

NTSE STAGE – I (DELHI STATE)
05 – A (2018 – 19)
(For Class – X)
MENTAL ABILITY TEST (MAT)
HINTS & SOLUTIONS

1. 4

$$1. \quad x \sqrt{\frac{25}{x^2}} \cdot 10 \sqrt{x^2} \cdot 10x \sqrt{25} \cdot 0 \sqrt{x} \cdot 5 \sqrt{0} \cdot x \sqrt{5x}$$

$$x^2 \sqrt{\frac{50}{x^2}} \cdot 25 \sqrt{\frac{50}{25}} \cdot 25 \sqrt{2} \cdot 27$$

2. 1

$$2. \quad x + y = 3, \quad x^2 + y^2 = 15$$

$$(x - y)^2 = ?, \quad (x^2 + y^2 + 2xy) = 9 \quad \square \quad 15 + 2xy = 9$$

$$\square \quad xy = \square 3$$

$$(x - y)^2 = x^2 + y^2 - 2xy = 15 + 6 = 21$$

3. 2

$$3. \quad \frac{a}{3} \square \frac{b}{5} \square \frac{c}{7} \square K \square a \square 3K, b \square 5K, c \square 7K$$

$$\square \quad \frac{a \square b \square c}{b} \square \frac{3K \square 5K \square 7K}{5K} \square 3$$

4. 3

$$4. \quad x + y = 25, \quad x^2 + y^2 = 425$$

$$\square \quad x^2 + y^2 + 2xy = 625$$

$$\square \quad 425 + 2xy = 625 \quad \square \quad xy = 100$$

5. 1

$$5. \quad 0.64 \square a^2 \square 64$$

$$\square \quad \frac{0.64}{a^2} \square 64 \square a^2 \square \frac{1}{100} \square a \square \frac{1}{10} \square 0.1$$

6. 2

$$6. \quad \text{Dividend} = \text{divisor} \times \text{quotient} + \text{remainder}$$

$$\text{Divisor} = 30 \times q$$

$$\text{Divisor} = 4 \times r$$

$$\square \quad q = 20 \quad \text{Divisor} \square 600 \quad \& \quad \text{remainder} \square \frac{600}{4} \square 150$$

$$\square \quad \text{Dividend} \square 600 \square 20 \square 150 \square 12,150$$

7. 4

$$7. \quad 3^{a-2b} = 27 \square 3^{a-2b} = 3^3 \square a - 2b = 3 \quad \dots(1)$$

$$9^{a+b} = 3 \square 3^{2a+2b} = 3^1 \square 2a + 2b = 1 \quad \dots(2)$$

by equation (1) and (2)

$$3a \square 4 \square a \square \frac{4}{3}, b \square \square \frac{5}{6}$$

$$\square \quad \square a \square \square \square \frac{4}{3} \square \square \frac{8}{5}$$

$$\square \quad \square \square \square \frac{5}{6} \square \square \frac{8}{5}$$

8. 4

8. $\sqrt{17x} \times \sqrt{1} = \sqrt{11 \times 6 \times 2 \times 11 \times 6}$
 $x = 2\sqrt{6}$
 $x^2 = 24$

9. 1
 9. $\sqrt{0.02 \times 0.2 \times \epsilon \times 0.2 \times 0.2 \times \sqrt{b}}$
 $0.02 \times 0.2 \times a \times 0.2 \times 0.2 \times 0.2 \times 0.2 \times b$
 $\frac{a}{b} \times \frac{0.2 \times 0.2 \times 0.2}{0.02} = 0.4$

10. 1
 10. $7\sqrt{3} \times 7\sqrt{3}$
 $14, 46$
 $x^2 - 14x + 46 = 0$

11. 2
 11. $Q = 3R = 2(P + R)$
 $Q = 2P + 2R$
 $3R = 2P + 2R$
 $R = 2P$
 $Q = 2P + 4P = 6P$
 $P + 6P + 2P = 180^\circ \Rightarrow 9P = 180^\circ \Rightarrow P = 20^\circ$
 $Q = 6 \times 20 = 120^\circ$

12. 2
 12. $\frac{p}{x} \times \frac{x}{3}, p \times x \times 3, q \times x \times 3, K, q$
 $\frac{p^2 \times q^2 \times x \times 3 \times K_1^2 \times x \times 3 \times K_1^2}{\frac{p^2 \times q^2 \times x \times 3 \times K_1^2 \times x \times 3 \times K_1^2}{x \times 3^2 \times x \times 3^2}}$
 $\frac{x \times 3 \times x \times 3 \times x \times 3 \times x \times 3}{2 \times x^2 \times 9}$
 $\frac{2x \times 6}{2 \times x^2 \times 9}$
 $\frac{6x}{x^2 \times 9}$

13. 1
 13. Perimeter of square = $4a = 2(l + b)$
 $l = 24 = 2b \Rightarrow b = 12$
 $4a = 72 \Rightarrow a = 18$
 Area of square = $18^2 = 324$

14. 1
 14. $\frac{V_1}{V_2} = \frac{\frac{1}{3} \pi r_1^2 h_1}{\frac{1}{3} \pi r_2^2 h_2} = \frac{2}{3} \times \frac{1}{4} \times \frac{h_1}{h_2} = \frac{h_1}{h_2} \times \frac{8}{3}$

15. 3

$$2^x = 8^{y-1} \quad \square \quad x = 3y - 3 \quad \dots(1)$$

$$9^y = 3^{x-6} \quad \square \quad 2y = x - 6 \quad \dots(2)$$

by (1) & (2)

$$x = 24, y = 9$$

$$\square \quad x + y = 33$$

16. 1

$$x - y : (x + y) : xy = 1 : 7 : 24$$

$$\frac{x - y}{x + y} = \frac{1}{7} \quad \square \quad 7x - 7y = x + y$$

$$= 6x = 8y$$

$$\square \quad x = \frac{4}{3}y$$

$$\frac{4}{3}y - y = y$$

$$\frac{x - y}{xy} = \frac{\frac{4}{3}y - y}{\frac{4}{3}y \cdot y} = \frac{\frac{1}{3}y}{\frac{4}{3}y^2} = \frac{1}{4y} = \frac{1}{24} \quad \square \quad y = 6$$

$$\square \quad x = \frac{4}{3} \cdot 6 = 8$$

$$\square \quad xy = 48$$

17. 1

17. 6, 7, 7, 7, 9, 9, 14, 15

mode = 7

$$\text{range} = 15 - 6 = 9$$

median = 8

$$\square \quad \text{mean} = \frac{7 + 9 + 8 + 8}{3} = 8$$

18. 4

18. Let initial income be x

$$\square \quad \text{initial expenditure} = 0.8x$$

$$\text{New expenditure} = 1.375(0.8x)$$

$$= 1.1x$$

$$\text{New income} = \frac{7x}{6}$$

$$\square \quad \text{Saving} = \frac{7x}{6} - \frac{11x}{10}$$

$$= \frac{2x}{30} = \frac{x}{15}$$

$$\square \quad \text{present percent saving} = \frac{\frac{x}{15}}{\frac{7x}{6}} \cdot 100 = 5 \frac{5}{7} \%$$

19. 3

19. Let the cost of 1 chair be 'c' and the cost of 1 table be 't'

$$5c + 3t = 3110$$

$$c = t - 210$$

So, we get,

$$5t - 1050 + 3t = 3110 \quad \square \quad 8t = 4160 \quad \square \quad t = 520$$

$$\square \quad c = 310$$

Rs.1660

20.

$$5a \frac{1}{1} \frac{1}{6} \frac{1}{2}$$

$$5a \frac{1}{1} \frac{1}{13}$$

$$5a \frac{13}{15}$$

$$a \frac{13}{15}$$

$$a \frac{62}{15}$$

21.

Let number be x

$$\frac{7}{8}x \frac{5}{7}x \frac{5}{7}$$

$$\frac{7x}{8} \frac{5x}{7} \frac{5}{7}$$

$$\frac{49x}{56} \frac{40x}{56} \frac{5}{9} \frac{56}{9}$$

$$9x \frac{56}{9} \frac{56}{9} \frac{56}{9} \frac{280}{9}$$

22.

$$\frac{1}{3} [6]^2 \frac{4}{3} R^3$$

$$R = 6$$

$$TSA = 4R^2 = 4 \times 36 = 144 \text{ sq cm}$$

23.

$$\frac{1}{P} \frac{1}{Q} \frac{1}{R} \frac{1}{10} \frac{1}{15} \frac{1}{20}$$

$$\frac{1}{P} \frac{1}{Q} \frac{1}{R} \frac{6 \times 4 \times 3}{60 \times 2} \frac{13}{60 \times 2}$$

$$\frac{1}{P} \frac{1}{Q} \frac{1}{R} \frac{1}{120} \frac{1}{10} \frac{13}{120}$$

$$\frac{1}{R} \frac{13}{120} \frac{12}{120} \frac{1}{120}$$

R will complete in 120 days

24.

$$3^{\frac{1}{2}}, 2^{\frac{1}{3}}, 2^{\frac{1}{2}}, 4^{\frac{1}{3}}$$

$$3^{\frac{3}{6}}, 2^{\frac{2}{6}}, 2^{\frac{3}{6}}, 4^{\frac{2}{6}}$$

$$[3^{\frac{3}{6}}, 2^{\frac{2}{6}}, 2^{\frac{3}{6}}, 4^{\frac{2}{6}}]$$

$$\square \quad \square 27 \frac{1}{6}, \square 4 \frac{1}{6}, \square 8 \frac{1}{6}, \square 16 \frac{1}{6}$$

25. 4

25. Putting symbols in option (4)
 $8 \times 8 + 8 \square 8 - 8 = 64 + 1 - 8 = 57$

26. 4

26. Out of 60 litres 12 litres is taken out

i.e. $\frac{12}{60} \square 100 \square 20\%$

milk remained after two replacement

$$\square 60 \square \frac{80}{100} \square \frac{80}{100} \square 38.4 \text{ litres}$$

27. 4

27. Except option (4) all follows.
 $x : 3x + 1$

28. 3

28. Between A and B $\square 30 - 20 - 1 = 9$
 total = $20 + 9 + 16 = 45$

29. 1

29. $n \square \frac{15}{3} \square 5$

one face painted $= (n - 2)^2 \times 6$
 $= 3^2 \times 6 = 54$

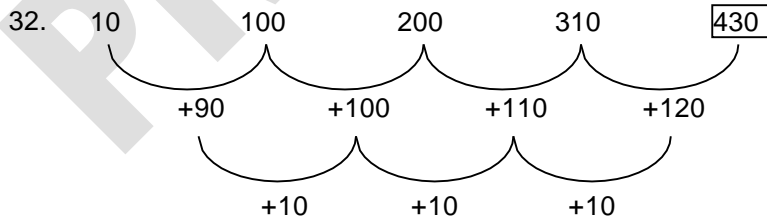
30. 2

30. Let son's present age $\square s$
 $S = 48 - 3S$
 $\square S = 12$
 Son is 12 years now, so 4 years ago he would be 8.

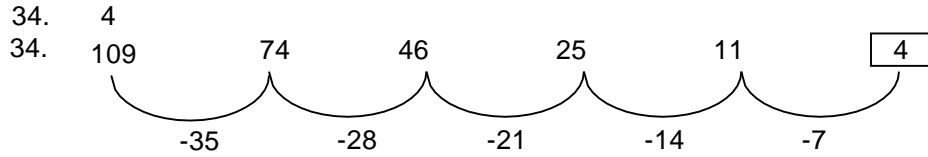
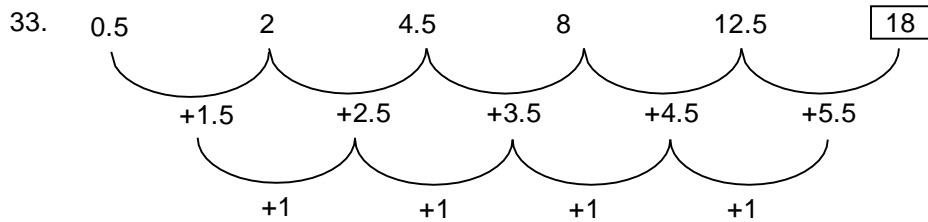
31. 2

31. Series follows
 $1 \square 2, 3 \square 4, 5 \square 6, 7 \square 8, 9 \square 10, 11 \square 12$
 $\square 56$

32. 4



33. 4



35. 4
 35. In numerator $+2, +3, +4, +5$
 In denominator $+4, +6, +8, +10$

$\square \frac{2}{4}, \frac{4}{7}, \frac{7}{3}, \frac{11}{21}, \frac{16}{31}$

36. 3
 36. Initially 12 dozen in basket = $12 \times 12 = 144$ apples
 2 dozen added later = $144 + (12 \times 2) = 168$
 10 apples got spoiled = $168 - 10 = 158$
 In each basket $\square \frac{158}{2} \square 79$

37. 2
 37. To coincide between 8 and 9 O'clock
 Minute hand require gain of 40 min
 55 min gain occur in 60 min
 1 min gain occur in $\frac{60}{55}$ min
 40 min gain occur in $\frac{60}{55} \times 40 \square 40 \square \frac{480}{11} \square 43 \frac{7}{11}$ min
 hands will coincide at $43 \frac{7}{11}$ min past 8.

38. 4
 38. From option (4)
 Putting $A = 9, B = 13, C = 11$
 $9 + 9 + 12 = 30$
 $13 + 10 + 7 = 30$
 $8 + 11 + 11 = 30$

39. 3
 $\frac{7^{n-3} \square 7 \square 2 \square 7^{n-4}}{7^{n-3}}$
 39. $\frac{7^{n-3} [1 \square 7^2 \square 2]}{7^{n-3}} \square 99$

40. 1
 40. $\tan x \square 5 \square \sqrt{3};$

$$22 \tan 90^\circ x \quad 22 \cot x \quad \frac{22}{5\sqrt{3}} \quad \frac{5\sqrt{3}}{5\sqrt{3}} \quad 5\sqrt{3}$$

41. 4
 41. $a = \frac{1}{2\sqrt{3}}, \quad b = \frac{1}{2\sqrt{3}} \quad ab = 1 \quad b = \frac{1}{a}$

$$7a^2 - 11ab + 7b^2$$

$$7a^2 - 7b^2 - 11$$

$$7(a^2 - b^2) - 11$$

$$7(a - b)(a + b) - 11$$

$$7(4 - 2\sqrt{3}) - 11$$

$$56\sqrt{3} - 11$$

42. 1
 42. Tank filled in one minute

$$\frac{1}{A} + \frac{1}{B} + \frac{1}{C}$$

$$\frac{1}{12} + \frac{1}{15} + \frac{1}{10}$$

$$\frac{5 + 4 + 6}{60} = \frac{3}{20}$$

Tank will be filled in 20 minutes

43. 1
 43. $A = P \frac{3T}{100} \dots (1)$
 $P = \frac{5T}{100} \dots (2)$
 by (1) & (2) $\frac{2PT}{100} = 200$
 $PT = 10,000$
 $P = 500,$
 $T = 20$

44. 1
 44. $x^2 - 2x - 1 = 0$
 $a + b = 2$
 $ab = -1$
 $a^2b + ab^2 = ab(a + b) = -1(2) = -2$

45. 3
 45. $1,00,000 \left[\frac{60}{100} + \frac{20}{100} \right] = 12,000$

46. 1
 46. $1,00,000 \left[\frac{5}{100} + \frac{60}{100} \right] = 3,000$

47. 3

47. $1,00,000 \square \frac{15}{100} \square \frac{6}{100} \square 9,000$

48. 2

48. $1,00,000 \square \frac{20}{100} \square \frac{60}{100} \square \frac{12}{100} \square 1,00,000 \square \frac{5}{100} \square \frac{20}{100} \square 1$

49. 3

49. $1,00,000 \square \frac{20}{100} \square \frac{20}{100} \square 1,00,000 \square \frac{5}{100} \square \frac{20}{100} \square 3,000$

50. 2

50. $(6 - 1)! = 5! = 120$

51. Incorrect Question

51. The alphabet R should not appear in the sequence. Then the next two letters will be D W.

52. 3

52. $R > P > S > Q > T$

53. 3

53. 7 M 4 P % J V I K 3 @ E W 2 Q © 6 T A □ 8 Z 1 5 \$ F U # 9 H N

54. No option correct.

54. 7 M 4 P % J V I K 3 @ E W 2 Q © 6 T A □ 8 Z 1 5 \$ F U # 9 H N

No such consonant is there in the given sequence which is immediately preceded by symbol and immediately followed by two numbers.

55. 2

55. 7 M 4 P J V I K 3 E W 2 Q 6 T A 8 Z 1 5 F U 9 H N

56. 2

56. The following table can be concluded:

Day	Performer	Item performed
Monday	D	Speech
Tuesday	A	Monologue
Wednesday	F	Dance
Thursday	B	Play
Friday	G	Mimicry
Saturday	C	Debate
Sunday	E	Music

F performs Dance

57. 4

57. D performs speech on Monday.

58. 1

58. A performs on Tuesday

59. 4

59. G performs on Friday.

60. 4

60. C performs Debate.

61. 3

61. Only educated non working female \square 10

Non-working female \square 7

$$\square (10 + 7) = 17$$

62. 1

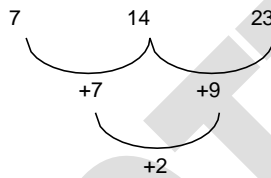
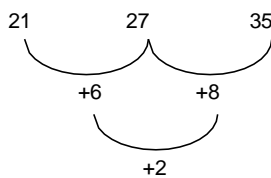
62. There are no women who are non-educated & non working.

63. 2

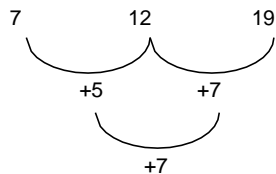
63. Area which occupy square + rectangle only
i.e. 40

64. 2

64.



So,



65. 2

65. +3, +3, +3, +3, series same as serial number (B)

66. 1

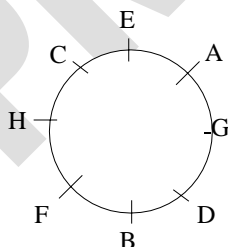
66. \square 4, \square 4, \square 4, \square 4 series same as series number (A)

67. Incorrect Question

67. The code in the question should be QLFIMZO instead of QLFIMZQ. In that case the answer is C (Option 3).

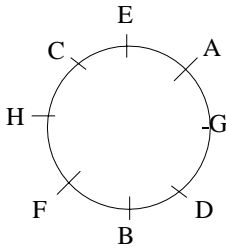
68. 2

68.

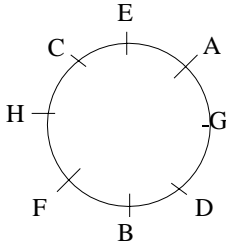


69. 1

69.



70. 4
70.



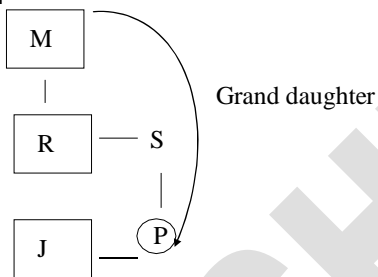
71. No option correct

71. If □ means □ and □ means □, then the answer will be 30 (Option 4)

72. 4

72. BHAGAT, BHAGIRATH, BHAGWAN, BHAGWAT

73. 1
73.



74. 3

74. $Z = 26 \times 2 = 52$

$ACT = 1 + 3 + 20 = 24 \times 2 = 48$

$BAT = 2 + 1 + 20 = 23 \times 2 = 46$

75. 3

75. $20 \parallel 3 \parallel^2 = 180, 4 \parallel 5 \parallel^2 = 100$. So, $7 \parallel 7 \parallel^2 = 343$

76. 4

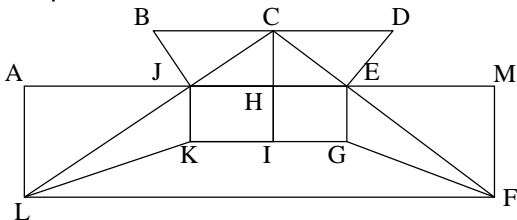
76. 2 opposite to 6

3 opposite to 4

1 opposite to 5

77. No option correct.

77.



The lines are AL, JK, CI, EG, MF, BD, AM, KG, LF, CL, KL, CF, GF, BJ & DE. So total 15 lines.

However, if CF & CL are not straight lines, then the number of lines will be 17.

78. 1

78. As per observation.

79. 3

79. As per observation.

80. 3

80. KILOMETER □ LHMNNDUDS

Then after arranged alphabetical order.

DDHLMNNSU. So, fifth from left end is M.

81. No option correct

81. The correct answer is 2nd as in 2nd move they are together however, if we consider the symbols in the same position as in given figure, then the correct answer will be 6th. (Option 2). If they count each move of white star and each move of black star as different moves, then total moves will be 4th(Option 1).

82. 2

82. As per observation

83. 1

83. As per observation

84. 2

84. 20 cubes in upper figure.

28 cubes in middle figure

20 cubes in lower figure

= 68 cubes total

85. 2

85. $8^2 \square 7^2 \square 6^2 \square 5^2 \square 4^2 \square 3^2 \square 2^2 \square 1^2$

$64 + 49 + 36 + 25 + 16 + 9 + 4 + 1 = 204$

86. No option correct

86. None of the given dices can be formed. In (2) and (4), no white face is visible, which is not possible. In (1) and (3), one new face is shown which is different from the faces shown in the given net.

87. 4

87. As per observation

88. 3

88.



89. No option correct

89. Option 2 is closest but is not completely correct.

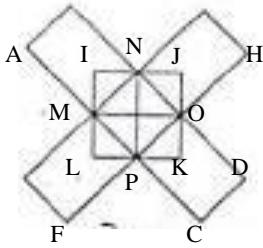
90. 4

90.

B

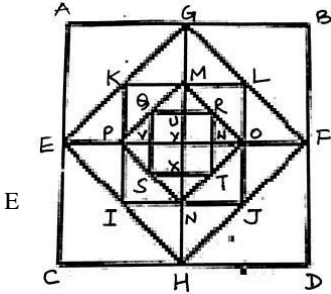
G

E



ABCD, ABOP, ABNM, CDPO, CDMN, EFGH, EFNO, EFMD, GHNO, GHMP, IJMO, MOLK, INPL, NJKP

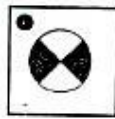
91. 2
91.



AGYE, GBFY, FYHD, HCEY, ABCD, GFHE, KMYP, MLOY, OJNY, PYNI, KLIJ, MONP, QUVX, RWYU, TXYW, SUYX, QRTS

92. No option correct

92. The correct answer should be



which is not there in the options.

93. 4
93.

One line remove from the outer figure for the bottom.

94. No option correct

94. The correct answer should be



which is not there in the options.

95. 3
95.

As per observation

96. No option correct

96. Option 2 and 4 are same. But the actual answer should be



97. 4
97.

As per observation

98. 1
98.

As per observation

99. 2
99.

As per observation

100. 4
100. As per observation

PRASHNOTTAR

NTSE STAGE – I (DELHI STATE)
05 – A (2018 – 19)
(For Class – X)
SCHOLASTIC APTITUDE TEST

HINTS & SOLUTIONS

101. **3**

101.

$$S \propto \frac{1}{2} a [t^2 - t_1^2]$$

$$x_1 \propto \frac{1}{2} a (10^2 - 0^2); \quad x_2 \propto \frac{1}{2} a (20^2 - 10^2); \quad x_3 \propto \frac{1}{2} a (30^2 - 20^2)$$

$$\text{So, } x_1 : x_2 : x_3 = 1 : 3 : 5$$

102. **1**

102.

$$M_1 V_1 = M_2 V_2$$

$$m \times 16 = 2m \times V$$

$$\therefore V = 8 \text{ m/s}$$

$$\text{K.E.} = \frac{1}{2} m \times 16^2 = \frac{1}{2} \times 2m \times 8^2 = 192 \text{ mJ}$$

103. **2**

103.

$$\sin x = \sin 45^\circ$$

$$\sin x = \frac{\sqrt{3}}{\sqrt{2}} \times \frac{1}{\sqrt{2}} = \frac{\sqrt{3}}{2}$$

$$\therefore x = 60^\circ$$

104. **4**

104.

$$P \propto \frac{1}{f} \quad \therefore f \propto \frac{1}{P} \text{ m} = -0.25 \text{ m}$$

105. **2**

105.

Using Maxwell's right hand thumb rule.

106. **4**

106.

$$\text{Let } i_1 \propto i; \quad i_2 \propto \frac{3}{2} i$$

$$P_2 \propto P_1 \propto i^2 \propto i^2$$

$$\frac{P_2}{P_1} = 100\% \times \frac{2}{1} = 200\%$$

$$\frac{P_2}{P_1} = \frac{5}{4}$$

$$\frac{P_2}{P_1} = 1 \times \frac{5}{4} = 125\%$$

$$\frac{P_2}{P_1} = \frac{5}{4}$$

107. **3**

107.

As slope of v-t gives acceleration and slope is positive as well as increasing.

108. **3**

108.

Astigmatism is corrected by using cylindrical lens.

109. **2**

109.

Distance between consecutive compression and rarefaction is half of wavelength.

110. No option

110. $\frac{5}{2} \times 20 = 8 \text{ cm}$

$\frac{v}{8} \times 100 = 4000 \text{ Hz.}$

111. 4

111. $H = mC\Delta T$
 $x = 15 \times 1 \times (24 - 20) = 60 \text{ cal}$

112. 2

112. In a hydro-Power Plant potential energy possessed by the stored water is converted into electricity.

113. 2

113. $\text{Weight} = 5 \times \frac{G \times 2M}{9R^2} \times \frac{10}{9} \times 9.8$
 $= 10.88 \text{ N}$

Where M & R are mass of earth and radius of earth.

114. 4

114. An olfactory indicator is a substance whose odour varies depending whether it is mixed with an acidic or basic solution

115. 3



116. 2

116.

Methyl orange	Acidic	Base
	Red	Yellow

117. 3



118. 3

118. Order of electricity
 $Ag > Cu > Au > Al > W > Hg$
Hg has very high resistance

119. 2

119. Gold & silver both are malleable as well as ductile

120. No correct option

121. 4

121. Au, Ag & Pt are noble metal does not corrode easily.

122. 1

122. $pH = -\log[H_3O^+]$

123. 2

123. The solution turns methyl orange into yellow the approximate pH of solution is 3.1 – 4.4

124. 2
 124. $Zn + 2NaOH \rightarrow Na_2ZnO_2 + H_2$
125. 1
 125. $SO_2 + H_2O \rightarrow H_2SO_3$ Sulphurous acid
126. 2
 126.
$$\begin{array}{c} \text{H} \quad \text{H} \\ | \quad | \\ \text{H}-\text{C}-\text{C}-\text{H} \\ | \quad | \quad | \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$$
127. 4
 127. A flagellum is present at one end of Leishmania.
128. 4
 128. DNA is not present in Ribosomes.
129. 1
 129. Wings of Housefly and wings of sparrow are an example of Analogous organs.
130. 2
 130. Transpiration is not helpful in prevention of loss of water.
131. 2
 131. Pulmonary veins carry oxygenated blood from lungs to heart.
132. 4
 132. Cell division is promoted by cytokinin.
133. 3
 133. Loop of Henle is found in Nephrons.
134. 1
 134. Flight and fight hormone is Adrenalin.
135. 1
 135. Grass T_1 Grasshopper T_2 Frog T_3 Snake T_4 Hawk T_5
 5000 KJ energy available at the producer level
136. 2
 136. Jaya and Ratna are varieties of rice.
137. 2
 137. Sargam is not a water harvesting structure.
138. 4
 138. ATP is formed by photosynthesizing plant cell during respiration and photosynthesis.
139. 4
 139. Breathing rate in human is controlled by medulla oblongata.
140. 2
 140. 31 pairs of nerves arises from Spinal cord.
141. 3

141. Let $a = 2k, b = 3k$

$$x = 3, y = 4$$

$$\text{Now } \frac{2ax + 25by}{3ay + 4bx} = \frac{24}{5}$$

142. 4

142. Diagonal of outer square = $2a$

$$\square \text{ Side of outer square} = \sqrt{2}a$$

$$\text{Diameter of inner circle} = \sqrt{2}a = \text{Diagonal of inner square}$$

$$\square \text{ Side of inner square} = a$$

143. 2

143. $a \cos \theta + b \sin \theta = c$

$$\square a^2 \cos^2 \theta + b^2 \sin^2 \theta + 2ab \sin \theta \cos \theta = c^2$$

$$\square a^2 - a^2 \sin^2 \theta + b^2 - b^2 \cos^2 \theta + 2ab \sin \theta \cos \theta = c^2$$

$$\square a^2 + b^2 - c^2 + 2ab \sin \theta \cos \theta = 0$$

$$\square a \sin \theta + b \cos \theta = \frac{\sqrt{a^2 + b^2 - c^2}}{2}$$

144. 3

$$144. x^2 + 3x + 2 = (x + 2)(x + 1)$$

$$x + 1 \text{ and } x + 2 \text{ are factors of } x^2 + px + q$$

$$\square p = -3 \text{ and } q = 2$$

On solving we get $p = -3$ and $q = 2$

145. 1

$$145. \frac{1}{x_1 x_2} + \frac{1}{x_2 x_3} + \frac{1}{x_3 x_4} + \dots + \frac{1}{x_{n-1} x_n}$$

$$= \frac{1}{d} \left[\frac{d}{x_1 x_2} + \frac{d}{x_2 x_3} + \frac{d}{x_3 x_4} + \dots + \frac{d}{x_{n-1} x_n} \right]$$

$$= \frac{1}{d} \left[\frac{x_2 - x_1}{x_1 x_2} + \frac{x_3 - x_2}{x_2 x_3} + \frac{x_4 - x_3}{x_3 x_4} + \dots + \frac{x_n - x_{n-1}}{x_{n-1} x_n} \right]$$

$$= \frac{1}{d} \left[\frac{1}{x_1} - \frac{1}{x_2} + \frac{1}{x_2} - \frac{1}{x_3} + \frac{1}{x_3} - \frac{1}{x_4} + \dots + \frac{1}{x_{n-1}} - \frac{1}{x_n} \right]$$

$$= \frac{1}{d} \left[\frac{x_n - x_1}{x_n x_1} \right] = \frac{n-1}{d x_1 x_n}$$

146. 1

$$146. x^2 + \frac{1}{x^2} + y^2 + \frac{1}{y^2} = 4$$

$$\square x^2 + \frac{1}{x^2} = 2 \text{ and } y^2 + \frac{1}{y^2} = 2 \text{ or } 0$$

$$\begin{aligned} & \left(x - \frac{1}{x} \right)^2 - \left(y - \frac{1}{y} \right)^2 = 0 \\ & \left(x - \frac{1}{x} \right) = 0 \text{ and } \left(y - \frac{1}{y} \right) = 0 \\ & x^2 = 1 \text{ and } y^2 = 1 \\ & x^2 - y^2 = 2 \end{aligned}$$

147. 4

147. Let ar[APC] = x

then ar[APD] = x

$$\text{ar[ABC]} = 2x = \text{ar[ADE]}$$

$$\text{So, } \frac{\text{ar[APC]}}{\text{ar[ABD]}} = \frac{x}{x} = \frac{4x}{4}$$

148. 2

$$\begin{aligned} 148. \quad & \frac{1}{1 - x^{b-a} - x^a} = \frac{1}{1 - x^{a-b} - x^{c-b}} = \frac{1}{1 - x^{b-c} - x^{a-c}} \\ & = \frac{x^a}{x^a - x^b - x^c} = \frac{x^b}{x^b - x^a - x^c} = \frac{x^c}{x^c - x^b - x^a} \\ & = 1 \end{aligned}$$

149. 2

149. Let height = h radius = r

$$\text{CSA} = 2\pi rh$$

$$\text{Increased height} = \frac{11h}{10}$$

$$\text{Decreased radius} = \frac{9}{10}r$$

$$\text{New CSA} = 2\pi r h \frac{99}{100}$$

$$\text{Decrease in CSA} = \frac{2\pi rh}{100}$$

$$\text{Decrease \%} = \frac{\frac{2\pi rh}{100}}{2\pi rh} \times 100 = 1\%$$

150. 4

150. Given AP is 0, d, 2d, 3d, ..., (n-1)d

Given expression is

$$\begin{aligned} & \frac{a_3}{a_1} + \frac{a_4}{a_2} + \dots + \frac{a_n}{a_{n-2}} \\ & = \frac{2d}{d} + \frac{3d}{2d} + \dots + \frac{(n-1)d}{(n-2)d} \\ & = 2 + \frac{3}{2} + \dots + \frac{n-1}{n-2} \\ & = \frac{1}{1} + \frac{1}{2} + \dots + \frac{1}{n-2} \end{aligned}$$

$$1 - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots + \frac{1}{n^2} - \frac{1}{(n+1)^2} + \frac{1}{(n+2)^2}$$

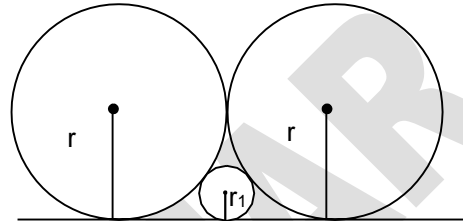
151. 3

151.

$$\frac{1}{\sqrt{r}} + \frac{1}{\sqrt{r}} + \frac{1}{\sqrt{r_1}}$$

$$\frac{2}{\sqrt{r}} + \frac{1}{\sqrt{r_1}} = r_1 = 4$$

$$\sqrt{r} = 4 \Rightarrow r = 16$$



152. 2

152.

Required area = $\frac{120}{360} \times 6^2 \times \frac{1}{2} \times 6^2 \times \sin 120^\circ$

$$= 12 \times 18 \times \frac{\sqrt{3}}{2}$$

$$= 12 \times 3.14 \times 9 \times 1.732$$

$$= 22.11 \times 22 \text{ cm}^2$$

153. 3

153.

$$\frac{1}{y+z} + \frac{1}{x+z} + \frac{2}{x+y}$$

$$= \frac{x+z}{y+z} + \frac{y+z}{x+z} + \frac{2}{x+y}$$

$$= \frac{x+y}{x+y} + \frac{2z}{x+y} + \frac{2}{x+y} + \frac{2}{x+y}$$

$$= \frac{x^2 + xy + xy + y^2 + 2xz + 2yz + 2xy + yz + xz + z^2}{x^2 + 2xy + y^2 + 2xz + 2yz + 2xy + 2yz + 2xz + 2z^2}$$

$$= \frac{x^2 + y^2 + 2z^2}{x^2 + y^2 + 2z^2}$$

154. 1

154.

$$x^2 + y^2 + z^2 + x^2 + x^2 + y^2 + z^2 + x(x+1) + x + y + z$$

$$= \frac{1}{x+1} + \frac{x}{x+y+z}$$

$$y^2 + z^2 + x$$

$$z^2 + x$$

$$y$$

$$y^2 + y + x + y + z$$

$$= y(y+1) + x + y + z = \frac{1}{y+1} + \frac{y}{x+y+z}$$

Similarly $\frac{1}{z+1} + \frac{z}{x+y+z}$

$$= \frac{1}{x+1} + \frac{1}{y+1} + \frac{1}{z+1} + \frac{x}{x+y+z} + \frac{y}{x+y+z} + \frac{z}{x+y+z} = 1$$

155. 2

155. Roots of $x^3 - 4x + 1 = 0$ are α, β, γ

$$\alpha\beta\gamma = 0$$

$$\alpha\beta + \beta\gamma + \gamma\alpha = 4$$

$$\alpha + \beta + \gamma = 1$$

$$\frac{1}{\alpha} + \frac{1}{\beta} + \frac{1}{\gamma} = ?$$

$$\frac{1}{\alpha} + \frac{1}{\beta} + \frac{1}{\gamma} = \frac{\beta\gamma + \alpha\gamma + \alpha\beta}{\alpha\beta\gamma} = \frac{4}{0} = 4$$

156. 4

156. Minimum value of $\frac{y^2z}{x} + \frac{z^2x}{y} + \frac{x^2y}{z}$?

Apply AM - GM on $\frac{y^2z}{x}, \frac{z^2x}{y}, \frac{x^2y}{z}$

$$\frac{y^2z}{x} + \frac{z^2x}{y} + \frac{x^2y}{z} \geq 6 \sqrt[6]{\frac{y^2z \cdot z^2x \cdot x^2y}{x \cdot y \cdot z}}$$

$$\geq \frac{y^2z}{x} + \frac{z^2x}{y} + \frac{x^2y}{z} \geq 6$$

∴ Min. value is = 6

157. 3

157. Min. value of the expression $\frac{3b^2 + 4c}{a} + \frac{4c^2 + a}{3b} + \frac{a^2 + 3b}{4c}$?

Apply AM. GM on $\frac{3b^2 + 4c}{a}, \frac{4c^2 + a}{3b}, \frac{a^2 + 3b}{4c}$

$$\frac{3b^2 + 4c}{a} + \frac{4c^2 + a}{3b} + \frac{a^2 + 3b}{4c} \geq 6 \sqrt[6]{\frac{3b^2 + 4c}{a} \cdot \frac{4c^2 + a}{3b} \cdot \frac{a^2 + 3b}{4c}}$$

$$\frac{3b^2 + 4c}{a} + \frac{4c^2 + a}{3b} + \frac{a^2 + 3b}{4c} \geq 6$$

$$\frac{3b^2 + 4c}{a} + \frac{4c^2 + a}{3b} + \frac{a^2 + 3b}{4c} \geq 6$$

∴ Minimum value = 6

158. 3

158. $a^3 - 12a$

$$a^2 - 12 = a - \sqrt{12}$$

$$TSA = 6a^2 - 6 \cdot 12 = 72$$

159. 1

159. $14^m - 6^m$

$a^n - b^n$ is always divisible by $a - b$

□ 14^m □ 6^m is divisible by 8

160. 2

160. $TS = 3\sqrt{5}$

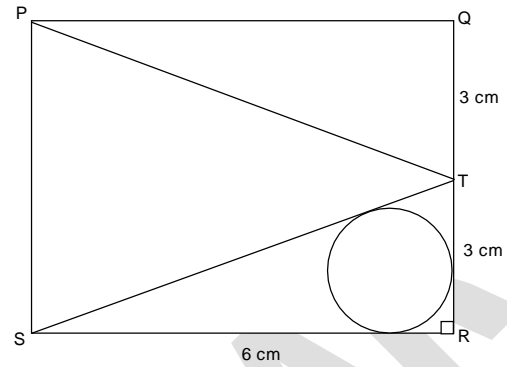
$TR = 3$

$SR = 6$

$r =$

$$\frac{1}{\frac{1}{\sqrt{5}} + \frac{1}{6} + \frac{1}{3}} = \frac{6\sqrt{5}}{2}$$

$$r = \frac{9}{\frac{9}{3\sqrt{5}} + \frac{18}{3\sqrt{5}} + \frac{6}{3\sqrt{5}}} = \frac{6}{\sqrt{5}}$$



161. 2

161. Democracy restored in Chile in 1988.

162. 3

162. Germany is not a operational member of security council.

163. 1

163. Mahatma Gandhi was not a member of the constituent assembly.

164. 1

164. General secretary Kofi A Anan said that US war on Iraq was not legal.

165. 3

165. President can declare emergency when the council of ministers in writing advices him to do so.

166. 4

166. KOSOVO was a province of try before the split of Yugoslavia.

167. 2

167. Nagaland state was born out of culture, ethnicity and geography.

168. 2

168. End of Racial discrimination is a part of right to equality fundamental right of citizen.

169. 3

169. Narivadi Aandolan is movement for Individual and family right of women.

170. 4

170. In transparency when decision are take with honesty and proper of rules.

171. 2

171. Amnesty International is the International Organisation that works for human rights.

172. 1

172. Livre was the currency of France.

173. 3

173. Elizabeth I was granted role right to trade with East to East India Company.

174. 4
174. Non-cooperation programme was adopted in Nagpur, in 1920 congress session.
175. 1
175. First Modern Novel published in Malayalam was Indulekha in 1889.
176. 3
176. "Damayanti" was made by Raja Ravi Verma.
177. 1
177. Simon Commission arrived in 1928 in India.
178. 1
178. Rinderpest is a term used for cattle disease.
179. 4
179. Giuseppe Garibaldi was a famous freedom fighter of Italy.
180. 3
180. Gudem Rebellion was led by Alluri Sitaram Raju.
181. 2
181. "The Social Contract" book was written by Rousseau.
182. 3
182. The Principle of the Garden City was developed by Ebenezer Howard.
183. 3
183. NABARD organization looks after the credit needs of agriculture and rural development in India.
184. 2
184. 3 phases are there in circular flow of income.
185. 2
185. Education is considered as social infrastructure.
186. 3
186. Cultivating more than one crop on the same field in a year called multiple cropping.
187. 1
187. Infant mortality rate refers to the death of child under the age of 1.
188. 2
188. The Integrated Child Development Service (ICDS) introduced in 1975.
189. 3
189. The first chairman of planning commission was Jawaharlal Nehru.
190. 3
190. The total surface area of India covered by mountains is 30%.
191. 4
191. Mica has excellent dielectric strength insulating properties, low power loss factor and resistance to high voltage.
192. 2
-

192. OIL is an example of joint sector industry.
193. 4
193. Pipelines reduce trans-shipment losses and delays.
194. 1
194. Lake Victoria lies on the equator.
195. 4
195. The longitudinal valleys lying between lesser Himalayas and Shivaliks are known as Duns.
196. 3
196. The Western cyclonic disturbances originate from Mediterranean sea.
197. 3
197. Balancing the head to use resources and also conserve them for future is called sustainable development.
198. 1
198. The maximum number of National Park is in Andaman and Nicobar Islands.
199. 1
199. When some plates come towards each others is formed convergent boundary.
200. 2
200. The largest producer of cotton in the world is China.

PRAASHNOFFAR
