# S I M S®

(SCHOLARS INTEGRAL MATHS & SCIENCE OLYMPIADS)

CLASS IX

## BIGGEST NATIONAL LEVEL OLYMPIAD : 2016-17

**MAX. MARKS : 100** **SIMO QUESTION PAPER** **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) are more than one correct answer type. Each question carries 4 marks.
- Marks are non deducted for wrong answers. (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.org

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**SINGLE CORRECT ANSWER TYPE:** **32 × 2 = 64**

1. 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 the expression is

$\left(x+\frac{1}{y}\right)+\left(y+\frac{1}{x}\right)-2y = \frac{1}{p+\sqrt{q}}$. What is the value of p/q ?

1) 5/12 2) $\frac{3+2}{\sqrt{6}}$ 3) 3 4) $\frac{5}{2\sqrt{6}}$

2. Which one is greatest out of $\sqrt{2}, \sqrt[6]{3}, \sqrt[3]{4}$ and $\sqrt[4]{5}$ ?

1) $\sqrt[3]{4}$ 2) $\sqrt[4]{5}$ 3) $\sqrt{2}$ 4) $\sqrt[6]{3}$

3. If $a^x = c^q = b$ and $c^y = a^z = d$, then which one of the following is correct ?

1) $xy = qz$ 2) $\frac{x}{y} = \frac{q}{z}$ 3) $x + y = q + z$ 4) $x - y = q - z$

4. The value of the expression $\frac{1}{1+\sqrt{2}}+\frac{1}{\sqrt{2}+\sqrt{3}}+\frac{1}{\sqrt{3}+\sqrt{4}}+\ldots+\frac{1}{\sqrt{8}+\sqrt{9}}$ is

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

5. A student is asked to find the ratio of the sum of length and breadth to difference of length and breadth of a rectangular field whose length is a side of square and breadth is the diagonal of the same square. If the area of square is 12 sq. units, then the ratio is

1) $2\sqrt{3} : 2\sqrt{6}$ 2) $3 + 2\sqrt{2} : 1$ 3) $1 : 3 + 2\sqrt{2}$ 4) None of these

6. When $x^{40} + 2$ is divided by $x^4 + 1$, then what is the remainder?

1) 21 2) 19 3) 3 4) – 2

7. In a school, there are some boys and girls in class IX. If difference between the squares of number of boys and girls is 400 and when the number of boys multiplied with the number of girls, result is 375. If difference in their numbers is 10, then the ratio of boys to girls is

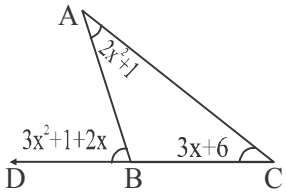
1) 5 : 3 2) 3 : 5 3) 4 : 5 4) 5 : 4

8. If the angle A is 5 times its complementary angle and 5/7 of its supplementary angle, then the measure of $\angle A$ is

1) 105° 2) 75° 3) 60° 4) 90°

9. If the sides of a triangle are in the ratio 2 : 3 : 5 and its perimeter is 20 cm and angles are in the ratio 5 : 3 : 2. Then, the longest side of the triangle is

1) 10 cm 2) 5 cm 3) 20 cm 4) Can't be constructed

10. 

In the given figure, find the value of $\angle ABC$.

1) 146° 2) 126° 3) 106° 4) 34°

11. If $l + m + n$ be real number such that $l + n \neq m$, what is the quotient on dividing $l^3 - m^3 + n^3 + 3lmn$ by $l - m + n$?

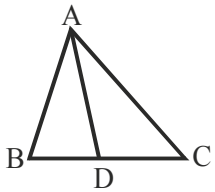
1) $l^2 + m^2 + n^2 - lm - mn - ln$ 2) $l^2 + m^2 + n^2 + lm + mn - ln$

3) $l^2 - m^2 + n^2 + lm - mn - ln$ 4) None of these

12. If $y = x + \frac{1}{x}$, then $x^4 + x^3 - 4x^2 + x + 1 = 0$ becomes

1) $x^2 (y^2 + y - 2) = 0$ 2) $x^2 (y^2 + y - 3) = 0$ 3) $x^2 (y^2 + y - 6) = 0$ 4) None of these

13. In the given figure, ABD is an equilateral triangle. If the area of triangle ABC is twice the area of triangle ADC, then $\angle BAC$ is equal to




1) 90° 2) 120° 3) 60° 4) None of these

14. $35.7-\left(3+\frac{1}{3+\frac{1}{3}}\right)-\left(2+\frac{1}{2+\frac{1}{2}}\right)$ is

1) 30 2) 34.8 3) 36.6 4) 41.4

15. If $\alpha$ and $\beta$ are the zeroes of $x^2 - 8x + \gamma$, such that $\alpha - \beta = 2$, then $\gamma$ is

1) 8 2) 60 3) 22 4) 15

16. If $3 \pm \sqrt{2}$ are the two zeroes of a polynomial, then the polynomial is

1) $x^2 - 6x + 7$ 2) $x^2 - 3x + 2$ 3) $x^2 - 7x + 6$ 4) $x^2 - 2x + 3$

17. The value of k, for which $2x - y - 3 = 0$, $2kx + 7y - 5 = 0$ have intersecting lines at points $x = 1$, $y = -1$, is

1) 4 2) 3 3) 6 4) – 6

18. The pair of equations $2x + 3y = 6$ and $5x + \frac{15}{2}y = 15$ has

1) infinite number of solutions 2) unique solution

3) no solution 4) Can't be determined

19. If P(a–b, a+b) and Q(a+b, a–b), then PQ is equal to

1) $a^2 + b^2$ 2) 8ab 3) 0 4) $2\sqrt{2}b$

20. If an isosceles triangle has a perimeter 30 cm and sum of its two equal sides is 24 cm, then its area is _____.

1) $\sqrt{135}cm^2$ 2) $9\sqrt{15}cm^2$ 3) $15\sqrt{9}\,cm^2$ 4) None of the above

21. If the mean of the following distribution is 20, then the value of $p^2+p$ is

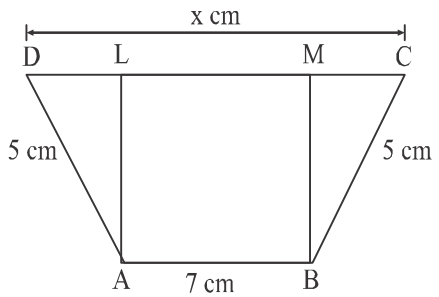
| **x** | 15 | 17 | 19 | 21 + p | 23 |
|---|---|---|---|---|---|
| **f** | 2 | 3 | 4 | 5p | 6 |

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

22. There are 25 cards numbered from 1 to 25. One card is drawn at random. What is the probability that the number on this card is not divisible by 3 ?

1) $\frac{6}{25}$ 2) $\frac{17}{25}$ 3) $\frac{25}{6}$ 4) $\frac{25}{17}$

23. In the given figure, if ABCD is a trapezium in which AB = 7 cm, AD = BC = 5 cm, DC = x cm and distance between AB and DC is 4 cm. Then, the value of x is




1) 6 cm 2) 9 cm 3) 13 cm 4) 10 cm

24. A carton contains 145 bulbs out of which 25 are defective and others are good. Sonu will buy a bulbs, if it is good and will not buy it, if it is defective. The shopkeeper draws one bulb at random and gives it to him. The probability that he will buy it, is

1) $\frac{29}{25}$ 2) $\frac{5}{29}$ 3) $\frac{24}{29}$ 4) $\frac{29}{5}$

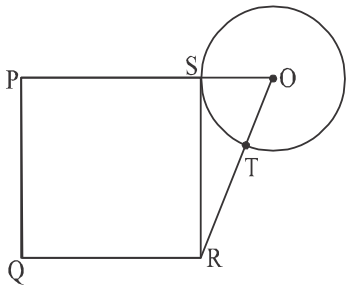
25. If $x = \frac{1}{a}$, $y = \frac{1}{b}$ and $z = \frac{1}{c}$, then $\left(\frac{1}{x}+\frac{1}{y}+\frac{1}{z}\right)^2 - \left(\frac{2}{xy}+\frac{2}{yz}+\frac{2}{zx}\right)$ is equal to

1) $a^2 + b^2 + c^2$ 2) $\frac{1}{a^2}+\frac{1}{b^2}+\frac{1}{c^2}$ 3) 0 4) 1

26. Two numbers are chosen from 1 to 6. The probability for the two numbers to be consecutive out of the set (1, 2), (1, 3), (1, 4), (1, 5), (1, 6), (2, 1), (2, 3), (2, 4), (2, 5), (2, 6), (3, 1), (3, 2), (3, 3), (3, 4)} is

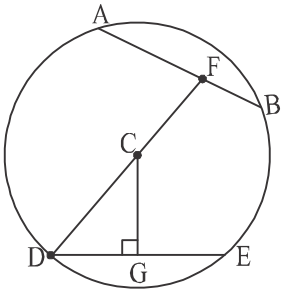
1) $\frac{1}{3}$ 2) $\frac{2}{3}$ 3) $\frac{4}{3}$ 4) $\frac{3}{14}$

27. In the given figure, PQRS is a square. SR is a tangent (at point S) to the circle with centre O and TR = OS. Then, the ratio of the area of circle to the area of square is




1) $\frac{11}{7}$ 2) $\frac{\pi}{3}$ 3) $\frac{3}{\pi}$ 4) $\frac{7}{11}$

28. In the following figure, if AB = 8 cm, DE = 8 cm and CD = 5 cm, then CF is equal to




1) 3 cm 2) 2 cm 3) 5 cm 4) 4 cm

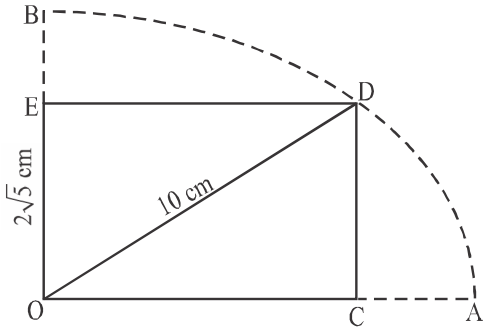
29. In a bag of 25 oranges, 17 were rotten. One orange is chosen at random. Then the probability of getting a fresh orange is

1) 15/25 2) 17/25 3) 8/25 4) None of these

30. ABCD is a parallelogram. E and F are mid-points of AB and CD, respectively. If GH is any line intersecting AD, EF and BC at G, P and H respectively such that GH || AB. Then, the point P is dividing GH in the ratio is

1) 1 : 2 2) 2 : 1 3) 1 : 1 4) 2 : 3

31. In the given figure, OCDE is a rectangle inscribed in a quadrant of circle of radius 10 cm. If $OE = 2\sqrt{5}$ cm, then area of $\Delta ODE$ : area of rectangle OCDE is equal to




1) 2 : 1 2) 1 : 2 3) 1 : 1 4) 1 : 3

32. In a circle of radius 17 cm, two parallel chords are drawn on opposite side of diameter. The distance between the chords is 23 cm. If the length of one chord is 16 cm and the perpendicular distance from centre to the chords are equal. Then, the length of the other chord is

1) 34 cm 2) 15 cm 3) 16 cm 4) 30 cm

**MORE THAN ONE CORRECT ANSWER TYPE:** **9 × 4 = 36**

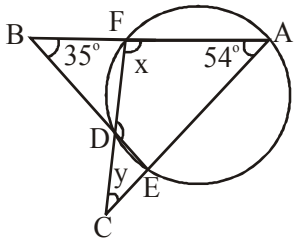
33. Find the values of P and Q, if (x + 2) and (x + 1) are the factors of $x^3 + 3x^2 - 2Px + Q$.

1) P = –1 2) P = 2 3) Q = 1 4) Q = 0

34. If a and b are the zeroes of a polynomial $px^2 - 5x + q$, then the values of p and q, if a+b = ab = 10, are

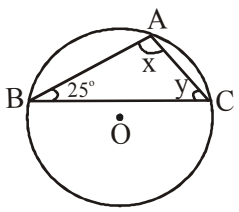
1) p = 1 2) q = 5 3) p = 1/2 4) q = 10

35. In the given figure, AEDF is a cyclic quadrilateral. The values of x and y respectively.




1) y = 47° 2) x = 89° 3) x = 37° 4) y = 37°

36. O is the centre of the circle. For what values of x and y, chord BC will passing through the centre of circle where points A, B and C are on the Circle ?




1) x = 90° 2) y = 65° 3) x = 75° 4) y = 30°

37. If (2, 4), (4, 2) are the extremities of the hypotenuse of a right angled isosceles triangle then the 3rd vertex is

1) (3, 3) 2) (2, 2) 3) (4, 4) 4) (3, 2)

38. 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

39. One card is drawn from a well shuffled deck of 52 cards. The probability of

1) the card will be diamond is 1/4 2) an ace of heart is 1/52
3) not a heart is 3/4 4) king or queen is 1/26

40. If $\frac{A}{a}=\frac{B}{b}=\frac{C}{c}=\frac{D}{d}$, then $\frac{\sqrt{Aa}+\sqrt{Bb}+\sqrt{Cc}+\sqrt{Dd}}{\sqrt{a+b+c+d}\sqrt{A+B+C+D}}$ is

1) 0 2) 1 3) $\frac{(A+B)(a-b)}{(a+b)(A-B)}$ 4) $\frac{(a+b)(A-B)}{(a-b)(A+B)}$

41. If the zeroes of the quadratic polynomial $x^2+(a+1)x+b$ are 2 and –3, then

1) a = –1 2) b = 5 3) b = –6 4) a = 0

❖ ❖ ❖ *All The Best* ❖ ❖ ❖