SOF
SCIENCE OLYMPIAD FOUNDATION

IMO

SOF INTERNATIONAL MATHEMATICS OLYMPIAD 2025-26

CLASS **10**

QUESTION PAPER SET **A**

Total Questions : 50

Time : 1 hr.

Guidelines for the Candidate

1. You will get additional ten minutes to fill up information about yourself on the OMR Sheet, before the start of the exam.
2. Write your **Name, School Code, Class, Section, Roll No.** and **Mobile Number** clearly on the **OMR Sheet** and do not forget to sign it. We will share your marks / result and other information related to SOF exams on your mobile number.
3. The Question Paper comprises four sections:

   Logical Reasoning (15 Questions), **Mathematical Reasoning** (20 Questions), **Everyday Mathematics** (10 Questions) and **Achievers Section** (5 Questions)

   Each question in Achievers Section carries 3 marks, whereas all other questions carry 1 mark each.
4. All questions are compulsory. There is no negative marking. Use of calculator is not permitted.
5. There is only ONE correct answer. Choose only ONE option for an answer.
6. To mark your choice of answers by darkening the circles on the OMR Sheet, use **HB Pencil** or **Blue / Black ball point pen** only. E.g.

   Q. 16: Navya purchased a hand bag for ₹ 345.50, a pair of shoes for ₹ 480.25 and a cap for ₹ 75.50. How much money did she spend in all?

   A. ₹ 901.25 B. ₹ 785.50 C. ₹ 895.75 D. ₹ 920.25

   As the correct answer is option A, you must darken the circle corresponding to option A on the OMR Sheet.

   16. ● Ⓑ Ⓒ Ⓓ
7. Rough work should be done in the blank space provided in the booklet.
8. Return the OMR Sheet to the invigilator at the end of the exam.
9. Please fill in your personal details in the space provided before attempting the paper.

Name:.....

SOF Olympiad Roll No.:.....

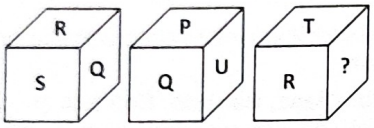
Contact No.:.....

DO NOT OPEN THIS BOOKLET UNTIL ASKED TO DO SO

1. In a certain code language,
'winds are heavy' is written as '416' ;
'heavy floods and rain' is written as '2713' ;
'winds and floods' is written as '247' and
'water are floods' is written as '682'.
Which of the following numbers is written as 'rain' in the same code language?

A. 6 B. 4
C. 3 D. 7

2. Three different positions of a cube are given below. Find the missing alphabet.

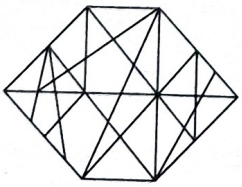


A. T B. P
C. S D. U

3. A word arrangement machine when given a particular input line of words, rearranges them following a particular rule in each step. The following is an illustration of input and steps of rearrangement.
Input : every practice makes the man success
Step I : the every practice makes man success
Step II : the success every practice makes man
Step III : the success practice every makes man
Step IV : the success practice man every makes
Step V : the success practice man makes every
And step V is the last step of the given input.
As per the rule followed in the above steps, which of the following will be the second step for the given input?
Input : hard work brings success and wealth

A. work wealth hard brings success and
B. wealth work success hard brings and
C. work wealth hard success brings and
D. wealth work hard brings success and

4. Which of the following figures is exactly embedded in the given figure as one of its parts?

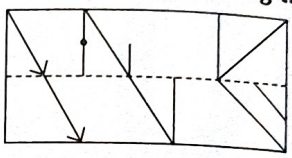


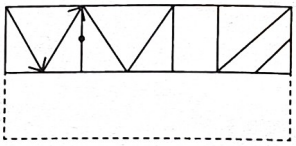
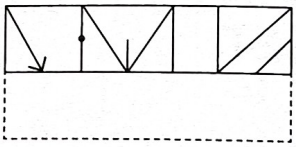
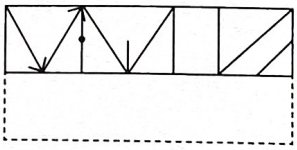
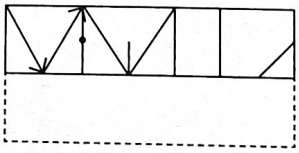
A. 
B. 
C. 
D. 

5. If 4 @ 8 = 32, 4 # 8 = 12 and 4 $ 8 = 0.5, then find the value of (192 $ 12)@ (9 # 4) # (27 $ 9).

A. 211 B. 223
C. 301 D. 198

6. A rectangular transparent sheet with a pattern and a dotted line on it is given. Select a figure from the options as to how the pattern would appear when the transparent sheet is folded along the dotted line.



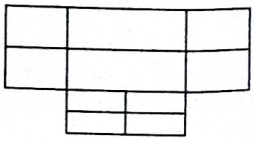
A. 
B. 
C. 
D. 

7. There is a certain relationship between the pair of numbers on the either side of ::. Identify the relationship of the given pair and find the missing number.

247 : ? :: 836 : 288

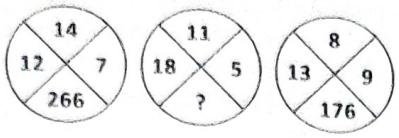
A. 112 B. 96
C. 128 D. 76

8. Find the number of rectangles formed in the given figure.



A. 22 B. 24
C. 25 D. More than 25

9. Find the missing number, if same rule is followed in all the three figures.

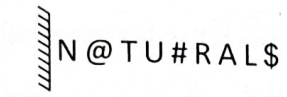


A. 316 B. 253
C. 281 D. 264

10. Nakul is 16^{th} from the left end in a row of boys and Pawan is 18^{th} from the right end. Aditya is 11^{th} from Nakul towards the right and 3^{rd} from Pawan towards the right end. How many boys are there in the row?

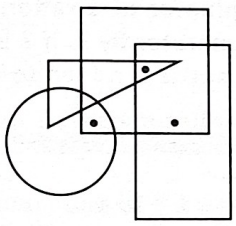
A. 42 B. 40
C. 39 D. None of these

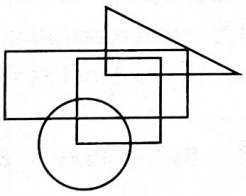
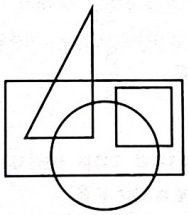
11. Select the correct mirror image of the given combination of letters and symbols.

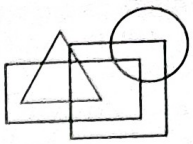


A. ИТ@∩#ЯАГ$ B. $ГАЯ#∩Т@N
C. $ГАЯ#UT@И D. ИТ@∩#ЯАГ$

12. Select a figure from the options which does not satisfy the same conditions of placement of the dots as in the given figure.



A.  B. 

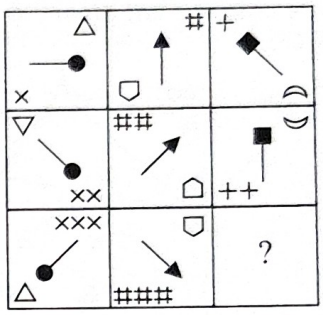
C.  D. 

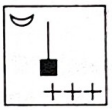
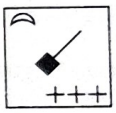
13. In the following letter series, some of the letters are missing which are given in that order as one of the options below it. Choose the correct option.

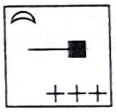
c_bba_cab_ac_ab_ac

A. abcbc B. acbcb
C. babcc D. abcab

14. Select a figure from the options which will complete the given figure matrix.



A.  B. 

C.  D. 

15. If it is possible to form only one meaningful English word with second, third, fifth and sixth letters of the word ARGUMENTS, then which of the following will be the third letter of that word? If no such word can be formed, then give 'X' as your answer and if more than one such word can be formed, then give 'Y' as your answer.

A. R B. X
C. M D. Y

MATHEMATICAL REASONING

16. If α and β are the zeroes of the quadratic polynomial $f(x) = x^2 - ax + b$, then $\frac{\alpha^2}{\beta^2}+\frac{\beta^2}{\alpha^2}$ is equal to

A. $\frac{a^4}{b^2}-\frac{4a^2}{b}+2$ B. $\frac{a^4}{b^2}+\frac{4a^2}{b}+2$

C. $\frac{a^2}{b^4}-\frac{4a^2}{b^4}+2$ D. $\frac{a^2}{b^2}-\frac{4a^2}{b^2}-2$

17. $ABCD$ is a cyclic quadrilateral such that $\angle A + \angle B = 2(\angle C + \angle D)$. If $\angle C > 30°$, then which one of the following is correct?

A. $\angle D \geq 90°$ B. $\angle D < 90°$
C. $\angle D \leq 90°$ D. $\angle D > 90°$

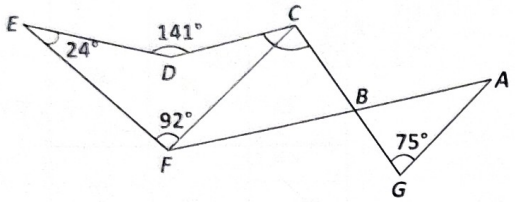
18. If mode of a series exceeds its mean by 12, then mode exceeds the median by

A. 4 B. 8
C. 6 D. 10

19. What is the greatest number of 5 digits which is exactly divisible by 24, 54, 27 and 36?

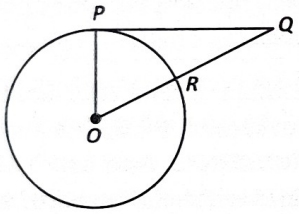
A. 99792 B. 99576
C. 99999 D. 99874

20. The figure below is not drawn to scale. Find $\angle GCD$, if $AG \parallel CF$.



A. 25° B. 75°
C. 100° D. 141°

21. In the given figure (not drawn to scale), PQ is a tangent drawn to the circle with centre O at P and $QR = RO$. If $PQ = 5\sqrt{3}$ cm and ORQ is a line segment, then find the radius of the circle.



A. $\sqrt{15}$ cm B. 5 cm
C. $3\sqrt{5}$ cm D. $\frac{5}{3}$ cm

22. Which among the following can be the vertices of an equilateral triangle?

A. (2, 3), (5, 4), (7, 8)
B. (3, −6), (5, −9), (6, −12)
C. (3, −3), (−3, 3), $(-3\sqrt{3}, -3\sqrt{3})$
D. All of these

23. If a number is selected at random from the first 20 natural numbers, then find the probability that it is not a prime number.

A. $\frac{1}{5}$ B. $\frac{3}{5}$
C. $\frac{2}{5}$ D. $\frac{4}{5}$

24. A cylindrical tub of radius 5 cm and height 9.8 cm is full of water. A solid in the form of a right circular cone mounted on a hemisphere is immersed into the tub. If the radius of the hemisphere is 3.5 cm and the height of the cone outside the hemisphere is 5 cm, then find the volume of water left in the tub. (Take : $\pi = \frac{22}{7}$)

A. 616 cm^3 B. 600 cm^3
C. 535 cm^3 D. 716 cm^3

25. If $\sin A + \text{cosec } A = 2$, then what is the value of $\frac{\sin^4 A + 2}{2\sin^2 A}$?

A. 0 B. 1
C. $\frac{1}{2}$ D. None of these

26. Which of the following is not equal to $\left\{\left(\frac{2}{3}\right)^{1/2}\right\}^{-1/3}$?

A. $\left(\frac{2}{3}\right)^{\frac{1}{2}\frac{1}{3}}$ B. $\frac{1}{\left\{\left(\frac{2}{3}\right)^{1/2}\right\}^{1/3}}$
C. $\left(\frac{3}{2}\right)^{1/6}$ D. $\left(\frac{2}{3}\right)^{-1/6}$

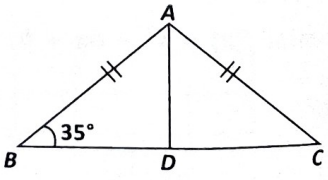
27. The denominator of a rational number is greater than its numerator by 3. If 3 is subtracted from the numerator and 2 is added to the denominator, the new number becomes $\frac{1}{5}$. Then the original number was _____.

A. $\frac{7}{11}$ B. $\frac{3}{5}$
C. $\frac{5}{8}$ D. $\frac{4}{7}$

28. Find the value of $x^3 - 8y^3 - 36xy - 216$, when $x = 2y + 6$.

A. −1 B. 2
C. 0 D. 3

29. In the given figure (not drawn to scale), if ABC is an isosceles triangle such that $AB = AC$ and AD is the median to base BC, then $\angle BAD$ =



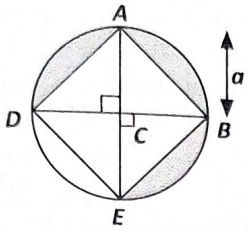
A. 55° B. 70°
C. 35° D. 110°

30. Three positive integers a_1, a_2 and a_3 are in increasing A.P. such that $a_1 + a_2 + a_3 = 33$ and $a_1 \times a_2 \times a_3 = 1155$. Find the values of a_1, a_2, a_3.

A. 15, 20, 17 B. 8, 10, 15

C. 7, 11, 15 D. 7, 15, 20

31. The area of the shaded region in the given figure, where C is the centre of the circle, is



A. $\frac{a^2}{2}\left(\frac{\pi}{2}-1\right)$ sq. units B. $a^2(\pi - 1)$ sq. units

C. $a^2\left(\frac{\pi}{2}-1\right)$ sq. units D. $\frac{3a^2}{2}\left(\frac{\pi}{2}-1\right)$ sq. units

32. Which of the following is not a Euclidean postulate?

A. All right angles are equal to one another.

B. A straight line may be drawn from any one point to any other point.

C. A terminated line can be produced indefinitely.

D. Two distinct lines cannot have more than one common point.

33. If the area of an isosceles triangle, having base 4 cm and length of one of equal sides as 6 cm, is $k\sqrt{2}$ cm^2, then the value of k is

A. 8 B. 6

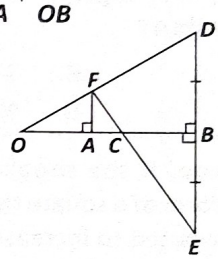
C. 4 D. 5

34. From a point on the ground, 15 m away from the foot of a tree, the angle of elevation of the top of the tree is 30°. Find the ratio of the distance of the point from the top of the tree to the height of the tree. (Take : $\sqrt{3} = 1.732$).

A. 1 : 2 B. 2 : 1

C. 3 : 1 D. $1 : \sqrt{3}$

35. In the given figure, OB is perpendicular bisector of the line segment DE, $FA \perp OB$ and FE intersects OB in C. Then $\frac{1}{OA}+\frac{1}{OB}$ =



A. $\frac{3}{OC}$ B. $\frac{1}{OC}$

C. $\frac{2}{OC}$ D. None of these

EVERYDAY MATHEMATICS

36. Mohit has two coins, one of ₹ 1 denomination and the other of ₹ 2 denomination. He tosses the two coins simultaneously. What is the probability that he gets at least one head?

A. $\frac{1}{4}$ B. $\frac{1}{2}$

C. $\frac{3}{4}$ D. 0

37. Deepak invested some amount at the rate of 12% simple interest and some other amount at the rate of 10% simple interest. He received yearly interest of ₹ 260. But, if he had interchanged the amounts invested, he would have received ₹8 more as interest. The amount he invested at 12% and 10% rate respectively are

A. ₹ 1000, ₹ 1400 B. ₹ 1400, ₹ 1000

C. ₹ 1000, ₹ 1000 D. ₹ 1200, ₹ 1600

38. Raghav buys a shop for ₹ 120000. He pays half of the amount in cash and agrees to pay the balance in 12 annual installments of ₹ 5000 each. If the rate of interest is 12% and he pays the interest due on the unpaid amount with the installment, then find the total cost of the shop.

A. ₹ 156800 B. ₹ 156700

C. ₹ 165200 D. ₹ 166800

39. Amit can complete $\left(\frac{1}{4}\right)^{th}$ of a work in 10 days, Varun can complete $\left(\frac{1}{3}\right)^{rd}$ of the work in 13 days and Gaurav can complete 40% of the work in 15 days. Who will complete the work first, if they start working together?

A. Amit

B. Varun

C. Gaurav

D. All the three will complete at same time

40. A man rows (to and fro) to a place of distance 35 km in 6 hours. He find that he can row 7 km with the stream in the same time as 5 km against the stream. Find the speed of stream.

A. 1 km/hr B. 2 km/hr
C. 3 km/hr D. 4 km/hr

41. Spherical marbles of diameter 1.4 cm are dropped into a cylindrical beaker containing some water and are fully submerged. The diameter of the beaker is 7 cm. How many marbles have been dropped in it, if the water rises by 5.6 cm?

A. 350 B. 250
C. 200 D. 150

42. Four bells begin to ring together and rings respectively at an intervals of 4, 6, 10 and 25 seconds. How many times will they ring together in an hour excluding the one at the start?

A. 10 B. 12
C. 15 D. None of these

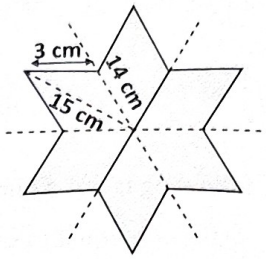
43. In a bangle shop, if the shopkeeper displays the bangles in the form of a square then he is left with 38 bangles. If he wanted to increase the size of square by one unit each side of the square he found that 25 bangles fall short of in completing the square. The actual number of bangles which he had with him in the shop was _____.

A. 1690
B. 999
C. 538
D. Can't be determined

44. If a person is standing at point M, whose coordinates are $(-2, 9)$ which can also be expressed as $(1 + x, y^2)$ and $y > 0$, then the quadrant in which person standing at point $(2x, -3y)$, is

A. I B. III
C. II D. IV

45. Kirti made the following design. Find area of symmetrical floral design. (Use : $\sqrt{26} = 5.10$)



A. 244.80 cm^2 B. 422.80 cm^2
C. 755.20 cm^2 D. None of these

ACHIEVERS SECTION

46. Read the statements carefully and state T for true and F for false.

(i) The first negative term of the progression $20, 19\frac{1}{4}, 18\frac{1}{2}, 17\frac{3}{4}, \ldots$ is the 27^{th} term.

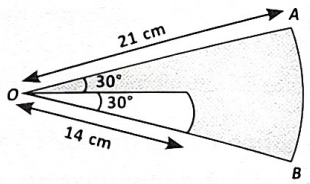
(ii) If p^{th} term of an A.P. is $\frac{1}{q}$ and q^{th} term is $\frac{1}{p}$, then sum of (pq) terms is $\frac{1}{2}(pq+1)$.

(iii) The sum of all two digit natural numbers which when divided by 3 leaves 1 as remainder is 1780.

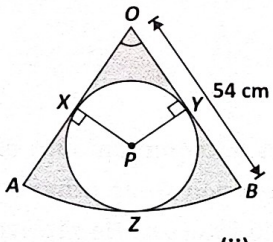
	(i)	(ii)	(iii)
A.	F	T	T
B.	F	T	F
C.	T	F	T
D.	T	F	F

47. Solve the following and select the correct option.

(i) In the given figure, there are two sectors with angle 30° and 60°, their radii are 14 cm and 21 cm respectively. Both have centre O. Find the perimeter of the shaded region.



(ii) The given figure shows sector OAB with centre O and radius 54 cm. Another circle XYZ with centre P is enclosed by the sector OAB. If $\angle AOB = 60°$, then find the area of $OXPY$. (Use: $\sqrt{3} = 1.732$)



	(i)	(ii)
A.	154 cm	15.67 cm^2
B.	$\frac{214}{3}$ cm	561.2 cm^2
C.	$\frac{155}{3}$ cm	561.2 cm^2
D.	None of these	

48. Fill in the blanks and select the correct option.

(i) If p and q be the roots of the quadratic equation $x^2 - (\alpha - 2)x - \alpha - 1 = 0$. Then the minimum possible values of $p^2 + q^2$ is _____.

(ii) The sum of values of k, for which the equation $(3k + 1)x^2 + 2(k + 1)x + k = 0$ have equal roots is _____.

(iii) The values of k for which the equation $x^2 - 4x + k = 0$ has distinct real roots is _____.

	(i)	(ii)	(iii)
A.	5	1/2	$k < 4$
B.	4	1	$k > 4$
C.	5	1/2	$k < 2$
D.	5	1/2	$k > 4$

49. Read the given statements carefully and select the correct option.

Statement-I : A ladder rests against a wall at an angle α to the horizontal. Its foot is pulled away from the wall through a distance 'a', so that it slides a distance 'b' down the wall making an angle β with the horizontal. The value of $\frac{a}{b}$ is $\frac{\sin\alpha + \sin\beta}{\cos\alpha + \cos\beta}$.

Statement-II : If an aeroplane at an altitude of 200 m observes the angles of depression of opposite points on the two banks of a river to be 45° and 60°, then the width of the river is 250 m.

A. Statement-I is true but Statement-II is false.
B. Statement-I is false but Statement-II is true.
C. Both Statement-I and Statement-II are true.
D. Both Statement-I and Statement II are false.

50. Solve the following and select the correct option.

(i) The three consecutive vertices of a parallelogram are $(a + b, a - b)$, $(2a + b, 2a - b)$, $(a - b, a + b)$. The fourth vertex is _____.

(ii) The line segment joining the points (3, –4) and (1, 2) is trisected at the points P and Q. If the coordinates of P and Q are $(p, -2)$ and $(5/3, q)$ respectively, then the value of $p^2 + q^2$ is _____.

	(i)	(ii)
A.	$(-a, -b)$	$\frac{7}{3}$
B.	$(-b, b)$	$\frac{4}{7}$
C.	$(-b, b)$	$\frac{49}{9}$
D.	$(-a, -b)$	$\frac{9}{49}$

SPACE FOR ROUGH WORK