

Algebraic Identities

MCQ Test, Set 03

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.

- The product $(6x + 7y) \times 5x$ is
A. $30x^2 + 7y$ **B.** $30x^2 + 35xy$ **C.** $30x^2 - 35xy$ **D.** $30x + 35xy$
- The product $(a - 9)(3a - 8)$ is
A. $3a^2 - 35a + 72$ **B.** $3a^2 - 19a + 72$ **C.** $3a^2 - 35a - 72$ **D.** $3a^2 + 72$
- $(4a + 3b)(4a - 3b)$ equals
A. $16a^2 - 9b^2$ **B.** $16a^2 + 9b^2 - 24ab$ **C.** $4a^2 - 3b^2$ **D.** $16a^2 + 9b^2$
- $(4a^4 + 6b^5)(4a^4 - 6b^5) =$
A. $16a^8 + 36b^{10}$ **B.** $16a^8 - 36b^{10}$ **C.** $4a^8 - 6b^{10}$ **D.** $16a^6 - 36b^7$
- $(8m + n)^2$ equals
A. $8m^2 + n^2 + 16mn$ **B.** $64m^2 + n^2$ **C.** $64m^2 + n^2 + 16mn$ **D.** $64m^2 + n^2 + 8mn$
- In the expansion of $(3a + 7b)^2$, the coefficient of ab is
A. 84 **B.** 42 **C.** 21 **D.** 20
- The expansion of $(2m - 8n)^2$ is
A. $4m^2 - 64n^2$ **B.** $4m^2 + 64n^2 - 32mn$ **C.** $4m^2 - 64n^2 - 32mn$ **D.** $4m^2 + 64n^2 + 32mn$
- $\left(\frac{a}{5} - \frac{4b}{5}\right)^2 =$
A. $\frac{a^2}{25} + \frac{16b^2}{25} - \frac{4ab}{25}$ **B.** $\frac{a^2}{25} + \frac{16b^2}{25} + \frac{8ab}{25}$
C. $\frac{a^2}{5} + \frac{16b^2}{5} - \frac{8ab}{25}$ **D.** $\frac{a^2}{25} + \frac{16b^2}{25} - \frac{8ab}{25}$
- $\left(1 + \frac{4}{t}\right)^2 + \left(1 - \frac{4}{t}\right)^2 =$
A. $2 + \frac{32}{t^2}$ **B.** $1 + \frac{16}{t^2}$
C. $\frac{16}{t}$ **D.** $2 + \frac{32}{t^2} + \frac{16}{t}$
- $(6p + 8q)^2 - (6p - 8q)^2 =$
A. $96pq$ **B.** $-192pq$ **C.** $72p^2 + 128q^2$ **D.** $192pq$

11.	If $p + q = 20$ and $p - q = 10$, then $pq =$			
	A. 150	B. 125	C. 300	D. 75
12.	If $(4x - 7y)^2 + kxy = (4x + 7y)^2$, then $k =$			
	A. 112	B. -112	C. 56	D. 28
13.	If $a + b = 7$ and $ab = 10$, then $(a - b)^2 =$			
	A. 9	B. 29	C. 69	D. 89
14.	If $t^2 + \frac{1}{t^2} = 7$, then $(t + \frac{1}{t})^2 =$			
	A. 11	B. 9	C. 5	D. 7
15.	If $p + q = 8$ and $pq = 12$, then $p^2 + q^2 =$			
	A. 40	B. 52	C. 88	D. 16
16.	In the expansion of $(6p + 5q + 4r)^2$, the coefficient of qr is			
	A. 20	B. 80	C. 18	D. 40
17.	The expansion of $(p - 6q - 3r)^2$ is			
	A. $p^2 + 36q^2 + 9r^2 - 12pq + 36qr + 6rp$	B. $p^2 + 36q^2 + 9r^2 - 12pq - 36qr - 6rp$		
	C. $p^2 + 36q^2 + 9r^2 - 12pq + 36qr - 6rp$	D. $p^2 + 36q^2 + 9r^2 + 12pq + 36qr + 6rp$		
18.	The coefficient of qr in $(3p - 6q + r)^2$ is			
	A. 6	B. -12	C. -6	D. 12
19.	$(3a + 4b)^3 =$			
	A. $27a^3 + 64b^3$	B. $27a^3 + 64b^3 + 36a^2b + 48ab^2$		
	C. $27a^3 + 64b^3 + 108a^2b + 144ab^2$	D. $27a^3 + 64b^3 + 36ab$		
20.	$(2p - 1)^3 =$			
	A. $8p^3 - 1 + 12p^2 - 6p$	B. $8p^3 - 1$	C. $8p^3 - 1 - 12p^2 - 6p$	D. $8p^3 - 1 - 12p^2 + 6p$
21.	$(2r + 3)(4r^2 - 6r + 9) =$			
	A. $8r^3 - 27$	B. $8r^3 + 9$	C. $8r^3 + 27$	D. $8r^3 + 36r^2 + 54r + 27$
22.	If $p + q = 9$ and $pq = 20$, then $p^3 + q^3 =$			
	A. 549	B. 1269	C. 189	D. 669
23.	$(3y - 1)(9y^2 + 3y + 1) =$			
	A. $27y^3 - 1$	B. $3y^3 - 1$	C. $27y^3 + 1$	D. $27y^3 - 1 - 27y^2 + 9y$

24. $(x + 3y + 2)(x^2 + 9y^2 + 4 - 3xy - 6y - 2x) =$

A. $x^3 + 27y^3 + 8$

B. $x^3 + 27y^3 + 8 + 18xy$

C. $x^3 + 27y^3 + 8 - 6xy$

D. $x^3 + 27y^3 + 8 - 18xy$

25. The value of $14^3 - 5^3 - 9^3$ is

A. 0

B. 630

C. 1890

D. -1890

Key sheet

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

Solutions

1. The product $(6x + 7y) \times 5x$ is

$$(a + b)c = ac + bc$$

$$(6x + 7y) \times 5x = (6x)(5x) + (7y)(5x) = 30x^2 + 35xy$$

Ans: (B) $30x^2 + 35xy$

2. The product $(a - 9)(3a - 8)$ is

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

$$\begin{aligned}(a - 9)(3a - 8) &= (a)(3a) - (a)(8) - (9)(3a) + (9)(8) \\ &= 3a^2 - 8a - 27a + 72 = 3a^2 - 35a + 72\end{aligned}$$

Ans: (A) $3a^2 - 35a + 72$

3. $(4a + 3b)(4a - 3b)$ equals

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

$$\begin{aligned}(4a + 3b)(4a - 3b) &= (4a)^2 - (3b)^2 \\ &= 16a^2 - 9b^2\end{aligned}$$

Ans: (A) $16a^2 - 9b^2$

4. $(4a^4 + 6b^5)(4a^4 - 6b^5) =$

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

$$(4a^4 + 6b^5)(4a^4 - 6b^5) = (4a^4)^2 - (6b^5)^2 = 16a^8 - 36b^{10}$$

Ans: (B) $16a^8 - 36b^{10}$

5. $(8m + n)^2$ equals

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

$$\begin{aligned}(8m + n)^2 &= (8m)^2 + (n)^2 + 2(8m)(n) \\ &= 64m^2 + n^2 + 16mn\end{aligned}$$

Ans: (C) $64m^2 + n^2 + 16mn$

6. In the expansion of $(3a + 7b)^2$, the coefficient of ab is

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

$$2ab = 2(3a)(7b) = 42ab$$

So the coefficient of ab is 42.

Ans: (B) 42

7. The expansion of $(2m - 8n)^2$ is

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

$$\begin{aligned}(2m - 8n)^2 &= (2m)^2 + (8n)^2 - 2(2m)(8n) \\ &= 4m^2 + 64n^2 - 32mn\end{aligned}$$

Ans: (B) $4m^2 + 64n^2 - 32mn$

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

9. $\left(1 + \frac{4}{t}\right)^2 + \left(1 - \frac{4}{t}\right)^2 =$
 $(a + b)^2 + (a - b)^2 = 2(a^2 + b^2)$
 $\left(1 + \frac{4}{t}\right)^2 + \left(1 - \frac{4}{t}\right)^2 = 2[(1)^2 + \left(\frac{4}{t}\right)^2] = 2 + \frac{32}{t^2}$
Ans: (A) $2 + \frac{32}{t^2}$

10. $(6p + 8q)^2 - (6p - 8q)^2 =$
 $(a + b)^2 - (a - b)^2 = 4ab$
 $(6p + 8q)^2 - (6p - 8q)^2 = 4(6p)(8q) = 192pq$
Ans: (D) $192pq$

11. If $p + q = 20$ and $p - q = 10$, then $pq =$
 $(p + q)^2 - (p - q)^2 = 4pq$
 $20^2 - 10^2 = 4pq$
 $400 - 100 = 4pq \Rightarrow pq = \frac{300}{4} = 75$
Ans: (D) 75

12. If $(4x - 7y)^2 + kxy = (4x + 7y)^2$, then $k =$
 $(a + b)^2 = (a - b)^2 + 4ab$
 $4ab = 4(4x)(7y) = 112xy$
 $k = 112$
Ans: (A) 112

13. If $a + b = 7$ and $ab = 10$, then $(a - b)^2 =$
 $(a - b)^2 = (a + b)^2 - 4ab$
 $(a - b)^2 = (7)^2 - 4(10) = 49 - 40 = 9$
Ans: (A) 9

14. If $t^2 + \frac{1}{t^2} = 7$, then $\left(t + \frac{1}{t}\right)^2 =$
 $(a + b)^2 = a^2 + b^2 + 2ab$
 $\left(t + \frac{1}{t}\right)^2 = t^2 + \frac{1}{t^2} + 2 \cdot t \cdot \frac{1}{t} = 7 + 2 = 9$
Ans: (B) 9

15. If $p + q = 8$ and $pq = 12$, then $p^2 + q^2 =$
 $a^2 + b^2 = (a + b)^2 - 2ab$
 $p^2 + q^2 = (8)^2 - 2(12) = 64 - 24 = 40$
Ans: (A) 40

16. In the expansion of $(6p + 5q + 4r)^2$, the coefficient of qr is

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

The qr term is $2(5q)(4r) = 40qr$, so the coefficient is 40.

Ans: (D) 40

17. The expansion of $(p - 6q - 3r)^2$ is

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

$$(p - 6q - 3r)^2 = (p)^2 + (6q)^2 + (3r)^2 - 2(p)(6q) + 2(6q)(3r) - 2(3r)(p)$$

$$\text{Ans: (C) } p^2 + 36q^2 + 9r^2 - 12pq + 36qr - 6rp$$

18. The coefficient of qr in $(3p - 6q + r)^2$ is

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

The qr term is $-2(6q)(r) = -12qr$, so the coefficient is -12 .

Ans: (B) -12

19. $(3a + 4b)^3 =$

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

$$(3a + 4b)^3 = (3a)^3 + (4b)^3 + 3(3a)(4b)(3a + 4b)$$

$$= 27a^3 + 64b^3 + 108a^2b + 144ab^2$$

$$\text{Ans: (C) } 27a^3 + 64b^3 + 108a^2b + 144ab^2$$

20. $(2p - 1)^3 =$

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

$$(2p - 1)^3 = (2p)^3 - (1)^3 - 3(2p)(1)(2p - 1)$$

$$= 8p^3 - 1 - 12p^2 + 6p$$

$$\text{Ans: (D) } 8p^3 - 1 - 12p^2 + 6p$$

21. $(2r + 3)(4r^2 - 6r + 9) =$

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

$$\text{Here } a = 2r, b = 3: (2r + 3)(4r^2 - 6r + 9) = (2r)^3 + (3)^3 = 8r^3 + 27$$

$$\text{Ans: (C) } 8r^3 + 27$$

22. If $p + q = 9$ and $pq = 20$, then $p^3 + q^3 =$

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

$$= (9)^3 - 3(20)(9) = 729 - 540 = 189$$

$$\text{Ans: (C) } 189$$

23. $(3y - 1)(9y^2 + 3y + 1) =$

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

$$(3y - 1)(9y^2 + 3y + 1) = (3y)^3 - (1)^3 = 27y^3 - 1$$

$$\text{Ans: (A) } 27y^3 - 1$$

24. $(x + 3y + 2)(x^2 + 9y^2 + 4 - 3xy - 6y - 2x) =$
 $a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$

Here $a = x, b = 3y, c = 2$

$$= x^3 + 27y^3 + 8 - 18xy$$

Ans: (D) $x^3 + 27y^3 + 8 - 18xy$

25. The value of $14^3 - 5^3 - 9^3$ is

Take $a = 14, b = -5, c = -9$

$$a + b + c = 14 - 5 - 9 = 0$$

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

$$\therefore 14^3 - 5^3 - 9^3 = 3(14)(-5)(-9) = 1890$$

Ans: (C) 1890
