

Algebraic Identities

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.

- $5x(2x - 7y) =$
A. $10x^2 - 35xy$ **B.** $10x^2 + 35xy$ **C.** $10x^2 - 7y$ **D.** $10x - 35xy$
- $(3m - 6)(4m + 9) =$
A. $12m^2 + 3m - 54$ **B.** $12m^2 - 54$ **C.** $12m^2 - 51m - 54$ **D.** $12m^2 + 3m + 54$
- $(8a + 5b)(8a - 5b) =$
A. $64a^2 + 25b^2$ **B.** $64a^2 + 25b^2 - 80ab$ **C.** $64a^2 - 25b^2$ **D.** $8a^2 - 5b^2$
- The product $(6x^5 + 3y^3)(6x^5 - 3y^3)$ is
A. $6x^{10} - 3y^6$ **B.** $36x^{10} + 9y^6$ **C.** $36x^7 - 9y^5$ **D.** $36x^{10} - 9y^6$
- $(3p + 9q)^2 =$
A. $9p^2 + 81q^2 + 27pq$ **B.** $9p^2 + 81q^2$ **C.** $3p^2 + 9q^2 + 54pq$ **D.** $9p^2 + 81q^2 + 54pq$
- $(6n + \frac{1}{7})^2$ equals
A. $36n^2 + \frac{1}{7} + \frac{12n}{7}$ **B.** $36n^2 + \frac{1}{49}$
C. $36n^2 + \frac{1}{49} + \frac{12n}{7}$ **D.** $36n^2 + \frac{1}{49} + \frac{6n}{7}$
- $(3m - 2n)^2 =$
A. $9m^2 - 4n^2$ **B.** $9m^2 + 4n^2 - 12mn$ **C.** $9m^2 + 4n^2 + 12mn$ **D.** $9m^2 - 4n^2 - 12mn$
- $(\frac{3m}{2} - \frac{n}{5})^2$ equals
A. $\frac{9m^2}{2} + \frac{n^2}{5} - \frac{3mn}{5}$ **B.** $\frac{9m^2}{4} + \frac{n^2}{25} - \frac{3mn}{10}$
C. $\frac{9m^2}{4} + \frac{n^2}{25} - \frac{3mn}{5}$ **D.** $\frac{9m^2}{4} + \frac{n^2}{25} + \frac{3mn}{5}$
- $(7p + q)^2 + (7p - q)^2$ simplifies to
A. $28pq$ **B.** $49p^2 + q^2$ **C.** $98p^2 + 2q^2$ **D.** $98p^2 + 2q^2 + 28pq$
- $(6x + 9y)^2 - (6x - 9y)^2$ simplifies to
A. $-216xy$ **B.** $108xy$ **C.** $72x^2 + 162y^2$ **D.** $216xy$
- If $m + n = 14$ and $m - n = 12$, then $mn =$
A. 85 **B.** 52 **C.** 26 **D.** 13

12. If $(4a + b)^2 - kab = (4a - b)^2$, then $k =$
A. 16 **B.** 4 **C.** -16 **D.** 8
-
13. If $m - n = 9$ and $mn = 10$, then $(m + n)^2 =$
A. 101 **B.** 121 **C.** 49 **D.** 41
-
14. If $z + \frac{1}{z} = 16$, then $z^2 + \frac{1}{z^2} =$
A. 252 **B.** 254 **C.** 256 **D.** 258
-
15. If $a - b = 4$ and $ab = 32$, then $a^2 + b^2 =$
A. 144 **B.** 48 **C.** 80 **D.** 68
-
16. The expansion of $(6a + 4b + 5c)^2$ is
A. $36a^2 + 16b^2 + 25c^2 + 24ab + 20bc + 30ca$ **B.** $6a^2 + 4b^2 + 5c^2 + 48ab + 40bc + 60ca$
C. $36a^2 + 16b^2 + 25c^2$ **D.** $36a^2 + 16b^2 + 25c^2 + 48ab + 40bc + 60ca$
-
17. $(2a + 4b - 5c)^2 =$
A. $4a^2 + 16b^2 + 25c^2 + 16ab - 40bc - 20ca$ **B.** $4a^2 + 16b^2 + 25c^2 + 16ab + 40bc + 20ca$
C. $4a^2 + 16b^2 + 25c^2 + 16ab - 40bc + 20ca$ **D.** $4a^2 + 16b^2 + 25c^2 + 16ab + 40bc - 20ca$
-
18. The coefficient of zx in $(5x - 6y - z)^2$ is
A. -10 **B.** 5 **C.** 10 **D.** -5
-
19. The expansion of $(3z + 2)^3$ is
A. $27z^3 + 8$ **B.** $27z^3 + 8 + 54z^2 + 36z$ **C.** $27z^3 + 8 + 18z^2 + 12z$ **D.** $27z^3 + 8 + 18z$
-
20. $(2t - 5)^3$ equals
A. $8t^3 - 125 - 60t^2 + 150t$ **B.** $8t^3 - 125 - 60t^2 - 150t$
C. $8t^3 - 125$ **D.** $8t^3 - 125 + 60t^2 - 150t$
-
21. The product $(3m + 4)(9m^2 - 12m + 16)$ is
A. $27m^3 + 108m^2 + 144m + 64$ **B.** $27m^3 + 16$
C. $27m^3 + 64$ **D.** $27m^3 - 64$
-
22. If $x + y = 13$ and $xy = 36$, then $x^3 + y^3 =$
A. 1729 **B.** 793 **C.** 2089 **D.** 3601
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23. If $x - y = 6$ and $xy = 16$, then $x^3 - y^3 =$
A. 312 **B.** 264 **C.** -72 **D.** 504
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24. The product $(2p + 3q + 5)(4p^2 + 9q^2 + 25 - 6pq - 15q - 10p)$ is
A. $8p^3 + 27q^3 + 125 + 90pq$ **B.** $8p^3 + 27q^3 + 125 - 90pq$
C. $8p^3 + 27q^3 + 125 - 30pq$ **D.** $8p^3 + 27q^3 + 125$
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25. $(-5)^3 + 2^3 + 3^3 =$

A. 0

B. -30

C. -90

D. 90

Key sheet

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

Solutions

1. $5x(2x - 7y) =$

$$a(b - c) = ab - ac$$

$$5x(2x - 7y) = (5x)(2x) - (5x)(7y) = 10x^2 - 35xy$$

Ans: (A) $10x^2 - 35xy$

2. $(3m - 6)(4m + 9) =$

$$(a - b)(c + d) = ac + ad - bc - bd$$

$$(3m - 6)(4m + 9) = (3m)(4m) + (3m)(9) - (6)(4m) - (6)(9)$$

$$= 12m^2 + 27m - 24m - 54 = 12m^2 + 3m - 54$$

Ans: (A) $12m^2 + 3m - 54$

3. $(8a + 5b)(8a - 5b) =$

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

$$(8a + 5b)(8a - 5b) = (8a)^2 - (5b)^2$$

$$= 64a^2 - 25b^2$$

Ans: (C) $64a^2 - 25b^2$

4. The product $(6x^5 + 3y^3)(6x^5 - 3y^3)$ is

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

$$(6x^5 + 3y^3)(6x^5 - 3y^3) = (6x^5)^2 - (3y^3)^2 = 36x^{10} - 9y^6$$

Ans: (D) $36x^{10} - 9y^6$

5. $(3p + 9q)^2 =$

$$(a + b)^2 = a^2 + b^2 + 2ab$$

$$(3p + 9q)^2 = (3p)^2 + (9q)^2 + 2(3p)(9q)$$

$$= 9p^2 + 81q^2 + 54pq$$

Ans: (D) $9p^2 + 81q^2 + 54pq$

6. $(6n + \frac{1}{7})^2$ equals

$$(a + b)^2 = a^2 + b^2 + 2ab$$

$$(6n + \frac{1}{7})^2 = (6n)^2 + (\frac{1}{7})^2 + 2(6n)(\frac{1}{7})$$

$$= 36n^2 + \frac{1}{49} + \frac{12n}{7}$$

Ans: (C) $36n^2 + \frac{1}{49} + \frac{12n}{7}$

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

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

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

$$= 9m^2 + 4n^2 - 12mn$$

Ans: (B) $9m^2 + 4n^2 - 12mn$

8. $\left(\frac{3m}{2} - \frac{n}{5}\right)^2$ equals

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

$$\left(\frac{3m}{2} - \frac{n}{5}\right)^2 = \left(\frac{3m}{2}\right)^2 + \left(\frac{n}{5}\right)^2 - 2\left(\frac{3m}{2}\right)\left(\frac{n}{5}\right)$$
$$= \frac{9m^2}{4} + \frac{n^2}{25} - \frac{3mn}{5}$$

Ans: (C) $\frac{9m^2}{4} + \frac{n^2}{25} - \frac{3mn}{5}$

9. $(7p + q)^2 + (7p - q)^2$ simplifies to

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

$$(7p + q)^2 + (7p - q)^2 = 2[(7p)^2 + (q)^2] = 98p^2 + 2q^2$$

Ans: (C) $98p^2 + 2q^2$

10. $(6x + 9y)^2 - (6x - 9y)^2$ simplifies to

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

$$(6x + 9y)^2 - (6x - 9y)^2 = 4(6x)(9y) = 216xy$$

Ans: (D) $216xy$

11. If $m + n = 14$ and $m - n = 12$, then $mn =$

$$(m + n)^2 - (m - n)^2 = 4mn$$

$$14^2 - 12^2 = 4mn$$

$$196 - 144 = 4mn \Rightarrow mn = \frac{52}{4} = 13$$

Ans: (D) 13

12. If $(4a + b)^2 - kab = (4a - b)^2$, then $k =$

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

$$4ab = 4(4a)(b) = 16ab$$

$$k = 16$$

Ans: (A) 16

13. If $m - n = 9$ and $mn = 10$, then $(m + n)^2 =$

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

$$(m + n)^2 = (9)^2 + 4(10) = 81 + 40 = 121$$

Ans: (B) 121

14. If $z + \frac{1}{z} = 16$, then $z^2 + \frac{1}{z^2} =$

$$a^2 + b^2 = (a + b)^2 - 2ab, \text{ with } ab = z \cdot \frac{1}{z} = 1$$

$$= (16)^2 - 2 = 256 - 2 = 254$$

Ans: (B) 254

15. If $a - b = 4$ and $ab = 32$, then $a^2 + b^2 =$

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

$$a^2 + b^2 = (4)^2 + 2(32) = 16 + 64 = 80$$

Ans: (C) 80

16. The expansion of $(6a + 4b + 5c)^2$ is

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

$$(6a + 4b + 5c)^2 = (6a)^2 + (4b)^2 + (5c)^2 + 2(6a)(4b) + 2(4b)(5c) + 2(5c)(6a)$$

$$\text{Ans: (D) } 36a^2 + 16b^2 + 25c^2 + 48ab + 40bc + 60ca$$

17. $(2a + 4b - 5c)^2 =$

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

$$(2a + 4b - 5c)^2 = (2a)^2 + (4b)^2 + (5c)^2 + 2(2a)(4b) - 2(4b)(5c) - 2(5c)(2a)$$

$$\text{Ans: (A) } 4a^2 + 16b^2 + 25c^2 + 16ab - 40bc - 20ca$$

18. The coefficient of zx in $(5x - 6y - z)^2$ is

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

The zx term is $-2(z)(5x) = -10zx$, so the coefficient is -10 .

$$\text{Ans: (A) } -10$$

19. The expansion of $(3z + 2)^3$ is

$$(a + b)^3 = a^3 + b^3 + 3ab(a + b)$$

$$(3z + 2)^3 = (3z)^3 + (2)^3 + 3(3z)(2)(3z + 2)$$

$$= 27z^3 + 8 + 54z^2 + 36z$$

$$\text{Ans: (B) } 27z^3 + 8 + 54z^2 + 36z$$

20. $(2t - 5)^3$ equals

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

$$(2t - 5)^3 = (2t)^3 - (5)^3 - 3(2t)(5)(2t - 5)$$

$$= 8t^3 - 125 - 60t^2 + 150t$$

$$\text{Ans: (A) } 8t^3 - 125 - 60t^2 + 150t$$

21. The product $(3m + 4)(9m^2 - 12m + 16)$ is

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

$$\text{Here } a = 3m, b = 4: (3m + 4)(9m^2 - 12m + 16) = (3m)^3 + (4)^3 = 27m^3 + 64$$

$$\text{Ans: (C) } 27m^3 + 64$$

22. If $x + y = 13$ and $xy = 36$, then $x^3 + y^3 =$

$$a^3 + b^3 = (a + b)^3 - 3ab(a + b)$$

$$= (13)^3 - 3(36)(13) = 2197 - 1404 = 793$$

$$\text{Ans: (B) } 793$$

23. If $x - y = 6$ and $xy = 16$, then $x^3 - y^3 =$

$$a^3 - b^3 = (a - b)^3 + 3ab(a - b)$$

$$= (6)^3 + 3(16)(6) = 216 + 288 = 504$$

$$\text{Ans: (D) } 504$$

24. The product $(2p + 3q + 5)(4p^2 + 9q^2 + 25 - 6pq - 15q - 10p)$ is

$$a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$$

Here $a = 2p$, $b = 3q$, $c = 5$

$$= 8p^3 + 27q^3 + 125 - 90pq$$

Ans: (B) $8p^3 + 27q^3 + 125 - 90pq$

25. $(-5)^3 + 2^3 + 3^3 =$

Take $a = -5$, $b = 2$, $c = 3$

$$a + b + c = -5 + 2 + 3 = 0$$

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

$$\therefore (-5)^3 + 2^3 + 3^3 = 3(-5)(2)(3) = -90$$

Ans: (C) -90
