

9th iOM'16

International Olympiad of Mathematics



Presented by:
SILVER ZONE FOUNDATION
 Organized by :
Mathematics Olympiad Foundation
 New Delhi, India
 For supremacy in Mathematics
www.silverzone.org

CLASS : 10 (SYLLABUS & SAMPLE QUESTIONS)

Number System, Polynomials, Linear Equation, Quadratic Equation, Arithmetic progression, Coordinate Geometry, Statistics, Trigonometry, Circles, Triangles, Probability, Sequence and Series, Mensuration, Mathematical Reasoning and Logical Ability, Applied Mathematics, Mental Aptitude

The Actual Question Paper Contains 50 Questions. The Duration of the Test Paper is 60 Minutes.

1. If α and β are roots of the polynomial $p(s) = 3s^2 - 6s + 4$, then find the value of

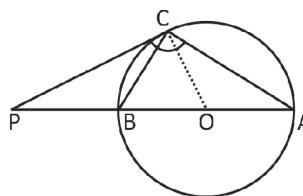
$$\frac{\alpha}{\beta} + \frac{\beta}{\alpha} + 2\left(\frac{1}{\alpha} + \frac{1}{\beta}\right) + 3\alpha\beta.$$

- (A) 8 (B) 2
 (C) 6 (D) 0
 (E) None of these
2. Six bells commence tolling together and toll at intervals of 2, 4, 6, 8, 10 and 12 seconds respectively. In 30 minutes, how many times do they toll together?
- (A) 4 (B) 10
 (C) 15 (D) 16
 (E) None of these
3. Find the coordinates of the vertex A of $\triangle ABC$, if D(3, -2), E(-3, 1) and F(4, -3) are the mid-points of BC, AC and AB respectively.
- (A) (10, -6) (B) (-2, 0)
 (C) (-4, 2) (D) (5, -3)
 (E) None of these
4. There are twenty books in a library numbered 61 to 80 on their cover page. What is the probability of getting a book having a multiple 8 or a prime number on its cover page?

- (A) $\frac{1}{5}$ (B) $\frac{2}{5}$
 (C) $\frac{3}{80}$ (D) $\frac{1}{10}$
 (E) None of these

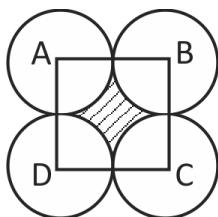
5. If 5 pencils and 7 pens together cost ₹ 50, whereas 7 pencils and 5 pens together cost ₹ 46, find the cost of one pen.
- (A) ₹ 5 (B) ₹ 6
 (C) ₹ 2 (D) ₹ 4
 (E) None of these

6. The tangent at a point C of a circle and a diameter AB when extended intersect at P. O is the centre of the circle. If $\angle PCA = 110^\circ$, then find the value of $\angle CBA$.



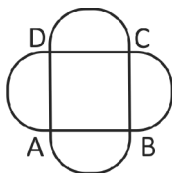
- (A) 20° (B) 30°
 (C) 40° (D) 70°
 (E) None of these

7. In the adjoining figure, ABCD is a square of side 14 cm. With centres A, B, C and D four circles are drawn such that each circle touches externally two of the remaining three circles. Find the area of the shaded region.



- (A) 48 cm^2 (B) 42 cm^2
 (C) 36 cm^2 (D) 56 cm^2
 (E) None of these

8. ABCD is a square of side a cm. AB, BC, CD and AD all are the chords of circles with equal radii each. If the chords subtends an angle of 120° at their respective centres, find the total area of the given figure where arcs are part of the circles:



(A) $\left[a^2 + 4 \left(\frac{\pi a^2}{9} - \frac{a^2}{3\sqrt{2}} \right) \right]$

(B) $\left[a^2 + 4 \left(\frac{\pi a^2}{9} - \frac{a^2}{4\sqrt{3}} \right) \right]$

(C) $\left[9a^2 - 4\pi + 3\sqrt{3}a^2 \right]$

(D) $\left[9a^2 + 4\pi - 3\sqrt{3}a^2 \right]$

(E) None of these

9. The shadow of a tower standing on a level ground is found to be 40 m longer when Sun's altitude is 30° than when it was 60° . What is the height of the tower?

(A) $15\sqrt{3} \text{ m}$ (B) $20\sqrt{3} \text{ m}$

(C) $22\sqrt{3} \text{ m}$ (D) $18\sqrt{3} \text{ m}$

(E) None of these

10. If $\operatorname{cosec} \phi - \sin \phi = a$ and $\sec \phi - \cos \phi = b$, then find the value of $(a^2 b)^{2/3} + (ab^2)^{2/3}$.

(A) 0 (B) -1

(C) 2 (D) 1

(E) None of these

ANSWERS

1. (A) 2. (D) 3. (B) 4. (B) 5. (A) 6. (D) 7. (B) 8. (B) 9. (B) 10. (D)