

Factorization

MCQ Test, Set 07

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.

- $144 - 25p^2 =$
A. $(5p + 12)^2$ **B.** $(12 + 5p)(12 - 5p)$ **C.** $(144 + 5p)(144 - 5p)$ **D.** $(-5p + 12)^2$
- On factorizing, $36t^2 + 60t + 25 =$
A. $(5t + 6)^2$ **B.** $(6t + 5)^2$ **C.** $(6t + 5)(6t - 5)$ **D.** $(6t - 5)^2$
- On factorizing, $9m^2 - 42mn + 49n^2 =$
A. $(3m + 7n)(3m - 7n)$ **B.** $(7m - 3n)^2$ **C.** $(3m - 7n)^2$ **D.** $(3m + 7n)^2$
- Factorize $4x^2 - 8x + 4 - 25y^2$.
A. $(2x + 2 + 5y)(2x + 2 - 5y)$ **B.** $(2x - 2 - 5y)^2$
C. $(2x + 2 - 5y)(2x - 2 + 5y)$ **D.** $(2x - 2 + 5y)(2x - 2 - 5y)$
- The factors of $2n^2 + 19n + 35$ are
A. $(2n - 5)(n - 7)$ **B.** $(2n + 5)(n + 7)$ **C.** $(2n + 7)(n + 5)$ **D.** $(2n - 5)(n + 7)$
- The factors of $3z^2 - 29z + 18$ are
A. $(3z - 9)(z - 2)$ **B.** $(3z + 2)(z - 9)$ **C.** $(3z - 2)(z - 9)$ **D.** $(3z + 2)(z + 9)$
- To factorize $4n^2 + 15n - 25$ by splitting the middle term, we need two numbers whose product is $4 \times (-25)$ and whose sum is 15. They are
A. 5 and -20 **B.** -4 and 25 **C.** -10 and 10 **D.** -5 and 20
- Factorize $11p^2 - 20p - 84$.
A. $(11p + 42)(p + 2)$ **B.** $(11p + 42)(p - 2)$ **C.** $(11p - 42)(p + 2)$ **D.** $(11p + 2)(p - 42)$
- On factorizing, $17p^2 - 40p - 225 =$
A. $(17p - 45)(p - 5)$ **B.** $(17p + 45)(p - 5)$ **C.** $(17p - 45)(p + 5)$ **D.** $(17p - 5)(p + 45)$
- $20p - 12 - 3p^2 =$
A. $(3p - 2)(6 - p)$ **B.** $(3p + 2)(p + 6)$ **C.** $(3p - 2)(p - 6)$ **D.** $(-3p - 2)(6 - p)$

11. On factorizing, $2(m+n)^2 + 3(m+n) - 20 =$
- A. $(2m+2n+5)(m+n-4)$ B. $(2m+2n-5)(m+n+4)$ C. $(2m+2n+5)(m+n+4)$ D. $(2m+2n-5)(m+n-4)$
-
12. Factorize $(3x+4y)^2 + 5(3x+4y) + 4$.
- A. $(3x+4y+1)(3x+4y+4)$ B. $(3x+4y-1)(3x+4y-4)$
 C. $(3x+4y+4)(3x+4y-1)$ D. $(3x+4y+1)(3x+4y-4)$
-
13. To factorize $6x^2 - 11xy + 5y^2$ by splitting the middle term, we need two numbers whose product is 6×5 and whose sum is -11 . They are
- A. -15 and -2 B. 5 and 6 C. -5 and -6 D. -10 and -3
-
14. The factors of $t^2 + 3\sqrt{2}t + 4$ are
- A. $(t - 2\sqrt{2})(t - \sqrt{2})$ B. $(t + 2\sqrt{2})(t - \sqrt{2})$
 C. $(t + \sqrt{2})(t - 2\sqrt{2})$ D. $(t + 2\sqrt{2})(t + \sqrt{2})$
-
15. On factorizing, $2x^2 + \frac{7}{15}x - \frac{1}{15} =$
- A. $(2x - \frac{1}{5})(x + \frac{1}{3})$ B. $(2x + \frac{1}{5})(x + \frac{1}{3})$
 C. $(2x - \frac{1}{3})(x + \frac{1}{5})$ D. $(2x + \frac{1}{5})(x - \frac{1}{3})$
-
16. The factors of $3(p-3)^2 - 11(p-3)(q+3) - 20(q+3)^2$ are
- A. $(3p+4q-3)(p-5q-18)$ B. $(3p+4q+3)(p-5q-18)$
 C. $(3p+4q+3)(p-5q+18)$ D. $(3p+4q)(p-5q)$
-
17. Factorize $2(p-4)^2 - 11(p-4)(q-1) + 5(q-1)^2$.
- A. $(2p-q-5)(p-5q-5)$ B. $(2p-q-7)(p-5q+1)$ C. $(2p-q-7)(p-5q-1)$ D. $(2p-q+7)(p-5q+1)$
-
18. The factors of $9p^2 + 9q^2 + 16r^2 - 18pq - 24qr + 24rp$ are
- A. $(3p-3q+4r)^2$ B. $(3p+3q+4r)^2$ C. $(3p+3q-4r)^2$ D. $(9p-9q+16r)^2$
-
19. $m^3 + 12m^2p + 48mp^2 + 64p^3 =$
- A. $(m-4p)^3$ B. $(m+4p)(m^2-4mp+16p^2)$
 C. $(m+4p)^2(m-4p)$ D. $(m+4p)^3$
-
20. $125m^6 - 27n^6 =$
- A. $(25m^4 - 15m^2n^2 + 9n^4)(5m^2 + 3n^2)$ B. $(25m^4 + 30m^2n^2 + 9n^4)(5m^2 - 3n^2)$
 C. $(25m^4 - 15m^2n^2 + 9n^4)(5m^2 - 3n^2)$ D. $(25m^4 + 15m^2n^2 + 9n^4)(5m^2 - 3n^2)$
-
21. $8x^3y^3 + 27 =$
- A. $(2xy+3)(4x^2y^2-6xy+9)$ B. $(2xy+3)(4x^2y^2-12xy+9)$
 C. $(2xy+3)(4x^2y^2+6xy+9)$ D. $(2xy-3)(4x^2y^2+6xy+9)$
-

22. Factorize $81m^4 + 64$.

A. $(9m^2 + 6m + 8)(9m^2 - 6m + 8)$

B. $(9m^2 + 12m - 8)(9m^2 - 12m - 8)$

C. $(9m^2 + 8)^2$

D. $(9m^2 + 12m + 8)(9m^2 - 12m + 8)$

23. The factors of $(5p - 3q)^3 + (3q - 2)^3 + (2 - 5p)^3$ are

A. 0

B. $(5p - 3q)(3q - 2)(2 - 5p)$

C. $3(5p - 3q)(3q - 2)(2 - 5p)$

D. $-3(5p - 3q)(3q - 2)(2 - 5p)$

24. Factorize $2t^5 - 32t$.

A. $2t(t + 2)(t - 2)(t^2 + 4)$

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

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

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

25. On factorizing, $3x^2 + (3x^2 + 1)x + 1 =$

A. $(3x + 1)(x^2 + 1)$

B. $(3x^2 + 1)(x - 1)$

C. $(3x^2 + 1)(x + 1)$

D. $(3x^2 - 1)(x + 1)$

Key sheet

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

Solutions

1. $144 - 25p^2 =$

$$144 - 25p^2 = 12^2 - (5p)^2$$

$$= (12 + 5p)(12 - 5p)$$

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

Ans: (B) $(12 + 5p)(12 - 5p)$

2. On factorizing, $36t^2 + 60t + 25 =$

$$36t^2 + 60t + 25 = (6t)^2 + 5^2 + 2(6t)(5)$$

$$= (6t + 5)^2$$

$$= (6t + 5)(6t + 5)$$

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

Ans: (B) $(6t + 5)^2$

3. On factorizing, $9m^2 - 42mn + 49n^2 =$

$$9m^2 - 42mn + 49n^2 = (3m)^2 + (7n)^2 - 2(3m)(7n)$$

$$= (3m - 7n)^2$$

$$= (3m - 7n)(3m - 7n)$$

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

Ans: (C) $(3m - 7n)^2$

4. Factorize $4x^2 - 8x + 4 - 25y^2$.

$$4x^2 - 8x + 4 - 25y^2 = (2x - 2)^2 - (5y)^2$$

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

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

Ans: (D) $(2x - 2 + 5y)(2x - 2 - 5y)$

5. The factors of $2n^2 + 19n + 35$ are

$$2 \times 35 = 70: 5 \times 14 = 70 \text{ and } 5 + 14 = 19$$

$$= 2n^2 + 5n + 14n + 35$$

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

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

Ans: (B) $(2n + 5)(n + 7)$

6. The factors of $3z^2 - 29z + 18$ are

$$3 \times 18 = 54: (-2) \times (-27) = 54 \text{ and } -2 - 27 = -29$$

$$= 3z^2 - 2z - 27z + 18$$

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

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

Ans: (C) $(3z - 2)(z - 9)$

7. To factorize $4n^2 + 15n - 25$ by splitting the middle term, we need two numbers whose product is $4 \times (-25)$ and whose sum is 15. They are

$$4 \times (-25) = -100$$

$$(-5) \times 20 = -100 \text{ and } -5 + 20 = 15$$

So the numbers are -5 and 20 .

Ans: (D) -5 and 20

8. Factorize $11p^2 - 20p - 84$.

$$11 \times (-84) = -924$$

$$924 = 2 \times 2 \times 3 \times 7 \times 11 = 22 \times 42, \text{ and } 22 - 42 = -20$$

$$= 11p^2 + 22p - 42p - 84$$

$$= 11p(p + 2) - 42(p + 2)$$

$$= (p + 2)(11p - 42)$$

Ans: (C) $(11p - 42)(p + 2)$

9. On factorizing, $17p^2 - 40p - 225 =$

$$17 \times (-225) = -3825$$

$$3825 = 3 \times 3 \times 5 \times 5 \times 17 = 45 \times 85, \text{ and } 45 - 85 = -40$$

$$= 17p^2 + 45p - 85p - 225$$

$$= p(17p + 45) - 5(17p + 45)$$

$$= (17p + 45)(p - 5)$$

Ans: (B) $(17p + 45)(p - 5)$

10. $20p - 12 - 3p^2 =$

Writing the terms in order: $-3p^2 + 20p - 12$

$$(-3) \times (-12) = 36; 2 \times 18 = 36 \text{ and } 2 + 18 = 20$$

$$= -3p^2 + 2p + 18p - 12$$

$$= -p(3p - 2) + 6(3p - 2)$$

$$= (3p - 2)(6 - p)$$

Ans: (A) $(3p - 2)(6 - p)$

11. On factorizing, $2(m + n)^2 + 3(m + n) - 20 =$

Let $m + n = p$

$$2(m + n)^2 + 3(m + n) - 20 = 2p^2 + 3p - 20$$

$$2 \times (-20) = -40; (-5) \times 8 = -40 \text{ and } -5 + 8 = 3$$

$$= 2p^2 - 5p + 8p - 20$$

$$= p(2p - 5) + 4(2p - 5)$$

$$= (2p - 5)(p + 4)$$

$$= [2(m + n) - 5][(m + n) + 4]$$

$$= (2m + 2n - 5)(m + n + 4)$$

Ans: (B) $(2m + 2n - 5)(m + n + 4)$

12. Factorize $(3x + 4y)^2 + 5(3x + 4y) + 4$.

Let $3x + 4y = p$

$$(3x + 4y)^2 + 5(3x + 4y) + 4 = p^2 + 5p + 4$$

$$1 \times 4 = 4; 1 \times 4 = 4 \text{ and } 1 + 4 = 5$$

$$= p^2 + p + 4p + 4$$

$$= p(p + 1) + 4(p + 1)$$

$$= (p + 1)(p + 4)$$

$$= [(3x + 4y) + 1][(3x + 4y) + 4]$$

$$= (3x + 4y + 1)(3x + 4y + 4)$$

Ans: (A) $(3x + 4y + 1)(3x + 4y + 4)$

13. To factorize $6x^2 - 11xy + 5y^2$ by splitting the middle term, we need two numbers whose product is 6×5 and whose sum is -11 . They are

$$6 \times 5 = 30$$

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

So the numbers are -5 and -6 .

Ans: (C) -5 and -6

14. The factors of $t^2 + 3\sqrt{2}t + 4$ are

$$\text{Product} = 4, \text{ sum} = 3\sqrt{2}: \sqrt{2} \times 2\sqrt{2} = 4 \text{ and } \sqrt{2} + 2\sqrt{2} = 3\sqrt{2}$$

$$= t^2 + \sqrt{2}t + 2\sqrt{2}t + 4$$

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

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

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

15. On factorizing, $2x^2 + \frac{7}{15}x - \frac{1}{15} =$

$$2x^2 + \frac{7}{15}x - \frac{1}{15} = \frac{30x^2 + 7x - 1}{15}$$

$$= \frac{1}{15}(30x^2 + 7x - 1)$$

$$30 \times (-1) = -30: (-3) \times 10 = -30 \text{ and } -3 + 10 = 7$$

$$= \frac{1}{15}[30x^2 - 3x + 10x - 1]$$

$$= \frac{1}{15}[3x(10x - 1) + 1(10x - 1)]$$

$$= \frac{1}{15}(10x - 1)(3x + 1)$$

$$= \left(x + \frac{1}{3}\right) \left(2x - \frac{1}{5}\right)$$

Ans: (A) $\left(2x - \frac{1}{5}\right) \left(x + \frac{1}{3}\right)$

16. The factors of $3(p-3)^2 - 11(p-3)(q+3) - 20(q+3)^2$ are

Let $p-3 = x$ and $q+3 = y$

$$3(p-3)^2 - 11(p-3)(q+3) - 20(q+3)^2 = 3x^2 - 11xy - 20y^2$$

$$3 \times (-20) = -60; 4 \times (-15) = -60 \text{ and } 4 - 15 = -11$$

$$= 3x^2 + 4xy - 15xy - 20y^2$$

$$= x(3x + 4y) - 5y(3x + 4y)$$

$$= (3x + 4y)(x - 5y)$$

$$= [3(p-3) + 4(q+3)][(p-3) - 5(q+3)]$$

$$= (3p - 9 + 4q + 12)(p - 3 - 5q - 15)$$

$$= (3p + 4q + 3)(p - 5q - 18)$$

Ans: (B) $(3p + 4q + 3)(p - 5q - 18)$

17. Factorize $2(p-4)^2 - 11(p-4)(q-1) + 5(q-1)^2$.

Let $p-4 = x$ and $q-1 = y$

$$2(p-4)^2 - 11(p-4)(q-1) + 5(q-1)^2 = 2x^2 - 11xy + 5y^2$$

$$2 \times 5 = 10; (-1) \times (-10) = 10 \text{ and } -1 - 10 = -11$$

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

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

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

$$= [2(p-4) - (q-1)][(p-4) - 5(q-1)]$$

$$= (2p - 8 - q + 1)(p - 4 - 5q + 5)$$

$$= (2p - q - 7)(p - 5q + 1)$$

Ans: (B) $(2p - q - 7)(p - 5q + 1)$

18. The factors of $9p^2 + 9q^2 + 16r^2 - 18pq - 24qr + 24rp$ are

$$9p^2 + 9q^2 + 16r^2 - 18pq - 24qr + 24rp = (3p)^2 + (3q)^2 + (4r)^2 - 2(3p)(3q) - 2(3q)(4r) + 2(4r)(3p)$$

$$= (3p - 3q + 4r)^2$$

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

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

19. $m^3 + 12m^2p + 48mp^2 + 64p^3 =$

$$m^3 + 12m^2p + 48mp^2 + 64p^3 = m^3 + (4p)^3 + 3(m)^2(4p) + 3(m)(4p)^2$$

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

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

Ans: (D) $(m + 4p)^3$

20. $125m^6 - 27n^6 =$

$$125m^6 - 27n^6 = (5m^2)^3 - (3n^2)^3$$

$$= (5m^2 - 3n^2)[(5m^2)^2 + (5m^2)(3n^2) + (3n^2)^2]$$

$$= (5m^2 - 3n^2)(25m^4 + 15m^2n^2 + 9n^4)$$

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

Ans: (D) $(25m^4 + 15m^2n^2 + 9n^4)(5m^2 - 3n^2)$

21. $8x^3y^3 + 27 =$

$$\begin{aligned}8x^3y^3 + 27 &= (2xy)^3 + 3^3 \\&= (2xy + 3)[(2xy)^2 - (2xy)(3) + 3^2] \\&= (2xy + 3)(4x^2y^2 - 6xy + 9) \\&\text{using } a^3 + b^3 = (a + b)(a^2 - ab + b^2)\end{aligned}$$

Ans: (A) $(2xy + 3)(4x^2y^2 - 6xy + 9)$

22. Factorize $81m^4 + 64$.

$$\begin{aligned}81m^4 + 64 &= (9m^2)^2 + 8^2 + 2(9m^2)(8) - 144m^2 \\&= (9m^2 + 8)^2 - (12m)^2 \\&= (9m^2 + 8 + 12m)(9m^2 + 8 - 12m) \\&= (9m^2 + 12m + 8)(9m^2 - 12m + 8)\end{aligned}$$

Ans: (D) $(9m^2 + 12m + 8)(9m^2 - 12m + 8)$

23. The factors of $(5p - 3q)^3 + (3q - 2)^3 + (2 - 5p)^3$ are

Here $(5p - 3q) + (3q - 2) + (2 - 5p) = 0$

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

$$\therefore (5p - 3q)^3 + (3q - 2)^3 + (2 - 5p)^3 = 3(5p - 3q)(3q - 2)(2 - 5p)$$

Ans: (C) $3(5p - 3q)(3q - 2)(2 - 5p)$

24. Factorize $2t^5 - 32t$.

$$\begin{aligned}2t^5 - 32t &= 2t(t^4 - 16) \\&= 2t[(t^2)^2 - 4^2] \\&= 2t(t^2 + 4)(t^2 - 4) \\&= 2t(t^2 + 4)[t^2 - 2^2] \\&= 2t(t^2 + 4)(t + 2)(t - 2)\end{aligned}$$

Ans: (A) $2t(t + 2)(t - 2)(t^2 + 4)$

25. On factorizing, $3x^2 + (3x^2 + 1)x + 1 =$

$$\begin{aligned}3x^2 + (3x^2 + 1)x + 1 &= 3x^2 + 3x^3 + x + 1 \\&= 3x^3 + 3x^2 + x + 1 \\&= 3x^2(x + 1) + 1(x + 1) \\&= (x + 1)(3x^2 + 1)\end{aligned}$$

Ans: (C) $(3x^2 + 1)(x + 1)$
