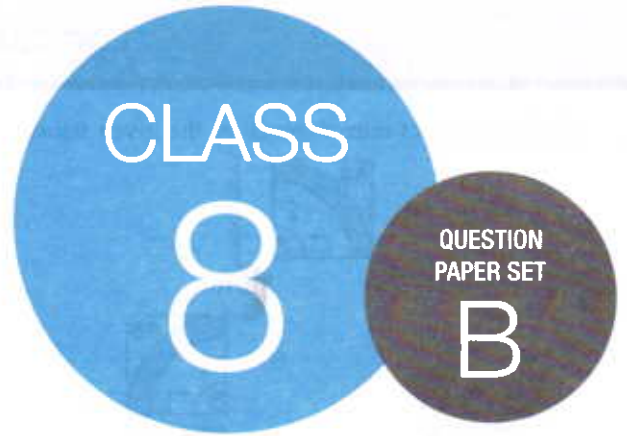


**SOF INTERNATIONAL
MATHEMATICS OLYMPIAD
2018-19**



DO NOT OPEN THIS BOOKLET UNTIL ASKED TO DO SO

Total Questions: 50 | Time: 1 hr.

Name:

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

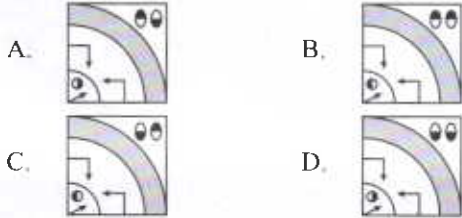
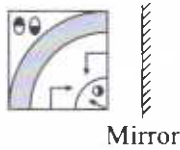
Guidelines for the Candidate

- 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 with you your marks / result 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 on this page before attempting the paper.

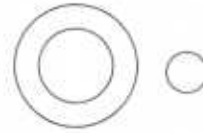
16. ● (B) (C) (D)

LOGICAL REASONING

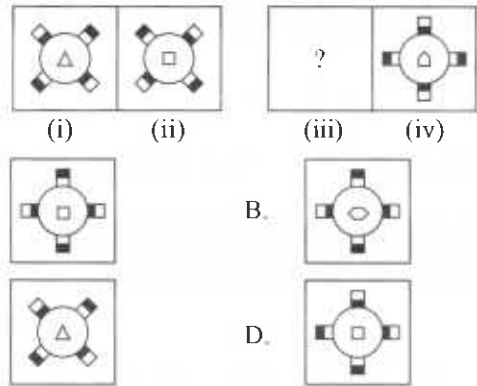
1. Find the correct mirror image of the given figure.



6. Which of the following options best represents the given Venn diagram?



- A. Males, Females, Teacher
 B. Tomato, Potato, Apple
 C. Vegetable, Grass, Bottle guard
 D. Painter, Cow, Hen
7. 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 (iii).



- A. B. C. D.
8. Two rows of numbers are given. The resultant number in each row is to be worked out separately based on the following rules and the question below the rows of numbers is to be answered. The operations on numbers progress from left to right.

Rules:

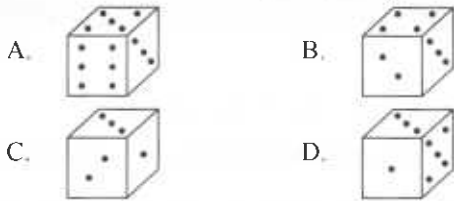
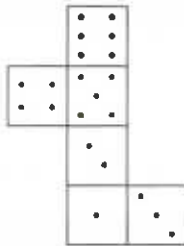
- (i) If an even number is followed by an even number, then they are to be added.
 (ii) If an odd number is followed by an even number, then the odd number is to be multiplied by the even number.
 (iii) If an even number is followed by an odd number which is a perfect square, then they are to be added.
 (iv) If an even number is followed by a prime number, then the first number is to be divided by the second number.
 (v) If an odd number is followed by a prime number, then the prime number is subtracted from the odd number.

46 23 64
 P 121 29

If P is the resultant of the first row, then what is the resultant of the second row?

- A. 200 B. 158
 C. 128 D. 222

2. Choose a box that is similar to the box formed when the given sheet of paper is folded.



3. Select a letter which replaces the (?), if the same rule is followed either row-wise or column-wise.

- A. P
 B. N
 C. M
 D. R

9	L	3
7	O	8
5	?	9

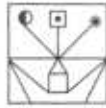
4. In a certain code language, INTRODUCED is written as EFDVEPSUOJ. How will INNOVATIVE be written in that language?

- A. FWJVBUPMMJ
 B. FWJUBWPOOJ
 C. WFJVPOMNOJ
 D. FWJUBJOOPW

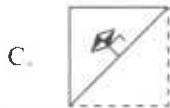
5. If 'P + Q' means P is the mother of Q, 'P ÷ Q' means P is the brother of Q, 'P # Q' means P is the father of Q and 'P * Q' means P is the sister of Q, then how is L related to O in 'K + L + M # N * O'?

- A. Grand daughter
 B. Sister
 C. Mother
 D. Grand mother

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



10. A square 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.



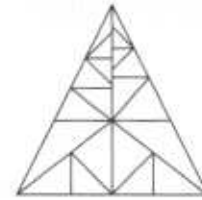
11. Aman walked 25 m towards East. Then he turned to his right and walked 20 m and again he turned to his right and walked 25 m. Then, he turned to his left and walked 10 m. How far and in which direction is he from the starting point?

- A. 35 m, North
 B. 30 m, North
 C. 30 m, South
 D. 20 m, North-East

12. If ' $a - b = a \times b$ ', ' $a + b = a + b$ ' and ' $a * b = b - a$ ', then the value of $(10 + 2) \times (5 - 2) \times (2 * 5)$ is _____.

- A. 150
 B. 180
 C. 360
 D. 108

13. Find the minimum number of straight lines required to make the given figure.

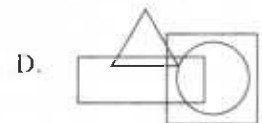
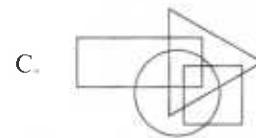
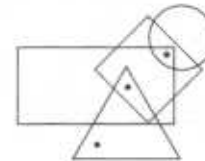


- A. 19
 B. 20
 C. 15
 D. None of these

14. Seven students P, Q, R, S, T, U and V are standing in a line facing North. V is to the immediate right of S and to the immediate left of Q. P and S have one student between them. P is to the immediate right of R. U and S have two students between them. Who is standing in the middle of the line?

- A. T
 B. V
 C. Q
 D. S

15. Select a figure from the options which satisfies the same conditions of placement of the dots as in the given figure.



MATHEMATICAL REASONING

16. Subtract the sum of $\frac{-1}{2}$ and $\frac{-4}{7}$ from the sum of $\frac{3}{4}$ and $\frac{-5}{7}$.

- A. $\frac{-33}{28}$

- B. $\frac{31}{28}$
 C. $\frac{1}{14}$
 D. $\frac{-51}{28}$

17. The tens digit of a two-digit number exceeds its units digit by 6. The number itself is 10 times the sum of its digits. Find the number.

- A. 82
- B. 90
- C. 93
- D. 60

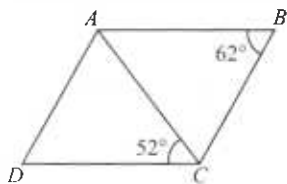
18. If $\sqrt[3]{x \times 0.000009} = 0.3$, then the value of \sqrt{x} is _____.

- A. 27
- B. 81
- C. 9
- D. 18

19. If a number $54x49y$ is divisible by 90, then what is the value of $\frac{y}{x}$?

- A. 0
- B. $\frac{5}{9}$
- C. 6
- D. 1

20. In the given quadrilateral $ABCD$ (not drawn to scale), $BC = AC = AD$. Find the sum of $\angle DAC$ and $\angle ACB$.



- A. 76°
- B. 132°
- C. 56°
- D. 112°

21. Which of the following CANNOT be true for any polyhedron?

- A. Faces = 4, Vertices = 4, Edges = 6
- B. Faces = 8, Vertices = 6, Edges = 12
- C. Faces = 5, Vertices = 1, Edges = 8
- D. Faces = 20, Vertices = 12, Edges = 30

22. If 540 is 10% of y and $z\%$ of y is 16200, then find the value of y and z respectively.

- A. 5400, 20
- B. 5400, 300
- C. 300, 5400
- D. 20, 5800

23. Which of the following is not true?

A. $\left(y + \frac{1}{y}\right)^2 = \left(y - \frac{1}{y}\right)^2 + 4$

B. $\left(y - \frac{1}{y}\right)^2 + 2 = y^2 + \frac{1}{y^2}$

C. $\left(y + \frac{1}{y}\right)^2 - 2 = \left(y - \frac{1}{y}\right)^2$

D. $\left(y - \frac{1}{y}\right)^2 - \left(y + \frac{1}{y}\right)^2 = -(2)^2$

24. If in a rectangle, the difference between the sum of adjacent sides and the diagonal is one-fourth the length of longer side, then 7 times the length of longer side is _____ times the length of shorter side.

- A. 3
- B. 8
- C. 24
- D. 20

25. If $\frac{a^{2b-3} \times (a^2)^{b+1}}{(a^4)^{-3}} = (a^3)^3 \div (a^6)^{-3}$, then find the value of $2b$.

- A. 4
- B. 8
- C. 16
- D. 24

26. Which of the following statements is correct?

- A. Length of a side of a square and its area vary directly with each other.
- B. If one angle of a triangle is kept fixed, then the measure of the remaining two angles vary inversely with each other.
- C. The area of a circle and its diameter vary directly with each other.
- D. All of these

27. Divide $(64x^2 + 48xy + 9y^2)(x + 2)$ by $(8x^2 + 16x + 3xy + 6y)$.

- A. $8x + 9y$
- B. $2x + 14y$
- C. $8x + 3y$
- D. $3x - 8y$

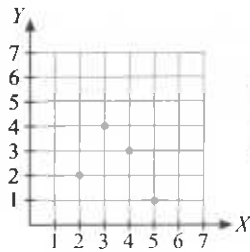
28. Cube root of a number when divided by the smallest prime number gives square of the smallest prime number. Find the number.

- A. 512
- B. 8
- C. 64
- D. 125

29. The radii of the bases as well as heights of a cylinder and a cone are equal to r cm and the radius of the hemisphere is also equal to the height of the cone. Find the ratio of the volume of cone, cylinder and hemisphere respectively.

- A. 2 : 3 : 1
 B. 1 : 3 : 2
 C. 1 : 2 : 3
 D. None of these

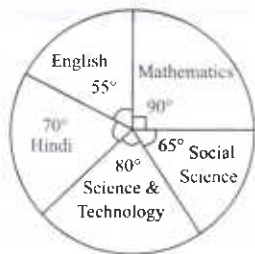
30. Study the given graph carefully. Complete the table and find the value of $P + Q - R - S$.



X	3	Q	2	S
Y	P	3	R	1

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

31. The given pie chart gives the marks scored in an examination by a student in English, Hindi, Science & Technology, Social Science and Mathematics. If the total marks obtained by the student were 540, then the subject in which the student scored 105 marks, is _____.



36. Shruti uses $105\frac{7}{8}$ g of wheat flour for making $\frac{1}{2}$ kg of halwa. Approximately how much grams of halwa can she make from $315\frac{3}{4}$ g of wheat flour?

A. 1491.145 g
 B. 1382.245 g
 C. 1500.471 g
 D. 1100.220 g

37. A farmer has a field in the shape of an isosceles trapezium whose perimeter is 215 m. One of its non-parallel sides is 50 m. What is the sum of its parallel sides?

- A. English
 B. Mathematics
 C. Social Science
 D. Hindi

32. Factorise : $25(x + y)^2 - 36(x - 2y)^2$

- A. $(11x + 7y)(17y - x)$
 B. $(11x - 7y)(17y - x)$
 C. $(17y + x)(11x - 7y)$
 D. None of these

33. Two successive discounts of $x\%$ and $y\%$ on a western gown is same as the single discount of _____.

- A. $\left(x + y + \frac{xy}{100}\right)\%$
 B. $\left(x - y - \frac{xy}{100}\right)\%$
 C. $\left(x + y - \frac{xy}{100}\right)\%$
 D. $\left(y - x - \frac{xy}{100}\right)\%$

34. Which of the following is incorrect?

- A. The cube of an even natural number is always even.
 B. The cube root of a rational number $\frac{x}{y}$ is $\frac{\sqrt[3]{x}}{\sqrt[3]{y}}$.
 C. The cube of a negative number is always positive.
 D. 2197 is a perfect cube.

35. If $A : B = 5 : 6$ and $B : C = 7 : 8$, then by approximately what percent is C more than A?

- A. 36%
 B. 40%
 C. 37.14%
 D. 48.23%

EVERYDAY MATHEMATICS

- A. 115 m
 B. 60 m
 C. 165 m
 D. 135 m

38. Shalini tosses a coin 98 times and head is obtained 56 times. If the coin is tossed at random, then what is the probability of getting a tail?

- A. $\frac{13}{98}$
 B. $\frac{42}{13}$
 C. $\frac{3}{7}$
 D. $\frac{7}{9}$

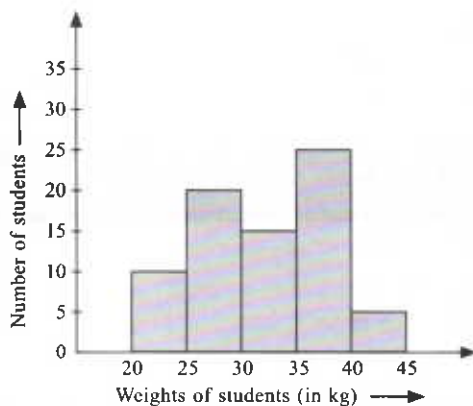
39. Vidhushi is 8 times as old as her grandson. Four years ago, Vidhushi was 12 times as old as her grandson. Find the difference between their present ages.
- A. 88 years
B. 77 years
C. 11 years
D. 99 years
-
40. A principal of the college wishing to arrange his 8341 students in the form of a square, found that he still had 60 students left. Find the number of students in the middle row.
- A. 61
B. 75
C. 81
D. 91
-
41. The cost of a vehicle is ₹ 175000. If its value depreciates at the rate of 20% per annum, then the total depreciation for 3 years is ____.
- A. ₹ 86400
B. ₹ 82500
C. ₹ 84500
D. ₹ 85400
-
42. 3 years ago, the average age of wife, husband and their child was 27 years. 5 years ago the average age of wife and child was 20 years. The present age of husband is

- A. 50 years
B. 40 years
C. 30 years
D. None of these

43. Anjali has 0.88 cubic metres of iron. Find the number of cylindrical iron rods, each of length 14 m and diameter 2 cm that she can make.
- A. 150
B. 200
C. 250
D. 400
-
44. A sells his motor cycle to B at a profit of 7%, B sells it to C at a profit of 8%. If C pays ₹ 14445 for it, then what was the cost price of motor cycle for A ?
- A. ₹ 12500
B. ₹ 12450
C. ₹ 13500
D. ₹ 13000
-
45. Weight of Moon is (7.346×10^{22}) kg and weight of Earth is (5.9724×10^{24}) kg. What is the total weight of both in standard form?
- A. (6.04×10^{24}) kg
B. (7.08×10^{22}) kg
C. (5.98×10^{24}) kg
D. (6.44×10^{24}) kg

ACHIEVERS SECTION

46. Study the given histogram representing the weights of students of class VIII and answer the following questions.



- (i) How many students weigh at least 30 kg but less than 45 kg?
- (ii) Which class interval has the highest frequency?
- | (i) | (ii) |
|-------|---------|
| A. 35 | 20 - 25 |
| B. 35 | 35 - 40 |
| C. 40 | 25 - 30 |
| D. 45 | 35 - 40 |

47. Arrange the following steps in correct order while constructing a trapezium $PQRS$ in which $SR \parallel PQ$, $PQ = 11$ cm, $QR = 9$ cm, $PS = 9.5$ cm and $\angle Q = 70^\circ$.

Step 1 : With Q as centre, draw $\angle PQY = 70^\circ$.

Step 2 : With R as centre, draw $\angle QRZ = 110^\circ$.

Step 3 : Draw $PQ = 11$ cm.

Step 4 : With P as centre, draw an arc of radius 9.5 cm which meets RZ at point S .

Step 5 : With Q as centre, draw an arc of radius 9 cm on \overline{QY} and mark the point as R .

Step 6 : Join PS .

- A. 3, 1, 2, 5, 4, 6
B. 2, 4, 1, 3, 5, 6
C. 3, 1, 5, 2, 4, 6
D. 3, 2, 5, 1, 4, 6

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

- (i) A number ending in (P) number of zeroes is never a perfect square.

- (ii) The square of an (Q) natural number can always be written as the sum of two consecutive positive integers.
- (iii) The sum of the first n odd natural numbers is (R).
- (iv) If $(3 \times 3 \times 7)^2 = 3969$, then $\sqrt{3969} =$ (S).
- | | (P) | (Q) | (R) | (S) |
|----|------|------|-------|-----|
| A. | Odd | even | $2n$ | 62 |
| B. | Even | odd | n^2 | 69 |
| C. | Even | even | n^3 | 39 |
| D. | Odd | odd | n^2 | 63 |

49. State 'T' for true and 'F' for false and select the correct option.

- (i) If Sunil bought a laptop for ₹ 44000 including a tax of 10%, then the price of the laptop before tax was added was ₹ 40000.
- (ii) $x\%$ of y is equal to $y\%$ of x .
- (iii) The compound interest on ₹ 12000 for $1\frac{1}{2}$ years at 10% per annum compounded half yearly is ₹ 13891.50.
- (iv) If a retailer sells an alarm clock for ₹ 350 and gains $\frac{1}{6}$ of its cost price, then the cost price is ₹ 250.

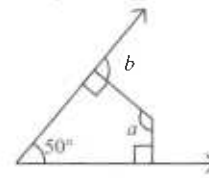
	(i)	(ii)	(iii)	(iv)
A.	T	T	F	F
B.	F	F	T	T
C.	T	F	T	F
D.	T	T	T	F

50. Match the following and select the correct option.

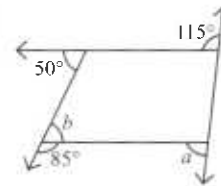
Column-I

Figure

(P)



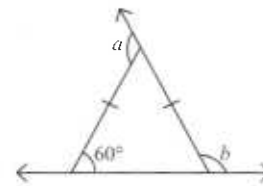
(Q)



(R)



(S)



Column-II

$a + b$

(i) 205°

(ii) 240°

(iii) 220°


(iv) 216°

- A. (P) \rightarrow (iii), (Q) \rightarrow (ii), (R) \rightarrow (iv), (S) \rightarrow (i)
- B. (P) \rightarrow (iii), (Q) \rightarrow (i), (R) \rightarrow (iv), (S) \rightarrow (ii)
- C. (P) \rightarrow (ii), (Q) \rightarrow (i), (R) \rightarrow (iv), (S) \rightarrow (iii)
- D. (P) \rightarrow (iv), (Q) \rightarrow (ii), (R) \rightarrow (iii), (S) \rightarrow (i)

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