Duration : 60 min. **Maximum Marks : 180**
Class : 10th **Subject : MATHEMATICS**

International Talent Search Examination - 2023-24

अंतर्राष्ट्रीय प्रतिभा खोज परीक्षा - २०२३-२४

Organized by

Savitri Skill Development Institute, Training Partner with
Ministry of Micro Small & Medium Enterprises (MSME), Govt. of India.

TEST BOOKLET

Name : .....

Class : ..... School: .....

Father's Name : ..... Father's Occupation : .....

Mother's Name : ..... Mother's Occupation : .....

Categories : Gen ☐ OBC ☐ SC ☐ ST ☐

Correspondence Address :.....

Date of Birth : ☐☐ ☐☐ ☐☐☐☐

Father's Contact No : ☐☐☐☐☐☐☐☐☐☐

Home/Mother's Contact No. : ☐☐☐☐☐☐☐☐☐☐

WhatsApp No. : ☐☐☐☐☐☐☐☐☐☐

Basic Instructions:

i. Ensure that your personal data has been entered correctly.
ii. Immediately after opening the test booklet verify that all the pages are printed properly and are in order. If there is a problem with your test booklet, immediately inform the invigilator. You will provided with the replacement.
iii. All questions in are compulsory.
iv. For every correct answer you will be awarded with 4 marks and for all incorrect answer 1 mark will be deducted.
v. Directions for answering the questions are given. Read those directions carefully and answer the question by circling the bubble in the OMR Sheet Provided to you. Test booklet/OMR Sheet will be submitted at the end of the examination.
vi. Follow the instructions given by the invigilator. Students found violating the instructions will be disqualified.
vii. Rough work can be done separately or on the Question paper.
viii. Please fill the bubbles in OMR sheet with Blue or Black pen only.
ix. Do not tear the question paper or OMR sheet else you will be disqualified in the examination.

CLASS-10 MATHEMATICS

1. P, Q and R are three natural numbers such that P and Q are primes and Q divides PR. Then out of the following the correct statement is
   (A) Q divides R (B) P divides R (C) P divides QR (D) R divides PQ

2. If $D = a^2 + b^2 + c^2$ where a and b are consecutive integers and c = ab, then $\sqrt{D}$ is
   (A) always an even integer (B) always an odd integer
   (C) an integer, odd or even (D) sometimes an irrational number

3. In the family decimal number system the base is 10. In another number system using base 4, the counting proceeds as 1, 2, 3, 10, 11, 12, 13, 20, 21,….. The twentieth number in this system will be
   (A) 40 (B) 320 (C) 210 (D) 110

4. If the eight digit number 2575d568 is divisible by 54 and 87, the value of the digit 'd' is
   (A) 4 (B) 7 (C) 0 (D) 8

5. If a, b, c are positive, $\frac{a+c}{b+c}$ is
   (A) always smaller than $\frac{a}{b}$ (B) always greater than $\frac{a}{b}$
   (C) greater than $\frac{a}{b}$ only if a > b (D) greater than $\frac{a}{b}$ only if a < b

6. What will be the remainder if the number 7^{2012} is divided by 25?
   (A) 24 (B) 18 (C) 7 (D) 1

7. If a + b + c = 0, then roots of the equation $3ax^2 + 4bx + 5c = 0$ are:
   (A) Positive (B) Negative (C) Real and distinct (D) imaginary

8. If $P(x) = x^3 - 3x^2 + 2x + 5$ and P(a) = P(b) = P(c) = 0 then the value of (2 - a) (2 - b) (2 - c) is:
   (A) 3 (B) 5 (C) 7 (D) 9

9. If every pair from among the equations $x^2 + px + qr = 0$, $x^2 + qx + rp = 0$ and $x^2 + rx + pq = 0$ has a common root then the product of three common root is
   (A) pqr (B) 2pqr (C) $p^2q^2r^2$ (D) none of these

10. $\frac{(a-b)^3 - (a+b)^3}{2} + a\left(a^2 + 3b^2\right) = ?$
    (A) $a^3 - b^3$ (B) $(a+b)^3$ (C) $a^3 + b^3$ (D) $(a-b)^3$

11. Find the square root of $(4a + 5b + 5c)^2 - (5a + 4b + 4c)^2 + 9a^2$.
    (A) $\sqrt{3}(b + c)$ (B) $3(b + c - a)$ (C) $3(b + c)$ (D) $2(b + c - a)$

12. The locus of a point equidistant from (a + b, b – a) and (a – b, a + b) is
    (A) ax + by = 0 (B) bx – ay = 0 (C) bx + ay = 0 (D) (a + b)x + (a – b)y = 0

13. If the points (0, 0), and lie on a straight line then t1t2 is equal to
    (A) 1 (B) 2 (C) 0 (D) –2

14. The value of P for which, three lines 7x – 11y + 3 = 0, 4x + 3y – 9 = 0 and 13x + py – 48 = 0 pass through same point is
    (A) 12 (B) 10 (C) 24 (D) 26

15. The area of the quadrilateral with vertices (3, 3), (1, 4), (– 2, 1) and (2, – 3) is
    (A) $\frac{35}{2}$ (B) $\frac{37}{2}$ (C) 18.5 (D) 47.5

16. If the centroid of the triangle formed by (7, x), (y, – 6) and (a, 10) is at (6, 3), then
    (A) x = 2 (B) y = 2 (C) y = 6 (D) x = 5

17. The value of k for which the system of equations 3x + 5y = 0 and kx + 10y = 0 has infinite solutions, is
    (A) 0 (B) 2 (C) 6 (D) 8

18. If the system of equations 2x + 3y = 7, 2ax + (a + b)y = 28 has infinitely many solutions, then
    (A) a = 2b (B) b = 2a (C) a + 2b = 0 (D) 2a + b = 0

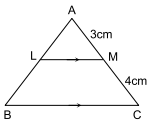
19. If 2x - 3y = 7 and (a + b)x - (a + b - 3) y = 4a + b represent coincident lines, then a and b satisfy the equation
    (A) a + 5b = 0 (B) 5a + b = 0 (C) a - 5b = 0 (D) 5a - b = 0

20. If the system of equation $2x + 3y = 7$, $(a + b)x + (2a - b)y = 21$ has infinitely many solutions, then
(A) $a = 1, b = 5$ (B) $a = 5, b = 1$ (C) $a = -1, b = 5$ (D) $a = 5, b = -1$

21. 37 pens and 53 pencils together cost Rs 320, while 53 pens and 37 pencils together cost Rs 400, then the cost of a pen is
(A) Rs 6.50 (B) Rs 1.50 (C) Rs 5.00 (D) Rs 5.50

22. A triangle has side 2, 3, 4. A tangent is drawn to the incircle parallel to side 2 cutting other two sides at X and Y. Then the length of 8XY =
(A) $\frac{5}{3}$ (B) $\frac{10}{9}$ (C) $\frac{7}{3}$ (D) $\frac{6}{9}$

23. In the given figure, LM || BC. AM = 3cm, MC = 4cm. If ar(ΔALM) = 27cm^2, then area of ΔABC is



(A) 36 cm^2 (B) 144 cm^2 (C) 64 cm^2 (D) 147 cm^2

24. Area of the equilateral triangle described on the side of a square is …… the area of the equilateral triangle described on its diagonal.
(A) half (B) one-fourth (C) double (D) four times

25. If S is a point on the side PQ of a ΔPQR such that PS = QS = RS, then
(A) PR x QR = RS^2 (B) QS^2 x RS^2 = QR^2 (C) PR^2 + QR^2 = PQ^2 (D) PS^2 x RS^2 = PR^2

26. In an equilateral triangle ABC, AD $\perp$ BC and $\frac{AD^2}{BC^2}$ =x, then x is equal to
(A) 3 (B) $\frac{3}{2}$ (C) $\frac{3}{4}$ (D) $\frac{\sqrt{3}}{2}$

27. The value of $\cos 1^0 \cos 2^0 \cos 3^0$ …… $\cos 98^0 \cos 99^0 \cos 100^0$ is
(A) 2/3 (B) 1/3 (C) –1/3 (D) 0

28. The value of sin10° + sin20° + sin30° + … + sin360° is:
(A) 1 (B) 0 (C) – 1 (D) none of these

29. The value of $\cos 15^0$ is
(A) $\frac{\sqrt{3}+1}{2\sqrt{2}}$ (B) $\frac{\sqrt{3}-1}{2\sqrt{2}}$ (C) $\frac{\sqrt{3}}{2\sqrt{2}}$ (D) none of these

30. If $\cos(\theta - \alpha) = \frac{3}{5}$ and $\sin(\theta + \alpha) = \frac{12}{13}$ then the value of $\cos 2\alpha$ may be
(A) $\frac{32}{65}$ (B) $\frac{63}{65}$ (C) $\frac{48}{65}$ (D) $\frac{34}{65}$

31. Which of the following is true if $\pi < \theta < \frac{3\pi}{2}$
(A) $\sin\theta > 0$ (B) $\cos\theta < 0$ and $\sec\theta > 0$ (C) $\cos\theta > 0$ and $\sin\theta < 0$ (D) $\cot\theta > 0$ and $\cos\theta < 0$

32. If three distinct numbers are chosen randomly from the first 100 natural numbers, then the probability that all three of them are divisible by 2 and 3 is
(A) $\frac{4}{25}$ (B) $\frac{4}{35}$ (C) $\frac{4}{33}$ (D) $\frac{4}{1155}$

33. Three houses are available in a locality. Three persons apply for the houses. Each applies for one house without consulting others. The probability that all three apply for the same house is
(A) $\frac{1}{9}$ (B) $\frac{2}{9}$ (C) $\frac{7}{9}$ (D) $\frac{8}{9}$

34. Two aeroplanes I and II bomb a target in succession. The probability of I and II scoring a hit correctly are 0.3 and 0.2 respectively. The second plane will bomb only if the first misses the target. The probability that the target is hit by the second plane is
(A) 0.14 (B) 0.2 (C) 0.7 (D) 0.06

35. The probability that the events A and B occur are 0.2 and 0.5 respectively. The probability that both A and B occur simultaneously is 0.15. The probability that neither A nor B occurs is
(A) 0.55 (B) 0.5 (C) 0.45 (D) 0.35

36. If X and Y are two independent events, then P(X and Y) is equal to
(A) P(X) + P(Y) (B) P(X) + P(Y) – P(X and Y) (C) P(X) . P(Y) (D) none of these

37. The quadratic equation whose roots are the squares of those of the equation $x^2 + ax + b = 0$ is
(A) $x^2 + (2b - a^2)x + b^2 = 0$ (B) $x^2 + (a^2 - 2b)x - b^2 = 0$ (C) $x^2 + (a^2 - b)x + b = 0$ (D) can't say

38. The value(s) of a for which one of the roots of $x^2 + (2a + 1)x + (a^2 + 2) = 0$ is twice the other root is
(A) 4 (B) –4 (C) 0 (D) –2

39. If α and β are the roots of quadratic equation $(x - 2)(x - 3) + (x - 3)(x + 1) + (x + 1)(x - 2) = 0$, then the value of $\frac{1}{(\alpha+1)(\beta+1)} + \frac{1}{(\alpha-2)(\beta-2)} + \frac{1}{(\alpha-3)(\beta-3)}$ is

(A) 1 (B) –1 (C) 0 (D) 2

40. If $\sin\alpha$ and $\cos\alpha$ are roots of the equation $px^2 + qx + r = 0$, then
(A) $(p + q)^2 = 2r$ (B) $p^2 - q^2 + 2pr = 0$ (C) $p + q + r = 0$ (D) $p - q - r = 0$

41. The number of real roots of equation $x(x + 2)(x^2 - 1) - 1 = 0$ are
(A) 0 (B) 4 (C) 3 (D) 2

42. The average score of boys in the examination of a school is 71 and that of the girls is 73. the average score of the school in the examination is 71.8. Find the ratio of the numbers of boys to the numbers of girls who appeared in the examination.

(A) $\frac{3}{2}$ (B) $\frac{2}{3}$ (C) $\frac{4}{2}$ (D) $\frac{5}{2}$

43. 20 years ago, when my parents got married their average age was 23 years. Now the average age of my family consisting of myself and my parents is 34 years. Then my present age is
(A) 10 years (B) 20 years (C) 16 years (D) 30 years

44. Average of first 5 prime natural numbers is
(A) 5.2 (B) 5.4 (C) 5.6 (D) 5.8

45. The mean weight of 150 students in a class is 60 kg. The mean weight of boys is 70 kg, while that of girls is 55 kg, then the number of boys and girls in the school is given by
(A) B = 50, g = 150 (B) B = 100, g = 300 (C) B = 50, G = 100 (D) B = 60, G = 100