

Factorization

MCQ Test, Set 01

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 $121x^2 - 16z^2$ are

- A.** $(11x - 4z)^2$ **B.** $(11x + 4z)^2$ **C.** $(121x + 4z)(121x - 4z)$ **D.** $(11x + 4z)(11x - 4z)$

2. $4m^2 + 4m + 1 =$

- A.** $(2m + 1)^2$ **B.** $(2m - 1)^2$ **C.** $(m + 2)^2$ **D.** $(2m + 1)(2m - 1)$

3. $49b^2 - 14b + 1 =$

- A.** $(7b + 1)^2$ **B.** $(b - 7)^2$ **C.** $(7b + 1)(7b - 1)$ **D.** $(7b - 1)^2$

4. $4m^2 + 28m + 49 - 25n^2 =$

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

5. To factorize $8m^2 + 22m + 5$ by splitting the middle term, we need two numbers whose product is 8×5 and whose sum is 22. They are

- A.** -2 and -20 **B.** 5 and 8 **C.** 2 and 20 **D.** 4 and 10

6. $10a^2 + 17a + 6 =$

- A.** $(2a + 6)(5a + 1)$ **B.** $(2a + 1)(5a - 6)$ **C.** $(2a - 1)(5a - 6)$ **D.** $(2a + 1)(5a + 6)$

7. The factors of $4y^2 - 21y + 20$ are

- A.** $(4y - 4)(y - 5)$ **B.** $(4y - 5)(y - 4)$ **C.** $(4y + 5)(y - 4)$ **D.** $(4y + 5)(y + 4)$

8. $10p^2 + 11p - 6 =$

- A.** $(2p + 3)(5p - 2)$ **B.** $(2p - 3)(5p + 2)$ **C.** $(2p - 2)(5p + 3)$ **D.** $(2p - 3)(5p - 2)$

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

- A.** -4 and 12 **B.** 4 and -12 **C.** -6 and 8 **D.** -3 and 16

10. On factorizing, $19t^2 + 94t - 273 =$

- A.** $(19t + 39)(t + 7)$ **B.** $(19t + 7)(t - 39)$ **C.** $(19t + 39)(t - 7)$ **D.** $(19t - 39)(t + 7)$

11. Factorize $17x - 35 - 2x^2$.
A. $(-2x - 7)(5 - x)$ **B.** $(2x - 7)(x - 5)$ **C.** $(2x - 7)(5 - x)$ **D.** $(2x + 7)(x + 5)$
-
12. The factors of $(m - p)^2 + 7(m - p) + 10$ are
A. $(m - p - 2)(m - p - 5)$ **B.** $(m - p + 5)(m - p - 2)$ **C.** $(m - p + 2)(m - p - 5)$ **D.** $(m - p + 2)(m - p + 5)$
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13. The factors of $12x^2 + 13xz + 3z^2$ are
A. $(3x - z)(4x + 3z)$ **B.** $(3x + 3z)(4x + z)$ **C.** $(3x - z)(4x - 3z)$ **D.** $(3x + z)(4x + 3z)$
-
14. To factorize $5x^2 - 2xz - 7z^2$ by splitting the middle term, we need two numbers whose product is $5 \times (-7)$ and whose sum is -2 . They are
A. -1 and 35 **B.** -35 and 1 **C.** 5 and -7 **D.** -5 and 7
-
15. On factorizing, $a^2 - 7\sqrt{5}a + 30 =$
A. $(a + \sqrt{5})(a - 6\sqrt{5})$ **B.** $(a - 6\sqrt{5})(a - \sqrt{5})$
C. $(a + 6\sqrt{5})(a - \sqrt{5})$ **D.** $(a + 6\sqrt{5})(a + \sqrt{5})$
-
16. Factorize $3y^2 + \frac{3}{4}y - \frac{1}{12}$.
A. $(3y + \frac{1}{4})(y - \frac{1}{3})$ **B.** $(3y - \frac{1}{4})(y + \frac{1}{3})$
C. $(3y - \frac{1}{3})(y + \frac{1}{4})$ **D.** $(3y + \frac{1}{4})(y + \frac{1}{3})$
-
17. On factorizing, $6(p + 4)^2 - 5(p + 4)(q - 4) - 4(q - 4)^2 =$
A. $(2p + q + 4)(3p - 4q + 28)$ **B.** $(2p + q + 4)(3p - 4q - 28)$
C. $(2p + q - 4)(3p - 4q + 28)$ **D.** $(2p + q)(3p - 4q)$
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18. $4p^2 + 4q^2 + 9r^2 + 8pq - 12qr - 12rp =$
A. $(2p + 2q + 3r)^2$ **B.** $(-2p + 2q + 3r)^2$ **C.** $(2p + 2q - 3r)^2$ **D.** $(4p + 4q - 9r)^2$
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19. The factors of $p^3 + 18p^2 + 108p + 216$ are
A. $(p - 6)^3$ **B.** $(p + 6)^3$ **C.** $(p + 6)(p^2 - 6p + 36)$ **D.** $(p + 6)^2(p - 6)$
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20. On factorizing, $x^3 + 9x^2 + 27x - 37 =$
A. $(x - 1)(x^2 + 2x + 13)$ **B.** $(x - 1)(x^2 + 6x + 25)$ **C.** $(x - 1)(x^2 + 10x + 37)$ **D.** $(x + 7)(x^2 + 2x + 13)$
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21. Factorize $64 + 125m^3n^3$.
A. $(25m^2n^2 - 40mn + 16)(5mn + 4)$ **B.** $(25m^2n^2 - 20mn + 16)(5mn + 4)$
C. $(25m^2n^2 + 20mn + 16)(5mn + 4)$ **D.** $(25m^2n^2 + 20mn + 16)(4 - 5mn)$
-
22. $16x^4 + 36x^2y^2 + 81y^4 =$
A. $(4x^2 + 12xy + 9y^2)(4x^2 - 12xy + 9y^2)$ **B.** $(4x^2 + 6xy + 9y^2)(4x^2 - 6xy + 9y^2)$
C. $(4x^2 + 6xy - 9y^2)(4x^2 - 6xy - 9y^2)$ **D.** $(4x^2 + 9y^2)^2$
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23. $(2x - 3y)^3 + (3y - 5)^3 + (5 - 2x)^3 =$

A. $3(2x - 3y)(3y - 5)(5 - 2x)$

C. $-3(2x - 3y)(3y - 5)(5 - 2x)$

B. $(2x - 3y)(3y - 5)(5 - 2x)$

D. 0

24. The factors of $16t^5 - t$ are

A. $t(2t + 1)^2(2t - 1)^2$

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

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

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

25. The factors of $10y^2 + (2y^2 + 5)y + 25$ are

A. $(2y^2 + 5)(y + 5)$

B. $(2y^2 + 5)(y - 5)$

C. $(2y^2 - 5)(y + 5)$

D. $(2y + 5)(y^2 + 5)$

Key sheet

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

Solutions

1. The factors of $121x^2 - 16z^2$ are

$$121x^2 - 16z^2 = (11x)^2 - (4z)^2$$

$$= (11x + 4z)(11x - 4z)$$

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

$$\text{Ans: (D) } (11x + 4z)(11x - 4z)$$

2. $4m^2 + 4m + 1 =$

$$4m^2 + 4m + 1 = (2m)^2 + 1^2 + 2(2m)(1)$$

$$= (2m + 1)^2$$

$$= (2m + 1)(2m + 1)$$

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

$$\text{Ans: (A) } (2m + 1)^2$$

3. $49b^2 - 14b + 1 =$

$$49b^2 - 14b + 1 = (7b)^2 + 1^2 - 2(7b)(1)$$

$$= (7b - 1)^2$$

$$= (7b - 1)(7b - 1)$$

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

$$\text{Ans: (D) } (7b - 1)^2$$

4. $4m^2 + 28m + 49 - 25n^2 =$

$$4m^2 + 28m + 49 - 25n^2 = (2m + 7)^2 - (5n)^2$$

$$= (2m + 7 + 5n)(2m + 7 - 5n)$$

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

$$\text{Ans: (D) } (2m + 7 + 5n)(2m + 7 - 5n)$$

5. To factorize $8m^2 + 22m + 5$ by splitting the middle term, we need two numbers whose product is 8×5 and whose sum is 22. They are

$$8 \times 5 = 40$$

$$2 \times 20 = 40 \text{ and } 2 + 20 = 22$$

So the numbers are 2 and 20.

$$\text{Ans: (C) } 2 \text{ and } 20$$

6. $10a^2 + 17a + 6 =$

$$10 \times 6 = 60: 5 \times 12 = 60 \text{ and } 5 + 12 = 17$$

$$= 10a^2 + 5a + 12a + 6$$

$$= 5a(2a + 1) + 6(2a + 1)$$

$$= (2a + 1)(5a + 6)$$

$$\text{Ans: (D) } (2a + 1)(5a + 6)$$

7. The factors of $4y^2 - 21y + 20$ are

$$\begin{aligned}4 \times 20 &= 80: (-5) \times (-16) = 80 \text{ and } -5 - 16 = -21 \\&= 4y^2 - 5y - 16y + 20 \\&= y(4y - 5) - 4(4y - 5) \\&= (4y - 5)(y - 4)\end{aligned}$$

Ans: (B) $(4y - 5)(y - 4)$

8. $10p^2 + 11p - 6 =$

$$\begin{aligned}10 \times (-6) &= -60: (-4) \times 15 = -60 \text{ and } -4 + 15 = 11 \\&= 10p^2 - 4p + 15p - 6 \\&= 2p(5p - 2) + 3(5p - 2) \\&= (5p - 2)(2p + 3)\end{aligned}$$

Ans: (A) $(2p + 3)(5p - 2)$

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

$$\begin{aligned}3 \times (-16) &= -48 \\(-4) \times 12 &= -48 \text{ and } -4 + 12 = 8\end{aligned}$$

So the numbers are -4 and 12 .

Ans: (A) -4 and 12

10. On factorizing, $19t^2 + 94t - 273 =$

$$\begin{aligned}19 \times (-273) &= -5187 \\5187 &= 3 \times 7 \times 13 \times 19 = 39 \times 133, \text{ and } -39 + 133 = 94 \\&= 19t^2 - 39t + 133t - 273 \\&= t(19t - 39) + 7(19t - 39) \\&= (19t - 39)(t + 7)\end{aligned}$$

Ans: (D) $(19t - 39)(t + 7)$

11. Factorize $17x - 35 - 2x^2$.

$$\begin{aligned}\text{Writing the terms in order: } &-2x^2 + 17x - 35 \\(-2) \times (-35) &= 70: 7 \times 10 = 70 \text{ and } 7 + 10 = 17 \\&= -2x^2 + 7x + 10x - 35 \\&= -x(2x - 7) + 5(2x - 7) \\&= (2x - 7)(5 - x)\end{aligned}$$

Ans: (C) $(2x - 7)(5 - x)$

12. The factors of $(m - p)^2 + 7(m - p) + 10$ are

Let $m - p = t$

$$(m - p)^2 + 7(m - p) + 10 = t^2 + 7t + 10$$

$$1 \times 10 = 10; 2 \times 5 = 10 \text{ and } 2 + 5 = 7$$

$$= t^2 + 2t + 5t + 10$$

$$= t(t + 2) + 5(t + 2)$$

$$= (t + 2)(t + 5)$$

$$= [(m - p) + 2][(m - p) + 5]$$

$$= (m - p + 2)(m - p + 5)$$

Ans: (D) $(m - p + 2)(m - p + 5)$

13. The factors of $12x^2 + 13xz + 3z^2$ are

$$12 \times 3 = 36; 4 \times 9 = 36 \text{ and } 4 + 9 = 13$$

$$= 12x^2 + 4xz + 9xz + 3z^2$$

$$= 4x(3x + z) + 3z(3x + z)$$

$$= (3x + z)(4x + 3z)$$

Ans: (D) $(3x + z)(4x + 3z)$

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

$$5 \times (-7) = -35$$

$$5 \times (-7) = -35 \text{ and } 5 - 7 = -2$$

So the numbers are 5 and -7 .

Ans: (C) 5 and -7

15. On factorizing, $a^2 - 7\sqrt{5}a + 30 =$

$$\text{Product} = 30, \text{ sum} = -7\sqrt{5}; (-\sqrt{5}) \times (-6\sqrt{5}) = 30 \text{ and } -\sqrt{5} + (-6\sqrt{5}) = -7\sqrt{5}$$

$$= a^2 - \sqrt{5}a - 6\sqrt{5}a + 30$$

$$= a(a - \sqrt{5}) - 6\sqrt{5}(a - \sqrt{5})$$

$$= (a - \sqrt{5})(a - 6\sqrt{5})$$

Ans: (B) $(a - 6\sqrt{5})(a - \sqrt{5})$

16. Factorize $3y^2 + \frac{3}{4}y - \frac{1}{12}$.

$$3y^2 + \frac{3}{4}y - \frac{1}{12} = \frac{36y^2 + 9y - 1}{12}$$

$$= \frac{1}{12}(36y^2 + 9y - 1)$$

$$36 \times (-1) = -36; (-3) \times 12 = -36 \text{ and } -3 + 12 = 9$$

$$= \frac{1}{12}[36y^2 - 3y + 12y - 1]$$

$$= \frac{1}{12}[3y(12y - 1) + 1(12y - 1)]$$

$$= \frac{1}{12}(12y - 1)(3y + 1)$$

$$= \left(y + \frac{1}{3}\right) \left(3y - \frac{1}{4}\right)$$

Ans: (B) $\left(3y - \frac{1}{4}\right) \left(y + \frac{1}{3}\right)$

17. On factorizing, $6(p+4)^2 - 5(p+4)(q-4) - 4(q-4)^2 =$

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

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

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

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

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

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

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

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

$$= (2p + q + 4)(3p - 4q + 28)$$

Ans: (A) $(2p + q + 4)(3p - 4q + 28)$

18. $4p^2 + 4q^2 + 9r^2 + 8pq - 12qr - 12rp =$

$$4p^2 + 4q^2 + 9r^2 + 8pq - 12qr - 12rp = (2p)^2 + (2q)^2 + (3r)^2 + 2(2p)(2q) - 2(2q)(3r) - 2(3r)(2p)$$

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

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

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

19. The factors of $p^3 + 18p^2 + 108p + 216$ are

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

$$= (p + 6)^3$$

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

Ans: (B) $(p + 6)^3$

20. On factorizing, $x^3 + 9x^2 + 27x - 37 =$

$$x^3 + 9x^2 + 27x - 37 = x^3 + 3(x)^2(3) + 3(x)(3)^2 + 3^3 - 64$$

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

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

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

$$= (x - 1)(x^2 + 10x + 37)$$

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

Ans: (C) $(x - 1)(x^2 + 10x + 37)$

21. Factorize $64 + 125m^3n^3$.

$$64 + 125m^3n^3 = 4^3 + (5mn)^3$$

$$= (4 + 5mn)[4^2 - (4)(5mn) + (5mn)^2]$$

$$= (5mn + 4)(25m^2n^2 - 20mn + 16)$$

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

Ans: (B) $(25m^2n^2 - 20mn + 16)(5mn + 4)$

22. $16x^4 + 36x^2y^2 + 81y^4 =$

$$\begin{aligned}16x^4 + 36x^2y^2 + 81y^4 &= (4x^2)^2 + 2(4x^2)(9y^2) + (9y^2)^2 - 36x^2y^2 \\&= (4x^2 + 9y^2)^2 - (6xy)^2 \\&= (4x^2 + 9y^2 + 6xy)(4x^2 + 9y^2 - 6xy) \\&= (4x^2 + 6xy + 9y^2)(4x^2 - 6xy + 9y^2)\end{aligned}$$

Ans: (B) $(4x^2 + 6xy + 9y^2)(4x^2 - 6xy + 9y^2)$

23. $(2x - 3y)^3 + (3y - 5)^3 + (5 - 2x)^3 =$

Here $(2x - 3y) + (3y - 5) + (5 - 2x) = 0$

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

$\therefore (2x - 3y)^3 + (3y - 5)^3 + (5 - 2x)^3 = 3(2x - 3y)(3y - 5)(5 - 2x)$

Ans: (A) $3(2x - 3y)(3y - 5)(5 - 2x)$

24. The factors of $16t^5 - t$ are

$$\begin{aligned}16t^5 - t &= t(16t^4 - 1) \\&= t[(4t^2)^2 - 1^2] \\&= t(4t^2 + 1)(4t^2 - 1) \\&= t(4t^2 + 1)[(2t)^2 - 1^2] \\&= t(4t^2 + 1)(2t + 1)(2t - 1)\end{aligned}$$

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

25. The factors of $10y^2 + (2y^2 + 5)y + 25$ are

$$\begin{aligned}10y^2 + (2y^2 + 5)y + 25 &= 10y^2 + 2y^3 + 5y + 25 \\&= 2y^3 + 10y^2 + 5y + 25 \\&= 2y^2(y + 5) + 5(y + 5) \\&= (y + 5)(2y^2 + 5)\end{aligned}$$

Ans: (A) $(2y^2 + 5)(y + 5)$
