EXPRESSWALA ACADEMY

Algebraic Identities

MCQ Test, Set 07

Time: 30 minutes | Maximum marks: 25

Name: _____ Class: _____ Date: _____

1. There are 25 questions. Each has exactly one correct answer: choose A, B, C or D.
2. Each correct answer carries 1 mark. There is no negative marking.
3. The key sheet and worked solutions are at the end of this test.

1. $2x(9x + 7y) =$

A. $18x^2 - 14xy$ **B.** $18x + 14xy$ **C.** $18x^2 + 7y$ **D.** $18x^2 + 14xy$

2. $(3m - 1)(m + 5) =$

A. $3m^2 - 5$ **B.** $3m^2 - 16m - 5$ **C.** $3m^2 + 14m - 5$ **D.** $3m^2 + 14m + 5$

3. $(5x - 9y)(5x + 9y) =$

A. $5x^2 - 9y^2$ **B.** $25x^2 + 81y^2$ **C.** $25x^2 - 81y^2$ **D.** $25x^2 + 81y^2 - 90xy$

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

A. $25m^8 - 4n^8$ **B.** $5m^8 - 2n^8$ **C.** $25m^6 - 4n^6$ **D.** $25m^8 + 4n^8$

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

A. $8x^2 + 4y^2 + 64xy$ **B.** $64x^2 + 16y^2 + 32xy$ **C.** $64x^2 + 16y^2$ **D.** $64x^2 + 16y^2 + 64xy$

6. In the expansion of $(8a + 9b)^2$, the coefficient of ab is

A. 288 **B.** 72 **C.** 34 **D.** 144

7. $(5m - n)^2 =$

A. $25m^2 - n^2$ **B.** $25m^2 + n^2 - 10mn$ **C.** $25m^2 + n^2 + 10mn$ **D.** $25m^2 - n^2 - 10mn$

8. $\left(\frac{x}{4} - \frac{7y}{5}\right)^2 =$

A. $\frac{x^2}{4} + \frac{49y^2}{5} - \frac{7xy}{10}$ **B.** $\frac{x^2}{16} + \frac{49y^2}{25} + \frac{7xy}{10}$

C. $\frac{x^2}{16} + \frac{49y^2}{25} - \frac{7xy}{20}$ **D.** $\frac{x^2}{16} + \frac{49y^2}{25} - \frac{7xy}{10}$

9. $\left(5 + \frac{8}{q}\right)^2 + \left(5 - \frac{8}{q}\right)^2 =$

A. $25 + \frac{64}{q^2}$ **B.** $50 + \frac{128}{q^2} + \frac{160}{q}$

C. $\frac{160}{q}$ **D.** $50 + \frac{128}{q^2}$

10. $(4m + 9n)^2 - (4m - 9n)^2 =$

A. $32m^2 + 162n^2$ **B.** $144mn$ **C.** $-144mn$ **D.** $72mn$

11. If $a + b = 16$ and $a - b = 2$, then $ab =$

A. 65 **B.** 63 **C.** 126 **D.** 252

12. If $(7p - 4q)^2 + kpq = (7p + 4q)^2$, then $k =$

A. 56 **B.** -112 **C.** 112 **D.** 28

13. If $x + y = 8$ and $xy = 7$, then $(x - y)^2 =$

A. 36 **B.** 50 **C.** 78 **D.** 92

14. If $q + \frac{1}{q} = 15$, then $q^2 + \frac{1}{q^2} =$

A. 225 **B.** 227 **C.** 221 **D.** 223

15. If $m + n = 6$ and $mn = 5$, then $m^2 + n^2 =$

A. 31 **B.** 46 **C.** 26 **D.** 16

16. In the expansion of $(3a + 2b + 6c)^2$, the coefficient of ca is

A. 72 **B.** 36 **C.** 18 **D.** 45

17. $(7a + b - 6c)^2 =$

A. $49a^2 + b^2 + 36c^2 + 14ab + 12bc + 84ca$ **B.** $49a^2 + b^2 + 36c^2 + 14ab + 12bc - 84ca$

C. $49a^2 + b^2 + 36c^2 + 14ab - 12bc + 84ca$ **D.** $49a^2 + b^2 + 36c^2 + 14ab - 12bc - 84ca$

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

A. 14 **B.** -14 **C.** -7 **D.** 7

19. $(3m + 2n)^3 =$

A. $27m^3 + 8n^3$ **B.** $27m^3 + 8n^3 + 18m^2n + 12mn^2$

C. $27m^3 + 8n^3 + 54m^2n + 36mn^2$ **D.** $27m^3 + 8n^3 + 18mn$

20. $(r - 4)^3 =$

A. $r^3 - 64$ **B.** $r^3 - 64 - 12r^2 + 48r$ **C.** $r^3 - 64 + 12r^2 - 48r$ **D.** $r^3 - 64 - 12r^2 - 48r$

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

A. $27y^3 + 8$ **B.** $27y^3 + 54y^2 + 36y + 8$ **C.** $27y^3 + 4$ **D.** $27y^3 - 8$

22. If $x + y = 5$ and $xy = 6$, then $x^3 + y^3 =$

A. 35 **B.** 107 **C.** 215 **D.** 95

23. $(4z - 1)(16z^2 + 4z + 1) =$

A. $64z^3 - 1 - 48z^2 + 12z$ **B.** $64z^3 + 1$ **C.** $64z^3 - 1$ **D.** $4z^3 - 1$

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

A. $8m^3+n^3+27-18mn$ **B.** $8m^3+n^3+27-6mn$ **C.** $8m^3+n^3+27+18mn$ **D.** $8m^3+n^3+27$

25. The value of $5^3-3^3-2^3$ is

A. 30 **B.** 90 **C.** 0 **D.** -90

Key sheet

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

Solutions

1. $2x(9x + 7y) =$

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

$2x(9x + 7y) = (2x)(9x) + (2x)(7y) = 18x^2 + 14xy$

Ans: (D) $18x^2 + 14xy$

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2. $(3m - 1)(m + 5) =$

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

$(3m - 1)(m + 5) = (3m)(m) + (3m)(5) - (1)(m) - (1)(5)$

$= 3m^2 + 15m - m - 5 = 3m^2 + 14m - 5$

Ans: (C) $3m^2 + 14m - 5$

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3. $(5x - 9y)(5x + 9y) =$

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

$(5x - 9y)(5x + 9y) = (5x)^2 - (9y)^2$

$= 25x^2 - 81y^2$

Ans: (C) $25x^2 - 81y^2$

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

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

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

Ans: (A) $25m^8 - 4n^8$

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

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

$(8x + 4y)^2 = (8x)^2 + (4y)^2 + 2(8x)(4y)$

$= 64x^2 + 16y^2 + 64xy$

Ans: (D) $64x^2 + 16y^2 + 64xy$

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6. In the expansion of $(8a + 9b)^2$, the coefficient of ab is

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

$2ab = 2(8a)(9b) = 144ab$

So the coefficient of ab is 144.

Ans: (D) 144

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7. $(5m - n)^2 =$

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

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

$= 25m^2 + n^2 - 10mn$

Ans: (B) $25m^2 + n^2 - 10mn$

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8. $\left(\frac{x}{4}-\frac{7y}{5}\right)^2 =$

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

$\left(\frac{x}{4}-\frac{7y}{5}\right)^2 = \left(\frac{x}{4}\right)^2+\left(\frac{7y}{5}\right)^2-2\left(\frac{x}{4}\right)\left(\frac{7y}{5}\right)$

$= \frac{x^2}{16}+\frac{49y^2}{25}-\frac{7xy}{10}$

Ans: (D) $\frac{x^2}{16}+\frac{49y^2}{25}-\frac{7xy}{10}$

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9. $\left(5+\frac{8}{q}\right)^2+\left(5-\frac{8}{q}\right)^2 =$

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

$\left(5+\frac{8}{q}\right)^2+\left(5-\frac{8}{q}\right)^2 = 2[(5)^2+\left(\frac{8}{q}\right)^2] = 50+\frac{128}{q^2}$

Ans: (D) $50+\frac{128}{q^2}$

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10. $(4m+9n)^2-(4m-9n)^2 =$

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

$(4m+9n)^2-(4m-9n)^2 = 4(4m)(9n) = 144mn$

Ans: (B) $144mn$

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11. If $a+b=16$ and $a-b=2$, then $ab=$

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

$16^2-2^2 = 4ab$

$256-4 = 4ab \Rightarrow ab = \frac{252}{4} = 63$

Ans: (B) 63

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12. If $(7p-4q)^2+kpq = (7p+4q)^2$, then $k=$

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

$4ab = 4(7p)(4q) = 112pq$

$k = 112$

Ans: (C) 112

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13. If $x+y=8$ and $xy=7$, then $(x-y)^2 =$

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

$(x-y)^2 = (8)^2-4(7) = 64-28 = 36$

Ans: (A) 36

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14. If $q+\frac{1}{q}=15$, then $q^2+\frac{1}{q^2} =$

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

$= (15)^2-2 = 225-2 = 223$

Ans: (D) 223

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15. If $m+n=6$ and $mn=5$, then $m^2+n^2 =$

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

$m^2+n^2 = (6)^2-2(5) = 36-10 = 26$

Ans: (C) 26

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16. In the expansion of $(3a + 2b + 6c)^2$, the coefficient of ca is

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

The ca term is $2(6c)(3a) = 36ca$, so the coefficient is 36.

Ans: (B) 36

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17. $(7a + b - 6c)^2 =$

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

$(7a + b - 6c)^2 = (7a)^2 + (b)^2 + (6c)^2 + 2(7a)(b) - 2(b)(6c) - 2(6c)(7a)$

Ans: (D) $49a^2 + b^2 + 36c^2 + 14ab - 12bc - 84ca$

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

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

The qr term is $+2(q)(7r) = 14qr$, so the coefficient is 14.

Ans: (A) 14

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19. $(3m + 2n)^3 =$

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

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

$= 27m^3 + 8n^3 + 54m^2n + 36mn^2$

Ans: (C) $27m^3 + 8n^3 + 54m^2n + 36mn^2$

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20. $(r - 4)^3 =$

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

$(r - 4)^3 = (r)^3 - (4)^3 - 3(r)(4)(r - 4)$

$= r^3 - 64 - 12r^2 + 48r$

Ans: (B) $r^3 - 64 - 12r^2 + 48r$

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

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

Here $a = 3y$, $b = 2$: $(3y + 2)(9y^2 - 6y + 4) = (3y)^3 + (2)^3 = 27y^3 + 8$

Ans: (A) $27y^3 + 8$

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22. If $x + y = 5$ and $xy = 6$, then $x^3 + y^3 =$

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

$= (5)^3 - 3(6)(5) = 125 - 90 = 35$

Ans: (A) 35

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23. $(4z - 1)(16z^2 + 4z + 1) =$

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

$(4z - 1)(16z^2 + 4z + 1) = (4z)^3 - (1)^3 = 64z^3 - 1$

Ans: (C) $64z^3 - 1$

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

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

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

$=8m^3+n^3+27-18mn$

Ans: (A) $8m^3+n^3+27-18mn$

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25. The value of $5^3-3^3-2^3$ is

$\text{Take } a=5,\ b=-3,\ c=-2$

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

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

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

Ans: (B) 90