

NTSE STAGE – I (HARYANA STATE)
(For Class – X)
SCHOLASTIC APTITUDE TEST (SAT)

FIITJEE ANSWER KEYS (SET – C)

1.	4	2.	3	3.	2	4.	2
5	4	6.	4	7.	2	8.	2
9.	4	10.	3	11.	4	12.	3
13.	*	14.	4	15.	2	16.	3
17.	3	18.	2	19.	2	20.	1
21.	*	22.	*	23.	1	24.	2
25.	3	26.	3	27.	2	28.	3
29.	1	30.	3	31.	2	32.	3
33.	2	34.	1	35.	1	36.	3
37.	4	38.	3	39.	4	40.	1
41.	4	42.	4	43.	2	44.	3
45.	3	46.	1	47.	3	48.	2
49.	4	50.	3	51.	1	52.	2
53.	2	54.	1	55.	4	56.	3
57.	2	58.	3	59.	1	60.	4
61.	3	62.	1	63.	3	64.	2
65.	3	66.	1	67.	1 and 3	68.	2
69.	4	70.	1	71.	4	72.	1
73.	4	74.	2	75.	4	76.	4
77.	1	78.	1	79.	4	80.	1
81.	1	82.	3	83.	3	84.	4
85.	1	86.	3	87.	3	88.	4
89.	3	90.	1	91.	2	92.	4
93.	1	94.	3	95.	3 and 4	96.	4
97.	2	98.	2	99.	2	100.	4

***Observations:**

13. Incorrect Question

21. No option is correct

22. Incorrect Question

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SCHOLASTIC APTITUDE TEST (SAT)

HINTS & SOLUTIONS (SET – C)

1. 4
1. \therefore gravitational field inside the spherical shell is zero. So, force is zero.
2. 3
2. Plaster of Paris is hygroscopic and absorbs water readily.
3. 2
3. X = C₂H₅OH (Alcohol); Y = CH₃COOH (Carboxylic Acid); Both X, Y liberate H₂ (A) when treated with Na metal; CH₃COOH + NaHCO₃ \longrightarrow CH₃COONa + H₂O + CO₂ \uparrow . So B is CO₂ gas.
4. 2
5. 4
5. Cl + 1e⁻ \longrightarrow Cl⁻, with configuration 2, 8, 8 \Rightarrow 8 valence electrons.
6. 4
7. 2
8. 2
8. Organ which look different and perform different functions but have similar basic structure and origin are called Homologous organs.
9. 4
9. N - W = m(3g) ; W = mg
N = 4W
10. 3
10. In human male, scrotum is called thermo regulator.
11. 4
12. 3
12. Slope of P-t graph is maximum at R. So, instantaneous force is maximum.
13. * (best possible answer is option (2) if the question is $\frac{3}{\sqrt{28+10\sqrt{3}} - \sqrt{7-4\sqrt{3}}} = a + \sqrt{3}b$.
13. $\frac{3}{\sqrt{28+10\sqrt{3}} - \sqrt{7-4\sqrt{3}}} = a + \sqrt{3}b$
 $\Rightarrow \frac{3}{(5+\sqrt{3}) - (2-\sqrt{3})} = a + \sqrt{3}b$

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

$$\Rightarrow \frac{3(3-2\sqrt{3})}{9-12} = a + \sqrt{3}b$$

$$\Rightarrow 2\sqrt{3} - 3 = a + \sqrt{3}b$$

$$\Rightarrow a = -3, b = 2$$

$$\therefore \sqrt{5a+12b} \Rightarrow \sqrt{-15+24} = 3$$

14. 4

14. $2x + 3y - A = 0$

$$x + 2y - B = 0$$

$$\frac{x}{-3B+2A} = \frac{y}{-A+2B} = \frac{1}{4-3}$$

$$x = 2A - 3B$$

$$y = 2B - A$$

Option 1 : $5(2A - 3B) + 3(2B - A)$

$$= 10A - 3A - 15B + 6B$$

$$\neq A - B$$

Option 2 : $3(2A - 3B) - 5(2B - A)$

$$= 6A + 5A - 9B - 10B$$

$$= 11A - 19B \neq A + B$$

Option 3 : $3x - 5y = 11A - 19B \neq A - B$

Option 4 : $3x + 5y = 6A - 5A - 9B + 10B$

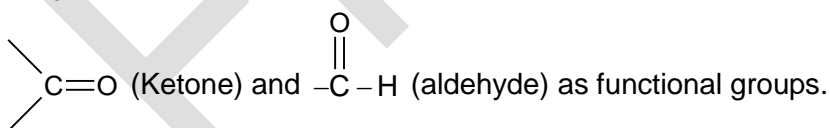
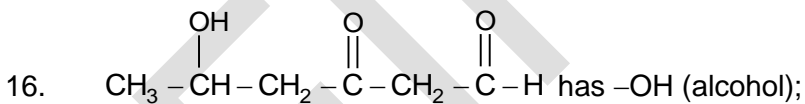
$$= A + B$$

\therefore Option (4) satisfies

15. 2

15. One mole $\text{CO}_2 = 44 \text{ g} \Rightarrow 2.5 \text{ moles} = 2.5 \times 44 = 110 \text{ g of } \text{CO}_2.$

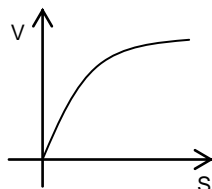
16. 3



17. 3

17. $v^2 = 2as$

$$y^2 \propto x$$



18. 2

18. $N = 9k_1 + 6 \rightarrow (1)$

$$N = 21k_2 + 12 \rightarrow (2)$$

First such number (greater than 100)
 = 159
 and other numbers will be 159, 222, 285,.....,
 $\Rightarrow 159 + 63(n-1) < 400$
 $\Rightarrow n-1 < 3.8$
 $\Rightarrow n < 4.8$
 $\Rightarrow n = 4$
 \therefore 4 terms

19. 2
 19. $MCl_3 \Rightarrow M$ has +3 oxidation state, so it belongs to Aluminium family.

20. 1
 20. Crura cerebri is not a part of hind brain.

21. No option is correct.

21. $2T = Mg$ $2T \sin 60 = Mg$ $2T \cos 30^\circ = Mg$ $2T \cos 60^\circ = Mg$
 $T = \frac{Mg}{2}$ $2T \frac{\sqrt{3}}{2} = Mg$ $2T \times \frac{\sqrt{3}}{2} = Mg$ $2T \times \frac{1}{2} = Mg$
 $T = \frac{Mg}{\sqrt{3}}$ $T = \frac{Mg}{\sqrt{3}}$ $T = Mg$

Maximum tension in (IV) case.

22. *
 22. No integral values of a, b and c satisfy any of the options.

23. 1
 23. Blood cells are manufactured in our bone marrow.

24. 2
 $a = (\sin \theta - \cos \theta)^4$
 $= (\sin^2 \theta + \cos^2 \theta - 2 \sin \theta \cos \theta)^2$
 $= (1 - 2 \sin \theta \cos \theta)^2$
 $= 1 - 4 \sin \theta \cos \theta + 4 \sin^2 \theta \cos^2 \theta$
 $b = \sin^6 \theta + \cos^6 \theta$
 $= (\sin^2 \theta)^3 + (\cos^2 \theta)^3$
 $= (\sin^2 \theta + \cos^2 \theta)(\sin^4 \theta + \cos^4 \theta - \sin^2 \theta \cos^2 \theta)$
 $= ((\sin^2 \theta + \cos^2 \theta)^2 - 3 \sin^2 \theta \cos^2 \theta)$
 $= 1 - 3 \sin^2 \theta \cos^2 \theta$
 $c = (\sin \theta + \cos \theta)^2 = 1 + 2 \sin \theta \cos \theta$
 $3a + 4b + 6c = 3 - 12 \sin \theta \cos \theta + 12 \sin^2 \theta \cos^2 \theta + 4 - 12 \sin^2 \theta \cos^2 \theta + 6 + 12 \sin \theta \cos \theta = 13$
 $\sqrt{3a + 4b + 6c} = \sqrt{13}$ lies between $\sqrt{9}$ and $\sqrt{16}$
 \Rightarrow lies between 3 and 4

25. 3
 25. $\therefore g_{\text{eff}}$ is zero.

38. 3

39. 4

40. 1

40. $x^2 - xy + 8 = 0$

$$x^2 - 8x + y = 0$$

$$xy - 8 = 8x - y$$

$$y(x+1) = 8(x+1)$$

$$(y-8)(x+1) = 0$$

$$y = 8 \text{ or } x = -1$$

For $y = 8, x \notin \mathbb{I}$

\therefore Only 1 set of solution, $x = -1, y = -9$

41. 4

41. Crab does not bear poisonous apparatus.

42. 4

43. 2

44. 3

44. Molecular mass = 2 × vapour density = 2 × 30 = 60 \Rightarrow It is CH_3COOH ethanoic acid.

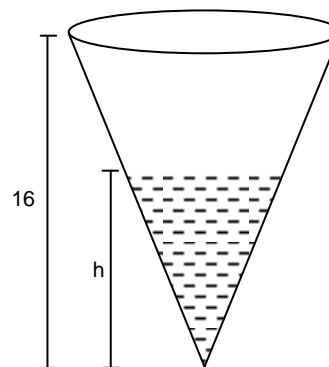
45. 3

46. 1

46. Let height of water left = h
and volume of whole cone = V
then volume of water left out

$$= \frac{8}{27}V \text{ then } \frac{V}{\frac{8}{27}V} = \left(\frac{16}{h}\right)^3 \Rightarrow h = \frac{32}{3}$$

$$\text{So, drop in water level} = 16 - \frac{32}{3} = \frac{16}{3}$$



47. 3

48. 2

48. $F_B = \rho_w Vg$

Density of water is maximum at 4°C .

So, $\beta_2 > \beta_1$

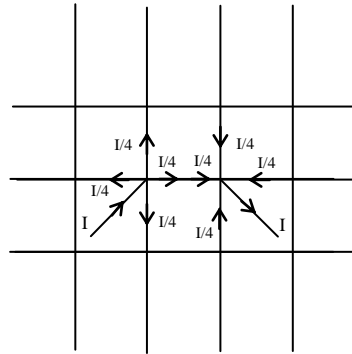
49. 4

50. 3

51. 1

52. 2

52. $V_{AB} = \frac{I}{2}R \Rightarrow I R_{eq}$
 $R_{eq} = \frac{R}{2}$



53. 2

54. 1

55. 4

55. Let $AD = x$ and $DO = OB = y$ then

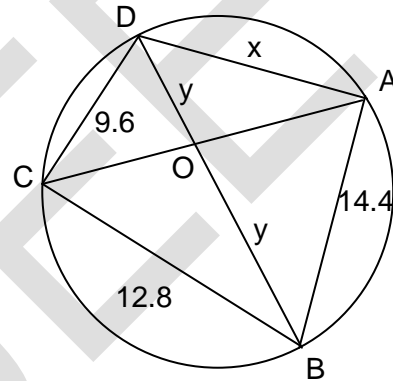
$\triangle DOA \sim \triangle COB$

$$\Rightarrow \frac{OA}{y} = \frac{x}{12.8} \dots\dots(1)$$

Similarly $\triangle AOB \sim \triangle DOC$

$$\Rightarrow \frac{OA}{y} = \frac{14.4}{9.6} \dots\dots(2)$$

From equation (1) and equation (2)
 $x = 19.2$



56. 3

57. 2

57. Atomic size decreases along the period and increases down the group. So 'N' is smallest.

58. 3

59. 1

60. 4

61. 3

62. 1

63. 3

63. Let probability of odd number = x
 Then probability of even number = $2x$
 then $P(1) + P(2) + P(3) + \dots + P(6) = 1$

$$\Rightarrow 9x = 1 \Rightarrow x = \frac{1}{9}$$

$$\text{So, } P(6) = \frac{2}{9}$$

64. 2

64. Canines are called as tearing teeth.

65. 3

66. 1

67. 1 and 3

67. $m = \frac{f-v}{f}$

If the screen is moved away $v_1 = v + x$

If the screen is brought closer to lens $v_2 = v - x$

$$m_1 = \frac{f-v}{f} \qquad m_1 = \frac{f-v}{f}$$

$$m_2 = \frac{f-(v+x)}{f} \qquad m_2 = \frac{f-(v-x)}{f}$$

$$f = \frac{x}{m_1 - m_2} \qquad f = \frac{x}{m_2 - m_1}$$

Options 1 and 3 are correct.

68. 2

69. 4

69. Insects respire through trachea.

70. 1

70. $\sqrt{\frac{1-\cos\theta}{1+\cos\theta}} \times \sqrt{\frac{\operatorname{cosec}\theta - \cot\theta}{\operatorname{cosec}\theta + \cot\theta}} = \frac{r-1}{r+1}$

$$\Rightarrow \sqrt{\frac{1-\cos\theta}{1+\cos\theta}} \times \sqrt{\frac{\frac{1-\cos\theta}{\sin\theta}}{\frac{1+\cos\theta}{\sin\theta}}} = \frac{r-1}{r+1}$$

$$\Rightarrow \frac{1-\cos\theta}{1+\cos\theta} = \frac{r-1}{r+1}$$

By componendo and dividendo

$$\cos\theta = \frac{1}{r} \Rightarrow \tan\theta = \sqrt{r^2 - 1}$$

71. 4

71. From S draw $SM \perp PQ$

In ΔSMP

$$PS = 2\sqrt{17}$$

$$\Rightarrow PT = TS = \sqrt{17}$$

$$\text{Let } QV = x \Rightarrow VR = 8 - x$$

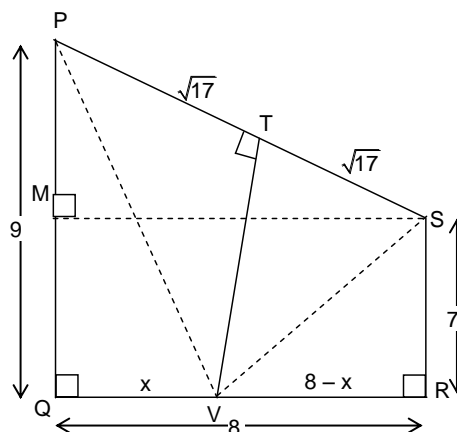
Since, $\Delta VTP \cong \Delta VTS$

$$\Rightarrow VP = VS \Rightarrow \sqrt{81+x^2} = \sqrt{7^2 + (8-x)^2}$$

$$\Rightarrow x = 2 \Rightarrow VT = 2\sqrt{17}$$

$$\text{ar}(\text{PTVQ}) = \frac{1}{2} \times \sqrt{17} \times 2\sqrt{17} + \frac{1}{2} \times 2 \times 9$$

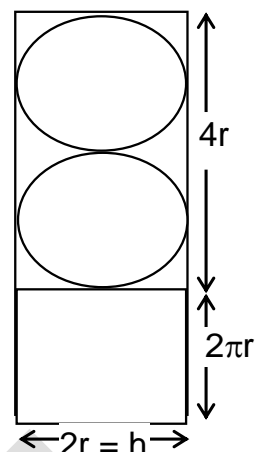
$$= 26$$



72. 1
72. Muscles involved in the movement of the arm are striated, multinucleated and voluntary.
73. 4
74. 2
74. $x^4 - 83x^2 + 1 = 0$
 $\Rightarrow x^2 + \frac{1}{x^2} = 83$
 $\Rightarrow x - \frac{1}{x} = \pm 9$
 $\left(x - \frac{1}{x}\right)^3 = x^3 - \frac{1}{x^3} - 3(\pm 9) = \pm 729$
 $\Rightarrow x^3 - \frac{1}{x^3} = \pm 729 + 3(\pm 9)$
 $= \pm 756$
75. 4
76. 4
77. 1
78. 1
78. Ratooning is the agricultural practice of harvesting a monocot crop by cutting most of the above-ground portion but leaving the roots and the growing shoot apices intact so as to allow the plants to recover and produce a fresh crop in the next season.
79. 4
79. Isobars are the atom of different elements but having same mass number. i.e. same (p + n) value.
80. 1
81. 1
82. 3
82. $x^2 + rx + 64 = 0$
for real roots $r^2 - 256 \geq 0$
 $\Rightarrow r \geq 16$
 $x^2 - 8x + r = 0$ have real roots
 $\Rightarrow 64 - 4r \geq 0 \Rightarrow r \leq 16$
So, $r = 16$
Now $r^2 - 13r - 48 = 16^2 - 13 \times 16 - 48 = 0$
83. 3
84. 4
84. Along the period –
(i) Size of atoms decreases with increasing effective nuclear charge.
(ii) Valence changes depending on the available valence electron and group number.
(iii) Electro negativity increases due to decrease in atomic size.
(iv) Extreme left are metals then it changes from metal to non-metal.

85. 1

85 Area of sheet = $(4r + 2\pi r) \times 2r$
 $= 2r(2 + \pi) \times 2r$
 $= 4r^2(\pi + 2)$
 Surface area of cylinder = used area
 $= 2\pi r(r + h)$
 $= 2\pi r(3r) = 6\pi r^2$
 \therefore Wasted area = $8r^2 - 2\pi r^2 = 2r^2(4 - \pi)$
 $\therefore \frac{\text{Wasted}}{\text{Used}} = \frac{2r^2(4 - \pi)}{6\pi r^2} = \frac{4 - \pi}{3\pi}$
 $= \frac{4 - \frac{22}{7}}{\frac{6 \times 22}{7}} = \frac{6}{6 \times 22} = \frac{1}{22}$



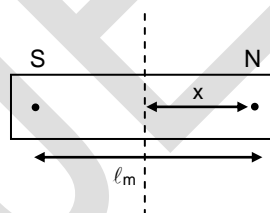
86. 3

86. Metal oxide + water = metal hydroxide (so basic solution)

87. 3

88. 4

88. $l_m \rightarrow$ magnetic length
 x is less than 3 cm.



89. 3

90. 1

91. 2

91. For parallel combination

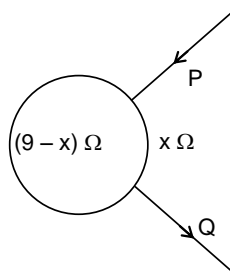
$$\frac{x(9-x)}{x+(9-x)} = 2$$

$$9x - x^2 = 18$$

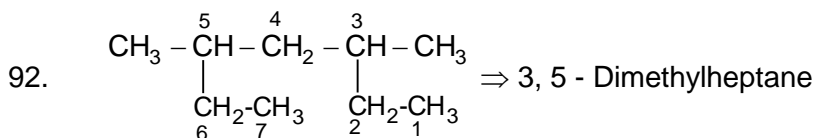
$$x = 3\Omega, 6\Omega$$

\therefore Resistance is proportional to length.

\therefore Length of shorter section is 3 m.



92. 4



93. 1

93. (1) 24 g of C = $\frac{24}{12} \times 6.022 \times 10^{23}$ atom (maximum)

$$(2) 56 \text{ g of Fe} = \frac{56}{56} \times 6.022 \times 10^{23} \text{ atoms}$$

$$(3) 27 \text{ g of Al} = \frac{27}{27} \times 6.022 \times 10^{23} \text{ atoms}$$

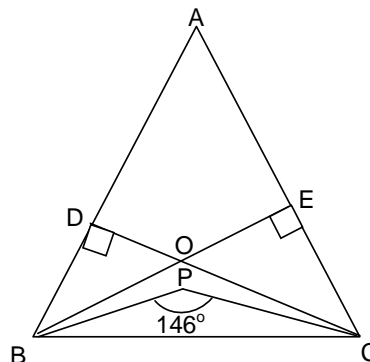
$$(4) 108 \text{ g of Ag} = \frac{108}{108} \times 6.022 \times 10^{23} \text{ atoms}$$

94. 3
94. When a cell is placed in strong salt solution it shrinks, because water came out of the cell to develop equilibrium.
95. 3 and 4
95. Drone is a male honey bee and its role is to mate.
Bees have very good sense of direction
96. 4
96. A pulse crop is grown in the time interval between two cereal crops to compensate for the loss of Nitrogen.

97. 2
97. Let remainder is $ax + b$
 $x^{100} - 2x^{51} + 1 = (x^2 - 1)Q(x) + ax + b$
 Put $x = 1$, $a + b = 0$
 Put $x = -1$, $-a + b = 4$
 $\Rightarrow a = -2, b = 2$
 So, $r(x) = -2x + 2 \Rightarrow r(-2) + r(2) = 4$

98. 2
98. Let the coordinate of 3rd vertex be (x, y)
 $\therefore \Delta = \frac{3}{2}|12y - 5x|$ and $\Delta > 0$
 Also, $x, y \in I, \Rightarrow 12y - 5x \in I$
 \therefore Minimum value that $|12y - 5x|$ can take is 1
 $\Rightarrow \Delta \geq \frac{3}{2}$ and, $\Delta = \frac{3}{2}$ is possible when $y = 2, x = 5$
 \therefore Minimum value of $\Delta = \frac{3}{2}$

99. 2
99. Let $\angle PBC = \angle OBP = a$ and
 $\angle PCB = \angle OCP = b$
 Then $a + b = 34$
 $\Rightarrow 2a + 2b = 68$
 $\Rightarrow \angle ECO = \angle DBO = 22^\circ$
 $\Rightarrow \angle A = 180^\circ - 68^\circ - 22^\circ \times 2$
 $= 68^\circ$



100. 4

100. Let $BT = 7\ell$, $TE = \ell$

$AT = 5k$, $TD = k$

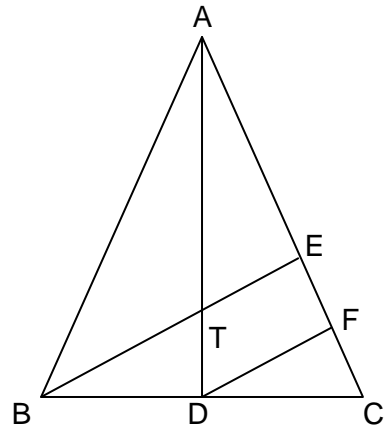
Draw $DF \parallel BE$

$$\Rightarrow DF = \frac{6\ell}{5}$$

In $\triangle CBE$,

$$\frac{CD}{CB} = \frac{\frac{6}{5}\ell}{8\ell} = \frac{3}{20}$$

$$\Rightarrow \frac{CD}{DB} = \frac{3}{17}$$



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