MOMENTUM

IIT (JEE Main & Advanced)

Momentum (A Division of Momentum Education Pvt. Ltd)

DATE : **DURATION: 3 HRS.** **MARKS: 280**

MTSE
(MODEL PAPER)

MTSE
MOMENTUM TALENT SEARCH EXAM

TEST ID-2105

CLASS: 10 (MOVING TO CLASS 11) **TEST NO - 1**

INSTRUCTIONS

A. GENERAL

1. **Please read the Instructions carefully, You are allotted 10 minutes specially for this purpose.**
2. Blank papers, clip boards, log tables, slide rule, calculators, mobiles or any other electronic instrument in any form is **"NOT PERMISSIBLE".**
3. Before starting the paper, fill up the required details in the blank spaces provided in the answersheet.
4. Using a **Blue/ Black Pen,** darken the bubbles on the **OMR sheet**.
5. **DO NOT TAMPER WITH/MUTILATE THE OMR OR THE BOOKLET.**
6. No rough sheets will be provided by the invigilators. All the rough work is to be done in the blank space povided in the question paper.

B. FILLING THE RIGHT PART OF THE OMR

7. Write your name, Bach and the Father's name in the boxes provided on the right part of the OMR. Do not write any of this information anywhere else. Darken the appropriate bubble under each digit of your Student ID Number and Test ID Number.
8. Do not fold or make any stray marks on the Answer Sheet.
9. On completion of the test, the candidate must hand over the Answer Sheet & Test Booklet to the Invigilator on duty in the Room / Hall.
10. Follow instructions by invigilator/Centre Superintendent (If any).
11. **Please fill in all the correct information on back page of this paper.**

C. QUESTION PAPER FORMAT :

This Question Paper consists of 70 objective type questions.

D. MARKING SCHEME :

- 4 Marks will be awarded for each Correct Answer.
- 1 Mark will be deducted for each incorrect Answer.
- 0 Marks will be awarded for unattempted Questions

Name of the Candidate	Candidate ID
I have read all the instructions and shall abide by them ..... Signature of the Candidate	I have verified all the information filled in by the Candidate ..... Signature of the Invigilator

PART I : MATHEMATICS

Question No. 1 to 25 Only one Correct Answer

1. Simplify:

$$\frac{a^2-(b-c)^2}{(a+c)^2-b^2}+\frac{b^2-(a-c)^2}{(a+b)^2-c^2}+\frac{c^2-(a-b)^2}{(b+c)^2-a^2}.$$

(a) 0 (b) 1

(c) $a+b+c$ (d) $\frac{1}{a+b+c}$

2. Simplify: $\frac{x+1}{x-1}+\frac{x-1}{x+1}-\frac{2x^2-2}{x^2+1}$.

(a) $\frac{4x^4+2}{x^4-1}$ (b) $\frac{4x^2}{x^4-1}$

(c) $\frac{8x^2}{x^4-1}$ (d) 1

3. If x^2+x-1 is a factor of $x^4+px^3+qx^2-1$, then the values of p and q can be

(a) 2, 1 (b) 1, −2

(c) −1, −2 (d) −2, −1

4. What should be multiplied to $(2x^2+3x-4)$ to get $4x^4-9x^2+24x-16$?

(a) $2x^2-3x-4$ (b) $2x^2+24x-16$

(c) $2x^2+3x+4$ (d) $2x^2-3x+4$

5. For what value of k do the equations $3(k-1)x+4y=24$ and $15x+20y=8(k+13)$ have infinite solutions?

(a) 1 (b) 4

(c) 3 (d) 2

6. If $173x+197y=149$ and $197x+173y=221$, then find (x, y).

(a) (3, −2) (b) (2, 1)

(c) (1, −2) (d) (2, −1)

7. The semi perimeter of a triangle exceeds each of its side by 5, 3 and 2 respectively. What is the perimeter of the triangle?

(a) 12 (b) 10

(c) 15 (d) 20

8. Find the values of x which satisfy the equation $\sqrt{3x+7}-\sqrt{2x+3}=1$.

(a) 2, −2 (b) 4, 3

(c) 5, −1 (d) 3, −1

Space for rough work

9. Find the nature of the roots of the equation $4x^2 - 2x - 1 = 0$.

(a) Real and equal

(b) Rational and unequal

(c) Irrational and unequal

(d) Imaginary

10. What are the values of x which satisfy the equation, $\sqrt{5x-6} + \frac{1}{\sqrt{5x-6}} = \frac{10}{3}$?

(a) 3 (b) $4, \frac{11}{9}$

(c) $\frac{11}{9}$ (d) $3, \frac{11}{9}$

11. $\frac{\sin^4\theta - \cos^4\theta}{\sin^2\theta - \cos^2\theta} =$

(a) -1 (b) 2

(c) 0 (d) 1

12. $\sin\theta \cos(90° - \theta) + \cos\theta \sin(90° - \theta)$ _____.

(a) -1 (b) 2

(c) 0 (d) 1

13. If $t_n = 6n + 5$, then $t_{n+1} =$

(a) $6n - 1$ (b) $6n + 11$

(c) $6n + 6$ (d) $6n - 5$

14. The value of $\tan 15° \tan 20° \tan 70° \tan 75°$ is

(a) -1 (b) 2

(c) 0 (d) 1

15. If the arithmetic mean of the first n natural numbers is 15, then n is _____.

(a) 15 (b) 30

(c) 14 (d) 29

16. If $\frac{1+\sin\alpha}{1-\sin\alpha} = \frac{m^2}{n^2}$, then $\sin\alpha$ is

(a) $\frac{m^2+n^2}{m^2-n^2}$ (b) $\frac{m^2-n^2}{m^2+n^2}$

(c) $\frac{m^2+n^2}{n^2-m^2}$ (d) $\frac{n^2-m^2}{m^2+n^2}$

17. Find the value of $\sin^2 5° + \sin^2 10° + \sin^2 15° + \cdots + \sin^2 90°$.

(a) 8 (b) 9

(c) $\frac{17}{2}$ (d) $\frac{19}{2}$

Space for rough work

18. From the top of a building, the angles of elevation and depression of top and bottom of a tower are 60° and 30° respectively. If the height of the building is 5 m, then find the height of the tower.

(a) $10\sqrt{3}$ m (b) 15 m

(c) $15\sqrt{3}$ m (d) 20 m

19. If $x^3 - ax^2 + bx - 6$ is exactly divisible by $x^2 - 5x + 6$, then $\frac{a}{b}$ is _____.

(a) $\frac{6}{11}$ (b) $\frac{-6}{11}$

(c) $\frac{1}{3}$ (d) $-\frac{1}{3}$

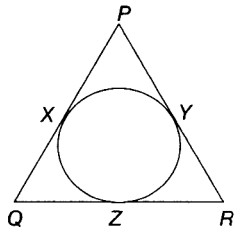
20. The median of the data 5, 6, 7, 8, 9, 10 is _____.

(a) 7 (b) 8

(c) 7.5 (d) 8.5

21. In the following figure X, Y and Z are the points at which the incircle touches the sides of the triangle.

If $PX = 4$ cm, $QZ = 7$cm and $YR = 9$ cm, then the perimeter of triangle PQR is

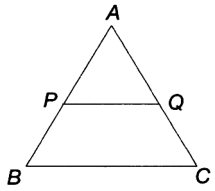


(a) 20 cm (b) 46 cm

(c) 40 cm (d) 80 cm

Space for rough work

22. In the following figure, PQ is parallel to BC and $PQ : BC = 1 : 3$. If the area of the triangle ABC is 144 cm^2, then what is the area of the triangle APQ?



(a) 48 cm^2 (b) 36 cm^2

(c) 16 cm^2 (d) 9 cm^2

23. The area of a sector whose perimeter is four times its radius (r units) is

(a) $\sqrt{r}$ sq. units. (b) r^4 sq. units.

(c) r^2 sq. units. (d) $\frac{r^2}{2}$ sq. units.

24. A roller levelled an area of 165000 m^2 in 125 revolutions, whose length is 28 m. Find the radius of the roller.

(a) 7.5 m (b) 8.5 m

(c) 6.5 m (d) 7 m

25. The value of $\frac{\cos^4 x + \cos^2 x \sin^2 x + \sin^2 x}{\cos^2 x + \sin^2 x \cos^2 x + \sin^4 x}$ is

(a) 2 (b) 1

(c) 3 (d) 0

Space for rough work

Question No. 26 to 55 Only one Correct Answer

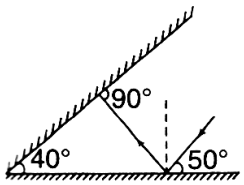
26. The focal length of a plane mirror is
(a) positive (b) negative (c) zero (d) infinity

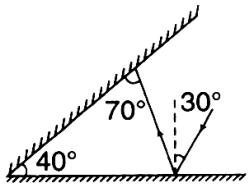
27. The magnification produced by a concave mirror
(a) is always more than one (b) is always less than one
(c) is always equal to one (d) may be less than equal to or greater than one

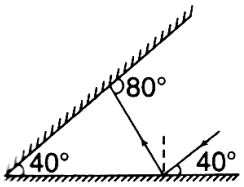
28. An inverted image can be seen in a convex mirror,
(a) under no circumstances
(b) when the object is very far from the mirror
(c) when the object is at a distance equal to the radius of curvature of the mirror
(d) when the distance of the object from the mirror is equal to the focal length ofthe mirror

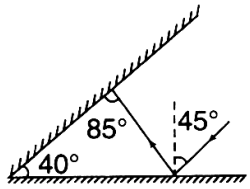
29. The mirror used by dentists to concentrate light on the tooth to be examined is a _____
(a) concave (b) plane or concave (c) convex (d) plane

30 Which of the following correctly depicts reflections in case of plane mirrors inclined at 40^{o} ?

(a) 

(b) 

(c) 

(d) 

Space for rough work

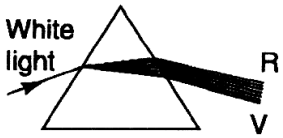
31. A beam of light incident on a plane mirror forms a real image on reflection. The incident beam is
(a) parallel (b) convergent (c) divergent (d) any of the above

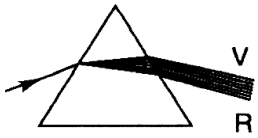
32. The unit of power of a lens is
(a) metre (b) dyne (c) dioptre (d) none of these

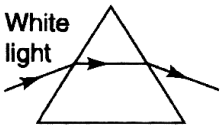
33. The amount of light entering the eye is controlled by the
(a) iris (b) cornea (c) pupil (d) crystalline lens

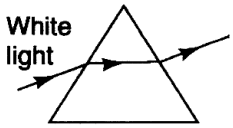
34. When an object is placed between F and 2F in front of a convex lens, the image formed is
(a) real and inverted (b) beyond 2F (c) magnified (d) all the above

35. Which of the following figures correctly represents the passage of white light through a prism ?

(a) 

(b) 

(c) 

(d) 

36. Butanone is a four-carbon compound with the functional group
(a) Caboxylic acid (b) Aldehyde (c) Ketone (d) Alcohol

Space for rough work

37. Benzene with molecular formula, C_6H_6, has
(a) 6 single bonds and 6 double bonds (b) 12 single bonds and 3 double bonds
(c) 18 single bonds only (d) 12 double bonds only

38. The functional group in methanol and methanal respectively are :
(a) – OH, – CHO (b) – CHO, – OH (c) – OH, – COOH (d) – CHO, – COOH

39. Graphite is a soft lubricant extremely difficult to melt. The reason for this anomalous behaviour is that graphite–
(a) has carbon atoms arranged in large plates of rings of strongly bonds carbon atoms with weak interplate bonds
(b) is a non - crystalline substance
(c) is an allotropic form of carbon
(d) has only single bonds between carbon atoms

40. The general formula of alcohol is
(a) $C_nH_{2n+2}OH$ (b) $C_nH_{2n+1}OH$ (c) $C_nH_{2n-1}OH$ (d) $C_nH_{2n+4}OH$

41. The reaction $2C_2H_5OH + 2Na \longrightarrow 2C_2H_5ONa + H_2$ suggests that ethanol is
(a) Acidic in nature (b) Basic in nature (c) Copper nitrate (d) Neutral

42. An example of soap is
(a) CH_3COONa (b) CH_3ONa (c) $C_{17}H_{35}COONa$ (d) $C_{17}H_{35}COOC_2H_5$

43. The major constituent of biogas is
(a) Propane (b) Acetylene (c) Methane (d) Benzene

44. n–butane and isobutane are
(a) Alkenes (b) Alkynes (c) Isomers (d) None of these

45. The major constituent of natural gas is
(a) Butane (b) Methane (c) Propane (d) Ethane

Space for rough work

46. The mode of nutrition found in fungi is
(a) Parasitic nutrition (b) Holozoic nutrition
(c) Autotrophic nutrition (d) Saprotrophic nutrition

47. Roots of the plants absorb water from soil through the process of
(a) Diffusion (b) Osmosis (c) Transpiration (d) none

48. The site of photosynthesis in the cells of a leaf is
(a) Chloroplast (b) Mitochondria (c) Cytoplasm (d) Protoplasm

49. In amoeba food is digested in the
(a) Food Vacuole (b) Mitochondria (c) Pseudopodia (d) Chloroplast

50. The breakdown of pyruvate to give carbon-dioxide, water and energy take place in
(a) Cytoplasm (b) Mitochondria (c) Chloroplast (d) Nucleus

51. Digestion of proteins, fats and carbohydrates is completed in
(a) Stomach (b) Small intestine (c) Large intestine (d) Buccal cavity

52. The enzymes pepsin and trypsin are secreted respectively by
(a) Stomach and pancreas (b) Salivary gland and stomach
(c) Liver and Pancreas (d) Liver and stomach

53. Which among the following procedures is used for cleaning the blood of a person by separating the waste substance from it ?
(a) Kidney transplant (b) Blood transfusion
(c) Dialysis (d) Hydrolysis

54. The excretory unit of human excretory system is known as
(a) Nephridia (b) Neuron (c) Nephron (d) Myofibril

55. Longest part of alimentary canal is
(a) Stomach (b) Small intestine (c) Large intestine (d) Buccal cavity

Space for rough work

PART III : REASONING

Question No. 56 to 70 Only one Correct Answer

56. Mirror is related to Reflexion in the same way as Water is related to .....?

(a) Conduction (b) Dispersion (c) Immersion (d) Refraction

57. In a certain code SIKKIM is written as THLJJL. How is TRAINING written in that code?

(a) SQBHOHOH (b) UQBHOHOF (c) UQBJOHHO (d) UQBJOHOH

58. Suresh walks 20 metres North. Then he turns right and walks 30 m. Then he turns right and walks 35 m. Then he turns left and walks 15 m. Then he gains turns left and walks 15 m. In which directions and how many metres awayis he from his original position?

(a) 15 m; West (b) 30 m; East (c) 30 m; West (d) 45 m; East

59. North. Then he turned West and covered 10 kms. Then, he turned South and covered 5 kms. Finally turning to East, he covered 10 kms. In which direction is he from his house?

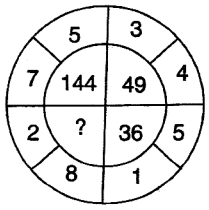
(a) East (b) West (c) North (d) South

60. 9, 19, 37, 75, 149, 299, ...

(a) 598 (b) 597 (c) 599 (d) 697

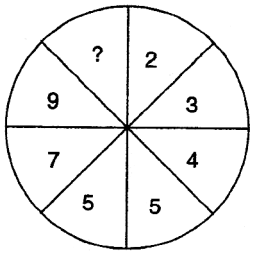
61. ba – cb – b – bab –

(a) acbb (b) bacc (c) bcaa (d) cabb

62. 

(a) 82 (b) 124 (c) 68 (d) 100

Space for rough work

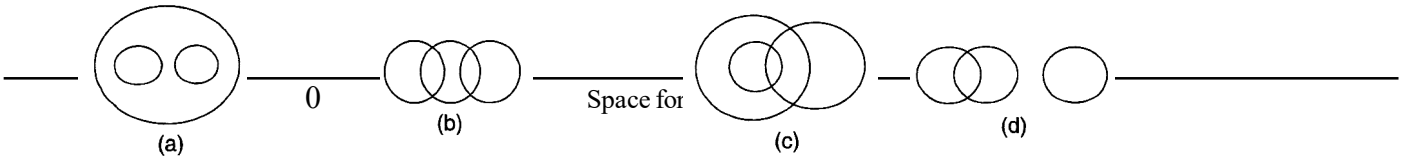
63. 

(a) 10 (b) 11 (c) 12 (d) 13

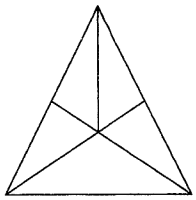
64. In the following series of numbers, find out how many times 1, 3 and 7 have appeared together, 7 being in the middle and 1 and 3 on either side of 7. 2 9 7 3 1 7 3 7 7 1 3 3 1 7 3 8 5 7 1 3 7 7 1 7 3 9 0 6

(a) 3 (b) 4 (c) 5 (d) More than 5

65. Which of the following diagrams correctly represents *Elephants, Wolves, Animals*?



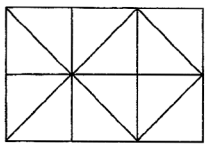
66. Find the number of triangles in the following figure.



(a) 9 (b) 10 (c) 11 (d) 12

Space for rough work

67. How many squares are contained in the following figure?



(a) 6 (b) 7 (c) 8 (d) 9

68. Sohan introduces Mohan as the son of the only brother of his father's wife. How is Mohan related to Sohan?
(a) Cousin (b) Son (c) Uncle (d) Son-in-law

69 Pointing to a man, a woman said: "His mother is the only daughter of my mother." How is the woman related to the man?
(a) Mother (b) Daughter (c) Sister (d) Grand mother

70. If $\times$ means $-$, $+$ means $\div$, $-$ means $\times$ and $\div$ means $+$, then $15 - 2 \div 900 + 90 \times 100 = ?$
(a) 190 (b) 180 (c) 90 (d) –60

Space for rough work

C. QUESTION PAPER FORMAT

The question paper consists of 3 parts I, II & III Mathematics , Science & Reasoning respectively.

D. MARKING SCHEME

There are three parts in the question paper. The distribution of marks subjectwise in each part is as under for each correct response :

PART	SUBJECT	QUESTION NO.	MARKS
Part - I	**MATHEMATICS**	01 to 25	**4**
Part - II	**SCIENCE**	26 to 55	**4**
Part - III	**REASONING**	56 to 70	**4**

You must fill the bubble in OMR in following manner. For example if only 'b' choice is correct then

A ○ B ● C ○ D ○

If you fill the bubble for any option other than the correct option then, your response will be considered *incorrect. 1/4 (one Four) of allotted marks i.e. 1 mark* if a question carries 4 marks will be deducted for indicating incorrect response of each question. No. deduction from the total score will be made if no response is indicated for a question in the answer sheet.

GENERAL INFORMATION

Fill by the candidate :- Candidate ID : _____

1. Candidate Name : _____
2. Father's Name : _____
3. Mother's Name : _____
4. Category : ☐ GEN ☐ OBC ☐ SC ☐ ST
5. Mobile No. 1.(G) _____ 2. (P) _____
6. NTSE Qualified [Y] [N] 7. KVPY [Y] [N] 8. OLYMPIAD [Y] [N]
9. Board ☐ CBSE ☐ ICSE / ISC ☐ U.P. Others : _____
10. Last Class : _____%_____10th %_____12th %_____
11. Last School Name : _____City_____
12. Any other achievement : _____
13. Have you attempted any admission test before : [Y] [N] _____
14. Old student of Momentum or admitted : [Y] [N] If yes,St.Id_____/Batch_____

Disclamer :

I hereby solemnly and sincerely affirm that all the particulars stated by me in this form are true and correct. However, if any information furnished herein is found false, wrong, incorrect or inaccumate, I understand that my candidate for Admission Test-2021 will be cancelled and lead to cancellation of the test result.

Candidate Signature _____ Invigilator Signature_____

MOMENTUM

ABOVE AXIS BANK, BETIAHATA CHOWK, GORAKHPUR

PHONES : 6389138701, 02