

NATIONAL TALENT SEARCH EXAMINATION, 2015-16 (STATE LEVEL) (FOR STUDENTS STUDYING IN CLASS X)

MENTAL ABILITY TEST (MAT)

Time: 45 Minutes

Full Marks: 50

INSTRUCTIONS TO CANDIDATES

Read the instructions carefully before you start answering the questions. Answers are to be given on a OMR Answer-Sheet provided.

1. In this Paper you are to answer 50 questions. Each questions carries 1 (one) mark. You are to answer all the questions.
2. Before you proceed to mark in the OMR answer-Sheet, find out the correct answer from the four alternatives (a), (b), (c) and (d) against each question in the Question Booklet. Darken the circle with a Black Ball Point Pen, to the corresponding correct answer for the item in the OMR Answer-Sheet.

(Here 'b' is the correct answer.)

3. If more than one circle is encoded or darken against a particular answer, it will be treated as a wrong answer.
4. There will be no penalty marks or negative marking for a wrong answer.
5. You are to start recording answers with the 'start' instruction from the Officer-in-Charge of your room/hall.
6. You are to write your Name and Roll No. in the space provided with for this purpose on the OMR Answer-Sheet. You must encode your Roll No. in OMR Answer Sheet.
7. The OMR Answer-Sheet should be handed over to the Invigilator before leaving the Examination Hall. You may take away the used Question Booklet after completion of the examination.

Enrollment No. : Batch : _____

Name : _____

Candidate's Signature _____ Invigilator's Signature: _____

(Questions 1–10)

DIRECTION: Read the questions carefully and give answer by filling the circle of the letter denoting your selected answer on the O.M.R. Answer-Sheet.

1. If $(x + a)$ is a factor of $f(x) = x^3 + ax^2 - 2x + a + 4$ then a is
 (A) $\frac{4}{3}$ (B) $-\frac{2}{3}$
 (C) $-\frac{4}{3}$ (D) $-\frac{7}{3}$
2. In a family, the average age of 5 children is 9 years. The average of those five children and their parents is 20 years. If the age of their mother is 5 years less than that of their father, then the age of their mother is
 (A) 40 years (B) 50 years
 (C) 35 years (D) 45 years
3. If $a^2 + b^2 + c^2 = ab + bc + ca$ then the value of $\frac{a+c}{b}$ is
 (A) 2 (B) 0
 (C) 1 (D) -1
4. At the end of the year 2002, Arghya was half old as his grandfather. The sum of the years in which they were born is 3854. Age of Arghya at the end of year 2003 is
 (A) 49 years (B) 50 years
 (C) 51 years (D) 52 years
5. The product of 12% of an integer and 20% of the next integer is 61.2. The integer is
 (A) 50 (B) -51
 (C) 63 (D) both (a) and (b)
6. A cone and a hemisphere have equal bases and equal volumes. The ratio of their height is
 (A) $\sqrt{2} : 1$ (B) 2 : 1
 (C) $\sqrt{3} : 2$ (D) 3 : 1
7. The unit's digit in the expansion of $(2317)^{759}$ is
 (A) 7 (B) 9
 (C) 3 (D) 1
8. A number is first reduced by 10% and then it is again increased by 10%. Then the number is changed by
 (A) 20% increase (B) 10% decrease
 (C) 10% increase (D) 1% decrease
9. How many solution does a linear equation in two variables have?
 (A) one (B) two
 (C) three (D) infinite
10. A sum of money becomes double at certain compound rate of interest in n years. In how many years it will become four times at the same compound rate of interest?
 (A) $2n^2$ years (B) $2n$ years
 (C) n^2 years (D) $4n$ years

(Questions 11—20)

DIRECTION: (In each questions 11 to 20 below, there is a number series with one term missing shown by '?'. The term is given as one of the alternatives among four numbers given below it. Find the term and indicate your answer by filling the circle of the corresponding letter of alternatives in the O.M.R. Answer-Sheet.

- | | | |
|-----|--|--------------------|
| 11. | 1, 2, 6, 15, 31, ?
(A) 47
(C) 55 | (B) 52
(D) 56 |
| 12. | 11, 23, 48, 99, ?, 409
(A) 200
(C) 201 | (B) 202
(D) 205 |
| 13. | 8, 24, 12, 36, 18, 54, ?
(A) 27
(C) 72 | (B) 68
(D) 108 |
| 14. | 2, 10, 26, 50, 82, ?
(A) 110
(C) 120 | (B) 112
(D) 122 |
| 15. | 2, 9, 30, 93, ?, 849
(A) 182
(C) 192 | (B) 282
(D) 292 |
| 16. | 0, 6, 24, 60, 120, 210, ?
(A) 240
(C) 336 | (B) 290
(D) 504 |
| 17. | 1, 4, 27, 16, ?, 36, 343
(A) 64
(C) 121 | (B) 125
(D) 216 |
| 18. | 7, 10, 15, 17, 23, 24, 31, ?
(A) 31
(C) 33 | (B) 34
(D) 35 |
| 19. | 2, 7, 24, 77, ?, 723
(A) 100
(C) 250 | (B) 238
(D) 235 |
| 20. | 134, 245, 356, 467, ?
(A) 579
(C) 578 | (B) 568
(D) 479 |

(Questions 20—30)

DIRECTION: In each of the questions 21 to 30, there are four items, three of which are alike by some means or other while one is out of the class. Find out the odd item and indicate your answer by filling the circle of the corresponding letter on the O.M.R. Answer-Sheet.

- | | | |
|-----|------------------------------|-----------------------------|
| 21. | (A) Methane
(C) Acetylene | (B) Ethylene
(D) Benzene |
|-----|------------------------------|-----------------------------|

NTSE_2015-16_P2_MAT

- | | | |
|-----|--|--|
| 22. | (A) Thyroxine
(C) Iodine | (B) Adrenalin
(D) Insulin |
| 23. | (A) Leprosy
(C) Typhoid | (B) Influenza
(D) Dysentery |
| 24. | (A) Ladder
(C) Bridge | (B) Staircase
(D) Escalator |
| 25. | (A) Tarapur
(C) Kalpakkam | (B) Kota
(D) Paradeep |
| 26. | (A) Sodium chloride
(C) Hydrogen chloride | (B) Magnesium chloride
(D) Pottasium chloride |
| 27. | (A) Granite
(C) Peat | (B) Lignite
(D) Bituminous |
| 28. | (A) Lymphocytes
(C) Fibrinogen | (B) Pepsinogen
(D) Haemoglobin |
| 29. | (A) Celsius
(C) Fahrenheit | (B) Calorie
(D) Kelvin |
| 30. | (A) Wheat
(C) Maize | (B) Rice
(D) Mustard |

(Questions 31—40)

DIRECTION: In each question below there are two words separated by ‘:’ in the upper row. Below that there are some words on each side of the symbol ‘:’. Find the relation between two upper words and select one word from the right side of ‘:’ below which have the same relation as above. Fill the circle of the letter denoting your selected answer on the O.M.R. Answer-Sheet.

- | | | |
|-----|---|----------------------------------|
| 31. | Scribble : Write
Stammer : ?
(A) Walk
(C) Speak | (B) Play
(D) Dance |
| 32. | Errate : Books
Flaws : ?
(A) Speech
(C) Metals | (B) Vocabulary
(D) Manuscript |
| 33. | Funk : Vitamins
Curie : ?
(A) Radium
(C) Photography | (B) Proton
(D) Uranium |
| 34. | Darwin : Evolution
Archimedes : ?
(A) Friction
(C) Liquids | (B) Lubrication
(D) Buoyancy |

NTSE_2015-16_P2_MAT

35. Giant : Dwarf
Genius : ?
(A) Wicked (B) Gentle
(C) Idiot (D) Tiny
36. Pesticide : Crop
Antiseptic : ?
(A) Wound (B) Clotting
(C) Bandage (D) Bleeding
37. Taxonomy : Classification
Pedology : ?
(A) Nature (B) Farming
(C) Soil (D) Mountain
38. Pigeon : Peace
White flag : ?
(A) Surrender (B) Enemy
(C) Victory (D) War
39. Millionaire : Wealth
Genius : ?
(A) Capability (B) Smartness
(C) Awareness (D) Intelligence
40. Compass : Direction
Altimeter : ?
(A) Sound (B) Height
(C) Eyesight (D) Weight

(Questions 41—50)

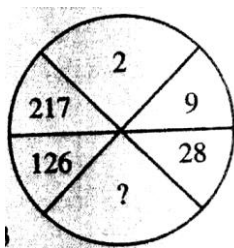
DIRECTION: In each questions 41—50, numbers are placed in figures on the basis of some rules. One place in the figure is indicated by the interrogation sign (?). Find out the correct alternative to replace the question mark and indicate your answer by filling the circle of the corresponding letter of alternatives in the O.M.R. Answer-Sheet.

41.

85	20	5
126	24	6
175	?	7

- (A) 22 (B) 24
(C) 26 (D) 28

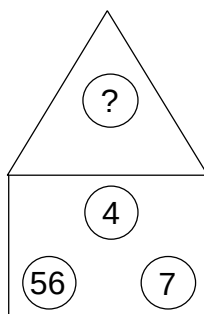
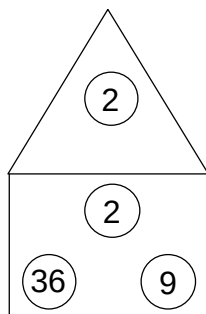
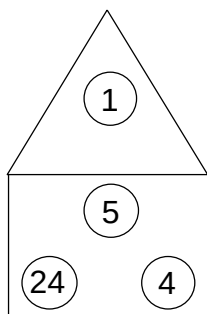
42.



- (A) 63
(C) 65

- (B) 64
(D) 66

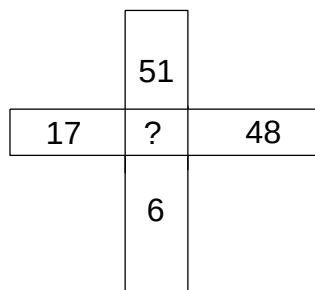
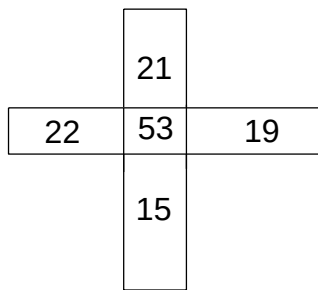
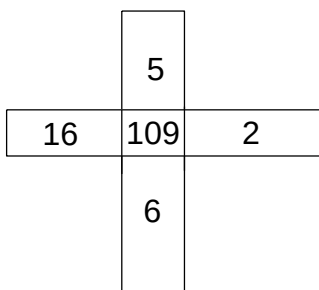
43.



- (A) 2
(C) 4

- (B) 3
(D) 5

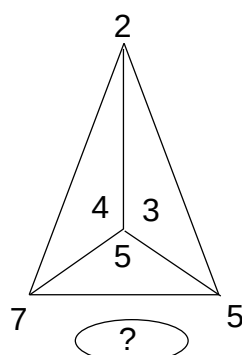
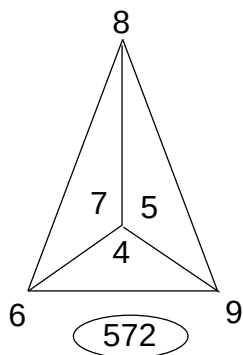
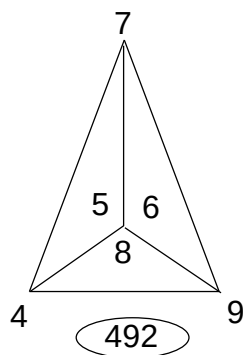
44.



- (A) 25
(C) 7

- (B) 129
(D) 49

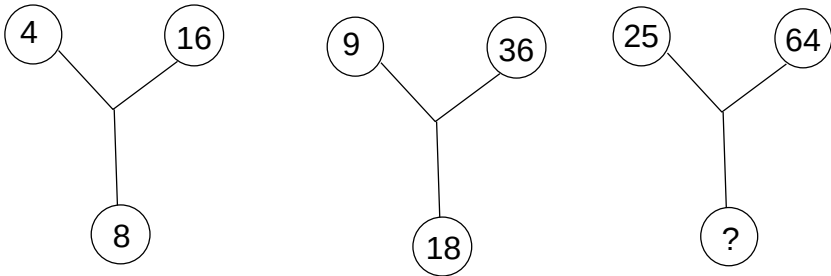
45.



- (A) 115
(C) 135

- (B) 130
(D) 140

46.



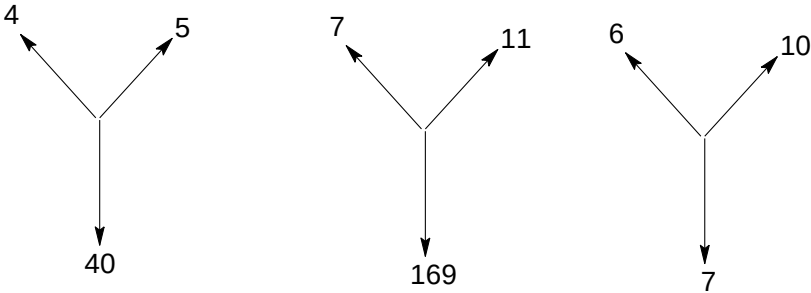
- (A) 30
- (B) 89
- (C) 40
- (D) 39

47.

27	22	?
13	12	26
9	10	20

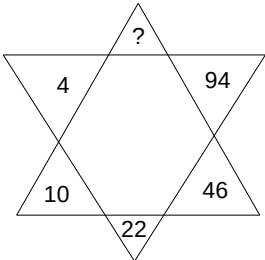
- (A) 52
- (B) 48
- (C) 49
- (D) 50

48.



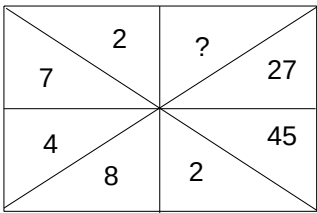
- (A) 60
- (B) 135
- (C) 256
- (D) 16

49.



- (A) 194
- (B) 188
- (C) 190
- (D) 192

50.



- (A) 51
- (B) 48
- (C) 52
- (D) 54

NATIONAL TALENT SEARCH EXAMINATION, 2015-16
(STATE LEVEL)
(FOR STUDENTS STUDYING IN CLASS X)

MENTAL ABILITY TEST (MAT)

Answers key

1.	C	2.	D	3.	A	4.	C
5.	D	6.	B	7.	C	8.	D
9.	D	10.	B	11.	D	12.	B
13.	A	14.	D	15.	B	16.	C
17.	B	18.	A	19.	B	20.	B
21.	D	22.	C	23.	A	24.	C
25.	B	26.	C	27.	A	28.	D
29.	B	30.	D	31.	C	32.	A
33.	A	34.	D	35.	C	36.	A
37.	C	38.	A	39.	D	40.	B
41.	D	42.	C	43.	C	44.	Question not clear
45.	B	46.	C	47.	D	48.	B
49.	C	50.	A				

HINTS & SOLUTIONS

01. $f(a) = 0$
 $f(-a) = -a^2 + a^3 + 2a + a + 4 = 0$
 $a = -\frac{4}{3}$
02. $C_1 + \dots + C_5 = 45$
 $C_1 + \dots + C_5 + M + M + 5 = 140$
 $\Rightarrow M = 45$
03. If $a^2 + b^2 + c^2 = ab + bc + ca$
 $\Rightarrow (a-b)^2 + (b-c)^2 + (c-a)^2 = 0$
 $\Rightarrow a = b = c$
 $\therefore \frac{a+c}{b} = \frac{2b}{b} = 2$
04. Arghya was born in 2002 — A
Grandfather2002 — 2A
 $\Rightarrow (2002 - A) + (2002 - 2A) = 3854$
 $A = 50$
 $\Rightarrow (C) \text{ 51 years in 2003}$
05. $\{12\% \text{ of } x\} \times \{20\% \text{ of } (x+1)\} = 61.2$
 $x(x+1) = 50 \times 51$
or -50×-51
 $\therefore d) \text{ Both } a \& b$
06. $V_C = \frac{1}{3} \pi r^2 L_1$
 $V_H = \frac{2}{3} \pi r^3 = \frac{2}{3} \pi r^2 \times h_2$
 $\Rightarrow \frac{1}{3} \pi r^2 h_1 = \frac{2}{3} \pi r^2 h_2$
 $\frac{h_1}{h_2} = \frac{2}{1}$
07. C

08. $(x - 10\% \text{ of } x) + 10\% \text{ of } (x - 10\% \text{ of } x) = \frac{99x}{100}$

$$\% \text{ Change } = \frac{x - \frac{99x}{100}}{x} \times 100 = 1\%$$

$\therefore$ d) 1% decrease

09. d)

10. b)

$$A = P \left(1 + \frac{r}{n} \right)^{nt} \text{ taking interest is being compounded yearly.}$$

11. $1^2 + 1 = 2$

$$2^2 + 2 = 6$$

$$3^2 + 6 = 15$$

$$4^2 + 15 = 31$$

$$5^2 + 31 = 56 \quad (d)$$

12. $11 \times 2 + 1 = 23$

$$\therefore 99 \times 2 + 4 = 202 \quad (b)$$

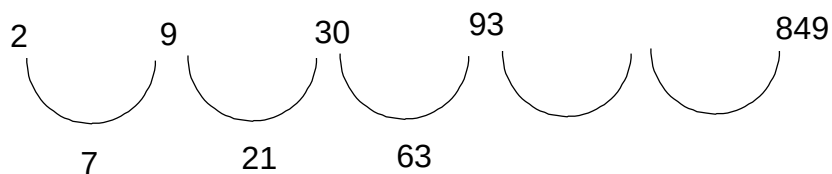
13. (a)

$$\frac{54}{2} = 27$$

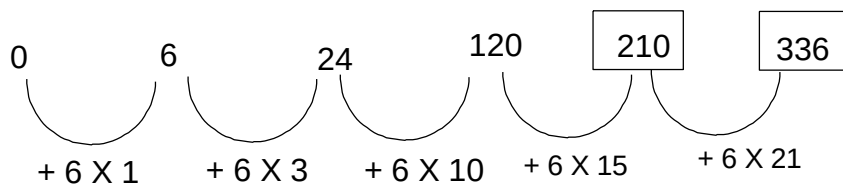
14. (d)

$$11^2 + 1 = 122$$

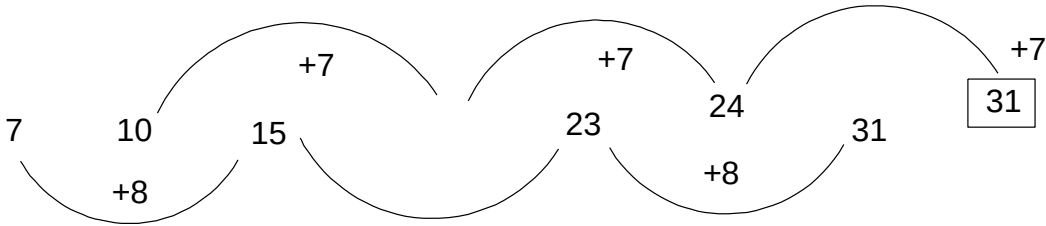
15. (b)



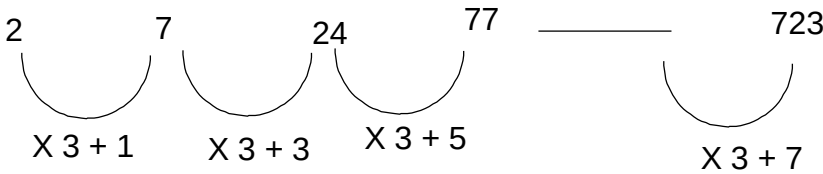
16. (c) 336



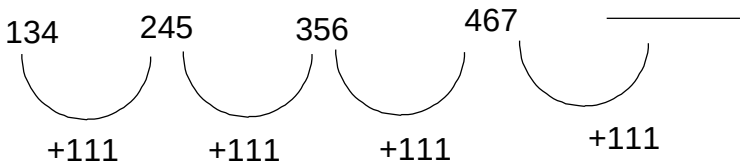
17. (b) 5^3
18. (a) 31



19. (b)



20. (c)



21. D
22. C
23. A
24. C
25. B
26. C
27. A
28. B
29. B
30. D
31. C
32. A
33. A
34. D
35. C
36. A
37. C
38. A
39. D
40. B
41. $\frac{115}{7} = 25$
 $25 + 3 = 28$ (d)
42. C
- $4^3 + 1 = 65$

NTSE_2015-16_P2_MAT

43. $(1+5) \times 4 = 24$

$$(2 + 2) \times 9 = 36$$

$$(? + 4) \times 7 = 56$$

(C) 4

44. Question not clear

45. (B)

$$(4 \times 9 \times 7) + (6 \times 5 \times 8) = 492$$

$$\therefore (2 \times 5 \times 7) + (3 \times 4 \times 5) = 130$$

46. $2^2 4^2 \Rightarrow 2 \times 4 = 8$

$$5^2 \ 8^2 \Rightarrow 5 \times 8 = 40$$

(C)

47. $27 + 22 = 49 + 1 = 50$

(D)

48. $5^2 + 4^2 - 1 = 40$

$$\therefore 10^2 + 6^2 - 1 = 135$$

(B)

49. $2 \times 2 \underbrace{\hspace{1cm}}_3 = 4$

$$2 \times 5 \quad \underbrace{\hspace{1cm}}_6 = 10$$

$$2 \times 11 \begin{matrix} \curvearrowright \\ 12 \end{matrix} = 22$$

$$2 \times 23 = 46$$

$$2 \times 47 \quad \text{)} 48$$

$$2 \times (47 + 48) = 190$$

(C)

50. A