



MATHS

BOOKS - PEARSON IIT JEE FOUNDATION

POLYNOMIALS AND SQUARE ROOTS OF ALGEBRAIC EXPRESSIONS

Example

1. Add $7x^2 - 8x + 5$, $3x^2 - 8x + 5$ and $- 6x^2 + 15x - 5$



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2. Subtract $11x^3 - 7x^2 + 10x$ from $16x^3 + 4x^2 - 11x$



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3. Multiply $(5x^2 - 8x + 7)$ with $(2x - 5)$



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4. Divide $18x^4 - 15x^3 + 24x^2 + 9x$ by $3x$



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5. Divide $4x^2 + 7x - 15$ by $x + 3$



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6. Divide $2x^2 + 9x^2 + 4x - 15$ by $2x + 5$



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7. Divide $27x^3 - 81x^2 + 45x + 23$ by $(x - 2)$



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8. Factorize $81x^2 - 225y^2$

A. $(9x + 15y)(9x + 15y)$

B. $(9x + 15y)(9x - 15y)$

C. $(x + 15y)(x - 15y)$

D. $(9x + y)(9x - y)$

Answer: B



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9. (a) Factorize $a^2 - (b - 8)a - 8b$



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10. (b) Factorize $4x^3 - 10y^3 - 8x^2y + 5xy^2$



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11. Factorize $49x^2 + 9y^2 + 42xy$



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12. Factorize $16x^2 + \frac{1}{16x^2} - 2$



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13. (a) Factorize $x^2 + 25x + 144$



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14. (b) Factorize $x^2 - 8x + 15$



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15. (c) Factorize $x^2 - 5x - 14$

A. $= (x + 5)(x - 4)$

B. $= (x + 7)(x - 2)$

C. $= (x + 2)(x - 7)$

D. $= (x + 2)(x - 4)$

Answer: C



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16. (a) $6x^2 + 19x + 15$



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17. (b) Factorize $7 - 17x - 12x^2$



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18. (a) Factorize $27a^3 + 125x^3$

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19. (b) Factorize $216x^3 - 64y^3$

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20. (a) Find the HCF of $48x^5y^2$ and $112x^3y$

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21. (b) Find the HCF of $51x^2(x + 3)^3(x - 2)^2$ and $34x(x - 1)^5(x - 2)^3$

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22. (a) Find the LCM of $18x^3y^2$ and $45x^5y^2z^3$



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23. (b) Find the LCM of $51x^2(x + 3)^3(x - 2)^2$ and $34x(x - 1)^5(x - 2)^3$



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24. Find the square root of $1296b^4$



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25. Find the square root of $\frac{81b^2a^4}{36x^2y^6}$



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26. Find the square root of $x^2 + 12xy + 36y^2$



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27. Find the square root of $a^2x^2 - 2ayx^2 + x^2y^2$



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28. (a) Find the square root of
 $(x^2 - 8x + 15)(2x^2 - 11x + 5)(2x^2 - 7x + 3)$



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29. find the square root of $(x - 1)(x - 2)(x - 3)(x - 4) + 1$ by factorization method



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30. Find the square root of $x^2 - 18x + 81$



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31. Find the square root of $4x^6 - 12x^5 + 9x^4 + 8x^3 - 12x^2 + 4$



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32. Find the square root of $x^4 + 4x^3 + 10x^2 + 12x + 9$.



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33. (b) Find the square root of $4x^4 - 4x^3 + 5x^2 - 2x + 1$



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34. Find the remainder when $x^3 - 8x^2 + 5x + 1$ is divided by $x - 1$

A. -1

B. -2

C. -3

D. -4

Answer: A



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35. Find the remainder when $x^2 - 8x + 6$ is divided by $2x - 1$



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36. (a) Is $x - 2$ a factor of $x^3 + x^2 - 4x - 4$?



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37. (b) Find the value of m, if $x + 2$ is a factor of $x^3 - 4x^2 + 3x - 5m$



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38. (c) Factorize $x^3 - 2x^2 - 5x + 6$

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39. Factorize $x^4 - x^3 - 11x^2 + 9x + 18$

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40. Consider the expressions given below and find if the expressions are symmetric or not

(a) $ax + ay + b$

(b) $ax^2 + bxy + ay^2$

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41. Factorise $a(b^3 - c^3) + b(c^3 - a^3) + c(a^3 - b^3)$



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Very Short Answer Type Question

1. $11x^2 - 88x^3 + 14x^4$ is called a _____ polynomial



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2. The degree of the polynomial $7x^3y^{10}z^2$ is _____

A. 3

B. 2

C. 15

D. none

Answer: C



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3. The expression is a polynomial. (True/False)



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4. If $A = 3x^2 + 5x - 3$ and $B = 5x^2 - 7$, then $2A - B$ is _____



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5. If $a+b+c=0$, then $a^3 + b^3 + c^3$ is equal to



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6. Factors of $x^6 - y^6$ is _____



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7. The LCM of $\sqrt{2}x$, $\sqrt{8}x^7y^2$ is _____



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8. The HCF of $44a^3$ and $66b^p a^4$ is $22a^3$, then p can be _____



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9. One of the factor of $x^3 - x^2 + x - 1$ is _____



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10. The quotient of $8x^3 - 7x^2 + 5x + 8$ when divided by $2x$ is _____



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11. The remainder obtained when $80x^3 + 55x^2 + 20x + 172$ is divided by $x + 2$ is _____



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12. Factorize $6x^2 + x - 2$



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13. Find the LCM and HCF of the polynomials $15x^2y^3z$, $3x^3yz^2$



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14. Find the remainder when x^{15} is divided by $x - 2$



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15. Find the remainder if $x^5 - 3x^3 + 5x + 1$ is divided by $2x - 1$



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16. $\sqrt{a + b - 2\sqrt{ab}}$ is ___ where $\sqrt{a} > \sqrt{b}$



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17. The product of two symmetric expressions is a/an ___ expression



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18. The square root of $a^{m^2} \cdot b^{n^2}$ is ___



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19. The value of a if $x^3 - 8x^2 + 2x + a$ is divisible by $x - 2$ is ___



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20. Factorize $a^5b - ab^5$



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21. The degree of a polynomial A is 7 and that of polynomial AB is 65, then find the degree of polynomial B



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22. If $A = x^3$, $B = 4x^2 + x - 1$, then find AB



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23. Factorize $m^7 + m^4$



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24. Factorize $\frac{1}{6}a^2 - a + \frac{4}{3}$



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25. If $3x^2 + 8ax + 3$ is a perfect square, then find the value of a



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26. The factors of $a^3 + b^3 + c^3 - 3abc$ are ____



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27. The HCF of $(a^2 + 1)(a + 11)$ and $(a^2 + 1)^2(a + 11)^2$ is ____



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28. The value of $81^3 - 100^3 + 19^3$ is ____



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29. If $A = 4x^3 - 8x^2$, $B = 7x^3 - 5x + 3$ and $C = 3x^3 + x - 11$, then find $(A + C) - B$



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30. $8x^2 + 11xy + bt^2$ is a symmetric expression, then $b = \underline{\hspace{2cm}}$



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Short Answer Type Question

1. The HCF of $(a - 1)(a^3 + m)$ and $(a + 1)(a^3 - n)$ and $(a + 1)(a^2 - n)$ is $a^2 - 1$, then the value of m and n are $\underline{\hspace{2cm}}$



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2. Expand $\pi a^2(b + c)$



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3. The factors of $(a - b)^3 + (b - c)^3 + (c - a)^3$ is ____



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4. Expand $\Sigma c^2(a^2 - b^2)$



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5. If $A = 4x^3 - 8x^2$, $B = 7x^3 - 5x + 3$ and $C = 3x^3 + x - 11$, then
find $2A - 3B + 4C$



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6. If $A = x^3$, $B = 4x^2 + x - 1$, $C = x + 1$, then find $(A - B)(A - C)$



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7. Find the quotient and remainder when $x^4 + 4x^3 - 31x^2 - 94x + 120$ is divided by $x^2 + 3x - 4$



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8. Factorize $a^3 + \frac{3ax}{8} + \frac{x^3}{64} - \frac{1}{8}$



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9. Find the LCM and HCF of the following polynomials

$36(x + 2)^2(x - 1)^3(x + 3)^5$, $45(x + 2)^5(x - 1)^2(x + 3)^5$ and $63(x - 1)^5(x + 2)^3$



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10. The LCM of the polynomials $(x^2 + x - 2)(x^2 + x - a)$ and $(x^2 + x - b)(x^2 + 5x + a)$ is $(x - 1)(x^2 + 3x + 2)(x^2 + 4x + b)$, then find the values of a and b



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11. Find the remainder when x^{23} is divided by $x^2 - 3x + 2$



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12. If $lmx^2 + mnx + ln$ is a perfect square then prove that, $4l^2 = mn$



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13. Find the value of $\sqrt{(a + b + c)^2 + (a + b + c)^2 + 2(c^2 - a^2 - b^2 - 2ab)}$



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14. If $\sqrt{\frac{125a^6b^4c^2}{5a^4b^2}} = x$, then find $\frac{x^2}{abc}$



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15. Find the square root of $(x^2 + 6x + 8)(x^2 + 5x + 6)(x^2 + 7x + 12)$



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Essay Type Questions

1. Factorize $6x^4 - 5x^3 - 38x^2 - 5x + 6$



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2. For what values of p and q, the expression, $x^4 - 14x^3 + 71x^2 + px + q$ is a perfect square ?



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3. Divide $20x^3 + 87x^2 + 96x + 48$ by $x+3$



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4. Find the quadratic polynomial when divided by x , $x - 1$ and $x - 2$ leaves remainders 1, 2 and 9 respectively

A. $3x^2 - 2x + 1$

B. $4x^2 - 2x + 1$

C. $6x^2 - 2x + 1$

D. $8x^2 - 2x + 1$

Answer: A



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5. Find the factors of $a^2(b + c) + b^2(c + a) + c^2(a + b) + 2abc$



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Level 1

1. If the degree of a polynomial AB is 15 and the degree of polynomial B is 5, then the degree of polynomial A is

A. 3

B. 8

C. 4

D. 10

Answer: D



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2. The expression $21x^2 + 11x - 2$ equals to

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

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

C. $(7x - 1)(3x - 2)$

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

Answer: D



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3. If the LCM and HCF of two polynomials are $90m^5a^6b^3x^2$ and m^3a^5 respectively and also one of the monomial is $18m^5a^6x^2$, then the other monomial is

A. $5m^3a^5b^3$

B. $15m^5a^3b^2$

C. $5m^5a^3b^5$

D. $15m^3a^5b^4$

Answer: A



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4. The remainder when $x^3 - 3x^2 + 5x - 1$ is divided by $x + 1$ is ___

A. -8

B. -12

C. -10

D. -9

Answer: C



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5. Which of the following is a homogeneous expression?

A. $4x^2 - 5xy + 5x^2y + 10y^2$

B. $5x + 10y + 100$

C. $14x^3 + 15x^2y + 16y^2x + 24y^3$

D. $x^2 + y^2 + x + y + 1$

Answer: C



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6. $\Sigma x(y^3 - z^3) = \underline{\hspace{2cm}}$

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

B. $(x - y)(y - z)(x - z)(x - y - z)$

C. $(x + y)(y + z)(z + x)(x + y + z)$

D. $(x + y)(y + z)(z + z)(z - y - z)$

Answer: A



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7. The remainder when $f(x) = 4x^3 - 3x^2 + 2x - 1$ is divided by $2x + 1$ is ____

A. 1

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

C. $\frac{-13}{4}$

D. $\frac{-7}{4}$

Answer: C



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8. The HCF of the polynomials $12a^3b^4c^2$, $18a^4b^3c^3$ and $24a^6b^2c^4$ is ____

A. $12a^3b^2c^2$

B. $6a^6b^4c^4$

C. $6a^3b^2c^2$

D. $48a^6b^4c^4$

Answer: C



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9. Find the value of a, if $(x + 2)$ is a factor of the polynomial

$$f(x) = x^3 + 13x^2 + ax + 20$$

A. -15

B. 20

C. 25

D. 32

Answer: D



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10. The polynomial $x^3 - 4x^2 + x - 4$ on factorization gives

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

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

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

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

Answer: D



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11. If the expression $ax^3 + 2x^2y - bxy^2 - 2y^3$ is symmetric, then $(a,b) =$

A. $(2, 2)$

B. $(-2, 2)$

C. $(-2, -2)$

D. $(2, -2)$

Answer: C



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12. The square root of $y^2 + \frac{1}{y^2} + 2$ is

- A. $y + \frac{1}{y}$
- B. $y - \frac{1}{y}$
- C. $y^2 + \frac{1}{y^2}$
- D. $y^2 - \frac{1}{y^2}$

Answer: A



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13. The product of the polynomials $2x^3 - 3x^2 + 6$ and $x^2 - x$ is ___

- A. $2x^6 - 5x^4 + 3x^3 + 6x^2 - 6x$

B. $2x^5 - x^4 + 3x^3 - 6x^2 + 6x$

C. $2x^5 - 5x^4 + 3x^3 + 6x^2 - 6x$

D. None of these

Answer: C



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14. The LCM of $x^2 - 16$ and $2x^2 - 9x + 4$ is

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

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

C. $2(1 - 2x)(x + 4)(x - 4)$

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

Answer: D



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15.

If

$$P = 3x^3 - 5x + 9, Q = 4x^3 + 5x^2 - 11 \text{ and } R = 5x^3 + 4x^2 - 3x + 7$$

, then $P - 2Q + R$ is

A. $2(3x^2 + 4x - 19)$

B. $-6x^2 - 5x + 38$

C. $-2(3x^2 + 4x + 19)$

D. $-2(3x^2 + 4x - 19)$

Answer: D



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16. If $g(x) = 3a^x + 7a^2b - 13ab^2 + 9b^y$ is a homogeneous expression in

terms of a and b, then the values of x and y respectively are __

A. 2, 2

B. 2, 1

C. 3, 2

D. 3, 3

Answer: D



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17. The polynomial $11a^2 - 12\sqrt{2}a + 2$ on factorization gives

A. $(11a + \sqrt{2})(a - \sqrt{2})$

B. $(a - \sqrt{2})(11a - \sqrt{2})$

C. $(a + 11)(a + \sqrt{2})$

D. $(11a - \sqrt{2})(a + \sqrt{2})$

Answer: B



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18. If $x^n + 1$ is divisible by $x + 1$, n must be

- A. any natural number
- B. an odd natural number
- C. an even natural number
- D. None of these

Answer: B



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19. What is the first degree expression to be subtracted from

$x^6 + 8x^4 + 2x^3 + 16x^2 + 4x + 5$ in order to make it a perfect square?

- (i) $-4x - 4$ (ii) $4x + 4$ (iii) $4x - 4$ (iv) $-4x + 4$

A. $-4x - 4$

B. $4x + 4$

C. $4x - 4$

D. $-4x + 4$

Answer: D



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20. Find the square root of $\frac{m^{n^2} n^{m^2} a^{(m+n)}}{(m+n)^{(m+n)^2}}$

A. $m^n n^m a^{\frac{m+n}{2}}$

B. $\frac{m^{\frac{n^2}{2}} n^{\frac{m^2}{2}} a^{\frac{m+n}{2}}}{(m+n)^{\frac{(m+n)^2}{2}}}$

C. $\frac{m^n n^m a^{\sqrt{m+n}}}{(m+n)^{(m+n)}}$

D. None of these

Answer: B



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21. What is the first degree expression to be added to $16x^6 + 8x^4 - 2x^3 + x^2 + 2x + 1$ in order to make it a perfect square?

A. $\frac{5}{2}x + \frac{15}{16}$

B. $-\frac{5}{2}x - \frac{15}{16}$

C. $-\frac{5}{2}x + \frac{15}{16}$

D. $+\frac{2}{2}x - \frac{15}{16}$

Answer: B



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22. Factorize the polynomial $8x^3 - \frac{1}{64}$

A. $\left(2x - \frac{1}{4}\right)\left(4x^2 - \frac{x}{2} + \frac{1}{16}\right)$

B. $\left(2x - \frac{1}{8}\right)\left(4x^2 + \frac{x}{2} - 16\right)$

C. $\left(2x - \frac{1}{4}\right)\left(4x^2 + \frac{1}{16} + \frac{x}{2}\right)$

D. $\left(2x - \frac{1}{4}\right)\left(4x^2 + \frac{x}{2} - 16\right)$

Answer: C



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23. The product of polynomials $3x^3 - 4x^2 + 7$ and $x^2 + 1$ is

A. $3x^5 - 4x^4 + 3x^3 + 3x^2 + 7$

B. $x^5 + 4x^2 - 2x + 3$

C. $3x^5 - 4x^4 - 3x^3 + 4x + 8$

D. $3x^5 - 5x^4 + 8x^2 + 2x + 1$

Answer: A



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24. The LCM and HCF of two monomials is $60x^4y^5a^6b^6$ and $5x^2y^3$ respectively. If one of the two monomials is $15x^4y^3a^6$, then the other monomial is

A. $12x^2y^3a^6b^6$

B. $20x^4y^5b^6$

C. $20x^2y^5b^6$

D. $15x^2y^5b^6$

Answer: C



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25. Which of the following is a factor of the polynomial

$$f(x) = 2x^3 - 5x^2 + x + 2?$$

A. $x + 1$

B. $x + 2$

C. $2x + 1$

D. $2x - 1$

Answer: C



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26. If $3x - 1$ is a factor of the polynomial $81x^3 - 45x^2 + 3a - 6$, then a is

A. $\frac{8}{3}$

B. $\frac{-7}{3}$

C. $\frac{-10}{3}$

D. $\frac{11}{3}$

Answer: A



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27. If $A = 4x^3 - 5x + 7$, $B = 2x^3 - x^2 + 3$ and $C = 5x^3 - 8x^2 + 10$, then $A - 2B - C$ is

A. $5x^3 - 2x^2 + x + 4$

B. $-5x^3 + 10x^2 - 5x - 9$

C. $x^3 + 10x^2 - 5x + 9$

D. $5x^3 - 8x^2 + x - 1$

Answer: B



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28. The square root of $x^{m^2 - n^2} \cdot x^{n^2 + 2mn} \cdot x^{n^2}$ is

A. x^{m+n}

B. $x^{(m+n)^2}$

C. $x^{(m+n)/2}$

D. $x^{\frac{1}{2}(m+n)^2}$

Answer: D



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29. $x^{831} + y^{831}$ is always divisible by

- A. $x - y$
- B. $x^2 + y^2$
- C. $x + y$
- D. None of these

Answer: C



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30. If $(x + 1)(x + 2)(x + 3)(x + k) + 1$ is a perfect square, then the

value of k is

- A. 4
- B. 5
- C. 6
- D. 7

Answer: A



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Level 2

1. If $A = 6x^4 + 5x^3 - 14x^2 + 2x + 2$ and $B = 3x^2 - 2x - 1$, then the remainder when $A \div B$ is

A. $5x+2$

B. $2x+3$

C. $3x+2$

D. $4x+3$

Answer: A



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2. The polynomial $x^5 - a^2x^3 - x^2y^3 + a^2y^3$ on factorization gives

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

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

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

D. None of these

Answer: A



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3. The HCF of the polynomials $x^4 + 6x^2 + 25$ and $x^3 - 3x^2 + 7x - 5$ is



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4. The HCF of the polynomials

$(2x - 1)(5x^2 - ax + 3)$ and $(x - 3)(2x^2 + x + b)$ is $(2x - 1)(x - 3)$

Then the values of a and b respectively are _____

A. 16, - 1

B. - 16, 1

C. - 16, - 1

D. 16, 1

Answer: A



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5. The remainder when x^{45} is divided by $x^2 - 1$ is

A. $2x$

B. $-x$

C. 0

D. x

Answer: D



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6. Factorize $\sum_{a,b,c} a^2(b^4 - c^4)$

- A. $(a - b)^2(b - c)^2(c - a)^2$
- B. $(a - b)(a + b)(b - c)(b + c)(c - a)(c + a)$
- C. $(a + b)^2(b + c)^2(c + a)^2$
- D. None of these

Answer: B



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7. The polynomial $6y^4 - 19y^3 - 23y^2 + 10y + 8$ on factorization gives

- A. $(y + 1)(y - 4)(3y + 2)(2y + 1)$
- B. $(y + 1)(y - 4)(3y - 2)(2y - 1)$
- C. $(y + 1)(y - 4)(3y - 2)(2y + 1)$

D. $(y + 1)(y - 4)(3y + 2)(2y - 1)$

Answer: C



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8. If the LCM of the polynomials $(y - 3)^a(2y + 1)^b(y + 13)^7$ and $(y - 3)^4(2y + 1)^9(y + 13)^c$ is $(y - 3)^6(2y + 1)^{10}(y + 13)^7$, then the least value of $a + b + c$ is

A. 23

B. 3

C. 10

D. 16

Answer: D



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9. The LCM of the polynomials

$195(x + 3)^2(x - 2)(x + 1)^2$ and $221(x + 1)^3(x - 2)(x + 4)$ is ___

A. $211(x + 3)^2(x + 1)^2(x - 2)(x - 14)$

B. $13(x + 3)(x + 1)^2$

C. $3315(x + 3)^2(x + 1)^3(x - 2)(x + 4)$

D. None of these

Answer: C



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10. For what value of k the HCF of

$x^2 + x + (5k - 1)$ and $x^2 - 6x + (3k + 11)$ is $(x - 2)$?

A. 2

B. 2

C. -2

Answer: D**Watch Video Solution**

11. The HCF of the polynomials $9(x + a)^p(x - b)^q(x + c)^r$ and $12(x + a)^{p+3}(x - b)^{q-3}(x + c)^{r+2}$ is 3(\dots), then the value of $p + q - r$ is

A. 21

B. 9

C. 15

D. 6

Answer: B**Watch Video Solution**

12. The remainders obtained when the polynomial $x^3 + x^2 - 9x - 9$ is divided by x , $x + 1$ and $x + 2$ respectively are ____

A. $-9, 0, -15$

B. $-9, -16, 5$

C. $0, 0, 5$

D. $-9, 0, 5$

Answer: D



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13. Let a, b, c belong to R and $a \neq b \neq c$ then find the value of

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

A. 3

B. 0

C. 1

D. 2

Answer: A



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14. Find the square root of the expression

$$\frac{1}{xyz} (x^2 + y^2 + z^2) + 2 \left(\frac{1}{x} + \frac{1}{y} + \frac{1}{z} \right)$$

A. $\frac{x + y + z}{xyz}$

B. $\sqrt{\frac{yz}{x}} + \sqrt{\frac{zx}{y}} + \sqrt{\frac{xy}{z}}$

C. $\sqrt{x} + \sqrt{y} + \sqrt{z}$

D. $\sqrt{\frac{x}{yz}} + \sqrt{\frac{y}{xz}} + \sqrt{\frac{z}{xy}}$

Answer: D



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15. Factorize the expression $9x^4 + \frac{1}{x^4} + 2$

- A. $\left(3x^2 - \frac{1}{x^2} + 2\right)\left(3x^2 + \frac{1}{x^2} + 2\right)$
- B. $\left(3x^2 - \frac{1}{x^2} - 2\right)\left(3x^2 + \frac{1}{x^2} + 2\right)$
- C. $\left(3x^2 - \frac{1}{x^2} + 2\right)\left(3x^2 - \frac{1}{x^2} + 2\right)$
- D. $\left(3x^2 + \frac{1}{x^2} + 2\right)\left(3x^2 + \frac{1}{x^2} - 2\right)$

Answer: D



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16. The following are the steps involved in factorizing $64x^6 - y^6$. Arrange them in sequential order

- (A) $\left\{(2x)^3 + y^3\right\}\left\{(2x)^3 - y^3\right\}$
- (B) $(8x^3)^2 - (y^3)^2$
- (C) $(8x^3 + y^3)(8x^3 - y^3)$
- (D) $(2x + y)(4x^2 - 2xy + y^2)(2x - y)(4x^2 + 2xy + y^2)$

A. BADC

B. BDAC

C. BCAD

D. BACD

Answer: C



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17. If $a + b + c = 0$, show that $a^3 + b^3 + c^3 = 3abc$

The following are the steps involved in showing the above result. Arrange them in sequential order

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

(B) $(a + b)^3 = (-c)^3$

(C) $a + b + c = 0 \Rightarrow a + b = -c$

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

(E) $a^3 + b^3 + c^2 = 3abc$

A. ABDCE

B. BCDAE

C. CBDAE

D. CADBE

Answer: C



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18. If the HCF of $8x^3y^a$ and $12x^b y^2$ is $4x^a y^b$ find the maximum value of $a + b$

A. 2

B. 4

C. 6

D. Cannot be determined

Answer: B



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19. The polynomial $5x^5 - 3x^3 + 2x^2 - k$ gives a remainder 1, when divided by $x + 1$. Find the value of k

A. 5

B. -1

C. 2

D. 1

Answer: B



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20. Factorize : $a^3 + b^3 + 3ab - 1$

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

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

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

D. None of these

Answer: A



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21. If f and g are two polynomials of degrees 3 and 4 respectively, then what is the degree of $f - g$?

A. 1

B. 3

C. 4

D. Cannot be determined

Answer: C



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22. Find the square root of $\frac{x^2}{9} + \frac{9}{4x^2} - \frac{x}{3} - \frac{3}{2x} + \frac{5}{4}$

A. $\frac{2x}{3} + \frac{3}{2x} - \frac{1}{2}$

B. $\frac{x}{3} - \frac{3}{2x} + 1$

C. $\frac{3}{x} + \frac{2}{3x} - \frac{1}{2}$

D. $\frac{x}{3} + \frac{3}{2x} - \frac{1}{2}$

Answer: D



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23. The square root of $(xy + xz - yz)^2 - 4xyz(x - y)$ is _____

A. $xy + yz - 2xyz$

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

C. $(xy + 3 - y)$

D. $(xy + yz - zx)$

Answer: D



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$$24. \left(\sum_{x,y,z} (x+1)^2 \right) - \left(\sum_{x,y,z} (x) \right)^2 - 3 = \underline{\hspace{2cm}}$$

A. $2 \left[\sum_{x,y,z} x - \sum_{x,y,z} xy \right]$

B. $3 \left[\sum_{x,y,z} x^2 - \sum_{x,y,z} x \right]$

C. $2 \left[\sum_{x,y,z} xy - \sum_{x,y,z} x^2 \right]$

D. $3 \left[\sum_{x,y,z} x^2 - \sum_{x,y,z} x \right]$

Answer: A



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$$25. \left(\sum_{x,y,z} x \right)^2 - \left(\sum_{x,y,z} x^2 \right) = \underline{\hspace{2cm}}$$

- A. $\sum_{x,y,z} x$
- B. $2\left(\sum_{x,y,z} xy\right)$
- C. $\pi \sum_{x,y,z} xy$
- D. $2\left(\sum_{x,y,z} x + y\right)$

Answer: B



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Level 3

1. If $\sqrt{4x^4 + 12x^3 + 25x^2 + 24x + 16} = ax^2 + bx + c$, then which of the following is true?

A. $2b = a - c$

B. $2a = b + c$

C. $2b = a + c$

D. $2b = c - a$

Answer: C



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2. Find the square root of the algebraic expression which is the average of the following expressions $x^2 + \frac{1}{x^2}$, $-2\left(x - \frac{1}{x}\right)$ and -1

A. $\frac{x}{\sqrt{3}} - \frac{1}{\sqrt{3}} + \frac{1}{x}$

B. $\frac{x}{\sqrt{3}} + 1 + x$

C. $\frac{1}{\sqrt{3}}\left(x - 1 - \frac{1}{x}\right)$

D. None of these

Answer: C



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3. If the each of algebraic expressions

$lx^2 + mx + n$, $mx^2 + nx + l$ and $nx^2 + lx + m$ are perfect squares,

then $\frac{l+m}{n} = \text{_____}$

A. -4

B. 6

C. -8

D. None of these

Answer: A



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4. Which of the following is to be added to make

$x^6 - 6x^4 + 4x^3 + 8x^2 - 10x + 3$ a perfect square?

A. $(x - 1)^2$

B. $(x - 2)^2$

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

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

Answer: A



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5. Resolve into factors : $\left(\sum_{x,y,z} x \right)^3 - \sum_{x,y,z} x^3$

A. $(x + y)(y + z)(z + x)$

B. $-(x + y)(y + z)(z + x)$

C. $3(x + y)(y + z)(z + x)$

D. $-3(x + y)(y + z)(z + x)$

Answer: C



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6. Find the square root of $\frac{a^2}{4} + \frac{1}{a^2} - \frac{1}{a} + \frac{a}{2} - \frac{3}{4}$

A. $\frac{a}{2} - \frac{1}{a} + \frac{1}{2}$

B. $\frac{a}{2} + \frac{2}{a} - 1$

C. $\frac{a}{2} + \frac{1}{a} - \frac{1}{2}$

D. $\frac{a}{2} - \frac{2}{a} - \frac{1}{2}$

Answer: A



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7. $\frac{(x+y)^3 + (x-y)^3}{2} - y(3x^2 + y^2) = \underline{\hspace{2cm}}$

A. $x^3 - y^3$

B. $(x-y)^3$

C. $2x^3 - 3x^2y$

D. $x^3 - 6xy^2$

Answer: B



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8. Find the square root of $(4a + 5b + 5c)^2 - (5a + 4b + 4c)^2 + 9a^2$

A. $\sqrt{3}(b + c)$

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

C. $3(b + c)$

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

Answer: C



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9. $\frac{(a - b)^3 - (a + b)^3}{2} + a(a^2 + 3b^2) = \underline{\hspace{2cm}}$

A. $a^3 - b^3$

B. $(a + b)^3$

C. $a^3 + b^3$

D. $(a - b)^3$

Answer: D



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10. The square root of $(3a + 2b + 3c)^2 - (2a + 3b + 2c)^2 + 5b^2$ is

A. $\sqrt{5}(a + b + c)$

B. $\sqrt{5}(a + b)$

C. $\sqrt{5}(a + c)$

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

Answer: C



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