# The University of the West Indies, Mona

**presents**

# The 2025/2026 Junior Mathematical Olympiad

### Qualifying Round (Solutions)

1. **Soln**: **(D)** First, $2\bigstar 3 = 2 \times 3 + 2 + 3 = 6 + 2 + 3 = 11$.

   Next, $(2\bigstar 3)\bigstar 1 = 11\bigstar 1 = 11 \times 1 + 11 + 1 = 11 + 11 + 1 = 23$.

2. **Soln**: **(D)** Zach's present age is $5 + 6 = 11$ and in seven years, the boy's ages will be $5 + 7 = 12$ and $11 + 7 = 18$. This gives a sum of $12 + 18 = 30$.

3. **Soln**: **(E)** The number of $1 \times 1$ rectangles is 6. The number of $2 \times 1$ rectangles is 6. The number of $3 \times 1$ rectangles is 2. The number of $2 \times 2$ rectangles is 1. The total number of rectangles is $6 + 6 + 2 + 1 = 15$.

4. **Soln**: **(B)** With the current order, the number of whistles is $4+1+2+3+4 = 14$. If Bea turns around the new total will be $4+3+2+3+4 = 16$.

5. **Soln**: **(B)** Turtle2 will need 4 one-quarters to complete the race and for this time, Turtle3 covers $4 \times 1/5 = 4/5$ the distance. This means that Turtle3 would be $1/5$ the distance from the finish line. This is 2 km.

6. **Soln**: **(D)** In the range the first leap year was 2000 ($400 \times 5 = 2000$) and the leap years are $2000, 2004, 2008, 2012, 2016, 2020$ and $2024$. The number is 7.

7. **Soln**: **(C)** There are 10 possible groups. These are

   $$ABC, ABD, ABE, ACD, ACE, ADE, BCD, BCE, BDE, CDE.$$

8. **Soln**: **(C)** Indira is currently 10 years old and will be twice her age in 10 years time. Armando is currently $4 \times 10 = 40$ years and in ten years he will be 50 years old.

9. **Soln**: **(B)** In grams, let the masses be $a, b$ and $o$. We are given that $a + b = 230$, $b + o = 370$ and $a + b + o = 540$. The orange weight is the difference between 540 and 230. This is $540 - 230 = 310$. The banana therefore weighs $370 - 310 = 60$. It follows that the apple weighs $230 - 60 = 170$. The weight of the apple and the orange is $a + o = 170 + 310 = 480$.

10. **Soln**: **(E)** Let the number of birds on the trees at the beginning be $x, y, z$ so that $x + y + z = 60$ and $x - 6 = y - 8 = z - 4$. The new total number of birds is $60 - 18 = 42$. The number remaining on each of the trees is therefore $\frac{42}{3} = 14$. The total on the second tree before the 8 birds flew off is therefore $14 + 8 = 22$.

11. **Soln**: **(B)** The only 5 digit number is 11111. The only 4-digit number is 1112. The possible 3-digit numbers are 113 and 122. The only 2-digit number is 14. The total possibilities is $1 + 1 + 2 + 1 = 5$.

12. **Soln**: **(D)** Range $0 - 99$ number of 7 is $10 + 10 = 20$. Range $100 - 999$ number of 7 is $9 \times 20 + 100 = 280$. Range $1000 - 1999$ number of 7 is $20 + 280 = 300$. Range $2000 - 2025$ number of 7 is $1 + 1 = 2$. The total is $1 + 19 + 280 + 300 + 2 = 602$.

13. **Soln**: **(A)** $\frac{1}{3} + \frac{1}{4} = \frac{4}{12} + \frac{3}{12} = \frac{7}{12}$. Since $1 - \frac{7}{12} = \frac{5}{12}$, 320 is equivalent to $\frac{5}{12}$. The total $\left(\frac{12}{12}\right)$ is therefore $(320 \div 5) \times 12 = 768$.

14. **Soln**: **(E)** Plant One grows $\frac{3}{2}$ cm every month and Plant Two grows $\frac{5}{6}$ cm every month. If $m$ is the number of months for the plants to have the same height, then $44 + \frac{3}{2}m = 80 + \frac{5}{6}m$. This gives $36 = \frac{9}{6}m - \frac{5}{6}m = \frac{4}{6}m = \frac{2}{3}m$. From this $2m = 36 \times 3 = 108$ and so $m = 54$.

15. **Soln**: **(C)** From the first rule, there must be 5 girls in the club. From the second rule, there can be no more than 2 boys in the club. From this, the maximum number of member must be $5 + 2 = 7$.

16. **Soln**: **(D)** All but 1 will have at least one face painted. The number of cubes with no pink is $(3 - 2) \times (3 - 2) \times (3 - 2) = 1$.

17. **Soln**: **(A)** The number of marbles is $3 \times n = 3n$ and the number of boys is $n + 3$. From the information given, $3n + 1 = 2(n + 3)$. That is, $3n + 1 = 2n + 6$. This given $n = 5$.

18. **Soln**: **(A)** The sum of the digits are $19+A+B$ and $15+A+B+C$. So $A+B$ takes the form $3m-1$. Now $15+3m-1+C = 14+3m+C$ must be divisible by 3. A possible value is $C = 7$.

19. **Soln**: **(D)** One clock is increasing and the other is decreasing. The will coincide in the middle or the average of the two times shown. The average is

$$\frac{1}{2}(14{:}58 + 21{:}32) = \frac{1}{2}(35{:}90) = \frac{1}{2}(36{:}30) = 18{:}15.$$

20. **Soln**: **(A)** $B = 2N$ and $B = 3A$ and so $B$ is even and is a multiple of 3. The possible values of $B$ are $0, 6$. But $B = 0$ is not possible because all digits would have been zero. So $B = 6$. This means that $A = 2$ and $N = 3$. In this case $B \times A \times N \times A \times N \times A = 6 \times 2 \times 3 \times 2 \times 3 \times 2 = 432$.

21. **Soln**: **(C)** The tens digit moved from ■ to ♠ and so ★ must be a 9 and ▲ must be a zero. It now means that ■ must be a 1. The numbers are therefore $19, 20, 21$. The next number being 22 or ♠♠.

22. **Soln**: **(B)** If Fabian cuts the 1 m long rope into $n$ pieces then 2 m long rope will have $2n$ pieces and the total is $3n$. The total number must therefore be a multiple of 3. Since 8 is not a multiple of 3, the answer is 8.

23. **Soln**: **(C)** The number of dog is $3t$ where $t$ is the number of treat bowls. The number of dog is $2w$ where $w$ is the number of water bowls and $f$ where $f$ is the number of food bowls. Now $t + w + f = 77$ and $3t = 2w = f$. So $t + \frac{3}{2}t + 3t = 77$. This last equation gives $2t + 3t + 6t = 154$. That is, $11t = 154$ and so $t = \frac{154}{11} = 14$. The number of dogs is $3t = 3 \times 14 = 42$.

    **Alternatively:** There is 1 dog for every bowl of food, and so if there were 6 dogs, then there would be 6 bowls of food. There are 2 dogs for every bowl of water, and so these same 6 dogs would need $\frac{6}{2} = 3$ bowls of water. There are 3 dogs for every bowl of treats, and so the 6 dogs would need $\frac{6}{3} = 2$ bowls of treats. Thus, 6 dogs require 6 bowls of food, 3 bowls of water, and 2 bowls of treats, or $6+3+2 = 11$ bowls in total. There are 11 bowls for every 6 dogs, and since there are $77 = 11 \times 7$ bowls, then there are 7 groups of 6 dogs, or $6 \times 7 = 42$ dogs.

24. **Soln**: **(E)** The possible pairs are $(1, 2025), (3, 225), (5, 81), (9, 25), (15, 9)$, and $(45, 1)$.

25. **Soln**: **(C)** $2h = 5s, 3s = 8t, 2t = 3c$. In terms of $s$, $h = \frac{5}{2}s, t = \frac{3}{8}s, c = \frac{2}{3}t = \frac{1}{4}s$. Now, one hat and five skirts is $\frac{5}{2}s + 5s = \frac{15}{2}s = \frac{30}{4}s$. One hat, three skirts and a cap is $\frac{5}{2}s + 3s + \frac{1}{4}s = \frac{23}{4}s$. Eight skirts and six T-shirts is $8s + 6 \times \frac{3}{8}s = \frac{41}{4}s$. Thirty-seven caps is $\frac{37}{4}s$. Three skirts and three caps is $3s + \frac{3}{4}s = \frac{15}{4}s$. It follows that the most expensive is Eight skirts and six T-shirts.