SCIENCE OLYMPIAD FOUNDATION

Inspiring Young Minds
Through Knowledge Olympiads

CLASS 8

QUESTION PAPER SET
C

DO NOT OPEN THIS BOOKLET UNTIL ASKED TO DO SO

Name:.....

SOF Olympiad Roll No.:.....

Contact No.:.....

Total Questions: 50 Time: 1 hr.

IMO

SOF INTERNATIONAL MATHEMATICS OLYMPIAD 2022-23

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, 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 one 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.

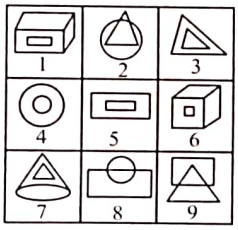
   Q.16: Rahul bought 4 kg 90 g of apples, 2 kg 60 g of grapes and 5 kg 300 g of mangoes. The total weight of all the fruits he bought is_____.

   A. 11.450 kg B. 11.000 kg C. 11.350 kg D. 11.250 kg

   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 on this page before attempting the paper.

1. Group the given figures into three classes on the basis of their identical properties using each figure only once.



A. 1, 2, 8; 3, 7, 9; 4, 5, 6
B. 1, 6, 7; 2, 8, 9; 3, 4, 5
C. 1, 2, 5; 3, 4, 7; 6, 8, 9
D. 1, 6, 9; 2, 5, 7; 3, 4, 8

2. How many such pairs of letters are there in the word INDIGENOUS each of which has the same number of letters between them in the word as in the English alphabets?

A. None
B. One
C. Two
D. More than two

3. Select the odd one out.

A. 31 - 37
B. 17 - 19
C. 23 - 29
D. 13 - 15

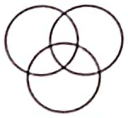
4. Select a number from the options which will complete the given number pattern.

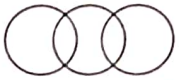
8 , 36 , 149 , 602 , ? , 9668

A. 2415
B. 3015
C. 1012
D. 2419

5. Which of the following Venn diagrams best represents the relationship amongst, " Wooden items, Chairs and Tables"?

A. 

B. 

C. 

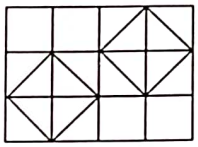
D. 

6. P, Q, R, S, T, U, V and W are sitting around a circle facing the centre. Q is second to the right of W and third to the left of P. S is sitting second to the right of U. Also, S is not an immediate neighbour of either Q or W. R is fourth to the right of V and immediate neighbour of S.

Who is sitting between W and Q?

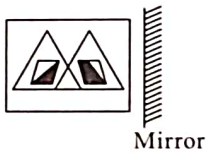
A. V
B. T
C. R
D. U

7. Find the number of squares formed in the given figure.

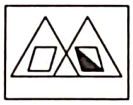


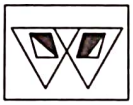
A. 16
B. 18
C. 20
D. More than 20

8. Select the correct mirror image of the given figure.



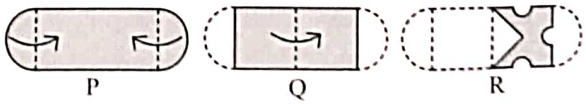
A. 

B. 

C. 

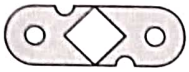
D. 

9. The given question consists of a set of three figures P, Q and R showing a sequence of folding of a piece of paper. Fig. R shows the manner in which the folded paper has been cut. Select a figure from the options which would most closely resemble the unfolded form of Fig. R.



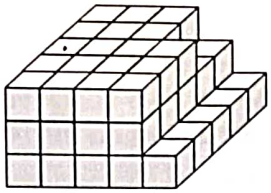
A. 

B. 

C. 

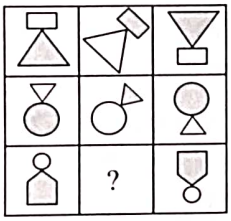
D. 

10. Count the number of cubes in the given figure.



A. 63
B. 50
C. 60
D. None of these

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



A. 

B. 

C. 

D. 

12. The following digits are coded as follows.

Digits	1	2	5	6	9	3	4	0	8	7
Codes	Z	#	$	©	L	T	@	A	%	R

While coding the given number, following conditions are also to be observed.

Conditions :

(i) If the first digit is odd and the last digit is even, then their codes are to be interchanged.

(ii) If the first as well as the last digit is even, then both are to be coded as *.

(iii) If the first digit is even and the last digit is odd, then both are to be coded as the code for the last digit.

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A. R$A@#*
B. *$A@#*
C. R$A@#L
D. *A$@#*

13. Amit starts from point Q and moves 10 metres towards South, then he turns left and moves 15 metres, then he turns right and moves 10 metres to reach point P. How far and in which direction will he be now with respect to point Q?

A. 25 metres, South-West
B. 25 metres, South-East
C. 45 metres, South-East
D. 40 metres, South

14. If the middle digit of each number is increased by 2 before arranging all the numbers in ascending order, then which of the following will be the last digit of the smallest number formed?

715 529 348 618 377 813

A. 5
B. 4
C. 8
D. 7

15. If '–' means '÷', '×' means '+', '+' means '×' and '÷' means '–', then which of the following equations is true?

A. $4 - 2 \times 10 \div 2 \div 2 = 20$
B. $4 + 2 - 10 \times 2 \div 2 = 20$
C. $4 - 2 \times 2 + 10 \div 2 = 20$
D. None of these

MATHEMATICAL REASONING

16. If $\frac{4}{7}$ of a number is subtracted from $\frac{2}{3}$ of the same number, then the result is 8. What will be the value of $\frac{3}{2}$ times of the same number?

A. 198
B. 126
C. 174
D. 162

17. If $a = \sqrt{4.84}$ and $b = \sqrt{4.41}$, then find the value of $\frac{a+b}{a-b}$.

A. 3.6
B. 22
C. 4.8
D. 43

18. One of the factors of $(p+q)^2 - (a-b)^2 + p + q - a + b$ is

A. $(p + q + a + b)$
B. $(p + q - a + b)$
C. $(p - q + a - b)$
D. $(p - q + a + b)$

19. In a basket of fruits, there are 7 apples, 12 oranges and 9 pomegranates. A fruit is taken out from the basket. Find the probability that the fruit is not an orange.

A. $\frac{4}{7}$
B. $\frac{5}{14}$
C. $\frac{3}{7}$
D. $\frac{9}{14}$

20. Find the value of z in the given equation.

$$\frac{1}{3}\left(5z - \frac{11}{4}\right) + \frac{7}{8} = \frac{7}{4}\left(z - \frac{1}{2}\right)$$

A. 10
B. −10
C. 12
D. −12

21. Which of the following options represents the given expression in usual form?

$$\frac{5000 \times 10^{-7} + 7 \times 10^{-4}}{6 \times 10^{-4} + 80000 \times 10^{-8}}$$

A. $\frac{4}{9}$
B. $\frac{3}{4}$
C. $\frac{2}{5}$
D. $\frac{6}{7}$

22. At $x = 2$ and $y = -1$, find the product of $\frac{2}{3}\left(\frac{4}{3}x - \frac{2}{3}y\right)$ and $(2x + y)$.

A. $\frac{19}{2}$
B. $\frac{20}{3}$
C. $\frac{11}{2}$
D. $\frac{17}{3}$

23. A T.V. worth ₹ 7200 is offered for sale at ₹ 4800. What percent discount is offered during the sale?

A. (98/3)%
B. (100/3)%
C. (46/3)%
D. (77/3)%

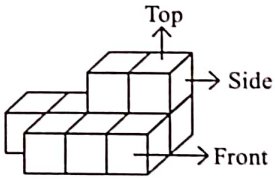
24. The curved surface area of a cylinder is 154 cm^2. If height of the cylinder is 3.5 cm, then find its volume.

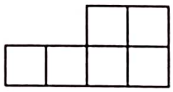
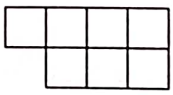
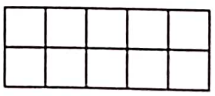
A. 424 cm^3
B. 348 cm^3
C. 539 cm^3
D. 612 cm^3

25. Simplify : $\frac{3.65 \times 2.35 + 36.2 \times 23.5}{0.25}$

A. 3417.11
B. 3437.11
C. 2317.12
D. 1417.11

26. Which of the following options is the top view of the given figure?



A. 
B. 
C. 
D. 

27. Find the median and mode respectively of the given data.

5, 2, 7, 3, 6, 7, 2, 5, 7

A. 4, 3
B. 5, 7
C. 4, 7
D. 5, 3

28. The sum of the cubes of three different numbers is 4256. Find the smallest number among them, if the numbers are in the ratio of 4 : 5 : 7.

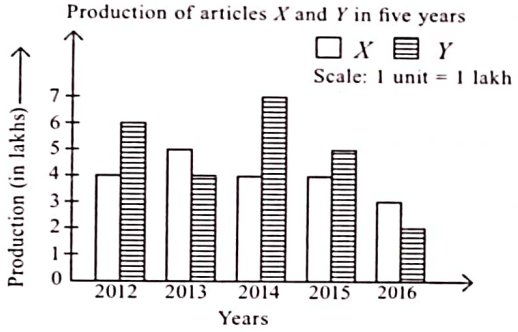
A. 10
B. 8
C. 14
D. 2

29. Simplify :

$$\left[\frac{52}{45}\times\frac{75}{78}+\frac{14}{15}\times\left(\frac{57}{77}\div\frac{19}{11}\right)\right]\div 1\frac{8}{9}$$

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

30. Study the double bar graph given below and answer the question that follows.



What was the ratio of the total production of article X to the total production of article Y?

A. 12 : 11
B. 1 : 2
C. 11 : 12
D. 5 : 6

31. If x varies directly as y, then find the value of $a_1 + a_2$.

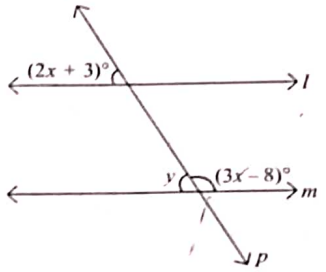
x	20	a_1	16
y	180	432	a_2

A. 192
B. 144
C. 184
D. 156

32. The number of sides of a regular polygon whose each exterior angle has a measure of 60° is _____.

A. 7
B. 6
C. 11
D. 9

33. In the given figure (not drawn to scale), if $l \| m$, then find the value of y.



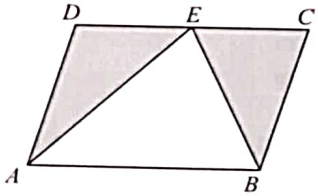
A. 103°
B. 67°
C. 77°
D. 113°

34. How many of the following letters have at least one line of symmetry in the given word?

EXAMINATION

A. 8
B. 10
C. 5
D. 9

35. In the given figure (not drawn to scale), $ABCD$ is a parallelogram whose side AB is 27 cm. If the perpendicular distance between parallel sides AB and DC is 8 cm, then find the area of the shaded region.



A. 216 cm²
B. 156 cm²
C. 184 cm²
D. None of these

36. Arvind borrows ₹ 8000 at $r\%$ p.a. compound interest for 3 years. If he paid back ₹ 12167, then find at what rate of interest he had borrowed the money?

A. 15 %
B. 10 %
C. 12 %
D. 20 %

37. Amisha bought a cuboidal vessel of capacity 1.47 litres. Find the area of base of the vessel, if its height is 5 cm. [1 litre = 1000 cm^3]

A. 196 cm^2
B. 294 cm^2
C. 148 cm^2
D. 232 cm^2

38. The perimeter of a triangular field is $6p^2 - 4p + 9$ and two of its sides are $p^2 - 2p + 1$ and $3p^2 - 5p + 3$. Find the third side of the field.

A. $8p^2 + 11p - 7$
B. $2p^2 + 3p + 5$
C. $3p^2 + 5p - 4$
D. $5p^2 - 5p + 9$

39. Weight of a tiny piece of diamond is 0.00000007511 g. Express this in standard form.

A. 7.511×10^8 g
B. 7.511×10^{-11} g
C. 7.511×10^{-8} g
D. 7.511×10^{11} g

40. A slide is made in a park for the children to play. The top of the slide is at the height of 2.4 m from a point on the ground and the distance of the bottom of the slide from that point is 0.7 m. Find the length of the slide.

A. 5.4 m
B. 3.2 m
C. 4.5 m
D. 2.5 m

41. Tushar walks for $1\frac{2}{3}$ hours at a speed of 7.2 km/h and runs for $2\frac{1}{4}$ hours at a speed of 8.6 km/h. How much total distance will be covered by Tushar in total $3\frac{11}{12}$ hours ?

A. 34.65 km
B. 27.45 km
C. 36.65 km
D. 31.35 km

42. A pipe X can fill a water tank in $1\frac{1}{3}$ hours and an another pipe Y can fill the same water tank in $1\frac{1}{2}$ hours. If both pipes are opened together, then in how many hours will they fill the water tank?

A. $\frac{16}{19}$ hour
B. $\frac{14}{17}$ hour
C. $\frac{13}{19}$ hour
D. None of these

43. Ankit went to visit a sacred place with his family. He had a total of ₹ 37,800. He spent $\frac{4}{9}$ of the total amount on fare and $\frac{5}{7}$ of the remaining amount on of food and stay. How much amount is left with him now?

A. ₹ 6000
B. ₹ 9500
C. ₹ 7000
D. ₹ 10700

44. Ahana bought a scooty for ₹ 66000. After using it for 2 years, she sold it. If its value gets depreciated by 20% and 15% annually respectively, then what amount will she get for the scooty?

A. ₹ 42740
B. ₹ 36840
C. ₹ 44880
D. ₹ 60000

45. A certain number of men went to a hotel. Each man spent as many rupees as one-fourth of the total number of men. If the total bill paid was ₹ 20449, then how many men visited the hotel?

A. 286
B. 284
C. 281
D. 283

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

(i) The rational number $\frac{228}{91}$ should be subtracted from $\frac{27}{13}$ to get $-\frac{3}{7}$.

(ii) The value of $\left(\frac{-7}{18}\times\frac{15}{-7}\right)-\left(1\times\frac{1}{4}\right)+\left(\frac{1}{2}\times\frac{1}{4}\right)$ is $\frac{17}{18}$.

(iii) The multiplicative inverse of $\left(\frac{-9}{10}+\frac{2}{5}\right)$ is $\frac{1}{2}$.

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

47. Match the following and select the correct option.

	Column - I	Column - II
(P)	If $7(2x - 3) - 4 = \frac{1}{3}(7x - 3) + 11$, then $x =$ ___.	**(i)** 11
(Q)	If $p+\frac{2p+3}{5}=\frac{4p+6}{3}-1$, then, $p =$ ___.	**(ii)** 3
(R)	If $0.3\ (5y - 6) = -\ 0.7(23 - 4y)$, then $y =$ ___.	**(iii)** 6

A. (P) → (ii); (Q) → (iii); (R) → (i)
B. (P) → (ii); (Q) → (i); (R) → (iii)
C. (P) → (i); (Q) → (ii); (R) → (iii)
D. (P) → (iii); (Q) → (ii); (R) → (i)

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

(i) The cost of digging a cuboidal pit which is 8 m long, 6 m broad and 3 m deep at the rate of ₹ 30 per m^3 is ₹ **P**.

(ii) A petrol tank is in the form of a cylinder diameter of which is 3 m and length is 7 m. The quantity of petrol that can be stored in it is **Q** litres. (1000 cm^3 = 1 litre)

	P	Q
A.	4320	35800
B.	4080	49000
C.	4320	49500
D.	3150	30500

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

Statement - I : If $\left(\frac{a}{b}\right)^{-7x}\times\left(\frac{b}{a}\right)^{5}=\left(\frac{b}{a}\right)^{13}\times\left(\frac{a}{b}\right)^{2x}$, then $\sqrt{10x+9}=25$.

Statement - II : If $(2^{3x-1}+10)\div 7=6$, then the value of x is 3.

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 false.
D. Both Statement - I and Statement - II are true.

50. A bag has 5 black marbles, 7 white marbles and 8 blue marbles. A marble is drawn from the bag without looking into the bag. Find the probability of getting

(i) a blue marble
(ii) a white marble
(iii) neither white nor blue marble.

	(i)	(ii)	(iii)
A.	$\frac{2}{5}$	$\frac{7}{20}$	$\frac{1}{4}$
B.	$\frac{1}{5}$	$\frac{3}{20}$	$\frac{2}{5}$
C.	$\frac{2}{5}$	$\frac{1}{5}$	$\frac{3}{5}$
D.	$\frac{1}{4}$	$\frac{1}{7}$	$\frac{3}{20}$

SPACE FOR ROUGH WORK

SPACE FOR ROUGH WORK

SOF SCIENCE OLYMPIAD FOUNDATION

National Office: Plot 99, First Floor, Sector 44 Institutional area, Gurugram -122 003 (HR) India
Email: info@sofworld.org | Website: www.sofworld.org
Regd. Office: 406, Taj Apt., Ring Road, New Delhi-110 029
Note: Please address all communication to the National Office only.