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

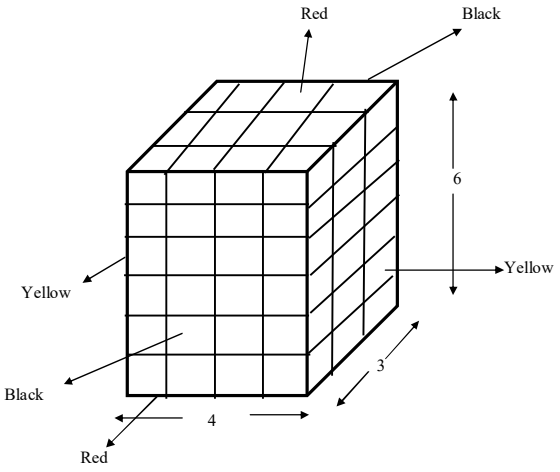
Sol. $1^2 + 2^2 + 4^2 = 21$

$3^2 + 8^2 + 5^2 = 98$

Similarly, $\boxed{7}^2 + 6^2 + 3^2 = 94$

3. 1

Sol.



Total number of cubes = 3 x 4 x 6 = 72

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

4. 3

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

5.

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 9^0 between 3 pm & 4 pm (minute hand ahead of hour hand), minute hand has to travel 99^0 from 3 pm.

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

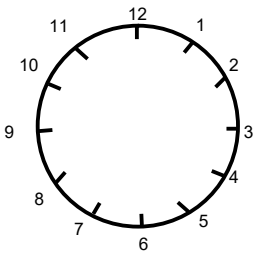
$\therefore$ Exact time = 3 hrs 18 min

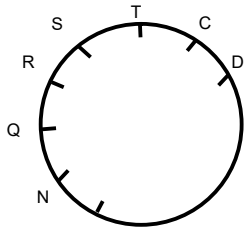
8. 4

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

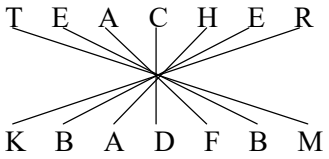
End time $\rightarrow$ S : K
11:25

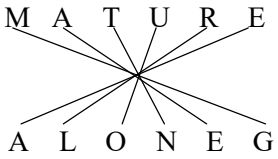
Total time $\rightarrow$ 3 hrs 25 min
Number of period = 5
Break time = 7 min, 9 min, 11 min, 13 min
= 40 min (total)

$\therefore$ Duration of each period =

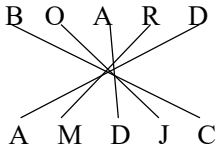
10. 1

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
$\therefore$ Total squares = 72

13. 4
Sol. Since, 25 – 10 + 4 = 16
$\Rightarrow$ + $\rightarrow$ –
x $\rightarrow$ +
and 10 x 3 ÷ 3 = 1
$\Rightarrow$ ÷ $\rightarrow$ x
– $\rightarrow$ ÷
$\therefore$ 16 x 5 + 40 – 10 x 2
= 16 + 5 – 40 ÷ 10 x 2
= 16 + 5 – 4 x 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.

23rd April	13th June
Monday	?

Number of days between these 2 dates = 7 + 31 + 13 = 51 days
51 days = 2 odd days
$\therefore$ 13th 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 ½ hrs.

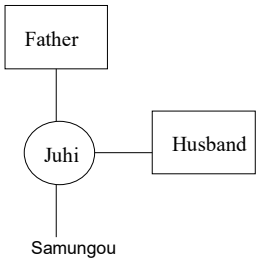
23. 3
Sol. Dr Ashutosh and Dr Shehnaz are available on Thursday for ½ hrs and on Sunday for 2 hrs.

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.

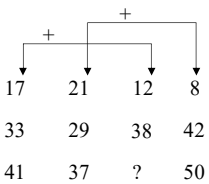
25. 3
Sol. Total number of students who are not qualified in atleast 1 subject are
(30 + 10 + 75 + 5 + 12 + 8 + 50) = 190
$\therefore$ 38% of total students = 190
Total students = 500
Candidates not qualified in atleast 2 subjects = 10 + 5 + 12 + 8 = 35
$\therefore$ % of such candidates = $\frac{35}{500}\times 100$ = 7%

26. 2
Sol.



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

27. 3
Sol.



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

28. 3
Sol. (13 – 4) x 5 + 4 = 49
(17 - 11) x 7 + 6 = 48
(19 - 13) x 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.

$$\underbrace{2,\quad 3,}_{1,}\quad \underbrace{5,}_{2,}$$

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

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

So, in 2017 – 18

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

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

38. 2

Sol. $27 + 22(2.7 + 0.27 + ...)$

$27 + 2 \times 2.7(1 + 0.1 + 0.01)$

$$27 + 2 \times \frac{27}{0.5} = 3$$

27 + 6 = 33

39. 1

Sol. $\sqrt{9} = 3, \sqrt{25} = 5$

So, 3 x 5 = 15

3 + 5 = 8 = 8^2 = 64

(5 - 3) = 2

Similarly,

$\sqrt{49} = 7, \sqrt{100} = 10$

7 x 10 = 70

7 + 10 = 17

10 – 7 = 3

40. 2

Sol. 002 B, 009 I, 028 J, ___, 126I

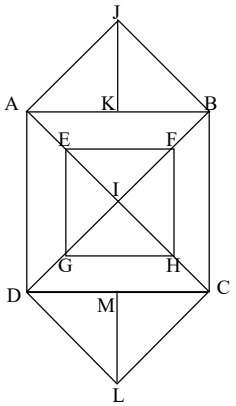
$1^3 + 1,\ 2^3 + 1,\ 3^3 + 1,\ 4^3 + 1$

B I J K I

(They are obtained by adding the digit)

41. 2

Sol.



ΔIEF, ΔIHF, ΔIGH, ΔGEI, ΔEFM, ΔEGH, ΔEGF, ΔGFH, ΔABI, ΔBIC, ΔDIC, ΔDAI, ΔABC, ΔADC, ΔADB, ΔDBC, ΔAJK, ΔJKB, ΔAJB, ΔDML, ΔLMC, ΔDCL

42. 2
Sol. 60 $\rightarrow$ total students
Girls = 24, boys = 36
Kartik's rank is17 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 ⬠
So, clearly 23 = 16 + 5 + 2
= ⬠ + (△ ／) + L
= L △ ／ ⬠

46. 1
Sol. As per observation.

47. 4
Sol. As per observation.

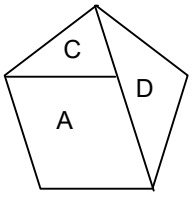
48. 4
Sol. As per observation.

49. 4
Sol. As per observation.

50. 1
Sol. As per observation.

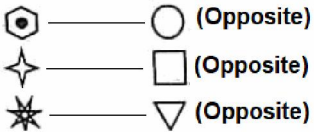
51. 4
Sol. As per observation

52. 4
Sol.



53. 4

Sol. As per observation

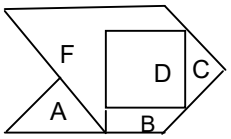


54. 2

Sol. As per observation

55. 3

Sol.



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 $\rightarrow \frac{7+\mathbf{3}+14+10+5+}{2} = 24$ (Middle No.)

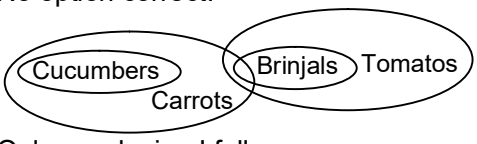
Third row $\rightarrow \frac{1+6+8+18+\mathbf{16}+9+7+3}{2} = 34$ (Middle No.)

Fourth row $\rightarrow \frac{5+2+13+15+2+5}{2} = 21$ (Middle No.)

Fifth row $\rightarrow \frac{5+16+12+\mathbf{7}}{2} = 20$ (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 $x = y + 6$,

$y = z + 8$

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

$x + y = 5z - 20$,

$x + y - 5z = -20$

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

$22 - 3z = -20$

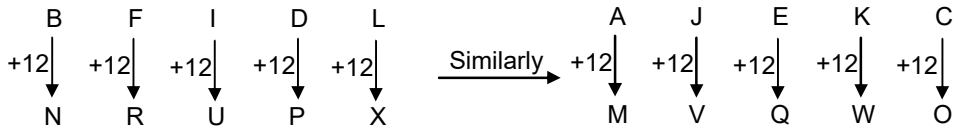
$-3z = -20 - 22$

$3z = 42$, $Z = 14$

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

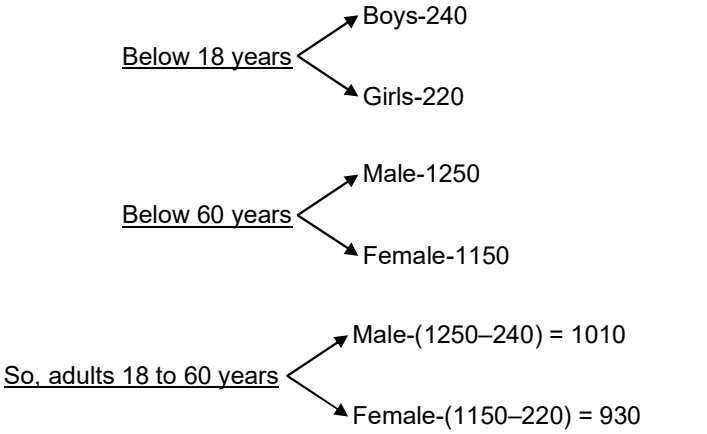
61. 3

Sol.

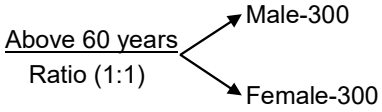


62. 3

Sol.



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



So, the difference → 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 → $3 \times 2 + 1 = 7$

$7 \times 3 - 2 = 19$

$19 \times 4 + 1 = 77$

$77 \times 5 - 2 = 383$

Similarly, in figure 3 → $\mathbf{4} \times 2 + 1 = 9$

$9 \times 3 - 2 = 25$

$25 \times 4 + 1 = \underline{\mathbf{101}}$
$101 \times 5 - 2 = 503$

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

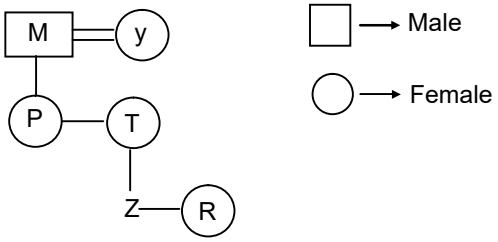
68. 1
Sol.

Monday	Tuesday	Wednesday	Thursday	Friday
Violet	Yellow	Indigo	Red	Green

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

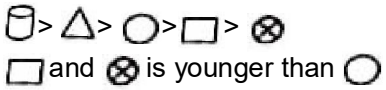
72. 4
Sol. In all other pairs except (86, 99). The ratio of the two numbers is 8 : 9.

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. 

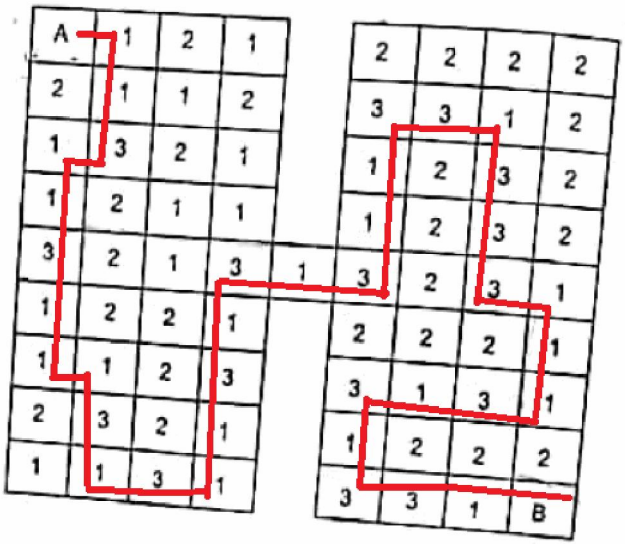
77. 3

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.

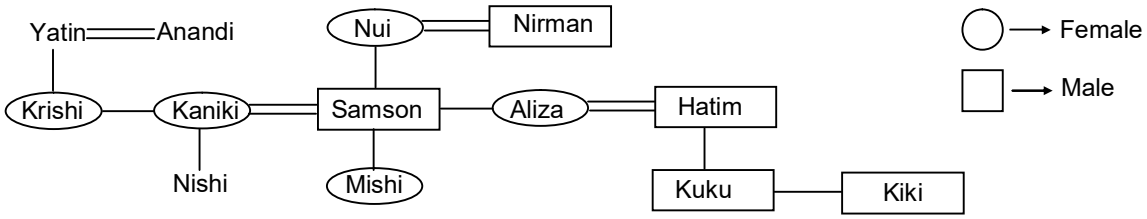
79. 4.

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 = $(n - 2) \times 12$

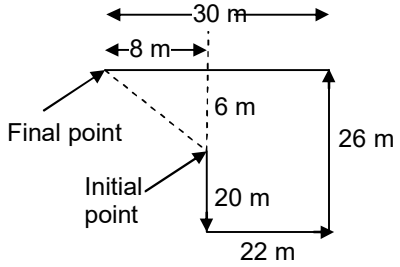
$= 24$

Ratio = 8 : 24

= 1 : 3

89. 3

Sol.

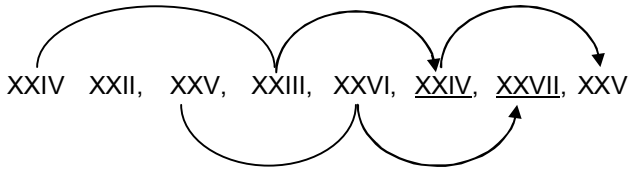


Distance = $\sqrt{8^2+6^2}$

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

90. 1

Sol.



Dual series

Series 1 $\rightarrow$ 14, 15, 16, **17**

Series 2 $\rightarrow$ 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 $\rightarrow$ revered (sum = 213)

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

94. 2

Sol. From A and B $\rightarrow$ 6 X

From D $\rightarrow$ 7, 1, 8 X

So 2 is at right place in A

		2

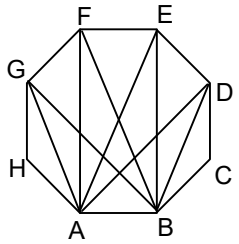
From options only (2)

0	4	2

is correct.

95. 2

Sol.



On every side 4 triangles can b formed.

For example $\rightarrow$ for side AB

AGB, AFB, AEB, ADB

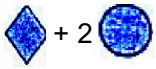
For 8 sides $\rightarrow 8 \times 4 = 32$

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

97. 4
Sol.

 = 35

2  = 40 …(i)

( = 35) × 2

2  = 70 …(ii)

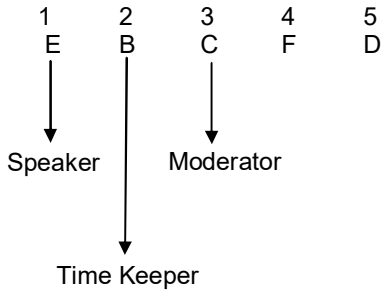
From (i) and (ii)

3  = 30 ⇒  = 10

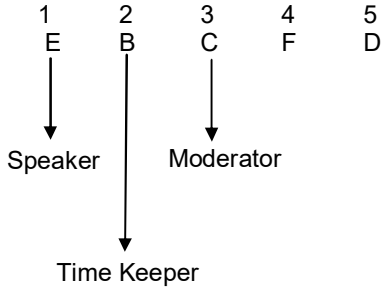
Only in option (4)

 = 10

98. 3
Sol.



99. 1
Sol.



100. 1
Sol.