



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:

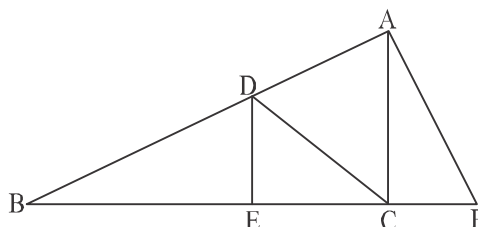
- ✦ This question paper contains 41 questions.
- ✦ First 32 questions (1 to 32) are single correct answer type. Each question carries 2 marks.
- ✦ Next 9 questions (33 to 41) are more than one correct answer type. Each question carries 4 marks.
- ✦ Marks are non deducted for wrong answers. (No negative 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

SINGLE CORRECT ANSWER TYPE:

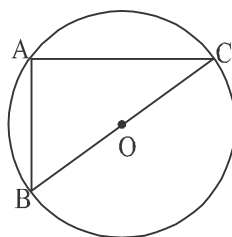
32 × 2 = 64

1. Three numbers which are coprime to each other are such that the product of first two numbers is 42 and the product of last two numbers is 78. Then, the sum of all the three numbers is
1) 25 2) 32 3) 26 4) 13
2. The value of $(0.\overline{2} + 0.\overline{3} + 0.\overline{4} + 0.\overline{9} + 0.\overline{39})$ is
1) 0.57 2) $1\frac{20}{33}$ 3) $\frac{7}{33}$ 4) $2\frac{13}{33}$
3. The value of $4 - \frac{5}{1 + \frac{1}{3 + \frac{1}{2 + \frac{1}{4}}}}$ is
1) $\frac{5}{4}$ 2) $\frac{3}{4}$ 3) $\frac{1}{8}$ 4) $\frac{5}{8}$
4. Simplify: $\frac{1}{x+p} + \frac{1}{x+q} + \frac{1}{x+r} + \frac{px}{x^3+px^2} + \frac{qx}{x^3+qx^2} + \frac{rx}{x^3+rx^2}$
1) $\frac{1}{x+p+q+r}$ 2) $\frac{1}{p} + \frac{1}{q} + \frac{1}{r}$ 3) $\frac{3}{x}$ 4) $\frac{3}{p+q+r}$

5. The pair of equations $4^{x+y} = 256$ and $256^{x-y} = 4$ will be
 1) intersecting 2) parallel 3) coincident 4) Can't be determined
6. From the coordinates of the triangle formed by the line $4x - 5y - 20 = 0$, $3x + 5y - 15 = 0$ and Y-axis, the area of triangle is
 1) 25 sq. units 2) $\frac{25}{2}$ sq. units 3) 35 sq. units 4) $\frac{35}{2}$ sq. units
7. For what value of k, the pair of linear equations $2x - y - 3 = 0$, $2kx + 7y - 5 = 0$ has unique solutions?
 1) $k \neq 8$ 2) $k \neq 7$ 3) $k \neq -7$ 4) All of the above
8. Albert buys 4 horses and 9 cows for ₹13400. If he sells the horses at 10% profit and the cows at 20% profit, then he earns a total profit of ₹1880. The cost of the horse is
 1) ₹2000 2) ₹1000 3) ₹2500 4) ₹3000
9. Three consecutive natural numbers are such that the square of the middle number exceeds the difference of the squares of the other two by 60. Then, the sum of the numbers will be
 1) 40 2) 35 3) 30 4) None of the above
10. The number of terms from 1 to 1000 divisible by 7 are
 1) 142 2) 143 3) 144 4) 141
11. In the given figure, $DE \parallel AC$ and $DC \parallel AP$, such that $BC = 4$ cm and $BP = 6$ cm, then $\frac{BE}{EC}$ is equal to



- 1) 1 : 1 2) 1 : 2 3) 2 : 1 4) 1 : 3
12. In $\triangle ABC$, $\angle BCA = 90^\circ$ and $CD \perp AB$, with $AD = 4$ cm and $BD = 9$ cm. Then, the value of DC is
 1) 8 cm 2) 6 cm 3) 4 cm 4) 10 cm
13. For an acute angle θ , $\sin \theta + \cos \theta$ takes the greatest value when θ is
 1) 30° 2) 45° 3) 60° 4) 90°
14. In the given figure, a triangle is being inscribed in circle with one of its sides as the diameter and length of other side be 3 cm. If the area of the triangle is 6 cm^2 , then area of the circle will be



- 1) $39\frac{2}{7} \text{ cm}^2$ 2) $34\frac{2}{7} \text{ cm}^2$ 3) $31\frac{4}{7} \text{ cm}^2$ 4) $19\frac{9}{14} \text{ cm}^2$

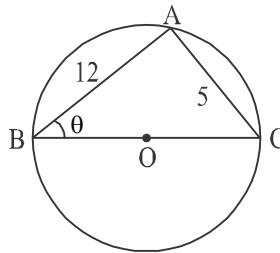
15. If $\sin 17^\circ = \frac{x}{y}$, then the value of $\sec 17^\circ - \sin 73^\circ$ will be

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

16. The probability that in a family of 3 children, there will be atleast one boy, is

- 1) $\frac{1}{2}$ 2) $\frac{1}{8}$ 3) $\frac{7}{8}$ 4) $\frac{3}{4}$

17. A triangle with sides 12 units and 3 units inscribed in circle with BC as diameter, then $\sin^2\theta + \cos^2\theta - 1$ will be



- 1) 1 2) 2 3) 0 4) $\frac{13}{5}$

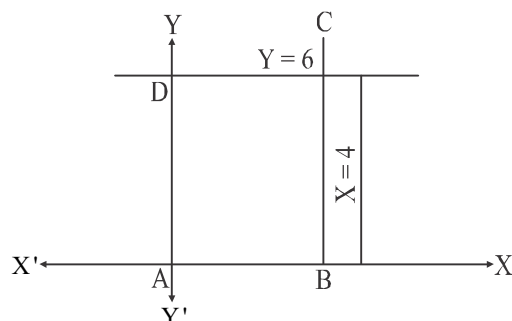
18. The mean of a set of 20 observations is 19.3. The mean is reduced by 0.5 when a new observation is added to the set. The new observation is

- 1) 19.8 2) 9.8 3) 9.2 4) 8.8

19. If the mode of a series exceeds its mean by 24, then mode exceeds median by

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

20. A farmer has to plough a field formed by the line $x = 4$, $y = 6$, X-axis and Y-axis. Then, area of the land ploughed will be

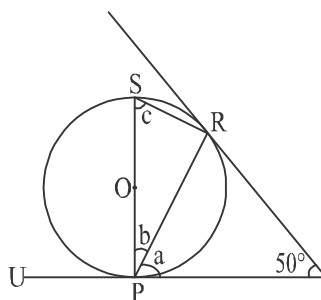


- 1) 12 sq units 2) 24 sq units 3) 48 sq units 4) None of these

21. A and B are two points with coordinates $(-2, 0)$ and $(0, 5)$. What is the length of the diagonal AC, if AB form one of the sides of the square ABCD?

- 1) $\sqrt{29}$ 2) $\sqrt{58}$ 3) $\sqrt{116}$ 4) $2\sqrt{58}$

22. Three numbers are in the ratio 3 : 4 : 5 and their LCM is 1200. Then, their HCF is
- 1) 40 2) 60 3) 20 4) 120
23. Simplify: $\frac{1}{x+p} + \frac{1}{x+q} + \frac{1}{x+r} + \frac{px}{x^3+px^2} + \frac{qx}{x^3+qx^2} + \frac{rx}{x^3+rx^2} =$
- 1) $\frac{1}{x+p+q+r}$ 2) $\frac{1}{p} + \frac{1}{q} + \frac{1}{r}$ 3) $\frac{3}{x}$ 4) $\frac{3}{p+q+r}$
24. If in an AP, the sum of p terms is equal to (q+1) and the sum of q terms is equal to (p+1), then sum of p+q terms is
- 1) $-(p+q)$ 2) $2(p+q)$ 3) $p+q+2$ 4) None of these
25. If $a = 1 + \log_x yz$; $b = 1 + \log_y zx$ and $c = 1 + \log_z xy$ then $ab + bc + ca =$
- 1) $a + b + c$ 2) abc 3) 1 4) 0
26. The value of $\sqrt{\frac{4+2\sqrt{3}}{7+4\sqrt{3}}}$ is
- 1) $\sqrt{1-\sqrt{3}}$ 2) $\sqrt{1+\sqrt{3}}$ 3) $\sqrt{\sqrt{3}-1}$ 4) $\sqrt{3}-1$
27. If the equation $(p^2+r^2)x^2 - 2r(p+q)x + r^2+q^2 = 0$ has equal roots, then
- 1) $2r = p+q$ 2) $r^2 = pq$ 3) $r = \frac{2pq}{p+q}$ 4) $r = pq$
28. In the given figure, find the values of a, b and c respectively.



- 1) $40^\circ, 25^\circ, 65^\circ$ 2) $25^\circ, 65^\circ, 25^\circ$ 3) $25^\circ, 65^\circ, 65^\circ$ 4) $65^\circ, 25^\circ, 65^\circ$
29. The area left after cutting out the largest circle that can be inscribed in a square of length 2a units, is
- 1) $(4\pi + a^2)$ sq. units 2) $(4\pi - a^2)$ sq. units 3) $a^2(4 - \pi)$ sq. units 4) $a^2(2 - \pi)$ sq. units
30. A Mathematician randomly selects a number from 1 to 100 to test the validity of result. What is the probability that the selected number is an odd prime number ?
- 1) $1/5$ 2) $3/25$ 3) $6/25$ 4) $2/25$

31. $\sqrt{-4 + \sqrt{8 + 16\sec^4 \alpha + \cos^4 \alpha}}$ is equal to

- 1) $\sec \alpha - \cos \alpha$ 2) $2\sec \alpha + \cos \alpha$ 3) $2\sec \alpha - \cos \alpha$ 4) None

32. Solve the following and choose the correct option.

$$x \left(a - b + \frac{ab}{a-b} \right) = y \left(a + b - \frac{ab}{a+b} \right), \quad x+y = 2a^2$$

1) $x = \frac{a^3 - b^3}{a}, y = \frac{a^2 - b^2}{b}$

2) $x = \frac{a^2 - b^2}{a}, y = \frac{a^2 - b^2}{b}$

3) $x = \frac{a^3 - b^3}{a}, y = \frac{a^3 - b^3}{b}$

4) None of the above

MORE THAN ONE CORRECT ANSWER TYPE:

9 × 4 = 36

33. If 20% of $x = y$ and 60% of $(x + y)$ is 360, then x and y are

- 1) $x = 500$ 2) $y = 300$ 3) $x = 100$ 4) $y = 100$

34. If $ax^m + bx^n + c = 0$ is a quadratic equation, then

- 1) $m = 1, n = 1$ 2) $m = 2, n = 1$ 3) $m = 1, n = 2$ 4) $m = n = 2$

35. Solve for x and y : $\log_3 x + \log_3 y = 1 + \log_3 2$ and $\log_{125}(x+y) = \frac{1}{3}$

- 1) $y = 3$ 2) $x = 4$ 3) $y = 5$ 4) $x = 2$

36. Which of the following pairs of equations are inconsistent?

1) $3x - y = 8, x - \frac{y}{3} = 3$

2) $4x + 3y = 24, -2x + 3y = 6$

3) $5x - y = 10, 10x - 2y = 20$

4) $-2x + y = 3, -4x + 2y = 10$

37. Which of the following satisfy the equation $a^2b^2x^2 + b^2x - a^2x - 1 = 0$?

1) $\frac{1}{a^2}$

2) $\frac{1}{b^2}$

3) $-\frac{1}{a^2}$

4) $-\frac{1}{b^2}$

38. If $\sin(A + B) = \frac{\sqrt{3}}{2}$ and $\sin 2B = \frac{1}{2}$, then

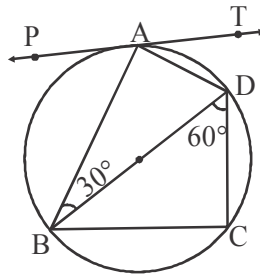
1) $\tan A = 1$

2) $B = 30^\circ$

3) $A = 45^\circ$

4) $\cos A = \frac{1}{2}$

39. In the given fig., ABCD is cyclic quadrilateral and PAT is a tangent line to the circle. If BD is a diameter of the circle, $\angle ABD = 30^\circ$ and $\angle BDC = 60^\circ$, then which of the following is true?



- 1) $\angle TAD = 30^\circ$ 2) $\angle BAD = 90^\circ$ 3) $\angle PAB = 60^\circ$ 4) $\angle CBD = 30^\circ$
40. If $\sin A = \frac{8}{17}$ and A is acute, then
- 1) $\cot A = \frac{15}{8}$ 2) $\sec A - \tan A = \frac{3}{5}$ 3) $\tan A = \frac{15}{8}$ 4) $\operatorname{cosec} A + \cot A = \frac{1}{4}$
41. If $\frac{\cos \theta}{1 - \sin \theta} + \frac{\cos \theta}{1 + \sin \theta} = 4$, then
- 1) $\cos \theta = \frac{\sqrt{3}}{2}$ 2) $\sin \theta = \frac{\sqrt{3}}{2}$ 3) $\theta = 60^\circ$ 4) $\tan \theta = \frac{1}{\sqrt{3}}$

❖ ❖ ❖ *All The Best* ❖ ❖ ❖