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

Ex.6 What is the square root of 0.0009?

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

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 | $1\overline{75}.\overline{29}\overline{76}$ (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) $\frac{\sqrt{32.4}}{?} = 2$ (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 | $3.\overline{00}\overline{00}\overline{00}$ (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 : $\sqrt{\frac{9.5 \times .0085 \times 18.9}{.0017 \times 1.9 \times 0.021}}$.

Sol. Given exp. $= \sqrt{\frac{9.5 \times .0085 \times 18.900}{.0017 \times 1.9 \times 0.021}}$

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.

$= \sqrt{\frac{95 \times 85 \times 18900}{17 \times 19 \times 21}} = \sqrt{5 \times 5 \times 900}$

$= 5 \times 30 = 150$.

Ex.14 Simplify :

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

Sol. Given exp.

$= \frac{\sqrt{(12.1 + 8.1)(12.1 - 8.1)}}{(0.25)(0.25 + 19.95)} = \sqrt{\frac{20.2 \times 4}{0.25 \times 20.2}}$

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

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

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

$= 2 \times 3 = 6$.

## EXERCISE - I

## UNSOLVED PROBLEM

1. Using the properties, find the square of a number of ending in 5 :
(i) $25^2$ (ii) $65^2$ (iii) $105^2$ (iv) $175^2$

2. Find the square roots of the following by prime factorisation :
(i) 196 (ii) 256 (iii) 676
(iv) 1369 (v) 1764 (vi) 9216

3. Write the possible unit's digits of the square root of the following numbers. Which of these numbers are odd square roots ?
(i) 447561 (ii) 19749136
(iii) 38750625 (iv) 1269995769

4. Find the square roots of 81 and 121 by method of repeated subtraction.

5. For each of the following numbers, find the smallest whole number by which it should be multiplied so as to get a perfect square number. Also find the square root of the square number, so obtained :
(i) 1100 (ii)180 (iii) 735 (iv) 1008.

6. For each of the following numbers find the smallest whole number by which, it should be divided so as to get a perfect square. Also find the square root of the square number so obtained :
(i) 396 (ii) 2800 (iii) 1620

7. Find the smallest square number that is divisible by each of the numbers : 8, 9 and 10.

8. Find the square roots of each of the following numbers by division method :
(i) 441 (ii) 2304 (iii) 7744
(iv)1000000 (v) 1002001(vi) 5909761
(viii)298116 (viii)1764 (ix) 5929

9. 3025 chairs are to be arranged in a auditorium in such a way that each row contains as many chairs as number of rows.Find the number of rows and number of chairs in each row.

10. Find the value of the following :
(i) $\sqrt{198.81}$ (ii) $\sqrt{75\frac{46}{49}}$
(iii) $\sqrt{0.3025}$ (iv) $\sqrt{0.0400}$

11. The area of a square field is $52\ \frac{857}{2116}$ $km^2$. Find the length of a side.

12. Find the least number which must be make each a perfect square :
(i) 2361 (ii) 1182000.

13. Find the least number which must be added to the following numbers to make each a perfect square :
(i) 4931 (ii) 1182000.

14. The area of a square field is 225.6004 $dm^2$. Find each side of the field.

15. Find the square root of
(i) 2 (ii) 10 (iii) 35 (iv) 0.025 (v) 13 upto two places of decimals.

16. In a right angled triangle PQR, $\angle Q = 90^o$.
(i) If PQ = 15 cm, QR = 8 cm, find PR
(ii) If PR = 26 cm, RQ = 7 cm, find PQ

17. There are 500 children in a school. For a P.T. drill they have to stand in such a manner that the number of rows is equal to number of columns. How many children would be left out of this arrangement ?

18. Find the greatest 5-digit number which is a perfect squre.

19. find the smallest 4-digit numbe which is a perfect square.

20. What will be the unit digit of the square of the following numbers ?
(i) 71 (ii) 352 (iii) 859
(iv)113 (v) 174 (vi) 1235
(vii)786 (viii)897 (ix) 7098

21. The following numbers are obviously not perfect squares. Give reasons.
(i) 1000 (ii) 587000 (iii) 6250
(iv) 2067 (v) 12463 (vi) 9758
(vii) 679212 (viii)7998 (ix) 81000
(x) 606070.

## EXERCISE - II OLYMPIAD PROBLEMS

1. $\sqrt{.0025}\times\sqrt{2.25}\times\sqrt{.0001}$ = ?
(A) .000075 (B) .0075
(C) .075 (D) None

2. $\sqrt{1.5625}$ = ?
(A) 1.05 (B) 1.25
(C) 1.45 (D) 1.55

3. sIf $\sqrt{.00000676}$ =.0026, the square root of 67,60,000 is -
(A) $\frac{1}{26}$ (B) 26
(C) 260 (D) 2600

4. If $\sqrt{18225}$ =135, then the value of $(\sqrt{182.25}+\sqrt{1.8225}+\sqrt{0.018225}+\sqrt{0.00018225}$ is :
(A) 1.499985 (B) 14.9985
(C) 149.985 (D) 1499.85

5. Given that $\sqrt{13}$ =3.605 and $\sqrt{130}$ =11.40, find the value of $\sqrt{1.3}+\sqrt{1300}+\sqrt{0.013}$ -
(A) 36.164 (B) 36.304
(C) 37.164 (D) 37.304

6. If $\frac{52}{x}=\sqrt{\frac{169}{289}}$, the value of x is -
(A) 52 (B) 38
(C) 62 (D) 68

7. For what value of * the statement $\left(\frac{*}{15}\right)\left(\frac{*}{135}\right)$ =1 is true ?
(A) 15 (B) 25
(C) 35 (D) 45

8. Which number can replace both the question marks in the equation $\frac{4\frac{1}{2}}{?}=\frac{?}{32}$.
(A) 1 (B) 7
(C) $7\frac{1}{2}$ (D) None

9. What should come in place of both the question marks in the equation $\frac{?}{\sqrt{128}}=\frac{\sqrt{162}}{?}$.
(A) 12 (B) 14
(C) 144 (D) 196

10. If 0.13 ÷ $p^2$ = 13, then p equals :
(A) 0.01 (B) 0.1
(C) 10 (D) 100

11. What number should be divide by $\sqrt{0.25}$ to give the result as 25 ?
(A) 12.5 (B) 25
(C) 50 (D) 125

12. If $\sqrt{3^n}$ =729, then the value of n is :
(A) 6 (B) 8
(C) 10 (D) 12

13. If $\sqrt{18\times14\times x}$ = 84, then x equals :
(A) 22 (B) 24
(C) 28 (D) 32

14. $28\sqrt{?}$ + 1426 = $\frac{3}{4}$ of 2872.
(A) 576 (B) 676
(C) 1396 (D) 1444

15. $\sqrt{\frac{?}{169}}=\frac{54}{39}$
(A) 108 (B) 324
(C) 2916 (D) 4800

16. If $\sqrt{x}\div\sqrt{441}$ = 0.02, then the value of x is -
(A) 0.1764 (B) 1.764
(C) 1.64 (D) 2.64

17. $\sqrt{\frac{0.196}{?}}=0.2$
(A) 0.49 (B) 0.7
(C) 4.9 (D) None

18. $\sqrt{0.0169\times?}=1.3$
(A) 10 (B) 100
(C) 1000 (D) None

19. If $\sqrt{1369}+\sqrt{.0615+x}$ =37.25, then x is equal to-
(A) $10^{-1}$ (B) $10^{-2}$
(C) $10^{-3}$ (D) None

20. If $\sqrt{(x-1)(y+2)}=7$, x and y being positive whole numbers, then the values of x and y respectively are -
(A) 8, 5 (B) 15, 12
(C) 22, 19 (D) None

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

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

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

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

(A) $2\frac{1}{2}$ (B) $3\frac{1}{2}$

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

44. 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

45. 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

46. 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

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

(A) $0.\overline{6}$ (B) $0.\overline{7}$

(C) $0.\overline{8}$ (D) $0.\overline{9}$

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

(A) 0.4 (B) 0.09

(C) 0.9 (D) 0.025

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

(A) 0.02 (B) 0.2

(C) 0.51 (D) 0.63

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

(A) 0.011 (B) 0.11

(C) 0.347 (D) 1.1

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

(A) 0.008 (B) 0.08

(C) 0.252 (D) 0.8

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

(A) 0.02 (B) 0.2

(C) 0.63 (D) None of these

53. $\frac{1+\sqrt{0.01}}{1-\sqrt{0.1}}$ is clese to -

(A) 0.6 (B) 1.1

(C) 1.6 (D) 1.7

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

(A) .367 (B) .447

(C) .745 (D) None of these

55. 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

56. 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

57. 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

58. 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

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

(A) 900 (B) 1200

(C) 2500 (D) 3600

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

(A) 213444 (B) 214344

(C) 214434 (D) 231444

61. If $\sqrt{.04\times.4\times a}$ = .004 × .4 × $\sqrt{b}$, then $\frac{a}{b}$ is -

(A) $16\times10^{-3}$ (B) $16\times10^{-4}$

(C) $16\times10^{-5}$ (D) None

80. 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) $10^3$

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) $2+\sqrt{3}$

118. Least pertect square of 6 digits is -
(A) 998000 (B) 998001
(C) 998002 (D) None of these

119. A 8 × 6 × 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

120. Value of $\sqrt[3]{392}\times\sqrt[3]{448}$ is -
(A) 50 (B) 52
(C) 54 (D) 56

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

122. 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

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

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

125. 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

126. 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

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

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

129. 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 + $\sqrt{5}$

130. 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) $4\frac{1}{5}$

131. A number is 64 time of the square of its reciprocal. The number is -
(A) 10 (B) 4
(C) 2 (D) 16

132. The smallest perfect square number exactly divisible by 4, 5, 6, 15, 18, is
(A) 1800 (B) 225
(C) 361 (D) 900

## ANSWER KEY

| | | | |
|---|---|---|---|
| 1. D | 2. B | 3. D | 4. B |
| 5. D | 6. B | 7. D | 8. D |
| 9. C | 10. B | 11. A,D | 12. D |
| 13. C | 14. B | 15. B | 16. A |
| 17. A | 18. B | 19. C | 20. A |
| 21. B | 22. A | 23. A | 24. C |
| 25. B | 26. A | 27. D | 28. C |
| 29. B | 30. D | 31. B | 32. B |
| 33. D | 34. D | 35. C | 36. B |
| 37. B | 38. B | 39. B | 40. D |
| 41. B | 42. C | 43. C | 44. C |
| 45. B | 46. C | 47. A | 48. B |
| 49. D | 50. C | 51. C | 52. C |
| 53. C | 54. B | 55. C | 56. D |
| 57. B | 58. D | 59. D | 60. A |
| 61. C | 62. A | 63. D | 64. C |
| 65. A | 66. A | 67. D | 68. C |
| 69. B | 70. B | 71. B | 72. D |
| 73. C | 74. B | 75. A | 76. B |
| 77. D | 78. A | 79. C | 80. B |
| 81. C | 82. B | 83. D | 84. D |
| 85. A | 86. A | 87. B | 88. C |
| 89. C | 90. D | 91. B | 92. B |
| 93. C | 94. D | 95. C | 96. B |
| 97. D | 98. A | 99. C | 100. C |
| 101. B | 102. A | 103. C | 104. C |
| 105. B | 106. B | 107. B | 108. B |
| 109. A | 110. D | 111. C | 112. D |
| 113. D | 114. C | 115. C | 116. A |
| 117. C | 118. B | 119. D | 120. D |
| 121. A | 122. B | 123. A | 124. C |
| 125. C | 126. C | 127. A | 128. A |
| 129. C | 130. A | 131. B | 132. D |