INTSO EDUCATION

MATHEMATICS TALENT SEARCH OLYMPIAD(MTSO) 2015 - 2016

	STAGE - 1	**TIME** : 60 min.
CLASS : X		**Max. Marks** : 50

Instructions:

⇨ *Fill the OMR sheet completely and carefully.*

⇨ *Each question carries one mark and has only one correct answer. No negative marks*

⇨ *The question paper contains 50 questions to be answered in 60 minutes.*

1. On a number line $(-2+\sqrt{5})$ lies [   ]
   1) between 0 and –1   2) between 1 and 2   3) between 0 and 1   4) between 2 and 3

2. The another name for irrational numbers π and e are called [   ]
   1) transcendental numbers   2) Euler's numbers
   3) GAUSS numbers   4) Euclid numbers

3. How many solutions are there for (a,b) if 7ab73 is a 5-digit number divisible by 99 [   ]
   1) 1   2) 0   3) 2   4) 4

4. $\dfrac{p}{q}$ form of $23.3\overline{4}$ [   ]

   1) $\dfrac{2334}{100}$ 2) $\dfrac{2101}{90}$ 3) $\dfrac{2334}{90}$ 4) $\dfrac{2331}{9}$

5. If $x \geq 0$ then $\sqrt{x\sqrt{x\sqrt{x\sqrt{x\sqrt{x}}}}}$ [   ]

   1) $\sqrt[5]{x^{31}}$ 2) $5\sqrt{x}$ 3) $\sqrt[32]{x^{31}}$ 4) $\sqrt[32]{x}$

6. If n be any positive Integer then $\left[\dfrac{n+1}{2}\right]+\left[\dfrac{n+2}{4}\right]+\left[\dfrac{n+4}{8}\right]+\left[\dfrac{n+8}{16}\right]+---- =$ [   ]

   1) 2n   2) ∞ 3) n^2 4) n

7. The number of positive Integers ≤ 3600 and coprime to 3600. [   ]
   1) 960   2) 850   3) 3500   4) 3000

8. $\log_{(-25)}(-25) =$ [   ]
   1) 1   2) –1   3) 0   4) does not exist

9. If the H.C.F of 525 and 231 is in the form 525 M + 231n, then M + n = [   ]
   1) 4   2) –9   3) 5   4) –5

10. Identify the nonterminating decimal [   ]

    1) $\sqrt{5}$ 2) $\sqrt{9}$ 3) $\dfrac{5}{3}$ 4) $\sqrt[3]{216}$

11. If 'o' is a point lies inside the $\triangle ABC$ then [ ]

1) $OA + OB + OC > \dfrac{1}{2}(AB + BC + CA)$ 2) $OA + OB + OC < \dfrac{1}{2}(AB + BC + CA)$

3) $OA + OB + OC > \dfrac{1}{3}(AB + BC + CA)$ 4) $OA + OB + OC < \dfrac{1}{3}(AB + BC + CA)$

12. If the ratio of the angles in a Δ^{le} is $1:2:3$ then the ratio of the sides of the triangle = [ ]

  1) $1:3:2$ 2) $2:3:1$ 3) $1:\sqrt{3}:2$ 4) $1:3:\sqrt{2}$

13. In $\triangle ABC$ $\angle B = 90°$, $BD \perp AC$, and BD = P, AB = c, BC = a, AC = b then [ ]

  1) $P^2 = c^2$ 2) $\dfrac{1}{p^2} = \dfrac{1}{a^2} + \dfrac{1}{b^2}$ 3) $P^2 = \dfrac{1}{a^2} + \dfrac{1}{b^2}$ 4) $\dfrac{1}{P^2} = \dfrac{1}{a^2} + \dfrac{1}{c^2}$

14. The length of a tangent from a point which is at a distance of 15cm from centre of circle with radius 9cm is [ ]

  1) 13   2) 8   3) 11   4) 12

15. The number of positive integers which divide 10^{999} but not 10^{998} is [ ]

  1) 1998   2) 1996   3) 1999   4) 2000

16. The number of diagonals of an n sides polygon [ ]

  1) $\dfrac{n(n-1)}{2}$ 2) $\dfrac{n(n+1)}{3}$ 3) $\dfrac{n(n-3)}{2}$ 4) n^2

17. If $\triangle ABC$ and $\triangle PQR$ are similar triangles and AB = 12cm, BC = 15cm, PQ = 4 cm then QR=
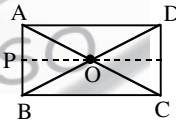
  1) 5cm   2) 20   3) 8cm   4) D = 15cm [ ]

18. In a cyclic Quadrilateral sum of opposite angles: [ ]

  1) 90°   2) 180°   3) 360°   4) 270°

19. Let $\square ABCD$ is a rectangle in which 'O' is a point inside the rectangle. ABCD then $OB^2 + OD^2 =$

  1) $OA^2 + OC^2$ 2) $OA^2 + OB^2$ [ ]

  3) $OB^2 + OC^2$ 4) $OA^2 + OD^2$

20. If BL and CM are medians of a right angled $\triangle ABC$ right angled at A, then $4\left(BL^2 + CM^2\right) =$

  1) $3BC^2$ [ ]

  2) $5BC^2$

  3) $7BC^2$

  4) $9BC^2$
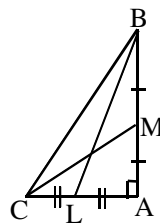
21. If the bases and heights of the parallelogram and a triangle are in the ratios $2:1$, $3:2$ then the ratio of their areas. [ ]

  1) $2:3$ 2) $3:2$ 3) $3:1$ 4) $6:1$

22. In the given figure $\angle A = 90°$ EF = 5cm, CB = 7cm, CF = 6cm then EB is equal to [ ]

  1) $2\sqrt{3}\,cm$

  2) $\sqrt{38}\,cm$

  3) 6cm

  4) 7cm

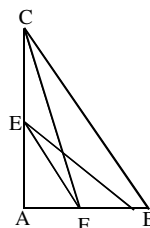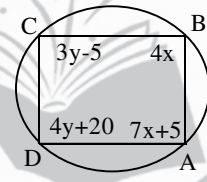23. Points P,Q,R,S divide the sides of a Rectangle ABCD in the ratio 1:2 . What fraction of area of the rectangle is the area of the parallelogram PQRS. [   ]

1) $\dfrac{2}{5}$ 2) $\dfrac{3}{5}$

3) $\dfrac{4}{9}$ 4) $\dfrac{5}{9}$

24. If (1,5) (2,3) and (–2,p) are collinear then P = [   ]
1) –11   2) 10   3) 9   4) 11

25. Find the co - ordinates of the point which divides the join of (–1,7) and (4,–3) in the ratio 2 : 3 internally [   ]
1) (2,4)   2) (3,5)   3) (1,3)   4) (5,6)

26. Find the ratio in which the line segment joining the points (-3,10) and (6,–8) is divided by (-1,6) is [   ]
1) 2: 7   2) 1 : 3   3) 4 : 5   4) 7 : 6

27. The equation of the straight line making equal intercepts on axes and passing through (–8,3) is [   ]
1) x + y = 5   2) x – y +5 = 0
3) x – y –5 = 0   4) x + y + 5 = 0

28. The vertices of a triangle are (3,4) (4,4) (4,5) then its orthocentre is [   ]
1) (3,4)   2) (4,5)   3) (4,4)   4) (3,5)

29. The area of the triangle with vertices A(5,2),B(4,7),C(7,–4) is [   ]
1) 4 sq units   2) 6 sq units   3) 1 sq units   4) 2 sq units

30. If $\triangle ABC$ is an issosceles triangle with $\angle B = \angle C = 78°$, D and E are points on AB, AC respectively such that $\angle BCD = 24°$ and $\angle CBE = 51°$ then $\angle BED =$ [   ]
1) 24°   2) 18°   3) 12°   4) 39°

31. The graph of a Quadratic polynomial $y = mx^2$ (M>0) lies in which quadrants [   ]
1) Q_1 and Q_3 2) Q_2 and Q_3 3) Q_1 and Q_2 4) Q_1 and Q_4

32. If α, β are roots of $x^2 +7x -14 = 0$ then $\dfrac{1}{\alpha} + \dfrac{1}{\beta} =$ [   ]
1) $\dfrac{1}{2}$ 2) 2   3) 3   4) 4

33. What are the remainders and Quotients when $2x^2 +3x +1$ is divided with x + 2 [   ]
1) 2x–1,3   2) 4x+1,7   3) 7x+5,3   4) 2x+3,1

34. If α, β, γ are the zeroes of cubic polynomial $ax^3 +bx^2 +cx +d$ then $= \alpha^2 + \beta^2 + \gamma^2 =$ [   ]
1) $\dfrac{b^2 - 2ac}{a^2}$ 2) $\dfrac{b^2 + 2ac}{b^2}$ 3) $\dfrac{b^2 + 2ac}{a^2}$ 4) $\dfrac{b^2 - 2ac}{c^2}$

35. The last two digits of $2005^{2006} + (2006)^{2005}$ [   ]
1) 11   2) 01   3) 21   4) 31

36. If α, β are the roots of $ax^2 + bx+c = 0$ then $\dfrac{\alpha^2 + \beta^2}{\alpha^{-2} + \beta^{-2}} =$ [   ]
1) $\dfrac{b^2}{a^2}$ 2) $\dfrac{c^2}{a^2}$ 3) $\dfrac{b^2}{c^2}$ 4) $\dfrac{a^2}{c^2}$

37. If the zeroes of $x^3 - 3x^2 + x + 1 = 0$ are $a-b, a, a+b$ then $(a,b) =$ [   ]

    1) $\left(1, \sqrt{2}\right)$ 2) $\left(\sqrt{2}, 1\right)$ 3) $\left(\sqrt{3}, 1\right)$ 4) $\left(\sqrt{2}, \sqrt{3}\right)$

38. If $f(x) = a_0 x^n + a_1 x^{n-1} + a_2 x^{n-2} + \text{-----} + a_n$ is a polynomial of degree n and $a_0 + a_1 + a_2 + \text{-----} + a_n = 0$ then what is the factor of $f(x)$ [   ]

    1) $x + 2$ 2) $x - 1$ 3) $x + 3$ 4) $x - 2$

39. Find two numbers whose sum is 27 and product is 182   [   ]

    1) 12,15   2) 11,16   3) 13,14   4) 9,18

40. If a,b,c are positive integers satisfying $5a + 5b + 2ab = 92$, $5b + 5c + 2bc = 136$, $5c + 5a + 2ca = 244$ then $7a + 8b + 9c =$ [   ]

    1) 171   2) 172   3) 174   4) 175

41. If $x = a + 2$, $y = a + 1$ are the solutions of the equation $5x + 3y - 7 = 0$ then $a =$ [   ]

    1) $\dfrac{3}{4}$ 2) $\dfrac{-3}{4}$ 3) $\dfrac{1}{2}$ 4) $\dfrac{1}{4}$

42. If (x,y) lies in 2nd Quadrant then $(x_1 - y)$ lies   [   ]

    1) I Quadrant   2) II Quadrant   3) III Quadrant   4) IV Quadrant

43. In a $\triangle ABC$ $\angle C = 3\angle B = 2(\angle A + \angle B)$ then $\angle A, \angle B \angle C$ [   ]

    1) 120,40,20   2) 20,40,120   3) 40,20,120   4) 120,20,40

44. $\square ABCD$ is a cyclic Quadrilateral then find $\angle A, \angle B, \angle C, \angle D$ [   ]

    1) 120,70,60,110
    2) 110,60,70,120
    3) 100,60,80,120
    4) 120,80,60,100

45. If $a_1 x + b_1 y + c_1 = 0$, $a_2 x + b_2 y + c_2 = 0$ and $\dfrac{a_1}{a_2} \neq \dfrac{b_1}{b_2}$ then given system has how many solutions

    1) 2   2) 3   3) ∞ 4) 1   [   ]

46. For what value of K the following pair of linear equations have infinitely many solutions $kx + 3y - (k-3) = 0$, $12x + ky - k = 0$ [   ]

    1) $k = 0$ 2) $K = 6$ 3) $K = 7$ 4) both A and B

47. Six straight lines are drawn in a plane with no two parallel and no three concurrent then the number of regions into which they divide the plane   [   ]

    1) 7   2) 11   3) 22   4) 20

48. Any solution of linear equation $2x + 0y = 9$ in two variables is of the form   [   ]

    1) $\left(\dfrac{9}{2}, M\right)$ 2) $\left(n, \dfrac{-9}{2}\right)$ 3) $\left(0, \dfrac{-9}{2}\right)$ 4) $\left(\dfrac{9}{2}, 0\right)$

49. ABCDEF is non - regular hexagon where all the six sides touch a circle and all the six sides are of equal length. If $\angle A = 140°$ then $\angle D =$ _____   [   ]

    1) 100°   2) 105°   3) 110°   4) 120°

50. What is the reminder when $x^5 - a^2 x^3 + 2x + a - 3$ is divided with $x - a$ [   ]

    1) $a + 3$ 2) $3a - 3$ 3) $3a + 4$ 4) $4a + 3$