SOF

SCIENCE OLYMPIAD FOUNDATION

I M O

SOF INTERNATIONAL MATHEMATICS OLYMPIAD

Total Questions : 50

Time : 1 hr.

PATTERN & MARKING SCHEME				
Section	**(1) Logical Reasoning**	**(2) Mathematical Reasoning**	**(3) Everyday Mathematics**	**(4) Achievers Section**
No. of Questions	15	20	10	5
Marks per Ques.	1	1	1	3

SYLLABUS

Section – 1 : Verbal and Non-Verbal Reasoning.

Section – 2 : Real Numbers, Polynomials, Pair of Linear Equations in Two Variables, Quadratic Equations, Arithmetic Progressions, Triangles, Coordinate Geometry, Introduction to Trigonometry, Some Applications of Trigonometry, Circles, Constructions, Areas Related to Circles, Surface Areas and Volumes, Statistics, Probability.

Section – 3 : The Syllabus of this section will be based on the syllabus of Mathematical Reasoning and Quantitative Aptitude.

Section – 4 : Higher Order Thinking Questions - Syllabus as per Section – 2.
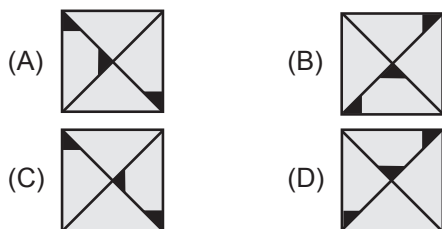
LOGICAL REASONING

1. Arrange the given words in the sequence in which they occur in the dictionary and then choose the correct sequence.
   1. Page   2. Pagan
   3. Palisade   4. Pageant
   5. Palate
   (A) 1, 4, 2, 3, 5   (B) 2, 4, 1, 3, 5
   (C) 2, 1, 4, 5, 3   (D) 1, 4, 2, 5, 3

2. Find the odd one out.

   (A)   (B)

   (C)   (D)

3. Mohit was looking for his father. He went 90 metres in the East before turning to his right.

He went 20 metres before turning to his right again to look for his father at his uncle's place 30 metres from this point. His father was not there. From here he went 100 metres to the North before meeting his father in a street. How far did the son meet his father from the starting point?
   (A) 80 metres   (B) 100 metres
   (C) 180 metres   (D) 160 metres

4. If + stands for 'division', × stands for 'addition', – stands for 'multiplication' and ÷ stands for 'subtraction', then which of the following options is correct?
   (A) $36 × 6 + 7 ÷ 2 – 6 = 20$
   (B) $36 ÷ 6 + 3 × 5 – 3 = 45$
   (C) $36 + 6 – 3 × 5 ÷ 3 = 24$
   (D) $36 – 6 + 3 × 5 ÷ 3 = 74$

MATHEMATICAL REASONING

5. In the given figure, O is the centre and SAT is a tangent to the circle at A. If $\angle BAT = 30°$, then find $\angle AOB$ and $\angle AQB$.
   (A) 60°, 150°
   (B) 30°, 150°
   (C) 60°, 60°
   (D) None of these
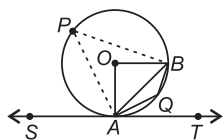
6. In the following system of linear equations, determine the value of k for which the given system of equations has a unique solution.
$$2x – 3y = 1$$
$$kx + 5y = 7$$

   (A) $k \neq -\dfrac{5}{3}$ (B) $k \neq -\dfrac{10}{3}$
   (C) $k \neq -\dfrac{3}{5}$ (D) $k \neq \dfrac{2}{3}$

7. If mean of the following distribution is 54, then find the value of p.

Class	0-20	20-40	40-60	60-80	80-100
Frequency	7	p	10	9	13

   (A) 9   (B) 11
   (C) 8   (D) 10

8. If the HCF of 210 and 55 is expressible in the form 210 × 5 + 55y, then find y.

(A) 5   (B) –15

(C) 14   (D) –19

9. The sum of three numbers in A.P. is –3, and their product is 8. Find the numbers.

(A) 2, –1, – 4   (B) – 4, –1, 2

(C) 4, –1, –2   (D) Both (A) and (B)

10. A copper sphere of diameter 18 cm is drawn into a wire of diameter 4 mm. Find the length of the wire.

(A) 240 m   (B) 242 m

(C) 243 m   (D) 245 m

EVERYDAY MATHEMATICS

11. Three ducks and two ducklings weigh 32 kg. Four ducks and three ducklings weigh 44 kg. All ducks weigh the same and all ducklings weigh the same. What is the weight of two ducks and one duckling?

(A) 20 kg   (B) 40 kg

(C) 60 kg   (D) 64 kg

12. What is the probability that a number selected from the numbers 1, 2, 3, ..., 25 is a prime number, when each of the given numbers is equally likely to be selected?

(A) 2/7   (B) 9/25

(C) 11/25   (D) 2/5

13. There is a circular path around a sports field. Priya takes 18 minutes to drive one round of the field, while Ravish takes 12 minutes for the same. Suppose they both start at the same point and at the same time, and go in the same direction. After how many minutes will they meet again at the starting point?

(A) 54   (B) 24

(C) 36   (D) 72

ACHIEVERS SECTION

14. Fill in the blanks.

Every _____(a)_____ number can be expressed (factorised) as the product of ___(b)___ factors and this factorisation is _____(c)_____ except for the order in which the prime factor occur.

	(a)	(b)	(c)
(A)	Prime	Composite	Unique
(B)	Composite	Prime	Unique
(C)	Odd	Even	Universal
(D)	Even	Odd	Universal

15. The graph of $ax^2 + bx + c$ is shown here and $A\left(\dfrac{-b}{2a}, -\dfrac{D}{4a}\right)$.

Identify the signs of a, b and c.
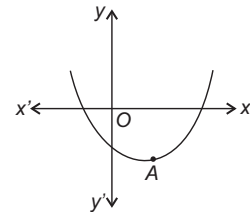
	a	b	c
(A)	+ve	+ve	–ve
(B)	+ve	–ve	–ve
(C)	+ve	–ve	+ve
(D)	–ve	+ve	–ve

SPACE FOR ROUGH WORK

ANSWERS

1. (C) 2. (D) 3. (B) 4. (D) 5. (A) 6. (B) 7. (B) 8. (D) 9. (D) 10. (C) 11. (A) 12. (B) 13. (C) 14. (B) 15. (B)