

The University of the West Indies, Mona
presents
2025/2026 Senior Mathematical Olympiad

Qualifying Round Examination Grades 7 and 8 (Solution)

1. **Soln: (A)** The conditions will be met if B_4 flies to the cell in the fourth row and second column.
2. **Soln: (E)** A half of a half of a day is a quarter of a day which has $\frac{1}{4} \times 24 = 6$ hours which has 12 half-hours.
3. **Soln: (B)** Consider the vertex due east of A . The distance travelled to that vertex is equivalent to $1 + 1 + 1 = 3$ edge lengths. The ant then travels another $1 + 1 = 2$ edge lengths for a total of 5 edge lengths or $5 \times 12 = 60$ cm.
4. **Soln: (B)** Based on the information given, 49 students did better than Raj and 49 students did worse than Raj. With Raj, the total number of participants is $49 + 1 + 49 = 99$.
5. **Soln: (D)** We have $\widehat{P} = 3\widehat{Q}$ and $\widehat{P} = \frac{1}{2}\widehat{R}$. This means that $\widehat{R} = 2\widehat{P} = 6\widehat{Q}$. The sum of the angles add to 180° and so $\widehat{P} + \widehat{Q} + \widehat{R} = 3\widehat{Q} + \widehat{Q} + 6\widehat{Q} = 10\widehat{Q}$. So $10\widehat{Q} = 180^\circ$ and $\widehat{Q} = \frac{180^\circ}{10} = 18^\circ$. The angle at P is therefore $3 \times 18^\circ = 54^\circ$.
6. **Soln: (B)** After the first set of cuts, Alpha had 10 pieces. After the second round of cuts she has $9 + 10$ pieces of paper. After the 5th round of cuts, she had $9 + 9 + 9 + 9 + 10 = 46$.
7. **Soln: (B)** The sum of the 10 numbers must be 100. The 9 smallest positive numbers add to $1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 = 45$. The now means that the 10th number is largest when it is $100 - 45 = 55$.
8. **Soln: (A)** The squares are of two different sizes with total $y = 6 + 1 = 7$. The triangles are of four different sizes with total $x = 4 + 3 + 2 + 1 = 10$. From this $x + y = 17$.
9. **Soln: (E)** The number of seven-buckets in 350 buckets of concrete mix is $\frac{350}{7} = 50$. The number of buckets of stone is therefore $4 \times 50 = 200$.

10. **Soln: (C)** Since 0 to any non-zero power is 0 and $2^0 = 1$, and, 1 to any power is 1, the sum is $2^0 + 1^{10} = 1 + 1 = 2$.
11. **Soln: (C)** The sum of the 5 numbers is $5 \times 15 = 75$ and so $3 + 5 + 7 + a + b = 75$. From this, $a + b = 60$ and the average is $\frac{a+b}{2} = 30$.
12. **Soln: (C)** The four quarter circles add to give one circle and so the number of shaded circle is 2. The number of unshaded circle (in terms of area) is therefore 3. The required ratio is 2 : 3.
13. **Soln: (E)** From today, the rest days are going to be day 5, 10, 15, 20, 25, 30, 35, etc. From this list, 35 is the first that is a multiple of 7 and so the next Sunday rest day will be day 35 or after 34 days.
14. **Soln: (D)** After filling in the 3 in the top row and the 8 in the left column, the table can be filled in as

×	3	9	2	7
8	24	72	16	56
4	12	36	8	28
3	9	27	6	P
6	18	54	12	42

We used the fact that the only (non unit) common factor to 8 and 6 is 2 and the only (non unit) common factor to 6 and 27 is 3. So $M = S = 12$.

15. **Soln: (D)** Angle $BAC = 180^\circ - (30^\circ + 75^\circ) = 75^\circ$. This means that triangle ABC is isosceles with $BC = AC$. Since $BC = AD$, we have $AC = AD$ and so triangle ACD is also isosceles. The base angles are $\frac{1}{2}(180^\circ - 50^\circ) = 65^\circ$. So angle $ADC = 65^\circ$.
16. **Soln: (E)** Expressing the numbers as product of prime numbers, we have $625 = 25^2 = 5^4$, $124 = 2 \times 62 = 2 \times 2 \times 31$, $108 = 2 \times 54 = 2 \times 2 \times 3 \times 3$, $2187 = 3^7$ and $2025 = 45^2 = 5^2 \times 3^4 = 3 \times 5 \times 9 \times 15$.
17. **Soln: (D)** In one hour, the number of 3 minutes is $\frac{60}{3} = 20$ and the number of 3 minutes interval in two hours is 40. The total number of balloons inflated (including those that popped) is therefore $40 \times 8 = 320 = 32 \times 10$. For every 10 inflated only 9 survived and so the number that survived is $32 \times 9 = 288$.

18. **Soln: (C)** Let the number of poles be p and the number of birds be b . We have $b = p + 1$ and $b = 2(p - 1) = 2p - 2$. Subtracting the first from the second $0 = p - 3$. It follows that $p = 3$.
19. **Soln: (A)** Let the numbers be abc and xy . The values are $100a + 10b + c$ and $10x + y$. The difference is $100a + 10(b - x) + (c - y)$. This is 989. This suggests that $a = 9$, $(b - x) = 8$ and $(c - y) = 9$. Since $c - y = 9$, $c = 9$ and $y = 0$. Also, x cannot be 0 since the two digit number is xy . Therefore $b = 9$ and $x = 1$. The two numbers are 999 and 10. The sum is $999 + 10 = 1009$.
20. **Soln: (B)** The area of $\triangle BCD$ is $\frac{1}{2}BD \times DF = 6$ and therefore $BD \times DF = 2 \times 6 = 12 \text{ cm}^2$. This is the area of triangle $DBEF$.
21. **Soln: (C)** The distance travelled by Mother after 25 seconds is $25 \times 5 = 125 \text{ m}$ and the distance travelled by Hopps after 25 seconds is $25 \times 2 = 50 \text{ m}$. The distance between them is therefore $125 \text{ m} - 50 \text{ m} = 75 \text{ m}$. Since Hopps stopped. They will next to each other again when Mother completes a further distance of $330 \text{ m} - 75 \text{ m} = 255 \text{ m}$. Mother will take $\frac{255}{5} = 51$ hops or another 51 seconds.
22. **Soln: (E)** The units digit of powers of 2 cycle between 2, 4, 8, 6. Since $2025 = 4 \times 506 + 1$, the units digit of 2^{2025} is 2. The units digit of powers of 3 cycle between 3, 9, 7, 1. Since $2025 = 4 \times 506 + 1$, the units digit of 3^{2025} is 3. The units digit of powers of 5 is always 5 and so the units digit of $2^{2025} + 3^{2025} + 5^{2025}$ is the units digit of $2 + 3 + 5 = 10$ which is 0.
23. **Soln: (B)** Stacking the four 4 m rectangles horizontally and both 3 m rectangle horizontally (on top) with the 2 m vertically (adjacent to the 3 m rectangles) create a 4×6 rectangle. This gives a perimeter of 20 m. Any other arrangements will result in a greater perimeter.
24. **Soln: (D)** The area of the shaded region that is trapped in the rectangle $ABFE$ is the area of the rectangle minus the area of two quarter circles. This is $2 \times 4 \text{ cm}^2$ minus the area of one of the semi-circle. The total area of the shaded region is therefore 8.
25. **Soln: (A)** Let the consecutive numbers be $a, a - 1, a - 2, a + 1$ and $a + 2$. The sum is $5a$ which is a number that is exactly divisible by 5. Of the numbers given, only 2025 is divisible by 5 and since $\frac{2025}{5} = 405$, the five consecutive numbers are 403, 404, 405, 406 and 407.