11th iOM 18 International Olympiad of Mathematics

Presented by: SILVER ZONE FOUNDATION NEW DELHI, INDIA
Organized by : Mathematics Olympiad Foundation
New Delhi, India
For supremacy in Mathematics
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CLASS : 10 (SYLLABUS & SAMPLE QUESTIONS)

Number System, Polynomials, Linear Equation, Quadratic Equation, Arithmetic Progression, Coordinate Geometry, Statistics, Trigonometry, Height & Distance, Circles, Triangles, Probability, Sequence and Series, Mensuration, Verbal & Non-verbal Reasoning.

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 Δ 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

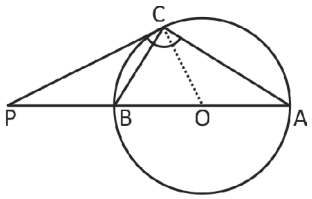
4. **There are twenty books in a library numbered 61 to 80 on their cover page. What is the probability of getting a book having a multiple 8 or a prime number on its cover page?**

(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.**

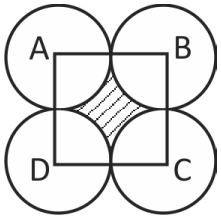
(A) ₹ 5 (B) ₹ 6
(C) ₹ 2 (D) ₹ 4
(E) None of these

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°, then find the value of $\angle$CBA.**



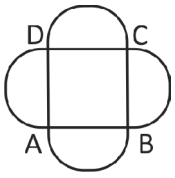
(A) 20° (B) 30°
(C) 40° (D) 70°
(E) None of these

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) $15\sqrt{3}$m (B) $20\sqrt{3}$m
(C) $22\sqrt{3}$m (D) $18\sqrt{3}$m
(E) None of these

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

(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)