

**The University of the West Indies**  
**The 2015 Junior Mathematics Olympiad**

SOLUTIONS TO THE FIRST ROUND EXAMINATION  
WEDNESDAY, FEBRUARY 25, 2015

1) Which of the expressions below has the greatest value?

(a)  $2 \times 0 + 1 \times 5$

(b)  $2 \times (0 + 1) \times 5$

(c)  $2 + 0 + 1 + 5$

(d)  $(2 + 0) \times (1 + 5)$

(e)  $2 + (1 \times 0) + 5$

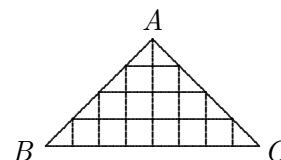
1. First,  $2 \times 0 + 1 \times 5 = 0 + 5 = 5$ . Second,  $2 \times (0 + 1) \times 5 = 2 \times 1 \times 5 = 10$ . Third,  $2 + 0 + 1 + 5 = 8$ . Fourth,  $(2 + 0) \times (1 + 5) = 2 \times 6 = 12$ . Fifth and finally,  $2 + (1 \times 0) + 5 = 2 + 0 + 5 = 7$ . The expression with the greatest value is  $(2 + 0) \times (1 + 5)$ . Its value is 12.

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2. Let  $x$  be the number of apples Mark picked. If he had picked twice as many apples as he picked, he would have picked  $2x$  apples. If he had 20 more apples than he has now, he would have  $x + 20$  apples. So,  $2x = x + 20$ . Subtracting  $x$  from both sides gives  $x = 20$ . Mark picked 20 apples.

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3. The triangle  $ABC$  contains 12 small squares and 8 halves of a square. The 8 halves are equal in area to 4 whole squares. So, the area of triangle  $ABC$  is equal to the area contained in 16 whole squares. The area of 16 squares is  $48 \text{ cm}^2$ .



4. The expression  $2 \times 2 \times 3 \times 3$  has the same value as  $2 \times 3 \times 2 \times 3$ . So, the equation  $\square \times \square = 2 \times 2 \times 3 \times 3$  has the same solution as the equation  $\square \times \square = 2 \times 3 \times 2 \times 3$ . The value of  $\square$  is  $2 \times 3$ . (This is 6.)

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5. Let  $x$  be the number of CDs that Mary has. If Adelaide gave Mary 10 CDs, Adelaide would have 27 CDs and Mary would have  $x + 10$  CDs. So,  $x + 10 = 27$ . Subtracting 10 from both sides gives  $x = 17$ . Mary has 17 CDs.

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6. Anne slept from 9:30 pm to 6:45 am the next day. She slept 9 hours and 15 minutes. Paul slept 1 hour and 50 minutes longer. He slept 11 hours and 5 minutes.

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7. Suppose Peter chose the number 51. When he placed a zero between its digits, his new number would have been 501. The difference between his numbers would have been  $501 - 51 = 450$ . Suppose that Peter chose 52 instead. When he placed a zero between the digits, the new number would have been 502. The difference between his numbers would have been  $502 - 52 = 450$ . In the same way, whether Peter chose 53, 54, or 55, the difference in his numbers would have been 450. So, whichever number he chose, the difference in his numbers was 450.

8. Ella came to the birthday party 5 minutes earlier than Stan did. Also, Stan left 2 minutes after Iona did and Ella left 5 minutes after Iona did. So, Ella left 3 minutes after Stan did. Then Ella was at the party 8 minutes longer than Stan was.

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9. Let  $x$  be the number of marbles that Lenroy has. If Tahjae had 6 more marbles than Lenroy has, he would have  $x + 6$  marbles. Together, they would have  $x + (x + 6) = 2x + 6$  marbles. So,  $2x + 6 = 34$ . Subtracting 6 from both sides gives  $2x = 28$ . Dividing both sides by 2 gives  $x = 14$ . Lenroy has 14 marbles. In reality, Tahjae has 6 fewer marbles than Lenroy. Tahjae has 8 marbles.

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10. Let  $x$  be the amount of money that Celine earned. Since Adam earned 4 times as much money as Celine did, Adam earned  $4x$ . He also earned twice as much as Brianna did. So, Brianna earned  $2x$ . The total amount that Adam, Brianna, and Celine earned is  $4x + 2x + x$ . This is  $7x$ . So,  $7x = \$2800$ . Dividing both sides by 7 gives  $x = \$400$ . Celine earned \$400.

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11. First, 16 of Rushane's marbles are not green. This means that 4 of them are green. Second, five of his marbles are blue. Third, 12 of his marbles are not yellow. This means that 8 of them are yellow. Then  $4 + 5 + 8 = 17$  of Rushane's marbles are green, blue, or yellow. This means that 3 of his marbles are black.

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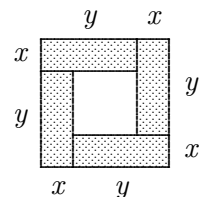
12. We consider each expression separately. First,  $10 \times 0.001 \times 100 = 0.01 \times 100 = 1$ . Second,  $0.01 \div 100 = 0.0001$ . Third,  $100 \div 0.001 = 100,000$ . Fourth,  $1000 \times 1000 \div 100 = 1,000,000 \div 100 = 10,000$ . Fifth and finally,  $0.1 \times 0.01 \times 10,000 = 0.001 \times 10,000 = 10$ . The greatest of these expressions is  $100 \div 0.001$ , which has the value 100,000.

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13. Let  $x$  be the number Marsha chose. Then her number plus one-half of her number is  $x + \frac{1}{2}x = \frac{3}{2}x$ . This is 3 less than twice her number. So,  $\frac{3}{2}x = 2x - 3$ . Multiplying throughout by 2 gives  $3x = 4x - 6$ . Adding 6 to both sides gives  $3x + 6 = 4x$ . Subtracting  $3x$  from both sides gives  $6 = x$ . Marsha chose the number 6.

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14. Let  $x$  be the width and  $y$  be the length of a shaded rectangle. Then  $x + y + x + y = 40$ . That is,  $2x + 2y = 40$  and so  $x + y = 20$ . The length of each side of the large outer square is  $x + y$ . So, the length of each side of the square is 20 cm. The area of the square is  $20 \text{ cm} \times 20 \text{ cm} = 400 \text{ cm}^2$ .



15. Each horizontal and each vertical line in the grid will be 1 m long. Since one match is 5 cm long, Reneisha will need 20 matches to complete each line. This means that the grid will have 20 squares in each row and 20 squares in each column. To form a "checkerboard" with 20 rows and 20 columns of squares, Reneisha will need to make 21 horizontal lines and 21 vertical lines out of matchsticks. For the horizontal lines, she will need  $21 \times 20 = 420$  matches. For the vertical lines, she will need another 420 matches. She will need  $420 + 420 = 840$  matches in all.

