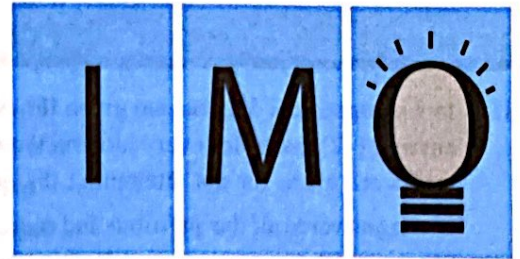


CLASS
7

LEVEL
2



**SOF INTERNATIONAL
MATHEMATICS OLYMPIAD
2019-20**

DO NOT OPEN THIS BOOKLET UNTIL ASKED TO DO SO

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. In the school code column in the OMR Sheet, please fill in code allocated to your school and not the exam center code.
4. The Question Paper comprises two sections : **Mathematics** Section (45 Questions) and **Achievers Section** (5 Questions).
Each question in Achievers Section carries 3 marks, whereas all other questions carry one mark each.
5. All questions are compulsory. There is no negative marking. Use of calculator / smart phone is not permitted.
6. There is only ONE correct answer. Choose only ONE option for an answer.
7. 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. ● (B) (C) (D)
8. Rough work should be done in the blank space provided in this booklet.
9. Please fill in your personal details in the space provided on this page before attempting the paper.
10. **RETURN THE OMR SHEET AND QUESTION PAPER TO THE INVIGILATOR AT THE END OF THE EXAM.**



SCIENCE OLYMPIAD FOUNDATION
Inspiring Young Minds Through Knowledge Olympiads

Name:.....

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

1. In a competition, 5 marks are given for every correct answer, (-2) marks for every incorrect answer and no marks are given for not attempting the question. Sneha answered all the questions and scored 30 marks. She gave 10 correct answers. How many questions she answered incorrectly?

- A. 10
- B. 20
- C. 30
- D. 40

2. Which of the following statements is/are correct?

- P.** All regular polygons have as many lines of symmetry as there are sides in them.
Q. The maximum angle through which the figure has to be rotated to get the original figure is called angle of rotation.

- A. Only Q
- B. Only P
- C. Both P and Q
- D. Neither P nor Q

3. How many times should a wheel of diameter 14 m rotate to go around the rectangular lawn of length 85 m and breadth 47 m?

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

4. Find the value of $[(a - b)^2 (a + b)^2 (a + b)] \div (a^2 + 2ab + b^2)(a^2 - 2ab + b^2)$, when $a = -1$ and $b = 2$.

- A. 1
- B. 0
- C. 10
- D. 8

5. How many lines of symmetry and order of rotational symmetry respectively are there in the given figure?



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

6. If the sum of two rational numbers is $\frac{-13}{35}$ and one of them is $\frac{-4}{7}$, then find the multiplicative inverse of the other rational number.

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

7. Fill in the blanks.

In two rational numbers $\frac{p}{q}$ and $\frac{r}{s}$, if $ps > qr$, then (i) and if $ps < qr$, then (ii).

- | | (i) | (ii) |
|----|-----------------------------|-----------------------------|
| A. | $\frac{p}{q} < \frac{r}{s}$ | $\frac{p}{q} < \frac{r}{s}$ |
| B. | $\frac{p}{q} > \frac{r}{s}$ | $\frac{p}{q} < \frac{r}{s}$ |
| C. | $\frac{p}{q} > \frac{r}{s}$ | $\frac{p}{q} > \frac{r}{s}$ |
| D. | None of these | |

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

38, 28, 31, 40, 32, 38, 32, 36, 32, 28, 14, 38, 24, 42, 38

- A. 75
- B. 50
- C. 64
- D. 70

9. Ankit was asked to write the value of $\frac{(2^4)^2 \times 7^3}{8^2 \times 7}$. By

mistake, he wrote the value of $\frac{(2^6)^2 \times 7^3}{(16)^2 \times 7}$. Find the difference between the obtained value and the actual value.

- A. 0
- B. 784
- C. 588
- D. 648

10. In a triangle, one angle is 65° and the other two angles are such that one is lesser in measure by 15° than the other. What is the measure of the smallest angle?

- A. 65°
- B. 70°
- C. 45°
- D. 50°

11. A cubical box with the numbers 4, 5, 1, 2, 4, 3 written on each of its faces is rolled. Find the probability of

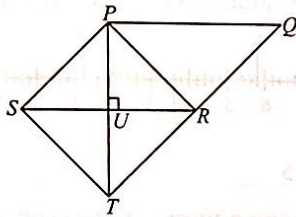
- (i) getting 4.
- (ii) getting the smallest prime number.

(i)	(ii)
A. $1/6$	$1/3$
B. $1/3$	$1/6$
C. $1/3$	$1/3$
D. $1/6$	$1/6$

12. Simplify: $777\frac{6}{7} + 777\frac{5}{7} + 777\frac{3}{7} + 777\frac{4}{7} + 777\frac{2}{7} + 777\frac{1}{7}$

- A. 5997
- B. 5994
- C. 2331
- D. 4665

13. In the given figure, PQRS is a parallelogram. U is the midpoint of PT and $PT \perp SR$. If $PT = 24$ cm and $SR = 30$ cm, then find the area of the given figure.



- A. 276 cm^2
- B. 342 cm^2
- C. 492 cm^2
- D. 540 cm^2

14. Shanaya spends 20% of her monthly income on clothes, 5% on cosmetic items, 60% on groceries and rest on education. If her monthly income is ₹ 25000, then how much she spend on education, cosmetic items and groceries altogether?

- A. ₹ 20000
- B. ₹ 15000
- C. ₹ 18750
- D. ₹ 17650

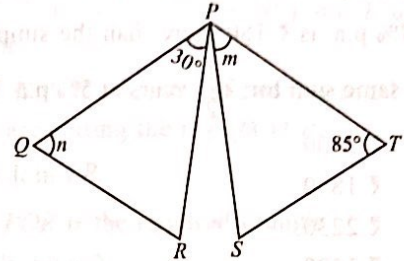
15. Find the measure of an angle which is 32° less than the supplement of 45° .

- A. 90°
- B. 60°
- C. 13°
- D. 103°

16. Find the absolute value of $6 - \{5 \times 3 - (-12) \times 16 + (-4)\} \times [2 - \{(-5) \times (-4) - (3 - 5)\}]$.

- A. -564
- B. 564
- C. 654
- D. -654

17. In the given figure (not drawn to scale), if $\Delta PQR \cong \Delta STP$, then what is the value of $n + m$?



- A. 95°
- B. 150°
- C. 115°
- D. 105°

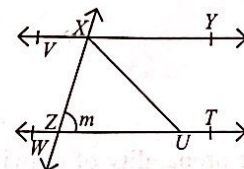
18. Three poles of length 284 m, 172 m and 368 m have to be divided into pieces of same length. What is the greatest possible length of each piece?

- A. 7 m
- B. 14 m
- C. 4 m
- D. 6 m

19. If $7^{86} \times 8^{39} \times 56^{44} \times 7^{39} \times 8^{86} = 56^{2y}$, then find the value of y.

- A. 84.5
- B. 16.90
- C. 72.4
- D. 147.6

20. In the given figure, line XU is the bisector of $\angle YXZ$ and the measure of $\angle XZU$ is m. What must be the measure of $\angle XUT$ in order for line VY to be parallel to line WT?

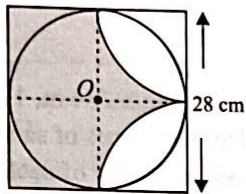


- A. $90^\circ - m$
- B. $90^\circ + m/2$
- C. $180^\circ - m/2$
- D. $90^\circ + m$

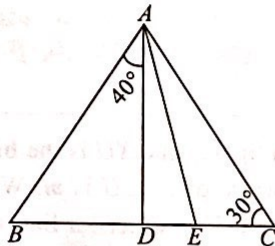
21. Which of the following statements is incorrect?
- The multiplicative identity for integers is 1.
 - Subtraction does not obey commutative law in integers.
 - Multiplication of two integers with unlike signs is always positive.
 - None of these

22. The simple interest on a certain sum for $3\frac{1}{2}$ years at 7% p.a. is ₹ 180 more than the simple interest on the same sum for $2\frac{1}{2}$ years at 5% p.a. Find the sum.
- ₹ 2000
 - ₹ 1850
 - ₹ 2230
 - ₹ 1500

23. The given figure shows a circle, centred at O , enclosed in a square. Find the total area of the shaded parts.



- 421 cm²
 - 392 cm²
 - 476 cm²
 - 616 cm²
24. In the given figure (not drawn to scale), $AD \perp BC$, AE bisects $\angle BAC$. If $\angle BAD = 40^\circ$ and $\angle BCA = 30^\circ$, then what is the measure of $\angle EAD$?



- 30°
 - 10°
 - 45°
 - 20°
25. What is the probability of drawing a king card from a deck of 52 playing cards?

- $\frac{1}{2}$
- $\frac{4}{13}$

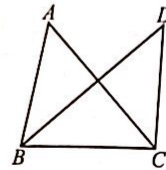
C. $\frac{2}{3}$

D. $\frac{1}{13}$

26. The value of $\left(\frac{23.87 + 46.52}{23.87 - 46.52} + \frac{238.7 + 465.2}{2.387 - 4.652}\right) \times 10^{-4}$ is equal to _____.

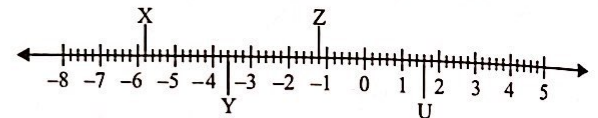
- 10^{-4}
- 10^{-6}
- 10
- 10^{-5}

27. In the given figure, $\triangle ABC$ and $\triangle DBC$ are on the same base BC , $AB = DC$ and $AC = DB$. Which of the following gives a correct congruence relationship?



- $\triangle DBC \cong \triangle ABC$
- $\triangle CBD \cong \triangle ABC$
- $\triangle DCB \cong \triangle ABC$
- $\triangle BCD \cong \triangle ABC$

28. Find the value of $(U - X) - Z + (X + Y)$.

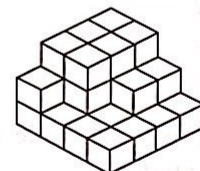


- 2.5
- 2.2
- 0.8
- 1.4

29. The ages of 12 employees (in years) are given as 28, 27, 25, 23, 29, 26, 26, 27, 27, 35, 30 and 36. Find the mean, mode and median respectively.

- 28.25, 27, 26
- 28.25, 27, 27
- 23.5, 27, 26
- 29.5, 26, 27

30. How many faces does the given solid have?



- 7
- 10
- 9
- None of these

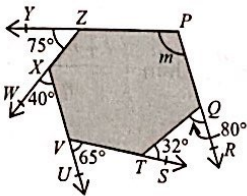
31. A long metallic rod of length $x^2y + 5xy + 6xy^2$ is bent in the form of a triangle. The two sides of the triangle formed are $3xy + 4x^2y$ and $2x^2y + 2xy$. Find the length of the third side (in units), if $x = 1$ and $y = 2$.

- A. 16
B. 24
C. 14
D. 28

32. The price of a fan is ₹ 100 less than 6 times the price of a cooler. The cost of a fan and 4 coolers is ₹ 1400. Find the price of the fan.

- A. ₹ 750
B. ₹ 600
C. ₹ 850
D. ₹ 800

33. In the given figure (not drawn to scale), find the value of $\frac{3}{4}\left(\frac{m}{2}\right)$.



- A. 92°
B. 42°
C. 112°
D. 43°

34. Karan sold an inverter at a profit percentage of 25%. If he earns the profit of ₹ 1500, then what was the selling price of the inverter?

- A. ₹ 6000
B. ₹ 6500
C. ₹ 7500
D. ₹ 4500

35. Simplify :

$$\left[\left(\frac{-9}{7} \times \frac{4}{5} \right) - \left(\frac{8}{7} \times \frac{-10}{3} \right) + \left(\frac{1}{2} \times \frac{3}{4} \right) \right] \times \left[\left(\frac{24}{9} \times \frac{3}{8} \right) - \left(\frac{9}{8} \times \frac{16}{18} \right) \right]$$

- A. -1
B. 1
C. Not defined
D. 0

36. Two poles 8 m and 20 m high stand upright on a ground. If their feet is 9 m apart, then find the distance between their tops.

- A. 2600 cm
B. 2400 cm
C. 800 cm
D. 1500 cm

37. Which of the following steps is/are incorrect while constructing a triangle PQR , right angled at Q , $PR = 5$ cm and $QR = 3$ cm?

Step-1 : Draw a line segment QR of length 3 cm.

Step-2 : Draw $\angle XQR = 90^\circ$ at point R using the protractor.

Step-3 : With R as centre and radius equal to 5 cm, draw an arc cutting the ray QX at P .

Step-4 : Join PR .

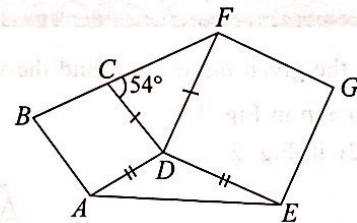
Thus, ΔPQR is the required triangle.

- A. Only Step-3
B. Only Step-2
C. Step-2 and Step-3
D. None of these

38. The ratio of the outer and the inner circumference of a circular path is 17:16. If the path is 7 m wide, then find the diameter of the inner circle.

- A. 224 m
B. 238 m
C. 119 m
D. 112 m

39. In the given figure (not drawn to scale), $ABCD$ is a rhombus, ADE and DCF are isosceles triangles, $DEGF$ is a square and BCF is a straight line. Find the sum of $\angle ADC$ and $\angle DAE$.



- A. 72°
B. 54°
C. 108°
D. 36°

40. By how much does the difference of 248.76 and 156.24 exceed the sum of 45.762 and 17.711?

- A. 29.047
B. 92.52
C. 37.476
D. 76.72

41. How many cubes should be removed from Fig. (i) to get Fig. (ii)?

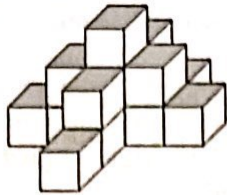


Fig. (i)

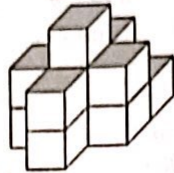
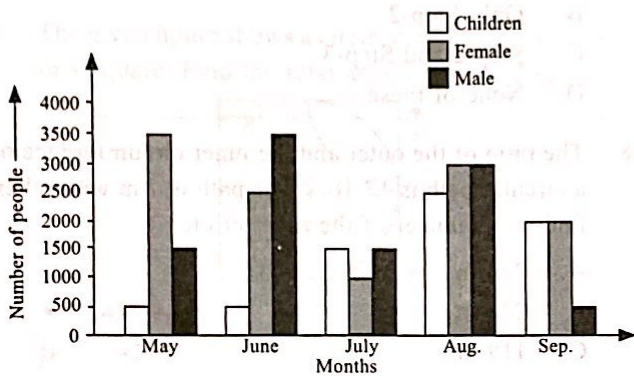


Fig. (ii)

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

Direction (42-43) : The given bar graph shows the number of people who visited Taj Mahal during the given five months. Study the graph carefully and answer the questions that follows.



42. What is the ratio of number of males visited in May, July and September altogether to the number of children visited in June and August together?

- A. 7:6
B. 5:7
C. 1:6
D. 7:5
43. What is the average number of females visited in all the given months?
- A. 2000
B. 1800
C. 1500
D. 2400

44. In an examination, one should get 36% of the maximum marks to pass. A student obtained 113 marks and is declared fail by 85 marks. The maximum marks are _____.
- A. 500
B. 550
C. 640
D. 1008

45. If $\frac{l}{5} = \frac{m}{6} = \frac{n}{7}$, then $\left(\frac{l+m+n}{n}\right)$ is equal to _____.
- A. $2\frac{4}{5}$
B. $1\frac{3}{7}$
C. $2\frac{4}{7}$
D. 2

ACHIEVERS SECTION

46. Study the given figures and find the value of
(i) $a + b$ in Fig. 1.
(ii) $2y$ in Fig. 2.

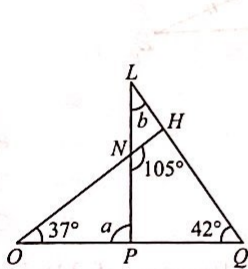


Fig. 1

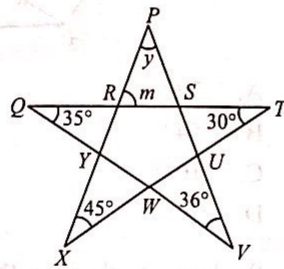
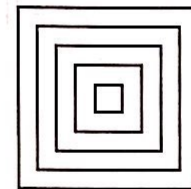


Fig. 2

- (i) (ii)
A. 128° 68°
B. 130° 90°
C. 94° 68°
D. 94° 34°

47. The adjoining figure shows a set of concentric squares. If the diagonal of the innermost square is 2 units and if the distance between the corresponding corners of any two successive square is 1 unit, then find the difference between the areas of the eighth and seventh squares, counting from the innermost square



- A. $10\sqrt{2}$ sq. units
B. 30 sq. units
C. $35\sqrt{2}$ sq. units
D. 20 sq. units

48. Match the following and select the correct option.

Column-I

(i) If $3^x - 3^{x-1} = 18$, then the value of x is P. $\frac{25}{16}$

(ii) If $4^{2x} = \frac{1}{32}$, then the value of x^2 is Q. 0

(iii) If $4(3x + 2) = 2(x - 8) + 4x$, then the value of $x + 4$ is R. 3

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

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

Statement-1 : 400 bananas are bought at the rate of ₹ 800 and sold at the rate of ₹ 36 per dozen. The profit percentage is 50%.

Statement-2 : There were 60 coins in a bag. If the ratio of the number of ₹ 2 coins to the number of ₹ 5 coins was 7 : 5 and the remaining 12 coins were of ₹ 1, then there was 20 coins of ₹ 5 in the bag.

- A. Both Statement-1 and Statement-2 are true.
- B. Both Statement-1 and Statement-2 are false.
- C. Statement-1 is true but Statement-2 is false.
- D. Statement-1 is false but Statement-2 is true.

50. If a die is rolled once, then find the probability of getting

- (i) a prime number
- (ii) a factor of 6
- (iii) an odd number.

	(i)	(ii)	(iii)
A.	$\frac{1}{2}$	$\frac{5}{6}$	$\frac{1}{2}$
B.	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{2}$
C.	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{1}{3}$
D.	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{1}{2}$

SPACE FOR ROUGH WORK