

# 10<sup>th</sup> iOM'17

## International Olympiad of Mathematics



Presented by:  
**SILVER ZONE**  
 FOUNDATION  
 NEW DELHI - INDIA

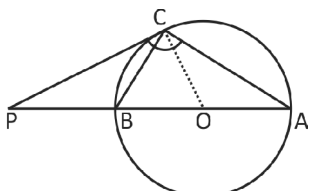
Organized by:  
**Mathematics Olympiad Foundation**  
 New Delhi, India

For supremacy in Mathematics  
[www.silverzone.org](http://www.silverzone.org)

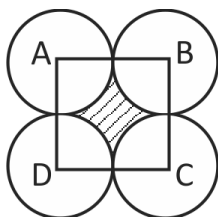
### CLASS : 10 (SYLLABUS & SAMPLE QUESTIONS)

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

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

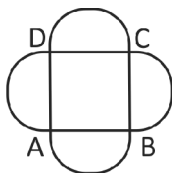
- If  $\alpha$  and  $\beta$  are roots of the polynomial  $p(s) = 3s^2 - 6s + 4$ , then find the value of  $\frac{\alpha}{\beta} + \frac{\beta}{\alpha} + 2\left(\frac{1}{\alpha} + \frac{1}{\beta}\right) + 3\alpha\beta$ .  
 (A) 8 (B) 2  
 (C) 6 (D) 0  
 (E) None of these
- Six bells commence tolling 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
- 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
- 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
- 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
- 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)  $20^\circ$  (B)  $30^\circ$   
 (C)  $40^\circ$  (D)  $70^\circ$   
 (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)  $48 \text{ cm}^2$                       (B)  $42 \text{ cm}^2$   
 (C)  $36 \text{ cm}^2$                       (D)  $56 \text{ cm}^2$   
 (E) None of these

8. ABCD is a square of side  $a \text{ cm}$ . AB, BC, CD and AD all are the chords of circles with equal radii each. If the chords subtends an angle of  $120^\circ$  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  $30^\circ$  than when it was  $60^\circ$ . 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)