

Algebraic Identities

MCQ Test, Set 09

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 $(6p - 9q) \times 2p$ is
A. $12p^2 - 18pq$ **B.** $12p^2 - 9q$ **C.** $12p^2 + 18pq$ **D.** $12p - 18pq$
- The product $(3x + 9)(4x + 2)$ is
A. $12x^2 + 42x - 18$ **B.** $12x^2 + 30x + 18$ **C.** $12x^2 + 42x + 18$ **D.** $12x^2 + 18$
- $(4m - 2n)(4m + 2n)$ equals
A. $16m^2 + 4n^2$ **B.** $16m^2 - 4n^2$ **C.** $16m^2 + 4n^2 - 16mn$ **D.** $4m^2 - 2n^2$
- $(2x^4 + 4y^5)(2x^4 - 4y^5) =$
A. $4x^8 + 16y^{10}$ **B.** $4x^6 - 16y^7$ **C.** $4x^8 - 16y^{10}$ **D.** $2x^8 - 4y^{10}$
- $(4m + 9n)^2$ equals
A. $16m^2 + 81n^2$ **B.** $16m^2 + 81n^2 + 72mn$ **C.** $16m^2 + 81n^2 + 36mn$ **D.** $4m^2 + 9n^2 + 72mn$
- In the expansion of $(2p + 5q)^2$, the coefficient of pq is
A. 40 **B.** 14 **C.** 10 **D.** 20
- The expansion of $(3a - 9b)^2$ is
A. $9a^2 + 81b^2 - 54ab$ **B.** $9a^2 + 81b^2 + 54ab$ **C.** $9a^2 - 81b^2 - 54ab$ **D.** $9a^2 - 81b^2$
- $\left(\frac{6a}{5} - \frac{b}{2}\right)^2 =$
A. $\frac{36a^2}{5} + \frac{b^2}{2} - \frac{6ab}{5}$ **B.** $\frac{36a^2}{25} + \frac{b^2}{4} - \frac{6ab}{5}$
C. $\frac{36a^2}{25} + \frac{b^2}{4} - \frac{3ab}{5}$ **D.** $\frac{36a^2}{25} + \frac{b^2}{4} + \frac{6ab}{5}$
- $\left(6 + \frac{5}{r}\right)^2 + \left(6 - \frac{5}{r}\right)^2 =$
A. $72 + \frac{50}{r^2} + \frac{120}{r}$ **B.** $\frac{120}{r}$
C. $72 + \frac{50}{r^2}$ **D.** $36 + \frac{25}{r^2}$
- $(2m + n)^2 - (2m - n)^2 =$
A. $8mn$ **B.** $-8mn$ **C.** $8m^2 + 2n^2$ **D.** $4mn$

11.	If $m + n = 12$ and $m - n = 8$, then $mn =$			
	A. 52	B. 80	C. 40	D. 20
12.	If $(m - 4n)^2 + kmn = (m + 4n)^2$, then $k =$			
	A. 16	B. 4	C. -16	D. 8
13.	If $x + y = 17$ and $xy = 70$, then $(x - y)^2 =$			
	A. 429	B. 569	C. 9	D. 149
14.	If $n^2 + \frac{1}{n^2} = 34$, then $(n + \frac{1}{n})^2 =$			
	A. 36	B. 34	C. 32	D. 38
15.	If $p + q = 12$ and $pq = 11$, then $p^2 + q^2 =$			
	A. 100	B. 133	C. 166	D. 122
16.	In the expansion of $(2p + 3q + 5r)^2$, the coefficient of qr is			
	A. 15	B. 60	C. 16	D. 30
17.	The expansion of $(6p - q - 4r)^2$ is			
	A. $36p^2 + q^2 + 16r^2 - 12pq + 8qr + 48rp$	B. $36p^2 + q^2 + 16r^2 - 12pq - 8qr - 48rp$		
	C. $36p^2 + q^2 + 16r^2 - 12pq + 8qr - 48rp$	D. $36p^2 + q^2 + 16r^2 + 12pq + 8qr + 48rp$		
18.	The coefficient of bc in $(3a - b + 2c)^2$ is			
	A. 2	B. -2	C. -4	D. 4
19.	$(3y + 4)^3 =$			
	A. $27y^3 + 64 + 108y^2 + 144y$	B. $27y^3 + 64 + 36y^2 + 48y$		
	C. $27y^3 + 64$	D. $27y^3 + 64 + 36y$		
20.	$(5r - 1)^3 =$			
	A. $125r^3 - 1$	B. $125r^3 - 1 - 75r^2 + 15r$	C. $125r^3 - 1 + 75r^2 - 15r$	D. $125r^3 - 1 - 75r^2 - 15r$
21.	$(2m + 6)(4m^2 - 12m + 36) =$			
	A. $8m^3 - 216$	B. $8m^3 + 216$		
	C. $8m^3 + 72m^2 + 216m + 216$	D. $8m^3 + 36$		
22.	If $a + b = 6$ and $ab = 8$, then $a^3 + b^3 =$			
	A. 72	B. 168	C. 192	D. 360
23.	$(2p - 6)(4p^2 + 12p + 36) =$			
	A. $8p^3 + 216$	B. $2p^3 - 216$		
	C. $8p^3 - 216 - 72p^2 + 216p$	D. $8p^3 - 216$		

24. $(4x + 2y + 1)(16x^2 + 4y^2 + 1 - 8xy - 2y - 4x) =$

A. $64x^3 + 8y^3 + 1 + 24xy$

B. $64x^3 + 8y^3 + 1 - 24xy$

C. $64x^3 + 8y^3 + 1 - 8xy$

D. $64x^3 + 8y^3 + 1$

25. The value of $7^3 + (-17)^3 + 10^3$ is

A. 0

B. 3570

C. -1190

D. -3570

Key sheet

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

Solutions

1. The product $(6p - 9q) \times 2p$ is

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

$$(6p - 9q) \times 2p = (6p)(2p) - (9q)(2p) = 12p^2 - 18pq$$

Ans: (A) $12p^2 - 18pq$

2. The product $(3x + 9)(4x + 2)$ is

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

$$\begin{aligned}(3x + 9)(4x + 2) &= (3x)(4x) + (3x)(2) + (9)(4x) + (9)(2) \\ &= 12x^2 + 6x + 36x + 18 = 12x^2 + 42x + 18\end{aligned}$$

Ans: (C) $12x^2 + 42x + 18$

3. $(4m - 2n)(4m + 2n)$ equals

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

$$\begin{aligned}(4m - 2n)(4m + 2n) &= (4m)^2 - (2n)^2 \\ &= 16m^2 - 4n^2\end{aligned}$$

Ans: (B) $16m^2 - 4n^2$

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

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

$$(2x^4 + 4y^5)(2x^4 - 4y^5) = (2x^4)^2 - (4y^5)^2 = 4x^8 - 16y^{10}$$

Ans: (C) $4x^8 - 16y^{10}$

5. $(4m + 9n)^2$ equals

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

$$\begin{aligned}(4m + 9n)^2 &= (4m)^2 + (9n)^2 + 2(4m)(9n) \\ &= 16m^2 + 81n^2 + 72mn\end{aligned}$$

Ans: (B) $16m^2 + 81n^2 + 72mn$

6. In the expansion of $(2p + 5q)^2$, the coefficient of pq is

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

$$2ab = 2(2p)(5q) = 20pq$$

So the coefficient of pq is 20.

Ans: (D) 20

7. The expansion of $(3a - 9b)^2$ is

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

$$\begin{aligned}(3a - 9b)^2 &= (3a)^2 + (9b)^2 - 2(3a)(9b) \\ &= 9a^2 + 81b^2 - 54ab\end{aligned}$$

Ans: (A) $9a^2 + 81b^2 - 54ab$

8. $\left(\frac{6a}{5} - \frac{b}{2}\right)^2 =$
 $(a - b)^2 = a^2 + b^2 - 2ab$
 $\left(\frac{6a}{5} - \frac{b}{2}\right)^2 = \left(\frac{6a}{5}\right)^2 + \left(\frac{b}{2}\right)^2 - 2\left(\frac{6a}{5}\right)\left(\frac{b}{2}\right)$
 $= \frac{36a^2}{25} + \frac{b^2}{4} - \frac{6ab}{5}$
Ans: (B) $\frac{36a^2}{25} + \frac{b^2}{4} - \frac{6ab}{5}$

9. $\left(6 + \frac{5}{r}\right)^2 + \left(6 - \frac{5}{r}\right)^2 =$
 $(a + b)^2 + (a - b)^2 = 2(a^2 + b^2)$
 $\left(6 + \frac{5}{r}\right)^2 + \left(6 - \frac{5}{r}\right)^2 = 2[(6)^2 + \left(\frac{5}{r}\right)^2] = 72 + \frac{50}{r^2}$
Ans: (C) $72 + \frac{50}{r^2}$

10. $(2m + n)^2 - (2m - n)^2 =$
 $(a + b)^2 - (a - b)^2 = 4ab$
 $(2m + n)^2 - (2m - n)^2 = 4(2m)(n) = 8mn$
Ans: (A) $8mn$

11. If $m + n = 12$ and $m - n = 8$, then $mn =$
 $(m + n)^2 - (m - n)^2 = 4mn$
 $12^2 - 8^2 = 4mn$
 $144 - 64 = 4mn \Rightarrow mn = \frac{80}{4} = 20$
Ans: (D) 20

12. If $(m - 4n)^2 + kmn = (m + 4n)^2$, then $k =$
 $(a + b)^2 = (a - b)^2 + 4ab$
 $4ab = 4(m)(4n) = 16mn$
 $k = 16$
Ans: (A) 16

13. If $x + y = 17$ and $xy = 70$, then $(x - y)^2 =$
 $(a - b)^2 = (a + b)^2 - 4ab$
 $(x - y)^2 = (17)^2 - 4(70) = 289 - 280 = 9$
Ans: (C) 9

14. If $n^2 + \frac{1}{n^2} = 34$, then $\left(n + \frac{1}{n}\right)^2 =$
 $(a + b)^2 = a^2 + b^2 + 2ab$
 $\left(n + \frac{1}{n}\right)^2 = n^2 + \frac{1}{n^2} + 2 \cdot n \cdot \frac{1}{n} = 34 + 2 = 36$
Ans: (A) 36

15. If $p + q = 12$ and $pq = 11$, then $p^2 + q^2 =$
 $a^2 + b^2 = (a + b)^2 - 2ab$
 $p^2 + q^2 = (12)^2 - 2(11) = 144 - 22 = 122$
Ans: (D) 122

16. In the expansion of $(2p + 3q + 5r)^2$, the coefficient of qr is

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

The qr term is $2(3q)(5r) = 30qr$, so the coefficient is 30.

Ans: (D) 30

17. The expansion of $(6p - q - 4r)^2$ is

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

$$(6p - q - 4r)^2 = (6p)^2 + (q)^2 + (4r)^2 - 2(6p)(q) + 2(q)(4r) - 2(4r)(6p)$$

$$\text{Ans: (C) } 36p^2 + q^2 + 16r^2 - 12pq + 8qr - 48rp$$

18. The coefficient of bc in $(3a - b + 2c)^2$ is

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

The bc term is $-2(b)(2c) = -4bc$, so the coefficient is -4 .

Ans: (C) -4

19. $(3y + 4)^3 =$

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

$$(3y + 4)^3 = (3y)^3 + (4)^3 + 3(3y)(4)(3y + 4)$$

$$= 27y^3 + 64 + 108y^2 + 144y$$

$$\text{Ans: (A) } 27y^3 + 64 + 108y^2 + 144y$$

20. $(5r - 1)^3 =$

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

$$(5r - 1)^3 = (5r)^3 - (1)^3 - 3(5r)(1)(5r - 1)$$

$$= 125r^3 - 1 - 75r^2 + 15r$$

$$\text{Ans: (B) } 125r^3 - 1 - 75r^2 + 15r$$

21. $(2m + 6)(4m^2 - 12m + 36) =$

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

$$\text{Here } a = 2m, b = 6: (2m + 6)(4m^2 - 12m + 36) = (2m)^3 + (6)^3 = 8m^3 + 216$$

$$\text{Ans: (B) } 8m^3 + 216$$

22. If $a + b = 6$ and $ab = 8$, then $a^3 + b^3 =$

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

$$= (6)^3 - 3(8)(6) = 216 - 144 = 72$$

Ans: (A) 72

23. $(2p - 6)(4p^2 + 12p + 36) =$

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

$$(2p - 6)(4p^2 + 12p + 36) = (2p)^3 - (6)^3 = 8p^3 - 216$$

$$\text{Ans: (D) } 8p^3 - 216$$

24. $(4x + 2y + 1)(16x^2 + 4y^2 + 1 - 8xy - 2y - 4x) =$
 $a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$

Here $a = 4x, b = 2y, c = 1$

$$= 64x^3 + 8y^3 + 1 - 24xy$$

Ans: (B) $64x^3 + 8y^3 + 1 - 24xy$

25. The value of $7^3 + (-17)^3 + 10^3$ is

Take $a = 7, b = -17, c = 10$

$$a + b + c = 7 - 17 + 10 = 0$$

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

$$\therefore 7^3 + (-17)^3 + 10^3 = 3(7)(-17)(10) = -3570$$

Ans: (D) -3570
