SMART SOCIETY INTERNATIONAL MATHEMATICS OLYMPIAD (SSIMO)

Organized by

Department of Basic Science and Humanities

INSTITUTE OF ENGINEERING & MANAGEMENT,

IEM-UEM GROUP and SMART SOCIETY, USA

IX CLASS

SMART SOCIETY INTERNATIONAL MATHEMATICS OLYMPIAD · SSIMO

TOTAL QUESTIONS: 50

DURATION: 1 HOUR

INSTRUCTIONS TO THE CANDIDATES:

1. The following question paper is divided into 3 sections

    a) Logical Reasoning (15 Questions)

    b) Mathematics (10 Questions)

    c) Achiever's Level Mathematics (25 Questions)

2. Each Logical Reasoning question carries 1 mark. Each Mathematics question carries 2 marks and each Achiever's Level Mathematics carries 3 marks.

3. All questions are compulsory. There is no negative marking. Use of calculator is not permitted.

4. There is only one correct answer. Choose only ONE option for an answer.

5. To mark your choice of answers by darkening the circles on the OMR sheet, Use HB Pencil or Blue/Black ball point pen.

6. Rough work should be done in the blank space provided in booklet.

7. Return the OMR sheet to the invigilator at the end of exam.

8. Please fill in your personal details in the space provided below.

NAME: ....

SCHOOL NAME: ....

CONTACT DETAILS OF GUARDIAN: ....

SECTION A LOGICAL REASONING

1. Find the next number in the sequence: 2, 6, 12, 20, 30 ?

   a) 36   b) 40

   c) 42   d) 48

2. Complete the pattern: 1,2,4,7,11?

   a) 14   b) 15

   c) 16   d) 18

3. Five friends Rohan, Shubham, Tanmay, Aryan, and Siddharth are standing in a row. Using the clues below, determine their order:

   - Rohan is standing next to Tanmay.

   - Shubham is standing between Aryan and Siddharth.

   - Tanmay is not standing at either rend.

   a) Siddharth, Shubham , Aryan, Rohan, Tanmay

   b) Aryan, Shubham, Tanmay, Rohan, Siddharth

   c) Aryan, Shubham, Siddharth, Rohan, Tanmay

   d) Rohan, Aryan, Shubham, Tanmay, Siddharth

4. Find the sum of all prime numbers between 20 and 50

   a) 254   b) 253

   c) 251   d) 255

5. A water tank fills at 2 liters/minute and empties 1liter/minute. How many minutes to fill 12 liters?

   a) 10minutes   b) 13minutes

   c) 11minutes   d) 12minutes

6. A snail climbs 10 meters in a day but slips back 3meters at night. How many days will it take to climb 20 meters?

   a) 6 days   b) 5 days

   c) 4 days   d) 2.5 days

7. Three numbers have an average of 20. If one number is 15more than another, and the third number is 5 less than twice the smallest number, find the sum of all the three numbers.

   a) 90   b) 75

   c) 60   d) 65

8. Solve for x: 2|x-3|+5=11

   a) $\{0,4\}$ b) $\{2,4\}$

   c) $\{0,6\}$ d) $\{4,6\}$

9. If $f(x) = x^2 + 3x - 2$, then f (-2)

   a) 2   b) -4

   c) -2   d) 4

10. If A=1, B=2,..., Z=26, then "CODE"=

    a) 51345   b) 31554

    c) 41354   d) 31545

11. A triangle has sides 5cm, 12cm, and 13cm.Is it a right-angled triangle?

    a) Yes

    b) Right angled isosceles triangle

    c) Equilateral triangle

    d) No

12. A square is inscribed in a circle. Find the ratio of the area of the square to the area of the circle.

    a) 0.954   b) 1.273

    c) 0.636   d) 0.356

13. Two circles intersect at points A and B. If the radius of one circle is 4cm and the other is 6 cm, find the length of AB.

    a) 4.2   b) 3.4

    c) 9.8   d) 8.4

14. 1, 4, 9, 16, 25, 36.5 (Which number doesn't belong?)

   a) 9   b) 25

   c) 36.5   d) 16

15. A code replaces each letter with its corresponding numerical position in the alphabet. Decode "215241418"

   a) BAEFDRAT   b) BRADABAT

   c) BAEBDADA   d) BRTERGHA

SECTION B

MATHEMATICS

16. Simplify: $(x^3-2x^2-5x+1)-(x^2+x-3)$ for x=3

   a) 24   b) 32

   c) -14   d) 22

17. Find the equation of the circle passing through (2,3), (4,5) and (6,7)

   a) $x^2-y^2+6x-8y=23$

   b) $x^2+y^2+6x-8y=-23$

   c) $x^2+y^2-6x-8y=-23$

   d) $x^2+y^2-6x+8y=-23$

18. Find the area of a triangle whose sides are 7cm, 24cm and 25cm

   a) 96 sq.cm   b) 58 sq.cm

   c) 84 sq.cm   d) 69 sq.cm

19. $3\sqrt{2}$ is

   a) Rational

   b) Irrational

   c) Indeterminate form

   d) None

20. Find the remainder when 2^{100} divided by 7

   a) 3   b) 3.3333

   c) 2   d) 0.0039

21. Find the least common multiple (LCM) of 1/4, 1/6 and 1/8.

   a) 28   b) 32

   c) 38   d) 24

22. Find the equation of the line passing through the points (1,2), (2,3) and (3,4).

   a) x=y-2   b) y=x-1

   c) x=y+1   d) x=y-1

23. In a cyclic quadrilateral ABCD, $\angle A=80°$ and $\angle D=100°$. Find $\angle B$.

   a) 80   b) 110

   c) 100   d) 105

24. Find the area of a quadrilateral whose diagonals intersect at right angles and are of lengths 8cm and 10cm.

   a) 36 sq.cm   b) 48 sq.cm

   d) 40 sq.cm   c) 28 sq.cm

25. Find the point of intersection of the graphs of the equations $4^{y^2-x^2}=15$, x+2y=5.

   a) (0.37, 1.2)   b) (1.2, 4.73)

   d) (1,2)   c) None

SECTION C

MATHEMATICS

26. In a parallelogram ABCD, AE is perpendicular to DC and CF is perpendicular to AD .If AB=10cm, AE=6cm and CF=8cm, then find AD.

    a) 16cm   b) 20cm

    c) 14cm   d) 12cm

27. (i) Only one line can pass through a single point.

    (ii) There are an infinite number of lines which pass through two distinct points.

    (iii) A terminated line can be produced indefinitely on both the sides.

    a) All the statements are false.

    b) All the statements are true.

    c) Only one statement is true

    d) Only one statement is false.

28. If $x = \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$ and $y = \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$ then the value of $x^2 + xy + y^2$ is

    a) 100   b) 99

    c) 98   d) 96

29. It is given that ∠XYZ=64° and XY is produced to point

    P. If ray YQ bisects ∠ZYP, find ∠XYQ and reflex ∠QYP.

   a) 120, 350   b) 122, 302

    c) 121, 305   d) 101, 153

30.
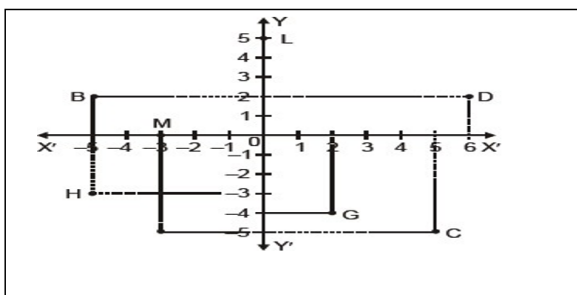
See the figure given above and write the sum of all the abscissas of the following points

i) The co-ordinates of B.

ii) The co-ordinates of C.

iii) The point identified by the co-ordinates (–3,–5).

iv) The point identified by the co-ordinates (2,–4).

v) The abscissa of the point D.

vi) The ordinate of the point H.

vii) The co-ordinates of the point L.

viii) The co-ordinates of the point M.

a) -3   b) 2

c) -4   d) 3

31. In the given figure, lines AB,CD and EF intersect at O. Find ∠AOC,∠COF =
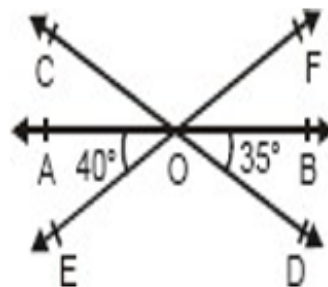
a) 30, 100   b) 60, 30

c) 115, 45   d) 35, 105

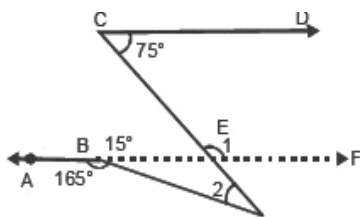32. The taxi fare in a town is Rs. 10 for the first kilometer and Rs. 6 per km for the subsequent distance. What will be the total fare for 15 km?

    a) Rs.100   b) Rs.110

    c) Rs.94   d) Rs.96

33. Determine the remainder when the polynomial $4x^5+2x^4-x^3+4x^2-7$, divided by (x-1).

    a) 2   b) 4

    c) 6   d) 8

34. In the following figure AB||CD. Find the measure of ∠2.

a) 45   b) 60

c) 54   d) 30

35. The ratio of the incomes of two friends is 3:2. If one friend spends Rs. 500 more than the other, their savings ratio be comes 1:2.Find their incomes.

a) Rs. 4500, Rs. 3000

b) Rs, 3000, Rs.1000

c) Rs.2500, Rs. 3000

d) Rs.3200, Rs. 4000

36. Let L be the lower class boundary of a class in a frequency distribution and m be the midpoint of the class. Which one of the following is the upper class boundary of the class?

a) $m + \dfrac{(m + L)}{2}$

b) $L + \dfrac{(m + L)}{2}$

c) $2m - L$

d) $m - 2L$

37. The mean of 200 items was 50. Later on, it was discovered that two items were misread as 92 and 8 instead of 192 and 88. Find the correct mean.

a) 50.9   b) 59

c) 49   d) 52

38. For an isosceles triangle having base b and each of the equal sides as a, we have:
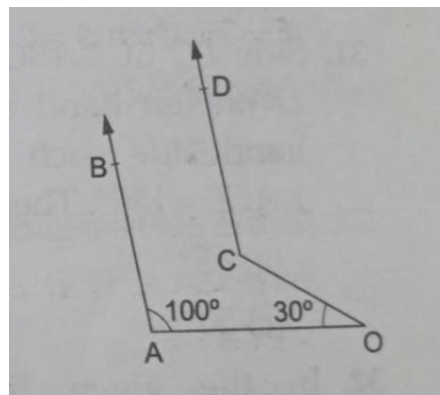
I. Area = $\dfrac{b}{4}\sqrt{(4a^2 - b^2)}$

II. Perimeter = (2a + b)

III. Height = $\dfrac{1}{2}\sqrt{(4a^2 - b^2)}$

Which of the following is true?

a) I only   b) I and II only

c) II and III only   d) I, II and III

39. In the given figure, AB || CD. If ∠AOC = 30° and ∠OAB = 100°, then ∠OCD = ?

a) 130°   b) 150°

c) 80°   d) 100°

40. O is any point in the interior of △ABC. Then, which of the following is true?

a) (OA+OB+OC)>(AB+BC+CA)

b) (OA+OB+OC)> (1)/2(AB+BC+CA)

c) (OA+OB+OC)<(1)/2 (AB+BC+CA)

d) None of these

41. Assertion(A)- If a ray CD stands on a line AB such that ∠ACD = ∠BCD, then ∠ACD = 90°.

Reason(R)-If a ray CD stands on a line AB then ∠ACD + ∠BCD = 180°.

a) Both Assertion (A) and Reason (R) are true and Reason (R) is a correct explanation of Assertion (A).

b) Both Assertion (A) and Reason (R) are true but Reason (R) is not a correct explanation of Assertion (A).

c) Assertion (A) is true and Reason (R) is false.

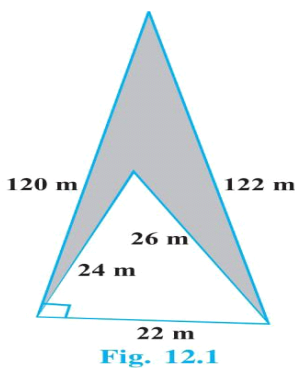d) Assertion (A) is false and Reason (R) is true.

a) $\angle DAE = \angle EFC$

b) $AE = EF$

c) $DE = EF$

d) $\angle ADE = \angle ECF$

42. ABCD is a rhombus and ADX is an equilateral triangle; $\angle ABC = 100°$, Then $\angle BAX, \angle ABX, \angle BDX$ and $\angle BXD =$
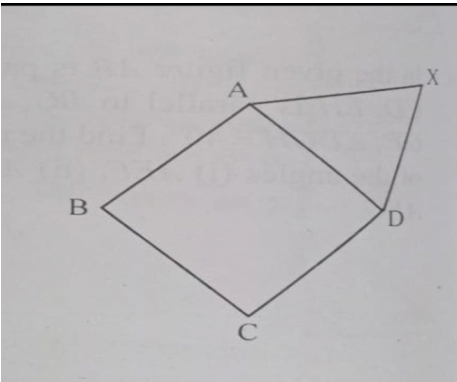
a) 130,20,110,30

b) 145, 20, 140, 40

c) 110, 20 ,140, 40

d) 140,20, 110, 40

43. The area of the shaded region given in the figure is

120 m 122 m

26 m

24 m

22 m

Fig. 12.1

c) 1082 m²   d) none of these

44. D and E are the mid-points of the sides AB and AC respectively of $\triangle ABC$. DE is produced to F. To prove that CF is equal and parallel to DA, we need an additional information which is

45. If bisectors of $\angle A$ and $\angle B$ of a quadrilateral ABCD intersect each other at P, of $\angle B$ and $\angle C$ at Q, of $\angle C$ and $\angle D$ at R and of $\angle D$ and $\angle A$ at S, then PQRS is a

a) rectangle

b) rhombus

c) parallelogram

d) quadrilateral whose opposite angles are supplementary

46. A river 3 m deep and 40 m wide is flowing at the rate of 2 km per hour. How much water will fall into the sea in a minute?

a) 1000 m³   b) 2000 m³

c) 4000 m³   d) none of these

47. If S is a point on side PQ of a $\triangle PQR$ such that PS $= QS = RS$, then

a) $PR \cdot QR = RS^2$

b) $QS^2 + RS^2 = QR^2$

c) $PR^2 + QR^2 = PQ^2$

d) $PS^2 + RS^2 = Pr^2$

48. In the figure, if PQR is the tangent to a circle at Q whose center is O, AB is a chord parallel to PR and $\angle BQR = 70°$, then $\angle AQB$ is equal to

Fig. 9.8
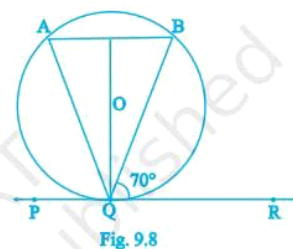
a) 20°   b) 40°

c) 35°   d) 45°

49. *If $\bar{x}$ is the mean of $x_1, x_2, x_3, \ldots, x_n$, then $\sum_{i=1}^{n}(x_i - \bar{x}) = ?$*

a) -1　　　　　　b) 0

c) 1　　　　　　d) n-1

50. The value of $\sqrt{5 - 2\sqrt{24}}$ is equal to

a) $\sqrt{5} - 1$

b) $\sqrt{6} - 1$

c) $\sqrt{6} - \sqrt{5}$

d) $\sqrt{3} - \sqrt{2}$