S I M S®

(SCHOLARS INTEGRAL MATHS & SCIENCE OLYMPIADS)

CLASS X

BIGGEST NATIONAL LEVEL OLYMPIAD (STAGE - II) : 2018-19

SIMO QUESTION PAPER

MAX. MARKS : 100 **TIME: 60 MIN.**

NAME OF THE STUDENT : .....

HALL TICKET NUMBER : .....

NAME OF THE SCHOOL : .....

INSTRUCTIONS:

- This question paper contains 41 questions.
- First 32 questions (1 to 32) are single correct answer type. Each question carries 2 marks.
- Next 9 questions (33 to 41) questions are one or more than one correct answer type. Each question carries 4 marks.
- No negative marks.
- You have not allowed to use a calculator or any other electronic devices in the examination hall.
- Read the instructions given in the answer sheet(OMR sheet) before answering the questions.
- The answer sheet should be returned to the invigilator before leaving the examination hall (You can retain the question paper with you)
- Results will be available at : www.simsolympiads.com

Single Correct Answer Type: **32 × 2 = 64**

1. If a sum of LCM and HCF of two numbers is 1260 and their LCM is 900 more than their HCF, then the product of two numbers is

1) 203400 2) 194400 3) 198400 4) 205400

2. The value of $\frac{6^n \times 2^{2n} \times 3^{3n}}{30^n \times 3^{2n} \times 2^{3n}}$ is equal to

1) 1 2) 0.3^{-1} 3) 3^{-n} 4) 0.3^n

3. Two finite sets have m and n elements. The total number of subsets of the first set is 56 more than the total number of subsets of second set. Find the value of (m, n).

1) (6, 3) 2) (8, 3) 3) (3, 6) 4) (8, 7)

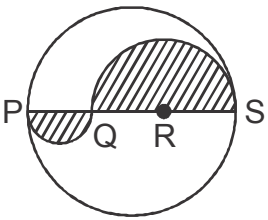
4. A tree is broken at a height of 12 m from the ground and its top touches the ground at a distance of 5 m from the base of the tree. Find the original height of the tree.

1) 13 m 2) 18 m 3) 25 m 4) 17 m

5. The line 3x – 4y = 9 meets the X-axis at _____.

1) x = –3 2) x = 3 3) $x = \frac{9}{4}$ 4) $x = \frac{3}{2}$

6. PQRS is a diameter of a circle whose radius is r. The lengths of PQ, QR and RS are equal. Semi-circles are drawn on PQ and QS to create the shaded figure below:



The perimeter of the shaded figure is

1) πr 2) $\frac{4\pi r}{3}$ 3) $\frac{5\pi r}{3}$ 4) $\frac{3\pi r}{2}$

7. Let $a_1, a_2, a_3, \ldots, a_n$ are n terms of A.P. If their common difference is –2, then $a_{30} - a_{12}$ is equal to

1) 24 2) 36 3) –60 4) –36

8. In a class of 50 students, 20 play Hockey, 15 play Cricket and 11 play Football. 7 play both Hockey and Cricket, 4 play Cricket and Football and 5 play Hockey and Football. If 18 students do not play any of these given sports, how many students play exactly two of these sports?

1) 12 2) 10 3) 11 4) 15

9. If α, β are roots of the equation $x^2 - 5x + 6 = 0$ then the equation whose roots of $\alpha+3$ and $\beta+3$ is

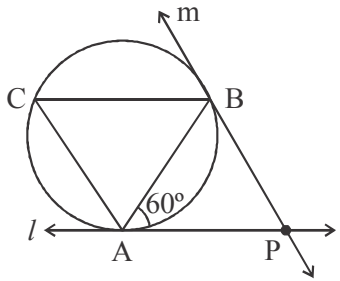
1) $x^2 - 11x + 30 = 0$ 2) $-x^2 + 11x = 0$

3) $2x^2 - 11x + 30 = 0$ 4) $x^2 - 22x + 60 = 0$

10. Two triangles have their sides measuring 5 cm, 6 cm and 9 cm and 9 cm, 7.5 cm and 13.5 cm respectively. Their areas are in the ratio of

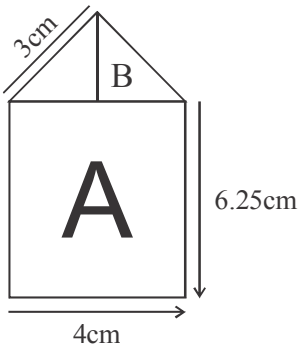
1) 2: 3 2) 4 : 9 3) 1 : 25 4) 5 : 2

11. In the diagram, if *l* and *m* are two tangents and AB is a chord making an angle of 60° with the tangent *l*, then the angle between the tangents *l* and *m* is



1) 45° 2) 30° 3) 60° 4) 90°

12. A is a right circular cylinder on which a cone B is placed. The entire structure is melted and spheres are formed each having radius 1 cm. How many spheres can be formed approximately ?



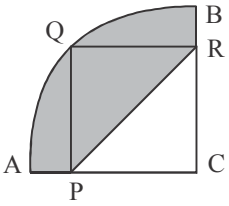
1) 18 2) 22

3) 21 4) 23

13. In ΔABC, $\angle A = 30^\circ$ and $\angle B = 90^\circ$. If AC = 8 cm, then its area is

1) $16\sqrt{3}$ cm^2 2) 16 cm^2 3) $8\sqrt{3}$ cm^2 4) $6\sqrt{3}$ cm^2

14. The quarter-circle shown below has centre C and radius 10 units. If the perimeter of rectangle CPQR is 26 units, then the perimeter of the shaded region is



1) $5\pi + 17$ 2) $5\pi + 20$

3) $5\pi + 10$ 4) $5\pi + 27$

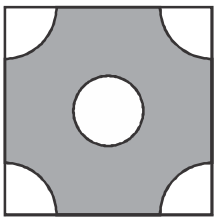
15. If $\sin\theta + \sqrt{\sin\theta + \sqrt{\sin\theta + \sqrt{\sin\theta....}}} \infty = \sec^4\alpha$, then $\sin\theta$ is equal to

1) $\sec^2\alpha$ 2) $\tan^2\alpha$ 3) $\sec^2\alpha\tan^2\alpha$ 4) $\cos^2\alpha$

16. The value of $\frac{\cos(90^\circ - \theta)\sec(90^\circ - \theta)\tan\theta}{\text{cosec}(90^\circ - \theta)\sin(90^\circ - \theta)\cot(90^\circ - \theta)} + \frac{\tan(90^\circ - \theta)}{\cot\theta}$ is _____.

1) 2 2) –1 3) 1 4) –2

17. From each corner of a square of side 4 cm, a quadrant of a circle of radius 1 cm is cut and also a circle of diameter 2 cm is cut as shown in the figure. Then the area of the remaining portion of the square is



1) $\frac{66}{7}cm^2$ 2) $\frac{68}{7}cm^2$ 3) $\frac{64}{7}cm^2$ 4) $\frac{62}{7}cm^2$

18. If θ and $2\theta - 45^\circ$ are acute angles such that $\sin\theta = \cos(2\theta - 45^\circ)$, then $\tan\theta$ is equal to

1) $\frac{1}{\sqrt{3}}$ 2) -1 3) $\sqrt{3}$ 4) 1

19. If $\sin\theta = \frac{24}{25}$ and θ lies in the second quadrant, then $\sec\theta + \tan\theta =$ _____.

1) -7 2) 6 3) 4 4) -5

20. The sum of the 6^{th} and 15^{th} terms of an arithmetic progression is equal to the sum of 7^{th}, 10^{th} and 12^{th} terms of the same progression. Which term of the series should necessarily be equal to zero ?

1) 10^{th} 2) 8^{th} 3) 1^{st} 4) 3^{rd}

21. If $x = \frac{\sqrt{a}+\sqrt{b}}{\sqrt{a}-\sqrt{b}}$, $y = \frac{\sqrt{a}-\sqrt{b}}{\sqrt{a}+\sqrt{b}}$ then the value of x^2+y^2+xy is

1) $\frac{4(a-b)}{(a+b)}$ 2) $\frac{4(a+b)}{(a-b)}$ 3) $\frac{2(a+b)}{(a-b)}$ 4) $\frac{2(a-b)}{(a+b)}$

22. A bag contains 20 balls out of which x are black. If 10 more black balls are put in the box, the probability of drawing a black ball is double of what it was before. The value of x is

1) 0 2) 5 3) 1 4) 40

23. The radius of circumcircle of a triangle ABC is $5\sqrt{10}$ units. If the point P is equidistant from A(1, 3), B(–3, 5) and C(5, –1) then the co-ordinates of points are _____.

1) (4, 6) 2) (4, 2) 3) (–4, –2) 4) (2, –4)

24. The ratio in which line $2x + y - 4 = 0$ divides the line segment joining the points A(2, –2) and B(3, 7) is

1) 3 : 7 2) 4 : 7 3) 2 : 9 4) 4 : 9

25. A boy had to divide 49471 by 210. He made a mistake in copying the divisor and obtained his quotient as 246 with a remainder 25. What divisor did the boy copy ?

1) 310 2) 201 3) 102 4) 120

26. What is the sum of all two-digit numbers that give a remainder of 3 when they are divided by 7 ?

1) 666 2) 777 3) 683 4) 676

27. The digit in the unit's place of the number represented by $(7^{95} - 3^{58})$ is

1) 0 2) 4 3) 6 4) 7

28. A number of friends decided to go on a picnic and planned to spend ₹96 on eatables. Four of them, did not turn up. As a consequence, the remaining ones had to contribute ₹4 each extra. The number of those who attended to picnic was _____.

1) 8 2) 16 3) 12 4) 24

29. A's age is $\frac{1}{6}$th of B's age. It will be twice of C's age after 10 years. If C's eighth birthday was celebrated two years ago, then the present age of A must be

1) 5 years 2) 10 years 3) 15 years 4) 20 years

30. If A(2, 2), B(–4 , –4) and C(5 , –8) are the vertices of a triangle, then the length of the median through vertex C is

1) $\sqrt{65}$ units 2) $\sqrt{117}$ units 3) $\sqrt{85}$ units 4) $\sqrt{113}$ units

31. The value of $\frac{1}{(\log_x yz+1)}+\frac{1}{(\log_y xz+1)}+\frac{1}{(\log_z xy+1)}$ is

1) 0 2) 1 3) 2 4) 3

32. If $(a-b)^2$, (a^2+b^2) are the first two terms of an AP, then which of the following will be the next term ?

1) 2ab 2) $-(a+b)^2$ 3) $-2ab$ 4) $(a+b)^2$

<u>One or more Correct Answer Type:</u> 9 × 4 = 36

33. Solve the equation $(x+2)(x+3)(x+8)(x+12) = 4x^2$

1) $x = -4$ 2) $x = -6$

3) $x = 6$ 4) $x = \frac{-15 \pm \sqrt{129}}{2}$

34. If $\tan^2\theta + 3 = 3\sec\theta$, then

1) $\cos\theta = \frac{\sqrt{3}}{2}$ 2) $\theta = 0^\circ$ 3) $\theta = 60^\circ$ 4) $\tan\theta = \sqrt{3}$

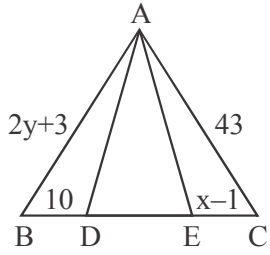
35. In the given figure, AD = AE, ∠BAD = ∠EAC, then find the values of x and y.

1) x = 11

2) x = 13

3) y = 20

4) y = 11



36. If $\sqrt{a+x}+\sqrt{b+x}=\sqrt{a+b+2x}$, then the value of x is

1) a 2) –a 3) –b 4) b

37. If α, β are the roots of the equation $(a-2)x^2-(5-a)x-5=0$, then find 'a' if $|\alpha-\beta|=2\sqrt{6}$.

1) $\frac{-37}{23}$ 2) 3 3) –3 4) $\frac{37}{23}$

38. If $\tan(A+B)=\sqrt{3}$ and $\tan(A-B)=\frac{1}{\sqrt{3}}$; $0^\circ < A+B \le 90^\circ$; A > B, find A and B.

1) $A=45^\circ$ 2) $B=15^\circ$ 3) $A=30^\circ$ 4) $B=60^\circ$

39. The points of trisection of the line segment joining (–5, 2), (3, 6) are _____.

1) $\left(\frac{-7}{3},\frac{10}{3}\right)$ 2) $\left(\frac{5}{3},\frac{6}{3}\right)$ 3) $\left(\frac{1}{3},\frac{14}{3}\right)$ 4) (3, 1)

40. The point A divides the join of P(–5, 1) and Q(3, 5) in the ratio k : 1. The values of k for which the area of ΔABC where B(1, 5), C(7, –2) is 2 sq. units is

1) 7 2) $\frac{31}{9}$ 3) $\frac{1}{7}$ 4) $\frac{32}{9}$

41. A card is drawn from a well shuffled pack of 52 cards. Find the probability of

1) a card of diamond is $\frac{1}{13}$

2) a king or a queen is $\frac{2}{13}$

3) a black face card is $\frac{1}{2}$

4) neither a spade nor a jack is $\frac{9}{13}$

**** ALL THE BEST ****