



# MATHS

BOOKS - S CHAND IIT JEE FOUNDATION

## FACTORIZATION OF ALGEBRAIC EXPRESSIONS

### Solved Examples

1. Factorise :  $(x^2 + y^2 - z^2)^2 - 4x^2y^2$



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2. Factorise :  $x^4 + x^2y^2 + y^4$ .



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3.

Factorise

$$: 16(2x - y)^2 - 24(4x^2 - y^2) + 9(2x + y)^2$$



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4. Factorise :  $4b^2 - 1 - 2a - a^2$ .



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5. Factorise:  $x^8 - x^4 - 72$

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6. Factorise:  $(x^2 - 5x)(x^2 - 5x - 20) + 84$

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7. Factorise  $2x^2 - \frac{5}{6}x + \frac{1}{12}$

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8.  $a^{12} - b^{12}$



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9. Factorise:  $\frac{1}{64}a^3 - \frac{1}{16}a^2b + \frac{1}{12}ab^2 - \frac{1}{27}b^3$



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10. Factorise:  $a^6 - 7a^3 - 18$



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11.

Factorise:

$$2\sqrt{2}x^3 + 3\sqrt{3}y^3 + \sqrt{5}(5 - 3\sqrt{6}xy)$$



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12.

Factorise:

$$(5x - y)^3 + (y - 4z)^3 + (4z - 5x)^3$$



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13. Factorise  $x^8 + x^4 + 1$



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14. The value of

$$(1.25)^3 - 2.25(1.25)^2 + 3.75(0.75)^2 - (0.75)^3$$

is (a) 1 (b)  $\frac{1}{2}$  (c)  $\frac{1}{4}$  (d)  $\frac{1}{8}$



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Question Bank 8

1. Factorise:  $ab(c^2 + 1) + c(a^2 + b^2)$

A.  $(ab + c)(a + bc)$

B.  $(ac + b)(ab + c)$

C.  $(a + bc)(ac + b)$

D.  $(a + b)(ac + b)$

**Answer: C**



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2. The factors of  $9a^2 - 6\sqrt{5}a + 5$  are

A.  $(3a + \sqrt{5})(3a - \sqrt{5})$

B.  $(3a - 5)(3a - 5)$

C.  $(3a - \sqrt{5})(3a - \sqrt{5})$

D.  $(3a + \sqrt{5})(3a - 5)$

**Answer: C**



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**3. Factorise:**

$$49(2x + 3y)^2 - 70(4x^2 - 9y^2) + 25(2x - 3y)^2$$



A.  $4(x - 9y)^2$

B.  $9(x + 4y)^2$

C.  $16(x + 9y)^2$

D.  $16(x - 9y)^2$

**Answer: C**



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4.  $a^2 - b^2 - c^2 + 2bc + a + b - c$  when

factorised equals

A.  $(a - b - c)(a - b + c + 1)$

B.  $(a + b - c)(a - b + c + 1)$

C.  $(a - b + c)(a - b + c + 1)$

D.  $(a + b + c)(a - b + c + 1)$

**Answer: B**



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5. Factorise :  $1 + 2ab - (a^2 + b^2)$

A.  $(1 - a + b)(1 - a - b)$

B.  $(1 + a + b)(1 - a + b)$

C.  $(1 + a + b)(1 - a + b)$

D.  $(1 + a - b)(1 + a + b)$

**Answer: C**



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**6. Factories  $x^4 + 4$**

A.  $(x^2 + 2)^2$

B.  $(x^2 + 2)(x^2 - 2)^2$

C.  $(x^2 + 2x + 2)(x^2 - 2x + 2)$

D.  $(x^2 - 2)^2$

**Answer: C**



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7. The factors of

$a^2 - b^2 - 4c^2 + 4d^2 - 4(ad - bc)$  are :

A.  $(a + 2d + b + 2c)(a - 2d - b + 2c)$

B.  $(a - 2d + b - 2c)(a + 2d - b + 2c)$

C.  $(a - 2d + b - 2c)(a - 2d - b + 2c)$

D.  $(a - 2d - b - 2c)(a + 2d + b + 2c)$

**Answer: C**



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**8. Factors of  $x^4 + 5x^2 + 9$  are**

A.  $(x^2 + 2x + 3)(x^2 + 3x + 3)$

B.  $(x^2 - x + 3)(x^2 - x - 3)$

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

D.  $(x^2 - x + 3)(x^2 + x + 3)$

**Answer: D**



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9. The factors of  $625a^{12} - 81b^{12}$  are :

A.  $(25a^2 + 9b^6)(5a^3 - 3b^3)(5a^3 + 3b^3)$

B.  $(5a^3 - 3b^3)^2(5a^3 + 3b^3)^2$

C.  $(5a^3 - 3b^3)^4$

D.  $(25a^6 - 9b^2)^2$

**Answer: A**



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**10.** The factors of  $x^8 - x^4 - 30$  are :

A.  $(x^4 - 6)$  and  $(x^4 - 5)$

B.  $(x^4 - 6)$  and  $(x^4 + 5)$

C.  $(x^4 + 6)$  and  $(x^4 - 5)$

D.  $(x^4 + 6)$  and  $(x^4 + 5)$

**Answer: B**

11. The factors of  $(x^4 - 7x^2y^2 + y^4)$  are

A.  $(x^2 + y^2 - 3xy)(x^2 + y^2 + 3xy)$

B.  $(x^2 - y^2 - 3xy)(x^2 + y^2 + 3xy)$

C.  $(x^2 - y^2 - 3xy)(x^2 - y^2 + 3xy)$

D.  $(x^2 + y^2 + 3xy)(x^2 - y^2 - 3xy)$

**Answer: A**



12. Factors of  $3m^5 - 48m$  are

A.  $3m(m - 1)(m - 3)$

B.  $3m(m - 2)(m + 2)(m^2 + 4)$

C.  $3m(m - 1)(m - 2)(m + 1)$

D.  $m(m - 1)(m + 2)(m^2 + 4)$

**Answer: B**



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13. Factorise:  $x^2 - xy + y - x$

A.  $(x - 1)(x + y)$

B.  $(x + 1)(x + y)$

C.  $(x - 1)(x - y)$

D. None of these

**Answer: C**



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**14. Factorise  $4x^4 + 3x^2 + 1$**

A.  $(2x^2 + x + 1)(2x^2 + x - 1)$

B.  $(2x^2 + x + 1)(2x^2 - x + 1)$

C.  $(2x^2 + x - 1)(2x^2 - x + 1)$

D.  $(2x^2 - x + 1)(2x^2 - x - 1)$

**Answer: B**



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**15. Factorise:  $x^2 + 5\sqrt{3}x + 12$**

A.  $(x + 2\sqrt{3})(x + 3\sqrt{3})$

B.  $(x + 2\sqrt{3})(x + 4\sqrt{3})$

C.  $(x + 4\sqrt{3})(x - \sqrt{3})$

D.  $(x - \sqrt{3})(x - 4\sqrt{3})$

**Answer: B**



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**16. Factorise:  $y^{16} - 63y^8 - 64$**

A.  $(y^8 - 1)(y^4 + 8)(y^4 - 8)$

B.  $(y^4 + 8)^2(y^8 + 1)$

C.  $(y^4 - 8)^2(y^8 - 1)$

D.  $(y^4 + 8)(y^4 - 8)(y^8 + 1)$

**Answer: D**



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17. Factorise:  $a^4 - 20a^2 + 64$

A.  $(a + 2)(a - 2)(a + 4)(a - 4)$

B.  $(a - 2)^2(a - 4)^2$

C.  $(a - 2)^2(a + 4)^2$

D. None of these

**Answer: A**



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**18. Factorise :  $27 + 125a^3 + 135a + 225a^2$**

A.  $(3 + 5a)(3 + 5a)(3 - 5a)$

B.  $(3 - 5a)(3 - 5a)(3 + 5a)$

C.  $(3 + 5a)(3 + 5a)(3 + 5a)$

D.  $(3 - 5a)(3 + 5a)(3 + 5a)$

**Answer: C**

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19. Factorise :  $(5x - 3)^2 - (5x - 3) - 20$

A.  $(5x + 8)(5x - 1)$

B.  $(5x - 8)(5x + 1)$

C.  $(5x - 8)(5x - 1)$

D.  $(5x + 8)(5x + 1)$

**Answer: B**

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20.  $6\sqrt{5}x^2 - 2x - 4\sqrt{5}$  is equal to

A.  $(\sqrt{5}x - 2)(6x + 2\sqrt{5})$

B.  $(\sqrt{5}x + 2)(6x + 2\sqrt{5})$

C.  $(\sqrt{5}x + 2)(6x - 2\sqrt{5})$

D.  $(\sqrt{5})x - 2)(6x - 2\sqrt{5})$

**Answer: A**



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21.  $10\left(3x - \frac{4}{x}\right)^2 - 3\left(3x - \frac{4}{x}\right) - 7$  is equal

to :

A.  $\left(3x - \frac{4}{x} + 7\right)\left(3x - \frac{4}{x} - 10\right)$

B.  $\left(3x - \frac{4}{x} - 1\right)\left(3x - \frac{4}{x} + 5\right)$

C.  $\left(3x - \frac{4}{x} - 1\right)\left(30x - \frac{40}{x} + 7\right)$

D.  $\left(3x - \frac{4}{x} - 1\right)\left(3x - \frac{4}{x} + 7\right)$

**Answer: C**



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22.

$$\frac{0.86 \times 0.86 \times 0.86 + 0.14 \times 0.14 \times 0.14}{0.86 \times 0.86 - 0.86 + 0.14 + 0.14 \times 0.14}$$
 is  
equal to

A. 1

B. 0

C. 2

D. 10

**Answer: A**



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23. Factorise :  $a^6 - 26a^3 - 27$

A.

$$(a - 3)(a + 1)(a^2 + a + 1)(a^2 + 3a + 9)$$

B.

$$(a - 3)(a - 1)(a^2 + a + 1)(a^2 + 3a + 9)$$

C.

$$(a - 3)(a + 1)(a^2 + 3a + 9)(a^2 - a + 1)$$

D.

$$(a + 3)(a - 1)(a^2 + 3a + 9)(a^2 + a + 1)$$

**Answer: C**



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24. Find the square root of :

$$4a^2 + 9b^2 + c^2 - 12ab + 6bc - 4ac$$

A.  $(2a + 3b - c)$

B.  $(2a - 3b + c)$

C.  $(-2a + 3b + c)$

D.  $(-2a + 3b + c)$

**Answer: C**



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25. Factorise:  $27a^3 - b^3 - 1 - 9ab$

A.

$$(3a + b - 1)(9a^2 + b^2 + 1 - 3ab + 3a - b)$$

B.

$$(3a - b - 1)(9a^2 - b^2 + 1 + 3ab + 3a - b)$$

C.  $(3a + b + 1)(9a^2 + 1 + 3ab + 3a - b)$

D.

$$(3a - b - 1)(9a^2 + b^2 + 1 + 3ab + 3a - b)$$

**Answer: D**



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**26. Factorise:**  $x^3 + \frac{1}{x^3} - 2$



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**27.** Factors of

$(2x - 3y)^3 + (3y - 5z)^3 + (5z - 2x)^3$  are:

A.  $3(2x - 3y)(3y - 5z)(5z - 2x)$

B.  $3(3x - 2y)(3y - 5z)(5z - 2x)$

C.  $3(2x - 3y)(5y - 3z)(5z - 2x)$

D.  $3(2x - 3y)(3y - 5z)(2z - 5x)$

**Answer: A**



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28. If  $\left(x^{3/2} - xy^{1/2} + x^{1/2}y - y^{3/2}\right)$  is

divided by  $\left(x^{1/2} - y^{1/2}\right)$ , the quotient is :

A.  $x + y$

B.  $x - y$

C.  $x^{1/2} + y^{1/2}$

D.  $x^2 - y^2$

**Answer: A**



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29. Factorise :  $a^2 + \frac{1}{a^2} + 3 - 2a - \frac{2}{a}$

A.  $\left(a + \frac{1}{a} - a\right) \left(a - \frac{1}{a} + 1\right)$

B.  $\left(a + \frac{1}{a} - 1\right) \left(a + \frac{1}{a} + 1\right)$



C.  $\left(a + \frac{1}{a} + 1\right)\left(a + \frac{1}{a} + 1\right)$

D.  $\left(a + \frac{1}{a} - 1\right)\left(a + \frac{1}{a} - 1\right)$

**Answer: D**



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**30. Factorise:  $x^3 - 3x^2 + 3x + 7$**

A.  $(x - 1)(x^2 - 4x + 7)$

B.  $(x + 1)(x^2 - 4x + 7)$

C.  $(x + 1)(x^2 + 4x + 7)$

D.  $(x - 1)(x^2 + 4x + 7)$

**Answer: B**



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## Self Assessment Sheet 8

1. The absolute difference between two linear factors of  $x^2 + 4xy + 4y^2 + x + 2y$  is :

A. 0

B. 1

C. 2

D. 3

**Answer: B**



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2. Factors of  $(2x^2 - 3x - 2)(2x^2 - 3x) - 63$

are :

A.  $(x - 3)(2x + 3)(x - 1)(x - 7)$

B.  $(x + 3)(2x + 3)(2x^2 - 1)(x - 7)$

C.  $(x + 3)(2x + 3)(2x^2 - 2x + 7)$

D.  $(x - 3)(2x + 3)(2x^2 - 3x + 7)$

**Answer: D**



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**3.** The factors of

$(2x^2 - x - 6)^2 - (2x^2 - 9x + 10)^2$  are:

A.  $8(x - 2)(2x - 1)^2$

B.  $16(x - 2)^2(2x - 1)$

C.  $16(x - 2)(2x - 1)$

D.  $16(x - 2)^2(2x - 1)^2$

**Answer: B**



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**4. The factors of**

$(12x - 8y)(a - 2b) + (6b - 2a)(3x - 2y)$  are

:

A.  $(3x + 2y)(a - 2b)$

B.  $2(3x - 2y)(a - b)$

C.  $(3x - 2y)(a + 2b)$

D.  $(3x + 2y)(a + 2b)$

**Answer: B**



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5. The positive square root of

$$(2x^2 + 5x + 2)(x^2 - 4)(2x^2 - 3x - 2)$$

expressed as factor is:

A.  $(2x + 3)(x + 2)(x - 1)$

B.  $(x + 2)(x - 2)(2x - 1)$

C.  $(2x + 1)(x + 2)(x - 2)$

D.  $(2x + 1)(x - 2)(x - 1)$

**Answer: C**



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**6. The factors of  $1 - (a^2 + b^2) + a^2b^2$  are :**

A.  $(1 + a)(1 - a)(1 + b^2)$

B.  $(1 + a^2)(1 + b^2)$

C.  $(1 + a^2)(1 - b)(1 + b)$

D.  $(1 - a)(1 + a)(1 - b)(1 + b)$

**Answer: D**



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7. Simplify, giving the answers in factors:  $(a+1)$

$(a-18)+(a-2)(a+15)$

A.  $2(a - 6)(a - 4)$



B.  $2(a - 6)(a + 4)$

C.  $2(a - 4)(a + 6)$

D.  $2(a + 6)(a + 4)$

**Answer: B**



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**8. The positive square root of**

$$\frac{(a + b)^2 - (c + d)^2}{(a + b)^2 - (c - d)^2} \times \frac{(a + b + c)^2 - d^2}{(a + b - c)^2 - d^2}$$

**using factorisation is:**

A.  $\frac{a + b + c + d}{a + b - c + d}$

B.  $\frac{a + b + c - d}{a + b + c + d}$

C.  $\frac{a + b - c + d}{a + b + c - d}$

D.  $\frac{a - b - c + d}{a + b + c + d}$

**Answer: A**



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9. One factor of  $x^3 - 7x + 6$  is  $x - 1$ . The other factors are :

A.  $(x - 3)(x + 2)$

B.  $(x + 3)(x - 2)$

C.  $(x - 3)(x - 2)$

D.  $(x + 3)(x + 2)$

**Answer: B**



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**10.**

**Factorise**

**:**

$$(m + a)(n - b) - (m + b)(n - a)$$

A.  $(a - b)(m - n)$

B.  $(a + b)(m - n)$

C.  $(a - b)(m + n)$

D.  $(a - b)(m - n)$

**Answer: C**



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