

**The University of the West Indies**  
**The 2019 Junior Mathematical Olympiad**

SOLUTIONS FOR FIRST ROUND EXAMINATION, GRADES 5 AND 6  
WEDNESDAY, FEBRUARY 20, 2019

---

1. We have

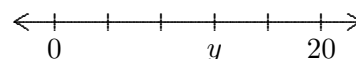
$$\begin{aligned} & (1 + 11 + 21 + 31 + 41) + (9 + 19 + 29 + 39 + 49) \\ &= (1 + 9) + (11 + 19) + (21 + 29) + (31 + 39) + (41 + 49) \\ &= 10 + 30 + 50 + 70 + 90 = 250 \end{aligned}$$

---

2. We have  $1,000,000,000 - 777,777,777 = 222,222,223$ .

---

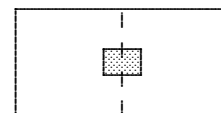
3. The markings on the number line divide it into 5 equal segments. Each segment has a length of 4. The value of  $y$  is 12.



4. We have  $991 + 993 + 995 + 997 + 999 = 4975$ . This is equal to  $5000 - 25$ . Then  $N = 25$ .

---

5. If an imaginary line is drawn down the middle of the wall, the ends of the picture extend 1.5 feet past it and the ends of the wall are 9.5 feet away. The distance from an end of the picture to the nearest end of the wall is  $9.5 \text{ feet} - 1.5 \text{ feet} = 8 \text{ feet}$ .



6. In reduced form the fractions are  $\frac{8}{9}$ ,  $\frac{7}{8}$ ,  $\frac{6}{7}$ ,  $\frac{5}{6}$ , and  $\frac{4}{5}$ . All of these fractions are close to 1, but a little bit less. The fraction closest to 1, and hence the largest one, is  $\frac{8}{9}$ .

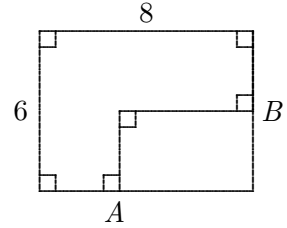
---

7. We have  $39 = 3 \times 13$ ,  $51 = 3 \times 17$ ,  $77 = 7 \times 11$ ,  $91 = 7 \times 13$ , and  $121 = 11 \times 11$ . The number with the largest prime factor is 51.

---

8. The perfect squares between 8 and 80 are 9, 16, 25, 36, 49, and 64. Then the whole numbers between  $\sqrt{8}$  and  $\sqrt{80}$  are 3, 4, 5, 6, 7, and 8. There are 6 such numbers in all.

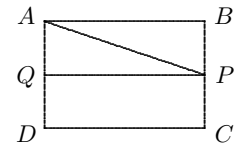
9. The perimeter of the polygon is the same as the perimeter of the rectangle containing it. (The length of the path from  $A$  to  $B$  is the same either way.) Then the perimeter of the polygon is equal to  $6 + 8 + 6 + 8 = 28$ .



10. Since 0.48017 is a little bit less than  $\frac{1}{2}$ , the product  $(0.48017)(0.48017)(0.48017)$  is a bit less than  $(\frac{1}{2})(\frac{1}{2})(\frac{1}{2}) = \frac{1}{8}$ . In decimal form,  $\frac{1}{8} = 0.125$ . So, the product  $(0.48017)(0.48017)(0.48017)$  is a bit less than 0.125. Among the choices given, the best estimate is 0.110.

11. Using the rule of formation which has been given, the Fibonacci sequence is 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, ... Among the numbers given, 34 is a Fibonacci number.

12. Let  $Q$  be the midpoint of  $AD$ . Then rectangles  $ABPQ$  and  $QPCD$  divide  $ABCD$  into two equal parts. Each one has area  $12 \text{ cm}^2$ . Triangles  $ABP$  and  $PQA$  also divide rectangle  $ABPQ$  into two equal parts. Each one has area  $6 \text{ cm}^2$ . Then the area of quadrilateral  $APCD$  is  $6 \text{ cm}^2 + 12 \text{ cm}^2 = 18 \text{ cm}^2$ .



13. Since 60 minutes represents one hour, 1000 minutes represents 16 hours and 40 minutes. If the contest started at noon, it ended 16 hours and 40 minutes later. This would be 4:40 am.

14. The least common multiple of 2, 3, 4, and 6 is 12. Also, 12, 5, and 7 have no common factors other than 1. Then the least common denominator for the sum of the given fractions is  $5 \times 7 \times 12 = 420$ .

15. When Jack sold 25% of his apples to Jill, he sold 32 apples in all. He had 96 apples left. When he sold 25% of them to June, he sold 24 apples in all. He had 72 apples left. After he gave one to his teacher, he had 71 apples left.