MATHS

BOOKS - S CHAND IIT JEE FOUNDATION

ALGEBRIC IDENTITIES

Solved Examples

1. Find the product : $\left(a^2+b^2\right)\left(a^4+b^4\right)(a+b)(a-b)$

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2. Find the value of $c + d$ if $c - d = 2, cd = 63.$

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3. Find the value of $a^2 + b^2$ if $a + b = 10$ and $a - b = 2.$

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4. If $a^2 + \frac{1}{a^2} = 7,$ find the value of $\left(a + \frac{1}{a}\right)$

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5. If $a^2 + \frac{1}{a^2} = 7$, find the value of $\left(a - \frac{1}{a}\right)$

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6. If $a^2 + \frac{1}{a^2} = 7$, find the value of $\left(a^2 - \frac{1}{a^2}\right)$

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7. If $p - \frac{1}{p} = 4$, find the value of $p^4 + \frac{1}{p^4}$.

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8. Find the value of pq if $p^3 - q^3 = 68$ and $p - q = -4$.

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9. If $\left(x + \frac{1}{x}\right)^2 = 3$, show that $x^3 + \frac{1}{x^3} = 0$

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10. If $a^2 + b^2 + c^2 = 50$ and $ab + bc + ca = 47$, find the value of $a + b + c$.

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11. Find the continued product of

$x + y, x - y, x^2 + xy + y^2, x^2 - xy + y^2$

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12. Multiply by using the correct identity

$(x + y - z)(x^2 + y^2 + z^2 - xy + xz + yz)$

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13. Find the value of $a^3 + b^3 + c^3 - 3abc$

if $a + b + c = 8$ and $ab + bc + ca = 19$.

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Question Bank 7

1. Find $\left(3m + \frac{1}{5}\right)^2 =$ _____

A. $3m^2 + \frac{6m}{5} + \frac{1}{25}$

B. $9m^2 + \frac{3m}{5} - \frac{1}{25}$

C. $9m^2 + \frac{6m}{5} + \frac{1}{25}$

D. $3m^2 + \frac{3m}{5} + \frac{1}{25}$

Answer: C

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2. $(mx - ny)(mx - ny) =$ ____

A. $m^2x^2 + 2mxny - n^2y^2$

B. $m^2x^2 - 2mxny - n^2y^2$

C. $m^2x^2 - 2mxny + n^2y^2$

D. $m^2x^2 + 2mxny + n^2y^2$

Answer: C

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3. $\left(5z^6 + \frac{1}{z^6}\right)^2 =$ ----

A. $5z^8 + 10z^6 + \frac{1}{z^8}$

B. $25z^{12} + 10z^6 + \frac{1}{z^{12}}$

C. $25z^{12} + 10 + \frac{1}{z^{12}}$

D. $5z^{8} + 10 + \frac{1}{z^{8}}$

Answer: C

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4. $\left(z^2 + 13\right)\left(z^2 - 5\right) =$ ____

A. $2z^4 + 18z^2 - 8$

B. $z^4 + 8z^2 - 65$

C. $z^4 - 8z^2 - 65$

D. $z^4 + 8z^2 + 65$

Answer: B

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

A. $x^2-4xy-y^2$

B. x^2+y^2

C. x^2-y^2

D. $x^2-4xy+y^2$

Answer: B

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6. $(p-q)^2+4pq$

A. p^2-q^2

B. $(p+q)^2$

C. $(2p-q)^2$

D. $(2p-2q)^2$

Answer: B

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7. $x^2+\frac{1}{x^2}=$ ____

A. $\left(x+\frac{1}{x}\right)^2-2$

B. $\left(x+\frac{1}{x}\right)^2+2$

C. $\left(x-\frac{1}{x}\right)^2-2$

D. $\left(x-\frac{1}{x}\right)^2-1$

Answer: A

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8. If $x+\frac{1}{x}=m$, then the find value of $x^2+\frac{1}{x^2}$.

A. $\frac{m^2}{4}$

B. m^2-2

C. $2m^2+1$

D. $2m^2 - 1$

Answer: B

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9. If $x - \frac{1}{x} = 8$, the value of $x^2 + \frac{1}{x^2}$ is

A. 10

B. 62

C. 6

D. 66

Answer: D

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10. If $x^2 + \frac{1}{x^2} = 83$, the value of $x - \frac{1}{x}$ is

A. 9

B. $\sqrt{85}$

C. 81

D. 85

Answer: A

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11. If $x + \frac{1}{x} = 7$, the value of $x^4 + \frac{1}{x^4}$ is

A. 2401

B. 2023

C. 2209

D. 2207

Answer: D

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12. $\left(\frac{2}{5}ab + c\right)\left(\frac{2}{5}ab - c\right) =$ ____

A. $\frac{4}{25}a^2b^2 - \frac{4}{5}abc + c^2$

B. $\frac{4}{25}a^2b^2 + \frac{4}{5}abc + c^2$

C. $\frac{4}{25}a^2b^2 - c^2$

D. $\frac{4}{25}a^2b^2 + c^2$

Answer: C

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13. $(x+4)(x-4)\left(x^2+16\right) =$ ____

A. $x^2 - 64$

B. $x^4 - 64$

C. $x^4 - 256$

D. $x^2 - 256$

Answer: C

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14. $25^2 - 15^2 = \_\_\_$

A. $(25 + 15)^2$

B. $(25 - 15)^2$

C. $(25 + 15)(25 - 15)$

D. 25×15

Answer: C

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15. $\left(3x+\left(\frac{-1}{4}\right)+2y\right)^2=$ ---

A. $9x^2-\frac{1}{16}+4y^2-\frac{6x}{4}-y+12xy$

B. $9x^2+\frac{1}{16}+4y^2+\frac{6x}{4}-y-12xy$

C. $9x^2+\frac{1}{16}+4y^2-\frac{3x}{2}-y+12xy$

D. $9x^2-\frac{1}{16}+4y^2+\frac{3x}{2}+y-12xy$

Answer: C

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16. $(x-y-z)^2-(x+y+z)^2$ is equal to

A. $4xy+4yz$

B. $-4xy-4xz$

C. $4xy+4xz$

D. $-4yz$

Answer: B

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17. If $x+y+z=0$, then x^2+xy+y^2 equals

A. y^2+yz+z^2

B. y^2-yz+z^2

C. z^2-xy

D. z^2+zx+x^2

Answer: D

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18. If $a^2 + b^2 = 6, a + b = 4$, then ab = ____

A. 10

B. 5

C. 20

D. 7

Answer: B

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19. If $x^4 + \frac{1}{x^4} = 727$, then $x - \frac{1}{x}$ is equal to

A. 5

B. $\sqrt{29}$

C. 25

D. 27

Answer: A

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20. If $a + b + c = 9$ and $a^2 + b^2 + c^2 = 21$, then $ab + bc + ca$ is equal to

A. 30

B. 15

C. 51

D. 60

Answer: A

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21. If $a^2 + b^2 + c^2 = 31$ and $ab + bc + ca = 25$, then $a + b + c$ is equal to

A. 81

B. 56

C. 9

D. 6

Answer: C

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22. If $a+b+c=0$, then the value of $\frac{a^2+b^2+c^2}{bc+ca+ab}$ is....

A. 2

B. -2

C. 4

D. -4

Answer: B

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23. $\left(\frac{4}{3}x - \frac{3}{4}y\right)^3$ is equal to

A. $\frac{64}{27}x^3 + \frac{27}{64}y^3 + 4x^2y + \frac{9}{4}xy^2$

B. $\frac{64}{27}x^3 + \frac{27}{64}y^3 - 4x^2y - \frac{9}{4}xy^2$

C. $\frac{64}{27}x^3 - \frac{27}{64}y^3 - 4x^2y + \frac{9}{4}xy^2$

D. $\frac{64}{27}x^3 - \frac{27}{64}y^3 + 4x^2y - \frac{9}{4}xy^2$

Answer: C

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24. $\left(x^2 - \frac{1}{x^2}\right)^3 = x^6 - \frac{1}{x^6} + \ldots$. The missing part is

A. $3x^2 - \frac{3}{x^2}$

B. $-3x^4 + \frac{3}{x^4}$

C. $-3x^2 + \frac{3}{x^2}$

D. $3x^4 - \frac{3}{x^4}$

Answer: C

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25. $(p-q)^3 - (p+q)^3$ is equal to

A. $2p^3 - 2q^3$

B. $2p^3 + 2q^3$

C. $2p^3 + 6pq^2$

D. $-6p^2q - 2q^3$

Answer: D

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26. The value of $a^3 - b^3$, when $a - b = 4$ and $ab = -2$ is

A. 88

B. 40

C. 72

D. 64

Answer: B

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27. The value of $x^3 + y^3$, when $x + y = 5$ and $xy = 6$ is

A. 125

B. 35

C. 215

D. 107

Answer: B

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28. If $x + \frac{1}{x} = 5$, then $x^3 + \frac{1}{x^3}$ is equal to

A. 125

B. 140

C. 110

D. 100

Answer: C

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29. If $x^2 + \frac{1}{x^2} = 51,$ find the value of $x^3 - \frac{1}{x^3}$

A. 364

B. 343

C. 153

D. 103

Answer: A

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30. $(0.8x + 0.3y)\left(0.64x^2 - 0.24xy + 0.09y^2\right)$ equals

A. $(0.8x + 0.3y)^2$

B. $(0.8x + 0.3y)^3$

C. $(0.8x)^3 + (0.3y)^3$

D. $(0.8x)^3 - (0.3y)^3$

Answer: C

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31. $(2x - 5)(4x^2 + 10x + 25)$ is equal to

A. $(2x - 5)^3$

B. $8x^3 + 125$

C. $(2x + 5)^3$

D. $8x^3 - 125$

Answer: D

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32. The value of $\frac{4.359 \times 4.359 - 1.641 \times 1.641}{4.359 - 1.641}$ is

A. 6.3

B. 6

C. 3.2

D. 4.6

Answer: B

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33. $\frac{(6.4)^2-(5.4)^2}{(8.9)^2+8.9\times 2.2+(1.1)^2}=$

A. 0.118

B. 0.92

C. 1.5

D. 0.61

Answer: A

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34. $\frac{3.7\times 3.7+2.3\times 2.3+2\times 3.7\times 2.3}{4.6\times 4.6-3.4\times 3.4}=$

A. $3\frac{3}{4}$

B. $4\frac{3}{4}$

C. $3\frac{1}{4}$

D. $3\frac{1}{2}$

Answer: A

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35. $\frac{8.73 \times 8.73 \times 8.73 + 4.27 \times 4.27 \times 4.27}{8.73 \times 8.73 - 8.73 \times 4.27 + 4.27 \times 4.27} =$

A. 11

B. 12

C. 13

D. 10

Answer: C

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36. $\frac{0.06 \times 0.06 \times 0.06 - 0.05 \times 0.05 \times 0.05}{0.06 \times 0.06 + 0.06 \times 0.05 + 0.05 \times 0.05}$ gives

A. 0.01

B. 0.001

C. 0.1

D. 0.02

Answer: A

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37. $(1-a)\left(1+a+a^2\right)+(1+a)\left(1-a+a^2\right)$ is equal to

A. $2a^3$

B. 2

C. $-2a^3$

D. 0

Answer: B

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38. The product $(2x - 3y + 5z)\left(4x^2 + 9y^2 + 25z^2 + 6xy + 15yz - 10xz\right)$ is

A. $8x^3 + 27y^3 + 125z^3 - 90xyz$

B. $8x^3 + 27y^3 + 125z^3 + 90xyz$

C. $8x^3 - 27y^3 + 125z^3 - 90xyz$

D. $8x^3 - 27y^3 + 125z^3 + 90xyz$

Answer: D

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39. If $x + y + z = 7, xy + yz + zx = 12,$ find the value of $x^3 + y^3 + z^3 - 3xyz.$

A. 25

B. 91

C. 105

D. 59

Answer: B

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40. The product $(x+y+z)\left[(x-y)^2+(y-z)^2+(z-x)^2\right]$ is equal to

A. $x^3+y^3+z^3-3xyz$

B. $x^3+y^3+z^2$

C. 3xyz

D. $2\left[\left(x^3+y^3+z^3\right)-3xyz\right]$

Answer: D

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Self Assessment Sheet 7

1. $(-a-b)(b-a)$ is

A. a^2+b^2

B. b^2-a^2

C. a^2-b^2

D. $-\left(b^2+a^2\right)$

Answer: C

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2. $\frac{0.25\times 0.25-0.24\times 0.24}{0.49}=?$

A. 0.0006

B. 0.49

C. 0.01

D. 0.1

Answer: C

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3. The value of $(5x-3y)^2-(5x+3y)^2$ when $x=-1, y=\sqrt{\frac{1}{25}}$ is

A. 12

B. $\frac{1}{15}$

C. 10

D. -30

Answer: A

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4. $8x^3 - 27$ divided by $4x^2 + 6x + 9$ is

A. $2x + 3$

B. $-2x + 3$

C. $2x - 3$

D. $-(2x + 3)$

Answer: C

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5. $\frac{2.3 \times 2.3 \times 2.3 - 1}{2.3 \times 2.3 + 2.3 + 1} = ?$

A. 0.3

B. 1.3

C. 2.2

D. 3.3

Answer: B

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6. $a^3 + 3a^2b + 3ab^2 + b^3$ divided by $a^2 + 2ab + b^2$ is

A. $a^2 + b^2$

B. $a + 2b$

C. $2a^2 + b^2$

D. $a + b$

Answer: D

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7. $(25.732)^2 - (15.732)^2 = ?$

A. 4.1464

B. 41.464

C. 414.64

D. 4164.4

Answer: C

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8. If $x + \frac{1}{x} = 8$, then the value of $\left(x - \frac{1}{x}\right)^2$ is

A. 64

B. 60

C. 16

D. 62

Answer: B

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9. The continued product of $(x+3)(x-3)\left(x^2+9\right)$ is

A. $-x^4+81$

B. x^2-81

C. x^4-18

D. x^4-81

Answer: D

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10. If $x^2 + \frac{1}{x^2} = 7$, find the value of $x^3 + \frac{1}{x^3}$

A. 9

B. 18

C. 27

D. 14

Answer: B

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