors of $x^4 + 25x^2z^2 + 625z^4$ are

A. $(x^2 + 25z^2)^2$

B. $(x^2 + 5xz - 25z^2)(x^2 - 5xz - 25z^2)$

C. $(x^2 + 5xz + 25z^2)(x^2 - 5xz + 25z^2)$

D. $(x^2 + 10xz + 25z^2)(x^2 - 10xz + 25z^2)$

23. The factors of $(4p - 5q)^3 + (5q - 3)^3 + (3 - 4p)^3$ are

A. 0

B. $3(4p - 5q)(5q - 3)(3 - 4p)$

C. $-3(4p - 5q)(5q - 3)(3 - 4p)$

D. $(4p - 5q)(5q - 3)(3 - 4p)$

24. Factorize $2a^5c - 162ac^5$.

A. $2ac(a + 3c)^2(a - 3c)^2$

B. $2ac(a - 3c)^2(a^2 + 9c^2)$

C. $2ac(a + 3c)^2(a^2 + 9c^2)$

D. $2ac(a + 3c)(a - 3c)(a^2 + 9c^2)$

25. The factors of $18m^2 + (3m^2 + 8)m + 48$ are

A. $(3m^2 + 6)(m + 8)$

B. $(3m^2 - 8)(m + 6)$

C. $(3m^2 + 8)(m - 6)$

D. $(3m^2 + 8)(m + 6)$

Key sheet

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

Solutions

1. On factorizing, $16m^2 - 25n^2 =$

$$16m^2 - 25n^2 = (4m)^2 - (5n)^2$$

$$= (4m + 5n)(4m - 5n)$$

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

$$\text{Ans: (C) } (4m + 5n)(4m - 5n)$$

2. The factors of $16x^4z^4 - 81$ are

$$16x^4z^4 - 81 = (4x^2z^2)^2 - 9^2$$

$$= (4x^2z^2 + 9)(4x^2z^2 - 9)$$

$$= (4x^2z^2 + 9)[(2xz)^2 - 3^2]$$

$$= (4x^2z^2 + 9)(2xz + 3)(2xz - 3)$$

$$\text{Ans: (A) } (2xz + 3)(2xz - 3)(4x^2z^2 + 9)$$

3. $49z^2 + 56z + 16 =$

$$49z^2 + 56z + 16 = (7z)^2 + 4^2 + 2(7z)(4)$$

$$= (7z + 4)^2$$

$$= (7z + 4)(7z + 4)$$

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

$$\text{Ans: (C) } (7z + 4)^2$$

4. On factorizing, $a^2 - 6ab + 9b^2 =$

$$a^2 - 6ab + 9b^2 = a^2 + (3b)^2 - 2(a)(3b)$$

$$= (a - 3b)^2$$

$$= (a - 3b)(a - 3b)$$

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

$$\text{Ans: (A) } (a - 3b)^2$$

5. Factorize $4x^2 - 28x + 49 - 36y^2$.

$$4x^2 - 28x + 49 - 36y^2 = (2x - 7)^2 - (6y)^2$$

$$= (2x - 7 + 6y)(2x - 7 - 6y)$$

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

$$\text{Ans: (A) } (2x - 7 + 6y)(2x - 7 - 6y)$$

6. To factorize $3y^2 + 10y + 7$ by splitting the middle term, we need two numbers whose product is 3×7 and whose sum is 10. They are

$$3 \times 7 = 21$$

$$3 \times 7 = 21 \text{ and } 3 + 7 = 10$$

So the numbers are 3 and 7.

$$\text{Ans: (D) } 3 \text{ and } 7$$

7. On factorizing, $5a^2 - 11a + 2 =$

$$\begin{aligned} 5 \times 2 = 10: (-1) \times (-10) &= 10 \text{ and } -1 - 10 = -11 \\ &= 5a^2 - a - 10a + 2 \\ &= a(5a - 1) - 2(5a - 1) \\ &= (5a - 1)(a - 2) \end{aligned}$$

Ans: (A) $(5a - 1)(a - 2)$

8. To factorize $9m^2 - 30m + 16$ by splitting the middle term, we need two numbers whose product is 9×16 and whose sum is -30 . They are

$$\begin{aligned} 9 \times 16 &= 144 \\ (-6) \times (-24) &= 144 \text{ and } -6 - 24 = -30 \\ \text{So the numbers are } &-6 \text{ and } -24. \end{aligned}$$

Ans: (D) -6 and -24

9. To factorize $10a^2 + 33a - 7$ by splitting the middle term, we need two numbers whose product is $10 \times (-7)$ and whose sum is 33 . They are

$$\begin{aligned} 10 \times (-7) &= -70 \\ (-2) \times 35 &= -70 \text{ and } -2 + 35 = 33 \\ \text{So the numbers are } &-2 \text{ and } 35. \end{aligned}$$

Ans: (C) -2 and 35

10. $17a^2 - 81a + 52 =$

$$\begin{aligned} 17 \times 52 &= 884 \\ 884 &= 2 \times 2 \times 13 \times 17 = 13 \times 68, \text{ and } -13 - 68 = -81 \\ &= 17a^2 - 13a - 68a + 52 \\ &= a(17a - 13) - 4(17a - 13) \\ &= (17a - 13)(a - 4) \end{aligned}$$

Ans: (A) $(17a - 13)(a - 4)$

11. Factorize $12n - 35 - n^2$.

$$\begin{aligned} \text{Writing the terms in order: } &-n^2 + 12n - 35 \\ (-1) \times (-35) &= 35: 5 \times 7 = 35 \text{ and } 5 + 7 = 12 \\ &= -n^2 + 5n + 7n - 35 \\ &= -n(n - 5) + 7(n - 5) \\ &= (n - 5)(7 - n) \end{aligned}$$

Ans: (C) $(7 - n)(n - 5)$

12. $(a - 2b)^2 - 11(a - 2b) + 30 =$

Let $a - 2b = p$

$$(a - 2b)^2 - 11(a - 2b) + 30 = p^2 - 11p + 30$$

$$1 \times 30 = 30: (-5) \times (-6) = 30 \text{ and } -5 - 6 = -11$$

$$= p^2 - 5p - 6p + 30$$

$$= p(p - 5) - 6(p - 5)$$

$$= (p - 5)(p - 6)$$

$$= [(a - 2b) - 5][(a - 2b) - 6]$$

$$= (a - 2b - 5)(a - 2b - 6)$$

Ans: (B) $(a - 2b - 5)(a - 2b - 6)$

13. Factorize $4x^2 - 25xy + 6y^2$.

$$4 \times 6 = 24: (-1) \times (-24) = 24 \text{ and } -1 - 24 = -25$$

$$= 4x^2 - xy - 24xy + 6y^2$$

$$= x(4x - y) - 6y(4x - y)$$

$$= (4x - y)(x - 6y)$$

Ans: (C) $(4x - y)(x - 6y)$

14. The factors of $7\sqrt{3}t^2 + 48t + 12\sqrt{3}$ are

$$7\sqrt{3} \times 12\sqrt{3} = 7 \times 12 \times 3 = 252: 42 \times 6 = 252 \text{ and } 42 + 6 = 48$$

$$= 7\sqrt{3}t^2 + 42t + 6t + 12\sqrt{3}$$

$$= 7t(\sqrt{3}t + 6) + 2\sqrt{3}(\sqrt{3}t + 6)$$

$$= (\sqrt{3}t + 6)(7t + 2\sqrt{3})$$

Ans: (D) $(7t + 2\sqrt{3})(\sqrt{3}t + 6)$

15. Factorize $10y^2 + 6y + \frac{9}{10}$.

$$10y^2 + 6y + \frac{9}{10} = \frac{100y^2 + 60y + 9}{10}$$

$$= \frac{1}{10}(100y^2 + 60y + 9)$$

$$= \frac{1}{10}[(10y)^2 + 3^2 + 2(10y)(3)]$$

$$= \frac{1}{10}(10y + 3)^2$$

$$= \left(y + \frac{3}{10}\right)(10y + 3)$$

Ans: (B) $(10y + 3)\left(y + \frac{3}{10}\right)$

16. Factorize $5(a+3)^2 - 27(a+3)(c+4) - 18(c+4)^2$.

Let $a+3 = x$ and $c+4 = y$

$$5(a+3)^2 - 27(a+3)(c+4) - 18(c+4)^2 = 5x^2 - 27xy - 18y^2$$

$$5 \times (-18) = -90; 3 \times (-30) = -90 \text{ and } 3 - 30 = -27$$

$$= 5x^2 + 3xy - 30xy - 18y^2$$

$$= x(5x + 3y) - 6y(5x + 3y)$$

$$= (5x + 3y)(x - 6y)$$

$$= [5(a+3) + 3(c+4)][(a+3) - 6(c+4)]$$

$$= (5a + 15 + 3c + 12)(a + 3 - 6c - 24)$$

$$= (5a + 3c + 27)(a - 6c - 21)$$

Ans: (A) $(5a + 3c + 27)(a - 6c - 21)$

17. On factorizing, $9p^2 + q^2 + 9r^2 - 6pq - 6qr + 18rp =$

$$9p^2 + q^2 + 9r^2 - 6pq - 6qr + 18rp = (3p)^2 + q^2 + (3r)^2 - 2(3p)(q) - 2(q)(3r) + 2(3r)(3p)$$

$$= (3p - q + 3r)^2$$

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

Ans: (B) $(3p - q + 3r)^2$

18. $27y^3 + 108y^2 + 144y + 64 =$

$$27y^3 + 108y^2 + 144y + 64 = (3y)^3 + 4^3 + 3(3y)^2(4) + 3(3y)(4)^2$$

$$= (3y + 4)^3$$

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

Ans: (B) $(3y + 4)^3$

19. Factorize $x^3 - 125$.

$$x^3 - 125 = x^3 - 5^3$$

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

$$= (x - 5)(x^2 + 5x + 25)$$

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

Ans: (D) $(x - 5)(x^2 + 5x + 25)$

20. Factorize $8y^3 + 27$.

$$8y^3 + 27 = (2y)^3 + 3^3$$

$$= (2y + 3)[(2y)^2 - (2y)(3) + 3^2]$$

$$= (2y + 3)(4y^2 - 6y + 9)$$

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

Ans: (C) $(2y + 3)(4y^2 - 6y + 9)$

21. $x^3 - 21x - 20 =$

$$x^3 - 21x - 20 = x^3 - x - 20x - 20$$

$$= x(x^2 - 1) - 20(x + 1)$$

$$= x(x + 1)(x - 1) - 20(x + 1)$$

$$= (x + 1)[x(x - 1) - 20]$$

$$= (x + 1)(x^2 - x - 20)$$

Now $x^2 - x - 20$: $4 \times (-5) = -20$ and $4 - 5 = -1$

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

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

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

So $x^3 - 21x - 20 = (x + 1)(x + 4)(x - 5)$

Ans: (B) $(x + 1)(x + 4)(x - 5)$

22. The factors of $x^4 + 25x^2z^2 + 625z^4$ are

$$x^4 + 25x^2z^2 + 625z^4 = (x^2)^2 + 2(x^2)(25z^2) + (25z^2)^2 - 25x^2z^2$$

$$= (x^2 + 25z^2)^2 - (5xz)^2$$

$$= (x^2 + 25z^2 + 5xz)(x^2 + 25z^2 - 5xz)$$

$$= (x^2 + 5xz + 25z^2)(x^2 - 5xz + 25z^2)$$

Ans: (C) $(x^2 + 5xz + 25z^2)(x^2 - 5xz + 25z^2)$

23. The factors of $(4p - 5q)^3 + (5q - 3)^3 + (3 - 4p)^3$ are

Here $(4p - 5q) + (5q - 3) + (3 - 4p) = 0$

If $a + b + c = 0$, then $a^3 + b^3 + c^3 = 3abc$

$$\therefore (4p - 5q)^3 + (5q - 3)^3 + (3 - 4p)^3 = 3(4p - 5q)(5q - 3)(3 - 4p)$$

Ans: (B) $3(4p - 5q)(5q - 3)(3 - 4p)$

24. Factorize $2a^5c - 162ac^5$.

$$2a^5c - 162ac^5 = 2ac(a^4 - 81c^4)$$

$$= 2ac[(a^2)^2 - (9c^2)^2]$$

$$= 2ac(a^2 + 9c^2)(a^2 - 9c^2)$$

$$= 2ac(a^2 + 9c^2)[a^2 - (3c)^2]$$

$$= 2ac(a^2 + 9c^2)(a + 3c)(a - 3c)$$

Ans: (D) $2ac(a + 3c)(a - 3c)(a^2 + 9c^2)$

25. The factors of $18m^2 + (3m^2 + 8)m + 48$ are

$$18m^2 + (3m^2 + 8)m + 48 = 18m^2 + 3m^3 + 8m + 48$$

$$= 3m^3 + 18m^2 + 8m + 48$$

$$= 3m^2(m + 6) + 8(m + 6)$$

$$= (m + 6)(3m^2 + 8)$$

Ans: (D) $(3m^2 + 8)(m + 6)$
