SQUARE ROOT & CUBE ROOTS

IMPORTANT FACTS AND FORMULAE :

◈ **Square Root :** If $x^2 = y$, We say that the square root of y is x and we write, $\sqrt{y} = x$. Thus, $\sqrt{4} = 2$, $\sqrt{9} = 3$, $\sqrt{196} = 14$.

◈ **Cube Root :** The cube root of a given number x is the number whose cube is x. We denote the cube root of x by $\sqrt[3]{x}$.
Thus, $\sqrt[3]{8} = \sqrt[3]{2\times2\times2} = 2$, $\sqrt[3]{7\times7\times7} = 7$ etc.

Note :

1. $\sqrt{xy} = \sqrt{x} \times \sqrt{y}$
2. $\sqrt{\frac{x}{y}} = \frac{\sqrt{x}}{\sqrt{y}} = \frac{\sqrt{x}}{\sqrt{y}} \times \frac{\sqrt{y}}{\sqrt{y}} = \frac{\sqrt{xy}}{\sqrt{y}}$.

❖ EXAMPLES ❖

Ex.1 Evaluate $\sqrt{6084}$ by factorization method,

Sol. **Method :** Express the given number as the product of prime factors. Now, take the product of these prime factors choosing one out of every pair of the same primes. This product gives the squeare root of the given number.
Thus, resolving 6084 into prime factors, we get:

2	6084
2	3042
3	1521
3	507
13	169
	13

$6084 = 2^2 \times 3^2 \times 13^2$
$\therefore \sqrt{6084} = (2 \times 3 \times 13) = 78.$

Ex.2 Find the square root of 1471369.

Sol. **Explanation :** In the given number, mark off the digits in pairs starting from the unit's digit. Each pair and the remaining one digit is called a period.
Now, $1^2 = 1$. One subtracting, we get 0 as remainder. Now, bring down the next period i.e., 47.
Now, trial divisor is $1 \times 2 = 2$ and triall dividend is 47.
So, we take 22 as dvsor and put 2 as quotient.
The remainder is 3.
Next, we bring down the next period which is 13.
Now, trial divisor is $12 \times 2 = 24$ and trial dividend is 313. So, we take 241 as dividend and 1 as quotient.
The remainder is 72.
Bring down the next period i.e., 69.
Now, the trial divisor is $121 \times 2 = 242$ and the trial dividend is 7269. So, we take 3 as quatient and 2423 as dividsor. The remainder is then zero.
Hence, $\sqrt{1471369} = 1213$.

1	$\overline{14}\,\overline{71}\,\overline{36}\,\overline{9}$	(1213
	1	
22	47	
	44	
241	313	
	241	
2423	7269	
	7269	
	×	

Ex.3 Evaluate : $\sqrt{248+\sqrt{51+\sqrt{169}}}$.

Sol. Given expression

$= \sqrt{248+\sqrt{51+13}} = \sqrt{248+\sqrt{64}} = \sqrt{248+8} = \sqrt{256} = 16.$

Ex.4 If $a*b*c = \dfrac{\sqrt{(a+2)(b+3)}}{c+1}$, then find the value of 6*15*3.

Sol. $6*15*3 = \dfrac{\sqrt{(6+2)(15+3)}}{3+1} = \dfrac{\sqrt{8}\times 18}{4} = \dfrac{\sqrt{144}}{4}$

$= \dfrac{12}{4} = 3.$

Ex.5 Find the value of $\sqrt{1\dfrac{9}{16}}$.

Sol. $\sqrt{1\dfrac{9}{16}} = \sqrt{\dfrac{25}{16}} = \dfrac{\sqrt{25}}{\sqrt{16}} = \dfrac{5}{4} = 1\dfrac{1}{4}$.

Ex.6 What is the square root of 0.0009?

Sol. $\sqrt{0.0009} = \sqrt{\dfrac{9}{10000}} = \dfrac{\sqrt{9}}{\sqrt{10000}} = \dfrac{3}{100} = 0.03$

Ex.7 Evaluate $\sqrt{175.2976}$.

Sol. **Method :** We make even number of decimal places by affixing a zero, If necessary. Now we mark off periods and extract the square root as shown.

1	$\overline{1}\,\overline{75}.\overline{29}\,\overline{76}$	(13.24
	1	
23	75	
	69	
262	629	
	524	
2644	10576	
	10576	
	×	

$\therefore \sqrt{175.2976} = 13.24.$

Ex.8 What will come in place of question mark in each of the following questions?

(i) $\dfrac{\sqrt{32.4}}{?} = 2$ (ii) $\sqrt{86.49} + \sqrt{5+(?)^2} = 12.3$

Sol. (i) Let $\sqrt{\frac{32.4}{x}} = 2$. Then, $\frac{32.4}{x} = 4 \Leftrightarrow 4x$

$= 32.4 \Leftrightarrow x = 8.1$

(ii) Let $\sqrt{86.49} + \sqrt{5+x^2} = 12.3$.

Then, $9.3 + \sqrt{5+x^2} = 12.3 \Leftrightarrow \sqrt{5+x^2}$

$= 12.3 - 9.3 = 3$

$\Leftrightarrow 5+x^2 = 9 \Leftrightarrow x^2 — = 9 - 5 = 4 \Leftrightarrow x = \sqrt{4} = 2.$

Ex.9 Find the value of $\sqrt{\frac{0.289}{0.00121}}$.

Sol. $\sqrt{\frac{0.289}{0.00121}} = \sqrt{\frac{0.28900}{0.00121}} = \sqrt{\frac{28900}{121}} = \sqrt{\frac{170}{11}}$

Ex.10 If $\sqrt{1+\frac{x}{144}} = \frac{13}{12}$, then find the value of x.

Sol. $\sqrt{1+\frac{x}{144}} = \frac{13}{12} \Leftrightarrow \left(1+\frac{x}{144}\right) = \left(\frac{13}{12}\right)^2 = \frac{169}{144} - 1$

$\Leftrightarrow \frac{x}{144} = \frac{25}{144} \Leftrightarrow x = 25.$

Ex.11 Find the value of $\sqrt{3}$ upto three places of decimal.

Sol.

1	$3.\overline{000000}$ (1.732
	1
27	200
	189
343	1100
	1029
3462	7100
	6924

$\therefore \sqrt{3} = 1.732.$

Ex.12 If $\sqrt{3} = 1.732$, find the value of $\sqrt{192} - \frac{1}{2}\sqrt{48} - \sqrt{75}$ correct to 3 places of decimal.

Sol. $\sqrt{192} - \frac{1}{2}\sqrt{48} - \sqrt{75}$

$= \sqrt{64 \times 3} - \frac{1}{2}\sqrt{16 \times 3} - \sqrt{25 \times 3}$

$= 8\sqrt{3} - \frac{1}{2} \times 4\sqrt{3} - 5\sqrt{3}$

$= 3\sqrt{3} - 2\sqrt{3} = \sqrt{3} = 1.732$

Ex.13 Evaluate : $\sqrt{\frac{9.5\times.0085\times18.9}{.0017\times1.9\times0.021}}$.

Sol. Given exp. $= \sqrt{\frac{9.5\times.0085\times18.900}{.0017\times1.9\times0.021}}$

Now, since the sum of decimal places in the numerator and denominator and under the radial sign is the same, we remove the decimal.

$\therefore$ Given exp. $= \sqrt{\frac{95\times85\times18900}{17\times19\times21}} = \sqrt{5\times5\times900}$

$= 5 \times 30 = 150.$

Ex.14 Simplify :

$$\sqrt{[(12.1)^2-(8.1)^2]\div[(0.25)^2+(0.25)(19.95)]}$$

Sol. Given exp.

$$= \frac{\sqrt{(12.1+8.1)(12.1-8.1)}}{(0.25)(0.25+19.95)} = \sqrt{\frac{20.2\times4}{0.25\times20.2}}$$

$$= \sqrt{\frac{4}{0.25}} = \sqrt{\frac{400}{25}} = \sqrt{16} = 4.$$

Ex.15 If $x = 1+\sqrt{2}$ and $y = 1-\sqrt{2}$, find the value of (x^2+y^2).

Sol. $x^2 + y^2 = (1+\sqrt{2})^2 = 2(1)^2 + (\sqrt{2})^2] = 2 \times 3 = 6.$

Ex.16 Evaluate $\sqrt{0.9}$ upto three place of decimal.

Sol.

$$\begin{array}{r|l} 9 & 0.\overline{90}\,\overline{00}\,\overline{00}\ (.948 \\ & \quad 81 \\ \hline 184 & \quad 900 \\ & \quad 736 \\ \hline 1888 & \quad 16400 \\ & \quad 15104 \\ \hline & \end{array}$$

$\therefore \sqrt{0.9} = 0.948$

Ex.17 If $\sqrt{15} = 3.88$, find the value of $\sqrt{\frac{5}{3}}$.

Sol. $\sqrt{\frac{5}{3}} = \sqrt{\frac{5\times3}{3\times3}} = \frac{\sqrt{15}}{3} = \frac{3.88}{3}$

$= 1.2933 \ldots\ldots = 1.29\overline{3}.$

Ex.18 Find the least square number which is exactly divisible by 10, 12, 15 and 18.

Sol. L.C.M. of 10, 12, 15, 18 = 180. Now,

$180 = 2 \times 2 \times 3 \times 3 \times 5 = 2^2 \times 3^2 \times 5.$

To make it a perfect square, It must be multiplied by 5.

$\therefore$ Required number $= (2^2 \times 3^2 \times 5^2) = 900.$

Ex.19 Find the greatest number of five digits which is a perfect square.

Sol. Greatest number of 5 digits is 99999.

$$\begin{array}{r|l} 3 & \overline{99}\,\overline{99} \,(316 \\ & 9 \\ \hline 61 & 99 \\ & 61 \\ \hline 626 & 6899 \\ & 3756 \\ \hline & 143 \end{array}$$

$\therefore$ Required number = (99999 – 143) = 99856.

Ex.20 Find the smallest number that must be added to 1780 to make it a perfect square.

Sol.

$$\begin{array}{r|l} 4 & \overline{17}\,\overline{80} \,(42 \\ & 16 \\ \hline 82 & 180 \\ & 164 \\ \hline & 16 \end{array}$$

$\therefore$ Required to be added = $(43)^2 - 1780$
= 1849 – 1780 = 69.

Ex.21 If $\sqrt{2} = 1.4142$, find the value of $\dfrac{\sqrt{2}}{(2+\sqrt{2})}$.

Sol. $\dfrac{\sqrt{2}}{(2+\sqrt{2})} = \dfrac{\sqrt{2}}{(2+\sqrt{2})} \times \dfrac{(2-\sqrt{2})}{(2-\sqrt{2})} = \dfrac{2\sqrt{2}-2}{(4-2)}$

$= \dfrac{2(\sqrt{2}-1)}{2} = (\sqrt{2}-1) = (1.4142-1) = 0.4142.$

Ex.22 If $x = \left(\dfrac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}}\right)$ and $y = \left(\dfrac{\sqrt{5}-\sqrt{3}}{\sqrt{5}+\sqrt{3}}\right)$, find the value of $(x^2 + y^2)$.

Sol. $x = \dfrac{(\sqrt{5}+\sqrt{3})}{(\sqrt{5}-\sqrt{3})} \times \dfrac{(\sqrt{5}+\sqrt{3})}{(\sqrt{5}+\sqrt{3})} = \dfrac{(\sqrt{5}+\sqrt{3})^2}{(5-3)}$

$= \dfrac{5+3+2\sqrt{15}}{2} = 4+\sqrt{15}.$

$y = \dfrac{(\sqrt{5}-\sqrt{3})}{(\sqrt{5}+\sqrt{3})} \times \dfrac{(\sqrt{5}-\sqrt{3})}{(\sqrt{5}-\sqrt{3})} = \dfrac{(\sqrt{5}-\sqrt{3})^2}{(5-3)}$

$= \dfrac{5+3-2\sqrt{15}}{2} = 4-\sqrt{15}.$

$\therefore$ $x^2 + y^2 = (4 + (\sqrt{15})^2 = 2[(4)^2 + (\sqrt{15})^2]$

$= 2 \times 31 = 62.$

Ex.23 Find the cube of root of 2744.

Sol. **Method :** Resolve the given number as the product of prime factors and take the product of prime factor. Resolving 2744 as the product of prime factors, we get :

$\sqrt[3]{2744} = 2^3 \times 7^3.$

2	2744
2	1327
2	686
7	343
7	49
	7

$\therefore \sqrt[3]{2744} = 2 \times 7 = 14.$

Ex.24 By what least number 4320 be multiplied to obtain a number which is a perfect cube ?

Sol. Clearly, $4320 = 2^3 \times 3^3 \times 2^2 \times 5$.

To make it a perfect cube, it must be multiplied by 2×5^2 i.e., 50.

1. $\sqrt{53824} = ?$

(A) 202 (B) 232 (C) 242 (D) 332

2. The square root of 64009 is -

(A) 253 (B) 347 (C) 363 (D) 803

3. The value of $\sqrt{10+\sqrt{25+\sqrt{108+\sqrt{154+\sqrt{225}}}}}$ is -

(A) 4 (B) 6 (C) 8 (D) 10

4. Evaluate : $\sqrt{41-\sqrt{21+\sqrt{19-\sqrt{9}}}}$ -

(A) 3 (B) 5 (C) 6 (D) 6.9

5. $\sqrt{176+\sqrt{2401}}$ is equal to -

(A) 14 (B) 15 (C) 18 (D) 24

6. $\left(\frac{\sqrt{625}}{11} \times \frac{14}{\sqrt{25}} \times \frac{11}{\sqrt{196}}\right)$ is equal to -

(A) 5 (B) 6 (C) 8 (D) 11

7. $\left(\sqrt{\frac{225}{729}} - \sqrt{\frac{25}{144}}\right) \div \sqrt{\frac{16}{81}} = ?$

(A) $\frac{1}{48}$ (B) $\frac{5}{48}$ (C) $\frac{5}{16}$ (D) None

8. The square root of $(272^2 - 128^2)$ is -

(A) 144 (B) 200 (C) 240 (D) 256

9. If $x * y = x = y + \sqrt{xy}$, the value of $6 * 24$ is -

(A) 41 (B) 42 (C) 43 (D) 44

10. If y = 5, then what is the value of $10y\sqrt{y^3 - y^2}$?

(A) $50\sqrt{2}$ (B) 100 (C) $200\sqrt{5}$ (D) 500

11. $\sqrt{110\frac{1}{4}} = ?$

(A) 10.25 (B) 10.5 (C) 11.15 (D) 19.5

12. $\sqrt{\frac{25}{81} - \frac{1}{9}} = ?$

(A) $\frac{2}{3}$ (B) $\frac{4}{9}$ (C) $\frac{16}{81}$ (D) $\frac{25}{81}$

13. The digit in the unit's place in the square root of 15876 is -

(A) 2 (B) 4 (C) 3 (D) None

14. How many two digit-numbers satisfy this property : The last digit (unit's digit) of the square of the two-digit number is 8 ?

(A) 1 (B) 2 (C) 3 (D) None

15. What is the square root of 0.16 ?

(A) 0.004 (B) 0.04 (C) 0.4 (D) 4

16. The value of $\sqrt{0.0004761}$ is -

(A) 0.00021 (B) 0.0021 (C) 0.021 (D) 0.21

17. $\sqrt{0.00004761}$ equals -

(A) 0.00069 (B) 0.0069 (C) 0.0609 (D) 0.069

18. $1.5^2 \times \sqrt{0.0225} = ?$

(A) 0.0375 (B) 0.3375 (C) 3.275 (D) 32.75

19. $\sqrt{0.01 + \sqrt{0.0064}} = ?$

(A) 0.03 (B) 0.3 (C) 0.42 (D) None

20. The value of $\sqrt{0.01} + \sqrt{0.81} + \sqrt{1.21} + \sqrt{0.0009}$ is -

(A) 2.03 (B) 2.1 (C) 2.11 (D) 2.13

21. $\sqrt{.0025} \times \sqrt{2.25} \times \sqrt{.0001} = ?$

(A) .000075 (B) .0075 (C) .075 (D) None

22. $\sqrt{1.5625} = ?$

(A) 1.05 (B) 1.25 (C) 1.45 (D) 1.55

23. If $\sqrt{.00000676} = .0026$, the square root of 67,60,000 is -

(A) $\frac{1}{26}$ (B) 26 (C) 260 (D) 2600

49. By how much does $\sqrt{12}+\sqrt{18}$ exceed $\sqrt{3}+\sqrt{2}$?

(A) $\sqrt{2}-4\sqrt{3}$ (B) $\sqrt{3}+2\sqrt{2}$

(C) $2(\sqrt{3}-\sqrt{2})$ (D) $3(\sqrt{3}-\sqrt{2})$

50. $\frac{\sqrt{24}+\sqrt{216}}{\sqrt{96}}=?$

(A) $2\sqrt{6}$ (B) 2 (C) $6\sqrt{2}$ (D) $\frac{2}{\sqrt{6}}$

51. The value of $\frac{\sqrt{80}-\sqrt{112}}{\sqrt{45}-\sqrt{63}}$ is -

(A) $\frac{3}{4}$ (B) $1\frac{1}{3}$ (C) $1\frac{7}{9}$ (D) $1\frac{3}{4}$

52. If $3\sqrt{5}+\sqrt{125}=17.88$, then what will be the value of $\sqrt{80}+6\sqrt{5}$?

(A) 13.41 (B) 20.46 (C) 21.66 (D) 22.36

53. $\sqrt{50}\times\sqrt{98}$ is equal to -

(A) 63.75 (B) 65.95 (C) 70 (D) 70.25

54. Given $\sqrt{2}=1.414$. The value of

$\sqrt{8}+2\sqrt{32}-3\sqrt{128}+4\sqrt{50}$ is -

(A) 8.246 (B) 8.484 (C) 8.526 (D) 8.876

55. The approximate value of $\frac{3\sqrt{12}}{2\sqrt{28}}\div\frac{2\sqrt{21}}{\sqrt{98}}$ is -

(A) 1.0605 (B) 1.0727 (C) 1.6007 (D) 1.6026

56. $\sqrt{\frac{.081\times.484}{.0064\times6.25}}$ is equal to -

(A) 0.9 (B) 0.99 (C) 9 (D) 99

57. $\sqrt{\frac{0.204\times42}{0.07\times304}}$ is equal to -

(A) $\frac{1}{6}$ (B) 0.06 (C) 0.6 (D) 6

58. $\sqrt{\frac{0.081\times0.324\times4.624}{1.5625\times0.0289\times72.9\times64}}$ is equal to -

(A) 0.024 (B) 0.24 (C) 2.4 (D) 24

59. $\sqrt{\frac{9.5\times.085}{.0017\times.19}}$ equals -

(A) .05 (B) 5 (C) 50 (D) 500

60. The value of $\sqrt{\frac{(0.03)^2+(0.21)^2+(0.065)^2}{(0.003)^2+(0.021)^2+(0.0064)^2}}$ is -

(A) 0.1 (B) 10 (C) 10^2 (D) 10^3

61. The square root of $(7+3\sqrt{5})(7-3\sqrt{5})$ is -

(A) $\sqrt{5}$ (B) 2 (C) 4 (D) $3\sqrt{5}$

62. $\left(\sqrt{3}-\frac{1}{\sqrt{3}}\right)^2$ simplifies to -

(A) $\frac{3}{4}$ (B) $\frac{4}{\sqrt{3}}$

(C) $\frac{4}{3}$ (D) None of these

63. $\left(\sqrt{2}+\frac{1}{\sqrt{2}}\right)^2$ is equal to -

(A) $2\frac{1}{2}$ (B) $3\frac{1}{2}$ (C) $4\frac{1}{2}$ (D) $5\frac{1}{2}$

64. If a = 0.1039, then the value of $\sqrt{4a^2-4a+1}+3a$ is -

(A) 0.1039 (B) 0.2078 (C) 1.1039 (D) 2.1039

65. The square root of $\frac{(0.75)^3}{1-0.75}+[0.75+(0.75)^2+1]$ is-

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

66. If 3a = 4b = 6a and a + b + c = $27\sqrt{29}$, then $\sqrt{a^2+b^2+c^2}$ is -

(A) $3\sqrt{29}$ (B) 81

(C) 87 (D) None of these

67. The square root of $0.\overline{4}$ is -

(A) $0.\overline{6}$ (B) $0.\overline{7}$ (C) $0.\overline{8}$ (D) $0.\overline{9}$

68. Which one of the following numbers has rational square root ?

(A) 0.4 (B) 0.09 (C) 0.9 (D) 0.025

69. The value of $\sqrt{0.4}$ is -

(A) 0.02 (B) 0.2 (C) 0.51 (D) 0.63

70. The value of $\sqrt{0.121}$ is -

(A) 0.011 (B) 0.11 (C) 0.347 (D) 1.1

71. The value of $\sqrt{0.064}$ is -

(A) 0.008 (B) 0.08 (C) 0.252 (D) 0.8

72. The value of $\sqrt{\frac{0.16}{0.4}}$ is -

(A) 0.02 (B) 0.2
(C) 0.63 (D) None of these

73. The value of $\frac{1+\sqrt{0.01}}{1-\sqrt{0.1}}$ is clese to -

(A) 0.6 (B) 1.1 (C) 1.6 (D) 1.7

74. If $\sqrt{5}$ = 2.236, then the value of $\frac{1}{\sqrt{5}}$ is -

(A) .367 (B) .447
(C) .745 (D) None of these

75. If $\sqrt{24}$ =4.899, the value of $\sqrt{\frac{8}{3}}$ is -

(A) 0.544 (B) 1.333 (C) 1.633 (D) 2.666

76. If $\sqrt{6}$ =2.449, then the value of $\frac{3\sqrt{2}}{2\sqrt{3}}$ is -

(A) 0.6122 (B) 0.8163 (C) 1.223 (D) 1.2245

77. If $\sqrt{5}$ =2.236, then the value of $\frac{\sqrt{5}}{2}-\frac{10}{\sqrt{5}}+\sqrt{125}$ is equal to -

(A) 5.59 (B) 7.826 (C) 8.944 (D) 10.062

78. If $2*3=\sqrt{3}$ and $3*4$ =5, then the value of $5*12$ is -

(A) $\sqrt{17}$ (B) $\sqrt{29}$ (C) 12 (D) 13

79. The least perfect square number divisible by 3, 4, 5, 6 and 8 is -

(A) 900 (B) 1200 (C) 2500 (D) 3600

80. The least perfect square, which is divisible by each of 21, 36 and 66 is -

(A) 213444 (B) 214344
(C) 214434 (D) 231444

81. The least number by which 294 must be multiplied to make it a perfect square is -

(A) 2 (B) 3 (C) 6 (D) 24

82. Find the smallest number by which 5808 should be multiplied so that the product becomes a perfect square -

(A) 2 (B) 3 (C) 7 (D) 11

83. The least number by which 1470 must be divided to get a number which is a perfect square is -

(A) 5 (B) 6 (C) 15 (D) 30

84. What is the smallest number to be subtracted form 549162 in order to make it a perfect square?
(A) 28 (B) 36 (C) 62 (D) 81

85. What is the least which should be subtracted from 0.000326 to make it a perfect square ?
(A) 0.000002 (B) 0.000004
(C) 0.02 (D) 0.04

86. The smallest number added to 680621 to make the sum a perfect square is -
(A) 4 (B) 5 (C) 6 (D) 8

87. The greates four-digit perfect square number, is-
(A) 9000 (B) 9801 (C) 9900 (D) 9981

88. The least number of a digits which is a perfect square is -
(A) 1000 (B) 1016 (C) 1024 (D) 1036

89. Given $\sqrt{5}=2.2361$, $\sqrt{3}=1.7321$, then $\frac{1}{\sqrt{5}-\sqrt{3}}$ is equal to -
(A) 1.89 (B) 1.984 (C) 1.9841 (D) 2

90. $\frac{1}{(\sqrt{9}-\sqrt{8})}-\frac{1}{(\sqrt{8}-\sqrt{7})}+\frac{1}{(\sqrt{7}-\sqrt{6})}$
$-\frac{1}{(\sqrt{6}-\sqrt{5})}+\frac{1}{(\sqrt{5}-\sqrt{4})}$ is equal to -
(A) 0 (B) $\frac{1}{3}$ (C) 1 (D) 5

91. $\left(2+\sqrt{2}+\frac{1}{2+\sqrt{2}}+\frac{1}{\sqrt{2}+2}\right)$ simplifies to -
(A) $2-\sqrt{2}$ (B) 2 (C) $2+\sqrt{2}$ (D) $2\sqrt{2}$

92. If $\sqrt{2}=1.4142$, the square root of $\frac{\sqrt{2}-1}{\sqrt{2}+1}$ is nearest to -
(A) 0.172 (B) 0.414 (C) 0.586 (D) 1.414

93. $\left[\frac{3\sqrt{2}}{\sqrt{6}-\sqrt{3}}-\frac{4\sqrt{3}}{\sqrt{6}-\sqrt{2}}-\frac{6}{\sqrt{8}-\sqrt{12}}\right]=?$
(A) $\sqrt{3}-\sqrt{2}$ (B) $\sqrt{3}+\sqrt{2}$
(C) $5\sqrt{3}$ (D) 1

94. $\frac{\sqrt{7}+\sqrt{5}}{\sqrt{7}-\sqrt{5}}$ is equal to -
(A) 1 (B) 2
(C) $6-\sqrt{35}$ (D) $6+\sqrt{35}$

95. If $\frac{5+2\sqrt{3}}{7+4\sqrt{3}} = a+b\sqrt{3}$, then -

(A) a = –11, b= – 6 (B) a = –11, b= 6

(C) a = 11, b= – 6 (D) a = 6, b= 11

96. If $\sqrt{2}$ =1.414, the square root of $\frac{\sqrt{2}-1}{\sqrt{2}+1}$ is nearest to -

(A) 0.172 (B) 0.414

(C) 0.586 (D) 1.414

97. $\frac{3+\sqrt{6}}{3\sqrt{5}-2\sqrt{12}-\sqrt{32}+\sqrt{50}} = ?$

(A) 3 (B) $3\sqrt{2}$

(C) 6 (D) None of these

98. $\left(\frac{2+\sqrt{3}}{2-\sqrt{3}}+\frac{2-\sqrt{3}}{2+\sqrt{3}}+\frac{\sqrt{3}-1}{\sqrt{3}+1}\right)$ simplifies to -

(A) $16-\sqrt{3}$ (B) $4-\sqrt{3}$

(C) $2-\sqrt{3}$ (D) $2+\sqrt{3}$

99. If $x = (7-4\sqrt{3})$, then the value of $\left(x+\frac{1}{x}\right)$ is-

(A) $3\sqrt{3}$ (B) $8\sqrt{3}$

(C) 14 (D) $14 + 8\sqrt{3}$

100. If $x = \frac{\sqrt{3}+1}{\sqrt{3}-1}$ and $y = \frac{\sqrt{3}-1}{\sqrt{3}+1}$, then the value of $(x^2 + y^2)$ is -

(A) 10 (B) 13 (C) 14 (D) 15

101. If $a = \frac{\sqrt{5}+1}{\sqrt{5}-1}$ and $b = \frac{\sqrt{5}-1}{\sqrt{5}+1}$, the value of $\left(\frac{a^2+ab+b^2}{a^2-ab+b^2}\right)$ is -

(A) $\frac{3}{4}$ (B) $\frac{4}{3}$ (C) $\frac{3}{5}$ (D) $\frac{5}{3}$

102. A man plants 15376 apple trees in this garden and arranged them so that there are as many rows as there are apples trees in each row. The number of row is -

(A) 124 (B) 126 (C) 134 (D) 144

103. A General wishes to draw up his 56581 soldiers in the form of a solid square. After arranging them, he found that some of them are left over. How many are left ?

(A) 65 (B) 81

(C) 100 (D) None of these

104. A group of student decided to collect s many paise from each member of the group as is the number of members. If the total collection amounts to Rs. 59.29, The number of members in the group is -

(A) 54 (B) 67 (C) 77 (D) 87

105. The cube root of .000216 is -
(A) .6 (B) .06
(C) .006 (D) None of these

106. $\sqrt[3]{4\frac{12}{125}} = ?$
(A) $1\frac{2}{5}$ (B) $1\frac{3}{5}$ (C) $1\frac{4}{5}$ (D) $2\frac{2}{5}$

107. $\sqrt[3]{\sqrt{.000064}} = ?$
(A) .02 (B) .2
(C) 2 (D) None of these

108. The largest four-digit number which is a perfect cube, is -
(A) 8000 (B) 9261
(C) 9999 (D) None of these

109. By what least number 675 be multiplied to obtain a number which is a perfect cube ?
(A) 5 (B) 6 (C) 7 (D) 8

110. What is the smallest number by which 3600 be divided to make it a perfect cube ?
(A) 9 (B) 50 (C) 300 (D) 450

111. The square root of 73.96 is -
(A) 8.6 (B) 86
(C) 0.86 (D) None of these

112. If $\sqrt{\frac{x}{49}} = \frac{4}{7}$ then the value of x is -
(A) 9 (B) 25 (C) 16 (D) 8

113. Which of the following can not be a digit in the unit place of a perfect square -
(A) 1 (B) 5 (C) 7 (D) 0

114. If $\sqrt{35} = 5.9160$, then value of $\frac{\sqrt{7}+\sqrt{5}}{\sqrt{7}-\sqrt{5}}$ is -
(A) 9.1060 (B) 10.9160
(C) 11.9160 (D) 12

115. If $x = \sqrt{3018+\sqrt{36+\sqrt{169}}} = 0.9 \times 0.09 \times \sqrt{2}$ then value of $\frac{x}{2}$ is -
(A) 55 (B) 44 (C) 63 (D) 42

116. If $\sqrt{0.9\times0.09\times x} = 0.9 \times 0.09 \times \sqrt{2}$ then value of $\frac{x}{2}$ is -
(A) 0.081 (B) 0.810 (C) 0.81 (D) 8.09

117. The value of $\sqrt{7+2\sqrt{10}}$ is -
(A) $\sqrt{6}+1$ (B) $\sqrt{4}+\sqrt{3}$
(C) $\sqrt{5}+\sqrt{2}$ (D) $2+\sqrt{5}$

118. If $x = \sqrt[3]{2\frac{93}{125}}$, then value of x is -

(A) $1\frac{2}{5}$ (B) $2\frac{1}{5}$

(C) $3\frac{4}{5}$ (D) $4\frac{1}{5}$

119. A number is 64 time of the square of its reciprocal. The number is -

(A) 10 (B) 4 (C) 2 (D) 16

120. The smallest perfect square number exactly divisible by 4, 5, 6, 15, 18, is -

(A) 1800 (B) 225 (C) 361 (D) 900

121. A gardner plants 17956 trees in such a way that there are as many rows as there are trees in each row. The number of trees in a row are -

(A) 136 (B) 164 (C) 134 (D) 166

122. $\sqrt{2\sqrt{2\sqrt{2\sqrt{2\sqrt{2}}}}}$ is equal to -

(A) 0 (B) 2 (C) 1 (D) $2^{\frac{31}{32}}$

123. The greatest six digit number which is perfect square is -

(A) 998004 (B) 998006

(C) 998049 (D) 998001

124. Divide the number 26244 by the smallest number so that the quolient is a pertect cube, so the smallest number is -

(A) 4 (B) 6 (C) 36 (D) 16

125. The pertect cube cube nearest to 2750 is -

(A) 2749 (B) 2747

(C) 2744 (D) 2754

126. The least number which must be added to 4931 to make it perfect square is -

(A) 110 (B) 120

(C) 130 (D) None

127. The least number which must be added to 4931 to make it perfect square is -

(A) 20 (B) 30 (C) 40 (D) 50

128. Least pertect square of 6 digits is -

(A) 998000 (B) 998001

(C) 998002 (D) None of these

129. A $8 \times 6 \times 4$ cm^3 metalic cube is melted. Find the minimum volume of molten metal which should be added to mould it into a cube whose edge is an x, where x is an interger -

(A) 20 (B) 21 (C) 23 (D) 24

130. Value of $\sqrt[3]{392} \times \sqrt[3]{448}$ is -

(A) 50 (B) 52 (C) 54 (D) 56

131. The smallest number by which 137592 should be multiply to make it perfect cube -
(A) 1183 (B) 1180
(C) 1181 (D) None of these

132. The volume of two cubes are in the ratio of 343 : 1331, the ratio of their edges is -
(A) 7 : 10 (B) 7 : 11
(C) 7 : 12 (D) None of these

ANSWER KEY

Q.No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	B	A	A	C	B	A	D	C	B	D	B	B	D	D	C	B	B	B	B	D
Q.No	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Ans.	D	B	D	B	D	B	D	D	C	B	A	D	C	B	B	A	A	B	C	A
Q.No	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	C	A	D	C	A	A	D	C	B	B	B	D	C	B	A	B	D	A	C	B
Q.No	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Ans.	B	C	C	C	B	C	A	B	D	C	C	C	C	B	C	D	B	D	D	A
Q.No	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Ans.	C	B	D	D	A	A	B	C	C	D	B	B	C	D	C	B	D	A	C	C
Q.No	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
Ans.	B	A	C	C	B	B	B	B	A	D	A	C	C	C	A	A	C	A	B	D
Q.No	121	122	123	124	125	126	127	128	129	130	131	132								
Ans.	C	D	D	C	C	A	C	B	D	D	A	B								

HINTS & SOLUTION

1.

$$\begin{array}{r|l} 2 & \overline{53824}\ (232 \\ & 4 \\ \hline 43 & 138 \\ & 129 \\ \hline 462 & 924 \\ & 924 \\ \hline & \times \end{array}$$

$\therefore \quad \sqrt{53824} = 232.$

3. Given exp.

$$= \sqrt{10+\sqrt{25+\sqrt{108+\sqrt{154+15}}}}$$

$$= \sqrt{10+\sqrt{25+\sqrt{108+\sqrt{169}}}}$$

$$= \sqrt{10+\sqrt{25+\sqrt{108+13}}} = \sqrt{10+\sqrt{25+\sqrt{121}}}$$

$$= \sqrt{10+\sqrt{25+\sqrt{11}}} = \sqrt{10+\sqrt{36}} = \sqrt{10+6}$$

$$= \sqrt{16} = 4.$$

4. Given exp.

$$= \sqrt{41-\sqrt{21+\sqrt{19-3}}} = \sqrt{41-\sqrt{21+\sqrt{16}}}$$

$$= \sqrt{41-\sqrt{21+4}} = \sqrt{41-5} = \sqrt{36} = 6.$$

5. Given exp.

$= \sqrt{176+49} = \sqrt{225} = 15.$

$$\begin{array}{r|l} 4 & \overline{2401}\ (49 \\ & 16 \\ \hline 89 & 801 \\ & 801 \\ \hline & \times \end{array}$$

7. Given exp. $= \left(\dfrac{\sqrt{225}}{\sqrt{729}} - \dfrac{\sqrt{25}}{\sqrt{144}}\right) \div \dfrac{\sqrt{16}}{\sqrt{81}}$

$$= \left(\frac{15}{108} \times \frac{9}{4}\right) \div \frac{5}{16}.$$

9. $6*24 = 6 + 24 + \sqrt{6 \times 24} = 30 + \sqrt{144}$

$= 30 + 12 = 42.$

10. $10y\sqrt{y^3 - y^2} = 10 \times 5\sqrt{5^3 - 5^2}$

$= 50 \times \sqrt{125-25} = 50 \times \sqrt{100} = 50 \times 10 = 500$

13.

1	$\overline{15}\,\overline{87}\,\overline{6}$ (126
	1
22	58
	44
246	1476
	1476
	×

$\therefore \quad \sqrt{15876} = 126$

14. A number ending in 8 can never be a perfect square.

17. $\sqrt{0.00004761} = \sqrt{\frac{4761}{10^8}} = \frac{\sqrt{4761}}{\sqrt{10^8}} = \frac{69}{10^4}$

$= \frac{69}{10000} = 0.0069$

18. $1.5^2 \times \sqrt{0.0225} = 1.5^2 \times \sqrt{\frac{225}{10000}}$

$= 2.225 \times \frac{15}{100} = 2.25 \times 0.15 = 0.3375$

19. $\sqrt{0.01 + \sqrt{0.0064}} = 1.5^2 \times \sqrt{\frac{225}{10000}}$

$= 2\sqrt{0.01 + \sqrt{0.0064}} = \sqrt{0.01 + \sqrt{\frac{64}{10000}}}$

$= \sqrt{0.01 + \frac{8}{100}} + \sqrt{0.01 + 0.08} = \sqrt{0.09} = 0.3.$

20. Given exp. $= \sqrt{\frac{1}{100}} + \sqrt{\frac{81}{100}} + \sqrt{\frac{121}{100}} + \sqrt{\frac{9}{10000}}$

$= \frac{1}{10} + \frac{9}{10} + \frac{11}{10} + \frac{3}{100}$

$= 0.1 + 0.9 + 1.1 + 0.03 = 2.13.$

21. Given Exp. $= \sqrt{\frac{25}{10000}} \times \sqrt{\frac{255}{100}} \times \sqrt{\frac{1}{10000}}$

$= \frac{5}{100} \times \frac{15}{10} \times \frac{1}{100} = \frac{75}{100000} = 0.00075.$

22.

1	$1.\overline{56}\,\overline{25}$ (1.25
	1
22	56
	44
245	1225
	1225
	×

23. $\sqrt{6760000} = \sqrt{0.00000676 \times 10^{12}}$

$= \sqrt{0.00000676} \times \sqrt{10^{12}} = .0026 \times 10^6 = 2600.$

24. Given exp.

$= \sqrt{\frac{18225}{10^2}} + \sqrt{\frac{18225}{10^4}} + \sqrt{\frac{18225}{10^6}} + \sqrt{\frac{18225}{10^8}}$

$= \frac{\sqrt{18225}}{10} + \frac{\sqrt{18225}}{10^2} + \frac{\sqrt{18225}}{10^3} + \frac{\sqrt{18225}}{10^4}$

$= \frac{135}{10} + \frac{135}{100} + \frac{135}{1000} + \frac{135}{10000}$

$= 13.5 + 1.35 + 0.135 + 0.0135 = 14.9985$

25. Given exp. $= \sqrt{1.30} + \sqrt{1300} + \sqrt{0.0130}$

$= \sqrt{\frac{130}{100}} + \sqrt{13 \times 100} + \sqrt{\frac{130}{10000}}$

$= \frac{\sqrt{130}}{10} + \sqrt{13} \times 10 + \frac{\sqrt{130}}{100}$

$= \frac{11.40}{10} + 3.605 \times 10 + \frac{11.40}{100}$

$= 1.14 + 36.05 + 0.114 = 37.304.$

26. $\frac{52}{x} = \sqrt{\frac{169}{289}} \Leftrightarrow \frac{52}{x} = \frac{13}{17} \Leftrightarrow x = \left(\frac{52 \times 17}{13}\right) = 38$

27. Let the missing number be x

Then, $x^2 = 15 \times 136 \Leftrightarrow x = \sqrt{15 \times 135}$

$= \sqrt{15^2 \times 3^2} = 15 \times 3 = 45.$

28. Let $\frac{4\frac{1}{2}}{x} = \frac{x}{32}.$

Then, $x^2 = 32 \times \frac{9}{2} = 144 \Leftrightarrow x = \sqrt{144} = 12$

29. Let $\frac{x}{\sqrt{128}} = \frac{\sqrt{162}}{x}.$

Then, $x^2 = \sqrt{128 \times 162} = \sqrt{64 \times 2 \times 18 \times 9}$

$= \sqrt{8^2 \times 6^2 \times 3^2} = 8 \times 6 \times 3 = 144$

30. $\frac{0.13}{p^2} = 13 \Leftrightarrow p^2 \ \frac{0.13}{13} = \frac{1}{100} \Leftrightarrow p$

$= \sqrt{\frac{1}{100}} = \frac{1}{100} = \frac{1}{10} = 0.1.$

31. Let the required number be x. Then,

$$\frac{x}{\sqrt{0.25}} = 25 \Leftrightarrow \frac{x}{0.5} = 25 \Leftrightarrow x = 25 \times 0.5 = 12.5$$

32. $\sqrt{3^n} = 729 = 3^6 \Leftrightarrow (\sqrt{3^n})^2 = (3^6)^2 \Leftrightarrow 3^n$
$= 13^{12} \Leftrightarrow n = 12$

33. $\sqrt{18 \times 14 \times x} = 84 \Leftrightarrow 18 \times 14 \times x$
$= 84 \times 84 \Leftrightarrow x = \frac{84 \times 84}{18 \times 14} = 28$

34. Let $28\sqrt{x} + 1426 = 3 \times 718$

35. Let $\sqrt{\frac{x}{169}} = \frac{54}{39}$. Then, $\frac{\sqrt{x}}{13} = \frac{54}{39} \Leftrightarrow \sqrt{x}$
$= \left(\frac{59}{39} \times 13\right) = 18 \Leftrightarrow x = (18)^2 = 324$

36. $\frac{\sqrt{x}}{\sqrt{441}} = 0.02 \Leftrightarrow \sqrt{x} = \left(\frac{54}{39} \times 13\right)$
$= 18 \Leftrightarrow x = (0.42)^2 = 0.1764.$

37. Let $\sqrt{\frac{.0169}{x}} = 0.2$. Then, $\frac{.0196}{x}$
$= 0.04 \Leftrightarrow x = \frac{.0196}{.04} = \frac{1.96}{4} = .49.$

38. Let $\sqrt{0.0169 \times x} = 1.3$. Then, $0.0169x = (1.3)^2$
$= 1.69 \Leftrightarrow x = \frac{1.69}{0.0169} = 100.$

39. $37 + \sqrt{.0615 + x} = 37.25 \Leftrightarrow \sqrt{.0615 + x} = 0.25$
$\Leftrightarrow .615 + x = (0.25)^2 = 0.0625 \Leftrightarrow x = 0.001$
$= \frac{1}{10^3} = 10^{-3}.$

40. $\sqrt{(x-1)(y+2)} = 7 \Rightarrow (x - 1)(y + 2) = (7)^2$
$\Rightarrow (x - 1) = 7$ and $(y + 2) = 7$

41. $\frac{\sqrt{a}}{\sqrt{b}} = \frac{.004 \times .4}{\sqrt{.04 \times .4}} \Rightarrow \frac{a}{b} = \frac{.004 \times .4 \times .004 \times .4}{.04 \times .4}$
$= \frac{.0000064}{.04}$
$\therefore \frac{a}{b} = \frac{.00064}{4} = .00016 = \frac{16}{10^5} = 16 \times 10^{-5}$

42. Let the number be x. Then,

$\frac{3}{5}x^2 = 126.15 \Leftrightarrow x^2$

$= \left(126.15 \times \frac{5}{3}\right) = 210.25 \Leftrightarrow x = \sqrt{210.25} = 14.5$

43. $\sqrt{\frac{0.361}{0.00169}} = \sqrt{\frac{0.36100}{0.00169}} = \sqrt{\frac{36100}{169}} = \frac{190}{13}.$

44. $\sqrt{\frac{48.4}{0.289}} = \sqrt{\frac{48.400}{0.289}} = \sqrt{\frac{48400}{289}} = \frac{220}{17} = 12\frac{16}{17}.$

45. $\sqrt{1+\frac{x}{169}} = \frac{x}{27} \Rightarrow \sqrt{\frac{784}{729}} = \frac{27+x}{27} \Rightarrow \frac{28}{27}$

$= \frac{27+x}{27} \Rightarrow 27 + x = 28 \Rightarrow x = 1.$

46. $\sqrt{1+\frac{55}{729}} = 1+\frac{x}{27} \Rightarrow \sqrt{\frac{784}{729}} = \frac{27+x}{27} \Rightarrow \frac{28}{27}$

$= \frac{27+x}{27} \Rightarrow 27 + x = 28 \Rightarrow x = 1$

47.

1	$2.\overline{00}\,\overline{00}\,00$ (1.414
	1
24	100
	96
281	400
	281
2824	11900
	11296

$\therefore \sqrt{2} = 1.414.$

48. $2\sqrt{2} - \sqrt{75} + \sqrt{12} = 2\sqrt{9\times3} - \sqrt{25\times3} + \sqrt{4\times3}$

$= 6\sqrt{3} - 5\sqrt{3} + 2\sqrt{3} = 3\sqrt{3}.$

49. $(\sqrt{12} + \sqrt{18}) - (\sqrt{3} + \sqrt{2})$

$= (\sqrt{4\times3} + \sqrt{9\times2}) - (\sqrt{3} + \sqrt{2})$

$= (2\sqrt{3} + 3\sqrt{2}) - (\sqrt{3} + \sqrt{2})$

$= (2\sqrt{3} - \sqrt{3}) + (3\sqrt{2} - \sqrt{2}) = \sqrt{3} + 2\sqrt{2}.$

50. $\frac{\sqrt{24}+\sqrt{216}}{\sqrt{96}} = \frac{\sqrt{4\times6}+\sqrt{36\times6}}{\sqrt{16\times6}}$

$= \frac{2\sqrt{6}+6\sqrt{6}}{4\sqrt{6}} = \frac{8\sqrt{6}}{4\sqrt{6}} = 2.$

51. $\frac{\sqrt{80}-\sqrt{112}}{\sqrt{45}-\sqrt{163}} = \frac{\sqrt{16\times5}-\sqrt{16\times7}}{\sqrt{9\times5}-\sqrt{9\times7}}$

$= \frac{4\sqrt{5}-4\sqrt{7}}{3\sqrt{5}-3\sqrt{7}} = \frac{4(\sqrt{5}-\sqrt{7})}{3(\sqrt{5}-\sqrt{7})} = \frac{4}{3} = 1\frac{1}{3}$

52. $3\sqrt{5}+\sqrt{125}=17.88 \Rightarrow 3\sqrt{5}+\sqrt{25\times5}=17.88$

$\Rightarrow 3\sqrt{5}+5\sqrt{5}=17.88 \Rightarrow 8\sqrt{5}$

$=17.88 \Rightarrow \sqrt{5}=2.235$

$\therefore \sqrt{80}+6\sqrt{5}=\sqrt{16\times5}+6\sqrt{5}$

$= 4\sqrt{5}+6\sqrt{5}=10\sqrt{5}=(10\times2.235)=22.35$

53. $\sqrt{50}\times\sqrt{98}=\sqrt{50\times98}=\sqrt{4900}=70.$

54. Given exp.

$= \sqrt{4\times2}+2\sqrt{16\times2}-3\sqrt{64\times2}+4\sqrt{25\times2}$

$= 2\sqrt{2}+8\sqrt{2}-24\sqrt{2}+20\sqrt{2}$

$= 6\sqrt{2}=6\times1.414=8.484.$

55. Given exp.

$$=\frac{3\sqrt{2}}{2\sqrt{28}}\times\frac{\sqrt{98}}{2\sqrt{21}}=\frac{2\sqrt{4\times3}}{3\sqrt{4\times7}}\times\frac{\sqrt{49\times2}}{2\sqrt{21}}$$

$$=\frac{6\sqrt{3}}{4\sqrt{7}}\times\frac{7\sqrt{3}}{4\sqrt{7}}\times\frac{7\sqrt{2}}{2\sqrt{21}}$$

$$=\frac{21\sqrt{6}}{4\sqrt{7\times21}}=\frac{21\sqrt{6}}{28\sqrt{3}}=\frac{3}{4}\sqrt{2}$$

$$=\frac{3}{4}\times1.414=3\times0.3535=1.0605$$

56. Sum of decimal places in the numerator and denominator under the radical sign being the same, we remove the decimal.

$\therefore$ Given exp. $=\sqrt{\frac{81\times484}{64\times625}}=\frac{9\times22}{8\times25}=0.99.$

57. Given exp. $=\sqrt{\frac{204\times42}{7\times34}}=\sqrt{36}=6.$

58. Given exp.

$$=\sqrt{\frac{81\times324\times4624}{15625\times289\times729\times64}}=\frac{9\times18\times68}{125\times17\times27\times8}$$

$$=\frac{3}{125}=0.024.$$

59. Given exp. $=\sqrt{\frac{9.5\times08500}{.19\times.0017}}=\sqrt{\frac{95\times82500}{19\times17}}$

$=\sqrt{5\times500}=\sqrt{2500}=50$

60. Given exp. $=\sqrt{\frac{(0.03)^2+(0.21)^2+(0.065)^2}{\left(\frac{0.03}{10}\right)^2+\left(\frac{0.21}{10}\right)^2+\left(\frac{0.065}{10}\right)^2}}$

$$=\sqrt{\frac{100[(0.03)^2+(0.21)^2+(0.065)^2]}{(0.03)^2+(0.21)^2+(0065)^2}}=\sqrt{100}=10.$$

61. $\sqrt{(7+3\sqrt{5})(7-3\sqrt{5})} = \sqrt{(7)^2-(3\sqrt{5})^2}$

$= \sqrt{49-45} = \sqrt{4} = 2.$

62. $\left(\sqrt{3}-\frac{1}{\sqrt{3}}\right)^2 = (\sqrt{3})^2+\left(\frac{1}{\sqrt{3}}\right)^2-2\times\sqrt{3}\times\frac{1}{\sqrt{3}}$

$= 3+\frac{1}{3}-2 = 1+\frac{1}{3} = \frac{4}{3}.$

63. $\left(\sqrt{2}+\frac{1}{\sqrt{2}}\right)^2 = (\sqrt{2})^2+\left(\frac{1}{\sqrt{3}}\right)^2-2\times\sqrt{2}\times\frac{1}{\sqrt{2}}$

$= 2+\frac{1}{2}+2 = 4+\frac{1}{2} = 4\frac{1}{2}.$

64. $\sqrt{4a^2-4a+1}+3a$

$= \sqrt{(1)^2+(2a)^2-2\times1\times2a+3a}$

$= \sqrt{(1-2a)^2}+3a = (1-a)+3a$

$= (1 + a) = (1 + 0.1039) = 1.1039.$

65. $\sqrt{\frac{(0.75)^3}{(1-0.75)}+[0.75+(0.75)^2+1]}$

$= \sqrt{\frac{(0.75)^3+(1-0.75)[(1)^2+(0.75)^2+1\times0.75]}{1-0.75}}$

$= \sqrt{\frac{(0.75)^3+[(1)^3-(0.75)^3]}{1-0.75}} = \sqrt{\frac{1}{0.25}} =$

$= \sqrt{\frac{100}{25}} = \sqrt{4} = 2.$

66. $4a = 6c \Rightarrow b = \frac{2}{3}c$ and $3a = 4b \Rightarrow a = \frac{4}{3}b$

$= \frac{4}{3}\left(\frac{3}{2}c\right) = 2c.$

$a + b + c = 27\sqrt{29} \Rightarrow 2c+\frac{3}{2}c+c$

$= 27\sqrt{29} \Rightarrow \frac{9}{2}c = 27\sqrt{29} \Rightarrow c = 6\sqrt{29}.$

$\therefore \sqrt{a^2+b^2+c^2}$

$= \sqrt{(a+b+c+)^2-2(ab+bc+ca)}$

$= \sqrt{(27\sqrt{29})^2-2\left(2c\times\frac{3}{2}c+\frac{3}{2}c\times c+c\times2c\right)}$

$= \sqrt{(729\times29)-2\left(3c^2+\frac{3}{2}c^2+2c^2\right)}$

$= \sqrt{(729\times29)-2\times\frac{13}{2}c^2}$

$= \sqrt{(729\times29)-13\times(6\sqrt{29})^2}$

$= \sqrt{(729\times 29)-13\times(6\sqrt{29})^2}$

$= \sqrt{29(729-468)}$

$= \sqrt{29\times 261} = \sqrt{29\times 29\times 9} = 29 \times 3 = 87.$

67. $\sqrt{0.\overline{4}} = \sqrt{\frac{4}{9}} = \frac{2}{3} = 0.666..... = 0.\overline{6}$.

68. $\sqrt{0.09} = \sqrt{\frac{9}{100}} = \frac{3}{10} = 0.3$, Which is rational.

$\therefore$ 0.09 has rational square root.

69.

```
 6 | 0.40 00 00 ( .63
     36
   ------
123 | 400
     369
   ------
```

70.

```
 3 | 0.12 10 00 ( .347
     9
   ------
 64 | 310
      256
   ------
687 | 5400
      4809
   ------
```

71.

```
 2 | 0.06 40 00 ( .252
     4
   ------
 45 | 240
      225
   ------
502 | 1500
      1006
   ------
```

72. $\sqrt{\frac{0.16}{0.4}} = \sqrt{\frac{0.16}{0.4}} = \sqrt{\frac{16}{40}} = \sqrt{\frac{4}{10}} = \sqrt{0.4} = 0.63$.

73. $\frac{1+\sqrt{0.01}}{1-\sqrt{0.1}} = \frac{1+0.1}{1-0.316} = \frac{1.1}{0.684}$

```
 3 | 0.1 00 00 00 ( .316
     9
   ------
 61 | 100
      60
   ------
 62 | 3900
      3750
   ------
```

$= \frac{1100}{684} = 1.6.$

74. $\frac{1}{\sqrt{5}} = \frac{1}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}} = \frac{\sqrt{5}}{5} = \frac{2.236}{5} = 0.447.$

75. $\sqrt{\frac{8}{3}} = \sqrt{\frac{8\times 3}{3\times 3}} = \frac{\sqrt{24}}{3} = \frac{4.899}{3} 1.633.$

76. $\frac{3\sqrt{2}}{2\sqrt{3}} = \frac{3\sqrt{2}}{2\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{6}}{2} = \frac{2.449}{2} = 1.2245.$

77. $\frac{\sqrt{5}}{2} - \frac{10}{\sqrt{5}} + \sqrt{125} = \frac{(\sqrt{5})^2 - 20 + 2\sqrt{5} \times 5\sqrt{5}}{2\sqrt{5}}$

$= \frac{2 - 20 + 50}{2\sqrt{5}} = \frac{35}{2\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}}$

$= \frac{35\sqrt{5}}{10} = \frac{7}{2} \times 2.236 = 7 \times 1.118 = 7.826.$

78. Clearly, $a + b = \sqrt{a^2 + b^2}$

$\therefore \quad 5 * 12 = \sqrt{5^2 + 12^2} = \sqrt{25 + 144} = \sqrt{169} = 13.$

79. L.C.M. of 3, 4, 5, 6, 8 is 120. Now,
$120 = 2 \times 2 \times 2 \times 3 \times 5.$
To make it a perfect square, it must be multiplied by $2 \times 3 \times 5$.
So, required number
$= 2^2 \times 2^2 \times 3^2 \times 5^2 = 3600.$

80. L.C.M. of 21, 36, 66 = 2772. Now,
$2772 = 2 \times 2 \times 3 \times 3 \times 7 \times 11.$
To make it a perfect square, It must be multiplied by 7×11.
So required number $= 2^2 \times 3^2 \times 7^2 \times 11^2$
$= 213444.$

81. $294 = 7 \times 7 \times 2 \times 3$

i.e., 6.

$\therefore$ Required number is = 6.

82. $5808 = 2 \times 2 \times 2 \times 2 \times 3 \times 11 \times 11$
$= 2^2 \times 2^2 \times 3 \times 11^2 = 213444.$
To make it a perfect square, It must be multiplied by 3.

83. $1470 = 7 \times 7 \times 5 \times 6$. To make it a perfect square, it must be a divided by 5×6, *i.e.*, 30.

84.

7	$\overline{54}\,\overline{91}\,\overline{62}$ (741
	49
144	591
	576
1481	1562
	1481
	81

$\therefore$ Required number to be subtracted = 81.

85. $0.000326 = \frac{326}{10^6}$

1	$\overline{326}$ (18
	1
28	226
	224
	2

$\therefore$ Required number to be subtracted $= \frac{2}{10^6}$

$=$ 0.000002.

86.

```
  8 | 6̄8̄0̄6̄2̄1̄ ( 824
    | 64
    |-----
162 | 406
    | 324
    |-----
1644| 8221
    | 6576
    |-----
    | 1645
```

$\therefore$ Number to be added $= (825)^2 - 680621$

$= 680625 - 680621 = 4.$

87. Greates number of foud digits is 9999.

```
  9 | 9̄9̄9̄9̄ ( 99
    | 81
    |-----
189 | 1899
    | 1701
    |-----
    | 198
```

$\therefore$ Required number $= (9999 - 198) = 9801.$

88. Least number of four digits is 1000.

```
  3 | 1̄0̄0̄0̄ ( 31
    | 9
    |-----
 61 | 100
    | 61
    |-----
    | 39
```

$\therefore$ $(31)^2 < 1000 < (32)^2$. Hence, required number $= (32)^2 = 1024.$

89. $$\frac{1}{(\sqrt{5}-\sqrt{3})} = \frac{1}{(\sqrt{5}-\sqrt{3})} \times \frac{(\sqrt{5}+\sqrt{3})}{(\sqrt{5}+\sqrt{3})}$$

$$= \frac{(2.2361+1.7321)}{2} = \frac{3.9682}{2} = 1.9841$$

90. Given exp.

$$= \frac{1}{(\sqrt{9}-\sqrt{8})} \times \frac{(\sqrt{9}+\sqrt{8})}{(\sqrt{9}+\sqrt{8})} - \frac{1}{(\sqrt{8}-\sqrt{7})}$$

$$\times \frac{(\sqrt{8}+\sqrt{7})}{(\sqrt{8}+\sqrt{7})} + \frac{1}{(\sqrt{7}-\sqrt{6})} \times \frac{(\sqrt{7}+\sqrt{6})}{(\sqrt{7}+\sqrt{6})}$$

$$- \frac{1}{(\sqrt{6}-\sqrt{5})} \times \frac{(\sqrt{6}+\sqrt{5})}{(\sqrt{6}+\sqrt{5})}$$

$$+ \frac{1}{(\sqrt{5}-\sqrt{4})} \times \frac{(\sqrt{5}+\sqrt{4})}{(\sqrt{5}+\sqrt{4})}$$

$$= \frac{(\sqrt{9}+\sqrt{8})}{(9-8)} - \frac{(\sqrt{8}+\sqrt{7})}{(8-7)} + \frac{(\sqrt{7}+\sqrt{6})}{(7-6)}$$
$$- \frac{(\sqrt{6}+\sqrt{5})}{(6-5)} - \frac{(\sqrt{5}+\sqrt{4})}{(5-4)}$$
$$= (\sqrt{9}+\sqrt{8}) - (\sqrt{8}+\sqrt{7}) + (\sqrt{7}+\sqrt{6})$$
$$- (\sqrt{6}+\sqrt{5}) + (\sqrt{5}+\sqrt{4}) = (\sqrt{9}+\sqrt{4})$$
$$= 3 + 2 = 5.$$

91. Given exp. $= (2 + \sqrt{2}) + \frac{1}{(2+\sqrt{2})} \times \frac{(2-\sqrt{2})}{(2-\sqrt{2})}$
$$- \frac{1}{(2-\sqrt{2})} \times \frac{(2+\sqrt{2})}{(2+\sqrt{2})}$$
$$= (2+\sqrt{2}) + \frac{(2-\sqrt{2})}{(4-2)} - \frac{(2+\sqrt{2})}{(4-2)}$$
$$= (2+\sqrt{2}) + \frac{1}{2}(2-\sqrt{2}) - \frac{1}{2}(2+\sqrt{2}) = 2.$$

92. $\frac{7}{(3+\sqrt{2})} = \frac{7}{(3+\sqrt{2})} \times \frac{(3-\sqrt{2})}{(3-\sqrt{2})}$
$$= \frac{7(3-\sqrt{2})}{(9-2)} = (3-\sqrt{2})$$
$$= (3 - 1.4142) = 1.5858.$$

93. Given exp.
$$= \frac{3\sqrt{2}}{(\sqrt{6}-\sqrt{3})} \times \frac{(\sqrt{6}+\sqrt{3})}{(\sqrt{6}+\sqrt{3})} - \frac{4\sqrt{3}}{(\sqrt{6}-\sqrt{2})}$$
$$\times \frac{(\sqrt{6}+\sqrt{2})}{(\sqrt{6}+\sqrt{2})} - \frac{6}{2(\sqrt{2}-\sqrt{3})}$$
$$= \frac{3\sqrt{2}(\sqrt{6}+\sqrt{3})}{(6-3)} - \frac{4\sqrt{3}(\sqrt{6}+\sqrt{2})}{(6-2)}$$
$$+ \frac{3}{(\sqrt{3}-\sqrt{2})} \times \frac{(\sqrt{3}+\sqrt{2})}{(\sqrt{3}+\sqrt{2})}$$
$$= \sqrt{2} + (\sqrt{6}+\sqrt{3}) - \sqrt{3}(\sqrt{6}+\sqrt{2}) + 3(\sqrt{3}+\sqrt{2})$$
$$= \sqrt{12} + \sqrt{6} - \sqrt{18} - \sqrt{6} + 3\sqrt{3} + 3\sqrt{2}$$
$$= 2\sqrt{3} - 3\sqrt{2} + 3\sqrt{3} + 3\sqrt{2} = 5\sqrt{3}.$$

94. $\frac{\sqrt{7}+\sqrt{5}}{\sqrt{7}-\sqrt{5}} = \frac{\sqrt{7}+\sqrt{5}}{\sqrt{7}-\sqrt{5}} \times \frac{(\sqrt{7}+\sqrt{5})}{(\sqrt{7}+\sqrt{5})}$
$$= \frac{(\sqrt{7}+\sqrt{5})^2}{(7-5)} = \frac{7+5+2\sqrt{35}}{2}$$
$$= \frac{12+2\sqrt{35}}{2} = 6+\sqrt{35}.$$

95. $a+b\sqrt{3}=\frac{(5+2\sqrt{3})}{(7+4\sqrt{3})}\times\frac{(7-4\sqrt{3})}{(7-4\sqrt{3})}$

$=\frac{35-20\sqrt{3}+14\sqrt{3}-24}{(7)^2-(4\sqrt{3})^2}=\frac{11-6\sqrt{3}}{49-48}=11-6\sqrt{3}$

$\therefore$ a = 11, b = – 6.

96. $\frac{\sqrt{2}-1}{\sqrt{2}+1}=\frac{(\sqrt{2}-1)}{(\sqrt{2}+1)}\times\frac{(\sqrt{2}-1)}{(\sqrt{2}-1)}=(\sqrt{2}-1)^2.$

$\therefore\ \sqrt{\frac{\sqrt{2}-1}{\sqrt{2}+1}}=(\sqrt{2}-1)=(1.414-1)\ =0.414.$

97. Givne exp.

$=\frac{3+\sqrt{6}}{5\sqrt{3}-4\sqrt{3}-4\sqrt{2}+4\sqrt{2}}=\frac{(3+\sqrt{6})}{(\sqrt{3}+\sqrt{2})}$

$=\frac{(3+\sqrt{6})}{(\sqrt{3}+\sqrt{2})}\times\frac{(\sqrt{3}-\sqrt{2})}{(\sqrt{3}-\sqrt{2})}$

$=\frac{3\sqrt{3}-3\sqrt{2}+3\sqrt{2}-2\sqrt{3}}{(3-2)}=\sqrt{3}.$

98. Given exp.

$=\frac{(2+\sqrt{3})}{(2-\sqrt{3})}\times\frac{(2+\sqrt{3})}{(2+\sqrt{3})}+\frac{(2-\sqrt{3})}{(2+\sqrt{3})}\times\frac{(2-\sqrt{3})}{(2-\sqrt{3})}$

$+\frac{(\sqrt{3}-1)}{(\sqrt{3}+1)}\times\frac{(\sqrt{3}-1)}{(\sqrt{3}-1)}$

$=\frac{(2+\sqrt{3})^2}{(4-3)}+\frac{(2-\sqrt{3})^2}{(4-3)}+\frac{(\sqrt{3}-1)}{(\sqrt{3}+1)}\times\frac{(\sqrt{3}-1)}{(\sqrt{3}-1)}$

$=\frac{(2+\sqrt{3})^2}{(4-3)}+\frac{(2-\sqrt{3})^2}{(4-3)}+\frac{(\sqrt{3}-1)^2}{(3-1)}$

$=[(2+\sqrt{3})^2+(2-\sqrt{3})^2]+\frac{4-2\sqrt{3}}{2}$

$= 2\ (4 + 3) + 2 - \sqrt{3}\ = 16 - \sqrt{3}.$

99. $x+\frac{1}{x}=(7-4\sqrt{3})+\frac{1}{(7-4\sqrt{3})}\times\frac{(7+4\sqrt{3})}{(7+4\sqrt{3})}$

$=(7+4\sqrt{3})+\frac{(7+4\sqrt{3})}{(49-48)}$

$= (7 - 4\sqrt{3}) + (7 + 4\sqrt{3}) = 14.$

100. $x=\frac{(\sqrt{3}+1)}{(\sqrt{3}-1)}\times\frac{(\sqrt{3}+1)}{(\sqrt{3}-1)}=\frac{(\sqrt{3}+1)^2}{(3-1)}$

$=\frac{3+1+2\sqrt{3}}{2}=2+\sqrt{3}.$

$y=\frac{(\sqrt{3}-1)}{(\sqrt{3}+1)}\times\frac{(\sqrt{3}+1)}{(\sqrt{3}+1)}=\frac{(\sqrt{3}-1)^2}{(3+1)}$

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

$\therefore \quad x^2 + y^2 = (2+\sqrt{3})^2 + (2-\sqrt{3})^2$

$= 2\ (4 + 3) = 2 \times 7 = 14.$

101. $a = \dfrac{(\sqrt{5}+1)}{(\sqrt{5}-1)} \times \dfrac{(\sqrt{5}+1)}{(\sqrt{5}+1)} = \dfrac{(\sqrt{5}+1)^2}{(5-1)}$

$= \dfrac{5+2+1\sqrt{5}}{4} = \left(\dfrac{3+\sqrt{5}}{2}\right).$

$b = \dfrac{(\sqrt{5}-1)}{(\sqrt{5}+1)} \times \dfrac{(\sqrt{5}-1)}{(\sqrt{5}-1)} = \dfrac{(\sqrt{5}+1)^2}{(5-1)}$

$= \dfrac{5+1+2\sqrt{5}}{4} = \left(\dfrac{3+\sqrt{5}}{2}\right).$

$\therefore \quad a^2 + b^2 = \dfrac{(3+\sqrt{5})^2}{4} + \dfrac{(3-\sqrt{5})^2}{4}$

$= \dfrac{(3+\sqrt{5})^2 + (3-\sqrt{5})^2}{4} = \dfrac{2(9+5)}{4} = 7.$

102.

1	15376 (124
	1
22	53
	44
244	976
	976
	×

$\therefore$ Number of row = 124.

103.

1	36581 (191
	1
29	265
	261
381	481
	381
	100

$\therefore$ Number of men left = 100.

104. Money collected = (59.29 × 100) paise
= 5929 paise

$\therefore$ Number of members = $\sqrt{5929} = 77.$

105. $(.000216)^{1/3} = \left(\dfrac{216}{10^6}\right)^{1/3} = \left(\dfrac{6\times6\times6}{10^2\times10^2\times10^2}\right)$

$= \dfrac{6}{10^2} = \dfrac{6}{100} = .06.$

106. $\sqrt[3]{4\dfrac{12}{125}} = \sqrt[3]{4\dfrac{512}{125}} = \left(\dfrac{8\times8\times8}{5\times5\times5}\right)^{1/3} = \dfrac{8}{5} = 1\dfrac{3}{5}.$

107. $\sqrt{.000064} = \sqrt{\frac{64}{10^6}} = \frac{8}{10^3} = \frac{8}{1000} = .008$.

$\therefore \quad \sqrt[3]{\sqrt{.000064}} = \sqrt[3]{.008} = \sqrt[3]{\frac{8}{1000}} = \frac{2}{10} = 0.2$

108. Clearly, 9261 is a perfect cube satisfying the given property.

109. $675 = 5 \times 5 \times 3 \times 3 \times 3$.
To make it a perfect cube, it must be multiplied by 5.

110. $3600 = 2^3 \times 5^2 \times 3^2 \times 2$.
To make it a perfect cube, it must be divided by $5^2 \times 3^2 \times 2$ *i.e.,* 450.

111. (A) Do your self.

112. (C) $\sqrt{\frac{x}{49}} = \frac{4}{7}$ or $\frac{\sqrt{x}}{7} = \frac{4}{7} \Rightarrow \sqrt{x} = 4 \Rightarrow x = 16$

113. (C) Do your self.

114. (C) $\frac{\sqrt{7}+\sqrt{5}}{\sqrt{7}-\sqrt{5}} \times \frac{\sqrt{7}+\sqrt{5}}{\sqrt{7}+\sqrt{5}} = \frac{(\sqrt{7}+\sqrt{5})^2}{7-5}$

$= \frac{7+5+2\sqrt{35}}{2} = \frac{12+2\sqrt{35}}{2} = 6+\sqrt{35}$

$= 6 + 5.9160 = 11.9160$

115. (A) $\sqrt{318+\sqrt{36+\sqrt{169}}} = \sqrt{3018+\sqrt{36+\sqrt{13}}}$

$= \sqrt{3018+\sqrt{49}}$

$= \sqrt{3018+7} = \sqrt{3025} = 55$

116. (A) $\sqrt{\frac{x}{5}} = \frac{0.9 \times 0.09}{\sqrt{0.9 \times 0.09}} = 0.9 \times 0.09 = 0.081$

117. (C) $\sqrt{7+2\sqrt{10}} = \sqrt{5+2+2\times\sqrt{5}+\sqrt{2}}$

$= \sqrt{\left(\sqrt{5}\right)^2+\left(\sqrt{2}\right)^2+2\sqrt{5}\times\sqrt{2}} = \sqrt{\left(\sqrt{5}+\sqrt{2}\right)^2}$

$= \sqrt{5}+\sqrt{2}$

119. (B) Let number be x so $x = 64 \times \frac{1}{x^2} \Rightarrow x^3$

$= 64 \Rightarrow x = 4$

120. (D) LCM of 4, 5, 6, 15, 18 = 180 required perfect square = $180 \times 5 = 900$

121. (C)

122. (D) $\sqrt{2\sqrt{2\sqrt{2\sqrt{2\sqrt{2}}}}} = 2\frac{31}{32}$

123. (D) Greatest number of siz digits = 999999 number nearest to it is 998001 which is perfect square.

124. (C) $26244 = 2 \times 2 \times 3 \times 3 \times 3^2 \times 3^2$. Hence required no. to divide is $2 \times 2 \times 3 \times 3 = 36$.

125. (C) $14^3 = 2744$ & $15^3 = 3375$

126. (A)

	71
7	4931
	49
141	31
	141
	110

127. (C)

128. (B)

129. (D) Volume $= 8 \times 6 \times 4 = 192$
Cube of $5 = 5^3 = 125$
Cube of $6 = 6^3 = 216$
So $216 - 192 = 24$

130. (D) $\sqrt[3]{392 \times 448}$ do prime factorization & find.

131. (A)

132. (B) $\frac{x^3}{y^3} = \frac{343}{1331} \Rightarrow \frac{x}{y} = \frac{7}{11}$.