

Factorization

MCQ Test, Set 04

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.

- Factorize $25p^2 - 4q^2$.
A. $(5p + 2q)^2$ **B.** $(5p + 2q)(5p - 2q)$ **C.** $(5p - 2q)^2$ **D.** $(25p + 2q)(25p - 2q)$
- Factorize $b^2 + 14b + 49$.
A. $(b - 7)^2$ **B.** $(b + 7)(b - 7)$ **C.** $(b + 7)^2$ **D.** $(7b + 1)^2$
- Factorize $9b^2 - 6b + 1$.
A. $(b - 3)^2$ **B.** $(3b + 1)^2$ **C.** $(3b - 1)^2$ **D.** $(3b + 1)(3b - 1)$
- On factorizing, $x^2 + 8xy + 16y^2 - 36 =$
A. $(x + 4y + 6)(x + 4y - 6)$ **B.** $(x + 4y - 6)^2$ **C.** $(x + 4y + 6)(x - 4y - 6)$ **D.** $(x - 4y + 6)(x - 4y - 6)$
- To factorize $5b^2 + 19b + 12$ by splitting the middle term, we need two numbers whose product is 5×12 and whose sum is 19. They are
A. -4 and -15 **B.** 5 and 12 **C.** 6 and 10 **D.** 4 and 15
- The factors of $4y^2 + 17y + 4$ are
A. $(4y + 4)(y + 1)$ **B.** $(4y - 1)(y - 4)$ **C.** $(4y + 1)(y - 4)$ **D.** $(4y + 1)(y + 4)$
- To factorize $6a^2 - 5a + 1$ by splitting the middle term, we need two numbers whose product is 6×1 and whose sum is -5. They are
A. -2 and -3 **B.** -6 and -1 **C.** 2 and 3 **D.** 1 and 6
- The factors of $3m^2 - 5m - 28$ are
A. $(3m - 7)(m + 4)$ **B.** $(3m + 7)(m - 4)$ **C.** $(3m - 4)(m + 7)$ **D.** $(3m + 7)(m + 4)$
- To factorize $15p^2 + p - 40$ by splitting the middle term, we need two numbers whose product is $15 \times (-40)$ and whose sum is 1. They are
A. 24 and -25 **B.** -20 and 30 **C.** -24 and 25 **D.** -30 and 20
- The factors of $17x^2 + 92x - 189$ are
A. $(17x + 27)(x + 7)$ **B.** $(17x - 27)(x + 7)$ **C.** $(17x + 7)(x - 27)$ **D.** $(17x + 27)(x - 7)$

11. On factorizing, $-15 + 14t - 3t^2 =$
A. $(3t + 5)(t + 3)$ **B.** $(-3t - 5)(3 - t)$ **C.** $(3t - 5)(t - 3)$ **D.** $(3 - t)(3t - 5)$
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12. Factorize $(3x - 4z)^2 + 3(3x - 4z) - 18$.
A. $(3x - 4z + 6)(3x - 4z - 3)$ **B.** $(3x - 4z + 3)(3x - 4z + 6)$
C. $(3x - 4z - 3)(3x - 4z - 6)$ **D.** $(3x - 4z + 3)(3x - 4z - 6)$
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13. On factorizing, $2(p + 2q)^2 + 13(p + 2q) - 7 =$
A. $(2p + 4q - 1)(p + 2q - 7)$ **B.** $(2p + 4q + 1)(p + 2q + 7)$
C. $(2p + 4q + 1)(p + 2q - 7)$ **D.** $(2p + 4q - 1)(p + 2q + 7)$
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14. $2p^2 - pq - 28q^2 =$
A. $(2p + 7q)(p + 4q)$ **B.** $(2p - 7q)(p + 4q)$ **C.** $(2p + 7q)(p - 4q)$ **D.** $(2p - 4q)(p + 7q)$
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15. Factorize $y^2 - \sqrt{6}y - 120$.
A. $(y + 4\sqrt{6})(y + 5\sqrt{6})$ **B.** $(y + 4\sqrt{6})(y - 5\sqrt{6})$
C. $(y + 5\sqrt{6})(y - 4\sqrt{6})$ **D.** $(y - 4\sqrt{6})(y - 5\sqrt{6})$
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16. The factors of $9y^2 + \frac{4}{5}y - \frac{4}{15}$ are
A. $(3y + \frac{2}{5})(3y - \frac{2}{3})$ **B.** $(3y - \frac{2}{3})(3y - \frac{2}{5})$
C. $(3y + \frac{2}{3})(3y + \frac{2}{5})$ **D.** $(3y + \frac{2}{3})(3y - \frac{2}{5})$
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17. The factors of $4(m - 5)^2 + 19(m - 5)(n + 3) - 30(n + 3)^2$ are
A. $(4m - 5n - 2)(m + 6n - 2)$ **B.** $(4m - 5n - 35)(m + 6n + 13)$
C. $(4m - 5n + 35)(m + 6n + 13)$ **D.** $(4m - 5n - 35)(m + 6n - 13)$
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18. $8(a + 3)^2 - 10(a + 3)(c - 2) + 3(c - 2)^2 =$
A. $(2a - c + 8)(4a - 3c + 18)$ **B.** $(2a - c + 8)(4a - 3c - 18)$
C. $(2a - c - 8)(4a - 3c + 18)$ **D.** $(2a - c + 1)(4a - 3c + 1)$
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19. Factorize $a^2 + b^2 + 4c^2 - 2ab - 4bc + 4ca$.
A. $(a + b - 2c)^2$ **B.** $(a - b + 4c)^2$ **C.** $(a - b + 2c)^2$ **D.** $(a + b + 2c)^2$
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20. $y^3 - 15y^2 + 75y - 125 =$
A. $(y - 5)(y^2 + 5y + 25)$ **B.** $(y + 5)^3$ **C.** $(y + 5)(y - 5)^2$ **D.** $(y - 5)^3$
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21. On factorizing, $64m^3p^3 - 27 =$
A. $(16m^2p^2 - 12mp + 9)(4mp + 3)$ **B.** $(16m^2p^2 + 24mp + 9)(4mp - 3)$
C. $(16m^2p^2 + 12mp + 9)(4mp - 3)$ **D.** $(16m^2p^2 - 12mp + 9)(4mp - 3)$
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22. $27m^3 + 125n^3 =$
A. $(3m + 5n)(9m^2 + 15mn + 25n^2)$ **B.** $(3m - 5n)(9m^2 + 15mn + 25n^2)$
C. $(3m + 5n)(9m^2 - 30mn + 25n^2)$ **D.** $(3m + 5n)(9m^2 - 15mn + 25n^2)$
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23. $(2a - 5b)^3 + (5b - c)^3 + (c - 2a)^3 =$

A. $3(2a - 5b)(5b - c)(c - 2a)$

B. 0

C. $-3(2a - 5b)(5b - c)(c - 2a)$

D. $(2a - 5b)(5b - c)(c - 2a)$

24. Factorize $16m^5 - mn^4$.

A. $m(2m - n)^2(4m^2 + n^2)$

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

C. $m(2m + n)^2(2m - n)^2$

D. $m(2m + n)^2(4m^2 + n^2)$

25. Factorize $10a^2 + (2a^2 + 3)a + 15$.

A. $(2a^2 + 3)(a + 5)$

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

C. $(2a^2 + 5)(a + 3)$

D. $(2a^2 - 3)(a + 5)$

Key sheet

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

Solutions

1. Factorize $25p^2 - 4q^2$.

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

Ans: (B) $(5p + 2q)(5p - 2q)$

2. Factorize $b^2 + 14b + 49$.

$$\begin{aligned}b^2 + 14b + 49 &= b^2 + 7^2 + 2(b)(7) \\&= (b + 7)^2 \\&= (b + 7)(b + 7) \\&\text{using } a^2 + b^2 + 2ab = (a + b)^2\end{aligned}$$

Ans: (C) $(b + 7)^2$

3. Factorize $9b^2 - 6b + 1$.

$$\begin{aligned}9b^2 - 6b + 1 &= (3b)^2 + 1^2 - 2(3b)(1) \\&= (3b - 1)^2 \\&= (3b - 1)(3b - 1) \\&\text{using } a^2 + b^2 - 2ab = (a - b)^2\end{aligned}$$

Ans: (C) $(3b - 1)^2$

4. On factorizing, $x^2 + 8xy + 16y^2 - 36 =$

$$\begin{aligned}x^2 + 8xy + 16y^2 - 36 &= (x + 4y)^2 - 6^2 \\&= (x + 4y + 6)(x + 4y - 6) \\&\text{using } a^2 + 2ab + b^2 = (a + b)^2 \text{ and } a^2 - b^2 = (a + b)(a - b)\end{aligned}$$

Ans: (A) $(x + 4y + 6)(x + 4y - 6)$

5. To factorize $5b^2 + 19b + 12$ by splitting the middle term, we need two numbers whose product is 5×12 and whose sum is 19. They are

$$\begin{aligned}5 \times 12 &= 60 \\4 \times 15 &= 60 \text{ and } 4 + 15 = 19 \\&\text{So the numbers are 4 and 15.}\end{aligned}$$

Ans: (D) 4 and 15

6. The factors of $4y^2 + 17y + 4$ are

$$\begin{aligned}4 \times 4 &= 16: 1 \times 16 = 16 \text{ and } 1 + 16 = 17 \\&= 4y^2 + y + 16y + 4 \\&= y(4y + 1) + 4(4y + 1) \\&= (4y + 1)(y + 4)\end{aligned}$$

Ans: (D) $(4y + 1)(y + 4)$

7. To factorize $6a^2 - 5a + 1$ by splitting the middle term, we need two numbers whose product is 6×1 and whose sum is -5 . They are

$$6 \times 1 = 6$$

$$(-2) \times (-3) = 6 \text{ and } -2 - 3 = -5$$

So the numbers are -2 and -3 .

Ans: (A) -2 and -3

8. The factors of $3m^2 - 5m - 28$ are

$$3 \times (-28) = -84; 7 \times (-12) = -84 \text{ and } 7 - 12 = -5$$

$$= 3m^2 + 7m - 12m - 28$$

$$= m(3m + 7) - 4(3m + 7)$$

$$= (3m + 7)(m - 4)$$

Ans: (B) $(3m + 7)(m - 4)$

9. To factorize $15p^2 + p - 40$ by splitting the middle term, we need two numbers whose product is $15 \times (-40)$ and whose sum is 1 . They are

$$15 \times (-40) = -600$$

$$(-24) \times 25 = -600 \text{ and } -24 + 25 = 1$$

So the numbers are -24 and 25 .

Ans: (C) -24 and 25

10. The factors of $17x^2 + 92x - 189$ are

$$17 \times (-189) = -3213$$

$$3213 = 3 \times 3 \times 3 \times 7 \times 17 = 27 \times 119, \text{ and } -27 + 119 = 92$$

$$= 17x^2 - 27x + 119x - 189$$

$$= x(17x - 27) + 7(17x - 27)$$

$$= (17x - 27)(x + 7)$$

Ans: (B) $(17x - 27)(x + 7)$

11. On factorizing, $-15 + 14t - 3t^2 =$

Writing the terms in order: $-3t^2 + 14t - 15$

$$(-3) \times (-15) = 45; 5 \times 9 = 45 \text{ and } 5 + 9 = 14$$

$$= -3t^2 + 5t + 9t - 15$$

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

$$= (3t - 5)(3 - t)$$

Ans: (D) $(3 - t)(3t - 5)$

12. Factorize $(3x - 4z)^2 + 3(3x - 4z) - 18$.

Let $3x - 4z = p$

$$(3x - 4z)^2 + 3(3x - 4z) - 18 = p^2 + 3p - 18$$

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

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

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

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

$$= [(3x - 4z) - 3][(3x - 4z) + 6]$$

$$= (3x - 4z - 3)(3x - 4z + 6)$$

Ans: (A) $(3x - 4z + 6)(3x - 4z - 3)$

13. On factorizing, $2(p + 2q)^2 + 13(p + 2q) - 7 =$

Let $p + 2q = t$

$$2(p + 2q)^2 + 13(p + 2q) - 7 = 2t^2 + 13t - 7$$

$$2 \times (-7) = -14: (-1) \times 14 = -14 \text{ and } -1 + 14 = 13$$

$$= 2t^2 - t + 14t - 7$$

$$= t(2t - 1) + 7(2t - 1)$$

$$= (2t - 1)(t + 7)$$

$$= [2(p + 2q) - 1][(p + 2q) + 7]$$

$$= (2p + 4q - 1)(p + 2q + 7)$$

Ans: (D) $(2p + 4q - 1)(p + 2q + 7)$

14. $2p^2 - pq - 28q^2 =$

$$2 \times (-28) = -56: 7 \times (-8) = -56 \text{ and } 7 - 8 = -1$$

$$= 2p^2 + 7pq - 8pq - 28q^2$$

$$= p(2p + 7q) - 4q(2p + 7q)$$

$$= (2p + 7q)(p - 4q)$$

Ans: (C) $(2p + 7q)(p - 4q)$

15. Factorize $y^2 - \sqrt{6}y - 120$.

$$\text{Product} = -120, \text{ sum} = -\sqrt{6}: 4\sqrt{6} \times (-5\sqrt{6}) = -120 \text{ and } 4\sqrt{6} + (-5\sqrt{6}) = -\sqrt{6}$$

$$= y^2 + 4\sqrt{6}y - 5\sqrt{6}y - 120$$

$$= y(y + 4\sqrt{6}) - 5\sqrt{6}(y + 4\sqrt{6})$$

$$= (y + 4\sqrt{6})(y - 5\sqrt{6})$$

Ans: (B) $(y + 4\sqrt{6})(y - 5\sqrt{6})$

16. The factors of $9y^2 + \frac{4}{5}y - \frac{4}{15}$ are

$$9y^2 + \frac{4}{5}y - \frac{4}{15} = \frac{135y^2 + 12y - 4}{15}$$

$$= \frac{1}{15}(135y^2 + 12y - 4)$$

$$135 \times (-4) = -540: (-18) \times 30 = -540 \text{ and } -18 + 30 = 12$$

$$= \frac{1}{15}[135y^2 - 18y + 30y - 4]$$

$$= \frac{1}{15}[9y(15y - 2) + 2(15y - 2)]$$

$$= \frac{1}{15}(15y - 2)(9y + 2)$$

$$= (3y + \frac{2}{3})(3y - \frac{2}{5})$$

$$\text{Ans: (D) } (3y + \frac{2}{3})(3y - \frac{2}{5})$$

17. The factors of $4(m - 5)^2 + 19(m - 5)(n + 3) - 30(n + 3)^2$ are

$$\text{Let } m - 5 = x \text{ and } n + 3 = y$$

$$4(m - 5)^2 + 19(m - 5)(n + 3) - 30(n + 3)^2 = 4x^2 + 19xy - 30y^2$$

$$4 \times (-30) = -120: (-5) \times 24 = -120 \text{ and } -5 + 24 = 19$$

$$= 4x^2 - 5xy + 24xy - 30y^2$$

$$= x(4x - 5y) + 6y(4x - 5y)$$

$$= (4x - 5y)(x + 6y)$$

$$= [4(m - 5) - 5(n + 3)][(m - 5) + 6(n + 3)]$$

$$= (4m - 20 - 5n - 15)(m - 5 + 6n + 18)$$

$$= (4m - 5n - 35)(m + 6n + 13)$$

$$\text{Ans: (B) } (4m - 5n - 35)(m + 6n + 13)$$

18. $8(a + 3)^2 - 10(a + 3)(c - 2) + 3(c - 2)^2 =$

$$\text{Let } a + 3 = x \text{ and } c - 2 = y$$

$$8(a + 3)^2 - 10(a + 3)(c - 2) + 3(c - 2)^2 = 8x^2 - 10xy + 3y^2$$

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

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

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

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

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

$$= (2a + 6 - c + 2)(4a + 12 - 3c + 6)$$

$$= (2a - c + 8)(4a - 3c + 18)$$

$$\text{Ans: (A) } (2a - c + 8)(4a - 3c + 18)$$

19. Factorize $a^2 + b^2 + 4c^2 - 2ab - 4bc + 4ca$.

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

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

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

$$\text{Ans: (C) } (a - b + 2c)^2$$

20. $y^3 - 15y^2 + 75y - 125 =$
 $y^3 - 15y^2 + 75y - 125 = y^3 - 5^3 - 3(y)^2(5) + 3(y)(5)^2$
 $= (y - 5)^3$
 using $(a - b)^3 = a^3 - b^3 - 3ab(a - b)$
Ans: (D) $(y - 5)^3$

21. On factorizing, $64m^3p^3 - 27 =$
 $64m^3p^3 - 27 = (4mp)^3 - 3^3$
 $= (4mp - 3)[(4mp)^2 + (4mp)(3) + 3^2]$
 $= (4mp - 3)(16m^2p^2 + 12mp + 9)$
 using $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$
Ans: (C) $(16m^2p^2 + 12mp + 9)(4mp - 3)$

22. $27m^3 + 125n^3 =$
 $27m^3 + 125n^3 = (3m)^3 + (5n)^3$
 $= (3m + 5n)[(3m)^2 - (3m)(5n) + (5n)^2]$
 $= (3m + 5n)(9m^2 - 15mn + 25n^2)$
 using $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$
Ans: (D) $(3m + 5n)(9m^2 - 15mn + 25n^2)$

23. $(2a - 5b)^3 + (5b - c)^3 + (c - 2a)^3 =$
 Here $(2a - 5b) + (5b - c) + (c - 2a) = 0$
 If $a + b + c = 0$, then $a^3 + b^3 + c^3 = 3abc$
 $\therefore (2a - 5b)^3 + (5b - c)^3 + (c - 2a)^3 = 3(2a - 5b)(5b - c)(c - 2a)$
Ans: (A) $3(2a - 5b)(5b - c)(c - 2a)$

24. Factorize $16m^5 - mn^4$.
 $16m^5 - mn^4 = m(16m^4 - n^4)$
 $= m[(4m^2)^2 - (n^2)^2]$
 $= m(4m^2 + n^2)(4m^2 - n^2)$
 $= m(4m^2 + n^2)[(2m)^2 - n^2]$
 $= m(4m^2 + n^2)(2m + n)(2m - n)$
Ans: (B) $m(2m + n)(2m - n)(4m^2 + n^2)$

25. Factorize $10a^2 + (2a^2 + 3)a + 15$.
 $10a^2 + (2a^2 + 3)a + 15 = 10a^2 + 2a^3 + 3a + 15$
 $= 2a^3 + 10a^2 + 3a + 15$
 $= 2a^2(a + 5) + 3(a + 5)$
 $= (a + 5)(2a^2 + 3)$
Ans: (A) $(2a^2 + 3)(a + 5)$
