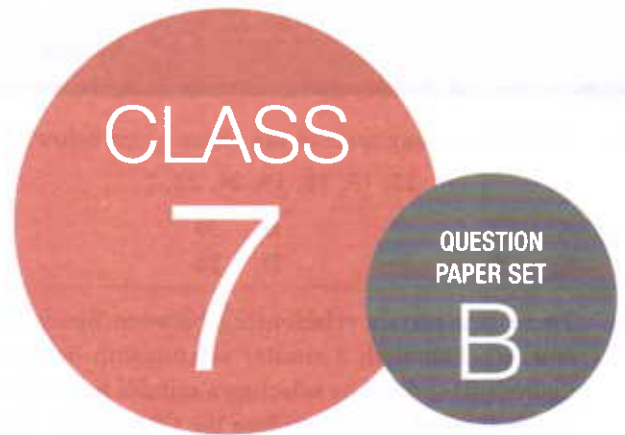




**SOF INTERNATIONAL
MATHEMATICS OLYMPIAD
2018-19**



DO NOT OPEN THIS BOOKLET UNTIL ASKED TO DO SO

Total Questions: 50 | Time: 1 hr.

Name:

Section: SOF Olympiad Roll No.: Contact No.:

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 with you your marks / result 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
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.

16. ● (B) (C) (D)



SCIENCE OLYMPIAD FOUNDATION
Inspiring Young Minds Through Knowledge Olympiads

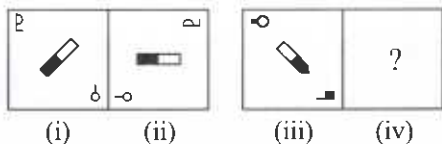
LOGICAL REASONING

1. Find the missing term in the series given below.

12, 13, 18, 19, 24, 25, ?

- A. 27 B. 30
C. 29 D. 26

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



- A. B.
C. D.

3. How many meaningful three letter words can be formed with the letters U, T and B using each letter only once in each word?

- A. 2
B. 1
C. More than 2
D. None of these

4. If in a certain code language, MEDICATE is written as GVCEKFGO, then how will VALIDATE be written in the same code language?

- A. XCNFKCVG
B. XCMJFCUF
C. GVCFKNCX
D. GVCTLODW

5. Sukul walks 5 km from her school. Then she turns to her right and after walking 3 km, again she turns to her right and walks 1 km to reach her home. How far is she now from her school?

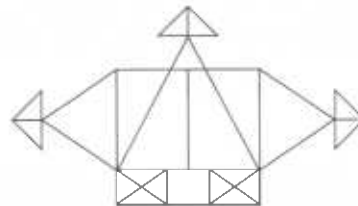
- A. 6 km
B. 5 km
C. 7 km
D. 8 km

6. In a queue of 28 girls, Kuhu is 6 ranks ahead of Pihu. If Pihu's rank is 15th from the last, then what is the rank of Kuhu from the starting of the queue?

- A. 8th

- B. 14th
C. 9th
D. 13th

7. Find the minimum number of straight lines required to draw the given figure.



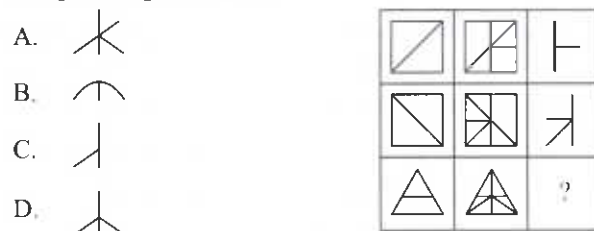
- A. 22
B. 24
C. 28
D. 26

8. In which of the following figures, given figure is exactly embedded as one of its parts?



- A. B.
C. D.

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



10. Deepanshu is father-in-law of Aanya who is the sister-in-law of Nitin. Savita is mother of Jitu who is the only brother of Nitin. How is Aanya related to Jitu?

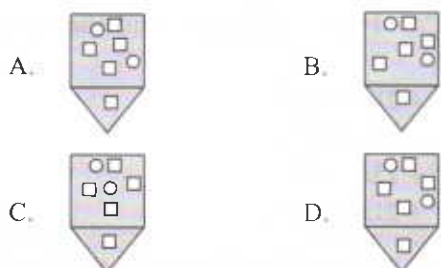
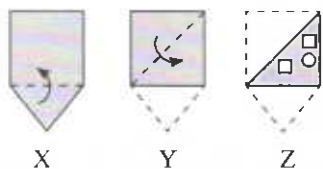
- A. Sister-in-law
B. Sister
C. Aunt
D. Wife

11. Three positions of a dice are shown below. How many dots will be there on the face opposite to the face having 6 dots?

- A. 4
B. 2
C. 5
D. 1



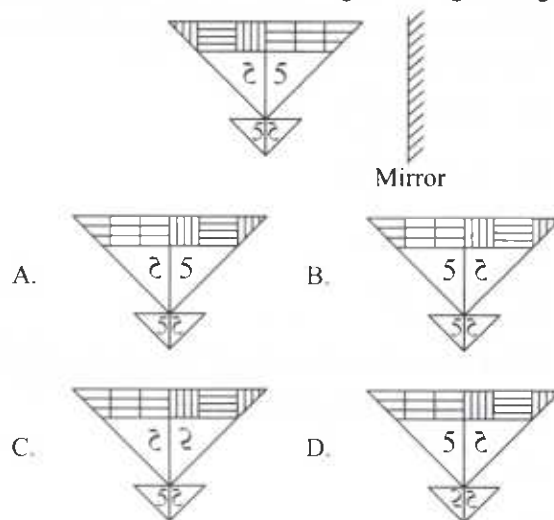
12. The given question consists of a set of three figures X, Y and Z showing a sequence of folding of a piece of paper. Fig. (Z) shows the manner in which the folded paper has been cut. Select a figure from the options which would most closely resemble the unfolded form of Fig. (Z).



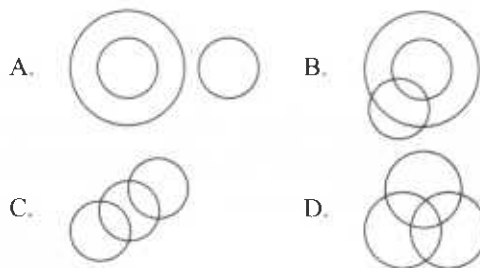
13. If we interchange '+' with '÷' and '×' with '·' in each of the following options, then which of the following options becomes correct?

- A. $4 - 2 \div 12 + 6 \times 2 = 7$
 B. $4 - 6 + 3 \div 5 \times 7 = 8$
 C. $4 \div 3 + 3 - 5 \times 6 = 3$
 D. $6 + 3 + 4 - 7 \times 2 = 2$

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



15. Which of the following Venn diagrams best represents the relationship amongst, "Red, Rose, Clothes"?



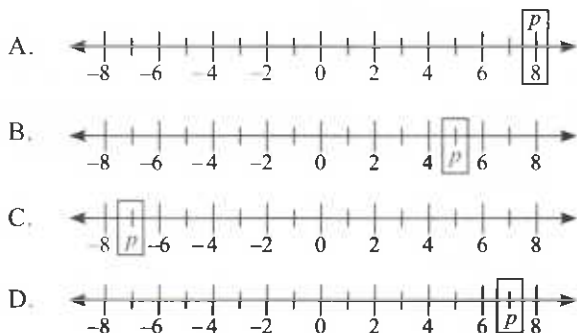
MATHEMATICAL REASONING

16. Evaluate :
$$\frac{\left(1 + \frac{2}{9}\right) - \left[2 \frac{1}{2} - \left(1 \frac{1}{2} - \left(\frac{-1}{3}\right)\right)\right]}{\left(1 + 3 \frac{1}{5}\right) + \left(1 + 2 \frac{2}{3}\right)}$$

- A. $5 \frac{19}{33}$ B. $5 \frac{13}{19}$
 C. $3 \frac{8}{33}$ D. $13 \frac{5}{6}$

17. Which of the following number lines correctly represents 'p' if,

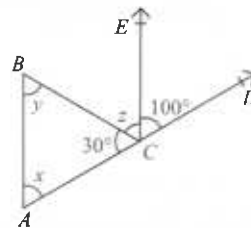
$$p - (2p + 5) - 5(1 - 2p) = 2(3 + 4p) - 3(p - 4)$$



18. Find the additive inverse of the number obtained by subtracting -9 from the additive inverse of -23 .

- A. 32 B. -14
 C. -32 D. 14

19. In the given figure (not drawn to scale), $AB \parallel CE$ and ACD is a straight line. Which of the following options is not correct?



- A. $x = y + z$
 B. $\frac{x}{2} = y = z$
 C. $2x + y = 150^\circ$
 D. None of these

20. Find the sum of the mode and the median of the given data.

2, 4, 3, 4, 6, 2, 5, 1, 3, 2, 1

- A. 6 B. 5
 C. 8 D. 10

21. If 30 shirts were bought for ₹ 9000 and out of those, 10 shirts were sold for ₹ 3500, then find the profit/loss percent in the whole transaction.

- A. Profit, $16\frac{2}{3}\%$
 B. Loss, $16\frac{2}{3}\%$
 C. Profit, 16%
 D. Loss, 16%

22. What rational number should be added to $\left(\frac{-3}{7}\right)$ to get the greatest negative integer?

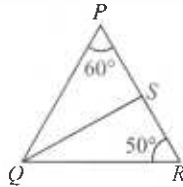
- A. $\frac{4}{7}$
 B. $\frac{3}{7}$
 C. $\frac{-4}{7}$
 D. $\frac{7}{3}$

23. In the given magic square, if each row, column and diagonal have the same sum, then the value of A and B respectively are _____.

- A. $-7, -4$
 B. $-4, -7$
 C. $-4, -6$
 D. $-6, -4$

1	-10	0
A	-3	-2
-6	4	B

24. In the given figure (not drawn to scale), QS is the bisector of $\angle PQR$. Find the value of $2\angle QSP$.

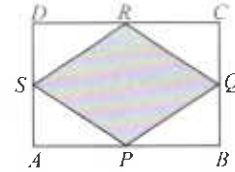


- A. 85°
 B. 70°
 C. 170°
 D. 140°

25. The value of x in $\frac{3}{4}(7x-1) - \left(2x - \frac{1-x}{2}\right) = x + \frac{3}{2}$ is _____.

- A. 2
 B. 3
 C. 1
 D. 0

26. $ABCD$ is a rectangle (not drawn to scale) having length 30 cm and breadth 25 cm. P, Q, R and S are midpoints of AB, BC, CD and AD respectively. Find the area of the shaded region of the figure.



- A. 375 cm^2
 B. 370 cm^2
 C. 475 cm^2
 D. 450 cm^2

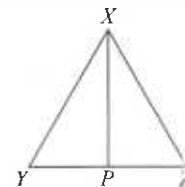
27. If $A = 9t^2 + 14xt - 3x^2$, $B = 16xt + 4x^2 - 5t^2$ and $C = -7x^2 - 19xt - 8t^2$, then find the value of $B - A - C$.

- A. $-6t^2 + 21xt + 14x^2$
 B. $6t^2 - 21xt - 14x^2$
 C. $14x^2 + 15xt - 3t^2$
 D. $17x^2 + 21xt + 19t^2$

28. In a $\triangle ABC$, if $AB + BC = 10 \text{ cm}$, $BC + CA = 12 \text{ cm}$ and $CA + AB = 16 \text{ cm}$, then the perimeter of the triangle is _____.

- A. 19 cm
 B. 17 cm
 C. 28 cm
 D. 22 cm

29. In an isosceles triangle XYZ with $XY = XZ$, XP bisects the base YZ . Which of the following congruence criterion can be used to conclude that $\triangle XYP \cong \triangle XZP$?



- A. RHS
 B. SAS
 C. ASA
 D. None of these

30. Which of the following options is not correct?

- A. $16^2 \div 4^3 = 2^2$
 B. $3^2 \times 27 = 3^5$
 C. $[(-2)^2]^m = 4^m$
 D. $4^0 + 4^1 + 4^2 = 20$

31. If twice of A is equal to thrice of B and four times of B is equal to five times of C , then find the ratio of A to C .

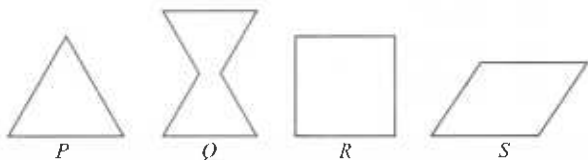
- A. 4 : 5
 B. 2 : 3
 C. 8 : 15
 D. 15 : 8

32. Which of the following can be the net of the given solid?



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

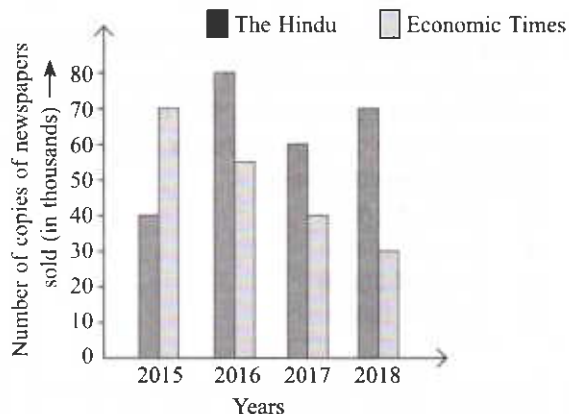
33. Which of the following figures have at least 2 lines of symmetry?



- A. P and R only
B. S and P only

- C. P, Q and R only
D. Q and S only

Direction (34-35) : Study the given double bar graph which shows the number of copies of newspapers sold by The Hindu and Economic Times from 2015 to 2018 and answer the following questions.



34. In which year, the difference of number of copies of both the newspapers sold was maximum?
- A. 2016
B. 2017
C. 2018
D. 2015
35. What is the ratio of newspapers sold in year 2016 and 2017 together to the total number of newspapers sold in 2018?
- A. 47 : 20
B. 35 : 19
C. 17 : 24
D. 20 : 37

EVERYDAY MATHEMATICS

36. Mr Walia saves 36% of his monthly salary every month. In how many months will he save ₹72000, if he earns ₹25000 per month?
- A. 9
B. 7
C. 6
D. 8
37. The teacher tells the class that the highest marks obtained by a student in her class is four times the lowest marks plus 6. The highest score is 65. Form the equation which will calculate the lowest marks represented by m .
- A. $6m + 4 = 65$ B. $4m + 65 = 6$
C. $4m + 6 = 65$ D. $6m + 65 = 4$
38. Inside a rectangular garden which is 20 m long and 15 m wide, a margin of 2 m width has been left all

around for planting marigold plant and grass has been planted in the rest of the area. If 4 marigold plants can be planted in 2 m^2 , then how many marigold plants can be planted in the garden?

- A. 122
B. 248
C. 250
D. 240
39. The ratio of number of 10 rupee notes to 20 rupee notes in a purse is 3 : 4. If there are total 84 notes in the purse, then how much money is there in the purse?
- A. ₹ 1320
B. ₹ 1230
C. ₹ 1100
D. ₹ 1260

40. Raghav was measuring a piece of cloth of length 2.5 m but by mistake he measured its length as 255 cm. Find the change in percentage in measuring the length.
- A. 1.5%
B. 2.5%
C. 2%
D. 1%
-
41. A rice company earns a profit of ₹ 15 per bag of Type I rice sold and a loss of ₹ 10 per bag of Type II rice sold. If the company sells 2000 bags of Type I rice and 1000 bags of Type II rice in a month, then find the overall profit or loss.
- A. Profit, ₹ 10000
B. Loss, ₹ 15000
C. Profit, ₹ 20000
D. Loss, ₹ 10000
-
42. In a hall, $\frac{1}{3}$ of the people were females and $\frac{1}{2}$ of those females were school girls. If the total number of people were 600, then how many school girls were there in the hall?
- A. 200
B. 100
C. 400
D. 150
-
43. In a class, there are 20 girls and 30 boys. The mean weight of 20 girls is 35 kg and mean weight of 30 boys is 60 kg. Find the mean weight of the class.

- A. 50 kg
B. 65 kg
C. 60 kg
D. 70 kg

44. A bag contains red, white and blue pencils. The probability of selecting a red pencil is $\frac{2}{13}$ and that of selecting a blue pencil is $\frac{4}{13}$. Find the probability of selecting a white pencil.
- A. $\frac{6}{13}$
B. $\frac{7}{13}$
C. $\frac{3}{5}$
D. $\frac{2}{5}$
-
45. Kanika lent ₹ 6400 to Richa and Renuka each at 15% per annum for 5 years and $3\frac{1}{2}$ years respectively. Find the difference between the simple interests paid by them.
- A. ₹ 4800
B. ₹ 3360
C. ₹ 1440
D. ₹ 2456

ACHIEVERS SECTION

46. Fill in the blanks and select the correct option.
- (i) If two lines intersect each other, then the vertically opposite angles are (P).
- (ii) The angles of a linear pair are (Q) as well as (R).
- (iii) If a transversal is perpendicular to two parallel lines then sum of each pair of corresponding angles is (S).
- | | (P) | (Q) | (R) | (S) |
|----|---------|---------------|---------------|-------------|
| A. | Unequal | adjacent | complementary | 90° |
| B. | Unequal | complementary | supplementary | 90° |
| C. | Equal | adjacent | supplementary | 180° |
| D. | Equal | supplementary | complementary | 180° |

47. Arrange the following steps in correct order, while constructing a triangle ABC , given $AB = 6$ cm, $BC = 8$ cm and $\angle ABC = 60^\circ$.

Step-1 : With B as a centre, draw an arc of radius 6 cm, which cuts BX at the point A .

Step-2 : At B , draw a ray BX making an angle of 60° with BC .

Step-3 : Join AC , $\triangle ABC$ is the required triangle.

Step-4 : Draw a line segment BC of length 8 cm.

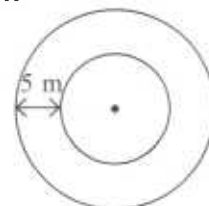
- A. 4, 1, 2, 3
B. 4, 3, 2, 1
C. 2, 1, 3, 4
D. 4, 2, 1, 3

48. The ratio of the outer and the inner circumference of a circular path as shown in the figure is 26 : 25. If the path is 5 m wide, then find :

- (i) the area enclosed by the path
(ii) the diameter of the inner circle

$$\left(\text{Take } \pi = \frac{22}{7} \right)$$

- | | |
|--------------------------|-------|
| (i) | (ii) |
| A. 4007.14 m^2 | 250 m |
| B. 4096.23 m^2 | 256 m |
| C. 3345.17 m^2 | 125 m |
| D. 3372.62 m^2 | 130 m |



49. Match the following and select the correct option.

Column-I

Column-II

(P) $\frac{3^4}{(3^0 + 7^0)^4} =$ (i) 1

(Q) $\left[\left(\frac{3}{7} \right)^5 + \left(\frac{3}{7} \right)^9 \right] \times \frac{7}{3} =$ (ii) 3^9

(R) $\left(\left(\left(\frac{3}{7} \right)^9 \right)^0 \right)^{10} =$ (iii) $\left(\frac{3}{2} \right)^4$

(S) $\frac{(3^3)^3 \times 3^3 \times 7^3}{27 \times 343} =$ (iv) $\left(\frac{7}{3} \right)^5$

A. (P) \rightarrow (ii), (Q) \rightarrow (iv), (R) \rightarrow (i), (S) \rightarrow (iii)

B. (P) \rightarrow (iii), (Q) \rightarrow (iv), (R) \rightarrow (i), (S) \rightarrow (ii)

C. (P) \rightarrow (iv), (Q) \rightarrow (ii), (R) \rightarrow (iii), (S) \rightarrow (i)

D. (P) \rightarrow (iii), (Q) \rightarrow (iv), (R) \rightarrow (ii), (S) \rightarrow (i)

50. Read the following statements carefully and select the correct option.

Statement-1 : Difference between the value of expression, $4x + 2(x + y)$ when $x = 2; y = 3$ and when $x = 3; y = 2$ is 10.

Statement-2 : $4(a + 2b) + 3b^2 + 9ab$ should be subtracted from $2a - 2b + b^2 - 6ab$ to get $-(2a + 10b + 8b^2 + 5ab)$

A. Statement-1 is true but Statement-2 is false.

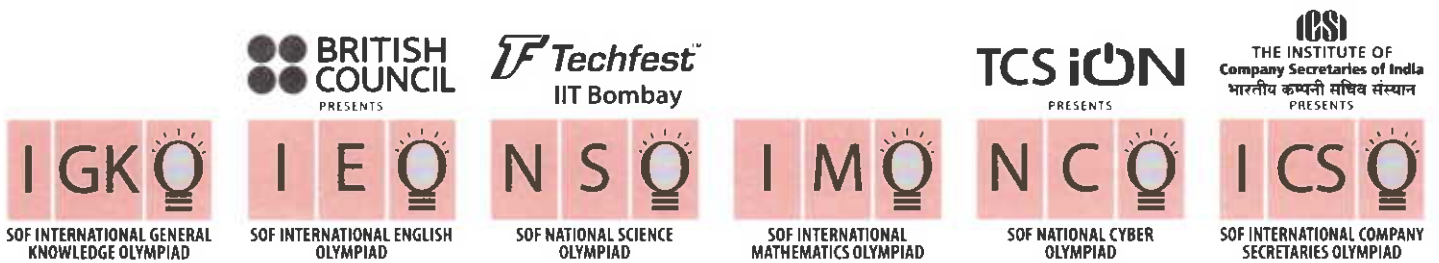
B. Statement-1 is false but Statement-2 is true.


C. Both Statement-1 and Statement-2 are true.

D. Both Statement-1 and Statement-2 are false.

SPACE FOR ROUGH WORK

SPACE FOR ROUGH WORK



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