

Algebraic Identities

MCQ Test, Set 05

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. $3x(8x - 2y)$ equals

- A.** $24x - 6xy$ **B.** $24x^2 - 2y$ **C.** $24x^2 - 6xy$ **D.** $24x^2 + 6xy$

2. $(3p - 7)(p + 6)$ equals

- A.** $3p^2 - 25p - 42$ **B.** $3p^2 + 11p + 42$ **C.** $3p^2 + 11p - 42$ **D.** $3p^2 - 42$

3. The product $(a + 2b)(a - 2b)$ is

- A.** $a^2 + 4b^2 - 4ab$ **B.** $a^2 - 4b^2$ **C.** $a^2 + 4b^2$ **D.** $a^2 - 2b^2$

4. $(4m^4 + 5n^3)(4m^4 - 5n^3) =$

- A.** $16m^8 - 25n^6$ **B.** $4m^8 - 5n^6$ **C.** $16m^8 + 25n^6$ **D.** $16m^6 - 25n^5$

5. The expansion of $(9m + 3n)^2$ is

- A.** $81m^2 + 9n^2 + 54mn$ **B.** $9m^2 + 3n^2 + 54mn$ **C.** $81m^2 + 9n^2 + 27mn$ **D.** $81m^2 + 9n^2$

6. In the expansion of $(3m + 8n)^2$, the coefficient of mn is

- A.** 22 **B.** 24 **C.** 96 **D.** 48

7. $(7p - 3q)^2$ equals

- A.** $49p^2 - 9q^2$ **B.** $49p^2 + 9q^2 - 42pq$ **C.** $49p^2 - 9q^2 - 42pq$ **D.** $49p^2 + 9q^2 + 42pq$

8. $\left(\frac{3p}{2} - \frac{5q}{4}\right)^2 =$

- A.** $\frac{9p^2}{4} + \frac{25q^2}{16} - \frac{15pq}{8}$ **B.** $\frac{9p^2}{2} + \frac{25q^2}{4} - \frac{15pq}{4}$
C. $\frac{9p^2}{4} + \frac{25q^2}{16} + \frac{15pq}{4}$ **D.** $\frac{9p^2}{4} + \frac{25q^2}{16} - \frac{15pq}{4}$

9. $\left(2 + \frac{6}{y}\right)^2 + \left(2 - \frac{6}{y}\right)^2 =$

- A.** $4 + \frac{36}{y^2}$ **B.** $8 + \frac{72}{y^2} + \frac{48}{y}$
C. $\frac{48}{y}$ **D.** $8 + \frac{72}{y^2}$

10. $(7x + 5y)^2 - (7x - 5y)^2 =$

- A.** $70xy$ **B.** $140xy$ **C.** $-140xy$ **D.** $98x^2 + 50y^2$

11.	If $x + y = 6$ and $x - y = 4$, then $xy =$			
	A. 13	B. 20	C. 5	D. 10
12.	If $(6x - 4y)^2 + kxy = (6x + 4y)^2$, then $k =$			
	A. 48	B. -96	C. 96	D. 24
13.	If $m + n = 12$ and $mn = 35$, then $(m - n)^2 =$			
	A. 284	B. 4	C. 74	D. 214
14.	If $m - \frac{1}{m} = 9$, then $m^2 + \frac{1}{m^2} =$			
	A. 83	B. 79	C. 81	D. 85
15.	If $a + b = 18$ and $ab = 80$, then $a^2 + b^2 =$			
	A. 164	B. 484	C. 4	D. 244
16.	In the expansion of $(7x + 4y + z)^2$, the coefficient of zx is			
	A. 7	B. 28	C. 14	D. 16
17.	$(p - 5q + 7r)^2$ equals			
	A. $p^2 + 25q^2 + 49r^2 - 10pq - 70qr - 14rp$	B. $p^2 + 25q^2 + 49r^2 - 10pq - 70qr + 14rp$		
	C. $p^2 + 25q^2 + 49r^2 - 10pq + 70qr + 14rp$	D. $p^2 + 25q^2 + 49r^2 + 10pq + 70qr + 14rp$		
18.	The coefficient of qr in $(p + 7q - 3r)^2$ is			
	A. -21	B. 21	C. 42	D. -42
19.	$(2x + 4)^3 =$			
	A. $8x^3 + 64 + 48x^2 + 96x$	B. $8x^3 + 64 + 24x$	C. $8x^3 + 64 + 16x^2 + 32x$	D. $8x^3 + 64$
20.	$(2m - n)^3 =$			
	A. $8m^3 - n^3 - 12m^2n + 6mn^2$	B. $8m^3 - n^3$		
	C. $8m^3 - n^3 + 12m^2n - 6mn^2$	D. $8m^3 - n^3 - 12m^2n - 6mn^2$		
21.	$(3t + 5)(9t^2 - 15t + 25) =$			
	A. $27t^3 + 25$	B. $27t^3 - 125$		
	C. $27t^3 + 125$	D. $27t^3 + 135t^2 + 225t + 125$		
22.	If $x + y = 14$ and $xy = 48$, then $x^3 + y^3 =$			
	A. 2600	B. 728	C. 2072	D. 4760
23.	$(4t - 3)(16t^2 + 12t + 9) =$			
	A. $64t^3 + 27$	B. $4t^3 - 27$		
	C. $64t^3 - 27$	D. $64t^3 - 27 - 144t^2 + 108t$		

24. $(4m + 3n + 2)(16m^2 + 9n^2 + 4 - 12mn - 6n - 8m) =$

A. $64m^3 + 27n^3 +$
 $8 - 24mn$

B. $64m^3 + 27n^3 + 8$

C. $64m^3 + 27n^3 +$
 $8 + 72mn$

D. $64m^3 + 27n^3 +$
 $8 - 72mn$

25. The value of $4^3 + (-10)^3 + 6^3$ is

A. -240

B. 0

C. 720

D. -720

Key sheet

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

Solutions

1. $3x(8x - 2y)$ equals

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

$$3x(8x - 2y) = (3x)(8x) - (3x)(2y) = 24x^2 - 6xy$$

Ans: (C) $24x^2 - 6xy$

2. $(3p - 7)(p + 6)$ equals

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

$$(3p - 7)(p + 6) = (3p)(p) + (3p)(6) - (7)(p) - (7)(6)$$

$$= 3p^2 + 18p - 7p - 42 = 3p^2 + 11p - 42$$

Ans: (C) $3p^2 + 11p - 42$

3. The product $(a + 2b)(a - 2b)$ is

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

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

$$= a^2 - 4b^2$$

Ans: (B) $a^2 - 4b^2$

4. $(4m^4 + 5n^3)(4m^4 - 5n^3) =$

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

$$(4m^4 + 5n^3)(4m^4 - 5n^3) = (4m^4)^2 - (5n^3)^2 = 16m^8 - 25n^6$$

Ans: (A) $16m^8 - 25n^6$

5. The expansion of $(9m + 3n)^2$ is

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

$$(9m + 3n)^2 = (9m)^2 + (3n)^2 + 2(9m)(3n)$$

$$= 81m^2 + 9n^2 + 54mn$$

Ans: (A) $81m^2 + 9n^2 + 54mn$

6. In the expansion of $(3m + 8n)^2$, the coefficient of mn is

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

$$2ab = 2(3m)(8n) = 48mn$$

So the coefficient of mn is 48.

Ans: (D) 48

7. $(7p - 3q)^2$ equals

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

$$(7p - 3q)^2 = (7p)^2 + (3q)^2 - 2(7p)(3q)$$

$$= 49p^2 + 9q^2 - 42pq$$

Ans: (B) $49p^2 + 9q^2 - 42pq$

8. $\left(\frac{3p}{2} - \frac{5q}{4}\right)^2 =$
 $(a - b)^2 = a^2 + b^2 - 2ab$
 $\left(\frac{3p}{2} - \frac{5q}{4}\right)^2 = \left(\frac{3p}{2}\right)^2 + \left(\frac{5q}{4}\right)^2 - 2\left(\frac{3p}{2}\right)\left(\frac{5q}{4}\right)$
 $= \frac{9p^2}{4} + \frac{25q^2}{16} - \frac{15pq}{4}$
Ans: (D) $\frac{9p^2}{4} + \frac{25q^2}{16} - \frac{15pq}{4}$

9. $\left(2 + \frac{6}{y}\right)^2 + \left(2 - \frac{6}{y}\right)^2 =$
 $(a + b)^2 + (a - b)^2 = 2(a^2 + b^2)$
 $\left(2 + \frac{6}{y}\right)^2 + \left(2 - \frac{6}{y}\right)^2 = 2[(2)^2 + \left(\frac{6}{y}\right)^2] = 8 + \frac{72}{y^2}$
Ans: (D) $8 + \frac{72}{y^2}$

10. $(7x + 5y)^2 - (7x - 5y)^2 =$
 $(a + b)^2 - (a - b)^2 = 4ab$
 $(7x + 5y)^2 - (7x - 5y)^2 = 4(7x)(5y) = 140xy$
Ans: (B) $140xy$

11. If $x + y = 6$ and $x - y = 4$, then $xy =$
 $(x + y)^2 - (x - y)^2 = 4xy$
 $6^2 - 4^2 = 4xy$
 $36 - 16 = 4xy \Rightarrow xy = \frac{20}{4} = 5$
Ans: (C) 5

12. If $(6x - 4y)^2 + kxy = (6x + 4y)^2$, then $k =$
 $(a + b)^2 = (a - b)^2 + 4ab$
 $4ab = 4(6x)(4y) = 96xy$
 $k = 96$
Ans: (C) 96

13. If $m + n = 12$ and $mn = 35$, then $(m - n)^2 =$
 $(a - b)^2 = (a + b)^2 - 4ab$
 $(m - n)^2 = (12)^2 - 4(35) = 144 - 140 = 4$
Ans: (B) 4

14. If $m - \frac{1}{m} = 9$, then $m^2 + \frac{1}{m^2} =$
 $a^2 + b^2 = (a - b)^2 + 2ab$, with $ab = m \cdot \frac{1}{m} = 1$
 $= (9)^2 + 2 = 81 + 2 = 83$
Ans: (A) 83

15. If $a + b = 18$ and $ab = 80$, then $a^2 + b^2 =$
 $a^2 + b^2 = (a + b)^2 - 2ab$
 $a^2 + b^2 = (18)^2 - 2(80) = 324 - 160 = 164$
Ans: (A) 164

16. In the expansion of $(7x + 4y + z)^2$, the coefficient of zx is

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

The zx term is $2(z)(7x) = 14zx$, so the coefficient is 14.

Ans: (C) 14

17. $(p - 5q + 7r)^2$ equals

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

$$(p - 5q + 7r)^2 = (p)^2 + (5q)^2 + (7r)^2 - 2(p)(5q) - 2(5q)(7r) + 2(7r)(p)$$

$$\text{Ans: (B) } p^2 + 25q^2 + 49r^2 - 10pq - 70qr + 14rp$$

18. The coefficient of qr in $(p + 7q - 3r)^2$ is

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

The qr term is $-2(7q)(3r) = -42qr$, so the coefficient is -42 .

Ans: (D) -42

19. $(2x + 4)^3 =$

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

$$(2x + 4)^3 = (2x)^3 + (4)^3 + 3(2x)(4)(2x + 4)$$

$$= 8x^3 + 64 + 48x^2 + 96x$$

$$\text{Ans: (A) } 8x^3 + 64 + 48x^2 + 96x$$

20. $(2m - n)^3 =$

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

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

$$= 8m^3 - n^3 - 12m^2n + 6mn^2$$

$$\text{Ans: (A) } 8m^3 - n^3 - 12m^2n + 6mn^2$$

21. $(3t + 5)(9t^2 - 15t + 25) =$

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

$$\text{Here } a = 3t, b = 5: (3t + 5)(9t^2 - 15t + 25) = (3t)^3 + (5)^3 = 27t^3 + 125$$

$$\text{Ans: (C) } 27t^3 + 125$$

22. If $x + y = 14$ and $xy = 48$, then $x^3 + y^3 =$

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

$$= (14)^3 - 3(48)(14) = 2744 - 2016 = 728$$

$$\text{Ans: (B) } 728$$

23. $(4t - 3)(16t^2 + 12t + 9) =$

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

$$(4t - 3)(16t^2 + 12t + 9) = (4t)^3 - (3)^3 = 64t^3 - 27$$

$$\text{Ans: (C) } 64t^3 - 27$$

24. $(4m + 3n + 2)(16m^2 + 9n^2 + 4 - 12mn - 6n - 8m) =$
 $a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$

Here $a = 4m, b = 3n, c = 2$

$$= 64m^3 + 27n^3 + 8 - 72mn$$

Ans: (D) $64m^3 + 27n^3 + 8 - 72mn$

25. The value of $4^3 + (-10)^3 + 6^3$ is

Take $a = 4, b = -10, c = 6$

$$a + b + c = 4 - 10 + 6 = 0$$

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

$$\therefore 4^3 + (-10)^3 + 6^3 = 3(4)(-10)(6) = -720$$

Ans: (D) -720
