NTSE STAGE – I (2017- 18)
SET – D
HARYANA STATE
MENTAL ABILITY TEST
SOLUTIONS

1. 2
1. Dissent
Dissident
Dissolute
Dissolution
Dissolve

2. 4
2. Amar $\rightarrow$ Winner
Chetan
Bipin
Deepak

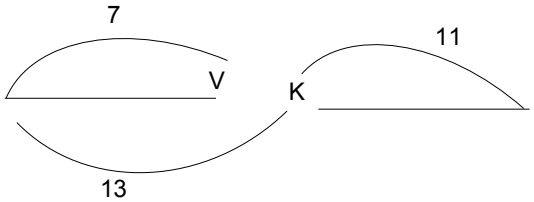
3. 3
3. 15^{th} September 2000 $\rightarrow$ Friday
15^{th} September 2001 $\rightarrow$ Saturday [because 2001 is a non – leap year i.e. +1 odd day]

4. 4
4. Except option 4 all are antonyms. Option 4 is synonyms.

5. 1
5. Except 18:48 all other are (1^{st} number x 3 – 10)

6. 3
6. Except QVZBC which follows +5, +4, +2, +1 all follows +5, +4, +3, +2

7. 2
7. Father = Son + 25 …(i)
After 13 years
(Father + 13) = 2 (Son + 13)
$\Rightarrow$ Father – 2 x son = 13 ….(ii)
Solving equation (i) and (ii) we get father = 37

8. 2
8. 

Total = 13 + 11 – 1 = 23
Kamal new position = (23 – 7) + 1 = 17

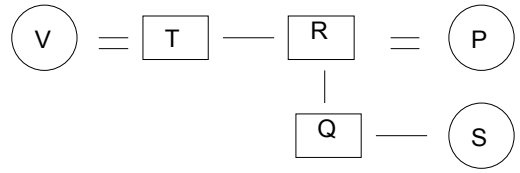
9. 4
9. Let x be ques with 2 marks
2x + 4 (15 – x) = 40

$2x + 60 - 4x = 40$

$x = \frac{20}{2} = 10$

10. 1

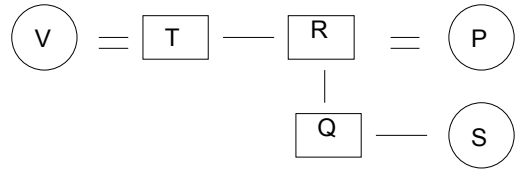
10.



Mother of Q → P

11. 4

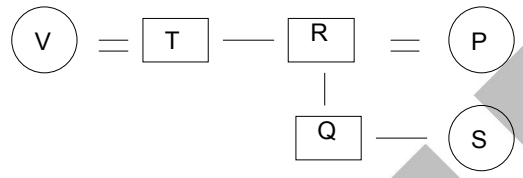
11.



T is the uncle of Q.

12. 2

12.



Wife of T → V

13. 3

13. There is L in MISSILE which is not present in COMMISSIONER.

14. 4

14.

S	I	N	G	E	R
4	0	5	3	1	2

15. 1

15. DIAMOND → DNOMAID

D	N	O	M	A	I	D
+1↓	–1↓	+1↓	-1↓	+1↓	-1↓	+1↓
E	M	P	L	B	H	E

Similarly for ROUTINE.

16. 3

16. DIAGRAM → ✳◪+△$+@

17. 2

17. MY = 16

SUN = 27

Adding positions from back , we get the number

HOTEL = 19 + 12 + 7 + 22 + 15 = 75

18. 4

18. Aero planes fly in the sky, answer is sea.

19. 3

19. 5 8 4 7 8 3 2 8 5 4 8 2 9 8 6 8 5 4 8 7 8 4 2 8 6 4 5 8 4 9

20. 1

20. J is educated, hard working, polite but not employed.

21. 2

21. $35 \div 7 \times 5 + 5 - 6 = 24$

22. 1

22. $\sqrt[3]{30-20} = 2$

$\sqrt[3]{67-40} = 3$

$\sqrt[3]{416-200} = 6$

23. 3

23. $(4 \times 3) + 2 = 14$

$(7 \times 3) + 4 = 25$

$(9 \times 4) + 6 = 42$

24. 3

24. $9 * 7 = 32 \Rightarrow (9+7) \times (9-7) = 32$

$11 * 5 = 96 \Rightarrow (11+5) \times (11-5) = 96$

$\therefore$ Answer = $(17+9) \times (17-9) = 208$

25. 2

25. $(8 \times 5) + (1 \times 4) = 44$

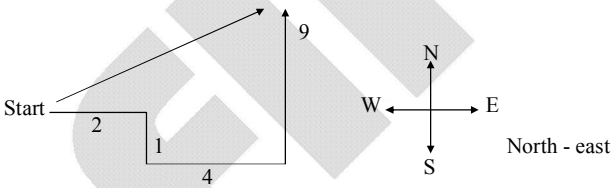
$(6 \times 8) + (2 \times 8) = 64$

Similarly,

$(7 \times 9) + (4 \times 8) = 83$

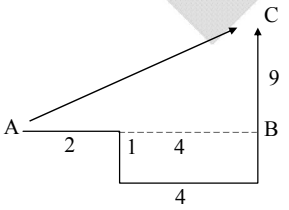
26. 2

26.



27. 3

27.



$AC = \sqrt{(AB)^2 + (BC)^2}$

$AC = \sqrt{(6)^2 + (8)^2}$

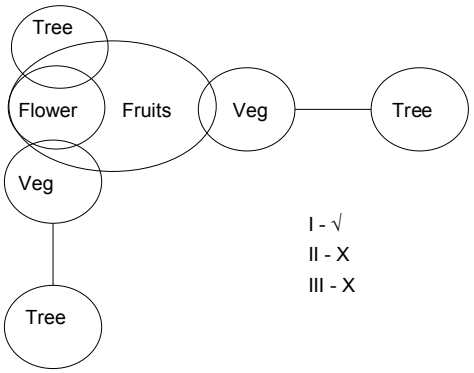
$AC = \sqrt{36+64}$

$AC = \sqrt{100}$

AC = 10

28. 1

28.



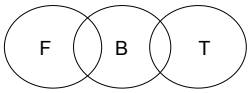
I - √
II - X
III - X

29. 2

29. The statement talks of "Adversity" in general and not lack of money.
So I does not follow. II correctly explains the statement and hence it follows

30. 4

30.



31. 4

31. By observation.

32. 3

32. By observation.

33. 4

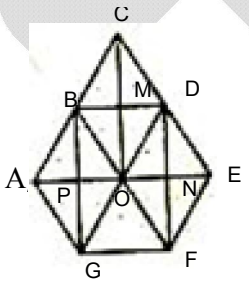
33. By observation.

34. 2

34. 3 – 6 – 2
3 – 5 – 4
↓ opposite
1

35. 3

35.



Single triangle – APB, APG, BPO, GPO, BMO, MDO, BCM, CMD, DNE, DNO, ONF, ENF, GOF, → 13
Two Δ combination → ABO, AGO, ABG, BOG, BCO, CDO, BCD, BDO, ODE, OEF, ODF, EDF → 12
Three triangle combination → BGF, GDF → 2
Four triangle combination → ACO, COE, GBD, BDF → 4
Eight triangle combination → ACE → 1

13 + 12 + 2 + 4 + 1 = 32

36. 3
36. The pattern is adding 4 to each of the letters after reversing the order of the letter.

37. 2
37. First and last letters of each word are interchanged.

38. 3
38. 63 : 9 : : 86 : 14
6 + 3 = 9
Similarly,
8 + 6 = 14

39. 4
39. 5 : 64 : : 11 : ?
$11 \rightarrow (11+3)^2$

40. 1
40. By observation.

41. 2
41. REOC; PGME, NIKG, LKII
Logic $\rightarrow$ – 2, + 2, – 2, +2

42. 4
42. BYCX, DWEV, FUGT, HSIR
Logic $\rightarrow$ +2, – 2, +2, – 2

43. 3
43.

6	11	26	71	206
6 x 3 –7= 11	11 x 3 – 7=26	26 x 3 – 7 =71	71 x 3 – 7= 201	206 x 3 – 7 = 611

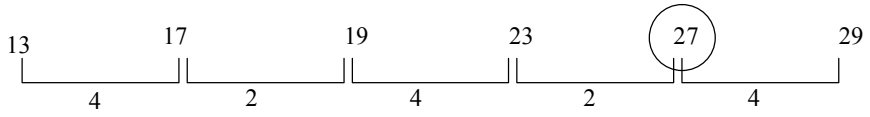
44. 2
44.

81,	192,	375,	648,	1029
$\left((9)^2-(0)^2\right)$	$\left((14)^2-(2)^2\right)$	$\left((20)^2-(5)^2\right)$	$\left((27)^2-(9)^2\right)$	$(35)^2-(14)^2$

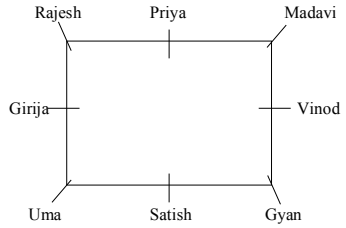
45. 1
45. By observation.

46. 3
46. Root $\rightarrow$ Stem $\rightarrow$ leaf $\rightarrow$Flower $\rightarrow$ fruit

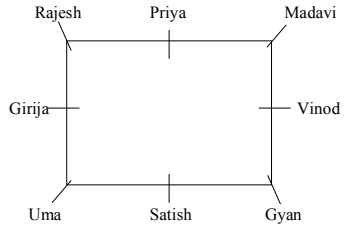
47. 2
47.



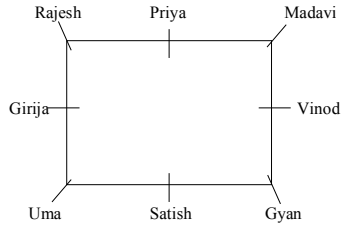
48. 1

48. 

49. 3

49. 

50. 2

50. 

NTSE STAGE – I (2017- 18)
SET – D
HARYANA STATE
SCHOLASTIC APTITUDE TEST (SAT)
SOLUTIONS

MATHEMATICS

101. 3

101. $5\left(3\left(2x+1\right)+2\right)+4$

$30x+15+10+4$

$30x+29$

$\therefore$ The numbers are : 119, 149, ……989

$989=119+30\left(n-1\right)$

$n-1=\frac{870}{30}$

$n-1=29$

n = 30

102. 2

102. $p=\operatorname{cosec}\theta-\cot\theta=\frac{\sin\theta}{1+\cos\theta}$

$p^2+1=\operatorname{cosec}^2\theta+\cot^2\theta-2\operatorname{cosec}\theta\cot\theta$

$=2\operatorname{cosec}\theta\left(\operatorname{cosec}\theta-\cot\theta\right)$

$=\frac{2}{1+\cos\theta}$

Now $\frac{p^2-1}{p^2+1}=1-\frac{2}{p^2+1}=1-\frac{2}{\frac{2}{1+\cos\theta}}=-\cos\theta$

103. 1

103. Given, $S_m=n$ and $S_n=m$

$\Rightarrow\frac{m}{2}\left[2a+\left(m-1\right)d\right]=n$ and $\frac{n}{2}\left[2a+\left(n-1\right)d\right]=m$

$\Rightarrow 2am+\left(m^2-m\right)d=2n$ and $2an+\left(n^2-n\right)d=2m$

on subtracting above two equations,

we get $2a+\left(m+n-1\right)d=-2$

So, $S_{m+n}=\frac{m+n}{2}\left[2a+\left(m+n-1\right)d\right]$

$=-\left(m+n\right)$

104. 4

104. $x^2+px-4=0$

$\alpha + \beta = -p$

$\alpha\beta = -4$

$\beta = -4 \Rightarrow \alpha = 1$

$\therefore p = 1 - 4$

$p = 3$

$x^2 + px + k$ has equal roots

$p^2 - 4k = 0$

$p^2 = 4k$

$k = \dfrac{9}{4}$

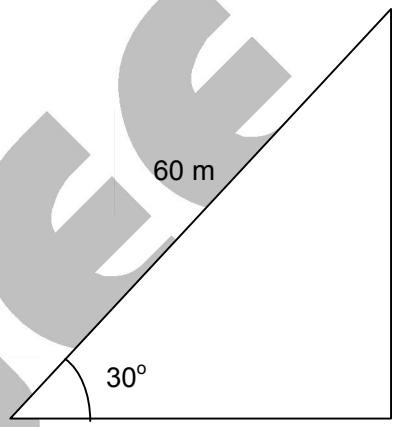
105. 1

105. Speed = 300 m/ min $= \dfrac{300}{60}$ m / sec

Distance traveled $= 5 \times 12$

= 60 m

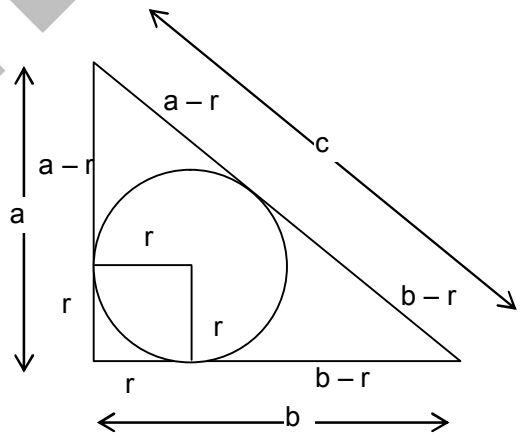
$\therefore$ Height of tree = 30 m



106. 4

106. $a - r + b - r = c$

$r = \dfrac{a + b - c}{2}$



107. 2

107. If roots are reciprocal $\dfrac{6}{a} = 1, a = 6$

$x = \dfrac{-15 \pm \sqrt{225 - 144}}{12}$

$= \dfrac{-15 \pm \sqrt{81}}{12}$

$= \dfrac{-15 \pm 9}{12}$

$= \frac{-24}{12}, \frac{-6}{12}$

$= -2, -\frac{1}{2}$

108. 2

108. $46n = (n-4) \times 44.5 + 52 \times 4$

$\Rightarrow n = 20$

109. 2

109. By using area of triangle formula

We get, $\left(8p^2 + 4p - 4\right) = \pm 140$

$\Rightarrow 8p^2 + 4p - 144 = 0$

$\Rightarrow p = 4$ or $p = \frac{-9}{2}$

Other equation $8p^2 + 4p + 136 = 0$ does not have real roots

So, numbers of integral values = 1

110. 1

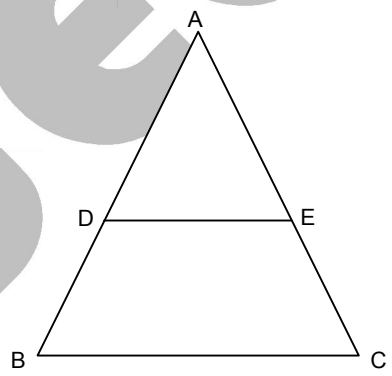
110. $AE : EC = 3 : 2$

$\Rightarrow AE : AC = 3 : 5$

Since $\Delta ADE \sim \Delta ABC$

$\Rightarrow \frac{ar(ADE)}{ar(ABC)} = \frac{9}{25}$

So, $\frac{ar(ADE)}{ar(DECB)} = \frac{9}{16}$



111. 4

111. On solving $x + 2y = 10$ and $3x + 4y = 360$

We get $x = 340$ and $y = -165$

So, $\lambda = \frac{-1}{2}$

112. 2

112. Given $xy = 80$ and $6^3 + x^3 + y^3 = 12^3 \Rightarrow x^3 + y^3 = 1512$

$\Rightarrow (x+y)^3 - 3xy(x+y) = 1512$

Let $x + y = a$

So, given equation reduces to $a^3 - 240a - 1512 = 0$

Now, a = 18 is root of above equation $\Rightarrow x + y = 18$

113. 3

113. $\cos\theta + \sin\theta = p \Rightarrow \sin\theta\cos\theta = \frac{p^2 - 1}{2}$

Now, $\sec\theta + \operatorname{cosec}\theta = V$

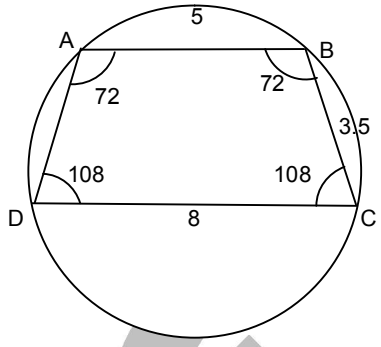
$\Rightarrow \frac{\sin\theta + \cos\theta}{\sin\theta\cos\theta} = V$

$$\Rightarrow V = \frac{2p}{p^2 - 1}$$

114. 2

114. ABCD is an isosceles trapezium,

$\Rightarrow AD = BC = 3.5$ cm



115. 3

115. 17, 18, 23, 27, x –3, x + 5, 45, 49, 74, 85

$$\frac{x-3+x+5}{2} = 35$$

$$\frac{2x+2}{2} = 35$$

$$x + 1 = 35$$

$$x = 34$$

$\therefore$ The number are 17, 18, 23, 31, 39, 45, 49, 72, 74, 85

$$\therefore \text{Median} = \frac{39+45}{2} = \frac{84}{2} = 42$$

116. 3

116. Longest altitude corresponds to shortest side = h_{35}

s = 75

$$\Delta = \sqrt{(75)(14)(21)(40)}$$

$$= \sqrt{25 \times 3 \times 2 \times 7 \times 7 \times 3 \times 4 \times 5 \times 2}$$

$$= 420\sqrt{5}$$

$$\therefore \frac{1}{2} \times 35 \times h_{35} = 420\sqrt{5}$$

$$h_{35} = 24\sqrt{5}$$

117. 2

117. $P(E) = \frac{1}{2} \times \frac{1}{2} + \frac{1}{2} \times 0$

$$= \frac{1}{4}$$

118. 4

118. $x^2 + 5x + d = 0$

$a + b = -5$

$ab = d$

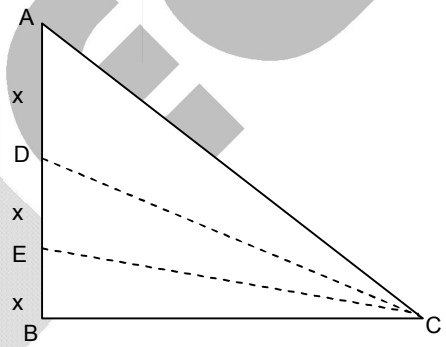
$x^2 + 6x + 2d = 0$

$a + c = -6$

$ac = 2d$
$ac = 2ab$
$c = 2b$
$\Rightarrow a + 2b = -6$
$a + b = -5$
$\Rightarrow b = -1 \Rightarrow a = -4$
$\therefore\ d = ab = (-4)(-1) = 4$

119. 2
119. Mode = 7
$\therefore$ Mean = 7
$\therefore \dfrac{21+5+x}{5} = 7$
$26 + x = 35$
$x = 9$

120. 4
120. $\dfrac{AC^2 - EC^2}{DC^2 - BC^2}$
$\dfrac{9x^2 + BC^2 - (x^2 + BC^2)}{4x^2 + BC^2 - BC^2} = \dfrac{8x^2}{4x^2} = \dfrac{2}{1}$



CHEMISTRY

161. 1
161. 46 gm Na atom
Moles = $\dfrac{46}{23}$ = $2N_A$ atom

162. 4
162. Cheese is a gel.

163. 3
163. Valency of X = 2, so correct formula is MgX

164. 4
164. $CaO + H_2O \longrightarrow Ca(OH)_2$
$Ca(OH)_2 + 2NH_4Cl \longrightarrow CaCl_2 + 2NH_3\uparrow + 2H_2O$

165. 3
165. $Fe_2O_3 + 2Al \longrightarrow Al_2O_3 + 2Fe$
(Molten)

166. 1

166. $Cu + SO_4^{2-} \longrightarrow Cu^{2+} + SO_2\uparrow$

(Choking smell)

167. 1

167. $CH_3COOH \xrightarrow{LiAlH_4} CH_3CH_2OH$

168. 4

168. Carbon has small size and maximum catenation property.

169. 2

169. Sodium is present in first group.

170. 4

170. Baking powder is a mixture of sodium hydrogen carbonate and tartaric acid.

171. 2

171. $_7N$, $_3Li$, $_{15}P$, $_{19}K$

Oxides of non-metal are acidic.

172. 3

172. $MnO_4^- + Cl^- \xrightarrow{H^+} Mn^{2+} + Cl_2\uparrow$

173. 1

173. CO_2 is a gas and SiO_2 is solid due to polymeric structure because it does not form Si=O (multiple bonding).

PHYSICS

174. 3

174. $F \times S = \frac{1}{2}mv^2$

$F \times S' = \frac{1}{2}m \times 9V^2$

$S' = 9S$

175. 1

175. $T = \sqrt{\frac{2h}{g}}$

$T_a : T_b = \sqrt{a} : \sqrt{b}$

176. 1

176. $u = V$

$v = 3V$

$a = g$

$S = \frac{v^2 - u^2}{2a}$; $S = \frac{9V^2 - V^2}{2g}$

$S = \frac{4V^2}{g}$

177. 4

177. The air bubble has less density than water so it will be collected at the neck.

178. 3

178. $V_3 = V_1 + V_2$ (as V_3 is connected in parallel with V_1 and V_2)

179. 4

179. $V_A + 3 - 7 \times 3 = V_B$

$V_A - V_B = 18$ V

180. 4

180. $P_1 = \dfrac{V^2}{3R} = 10$ watt ; $P_2 = \dfrac{V^2}{R/3}$

$P_2 = 3 \times \dfrac{V^2}{R} = 90$ watt

181. 3

181. $B = \dfrac{\mu_0 i}{2R}$

$\Rightarrow \quad B' = \dfrac{\mu_0 (ni)}{2R/n}$

$\Rightarrow \quad B' = n^2 \dfrac{\mu_0 i}{2R}$

$\Rightarrow \quad B' = n^2 B$

182. 3

182. $\dfrac{1}{V} + \dfrac{1}{u} = \dfrac{1}{f}$

$\Rightarrow \quad \dfrac{1}{f+p} + \dfrac{1}{f+q} = \dfrac{1}{f}$

$\Rightarrow \quad f^2 = qp$

183. 3

183. $-m = \dfrac{f}{-u_1 + f}$; $m = \dfrac{f}{-u_2 + f}$

$\therefore \quad \dfrac{-f}{f-u_1} = \dfrac{f}{f-u_2}$

$\Rightarrow \quad f = \dfrac{u_1 + u_2}{2}$

184. 3

184. $P \propto (V)^3$

$\therefore$ If velocity is doubled.

Power will become 8 times.

185. 1

185. Speed of sound does not depend on frequency.

186. 4

186. Outside a bar magnet field lines move from north pole to south pole and inside it moves from south to north.

187. 2
187. Plasmid" is made up only of one type of macro molecule.

188. 2
188. The relative energy yield in Kcal/gm is best represented in first ATP, followed Lipid and protein

189 4
189. The sub units of ribosomes in the cells of nephron of mouse is 60s & 40s

190. 3
190. Involuntary muscles are not found in "tongue"

191. 1
191. Only "denitrifying bacteria" work strictly under anaerobic conditions.

192. 1
192. The correct sequence of the given figure is (iii), (ii), (iv), (i)

193. 2
193. Mylein sheath is not present in grey neurons. (non myleinated neuron)

194. 3
194. The incorrect statement is they convert water and CO_2 into carbohydrate only in the absence of light)"

195. 1
195. The correct pathway of blood in circulatory system is
Atria $\rightarrow$ Ventricles $\rightarrow$ Artery $\rightarrow$ Vein

196. 4
196. "Iodine" is essential for formation of thryoxine in thyroid gland.

197. 2
197. According to Lindemauns' 10% low of energy transfer, only 10% of the energy is transferred from one trophic level to heat.

198. 3
198. both similarities and variation are transmitted from parents to offspring during reproduction.

199. 3
199. During excess of physical exercise, lactic acid gets accumulated in the muscles which causes pain.

200. 2
200. A good food chain includes
Grass, Goat, Lion