KD EDUCATION ACADEMY [9582701166] Street no. 21 A-1 block Bengali colony sant nagar burari delhi -110084

Time : 6 hour	**STD 9 Maths** kd sir 90+ Question ch-1 Number system	Total Marks : 270

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* Choose the right answer from the given options. [1 Marks Each] **[81]**

1. On simplification, the expression $\frac{5^{n+2}-6\times 5^{n+1}}{13\times 5^n - 2\times 5^{n+1}}$ equals:

   (A) $\frac{5}{3}$ (B) $-\frac{5}{3}$ (C) $\frac{3}{5}$ (D) $-\frac{3}{5}$

2. The sum of rational and an irrational number:

   (A) Repeating number.   (B) Is always irrational.   (C) Is always rational.   (D) Fraction number.

3. If $\sqrt{13-a\sqrt{10}} = \sqrt{8}+\sqrt{5}$, then a =

   (A) -5   (B) -6   (C) -4   (D) -2

4. If a, b, c are positive real numbers, then $\sqrt[5]{3125a^{10}b^5c^{10}}$ is equal to:

   (A) $5a^2bc^2$ (B) $25ab^2c$ (C) $5a^3bc^3$ (D) $125a^2bc^2$

5. The value of $\sqrt[4]{\sqrt[3]{2^2}}$ is:

   (A) $2^{\frac{1}{6}}$ (B) 2^6 (C) 2^{-6} (D) $2^{\frac{-1}{6}}$

6. If $64^{-\frac{1}{3}}\left(64^{\frac{1}{3}}-64^{\frac{2}{3}}\right)$ then $5\sqrt[n]{64}=$

   (A) 25   (B) $\frac{1}{125}$ (C) 625   (D) $\frac{1}{5}$

7. The value of $\sqrt[4]{(64)^{-2}}$ is:

   (A) $\frac{1}{8}$ (B) $\frac{1}{2}$ (C) 8   (D) $\frac{1}{64}$

8. If $10^x = 64$, what is the value of $10^{\frac{x}{2}+1}$?

   (A) 18   (B) 42   (C) 80   (D) 81

9. The value of $(x^{a-b})^{a+b} \times (x^{b-c})^{b+c} \times (x^{c-a})^{c+a}$ is:

   (A) 0   (B) 1   (C) 3   (D) 2

10. If $x = \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$ and $y = \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$, then $x^2 + xy + y^2 =$

    (A) 101   (B) 99   (C) 98   (D) 102

11. If $\left(\frac{2}{3}\right)^x \left(\frac{3}{2}\right)^{2x} = \frac{81}{16}$ then x = ?

    (A) 1   (B) 2   (C) 3   (D) 4

12. $(625)^{0.16} \times (625)^{0.09} =$

    (A) 25   (B) 625   (C) 125   (D) 5

13. If $2^x = 4^y$ and $\frac{1}{2x} + \frac{1}{4y} + \frac{1}{4z} = 4$ then the value of x is:

(A) $\frac{3}{4}$ (B) $\frac{4}{3}$ (C) $\frac{16}{7}$ (D) $\frac{7}{16}$

14. If $(16)^{2x+3} = (64)^{x+3}$, then $4^{2x-2} =$

(A) 64   (B) 256   (C) 32   (D) 512

15. If $x^{\frac{1}{12}} = 49^{\frac{1}{24}}$, then the value of x is:

(A) 12   (B) 7   (C) 2   (D) 49

16. If $x = \frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}}$ and $y = \frac{\sqrt{5}-\sqrt{3}}{\sqrt{5}+\sqrt{3}}$, then $x + y + xy =$

(A) 9   (B) 5   (C) 17   (D) 7

17. The value of $\left(\frac{256x^{16}}{81y^4}\right)^{-\frac{1}{4}}$ is:

(A) $\frac{4y}{5x^4}$ (B) $\frac{3y}{8x^4}$ (C) $\frac{3y}{4x^4}$ (D) $\frac{4x^4}{3y}$

18. If $x = 3 + \sqrt{8}$, than the value of $\left(x^2 + \frac{1}{x^2}\right)$ is:

(A) 32   (B) 34   (C) 6   (D) 12

19. If $8 = t^{\frac{2}{3}} + 4t^{-\frac{1}{2}}$, What is the value of g when t = 64?

(A) $\frac{31}{2}$ (B) $\frac{33}{2}$ (C) 16   (D) $\frac{257}{16}$

20. The value of $\left(\frac{81}{16}\right)^{\frac{-3}{4}} \times \left\{\left(\frac{25}{9}\right)^{\frac{-3}{2}} \div \left(\frac{5}{2}\right)^{-3}\right\}$ is:

(A) 2   (B) 3   (C) 1   (D) 4

21. The number of consecutive zeros in $2^3 \times 3^4 \times 5^4 \times 7$, is:

(A) 3   (B) 2   (C) 4   (D) 5

22. If a, b, c are positive real numbers, then $\sqrt{a^{-1}b} \times \sqrt{b^{-1}c} \times \sqrt{c^{-1}a}$ is equal to

(A) 1 (B) abc (C) $\sqrt{abc}$ (D) $\frac{1}{abc}$

23. If $9^{x+2} = 240 + 9^x$, then x =

(A) 0.5   (B) 0.2   (C) 0.4   (D) 0.1

24. If $4x - 4x^{-1} = 24$, then $(2x)^x$ equals:

(A) $5\sqrt{5}$ (B) $\sqrt{5}$ (C) $25\sqrt{5}$ (D) 125

25. If a = 2, b = 3, then the value of $(a^b + b^a)^{-1}$ is:

(A) $\frac{1}{15}$ (B) $\frac{1}{17}$ (C) $\frac{1}{16}$ (D) $\frac{1}{18}$

26. The value of $\frac{9^{\frac{1}{3}} \times 27^{\frac{1}{2}}}{3^{\frac{-1}{6}} \times 3^{\frac{1}{3}}}$ is:

(A) 27   (B) 1   (C) 3   (D) 9

27. The value of $\sqrt{p^{-1}q} \cdot \sqrt{q^{-1}r} \cdot \sqrt{r^{-1}p}$ is:

(A) -1   (B) 0   (C) 1   (D) 2

28. The seventh root of x divided by the eighth root of x is:

(A) x (B) $\sqrt{x}$ (C) $\sqrt[56]{x}$ (D) $\frac{1}{\sqrt[56]{x}}$

29. The simplest form of $0.12\overline{3}$ is:

(A) $\frac{41}{330}$ (B) $\frac{37}{330}$ (C) $\frac{41}{333}$ (D) None of these.

30. The value of m for which $\left[\left\{\left(\frac{1}{7^2}\right)^{-2}\right\}^{-\frac{1}{3}}\right]^{\frac{1}{4}} = 7^m$, is:

(A) $-\frac{1}{3}$ (B) $\frac{1}{4}$ (C) -3 (D) 2

31. $\left(\frac{2}{3}\right)^x \left(\frac{3}{2}\right)^{2x} = \frac{81}{16}$ then x =

(A) 2   (B) 3   (C) 4   (D) 1

32. If a, m, n are positive ingegers, then $\left\{\sqrt[m]{\sqrt[n]{a}}\right\}^{mn}$ is equal to

(A) a^{nm} (B) a (C) $a^{\frac{m}{n}}$ (D) 1

33. The square root of 64 divided by the cube root of 64 is:

(A) 64 (B) 2 (C) $\frac{1}{2}$ (D) $64^{\frac{2}{3}}$

34. If $\frac{x}{x^{1.5}} = 8x^{-1}$ then x =

(A) $\frac{\sqrt{2}}{4}$ (B) $\sqrt[2]{2}$ (C) 4 (D) 64

35. The value of $\left\{\left(23 + 2^2\right)^{\frac{2}{3}} + \left(140 - 19\right)^{\frac{1}{2}}\right\}^2$, is:

(A) 196   (B) 289   (C) 324   (D) 400

36. When simplified $\left(256\right)^{-\left(\left(4^{-\frac{3}{2}}\right)\right)}$ is:

(A) 8 (B) $\frac{1}{8}$ (C) 2 (D) $\frac{1}{2}$

37. The sum of $0.\overline{3}$ and $0.\overline{4}$ is:

(A) $\frac{7}{10}$ (B) $\frac{7}{9}$ (C) $\frac{7}{11}$ (D) $\frac{7}{99}$

38. If $\frac{3^{2x-8}}{225} = \frac{5^3}{5^x}$, then x =

(A) 2   (B) 3   (C) 5   (D) 4

39. If $\frac{2^{m+n}}{2^{n-m}} = 16$, $\frac{3^p}{2^n} = 81$ and $a = 2^{\frac{1}{10}}$, then $\frac{a^{2m+n-p}}{\left(a^{m-2n+2p}\right)^{-1}} =$

(A) 2 (B) $\frac{1}{4}$ (C) 9 (D) $\frac{1}{8}$

40. If $\sqrt{2^n} = 1024$, then $3^{2\left(\frac{n}{4}-4\right)} =$

(A) 3   (B) 9   (C) 27   (D) 81

41. If $x = \sqrt{5} + 2$, then $x - \frac{1}{x}$ equals:

(A) $2\sqrt{5}$ (B) 4 (C) 2 (D) $\sqrt{5}$

42. If $\frac{3^{5x} \times 81^2 \times 6561}{3^{2x}}$ then x =

(A) 3 (B) -3 (C) $\frac{1}{3}$ (D) $-\frac{1}{3}$

43. If $3^x = 64 = 2^6 + (\sqrt{3})^8$, then the value of x is:

(A) 2   (B) 1   (C) 4   (D) 3

44. If $x = 3 + 2\sqrt{2}$, than the value of $x + \frac{1}{x}$ is:

(A) 6   (B) 0   (C) 3   (D) 1

45. The Number $1.\overline{27}$ in the from $\frac{p}{q}$, where p and q are integers and $q \neq 0$, is:

(A) $\frac{14}{11}$ (B) $\frac{17}{14}$ (C) $\frac{14}{15}$ (D) $\frac{11}{14}$

46. $\left(\frac{125}{216}\right)^{\frac{-1}{3}} =$

(A) $\frac{5}{6}$ (B) $\frac{6}{5}$ (C) 125   (D) 216

47. The number $0.\overline{32}$ when expressed in the form $\frac{p}{q}$ $\left(\text{p, q are integers and } q \neq 0\right)$, is:

(A) $\frac{8}{25}$ (B) $\frac{29}{90}$ (C) $\frac{32}{99}$ (D) $\frac{32}{199}$

48. The value of $\frac{x^{a(c-c)}}{x^{b(a-c)}} \div \left(\frac{x^b}{x^a}\right)^c$ is:

(A) 4   (B) 3   (C) 2   (D) 1

49. If $\sqrt{2} = 1.414$ than $\sqrt{\frac{(\sqrt{2}-1)}{(\sqrt{2}+1)}} = ?$

(A) 0.207   (B) 0.414   (C) 2.414   (D) 0.621

50. The value of $64^{-\frac{1}{3}}\left(64^{\frac{1}{3}} - 64^{\frac{2}{3}}\right)$ is:

(A) 1   (B) 13   (C) -3   (D) -2

51. How many digits are there in the repeating block of digits in the decimal expansion of $\frac{17}{7}$?

(A) 16   (B) 6   (C) 26   (D) 7

52. $(256)^{0.16} \times (256)^{0.09}$

(A) 4   (B) 16   (C) 64   (D) 256.25

53. $16\sqrt{134} \div 9\sqrt{52}$ is equal to:

(A) $\frac{3}{9}$ (B) $\frac{9}{8}$ (C) $\frac{8}{9}$ (D) None of these.

54. If $x = \sqrt{6} + \sqrt{5}$, then $x^2 + \frac{1}{x^2} - 2 =$

(A) $2\sqrt{6}$ (B) $2\sqrt{5}$ (C) 24 (D) 20

55. If $(3^3)^2 = 9^x$ than $5^x = ?$

(A) 5   (B) 1   (C) 125   (D) 25

56. The simplest rationalisation factor of $\sqrt[3]{500}$ is:

(A) $\sqrt{5}$ (B) $\sqrt{3}$ (C) $\sqrt[3]{5}$ (D) $\sqrt[3]{2}$

57. **Directions:** In the following questions, the Assertions (A) and Reason(s) (R) have been put forward. Read both the statements carefully and choose the correct alternative from the following:

Assertion: $(2 + \sqrt{2})^2 = 6 + 4\sqrt{2}$

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

(A) Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.	(B) Both Assertion and Reason are correct and Reason is not the correct explanation for Assertion.	(C) Assertion is true but the reason is false.	(D) Both assertion and reason are false.

58. If $8^{x+1} = 64$, what is the value of 3^{2x+1}?

(A) 1   (B) 3   (C) 9   (D) 27

59. The simplified form of $16^{\frac{-1}{4}} \times \sqrt[4]{16}$ is:

(A) 1   (B) 6   (C) 4   (D) 16

60. If $\frac{\sqrt{3}-1}{\sqrt{3}+1} = a - b\sqrt{3}$, then:

(A) a = 2, b = 1   (B) a = 2, b = -1   (C) a = -2, b = 1   (D) a = b = 1

61. When $15\sqrt{15}$ is divided by $3\sqrt{3}$, the quotient is:

(A) $5\sqrt{3}$ (B) $3\sqrt{5}$ (C) $5\sqrt{5}$ (D) $3\sqrt{3}$

62. If $x = 7 + 4\sqrt{3}$ and xy = 1, then $\frac{1}{x^2} + \frac{1}{y^2} =$

(A) 64   (B) 134   (C) 194   (D) $\frac{1}{49}$

63. The value of $\left(\frac{x^l}{x^m}\right)^{\frac{1}{lm}} \times \left(\frac{x^m}{x^n}\right)^{\frac{1}{mn}} \times \left(\frac{x^n}{x^l}\right)^{\frac{1}{nl}}$ is:

(A) 4   (B) 1   (C) 2   (D) 0

64. Which of the following is true statement?

(A) Every real number is either rational or irrational.	(B) The product of two irrational numbers is an irrational number.	(C) The sum of two irrational numbers is an irrational number.	(D) Every real number is always rational.

65. $\frac{\sqrt{32}+\sqrt{48}}{\sqrt{8}+\sqrt{12}}$ is equal to:

(A) $\sqrt{2}$ (B) 4   (C) 8   (D) 2

66. If $x = (7 + 4\sqrt{3})$ than $\left(x + \frac{1}{x}\right) = ?$

(A) 49   (B) 14   (C) 48   (D) $8\sqrt{3}$

67. If $a = 7 - 4\sqrt{3}$, then the value of $\sqrt{a} + \frac{1}{\sqrt{a}}$ is:

(A) 8   (B) 1   (C) 2   (D) 4

68. Write the correct answer in the following:

$\sqrt[4]{\sqrt[3]{2^2}}$ equals.

(A) $2^{-\frac{1}{6}}$ (B) 2^{-6} (C) $2^{\frac{1}{6}}$ (D) 2^6

69. If $x = 3 + \sqrt{8}$ then $\left(x^2 + \frac{1}{x^2}\right) = ?$

(A) 34   (B) 56   (C) 28   (D) 63

70. If $x = \sqrt[3]{2 + \sqrt{3}}$, then $x^3 + \frac{1}{x^3} =$:

(A) 2   (B) 4   (C) 8   (D) 9

71. If $2^{-m} \times \frac{1}{2^m} = \frac{1}{4}$, then $\frac{1}{14} \left\{ (4^m)^{\frac{1}{2}} \left(\frac{1}{5^m} \right)^{-1} \right\}$ is equal to:

(A) $\frac{1}{2}$ (B) 2   (C) 4   (D) $-\frac{1}{4}$

72.
$\frac{5^{n+2} - 6 \times 5^{n+1}}{13 \times 5^n - 2 \times 5^{n+1}}$ is equal to:

(A) $\frac{5}{3}$ (B) $-\frac{5}{3}$ (C) $\frac{3}{5}$ (D) $-\frac{3}{5}$

73. The value of $(0.00032)^{\frac{-2}{5}}$ is:

(A) 5   (B) 1   (C) 0   (D) 25

74. Write the correct answer in each of the following:
Which of the following is irrational?
     a. 0.14
     b. $0.14\overline{16}$
     c. $0.\overline{1416}$
     d. $0.4014001400014...$

75. Write the correct answer in the following:
The product $\sqrt[3]{2} . \sqrt[4]{2} . \sqrt[12]{32}$ equals.
     a. $\sqrt{2}$
     b. 2
     c. $\sqrt[12]{2}$
     d. $\sqrt[12]{32}$

76. If $\frac{x}{x^{1.5}} = 8x^{-1}$ then x =
     a. $\frac{\sqrt{2}}{4}$
     b. $\sqrt[2]{2}$
     c. 4
     d. 64

77. If $x = \sqrt[3]{2 + \sqrt{3}}$, then $x^3 + \frac{1}{x^3} =$:
     a. 2
     b. 4
     c. 8
     d. 9

78. If $x = \frac{\sqrt{3} - \sqrt{2}}{\sqrt{3} + \sqrt{2}}$ and $y = \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}}$, then $x^2 + xy + y^2 =$
     a. 101
     b. 99
     c. 98
     d. 102

79. The value of $\sqrt{5 + 2\sqrt{6}}$, is:
     a. $\sqrt{3} - \sqrt{2}$

b. $\sqrt{3} + \sqrt{2}$

c. $\sqrt{5} + \sqrt{6}$

d. None of these

80. If $x = \sqrt{6} + \sqrt{5}$, then $x^2 + \frac{1}{x^2} - 2 =$

    a. $2\sqrt{6}$

    b. $2\sqrt{5}$

    c. 24

    d. 20

81. If $x = 7 + 4\sqrt{3}$ and xy = 1, then $\frac{1}{x^2} + \frac{1}{y^2} =$

    a. 64

    b. 134

    c. 194

    d. $\frac{1}{49}$

* A statement of Assertion (A) is followed by a statement of Reason (R). [5] Choose the correct option.

82. **Directions:** In the following questions, the Assertions (A) and Reason(s) (R) have been put forward. Read both the statements carefully and choose the correct alternative from the following:

    Assertion: 0.271 is a terminating decimal and we can express this number as $\frac{271}{1000}$ which is of the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$.

    Reason: A terminating or non - terminating decimal expansion can be expressed as rational number.

        a. Assertion and Reason both are correct statements and Reason is the correct explanation of Assertion.

        b. Assertion and Reason both are correct statements but Reason is not the correct explanation of Assertion.

        c. Assertion is correct statement but Reason is wrong statement.

        d. Assertion is wrong statement but Reason is correct statement.

83. **Directions:** In the following questions, the Assertions (A) and Reason(s) (R) have been put forward. Read both the statements carefully and choose the correct alternative from the following:

    Assertion: $\sqrt{(7 \times 8)} = \sqrt{7} \times \sqrt{8}$

    Reason: $\sqrt{ab} = \sqrt{a} \times \sqrt{b}$

        a. Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.

        b. Both Assertion and Reason are correct and Reason is not the correct explanation for Assertion.

        c. Assertion is true but the reason is false.

        d. Both assertion and reason are false.

84. **Directions:** In the following questions, the Assertions (A) and Reason(s) (R) have been put forward. Read both the statements carefully and choose the correct alternative from the following:

    Assertion: $5° = 1$

Reason: $a° = 1$

    a.   Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.

    b.   Both Assertion and Reason are correct and Reason is not the correct explanation for Assertion.

    c.   Assertion is true but the reason is false.

    d.   Both assertion and reason are false.

85. **Directions:** In the following questions, the Assertions (A) and Reason(s) (R) have been put forward. Read both the statements carefully and choose the correct alternative from the following:

    Assertion: (18, 25) is a pair of coprime numbers.

    Reason: pair of coprime number has common factor2.

        a.   Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.

        b.   Both Assertion and Reason are correct and Reason is not the correct explanation for Assertion.

        c.   Assertion is true but the reason is false.

        d.   Both assertion and reason are false.

86. **Directions:** In the following questions, the Assertions (A) and Reason(s) (R) have been put forward. Read both the statements carefully and choose the correct alternative from the following:

    Assertion: $\frac{7}{8} + \frac{9}{8} = \frac{16}{8}$

    Reason: $\frac{p}{q} + \frac{r}{q} = p + \frac{r}{q}$

        a.   Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.

        b.   Both Assertion and Reason are correct and Reason is not the correct explanation for Assertion.

        c.   Assertion is true but the reason is false.

        d.   Both assertion and reason are false.

* Answer the following questions in one sentence. [1 Marks Each]   [4]

87. Insert a rational number and an irrational number between the following:

    0.15 and 0.16

88. Find three rational numbers between:

    0.1 and 0.11

89. Prove that:

    $$\left(\frac{x^a}{x^b}\right)^c \times \left(\frac{x^b}{x^c}\right)^a \times \left(\frac{x^c}{x^a}\right)^b = 1$$

90. If a = 3 and b = -2, find the values of:

    $a + b^{ab}$

* Answer the following short questions. [2 Marks Each]   [40]

91. Show how $\sqrt{5}$ can be represented on the number line.

92. Write in decimal form and say what kind of decimal expansion: $\frac{329}{400}$

93. Simplify the following:

$$\sqrt[4]{81} - 8\sqrt[3]{216} + 15\sqrt[5]{32} + \sqrt{225}$$

94. Simplify:

$$\frac{3}{5}^{4} \frac{8}{5}^{-12} \frac{32}{5}^{6}$$

95. Show that:

$$\left(\frac{3^a}{2^b}\right)^{a+b}\left(\frac{3^b}{3^c}\right)^{b+c}\left(\frac{3^c}{3^a}\right)^{c+a} = 1$$

96. Solve the following equations for x:

$$4^{x-1} \times (0.5)^{3-2x} = \left(\frac{1}{8}\right)^{x}$$

97. Show that:

$$\frac{\left(a+\frac{1}{b}\right)^{m} \times \left(a-\frac{1}{b}\right)^{n}}{\left(b+\frac{1}{a}\right)^{m} \times \left(b-\frac{1}{a}\right)^{n}} = \left(\frac{a}{b}\right)^{m+n}$$

98. Solve the following equations:

$$4^{x-1} \times (0.5)^{3-2x} = \left(\frac{1}{8}\right)^{x}$$

99. If $x = a^{m+n}$, $y = a^{n+l}$ and $z = a^{l+m}$, prove that $x^m y^n z^l = x^n y^l z^m$.

100. If $a = x^{m+n}y^l$, $b = x^{n+l}y^m$ and $c = x^{l+m}y^n$, prove that $a^{m-n}b^{n-l}c^{l-m} = 1$.

101. Show that:

$$\left(\frac{x^{a^2+b^2}}{x^{ab}}\right)^{a+b}\left(\frac{x^{b^2+c^2}}{x^{bc}}\right)^{b+c}\left(\frac{x^{c^2+a^2}}{x^{ac}}\right)^{a+c} = x^{2(a^2+b^2+c^2)}$$

102. Simplify the following:

$$\frac{6(8)^{n+1} + 16(2)^{3n-2}}{10(2)^{3n+1} - 7(8)^n}$$

103. Simplify the following:

$$\frac{5 \times 25^{n+1} - 25 \times 5^{2n}}{5 \times 5^{2n+3} - (25)^{n+1}}$$

104. Express each one of the following with rational denominator:

$$\frac{\sqrt{3}+1}{2\sqrt{2}-\sqrt{3}}$$

105. If $x = 3 + 2\sqrt{2}$, than find the value of $\sqrt{x} - \frac{1}{\sqrt{x}}$.

106. Find a rational number between $\frac{3}{8}$ and $\frac{2}{5}$

107. Find the value of $(1296)^{0.17} \times (1296)^{0.08}$.

108. Solve for $x \left(\frac{2}{5}\right)^{2x-2} = \frac{32}{3125}$.

109. Find the value of x in the following:

$5^{x-3} \times 3^{2x-8} = 225$

110. Simplify:

$$\left(\frac{7776}{243}\right)^{-\frac{3}{5}}$$

*   Answer the following questions. [3 Marks Each]   **[72]**

111. Locate $\sqrt{2}$ on the number line.

112. Simplify:

$\dfrac{7\sqrt{3}}{\sqrt{10}+\sqrt{3}} - \dfrac{2\sqrt{5}}{\sqrt{6}+\sqrt{5}} - \dfrac{3\sqrt{2}}{\sqrt{15}+3\sqrt{2}}$.

113. Represent geometrically the following numbers on the number line:

$\sqrt{5.6}$

114. Express the following in the form $\dfrac{p}{q}$, where p and q are integers and $q \neq 0$:

$0.\overline{134}$

115. Find the value of $\dfrac{4}{(216)^{-\frac{2}{3}}} + \dfrac{1}{(256)^{-\frac{3}{4}}} + \dfrac{2}{(243)^{-\frac{1}{5}}}$

116. Locate $\sqrt{10}$ on the number line.

117. Express the following decimals in the form $\dfrac{p}{q}$:

$0.\overline{621}$

118. Express the following decimals in the form $\dfrac{p}{q}$:

$125.\overline{3}$

119. Prove that:

$\dfrac{1}{1+x^{b-a}+x^{c-a}} + \dfrac{1}{1+x^{a-b}+x^{c-b}} + \dfrac{1}{1+x^{b-c}+x^{a-c}} = 1$

120. Determine $(8x)^x$, if $9^{x+2} = 240 + 9^x$.

121. If a and b are different positive primes such that
$(a+b)^{-1}(a^{-1}+b^{-1}) = a^x b^y$, find $x+y+2$.

122. Solve the following equations for x:
$2^{2x} - 2^{x+3} + 2^4 = 0$

123. If $3^x = 5^y = (75^z)$, show that $z = \dfrac{xy}{2x+y}$.

124. Find the values of x in each of the following:
$\left(\sqrt[3]{4}\right)^{2x+\frac{1}{2}} = \dfrac{1}{32}$

125. if $a = xy^{p-1}$, $b = xy^{q-1}$ and $c = xy^{r-1}$, prove that $a^{q-r}\, b^{r-p}\, c^{p-q} = 1$.

126. Prove that:

$\dfrac{abc}{a^{-1}b^{-1}+b^{-1}c^{-1}+c^{-1}a^{-1}} = abc$

127. Prove that:

$\left(\dfrac{x^a}{x^b}\right)^{a^2+ab+b^2} \times \left(\dfrac{x^2}{x^c}\right)^{b^2+bc+c^2} \times \left(\dfrac{x^c}{x^a}\right)^{c^2+ca+a^2} = 1$

128. If $3^{4x} = (81)^{-1}$ and $10^{\frac{1}{y}}\, 0.0001$, find the value of 2^{-x+4y}.

129. Simplify:

$\dfrac{3\sqrt{2}-2\sqrt{3}}{3\sqrt{2}+2\sqrt{3}} + \dfrac{\sqrt{12}}{\sqrt{3}-\sqrt{2}}$

130. Express each one of the following with rational denominator:

$$\frac{b^2}{\sqrt{a^2+b^2}+a}$$

131. Express the following decimals in the form $\frac{p}{q}$, where p, q are integers and $q \neq 0$.

$$0.3\overline{178}$$

132. If $x = 2 - \sqrt{3}$, find the value of $\left(x - \frac{1}{x}\right)^3$.

133. Evaluate:

$$\frac{4}{(216)^{-\frac{2}{3}}} + \frac{1}{(256)^{-\frac{3}{4}}} + \frac{2}{(243)^{-\frac{1}{5}}}$$

134. Prove that:

$$\left(\frac{64}{125}\right)^{-\frac{2}{3}} + \frac{1}{\left(\frac{256}{625}\right)^{\frac{1}{4}}} + \frac{\sqrt{25}}{\sqrt[3]{64}} = \frac{65}{16}$$

*   Questions with calculation. [4 Marks Each]   **[60]**

135. If $x = \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$ and $y = \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$ then find the value of $x^2 + y^2$.

136. If $(x - 1)^3 = 8$, What is the value of $(x + 1)^2$?

137. Solve the following equations:

$8^{x+1} = 16^{y+2}$ and $\left(\frac{1}{2}\right)^{3+x} = \left(\frac{1}{4}\right)^{3y}$

138. Prove that:

$$\left(\frac{1}{4}\right)^{-2} - 3 \times 8^{\frac{2}{3}} \times 4^0 + \left(\frac{9}{16}\right)^{-\frac{1}{2}} = \frac{16}{3}$$

139. If $x = \frac{\sqrt{3}+1}{2}$, find the value of $4x^3 + 2x^2 - 8x + 7$.

140. If $x = 3 + \sqrt{8}$, find the value of $x^2 + \frac{1}{x^2}$.

141. Simplify:

$$\frac{7+3\sqrt{5}}{3+\sqrt{5}} - \frac{7-3\sqrt{5}}{3-\sqrt{5}}$$

142. Rationalise the denominator of the following:

$$\frac{3}{\sqrt{3}+\sqrt{5}-\sqrt{2}}$$

143. If $a = \frac{\sqrt{5}+\sqrt{2}}{\sqrt{5}-\sqrt{2}}$ and $b = \frac{\sqrt{5}-\sqrt{2}}{\sqrt{5}+\sqrt{2}}$, show that $3a^2 + 4ab - 3b^2 = 4 + \frac{56}{3}\sqrt{10}$.

144. Prove that:

$$\frac{1}{1+\sqrt{2}} + \frac{1}{\sqrt{2}+\sqrt{3}} + \frac{1}{\sqrt{3}+\sqrt{4}} + \frac{1}{\sqrt{4}+\sqrt{5}}$$
$$+ \frac{1}{\sqrt{5}+\sqrt{6}} + \frac{1}{\sqrt{6}+\sqrt{7}} + \frac{1}{\sqrt{7}+\sqrt{8}} + \frac{1}{\sqrt{8}+\sqrt{9}} = 2$$
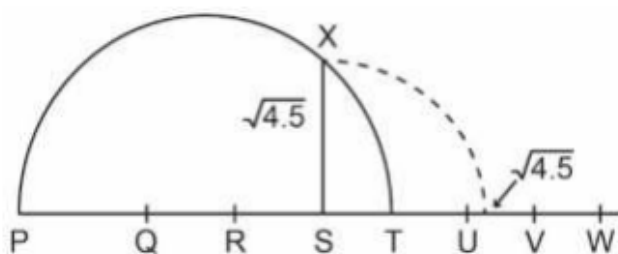
145. Represent $\sqrt{10.5}$ on the number line.

146. Represent $\left(1 + \sqrt{9.5}\right)$ on the number line.

147. If $x = 9 - 4\sqrt{5}$, find the value of $x^2 - \frac{1}{x^2}$.

148. If $x = \frac{1}{2-\sqrt{3}}$, find the value of $x^3 - 2x^2 - 7x + 5$.

149. Prove that:

$$\frac{1}{3+\sqrt{7}} + \frac{1}{\sqrt{7}+\sqrt{5}} + \frac{1}{\sqrt{5}+\sqrt{3}} + \frac{1}{\sqrt{3}+1} = 1$$

* **Case study based questions.** [8]

150. 1. A number line consists of an ininite number of points. Points on it are associated with a rational
number.
Khushi says – 'A point on the number line can represent different forms of a rational number.'
Akash says – 'I think each point represents a unique rational number.'
Who is correct? Give an example to support your argument.

151. Vasu represents √4.5 on the number line PW. The length of TS = 1 unit. His representation
is shown below.

6. Which letter represent 0 of the number line?
  A. P
  B. R
  C. X
  D. S

7. Between which two points does 5.2 lie on this number line?
  A. U and V
  B. T and U
  C. S and T
  D. V and W

8. Screen size is deined by the distance between two diagonally opposite corners of a screen. A
manufacturer can make rectangular display screens as per clients' demands.
A client purchased a display screen of size $\sqrt{70}$ units from the manufacturer last year. For
an upgrade, he wants the same type of screen with a larger display.
What are the possible dimensions of the screen purchased by the client last year?

9. The new screen size must be more than double, but it should be less than three times
that of the existing one.
Which of the following screen sizes meets the client's requirement?
  A. $\sqrt{145}$ units
  B. $\sqrt{175}$ units

C. $2\sqrt{70}$ units

D. $\sqrt{580}$ units

10. The new display screen is to be installed in a space measuring 3 m × 3 m. To make the desired screen for the client, what other information is required by the manufacturer?

----- "Our character is not define by the battles we win or lose ,but by the battles we dare to fight" -----