

# FIITJEE

NTSE STAGE II  
CODE: 13 – 15 (2019 – 2020)  
MENTAL ABILITY TEST (MAT)  
Held on: February 14, 2021

## HINTS & SOLUTIONS

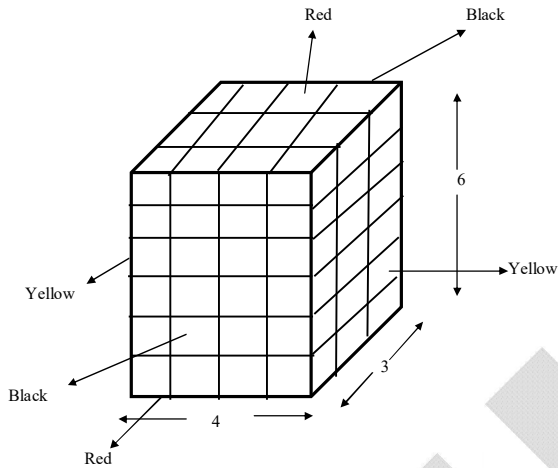
1.	3	2.	3	3.	1	4.	3
5.	No option correct.			6.	2	7.	4
8.	4						
9.	2	10.	1	11.	2	12.	2
13.	4	14.	2 or 3	15.	1	16.	1
17.	No option correct.			18.	1	19.	3
20.	4						
21.	2	22.	2	23.	3	24.	3
25.	3	26.	2	27.	3	28.	3
29.	2	30.	1	31.	3		
32.	2	33.	2	34.	1 & 3 both		
35.	2	36.	3	37.	3	38.	2
39.	1	40.	2	41.	2	42.	2
43.	4	44.	4	45.	4	46.	1
47.	4	48.	4	49.	4	50.	1
51.	4	52.	4	53.	4	54.	2
55.	3	56.	3	57.	4	58.	2
59.	No option correct.			60.	3	61.	3
62.	3	63.	3	64.	2	65.	4
66.	4	67.	1	68.	1	69.	1
70.	1	71.	2	72.	4	73.	1
74.	4	75.	2	76.	1	77.	3
78.	3	79.	4.	80.	3	81.	1
82.	2	83.	1.	84.	3	85.	4
86.	2	87.	4.	88.	2	89.	3
90.	1	91.	3	92.	1.	93.	4
94.	2	95.	2	96.	2	97.	4
98.	3	99.	1	100.	1		

1. 3  
Sol. (Sum of position number of letters present in that word) x (number of letters present in that word)

2. 3  
Sol.  $1^2 + 2^2 + 4^2 = 21$   
 $3^2 + 8^2 + 5^2 = 98$

Similarly,  $7^2 + 6^2 + 3^2 = 94$

3. 1  
Sol.



Total number of cubes =  $3 \times 4 \times 6 = 72$

All inner central cubes (after removing 2 faces of  $4 \times 6$ , 2 faces of  $4 \times 3$  and 2 faces of  $3 \times 6$  cubes)

4. 3  
Sol. 4 edges each common to red and yellow faces having 3 cubes each.

5. **No option correct.**

Sol. Since given statement is 'project work' which means 34, now from statement I and given statement it is clear that 3 is 'project' so 4 is 'work' and from statement II and given statement it is clear that 4 is 'work' so 3 is 'project' so we can determine answer from both the statements individually.  
So, no such option matches.

6. 2  
Sol. From the given statements it is clear that tortoise who like to fly will also like to jump as all tortoise like to jump.

7. 4

Sol. To form  $90^\circ$  between 3 pm & 4 pm (minute hand ahead of hour hand), minute hand has to travel  $99^\circ$  from 3 pm.

$$\text{i.e., } \frac{99}{5.5} = 18$$

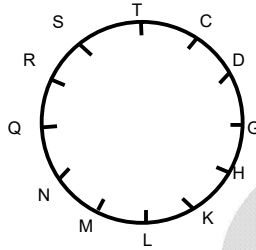
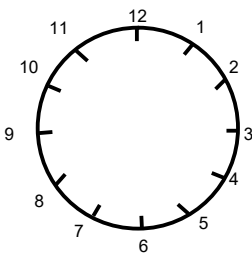
$\therefore$  Exact time = 3 hrs 18 min

8. 4

Sol. Position number of inner letter is written on outer side and position number of outer letter is written in opposite side (in square)

9. 2

Sol.



Not included letters  $\rightarrow$  (A, B), (E, F), (I, J), (O, P), (U, V)

Start time  $\rightarrow$  N : T  
8:00

End time  $\rightarrow$  S : K  
11:25

Total time  $\rightarrow$  3 hrs 25 min

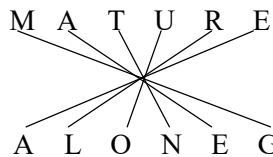
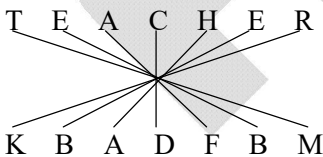
Number of period = 5

Break time = 7 min, 9 min, 11 min, 13 min  
= 40 min (total)

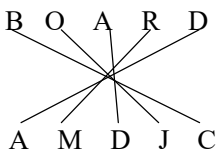
$$\therefore \text{Duration of each period} = \frac{180 + 25 - 40}{5} = 33 \text{ min}$$

10. 1

Sol.



Similarly,



Either sum or difference of position number of corresponding letters = total number of letters present in that word.

11. 2  
Sol.

	M	P	B	K	L	V
Dancing	√	√				
Acting	√	√				
Singing		√	√	√		√
Playing tabla	√		√	√	√	
Playing guitar		√				√

12. 2  
Sol. Squares formed from 2 figures = 24  
Squares formed from 4 figures = 16  
Squares formed from 8 figures = 13  
Squares formed from 16 figures = 9  
Squares formed from 18 figures = 4  
Square formed from 32 figures = 1  
Squares formed from 36 figures = 4  
Squares formed from 64 figures = 1  
∴ Total squares = 72

13. 4  
Sol. Since,  $25 - 10 + 4 = 16$   
 $\Rightarrow + \rightarrow -$   
 $x \rightarrow +$   
and  $10 \times 3 \div 3 = 1$   
 $\Rightarrow \div \rightarrow x$   
 $- \rightarrow \div$   
∴  $16 \times 5 + 40 - 10 \times 2$   
 $= 16 + 5 - 40 \div 10 \times 2$   
 $= 16 + 5 - 4 \times 2$   
 $= 21 - 8$   
 $= 13$

14. 2 or 3  
Sol. Since '>' occur 4 times. There is no symbol on the ninth number after '>', so if we consider cyclic order then correct answer is @.  
If in place of symbol its written character then answer should be S.

15. 1  
Sol. 1 to 9 all numbers are written horizontally, vertically and diagonally.

16. 1  
 Sol. \$ → ≥  
 © → <  
 # → >  
 % → ≤  
 @ → =

T%R, R\$M, M@D, D©H  
 ⇒ T ≤ R ≥ M = D < H

1. D % R  
D ≤ R, holds true
2. H # R  
H > R
3. T © M  
T < M
4. T % D  
T ≤ D

17. **No option correct.**

- Sol. \$ → ≥  
 © → <  
 # → >  
 % → ≤  
 @ → =

M@B, B#N, N\$R, R©K  
 M = B > N ≥ R < K

1. K © R  
K < R
2. R © B  
R < B, holds true
3. M \$ R  
M ≥ R
4. N © M  
N < M, holds true

18. 1  
 Sol. Area common to bigger rectangle, bigger triangle and smaller rectangle.

19. 3  
 Sol. Area common to vertical rectangle and circle.

20. 4  
 Sol. Area common to circle and bigger rectangle but not both triangles.

21. 2  
 Sol. 23<sup>rd</sup> April                      13<sup>th</sup> June  
       Monday                         ?

Number of days between these 2 dates =  $7 + 31 + 13 = 51$  days

51 days = 2 odd days

$\therefore$  13<sup>th</sup> June same year will be Monday + 2 = Wednesday

22. 2

Sol.

	M	T	W	T	F	S	S
9 - 10	S		S	S			
10 - 12	DS		S	DS	D		D
12 - 12:30	DS	A	S	ADS	D		AD
12:30 - 2	D	A		AD	D		AD
2 - 4		A		A	S	S	AS

All doctors are available on Thursday for  $\frac{1}{2}$  hrs.

23. 3

Sol. Dr Ashutosh and Dr Shehnaz are available on Thursday for  $\frac{1}{2}$  hrs and on Sunday for 2 hrs.

24. 3

Sol. Dr. Dhanwantri and Dr. Shehnaz are available on Monday for  $2\frac{1}{2}$  hrs and on Thursday for  $2\frac{1}{2}$  hrs.

25. 3

Sol. Total number of students who are not qualified in atleast 1 subject are

$$(30 + 10 + 75 + 5 + 12 + 8 + 50) = 190$$

$$\therefore 38\% \text{ of total students} = 190$$

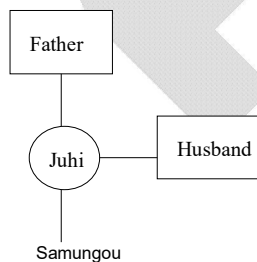
$$\text{Total students} = 500$$

$$\text{Candidates not qualified in atleast 2 subjects} = 10 + 5 + 12 + 8 = 35$$

$$\therefore \% \text{ of such candidates} = \frac{35}{500} \times 100 = 7\%$$

26. 2

Sol.



From figure we can say he is the father of Samungou.

27. 3

Sol.

	+		+		
+	↓	↓	↓	↓	
17	21	12	8		
33	29	38	42		
41	37	?	50		

Sum of number of 1<sup>st</sup> and 3<sup>rd</sup> column is equal to 2<sup>nd</sup> and 4<sup>th</sup> column.

28. 3

Sol.  $(13 - 4) \times 5 + 4 = 49$   
 $(17 - 11) \times 7 + 6 = 48$   
 $(19 - 13) \times 6 + 8 = 44$   
So, answer is option 3.

29. 2

Sol. Book =  $108^0$   
Not book =  $36^0$   
School fee =  $72^0$   
Mess charges =  $18^0$   
Travel and accommodation =  $126^0$

30. 1

Sol.  $\frac{A}{D} = \frac{2 \times 36}{5 \times 36}$   
 $A = 72$   
 $B = 180$   
 $A + D = 252$   
If x is the number of total student  
30 of x = 252  
 $x = \frac{252 \times 100}{30} = 840$

31. 3

Sol. Since some of the competitors are toppers and all topper are marked with green. So, some competitors (those were toppers) are definitely marked with green.

32. 2

Sol.  $2, 3, 5, 7, 11, 13, 17, 19$   
 $1, 2, 2, 4, 2, 4, 2$

33. 2

Sol. As per observation.

34. 1 & 3 both

Sol. Option 1 and 3 are same.

35. 2

Sol. Through options.

36. 3

Sol. Atleast 2 clubs =  $(14 + 11 + 8 + 36 + 12 + 24 + 10 + 15 + 16) = 146$

37. 3

Sol.  $\frac{B}{G} = \frac{1}{1}$

2017 – 18

$$\frac{B}{G} = 1.4 = \frac{14}{10} = \frac{7}{5}$$

So, in 2017 - 18

$$\frac{B}{G} = \frac{5}{5}$$

$$\therefore \text{Boys} = \frac{(17 - 18)}{(16 - 17)} = \frac{14}{5}$$

38. 2

Sol.  $27 + 22(2.7 + 0.27 + \dots)$   
 $27 + 2 \times 2.7(1 + 0.1 + 0.01)$   
 $27 + 2 \times \frac{27}{0.9} = 33$   
 $27 + 6 = 33$

39. 1

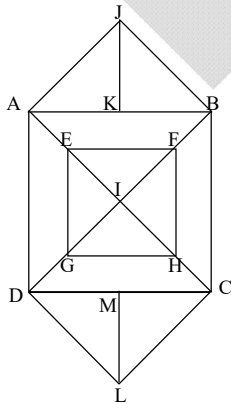
Sol.  $\sqrt{9} = 3, \sqrt{25} = 5$   
 So,  $3 \times 5 = 15$   
 $3 + 5 = 8 = 8^2 = 64$   
 $(5 - 3) = 2$   
 Similarly,  
 $\sqrt{49} = 7, \sqrt{100} = 10$   
 $7 \times 10 = 70$   
 $7 + 10 = 17$   
 $10 - 7 = 3$

40. 2

Sol. 002 B, 009 I, 028 J,     , 126I  
 $1^3 + 1, 2^3 + 1, 3^3 + 1, 4^3 + 1$   
 B I J K I  
 (They are obtained by adding the digit)

41. 2

Sol.



$\triangle IEF, \triangle IHF, \triangle IGH, \triangle GEI, \triangle EFM, \triangle EGH, \triangle EGF, \triangle GFH, \triangle ABI, \triangle BIC, \triangle DIC, \triangle DAI, \triangle ABC, \triangle ADC, \triangle ADB, \triangle BDC, \triangle AJK, \triangle JKB, \triangle AJB, \triangle DML, \triangle LMC, \triangle DCL$



42. 2  
 Sol. 60 → total students  
 Girls = 24, boys = 36  
 Kartik's rank is 17 in which 9 are girls rest are boys that is 7  
 Ratio of girls and boys after Kartik's is  

$$\frac{24 - 9}{36 - 8} = \frac{15}{28}$$

43. 4  
 Sol. Sum of the digit is 3

44. 4  
 Sol. As per observation.

45. 4  
 Sol. From 1 and 2                      L = 2  
 From 1 and 3                      □ = 8  
 From above equation and 4      ⬡ = 16  
 So, clearly  $23 = 16 + 5 + 2$   
 $= \text{⬡} + (\Delta / ) + L$   
 $= L \Delta / \text{⬡}$

46. 1  
 Sol. As per observation.

47. 4  
 Sol. As per observation.

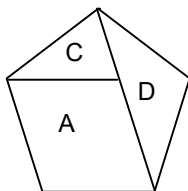
48. 4  
 Sol. As per observation.




49. 4  
 Sol. As per observation.

50. 1  
 Sol. As per observation.

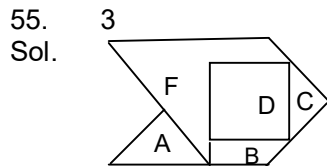
51. 4  
 Sol. As per observation

52. 4  
 Sol.



53. 4  
Sol. As per observation
-  (Opposite)  
 (Opposite)  
 (Opposite)

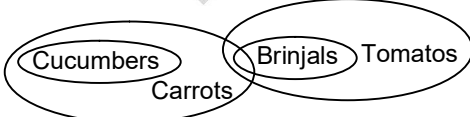
54. 2  
Sol. As per observation



56. 3  
Sol. By using option 3 =  $x^3 + \frac{3x}{2}$   
If we put n = 4  
Then =  $4^2 + \frac{3 \times 4}{2} = 64 + \frac{12}{2} = 70$

57. 4  
Sol.  $C_1 = 9 + 16 = 12 + 13$   
 $C_2 = x + 63 = 53 + 50 \rightarrow x = 40$   
 $C_3 = 102 + y = 140 + 118 \rightarrow y = 156$

58. 2  
Sol. First row  $\rightarrow \frac{6+17+11+4}{2} = 19$  (Middle No.)  
Second row  $\rightarrow \frac{7+3+14+10+5+9}{2} = 24$  (Middle No.)  
Third row  $\rightarrow \frac{1+6+8+18+16+9+7+3}{2} = 34$  (Middle No.)  
Fourth row  $\rightarrow \frac{5+2+13+15+2+5}{2} = 21$  (Middle No.)  
Fifth row  $\rightarrow \frac{5+16+12+7}{2} = 20$  (Middle No.)

59. No option correct.  
Sol.
- 
- I. ✓  
II. X  
III. X  
IV. X
- Only conclusion I follows.

60. 3

Sol. Let the present age of Aman = x, Ayaz = y and Ashwinder = z

Its given  $x = y + 6$ ,

$y = z + 8$

$x + y = (z - 4) \times 5$ ,

$x + y = 5z - 20$ ,

$x + y - 5z = -20$

$z + 14 + z + 8 - 5z = -20$  [ $\therefore x = z + 8 + 6, x = z + 14$ ]

$2z - 3z = -20$

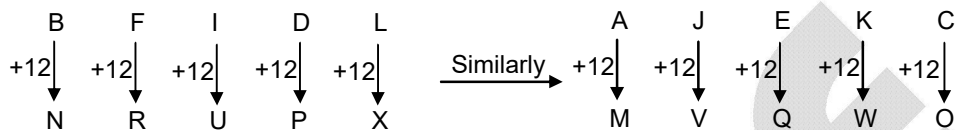
$-3z = -20 - 22$

$3z = 42, Z = 14$

So, Ashwinder = 14, Ayaz = 14 + 8 = 22 and Aman = 22 + 6 = 28

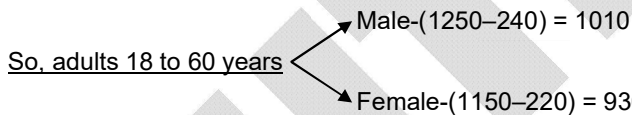
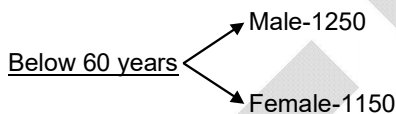
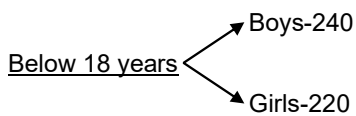
61. 3

Sol.

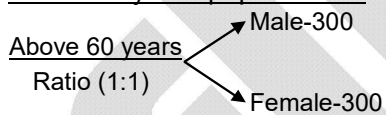


62. 3

Sol.



Above 60 years population = 3000 - (1250 + 1150) = 600



So, the difference  $\rightarrow 930 - 300 = 630$

63. 3

Sol.

$484 \rightarrow 4 + 8 + 4 = 16$

$529 \rightarrow 5 + 2 + 9 = 16$

$961 \rightarrow 9 + 6 + 1 = 16$

Similarly

$784 \rightarrow 7 + 8 + 4 = 19$

$676 \rightarrow 6 + 7 + 6 = 19$

$289 \rightarrow 2 + 8 + 9 = 19$

64. 2

Sol.

First figure  $\rightarrow$

$3 \times 2 + 1 = 7$

$7 \times 3 - 2 = 19$

$19 \times 4 + 1 = 77$

$77 \times 5 - 2 = 383$

Similarly, in figure 3  $\rightarrow$

$4 \times 2 + 1 = 9$

$9 \times 3 - 2 = 25$

$$25 \times 4 + 1 = \underline{101}$$

$$101 \times 5 - 2 = 503$$

65. 4  
Sol. As per observation

66. 4  
Sol. As per observation

67. 1  
Sol. 

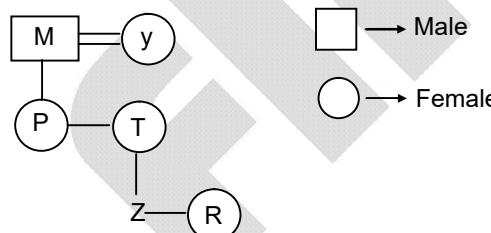
Monday	Tuesday	Wednesday	Thursday	Friday
Violet	Yellow	Indigo	Red	Green

68. 1  
Sol. 

Monday	Tuesday	Wednesday	Thursday	Friday
Violet	Yellow	Indigo	Red	Green

69. 1  
Sol. BC → 2,3  $\xrightarrow{\text{Reverse}}$  32 (Upper side)  
B → 2 → (Down side)  
EG → 5,7  $\xrightarrow{\text{Reverse}}$  75 (Upper side)  
C → 3 → (Down side)  
KM → 11,13 → 1311 (Upper side)  
O → 15 → (Down side)



70. 1  
Sol. Option 1 –  $24 * 3 * 10 * 120 * 2$   
After putting values  
 $24 \times 3 - 10 = 120 \div 2$   
 $72 - 10 = 60$   
 $62 \neq 0$

71. 2  
Sol.   
Here 'R' is the grand-daughter of M.

72. 4  
Sol. In all other pairs except (86, 99). The ratio of the two numbers is 8 : 9.

73. 1  
Sol. As per observation.

74. 4  
Sol. As per observation.

75. 2  
Sol.   
Second eldest among the five cousins is 

76. 1

Sol.

is younger than

77. 3

Sol.

+ 45 minutes → 3:15, 4:00, 4:45, 5:30, (6:15)  
 + 35 minutes → 7:20, 7:55, 8:30, (9:05), 9:40

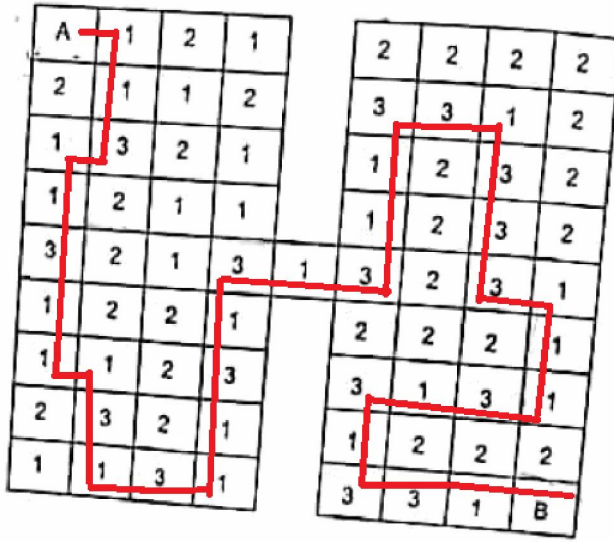
78. 3

Sol.

All angles form in figures A, B and D are same except figure C.

79. 4.

Sol.



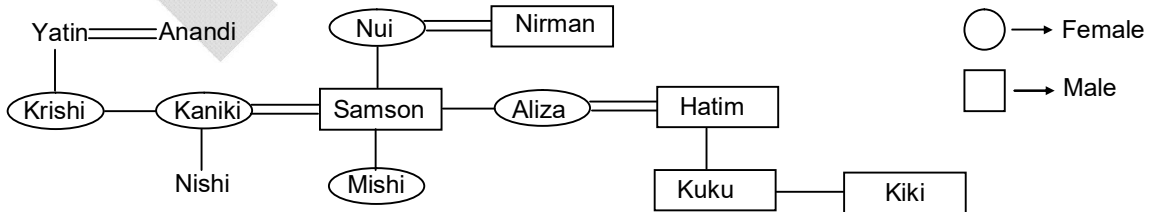
80. 3

Sol.

- 7. Srinivas
- 6. Yaima
- 5. Jeet
- 4. Ranjan
- 3. Aloka
- 2. Danial
- 1. Barisha

81. 1

Sol.



With 3 females and 2 males answer is 1.

82. 2

Sol.

Bottom box upside down on top with two remaining boxes combined together.

83. 1.  
Sol. As per observation



84. 3  
Sol.

	Fine Arts	Social Science	Chemistry	Physics	Biology
A		✓	✓	✓	
B	✓	✓	✓		
C			✓	✓	✓
D	✓		✓		✓
E	✓	✓			✓

85. 4  
Sol.

	Fine Arts	Social Science	Chemistry	Physics	Biology
A		✓	✓	✓	
B	✓	✓	✓		
C			✓	✓	✓
D	✓		✓		✓
E	✓	✓			✓

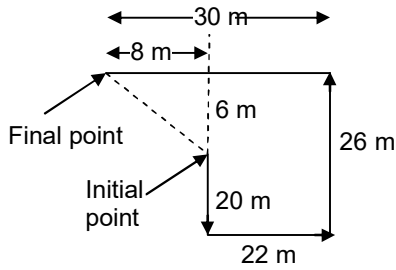
86. 2  
Sol.

	Fine Arts	Social Science	Chemistry	Physics	Biology
A		✓	✓	✓	
B	✓	✓	✓		
C			✓	✓	✓
D	✓		✓		✓
E	✓	✓			✓

87. 4.  
Sol.  $2^1 + 1, 4^2 + 2, 6^3 + 3, 8^4 + 4, 10^5 + 5$

88. 2  
Sol. Cubes with no paint  $\rightarrow (n-2)^3$   
Here  $n = 4 \Rightarrow (4-2)^3 = 8$   
Cubes with pain on two faces =  $(n-2) \times 12$   
 $= 24$   
Ratio =  $8 : 24$   
 $= 1 : 3$

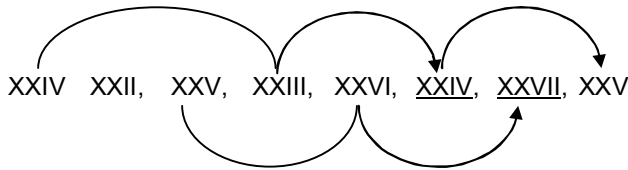
89. 3  
Sol.



$$\text{Distance} = \sqrt{8^2 + 6^2}$$

$$= \sqrt{100} = 10 \text{ m}$$

90. 1  
Sol.



Dual series

Series 1 → 14, 15, 16, 17

Series 2 → 12, 13, 14, 15

91. 3  
Sol.

2 3 1 4 6 5 7 satisfies all the given conditions.

92. 1.  
Sol.

Only I satisfies the fact as Mani is an island so it must be surrounded by water. We can't say anything about all island formation or all volcanoes.

93. 4  
Sol.

a	e	i	o	u
01	05	09	15	21
10	50	90	51	12 → reverd (sum = 213)

$$\text{Angle of u} \rightarrow \frac{360}{213} \times 12 = 20.281$$

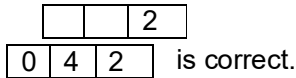
94. 2  
Sol.

From A and B → 6 X

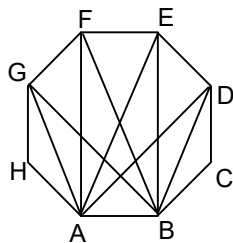
From D → 7, 1, 8 X

So 2 is at right place in A

From options only (2)



95. 2  
Sol.



On every side 4 triangles can be formed.

For example → for side AB

AGB, AFB, AEB, ADB

For 8 sides →  $8 \times 4 = 32$

96. 2  
 Sol. 3 Seerat 2 Shaurya 6 Ruhani 14  
 Total = 28

97. 4  
 Sol.  $\diamond + \bullet + \square = 35$

$2 \diamond + \bullet = 40$  ... (i)

$(\diamond + 2 \bullet = 35) \times 2$

$2 \diamond + 4 \bullet = 70$  ... (ii)

From (i) and (ii)

$3 \bullet = 30 \Rightarrow \bullet = 10$

Only in option (4)

$\bullet = 10$

