RK TUITION CENTRE - KUMBAKONAM

10TH MATHEMATICS
ALGEBRA

25 X 1 = 25

1. A system of three linear equations in three variables is inconsistent if their planes
   (a) intersect only at point (b) intersect in a line (c) coincides with each other
   (d) do not intersect
2. The solution of the system $x + y - 3x = -6, -7y + 7z = 7, 3z = 9$ is
   (a) $x = 1, y = 2, z = 3$ (b) $x = -1, y = 2, z = 3$ (c) $x = -1, y = -2, z = 3$
   (d) $x = 1, y = 2, z = 3$
3. If $(x - 6)$ is the HCF of $x^2 - 2x - 4$ and $x^2 - kx - 6$ then the value of k is
   (a) 3 (b) 5 (c) 6 (d) 8
4. $\frac{3y-3}{y} \div \frac{7y-7}{3y^2}$ is
   (a) $\frac{9y}{7}$ (b) $\frac{9y^2}{(21y-21)}$ (c) $\frac{21y^2-42y+21}{3y^2}$ (d) $\frac{7(y^2-2y+1)}{y^2}$
5. $y^2 + \frac{1}{y^2}$ is not equal to
   (a) $\frac{y^2+1}{y^2}$ (b) $\left(y + \frac{1}{y}\right)^2$ (c) $\left(y - \frac{1}{y}\right)^2$ (d) $\left(y + \frac{1}{y}\right)^2 - 2$
6. $\frac{x}{x^2-25} - \frac{8}{x^2+6x+5}$ gives
   (a) $\frac{x^2-7x+40}{(x-5)(x+5)}$ (b) $\frac{x^2+7x+40}{(x-5)(x+5)(x+1)}$ (c) $\frac{x^2-7x+40}{(x^2-25)(x+1)}$ (d) $\frac{x^2+10}{(x^2-25)(x+1)}$
7. The square root of $\frac{256x^8y^4z^{10}}{25x^6y^6z^6}$ is equal to
   (a) $\frac{16}{5}\left|\frac{x^2z^4}{y^2}\right|$ (b) $16\left|\frac{y^2}{x^2z^2}\right|$ (c) $\frac{16}{5}\left|\frac{y}{xz^2}\right|$ (d) $\frac{16}{5}\left|\frac{xz^2}{y}\right|$
8. Which of the following should be added to make $x^4 + 64$ a perfect square
   (a) $4x^2$ (b) $16x^2$ (c) $8x^2$ (d) $-8x^2$
9. The solution of $(2x - 1)^2 = 9$ is equal to
   (a) -1 (b) 2 (c) $-1, 2$ (d) None of these
10. The values of a and b if $4x^4 - 24x^3 + 76x^2 + ax + b$ is a perfect square are
    (a) 100,200 (b) 10,12 (c) $-120, 100$ (d) 12,10
11. If the roots of the equation $q^2x^2 + p^2x + r^2 = 0$ are the square of the roots of the equation $qx^2 + px + r = 0$, then q, p, r are in _____
    (a) A.P. (b) G.P. (c) Both A.P. and G.P. (d) none of these
12. Graph of a linear polynomial is a
    (a) Straight line (b) circle (c) parabola (d) hyperbola
13. The number of points of intersection of the quadratic polynomial $x^2 + 4x + 4$ with axis is
    (a) 0 (b) 1 (c) 0 or 1 (d) 2
14. The HCF of two polynomials $p(x)$ and $q(x)$ is $2x(x + 2)$ and LCM is $24x(x + 2)^2(x - 2)$ if $p(x) = 8x^3 + 32x^2 + 32x$, then $q(x)$
    (a) $4x^3 - 16x$ (b) $6x^3 - 24x$ (c) $12x^3 + 24x$ (d) $12x^3 - 24x$
15. $\frac{x^2+7x+12}{x^2+8x+15} \times \frac{x^2+5x}{x^2+6x+8} =$ _____
    (a) $x + 2$ (b) $\frac{x}{x+2}$ (c) $\frac{35x^2+60x}{48x^2+120}$ (d) $\frac{1}{x+2}$

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16. The square root of $4m^2 - 24m + 36$ is
    (a) $4(m-3)$ (b) $2(m-3)$ (c) $(2m-3)^2$ (d) $(m-3)$
17. A quadratic polynomial whose one zero is 5 and sum of the zeroes is 0 given by
    (a) $x^2 - 25$ (b) $x^2 - 5$ (c) $x^2 - 5x$ (d) $x^2 - 5c + 5$
18. The value of x in $(x+2) + 2(x-1) = 4x - 3$
    (a) 2 (b) 3 (c) -2 (d) -3
19. If x men can do a piece of work in y days, in how many days will z men do the iame work?
    (a) $\frac{xz}{y}$ (b) $\frac{xy}{z}$ (c) $\frac{yz}{x}$ (d) xyz
20. The solution of $x^2 - 25 = 0$ is
    (a) No real roots (b) real and equal roots (c) real and unequal roots
    (d) Imaginary roots
21. The GCD of two numbers is 36 and their LCM is 648. The product of two numbers is
    (a) 23328 (b) 648 (c) 3888 (d) 23348
22. The GCD of $10(x^2 + x - 20), 15(x^2 - 3x - 4)$ and $20(x^2 + 2x + 1)$ is
    (a) $5(x-4)$ (b) 5 (c) $5(x+1)$ (d) $5(x+1)(x-1)$
23. The LCM of $a^2 + 3a + 2, a^2 + 5a + 6$ and $a^2 + 4a + 4$ is
    (a) $(a+2)^2(a+3)$ (b) $(a+2)^2(a+1)$ (c) $(a+2)^2(a+1)(a+1)$
    (d) $(a+3)(a+2)(a+1)$
24. How many times 5 bells ring together in 1 hour if they start together and ring at intervals of 2,3,4,5 and 6 sec respectively?
    (a) 71 times (b) 60 times (c) 59 times (d) 61 times
25. GCD of $6x^2y, 9x^2yz, 12x^2y^2z$ is
    (a) $36xy^2z^2$ (b) $36x^2y^2z$ (c) $36x^2y^2z^2$ (d) $3x^2y$

30 X 2 = 60

26. Solve : $2x - 3y = 6, x + y = 1$.
27. Find the LCM and GCD for the following and verify that $(x) \times g(x) = LCM \times GCD\ 21x^2y, 35xy^2$.
28. Reduce each of the following rational expressions to its lowest form.
    $\frac{x^2-1}{x^2+x}$.
29. Simplify : $\frac{1}{x^2-5x+6} + \frac{1}{x^2-3x+2} - \frac{1}{x^2-8x+15}$.
30. Simplify : $\frac{x(x+1)}{x-2} + \frac{x(1-x)}{x-2}$.
31. Find the square root of the following expressions.
    $256(x-a)^2(x-b)^4(x-c)^{16}(x-d)^{20}$
32. Find the square root of the following.
    $4x^2 + 20x + 25$
33. Write down the quadratic equation in general form for which sum and product of the roots are given below.
    9,14
34. Find the sum and product of the roots for each of the following quadratic equations:
    $x^2 + 8x - 65 = 0$
35. Solve : $2x^2 - 2\sqrt{6x} + 3 = 0$.
36. Solve: $x^4 - 13x^2 + 42 = 0$

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37. Solve : $x^2 - 3x - 2 = 0$.
38. Determine the nature of roots for the following quadratic equations $x^2 - x - 20 = 0$.
39. Find the values of $'k'$ for which the quadratic equation $kx^2 - (8k + 4) + 81 = 0$ has real and equal roots?
40. Determine the nature of the roots for the following quadratic equations $15^2 + 11x + 2 = 0$
41. Find the values of $'k'$ for which of the roots of the following equations are real and equal.
    $(5k - 6)x^2 + 2kx + 1 = 0$
42. If α, β are the roots of the equation $3x^2 + 7x - 2 = 0$ find the values of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$
43. If α, β are the roots of $7x^2 + ax + 2 = 0$ and $\beta - \alpha = \frac{-13}{7}$. Find the values of a.
44. If one root of the equation $2y^2 - ay + 64 = 0$ is twice the other then find the values of a.
45. If one root of the equation $3x^2 + kx + 81 = 0$ (having real roots) is the square of the other then find k.
46. Find the LCM and GCD for the following and verify that $f(x) \times g(x) = LCM \times GCD$
    $(x^2 - 1)(x + 1), (x^3 + 1)$
47. Find the LCM and GCD for the following and verify that $f(x) \times g(x) = LCM \times GCD$
    $(x^2y + xy^2), (x^2 + xy)$
48. Reduce each of the following rational expressions to its lowest form.
    $\frac{9x^2+81x}{x^2+8x^2-9x}$
49. Find : $\frac{x^2-16}{x+1} \div \frac{x-4}{x+4}$
50. Find the square root of the following expressions
    $\frac{144a^8b^{12}c^{16}}{81f^{32}g^4h^{14}}$
51. Find the square root of $1 + \frac{1}{x^6} + \frac{2}{x^3}$
52. Find the square root of the following
    $(4x^2 - 9x + 2)(7x^2 - 13x - 2)(28x^2 - 3x - 1)$
53. Writ down the quadratic equation in general form for which sum and product of roots are given below.
    $-\frac{3}{5}, -\frac{1}{2}$
54. Solve the following quadratic equations by factorization method
    $3(p^2 - 6) = p(p + 5)$
55. Solve the following quadratic equations by factorization method
    $\sqrt{a(a - 7)} = 3\sqrt{2}$

30 X 5 = 150

56. Solve : $\frac{1}{3}(x + y - 5) = y - z = 2x - 11 = 9 - (x + 2x)$
57. In a three-digit number, when the tens and the hundreds digit are interchanged the new number is 54 more than three times the original number. If 198 is added to the number, the digits are reversed. The tens digit exceeds the hundreds digit by twice as that of the tens digit exceeds the unit digit. Find the original number.
58. Find the GCD of the following by division algorithm
    $2x^4 + 13x^3 + 27x + 7, x^3 + 3x^2 + 3x + 1, x^2 + 2x + 1$

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59. Find the square root of $289x^4 - 612x^3 + 970x^2 - 684x + 361$
60. Is it possible to design a rectangular park of perimeter $320m$ and area $4800m2$? If so find its length and breadth.
61. If α and β are the roots of the polynomial $f(x) = x^2 - 2x + 3$, find the polynomial whose roots are $\alpha + 2, \beta + 2$
62. The father's age is six times his son's age. Six years hence the age of father will be four times his son's age. Find the present ages (in years) of the son and father.
63. Solve the following system of linear equations in three variables $3x - 2y + z = 2$, $2x + 3y - x = 5$, $x + y + z = 6$.
64. Solve : $\frac{1}{2x} + \frac{1}{4y} - \frac{1}{3x} = \frac{1}{4}; \frac{1}{x} = \frac{1}{3y}; \frac{1}{x} - \frac{1}{5y} + \frac{4}{z} = 2\frac{2}{15}$
65. Find the GCD of $6x^3 - 30x^2 + 60x - 48$ and $3x^3 - 12x^2 + 21x - 18$.
66. Given the LCM and GCD of the two polynomials $p(x)$ and $q(x)$ find the unknown polynomial in the following table

S.No.	LCM	GCD	$p(x)$	$q(x)$
(i)	$a^3 - 10a^2 + 11a + 70$	$a - 7$	$a^2 - 12a + 35$	
(ii)	$(x^2 + y^2)(x^4 + x^2y^2 + y^4)(x^2 - y^2)$			$(x^4 - y^4)(x^2 + y^2 - xy)$

67. If $x = \frac{a^2+3a-4}{3a^2-3}$ and $y = \frac{a^2+2a-8}{2a^2-2a-4}$ find the value of x^2y^2
68. Which rational expression should be subtracted from $\frac{x^2+6x+8}{x^8+8}$ to get $\frac{3}{x^2-2x+4}$
69. If $A = \frac{2x+1}{2x-1}, B = \frac{2x-1}{2x+1}$ find $\frac{1}{A-B} - \frac{2B}{A^2-B^2}$
70. If $A = \frac{x}{x+1}, B = \frac{1}{x+1}$, prove that $\frac{(A+B)^2+(A-B)^2}{A+B} = \frac{2(x^2+1)}{x(x+1)^2}$
71. Find the square root of the following expressions
$16x^2 + 9y^2 - 24xy + 24x - 18y + 9$
72. Find the square roots of the expression $\frac{4x^2}{y^2} + \frac{20x}{y} + 13 - \frac{30y}{x} + \frac{9y^2}{x^2}$
73. If $9x^4 + 12x^3 + 28x^2 + ax + b$ is a perfect square, find the values of a and b.
74. Find the square root of the expression $\frac{x^2}{y^2} - \frac{10x}{y} + 27 - \frac{10y}{x} + \frac{y^2}{x^2}$
75. Find the values of a and b if the following polynomials are perfect squares
$4x^4 - 12x^3 + 37x^2 + bx + a$
76. Solve : $\frac{x}{x-1} + \frac{x-1}{x} = 2\frac{1}{2}$
77. Solve : $pqx^2 - (p+q)^2x + (p+q)^2 = 0$
78. A ladder 17 feet long is leaning against a wall. If the ladder, vertical wall and the floor from the bottom of the wall to the ladder from a right triangle, find the height of the wall where the top of the ladder meets if the distance between bottom of the wall to bottom of the ladder is 7 feet less than the height of the wall?
79. A passenger train takes 1hr more than an express train to travel a distance of 240 km from Chennai to Virudhachalam. The speed of passenger train is less than that of an express train by 20 km per hour. Find the average speed of both the trains.
80. If the difference between a number and its reciprocal is $\frac{24}{5}$, find the number.
81. A bus covers a distance of $90km$ at a uniform speed. Had the speed been 15 $km/hour$ more it would have taken 30 minutes less for the journey. Find the original speed of the bus.

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82. A girl is twice as old as her sister. Five years hence, the product of their ages (in years) will be 375. Find their present ages.
83. From a group of $2x^2$ black bees, square root of half of the group went to a tree. Again eight-ninth of the bees went to the same tree. The remaining two got caught up in a fragrant lotus. How many bees were there in total?
84. If the roots of $(a-b)x^2+(b-c)x+(c-a)=0$ are real and equal, then prove that b, a, c are in arithmetic progression.
85. If a, b are real then show that the roots of the equation $(a-b)x^2-6(a+b)x-9(a-b)=0$ are real and unequal.

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