

QUESTIONS

- Simplify the ratio $\frac{1}{3} : \frac{1}{8} : \frac{1}{6}$
 - 4:2:3
 - 8:3:4
 - 8:3:2
 - none
- Rounak weighs 56.7 kg. If he reduces his weight in the ratio 7 : 6, find his new weight.
 - 48.6
 - 50
 - 55
 - none
- The ratio of the number of boys to the number of girls in a school of 720 students is 3 : 5. If 18 new girls are admitted in the school, find how many new boys may be admitted so that the ratio of the number of boys to the number of girls may change to 2 : 3
 - 52
 - 45
 - 42
 - none
- The ratio of the prices of two houses was 16 : 23. Two years later when the price of the first has increased by 10% and that of the second by ₹ 477, the ratio of the prices becomes 11 : 20. Find the original prices of the two houses
 - 848 & 1229
 - 838 & 1219
 - 848 & 1219
 - none
- Find in what ratio will the total wages of the workers of a factory be increased or decreased if there be a reduction in the number of workers in the ratio 15 : 11 and an increment in their wages in the ratio 22 : 25.
 - 5:6
 - 6:5
 - 4:3
 - none
- The inverse ratio of 11 : 15 is
 - 15:11
 - $\sqrt{11}:\sqrt{15}$
 - 121:225
 - None
- The ratio of two quantities is 3 : 4. If the antecedent is 15, the consequent is
 - 16
 - 60
 - 22
 - 20
- The ratio of the quantities is 5 : 7. If the consequent of its inverse ratio is 5, the antecedent is
 - 5
 - $\sqrt{5}$
 - 7
 - none
- The ratio compounded of 2 : 3, 9 : 4, 5 : 6 and 8 : 10 is
 - 1:1
 - 1:5
 - 3:8

- d. none
10. The duplicate ratio of 3 : 4 is
- $\sqrt{3}:2$
 - 4:3
 - 9:16
 - none
11. The sub-duplicate ratio of 25 : 36 is
- 6:5
 - 36:25
 - 50:72
 - 5:6
12. The triplicate ratio of 2 : 3 is
- 8:27
 - 6:9
 - 2:3
 - none
13. The sub-triplicate ratio of 8 : 27 is
- 27:8
 - 24:81
 - 2:3
 - none
14. The ratio compounded of 4 : 9 and the duplicate ratio of 3 : 4 is
- 1:4
 - 1:3
 - 3:1
 - none
15. The ratio compounded of 4 : 9, the duplicate ratio of 3 : 4, the triplicate ratio of 2 : 3 and 9 : 7 is
- 2:7
 - 7:2
 - 2:21
 - none
16. The ratio compounded of duplicate ratio of 4 : 5, triplicate ratio of 1 : 3, sub duplicate ratio of 81 : 256 and sub-triplicate ratio of 125 : 512 is
- 4:512
 - 3:32
 - 1:12
 - none
17. If $a : b = 3 : 4$, the value of $(2a+3b) : (3a+4b)$ is
- 54:25
 - 8:25
 - 17:24
 - 18:25
18. Two numbers are in the ratio 2 : 3. If 4 be subtracted from each, they are in the ratio 3 : 5. The numbers are
- 16,24
 - 4,6
 - 2,3
 - none
19. The angles of a triangle are in ratio 2 : 7 : 11. The angles are
- 20,70,90
 - 30,70,80
 - 18,63,99
 - none
20. Division of ₹ 324 between X and Y is in the ratio 11 : 7. X & Y would get Rupees
- 204,120
 - 200,124
 - 180,144

- d. none
21. Anand earns ₹ 80 in 7 hours and Pramod 90 in 12 hours. The ratio of their hourly earnings is
- 32:21
 - 23:12
 - 8:9
 - none
22. The ratio of two numbers is 7 : 10 and their difference is 105. The numbers are
- 200,305
 - 185,290
 - 245,350
 - none
23. P, Q and R are three cities. The ratio of average temperature between P and Q is 11 : 12 and that between P and R is 9 : 8. The ratio between the average temperature of Q and R is
- 22:27
 - 27:22
 - 32:33
 - None
24. If $x : y = 3 : 4$, the value of $x^2y + xy^2 : x^3 + y^3$ is
- 13:12
 - 12:13
 - 21:31
 - None
25. If $p : q$ is the sub-duplicate ratio of $p - x^2 : q - x^2$ then x^2 is
- $p/(p+q)$
 - $q/(p+q)$
 - $pq/(p+q)$
 - none
26. If $2s : 3t$ is the duplicate ratio of $2s - p : 3t - p$ then
- $p^2 = 6st$
 - $p = 6st$
 - $2p = 3st$
 - None
27. If $p : q = 2 : 3$ and $x : y = 4 : 5$, then the value of $5px + 3qy : 10px + 4qy$ is
- 71:82
 - 27:28
 - 17:28
 - none
28. The number which when subtracted from each of the terms of the ratio 19 : 31 reducing it to 1 : 4 is
- 15
 - 5
 - 1
 - None
29. The ratio between the speeds of two trains is 7 : 8. If the second train runs 400 kms. in 5 hours, the speed of the first train is
- 10km/hr
 - 50km/hr
 - 70km/hr
 - none
30. Find the value of x if $10/3 : x :: 5/2 : 5/4$
- $5/3$
 - $3/5$
 - $5/4$

- d. none
31. Find the fourth proportional to $\frac{2}{3}$, $\frac{3}{7}$, 4
- $\frac{7}{18}$
 - $\frac{18}{7}$
 - 18
 - none
32. Find the third proportion to 2.4 kg, 9.6 kg.
- 38.4
 - 40
 - 38.2
 - none
33. Find the mean proportion between 1.25 and 1.8.
- 1.2
 - 1
 - 1.5
 - none
34. If $a : b = c : d = 2.5 : 1.5$, what are the values of $ad : bc$ and $a + c : b + d$?
- 1:1 & 5:3
 - 1:1 & 3:5
 - 2:5 & 5:3
 - none
35. If $\frac{a}{3} = \frac{b}{4} = \frac{c}{7}$ then find the value of $\frac{a+b+c}{c}$
- 4
 - 1
 - 3
 - 2
36. A dealer mixes tea costing ₹ 6.92 per kg. with tea costing ₹ 7.77 per kg and sells the mixture at ₹ 8.80 per kg and earns a profit of $17\frac{1}{2}\%$ on his sale price. In what proportion does he mix them?
- 16:4
 - 4:16
 - 3:2
 - 2:3
37. The fourth proportional to 4, 6, 8 is
- 12
 - 32
 - 48
 - None
38. The third proportional to 12, 18 is
- 24
 - 27
 - 36
 - none
39. The mean proportional between 25, 81 is
- 40
 - 50
 - 45
 - none
40. The number which has the same ratio to 26 that 6 has to 13 is
- 11
 - 10
 - 21
 - none
41. The fourth proportional to $2a$, a^2 , c is
- $\frac{ac}{2}$
 - ac
 - $\frac{2}{ac}$
 - none
42. If four numbers $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{5}$, $\frac{1}{x}$ are proportional then x is
- $\frac{6}{5}$

- b. $5/6$
c. $15/2$
d. none
43. The mean proportional between $12x^2$ and $27y^2$ is
a. $18xy$
b. $81xy$
c. $8xy$
d. none
44. If $A = B/2 = C/5$, then $A : B : C$ is
a. $3:5:2$
b. $2:5:3$
c. $1:2:5$
d. none
45. If $a/3 = b/4 = c/7$, then $a + b + c/c$ is
a. 1
b. 3
c. 2
d. none
46. If $p/q = r/s = 2.5/1.5$, the value of $ps : qr$ is
a. $3/5$
b. $1/1$
c. $5/3$
d. none
47. If $x : y = z : w = 2.5 : 1.5$, the value of $(x + z)/(y + w)$ is
a. 1
b. $3/5$
c. $5/3$
d. None
48. If $(5x - 3y)/(5y - 3x) = 3/4$, the value of $x : y$ is
a. $2:9$
b. $7:2$
c. $7:9$
d. none
49. If $A : B = 3 : 2$ and $B : C = 3 : 5$, then $A : B : C$ is
a. $9:6:10$
b. $6:9:10$
c. $10:9:6$
d. none
50. If $x/2 = y/3 = z/7$, then the value of $(2x - 5y + 4z)/2y$ is
a. $6/23$
b. $23/6$
c. $3/2$
d. $17/6$
51. If $x : y = 2 : 3$, $y : z = 4 : 3$ then $x : y : z$ is
a. $2:3:4$
b. $4:3:2$
c. $3:2:4$
d. None
52. Division of 750 into 3 parts in the ratio $4 : 5 : 6$ is
a. 200,250,300
b. 250,250,350
c. 350,250,150
d. None
53. The sum of the ages of 3 persons is 150 years. 10 years ago their ages were in the ratio $7 : 8 : 9$. Their present ages are
a. 45,50,55
b. 40,60,50
c. 35,45,70
d. None

54. The numbers 14, 16, 35, 42 are not in proportion. The fourth term for which they will be in proportion is

- a. 45
- b. 40
- c. 32
- d. None

55. If $x/y = z/w$, implies $y/x = w/z$, then the process is called

- a. Dividendo
- b. Componendo
- c. Alternendo
- d. None

56. If $p/q = r/s = p - r/q - s$, the process is called

- a. Subtrahendo
- b. Addendo
- c. Invertendo
- d. None

57. If $a/b = c/d$, implies $(a + b)/(a - b) = (c + d)/(c - d)$, the process is called

- a. Componendo
- b. Dividendo
- c. Compoendo & Dividendo
- d. None

58. If $u/v = w/p$, then $(u - v)/(u + v) = (w - p)/(w + p)$. The process is called

- a. Invertendo
- b. Alternendo
- c. Addendo
- d. None

59. 12, 16, *, 20 are in proportion. Then * is

- a. 25
- b. 14

- c. 15
- d. none

60. 4, *, 9, $13\frac{1}{2}$ are in proportion. Then * is

- a. 6
- b. 8
- c. 9
- d. None

61. The mean proportional between 1.4 gms and 5.6 gms is

- a. 28
- b. 2.8
- c. 3.2
- d. None

62. If $\frac{a}{4} = \frac{b}{5}$ then

- a. $\frac{a+4}{a-4} = \frac{b-5}{b+5}$
- b. $\frac{a+4}{a-4} = \frac{b+5}{b-5}$
- c. $\frac{a-4}{a+4} = \frac{b+5}{b-5}$
- d. None

63. If $a : b = 4 : 1$ then $\sqrt{\frac{a}{b}} + \sqrt{\frac{b}{a}}$ is

- a. $5/2$
- b. 4
- c. 5
- d. None

64. If $\frac{x}{b+c-a} = \frac{y}{c+a-b} = \frac{z}{a+b-c}$ then $(b - c)x + (c - a)y + (a - b)z$ is

- a. 1
- b. 0
- c. 5
- d. None

65. Simplify $2x^{\frac{1}{2}}3x^{-1}$ if $x=4$

- a. 3
- b. 4

- c. 1
d. none
66. Simplify $6ab^2c^3 \times 4b^{-2}c^{-3}d$.
- a. $24ad$
b. $12ad$
c. $36bc$
d. none
67. Find the value of $\frac{4x^{-1}}{x^{-1/3}}$
- a. $4x^{-\frac{1}{3}}$
b. $4x^{-\frac{2}{3}}$
c. 1
d. none
68. Simplify $\frac{2a^{1/2} \cdot a^{2/3} \cdot 6a^{-7/3}}{9a^{-5/3} \cdot a^{3/2}}$ if $a=4$
- a. 1
b. $3/2$
c. $2/3$
d. $1/3$
69. Simplify $(x^a \cdot y^{-b})^3 \cdot (x^3 y^2)^{-a}$
- a. $\frac{1}{(y)^{3b+2a}}$
b. $\frac{1}{(y)^{3b-2a}}$
c. $\frac{1}{(y)^{-3b+2a}}$
d. none
70. $\sqrt[6]{a^{4b}x^6} \cdot (a^{2/3}x^{-1})^{-b}$
- a. X^{1+b}
b. X^{1-b}
c. X^{-1+b}
d. None
71. Find x, if $x\sqrt{x} = (x\sqrt{x})^x$
- a. 0
b. $1/2$
c. 2
d. 1

72. Find the value of k from

$$(\sqrt{9})^{-7} \cdot (\sqrt{3})^{-5} = 3^k$$

- a. $-11/2$
b. $11/2$
c. $-19/2$
d. $19/2$
73. $4x^{-1/4}$ is expressed as
- a. $-4x^{-1/4}$
b. x^{-1}
c. $4/x^{-1/4}$
d. none
74. The value of $8^{1/3}$ is
- a. $\sqrt[3]{2}$
b. 4
c. 2
d. none
75. The value of $2 \times (32)^{1/5}$ is
- a. 2
b. 10
c. 4
d. none
76. The value of $(8/27)^{1/3}$ is
- a. $2/3$
b. $3/2$
c. $2/9$
d. none
77. The value of $2(256)^{-1/8}$ is
- a. 1
b. 2
c. $1/2$
d. none
78. $2\% \cdot 4\%$ is equal to
- a. a fraction

- b. a positive integer
c. a negative integer
d. none
79. $(81x^4/y^8)^{1/4}$ has simplified value equal to
a. xy^2
b. x^2y
c. $9xy^2$
d. none
80. The value of $(2p^2q^3/3xy)^0$ where $p, q, x, y \neq 0$
a. 0
b. $2/3$
c. 1
d. none
81. $\{(3^3)^2 \times (4^2)^3 \times (5^3)^2\} / \{(3^2)^3 \times (4^3)^2 \times (5^2)^3\}$ is
e. $3/4$
f. $4/5$
g. $4/7$
h. 1
82. Which is True ?
a. $2^0 > (1/2)^0$
b. $2^0 < (1/2)^0$
c. $2^0 = (1/2)^0$
d. None
83. The value of $y^{a-b} \times y^{b-c} \times y^{c-a} \times y^{-a-b}$
a. Y^{a+b}
b. y
c. 1
d. $1/Y^{a+b}$
84. The True option is
a. $x^{2/3} = \sqrt[3]{x^2}$
b. $x^{2/3} = \sqrt{x^3}$
c. $x^{2/3} > \sqrt[3]{x^2}$
d. $x^{2/3} < \sqrt[3]{x^2}$
85. Simplified value of $16x^{-3}y^2 \times 8^{-1}x^3y^{-2}$ is
a. $2xy$
b. $Xy/2$
c. 2
d. none
86. The value of $(8/27)^{-1/3} \times (32/243)^{-1/5}$ is
a. $9/4$
b. $4/9$
c. $2/3$
d. none
87. The value of $\{(x+y)^{2/3} (x-y)^{3/2} / \sqrt{x+y} \times \sqrt{(x-y)^3}\}^6$ is
a. $(x+y)^2$
b. $x-y$
c. $x+y$
d. None
88. Simplified value of $(125)^{2/3} \times \sqrt{25} \times \sqrt[3]{5^3} \times 5^{1/2}$ is
a. 5
b. $1/5$
c. 1
d. None
89. $[\{(2)^{1/2} \cdot (4)^{3/4} \cdot (8)^{5/6} \cdot (16)^{7/8} \cdot (32)^{9/10}\}^4]^{3/25}$ is
a. A Fraction
b. An Integer
c. 1
d. none
90. $[1 - \{1 - (1 - x^2)^{-1}\}^{-1}]^{-1/2}$ is equal to
a. x
b. $1/x$
c. 1
d. None

91. $[(x^n)^{n-\frac{1}{n}}]^{n+1}$

- a. x^n
- b. x^{n+1}
- c. x^{n-1}
- d. none

92. If $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$, then the simplified form of

$$\left(\frac{x^1}{x^m}\right) l^{2+lm+m^2} \times \left(\frac{x^m}{x^n}\right) m^{2+mn+n^2} \times \left(\frac{x^n}{x^1}\right) l^{2+ln+n^2}$$

- a. 0
- b. 1
- c. X
- d. none

93. Using $(a-b)^3 = a^3 - b^3 - 3ab(a-b)$ tick the correct of these when $x = p^{1/3} - p^{-1/3}$

- a. $x^3 + 3x = p + 1/p$
- b. $x^3 + 3x = p - 1/p$
- c. $x^3 + 3x = p + 1$
- d. none

94. On simplification, $1/(1+a^{m-n}+a^{m-p}) + 1/(1+a^{n-m}+a^{n-p}) + 1/(1+a^{p-m}+a^{p-n})$ is equal to

- a. 0
- b. a
- c. 1
- d. $1/a$

95. The value of $(x^a/x^b)^{a+b} \times (x^b/x^c)^{b+c} \times (x^c/x^a)^{c+a}$

- a. 1
- b. 0
- c. 2
- d. none

96. If $x = 3^{1/3} + 3^{-1/3}$, then $3x^3 - 9x$ is

- a. 15
- b. 10
- c. 12

d. none

97. If $a^x = b$, $b^y = c$, $c^z = a$, then xyz is

- a. 1
- b. 2
- c. 3
- d. none

98. The value of

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

- a. 1
- b. 0
- c. -1
- d. none

99. If $2^x = 3^y = 6^z$, $1/x + 1/y + 1/z$ is

- a. 1
- b. 0
- c. 2
- d. None

100. If $\log_a \sqrt{2} = 1/6$, find the value of a.

- a. 8
- b. 4
- c. 2
- d. 1

101. Find the logarithm of 5832 to the base $3\sqrt{2}$.

- a. 8
- b. 6
- c. 7
- d. 3

102. Solve $\frac{1}{2} \log_{10} 25 - 2 \log_{10} 3 + \log_{10} 18$

- a. 0
- b. 2

- c. 1
- d. none

103. Find the value of $\log 5$ if $\log 2$ is equal to .3010.

- a. .6990
- b. .3450
- c. 2
- d. 5

104. Find the logarithm of 64 to the base $2\sqrt{2}$

- a. 6
- b. 1
- c. 4
- d. 2

105. If $\log_a bc = x$, $\log_b ca = y$, $\log_c ab = z$, find $\frac{1}{x+1} + \frac{1}{y+1} + \frac{1}{z+1}$

- a. 1
- b. 2
- c. 0
- d. None

106. Find x , if $\log x = 2$

- a. 1
- b. 100
- c. 10
- d. none

107. $\log 6 + \log 5$ is expressed as

- a. $\log 11$
- b. $\log 30$
- c. $\log 5/6$
- d. none

108. $\log_2 8$ is equal to

- a. 2
- b. 8
- c. 3

- d. none

109. $\log \frac{32}{4}$ is equal to

- a. $\log 32 / \log 4$
- b. $\log 32 - \log 4$
- c. 2^3
- d. none

110. $\log (1 \times 2 \times 3)$ is equal to

- a. $\log 1 + \log 2 + \log 3$
- b. $\log 3$
- c. $\log 2$
- d. none

111. The value of $\log 0.0001$ to the base 0.1 is

- a. -4
- b. 4
- c. $1/4$
- d. none

112. If $2 \log x = 4 \log 3$, the x is equal to

- a. 3
- b. 9
- c. 2
- d. none

113. $\log 64$ to the base root 2 is

- a. 12
- b. 1
- c. 6
- d. none

114. $\log 1728$ to the base $2\sqrt{3}$ is equal to

- a. $2\sqrt{3}$
- b. 2
- c. 6
- d. none

115. $\log (1/81)$ to the base 9 is equal to 0

- a. 2

- b. $1/2$
c. -2
d. none
116. $\log 0.0625$ to the base 2 is equal to
a. 4
b. 5
c. 1
d. none
117. Given $\log 2 = 0.3010$ and $\log 3 = 0.4771$ the value of $\log 6$ is
a. 0.9030
b. 0.9542
c. 0.7781
d. None
118. The value of $\log_2 \log_2 \log_2 16$
a. 0
b. 2
c. 1
d. none
119. The value of $\log 1/3$ to the base 9 is
a. $-1/2$
b. $1/2$
c. 1
d. None
120. If $\log x + \log y = \log (x+y)$, y can be expressed as
a. $x-1$
b. x
c. $x/(x-1)$
d. none
121. The value of $\log_2 [\log_2 \{\log_3 (\log_3 27^3)\}]$ is equal to
a. 1
b. 2
c. 0
d. none
122. If $\log_2 x + \log_4 x + \log_{16} x = 21/4$, these x is equal to
a. 8
b. 4
c. 6
d. None
123. Given that $\log_{10} 2 = X$ and $\log_{10} 3 = y$, the value of $\log_{10} 60$ is expressed as
a. $x-y+1$
b. $x+y+1$
c. $x-y-1$
d. None
124. Given that $\log_{10} 2 = x$, $\log_{10} 3 = y$, then $\log_{10} 1.2$ is expressed in terms of x and y as
a. $X+2y-1$
b. $x+y-1$
c. $2x+y-1$
d. none
125. Given that $\log x = m + n$ and $\log y = m - n$, the value of $\log 10x/y^2$ is expressed in terms of m and n as
a. $1-m+3n$
b. $m-1+3n$
c. $m+3n+1$
d. None
126. The simplified value of $2 \log_{10} 5 + \log_{10} 8 - \frac{1}{2} \log_{10} 4$ is
a. $1/2$
b. 4
c. 2

d. none

127. $\log [1 - \{1 - (1 - x^2)^{-1}\}^{-1}]^{-1/2}$ can be written as

- a. $\log X^2$
- b. $\log x$
- c. $\log 1/x$
- d. none

128. The simplified value of $\log \sqrt[4]{729^3 \sqrt{9-127^{-4/3}}}$ is

- a. $\log 3$
- b. $\log 2$
- c. $\log 1/2$
- d. none

129. The value of $(\log_b a \times \log_c b \times \log_a c)^3$ is equal to

- a. 3
- b. 0
- c. 1
- d. None

130. The logarithm of 64 to the base $2\sqrt{2}$ is

- a. 2
- b. $\sqrt{2}$
- c. $1/2$
- d. none

131. The value of $\log_8 25$ given $\log 2 = 0.3010$ is

- a. 1
- b. 2
- c. 1.5482
- d. None

132. P, Q and R three cities. The ratio of average temperature between P and Q is 11:12 and that between P and R is 9:8. The ratio between the average temperature Q and R

- a. 22 : 27

b. 27 : 22

c. 32 : 33

d. None

133. The third proportional between $(a^2 - b^2)$ and $(a + b)^2$ is

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

134. The value of $\log_{0.1} 0.001 =$

- a. 3
- b. 2
- c. 4
- d. $1/3$

135. if $\log_4 x = -3/2$. Then x is

- a. $1/8$
- b. $1/4$
- c. $1/2$
- d. $1/3$

136. For $p, q, r, s > 0$ the value of each ratio is

$$\frac{p}{q+r} = \frac{q}{r+s} = \frac{r}{s+p} = \frac{s}{p+q}$$

- a. $1/2$
- b. $1/3$
- c. $1/4$
- d. 1

137. Let x, y, z be three positive numbers and $P = \frac{x+y+z}{2}$; if $(p-x) : (p-y) : (p-z) = 3 : 5 : 7$ then ratio of x:y:z is

- a. 4:5:6
- b. 6:5:4
- c. 3:5:7
- d. 7:5:3

138. If $x = \sqrt{\sqrt{6} + 6} + (\sqrt{7 + 2\sqrt{6}}) - \sqrt{6}$ then

the value

- a. 1
- b. 2
- c. 3
- d. 6

139. If $\log_7 \log_5(\sqrt{x+5} + \sqrt{x}) = 0$, the value of x is

- a. 0
- b. 1
- c. $\frac{1}{4}$
- d. 4

140. For $a, b, c > 0$ the value of each ratio is

$\frac{a}{b+c} = \frac{b}{c+a} = \frac{c}{a+b}$, then the value of each ratio if $a+b+c \neq 0$

- a. $\frac{1}{2}$
- b. $\frac{1}{3}$
- c. $\frac{1}{4}$
- d. 1

141. If $\frac{x}{b+c-a} = \frac{y}{c+a-b} = \frac{z}{a+b-c}$, then find the value of $(b-c)x + (c-a)y + (a-b)z =$

- a. 0
- b. -1
- c. +1
- d. $\frac{1}{2}$

142. $x:y:z = 2:3:5$. If $x+y+z = 60$, then the value of z is

- a. 30
- b. 15
- c. 9
- d. 12

143. Simplify $\log_2 3 \log_3 4 \log_4 5 \log_5 6 \log_6 7 \log_7 8$

- a. 2
- b. 3
- c. 4
- d. $\frac{3}{2}$

144. The ratio compounded of 2:3, 9:4, 5:6 and 8:10 is

- a. 1:1
- b. 1:5
- c. 3:8
- d. None of these

145. The sub-triplicate ratio of 8:27

- a. 27:8
- b. 24:81
- c. 2:3
- d. None of these

146. If $\frac{p}{q} = \frac{r}{s} = \frac{p-r}{q-s}$, the process is called

- a. Subtrahendo
- b. Componendo
- c. ALterendo
- d. None of these

147. The value of $\left(\frac{x^a}{x^b}\right)^{a^2+b^2+ab} \times \left(\frac{x^b}{x^c}\right)^{b^2+c^2+bc} \times \left(\frac{x^c}{x^a}\right)^{c^2+a^2+ca}$

- a. 1
- b. 0
- c. -1
- d. None of these

148. If $a = \log_{12} 24$, $b = \log_{36} 24$, $c = \log_{48} 36$ then $1 + abc =$

- a. $2bc$
- b. $2ca$
- c. $2ba$

d. $3bc$

149. If $x = 5^{1/3} + 5^{-1/3}$, $5x^3 - 15x$ is given by

- a. 25
- b. 26
- c. 27
- d. 30

150. If $x:y:z = 2:3:5$ if $x+y+z = 60$, then the value of z

- a. 30
- b. 15
- c. 9
- d. 12

151. The ratio of two numbers is $15:19$. If a certain number is added to each term of the ratio it become $8:9$. What is the number added to each of the ratio?

- a. 6
- b. 5
- c. 17
- d. 23

152. If $\frac{a}{3} = \frac{b}{4} = \frac{c}{5}$ then, $\frac{2a+3b+2c}{4a-b+2c}$ is

- a. $11/19$
- b. $17/19$
- c. $14/9$
- d. $19/7$

153. Simplify $\frac{2^n + 2^{n-1}}{2^{n+1} + 2^n}$

- a. 2^{n+2}
- b. 2^n
- c. 2
- d. $\frac{1}{2}$

154. If $2^a = 3^b = 12^c$ then $1/a + 1/b =$

- a. $1/c$
- b. $1/c - 1/a$

c. $-1/c$

d. 0

155. The value of $\log_{64} 512$ is

- a. 9
- b. $9/2$
- c. $9/4$
- d. $3/2$

156. The value of $(\log_b a \log_c b \log_a c)^3 =$

- a. 1
- b. 3
- c. $(\log_b c)^3$
- d. $(\log_c b)^3$

157. The ratio of the earnings of two persons $3:2$. If each saves $1/5$ th of their earnings, the ratio of their savings.

- a. $2:3$
- b. $3:2$
- c. $4:5$
- d. $5:4$

158. The Third Proportional to 15 and 20 is

- a. $80/3$
- b. 80
- c. $80/7$
- d. 120

159. If $\log_9 x + \log_3 x = 3/2$ then x is

- a. 0
- b. 1
- c. $9/4$
- d. 3

160. If $x+y, y+z, z+x$ are in the ratio $6:7:8$ and $x+y+z=14$ then the value of x is

- a. $6/3$
- b. $14/3$

- c. $8/3$
d. $10/3$
161. If $2^x = 3^y = 6^z$ then $1/x + 1/y =$
a. $1/z$
b. $1/z - 1/x$
c. $1/z + 1/x$
d. 0
162. The ratio of the prices of two houses was 16: 23. Two years later when the price of the first has increased by 10% and that of the second by Rs. 477, the ratio of the prices becomes 11: 20. Find the original prices of the two houses.
a. Rs. 848, Rs. 1,219
b. Rs. 838, Rs. 1,119
c. Rs. 828, Rs. 1,219
d. Rs. 848 Rs. 1,229
163. If $a : b = 3 : 4$, the value of $(2a+3b) : (3a+4b)$ is
a. 54: 25
b. 8: 25
c. 17: 24
d. 18: 25
164. $5^{16} + 125^5$ is divisible by which of the following
a. 5
b. 6
c. 8
d. 9
165. Given that $\log_{10}2 = x$ and $\log_{10}3 = y$, the value of $\log_{10}60$ is expressed as
a. $x - y + 1$
b. $x + y + 1$
c. $x - y - 1$
d. None of these
166. If $pqr = a^x$, $qrs = a^y$ and $rsp = a^z$, then find the value of $(pqrs)^{1/2}$
a. a^{x+y+z}
b. $a^{\sqrt{x+y+z}}$
c. $a^{\sqrt[4]{x+y+z}}$
d. $(a^{x+y+z})^{1/4}$
167. If $x : y = 2 : 3$, then find $(5x+2y) : (3x-y)$
a. $13/3$
b. $16/3$
c. $19/3$
d. $7/3$
168. A bag contains 187 in the form 1 rupee, 50 paise and 10 paise coins in the ratio 3:4:5. Find the number of each type of coins.
a. 102, 136, 170
b. 136, 102, 170
c. 170, 102, 136
d. None of these
169. $\log_e x + \log(1+x) = 0$ is equivalent to
a. $x^2+x+e = 0$
b. $x^2+x - e = 0$
c. $x^2+x+1 = 0$
d. $x^2+x-1 = 0$
170. The ratio of the speed of the two trains is 2: 5. If the distances they travel are in the ratio 5: 9, find the ratio of times taken by them.
a. 2: 9
b. 18: 25
c. 25: 18
d. 10: 45

171. If $x = 3^{1/4} + 3^{-1/4}$ and $y = 3^{1/4} - 3^{-1/4}$ then the value of $3(x^2 + y^2)^2$ will be

- a. 12
- b. 18
- c. 46
- d. 64

172. Find the value of $(x + y)$, if $(x + \frac{y^3}{x^2})^{-1} - (\frac{x^2}{y} + \frac{y^2}{x})^{-1} + (\frac{x^3}{y^2} + y)^{-1} = \frac{1}{3}$

- a. $1/3$
- b. 3
- c. $1/2$
- d. 2

173. Two numbers are in the ratio 7: 8 if 3 is added to each of them, their ratio becomes 8:9, the numbers are

- a. 14, 16
- b. 24, 27
- c. 21, 24
- d. 16, 18

174. Which of the numbers are not in proportions?

- a. 6, 8, 5, 7
- b. 7, 3, 14, 6
- c. 18, 27, 12, 18
- d. 18, 27, 12, 18

175. If $x^2 + y^2 = 7xy$, then $\log_3(x + y) =$

- a. $(\log x + \log y)$
- b. $\frac{1}{2}(\log x + \log y)$
- c. $\frac{1}{3}(\log x + \log y)$
- d. $3(\log x / \log y)$

176. The value of $\frac{2^n + 2^{n-1}}{2^{n+1} - 2^n}$ is

- a. $1/2$

b. $3/2$

c. $2/3$

d. 2

177. If $3^x = 5^y = 75^z$ then

- a. $x + y - z = 0$
- b. $2/x + 1/y = 1/z$
- c. $1/x + 2/y = 1/z$
- d. $2/x + 1/z = 1/y$

178. The ratio of the number of boys and girls in a school is 2:5. if there are 280 students in the school, find number of girls in the school

- a. 200
- b. 250
- c. 150
- d. 100

179. The third proportional to 9 and 25

- a. $80/3$
- b. 80
- c. $80/7$
- d. None of these

180. $(\frac{\sqrt{3}}{9})^{5/2} (\frac{9}{3\sqrt{3}})^{7/2} \times 9$ is equal to

- a. 1
- b. $\sqrt{3}$
- c. $3\sqrt{3}$
- d. $\frac{3}{9\sqrt{3}}$

181. The value $\frac{\log_3 8}{\log_9 16 \cdot \log_4 10}$ is

- a. $3 \log_{10} 2$
- b. $7 \log_{10} 3$
- c. $3 \log_e 2$
- d. None of these

182. If $\frac{p}{q} = -\frac{2}{3}$ then the value of $\frac{2p+q}{2p-q}$ is

- a. 1
- b. $-1/7$

c. $1/7$

d. 7

183. If $x:y = 3:5$, then find $(\frac{1}{x} + \frac{1}{y}) : (\frac{1}{x} - \frac{1}{y})$

a. 2

b. 4

c. 6

d. 8

184. if $A:B = 3:5$ and $B:C = 5:4$, $C:D = 2:3$ and D is 50% more than E, find the ratio between A and E

a. 2:3

b. 3:4

c. 3:5

d. 4:5

185. Find the value of $\sqrt{6561} + \sqrt[4]{6561} + \sqrt[8]{6561}$

a. 81

b. 93

c. 121

d. 243

186. Find the value of $\log \frac{x^n}{y^n} + \log \frac{y^n}{z^n} + \log \frac{z^n}{x^n}$

a. -1

b. 0

c. 1

d. 2

187. If $\frac{8^n \times 2^3 \times 16^{-1}}{2^n \times 4^2} = \frac{1}{4}$ then the value of n

a. 1

b. 3

c. $3/2$

d. $2/3$

188. If $xy + yz + zx = -1$, then the value of

$(\frac{x+y}{1+xy} + \frac{z+y}{1+zy} + \frac{x+z}{1+zx})$ is

a. xyz

b. $-1/yz$

c. $1/xyz$

d. $1/x + y + z$

189. The salaries of A, B and C are of ratio 2:3:5. if the increments of 15%, 10% and 20% are done their respective salaries, then find new salaries.

a. 23:33:60

b. 33:23:60

c. 23:60:33

d. 33:60:23

190. If $A:B = 5:3$, $B:C = 6:7$ and $C:D = 14:9$ then the value of $A:B:C:D$

a. 20:14:12:9

b. 20:9:12:14

c. 20:9:14:12

d. 20:12:14:9

191. The cab bill is partly fixed and partly varies on the distance covered. For 456 km the bill is Rs. 8252, for 484 km the bill is Rs. 8728. What will the bill be for 500km?

a. Rs. 8876

b. Rs.9156

c. Rs.9472

d. Rs.9000

192. X and Y have their present ages in the ratio 6:7. 14 years ago, the ratio of the ages of the two was 4:5. What will be the ratio of their ages 21 years from now?

a. 7:11

b. 9:10

c. 8:11

d. 11:13

193. The salary of P is 25% lower than that of Q and the salary of R is 20% higher than Q, the ratio of salary of R and P will be :

- a. 5:8
- b. 8:5
- c. 5:3
- d. 3:5

194. Find the value of $[\log_{10} \sqrt{25} - \log_{10}(2^3) + \log_{10}(4)^2]$

- a. x
- b. 10
- c. 1
- d. None of these

195. If $A : B = 2 : 5$, then $(10A + 3B) : (5A + 2B)$ is equal to

- a. 7:4
- b. 7:3
- c. 6:5
- d. 7:9

196. The ratio compounded of 4:5 and subduplicate of a:9 is 8:15. Then value of "a" is

- a. 2
- b. 3
- c. 4
- d. 5

197. If $\frac{1}{2}, \frac{1}{3}, \frac{1}{5}$ and $\frac{1}{x}$ are in proportion, then the value of x will be

- a. 15/2
- b. 6/5
- c. 10/3
- d. 5/6

198. If $P = x^{1/3} + x^{-1/3}$ then find value of $3p^3 - 9p$

- a. 3

b. $\frac{1}{2}(x+1/x)$

c. $(x+1/x)$

d. $2(x+1/x)$

199. Fourth proportional to x, 2x, (x+1) is:

a. (x+2)

b. (x-2)

c. (2x+2)

d. (2x-2)

200. The value of $\frac{3^{n+1} + 3^n}{3^{n+3} - 3^{n+1}}$ is

a. 1/5

b. 1/6

c. $\frac{1}{4}$

d. 1/9

201. The value of $\frac{x^2 - (y-z)^2}{(x+z)^2 - y^2} + \frac{y^2 - (x-z)^2}{(x+y)^2 - z^2} + \frac{z^2 - (x-y)^2}{(y+z)^2 - x^2}$

a. 0

b. 1

c. -1

d. ∞

202. If $abc = 2$, then the value of $\frac{1}{1+a+2b^{-1}} + \frac{1}{1+\frac{1}{2}b+c^{-1}} + \frac{1}{1+c+a^{-1}}$ is

a. 1

b. 2

c. 3

d. $\frac{1}{2}$

203. If $\frac{3x-2}{5x-6}$ is the duplicate ratio of 2/3 then the value of 'x' is

a. 2

b. 6

c. 5

d. 9

204. If $x:y = 2:3$, then $(5x+2y):(3x-y) =$

- a. 19:3
- b. 16:3
- c. 7:2
- d. 7:3

205. If $(25)^{150} = (25x)^{50}$, then the value of x will be:

- a. 5^3
- b. 5^4
- c. 5^2
- d. 5

206. The value of $\left(\frac{x^a}{x^b}\right)^{a^2+b^2+ab} \times \left(\frac{x^b}{x^c}\right)^{b^2+c^2+bc} \times \left(\frac{x^c}{x^a}\right)^{c^2+a^2+ca}$

- a. y
- b. -1
- c. 1
- d. None of these

207. If $x = \log_{24}12$, $y = \log_{36}24$, $z = \log_{48}36$ then $xyz+1=$

- a. $2xy$
- b. $2xz$
- c. $2yz$
- d. 2

208. A person has asset worth of ₹ 1,48,200. He wishes to divide it amongst his wife, son and daughter in the ratio 3:2:1 respectively. From these assets share of his wife son will be:

- a. ₹24,700
- b. ₹49,400
- c. ₹74,100
- d. ₹37,050

209. X, Y, Z together starts a business, if X invests 3 times as much as Y invests and Y invests two third of what Z invests, then the ratio of capitals of X, Y, Z is

- a. 3:9:2
- b. 6:3:2
- c. 3:6:2
- d. 6:2:3

210. If $2^{x+y} = 22^{x+y} = \sqrt{8}$ then the respective values of x and y are ___

- a. $1, \frac{1}{2}$
- b. $\frac{1}{2}, 1$
- c. $\frac{1}{2}, \frac{1}{2}$
- d. None of these

211. If $a^2 + b^2 = 45$ and $ab = 18$, the value of $1/a + 1/b$ is:

- a. $\pm 1/3$
- b. $\pm 2/3$
- c. $\pm 1/2$
- d. None of these

212. $\left(\frac{\sqrt{3}}{9}\right)^{5/2} \left(\frac{9}{3\sqrt{3}}\right)^{7/2} \times 9$ is equal to

- a. 1
- b. $\sqrt{3}$
- c. $3\sqrt{3}$
- d. $\frac{3}{9\sqrt{3}}$

213. If $\frac{p}{q} = \frac{2}{3}$ then the value of $\frac{2p+q}{2p-q}$ is

- a. $1/7$
- b. $-1/7$
- c. 1
- d. 7

214. $\log_a 3\sqrt{3} = 1/6$, find the value of a

- a. 9

b. 81

c. 27

d. 3

215. $\log \frac{p^2}{qr} + \log \frac{q^2}{pr} + \log \frac{r^2}{pq} =$

a. pqr

b. $1/pqr$

c. 1

d. 0

216. Find the value of $\frac{3t^{-1}}{t^{\frac{1}{3}}}$

a. $\frac{3}{t^{\frac{2}{3}}}$

b. $\frac{3}{t^{\frac{2}{3}}}$

c. $\frac{3}{t^{\frac{1}{3}}}$

d. $\frac{3}{t^2}$

217. A bag contains 25 paise, 10 paise and 5 paise are in the ratio 3:2:1. The total value of 40, the number of 5 paise coins is

a. 45

b. 48

c. 40

d. 20

218. If $2^x \times 3^y \times 5^z = 720$ then the value of x, y, z?

a. 4, 2, 1

b. 1, 2, 4

c. 2, 4, 1

d. 1, 4, 2

219. What must be added to each term of the ratio 49:68. So that it becomes 3:4?

a. 3

b. 5

c. 8

d. 9

220. The ratio of two numbers are 3 : 4. The difference of their squares is 28. Greater number is:

a. 8

b. 12

c. 24

d. 64

221. The price of scooter and moped are in the ratio 7 : 9. The price of moped is ₹ 1600 more than that of scooter. Then the price of moped is:

a. ₹ 7200

b. ₹ 5600

c. ₹ 800

d. ₹ 700

222. $\log_{0.01} 10,000 = ?$

a. 2

b. -2

c. 4

d. -4

223. Value of $\left[9^{n+\frac{1}{4}} \cdot \frac{\sqrt{3 \cdot 3^n}}{3 \cdot \sqrt{3^{-n}}}\right]^{\frac{1}{n}}$

a. 9

b. 27

c. 81

d. 3

224. $\frac{2x+5}{10} + \frac{3x+10}{8}$, then value of x is

a. 9

b. 10

c. 9.5

d. None of these

225. The value of $\frac{64(b^4 a^3)^6}{4(a^3 b)^2 \times (ab)^2}$ is

a. $16a^{10}b^{20}$

- b. $4a^{20}b^{10}$
c. $8a^{10}b^{20}$
d. $4a^{10}b^{20}$

226. Four persons A, B, C, D wish to share a sum in the ratio of 5:4:2:3. If D gets ₹1000 less than C, then the share of B?

- a. 2000
b. 1200
c. 2400
d. 3000

227. The mean proportional between $12x^2$ and $27y^2$

- a. $18xy$
b. $81xy$
c. $8xy$
d. $9xy$

228. If $\log_3 4 \cdot \log_4 5 \cdot \log_5 6 \cdot \log_6 7 \cdot \log_7 8 \cdot \log_8 9 = x$, then find the value of x

- a. 4
b. 2
c. 3
d. 1

229. if $\frac{1}{2} \log_{10} 4 = y$ and if $\frac{1}{2} \log_{10} 9 = x$, then the value of $\log_{10} 15$

- a. $x-y+1$
b. $x+y-1$
c. $x+y+1$
d. $y-x+1$

230. In a hostel ration stocked for 400 students upto 31 days. After 28 days 280 students were vacated the hostel. Find the number of days for which the remaining ratio will be sufficient for the remaining students.

- a. 5
b. 4
c. 7
d. 10

231. The monthly incomes of A & B are in the ratio 4 : 5 and their monthly expenditures are in the ratio 5 : 7. If each saves ₹150 per month, find their monthly incomes.

- a. 40, 50
b. 50, 40
c. 400, 500
d. None of these

232. Two vessels containing water and milk in the ratio 2 : 3 and 4 : 5 are mixed in the ratio 1 : 2. The ratio of milk and water in the resulting mixture.

- a. 58:77
b. 77:58
c. 68:77
d. None of these

233. If $(x - 9) : (3x + 6)$ is the duplicate ratio of 4 : 9, find the value of x

- a. 9
b. 16
c. 36
d. 25

234. Value of $(a^{1/8} + a^{-1/8})(a^{1/8} - a^{-1/8})(a^{1/4} + a^{-1/4})(a^{1/2} + a^{-1/2})$ is :

- a. $a + 1/a$
b. $a - 1/a$
c. $a^2 + 1/a^2$
d. $a^2 - 1/a^2$

235. If $(25)^{150} = (25x)^{50}$ then the value of x will be

- a. 5^3
- b. 5^4
- c. 5^2
- d. 5

236. $7\log(16/15) + 5\log(25/24) + 3\log(81/80)$ is equal to

- a. 0
- b. 1
- c. $\log 2$
- d. $\log 3$

237. $\log_4(x^2+x) - \log_4(x+1) = 2$. find x

- a. 16
- b. 0
- c. -1
- d. None of these

238. Given $\log 2 = 0.3010$ and $\log 3 = 0.4771$ then the value of $\log 24$

- a. 1.3081
- b. 1.1038
- c. 1.3801
- d. 1.830

239. What is the value of $\frac{p+q}{p-q}$ if $p/q = 7$

- a. $4/3$
- b. $2/3$
- c. $2/6$
- d. $7/8$

240. The ratio compounded of $4 : 5$, $9 : 7$, the triplicate ratio of $3 : 4$, and the triplicate ratio of $2 : 3$ is

- a. $4 : 512$
- b. $3 : 32$

- c. $1 : 12$
- d. none of these

241. Daily earnings of two persons are in the ratio $4 : 5$ and their daily expenses are in the ratio $7 : 9$. If each saves ₹ 50 per day, their daily earnings in ₹ are

- a. (40, 50)
- b. (50, 40)
- c. (400, 500)
- d. none of these

242. If $a^x = b$, $b^y = c$, $c^z = a$, then xyz is

- a. 1
- b. 2
- c. 3
- d. None of these

243. Given that $\log_{10} 2 = x$ and $\log_{10} 3 = y$, the value of $\log_{10} 120$ is expressed as

- a. $2x - y + 1$
- b. $2x + y - 1$
- c. $2x - y - 1$
- d. None of these

244. The simplified value of $2 \log_{10} 5 + \log_{10} 8 - \frac{1}{2} \log_{10} 4$ is

- a. $\frac{1}{2}$
- b. 4
- c. 2
- d. None of these

245. If $\log[(a+b)/4] = \frac{1}{2}(\log a + \log b)$ then $a/b + b/a$

- a. 12
- b. 14
- c. 16
- d. 8

246. If $\frac{\sqrt{x+5} + \sqrt{x-16}}{\sqrt{x+5} - \sqrt{x-16}} = \frac{7}{3}$ then x equals

- a. 10
- b. 20
- c. 30
- d. 40

247. If $x = 2 + \sqrt{3}$ and $y = 2 - \sqrt{3}$ then value of $x^2 + y^2 =$

- a. 14
- b. 4
- c. 2
- d. 6

248. If $(25)^{150} = (25x)^{50}$; then the value of x will be:

- a. 5^3
- b. 5^4
- c. 5^2
- d. 5

249. On solving the equation $\log t + \log (t-3) = 1$ we get the value of t as

- a. 5
- b. 2
- c. 3
- d. 0

250. If $\log 2 = 0.3010$ and $\log 3 = 0.4771$, then the value of $\log 24$ is :

- a. 1.0791
- b. 1.7323
- c. 1.3801
- d. 1.8301

251. If four numbers $1/2, 1/3, 1/5, 1/x$ are proportional then x =

- a. $6/5$
- b. $5/6$

c. $15/2$

d. None of these

252. A box contains 276 coins of 5 rupees, 2 rupees and 1 rupee. The value of each kind of coins are in the ratio 2:3:5 respectively. The number of 2 rupees coin is

- a. 52
- b. 60
- c. 76
- d. 85

253. What must be added to each term of the ratio 49 : 68, so that it becomes 3 : 4?

- a. 3
- b. 5
- c. 8
- d. 9

254. If $A : B = 3 : 2$ and $B : C = 3 : 5$, then $A : B : C$ is

- a. 9 : 6 : 10
- b. 6 : 9 : 10
- c. 10 : 9 : 6
- d. none of these

255. Two numbers are in the ratio 3 : 4; if 6 be added to each number of the ratio, then the new ratio

will be 4 : 5, then the numbers are

- a. 14, 20
- b. 17, 19
- c. 18 and 24
- d. none of these

256. The value of $4/(32)^{1/5}$ is

- a. 8
- b. 2

- c. 4
- d. none of these

257. $x^{a-b} \times x^{b-c} \times x^{c-a}$ is equal to

- a. x
- b. 1
- c. 0
- d. none of these

258. If $x^{1/p} = y^{1/q} = z^{1/r}$ and $xyz = 1$, then the value of $p + q + r$ is

- a. 1
- b. 0
- c. $1/2$
- d. none of these

259. The simplified value of $16x^{-3}y^2 \times 8^{-1}x^3y^{-2}$ is

- a. $2xy$
- b. $xy/2$

- c. 2
- d. none of these

260. $[(x^n)^{n-1/n}]^{1/n+1}$ is equal to

- a. xn
- b. $xn+1$
- c. $xn-1$
- d. none of these

261. If $2^x = 3^y = 6^{-z}$, $1/x + 1/y + 1/z$ is

- a. 1
- b. 0
- c. 2
- d. none of these

262. $\log_{\sqrt{2}} 64$ is equal to

- a. 12
- b. 6
- c. 1
- d. none of these

ANSWERS

1	2	3	4	5	a	a	b	d	c
b	a	c	c	b	81	82	83	84	85
6	7	8	9	10	d	c	d	a	c
a	d	c	a	c	86	87	88	89	90
11	12	13	14	15	a	c	d	b	a
d	a	c	a	c	91	92	93	94	95
16	17	18	19	20	c	b	b	c	a
d	d	a	c	d	96	97	98	99	100
21	22	23	24	25	b	a	a	b	a
a	c	b	b	c	101	102	103	104	105
26	27	28	29	30	b	c	a	c	a
a	c	a	c	a	106	107	108	109	110
31	32	33	34	35	b	b	c	b	a
b	a	c	a	d	111	112	113	114	115
36	37	38	39	40	b	b	a	c	c
c	a	b	c	d	116	117	118	119	120
41	42	43	44	45	d	c	c	a	c
a	c	a	c	c	121	122	123	124	125
46	47	48	49	50	c	a	b	c	a
b	c	d	a	d	126	127	128	129	130
51	52	53	54	55	c	b	a	c	d
d	a	a	b	d	131	132	133	134	135
56	57	58	59	60	c	b	d	a	a
a	c	d	c	a	136	137	138	139	140
61	62	63	64	65	a	b	a	d	a
b	b	a	b	a	141	142	143	144	145
66	67	68	69	70	a	a	b	a	c
a	b	d	a	a	146	147	148	149	150
71	72	73	74	75	a	a	a	b	a
d	c	c	c	c	151	152	153	154	155
76	77	78	79	80	c	c	d	b	d

156 157 158 159 160

a b a d b

161 162 163 164 165

a a d b b

167 168 169 170 171

b a d c c

172 173 174 175 176

b c a b b

177 178 179 180 181

c a d a a

182 183 184 185 186

c b b b b

187 188 189 190 191

c c a d d

192 193 194 195 196

b b c a c

197 198 199 200 201

a c c b b

202 203 204 205 206

a b b b c

207 208 209 210 211

c b d a c

212 213 214 215 216

a d c d a

217 218 219 220 221

c a c a a

222 223 224 225 226

b b b a a

227 228 229 230 231

a b a d c

232 233 234 235 236

b d b b c

237 238 239 240 241

a a a d c

242 243 244 245 246

a b c b b

247 248 249 250 251

a b a c c

252 253 254 255 256

b c a c b

257 258 259 260 261

b b c c b

262

a