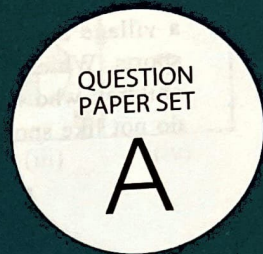
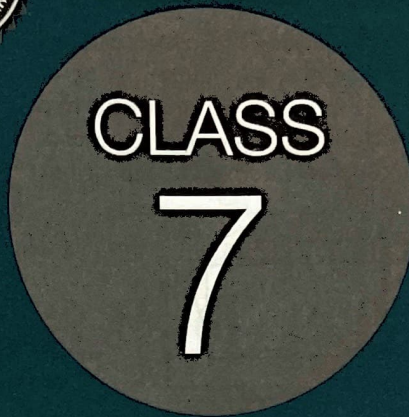




**SOF INTERNATIONAL  
MATHEMATICS OLYMPIAD  
2023-24**



**DO NOT OPEN THIS BOOKLET UNTIL ASKED TO DO SO**

Total Questions: 50 | Time: 1 hr.

**Guidelines for the Candidate**

- You will get additional ten minutes to fill up information about yourself on the OMR Sheet, before the start of the exam.
- 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.
- The Question Paper comprises four sections:

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

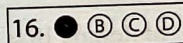
Each question in Achievers Section carries 3 marks, whereas all other questions carry one mark each.

- All questions are compulsory. There is no negative marking. Use of calculator is not permitted.
- There is only ONE correct answer. Choose only ONE option for an answer.
- 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.



- Rough work should be done in the blank space provided in the booklet.
- Return the OMR Sheet to the invigilator at the end of the exam.
- Please fill in your personal details in the space provided before attempting the paper.

Name:.....

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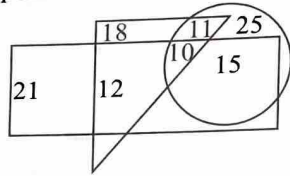
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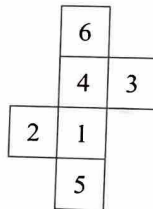
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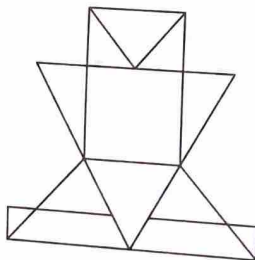
1. In the given Venn diagram, rectangle represents children going to school, circle represents children living in a village and triangle represents children who like sports. Which of the following numbers represents children who live in a village and go to school but do not like sports?



- A. 12  
B. 10  
C. 15  
D. 11
- 
2. How many such pairs of letters are there in the word DIGITAL each of which has as many letters between them in the word as in the English alphabets?
- A. One  
B. Two  
C. Three  
D. Four
- 
3. Which of the following numbers lies on the face opposite to the face having number 2, when the given net is folded to form a cube?



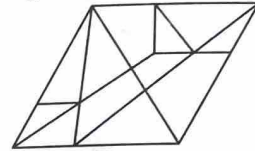
- A. 4  
B. 3  
C. 6  
D. 5
- 
4. Find the number of triangles formed in the given figure.



- A. 10  
B. 11  
C. 12  
D. More than 12

5. Raj is the brother of Aman. Shruti is the mother of Aman and wife of Amit. If Soumya is the mother of Amit, then how is Raj related to Soumya?
- A. Son  
B. Grandfather  
C. Grandson  
D. Brother

6. Select a figure from the options which is exactly embedded in the given figure as one of its parts.

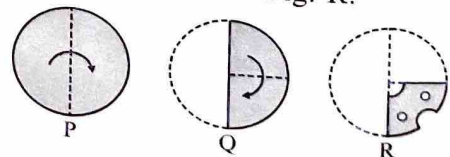


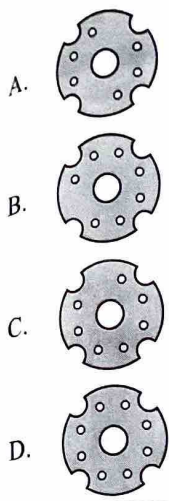
- A.
- B.
- C.
- D.

7. Select the correct mirror image of the given word, if the mirror is placed vertically to the left.

PERFORM

- A. MROFORM  
B. MROЯЯM  
C. MROЯЯM  
D. MROFORM
- 
8. In a certain code language, if 'DETAIL' is coded as 'EGUCJN', then how will 'HIGHER' be coded in that language?
- A. IKHJFT  
B. IJHIFS  
C. JKIJGT  
D. JKGIFS
- 
9. The given question consists of a set of three figures P, Q and R showing the 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 shows the unfolded form of Fig. R.





10. Pooja walks 18 m towards South and then turns left and walks 8 m. She then turns left again and walks 9 m. Finally, she turns right and walks 4 m. How far is she now from the starting point?

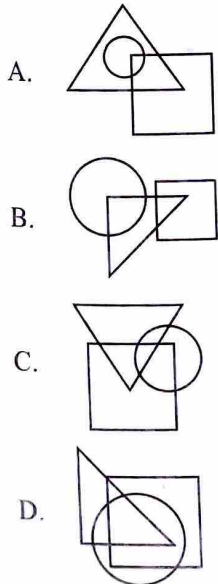
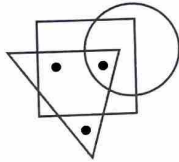
- A. 14 m  
 B. 13 m  
 C. 21 m  
 D. 15 m

11. Which of the following options will complete the given series?

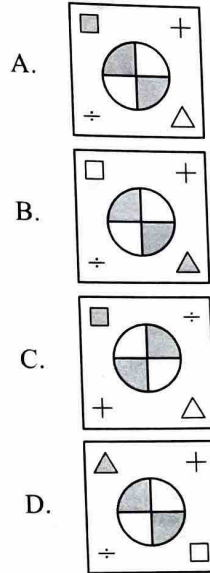
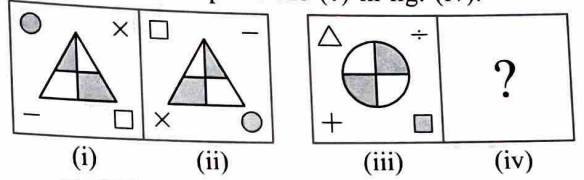
EXL, GVN, ITP, KRR,      ?

- A. MTT  
 B. MPT  
 C. NPT  
 D. NST

12. Which of the following options does not satisfy the same conditions of placement of dots as in the given figure?



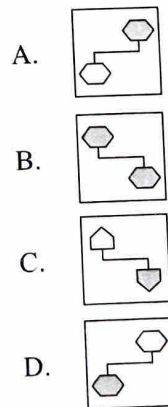
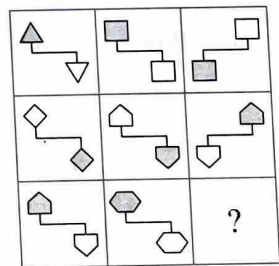
13. There is a certain relationship between figures (i) and (ii). Establish the similar relationship between figures (iii) and (iv) by selecting a suitable figure from the options that will replace the (?) in fig. (iv).



14. If '@' denotes '+', '\$' denotes '+', '#' denotes 'x' and '©' denotes '-', then find the value of  $32 @ 4 \# 57 \$ 19 © 6$ .

- A. 50  
 B. 38  
 C. 36  
 D. 48

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



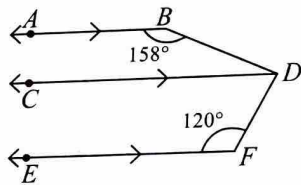
16. If  $5\frac{1}{6} - \left[ 1\frac{1}{5} + \left\{ 2\frac{3}{4} + 5\frac{1}{2} + x - \left( \frac{5}{6} - \frac{2}{3} \right) \right\} \right] = 2\frac{61}{120}$ , then the value of  $x$  is

- A.  $\frac{4}{13}$
- B.  $\frac{3}{13}$
- C.  $\frac{4}{11}$
- D.  $\frac{3}{11}$

17. What will be the least number which when doubled will be exactly divisible by 12, 16, 21 and 36?

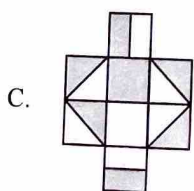
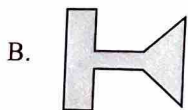
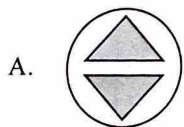
- A. 508
- B. 916
- C. 504
- D. 450

18. In the figure given below (not drawn to scale), find  $\angle BDF$ , if  $AB \parallel CD \parallel EF$ .



- A.  $80^\circ$
- B.  $82^\circ$
- C.  $42^\circ$
- D.  $90^\circ$

19. Which of the following figures does not have any line of symmetry?



- D. Both A and C

20. If  $(2^{4a-3} + 10) \div 6 = 7$ , then  $a =$  \_\_\_\_\_

- A. -1
- B. 0
- C. 1
- D. 2

21. Which of the following options is arranged in descending order?

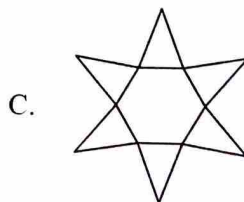
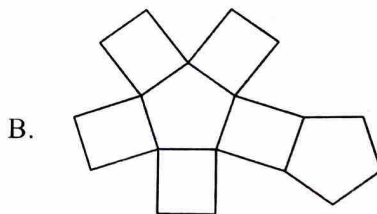
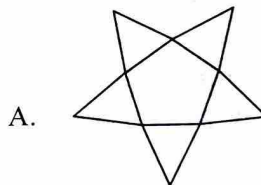
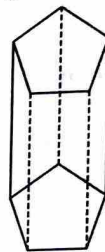
A.  $\frac{-5}{20}, \frac{2}{5}, \frac{7}{12}, \frac{-9}{10}$

B.  $\frac{-9}{10}, \frac{-5}{20}, \frac{2}{5}, \frac{7}{12}$

C.  $\frac{7}{12}, \frac{2}{5}, \frac{-5}{20}, \frac{-9}{10}$

D.  $\frac{-5}{20}, \frac{-9}{10}, \frac{2}{5}, \frac{7}{12}$

22. Which of the following is the net of the given figure?

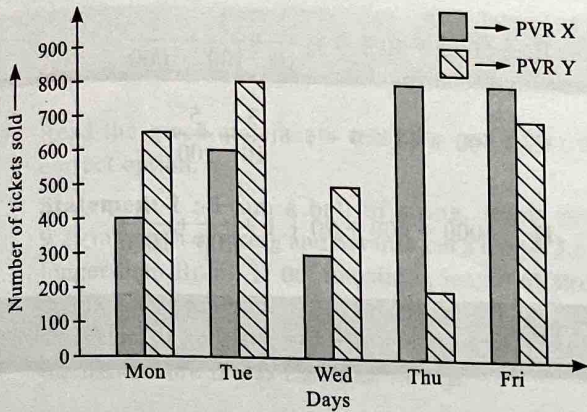


- D. None of these

23. Which of the following is not a Pythagorean triplet?

- A. 7, 24, 25
- B. 15, 20, 25
- C. 5, 7, 12
- D. 20, 21, 29

**Direction (24-25) :** The given double bar graph shows the sale of movie tickets of two different PVRs on five consecutive days. Study the graph carefully and answer the following questions.



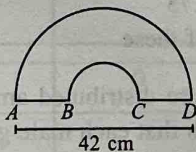
24. What is the ratio of the number of movie tickets sold by PVR X on Monday and Wednesday together to the number of movie tickets sold by PVR Y on Tuesday and Friday together?

- A. 15 : 7
- B. 8 : 7
- C. 7 : 15
- D. 7 : 8

25. If each movie ticket costs ₹ 250, then how much more money earned by PVR X than PVR Y on all the given five days?

- A. ₹ 12500
- B. ₹ 50000
- C. ₹ 18500
- D. None of these

26. In the given figure (not drawn to scale),  $AB = BC = CD$ . Find the perimeter of the given figure.



- A. 108 cm
- B. 112 cm
- C. 124 cm
- D. 116 cm

27. The simple interest on a certain sum for 8 months at 4% per annum is ₹129 less than the simple interest on the same sum for 15 months at 5% per annum. The sum is

- A. ₹ 2530
- B. ₹ 2400
- C. ₹ 2529
- D. ₹ 3600

28. Find the values of P and Q.

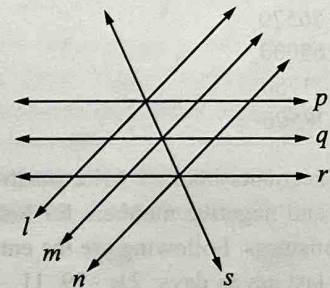
- (i) The sum of two integers is 71. If one of them is  $-101$ , then other integer is P.
- (ii) The product of an integer and Q is zero.

	P	Q
A.	172	0
B.	184	1
C.	172	1
D.	172	2

29. Find the value of  $x$ , if  $\frac{x-3}{5} - \frac{2x+1}{3} = -7$ .

- A. 10
- B. 13
- C. 8
- D.  $-5$

30. In the given figure, the number of pairs of parallel lines is \_\_\_\_\_.



- A. 4
- B. 6
- C. 5
- D. None of these

31. If 16, 80,  $x$  are in continued proportion, then find the value of  $x$ .

- A. 200
- B. 250
- C. 400
- D. 350

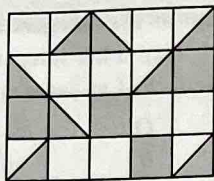
32. If  $x = 2$ ,  $y = -1$  and  $z = 3$ , then the value of expression  $3x^2y + 5xy^2 + 6yz^2 + 2xyz$  is \_\_\_\_\_.

- A. 38
- B. 40
- C.  $-40$
- D.  $-68$

33. Difference between the greatest and smallest 8-digit number that can be formed using the digits 4, 6, 0 and 2 (each digit at least once) is

- A. 86666502
- B. 46666374
- C. 4666347
- D. 46444174

34. What percent of the given figure is shaded?



- A. 52.5%  
 B. 25%  
 C.  $33\frac{1}{3}\%$   
 D. 40%

35. The expanded form of 5049.135 is \_\_\_\_\_

- A.  $5000 + 400 + 9 + \frac{1}{10} + \frac{3}{100} + \frac{5}{1000}$   
 B.  $5000 + 40 + 9 + \frac{1}{10} + \frac{3}{100} + \frac{5}{1000}$   
 C.  $500 + 40 + 9 + 1 + \frac{3}{10} + \frac{5}{100}$   
 D.  $5000 + 400 + 90 + 1 + \frac{3}{100} + \frac{5}{1000}$

## EVERYDAY MATHEMATICS

36. The population of a town is 2,75,000, out of which 40% are females. If 25% of males moved to big cities, then how many males are left in the town?

- A. 156570  
 B. 165000  
 C. 123750  
 D. 128500

37. In my accounts book, I write positive numbers for profits and negative numbers for losses that I make in my business. Following are the entries in the book for the last seven days: 21, -19, 11, -20, 17, 25 and -13. How much profit did I make in the last week?

- A. 32  
 B. 22  
 C. 34  
 D. 24

38. Maira noted the age (in years) of players in a state cricket team. The ages (in years) are as follows: 24, 37, 28, 25, 30, 21, 24, 22, 22, 28, 25

What is the mean age of the players?

- A. 30 years  
 B. 27.5 years  
 C. 20 years  
 D. 26 years

39. The ratio of the number of teachers to the number of students in a school is 3 : 200. If there are 36 teachers, then how many students are there in the school?

- A. 1800  
 B. 1500  
 C. 2400  
 D. 2100

40. A group of 15 children shared a box of candies. After taking 9 candies each, there were 7 candies left. How many candies were there at first?

- A. 142  
 B. 135  
 C. 120  
 D. 152

41. Rashmi studies  $\frac{5}{6}$  hour on Monday,  $\frac{3}{4}$  hour on Tuesday and  $\frac{1}{2}$  hour on Wednesday. How much total time did she spend on studies on the given three days?

- A. 80 minutes  
 B. 125 minutes  
 C. 135 minutes  
 D. 95 minutes

42. Priya bought 5 pairs of shoes and 3 pairs of socks from the market. If a pair of shoes costs ₹ 215.25 and a pair of socks costs ₹ 52.50, then how much total money did she spend?

- A. ₹ 1187.50  
 B. ₹ 987.25  
 C. ₹ 1233.75  
 D. None of these

43. 280 folders are distributed among 50 employees of an office such that each male gets 5 folders and each female gets 8 folders. How many males are there in the office?

- A. 60  
 B. 40  
 C. 35  
 D. 20

44. The area of a circular field is 6.16 hectares. Find the cost of fencing it at the rate of ₹ 7.50 per metre. (1 hectare = 10000 sq. m)

- A. ₹ 6600  
 B. ₹ 4250  
 C. ₹ 7800  
 D. ₹ 4800

45. Mohit bought a car for a certain sum of money. He spent 20% of the cost on repairs and sold the car for a profit of ₹ 6000. How much did he spend on repairs, if he made a profit of 10%?

- A. ₹ 10000  
B. ₹ 6400  
C. ₹ 9000  
D. ₹ 8400

### ACHIEVERS SECTION



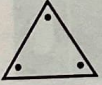
46. Read the given statements carefully and select the correct option.

**Statement-I :** From a ball of string, Rohit cut a 9.25 m length of string and Saransh cut a length 3.6 m longer than Rohit. If the remaining length of string in the ball was twice the total length cut by Rohit and Saransh, then the original length of the string in the ball before it was cut, was 78.2 m.

**Statement-II :** Mr Sharma painted  $\frac{2}{3}$  of the kitchen and his son painted  $\frac{1}{12}$  of it. Their neighbour helped to paint  $\frac{1}{4}$  of the kitchen. So, the fraction of kitchen that Mr Sharma and his son painted more than their neighbour is  $\frac{1}{2}$ .

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

47. Fill the table and select the correct option.

	Figures	Number of lines of symmetry	Order of rotational symmetry
(i)		P	1
(ii)		0	Q
(iii)		R	S

- |    | P | Q | R | S |
|----|---|---|---|---|
| A. | 1 | 0 | 2 | 3 |
| B. | 0 | 2 | 3 | 1 |
| C. | 0 | 2 | 3 | 3 |
| D. | 1 | 1 | 3 | 1 |

48. Solve the following and select the correct option.

- (i) A cow is tethered in the centre of a circular field (having diameter 112 cm) with a 56 m long rope. If the cow grazes 250 sq. m per day, then approximately how much time will be taken by the cow to graze the whole field?

- (ii) The area of a semicircle whose perimeter is 324 cm, is \_\_\_\_\_  $\text{cm}^2$ .

- |    | (i)     | (ii) |
|----|---------|------|
| A. | 37 days | 6205 |
| B. | 40 days | 6237 |
| C. | 32 days | 6205 |
| D. | 35 days | 6237 |

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

(i) If  $\frac{(2-3y)+4y}{9y-(8y+7)} = \frac{4}{5}$ , then  $y = -32$ .

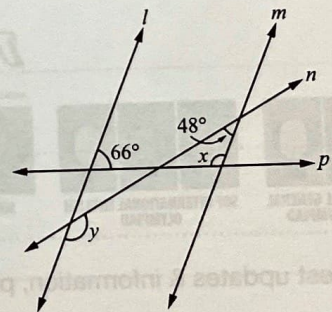
- (ii) Shruti's father's age is 10 years more than five times Shruti's age. If Shruti's father's age is 40 years old and Shruti's age is  $y$  years, then  $5y + 10 = 40$ .

- (iii) The equation for the statement "Sum of 8 times of a number  $x$  and 15 gives 55" is  $15x + 8 = 55$ .

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

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

- (i) In the given figure, two parallel lines  $l$  and  $m$  are cut by two transversals  $n$  and  $p$ . The value of  $x + y$  is \_\_\_\_\_.



- (ii) If the measure of two supplementary angles are in the ratio 3 : 7, then the difference between the two angles is \_\_\_\_\_.

- |    | (i)  | (ii) |
|----|------|------|
| A. | 90°  | 36°  |
| B. | 180° | 54°  |
| C. | 246° | 72°  |
| D. | 90°  | 54°  |