



MATHEMATICS TALENT HUNT 2025

Organized by : The Pi Group of Mathematics (TPGM), Cooch Behar

Registration No. – S0031696 of 2022-23

Class – X

Full Mark : 100

Time : 1 Hr 30 mins.

Instructions to the Candidates

1. Candidates must write their Name, Class, Roll No. allotted for the exam and Name of their School correctly in the specific places of the answer sheet.
2. There are 50 questions of 2 marks each. Four possible options of answer are given for each question.
3. Candidates should choose the correct option and completely darken the circle with that option written in it in the answer sheet (OMR). For example, say the correct option for Question Number 10 is (c), then the candidate should darken the circle completely with 'c' written in it against the number 10 of the answer sheet. Use black ball pen or pencil for darkening.
4. There is no negative marking.

1. The equation $x^2(a^2 + b^2) + 2x(ac + bd) + (c^2 + d^2) = 0$ has no real roots if
(a) $ad \neq bc$ (b) $ac \neq 2bd$ (c) $2ac \neq bd$ (d) $ac \neq bd$
2. Determine the value of k in the equation $(k-3)x^2 + x - 6 = 0$ so that it will have real and equal roots.
(a) $\frac{24}{71}$ (b) $\frac{71}{24}$ (c) 0 (d) $-\frac{71}{24}$
3. Solve the following equation : $\sqrt{x-3} + \sqrt{2x-2} = 2$
(a) $x = 19, 3$ (b) $x = 19$ (c) $x = 3$ (d) $x = -9, -3$
4. If a, b and c are respectively the p-th, q-th and r-th terms of a GP then, the value of $(q-r)\log a + (r-p)\log b + (p-q)\log c$ is
(a) $\log abc$ (b) $\log bc$ (c) $\log ab$ (d) 0
5. An AP starts with a positive fraction and every alternative term is an integer. If the sum of the first 11 term is 33 then, the 4th term is
(a) 3 (b) 6 (c) 5 (d) 2
6. Determine k so that $k^2 + 4k + 8$, $2k^2 + 3k + 6$ and $3k^2 + 4k + 4$ are three consecutive terms of an AP.
(a) 1 (b) 0 (c) 2 (d) 3
7. Find the sum: $\frac{1}{2} + \frac{1}{6} + \frac{1}{12} + \frac{1}{20} + \frac{1}{30} + \frac{1}{42} + \frac{1}{56} + \frac{1}{72} + \frac{1}{90} + \frac{1}{110} + \frac{1}{132}$
(a) $\frac{7}{8}$ (b) $\frac{11}{12}$ (c) $\frac{15}{16}$ (d) $\frac{17}{18}$
8. On simplification of the following, the result will be - $\left(1 - \frac{1}{2}\right)\left(1 - \frac{1}{3}\right)\left(1 - \frac{1}{4}\right) \dots \left(1 - \frac{1}{100}\right)$
(a) 0.01 (b) 0.001 (c) 1 (d) 0.1
9. The value of the expression $\cot 18^\circ \left(\cot 72^\circ \cos^2 22^\circ + \frac{1}{\tan 72^\circ \sec^2 68^\circ} \right)$
(a) 0 (b) 1 (c) 2 (d) 3

10. If $\cos \theta + \sec \theta = 2$ then, then the value of $\cos^{2025} \theta + \sec^{2025} \theta$ is
 (a) 0 (b) 1 (c) 2 (d) 3
11. If $\tan \theta \cdot \tan \varphi = 1$ then, $\tan \frac{\theta + \varphi}{2} = ?$
 (a) 0 (b) 1
 (c) $\sqrt{3}$ (d) $\frac{1}{\sqrt{3}}$
12. If $\frac{\cos \theta - \sin \theta}{\cos \theta + \sin \theta} = \frac{1 - \sqrt{3}}{1 + \sqrt{3}}$ and $0^\circ < \theta < 90^\circ$ then the value of θ is
 (a) 60° (b) 30° (c) 0° (d) 45°
13. If $\tan^4 \theta + \tan^2 \theta = 1$ then, $\cos^4 \theta + \cos^2 \theta = ?$
 (a) 0 (b) -1 (c) 2 (d) 1
14. The pair of equations $4x + 3y = 7$ and $7x - 3y = 4$ have
 (a) unique solutions (b) exactly two solutions
 (c) infinitely many solutions (d) no solutions
15. Graphically the pair of equations $4x + 4y = 20$, $5x + 5y = 30$ represents two line which are
 (a) intersecting at exactly one point (b) intersecting at exactly two points
 (c) coincides (d) parallel
16. The volumes of two sphere are in the ratio $27 : 8$ the ratio of their surface area is
 (a) $4 : 9$ (b) $9 : 4$ (c) $2 : 3$ (d) $1 : 2$
17. The volume of the greatest sphere that can be cut off from a cylindrical log of wood of base radius 1 cm and height 5 cm is
 (a) $\frac{4}{3} \pi \text{ cm}^3$ (b) $\frac{10}{3} \pi \text{ cm}^3$ (c) $5 \pi \text{ cm}^3$ (d) $\frac{20}{3} \pi \text{ cm}^3$
18. In what ratio are the volumes of a cylinder, a cone and a sphere, if each has the same diameter and the same height?
 (a) $1 : 3 : 2$ (b) $2 : 3 : 1$ (c) $3 : 1 : 2$ (d) $3 : 2 : 1$
19. If the height of a right circular cone is increased by 200% and the radius of the base is reduced by 50% then, the volume of the cone
 (a) remained unaltered (b) decreased by 25%
 (c) increased by 25% (d) increased by 50%
20. The sides of a triangle are 6 cm, 11 cm and 15 cm. The radius of its incircle is
 (a) $3\sqrt{2}$ cm (b) $\frac{4\sqrt{2}}{5}$ cm
 (c) $\frac{5\sqrt{2}}{4}$ cm (d) $6\sqrt{2}$ cm
21. A sphere of radius 'a' unit is immersed completely in water contained in a right circular cone of semi-vertical angle 30° and water is drained off from the cone till its surface touches the sphere. The volume of water remains in the cone is
 (a) $\frac{5}{3} \pi a^2$ (b) $\frac{5}{3} \pi a^3$ (c) $\frac{\pi}{3} a^3$ (d) $5 \pi a^3$

22. The co-ordinates of the vertices of ΔABC are respectively $(-4, -2)$, $(6, 2)$ and $(4, 6)$. The centroid G of ΔABC is

- (a) $(2, 3)$ (b) $(0, 1)$ (c) $(2, 2)$ (d) $(3, 3)$

23. If $x < y < 2x$ then, the median and mean of x , y and $2x$ are 27 and 33 respectively. The mean of x and y is

- (a) 25.2 (b) 25.5 (c) 25 (d) 25.1

24. Find the value of $\sum_{i=1}^{10} (x_i - \bar{x})$

- (a) 0 (b) $\bar{x}$ (c) $10\bar{x}$ (d) -1

25. If the ratio of mode and median of a certain data is 6 : 5 then, the ratio of its mean and median is

- (a) 10 : 9 (b) 9 : 10 (c) 10 : 8 (d) 8 : 10

26. If $u_i = \frac{x_i - 25}{10}$, $\sum f_i u_i = 20$, $\sum f_i = 100$ then $\bar{x} = ?$

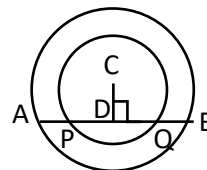
- (a) 23 (b) 24 (c) 27 (d) 25

27. In ΔABC , $AB = 6\sqrt{3}$ cm, $AC = 12$ cm and $BC = 6$ cm. The angle $\angle B$ is

- (a) 120° (b) 60° (c) 90° (d) 45°

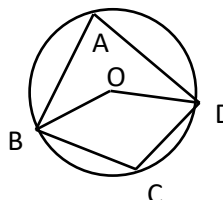
28. Two concentric circles have radii 10 cm and 17 cm respectively in the given figure. Find the length AP if the length of the perpendicular from the centre to PQ is 8 cm.

- (a) 8 cm (b) 10 cm
(c) 17 cm (d) 9 cm



29. In the given figure, O is the centre of the circle, $\angle BAD = 75^\circ$ and chord $BC =$ Chord CD . Find $\angle OBD$.

- (a) 15°
(b) 30°
(c) 45°
(d) 75°



30. If triangle PQR , $PQ = 24$ cm, $QR = 7$ cm and $\angle PQR = 90^\circ$. Find the radius of the inscribed circle.

- (a) 8 cm (b) 5 cm (c) 4 cm (d) 3 cm

31. Find the point of intersection of the two straight lines given by the equations $2x + y - 6 = 0$ and $x - 2y + 2 = 0$

- (a) $(3, 2)$ (b) $(2, 2)$ (c) $(-2, -2)$ (d) $(2, 3)$

32. A line AB meets x -axis at A and y -axis at B . $P(4, -1)$ divides AB in the ratio 1 : 2. Find the co-ordinate of B .

- (a) $(6, 0)$ (b) $(3, 0)$ (c) $(0, -3)$ (d) $(0, 0)$

33. Three unbiased coin are tossed. What is the probability of getting at least 2 heads?

- (a) $\frac{1}{4}$ (b) $\frac{1}{2}$ (c) $\frac{1}{3}$ (d) $\frac{1}{8}$

34. What is the probability of getting a sum 9 from two throws of dice?

- (a) $\frac{1}{6}$ (b) $\frac{1}{8}$ (c) $\frac{1}{9}$ (d) $\frac{1}{12}$

35. The probability that a card drawn from a pack of 52 cards will be a diamond or a king is

- (a) $\frac{2}{13}$ (b) $\frac{4}{13}$ (c) $\frac{1}{13}$ (d) $\frac{1}{52}$

36. A bag contains 6 black and 8 white balls. One ball is drawn at random. What is the probability that the ball drawn is white?

- (a) $\frac{3}{4}$ (b) $\frac{4}{7}$ (c) $\frac{1}{8}$ (d) $\frac{3}{7}$

37. If $x * y = x + y + \sqrt{xy}$, the value of $6 * 24$ is

- (a) 41 (b) 42 (c) 43 (d) 44

38. A number consists of 3 digits whose sum is 10. The middle digit is equal to the sum of the other two and the number will be increased by 99 if its digits are reversed. The number is

- (a) 145 (b) 253 (c) 370 (d) 352

39. Average of ten positive numbers is $\bar{x}$. If each number is increased by 10% then, $\bar{x}$

- (a) remains unchanged (b) may decrease
(c) may increase (d) is increased by 10%

40. What is the unit digit in $(7^{95} - 3^{58})$?

- (a) 0 (b) 4 (c) 6 (d) 7

41. Which one of the following will completely divide $(3^{25} + 3^{26} + 3^{27} + 3^{28})$?

- (a) 11 (b) 16 (c) 25 (d) 30

42. If $(a + b) : (b + c) : (c + a) = 6 : 7 : 8$ and $(a + b + c) = 14$ then, the value of 'c' is

- (a) 6 (b) 7 (c) 8 (d) 14

43. Find the next term in the series : BMO , EOQ , HQS , ?

- (a) KSU (b) LMN (c) SOV (d) SOW

44. Find out the wrong term in the given series : 3, 2, 8, 9, 13, 22, 18, 32, 23, 42

- (a) 8 (b) 9 (c) 13 (d) 22

45. Find the missing number in the given table.

- (a) 10C
(b) 12C
(c) 13C
(d) 10B

4C	2B	3A
28A	?	45B
7C	5A	15B

46. In a right angled triangle PQR , PR is the hypotenuse of length 10 cm, $\angle PRQ = 30^\circ$, find the area of the triangle.

- (a) $\frac{25\sqrt{2}}{2} \text{ cm}^2$ (b) $\frac{25\sqrt{3}}{\sqrt{2}} \text{ cm}^2$ (c) $\frac{25\sqrt{3}}{2} \text{ cm}^2$ (d) 25 cm^2

47. If $29x + 37y = 103$ and $37x + 29y = 95$ then

- (a) $x = 1, y = 2$ (b) $x = 2, y = 1$ (c) $x = 3, y = 2$ (d) $x = 2, y = 3$

48. Consider the following frequency distribution and find the upper limit of the median class.

Class	11 – 15	16 – 20	21 – 25	26 – 30	31 – 35
Frequency	6	7	5	4	3

- (a) 15 (b) 15.5 (c) 20 (d) 20.5

49. If m -th term of an AP is $\frac{1}{n}$ and n -th term is $\frac{1}{m}$ then, its mn -th term is

- (a) $\frac{1}{mn}$ (b) $\frac{1}{m}$ (c) $\frac{1}{n}$ (d) 1

50. The perimeter of a triangle with vertices $(0, 4)$, $(0, 0)$ and $(3, 0)$ is -

- (a) $7+\sqrt{5}$ unit (b) 5 unit (c) 10 unit (d) 12 unit
