

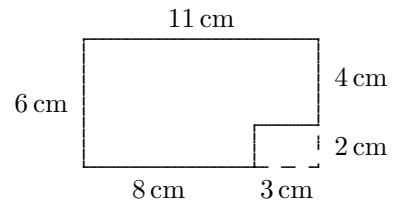
The University of the West Indies
The 2015 Junior Mathematics Olympiad

SOLUTIONS TO THE FIRST ROUND EXAMINATION
TUESDAY, FEBRUARY 24, 2015

1. When additions and multiplications are mixed in an expression (without any parentheses), the multiplications should be done first. So the original expression is equal to $16 + 4 + 4 + 4 + 4 + 16$. The value of this sum 48.

2. The length of Felix's tail is half of its length plus 12 cm. This means that half of his tail (the other half) is 12 cm long. Felix's tail is 24 cm long.

3. The original Chocolate bar was a rectangle $11 \text{ cm} \times 6 \text{ cm}$. It had $11 \times 6 = 66$ pieces in it. The pieces John already ate form a rectangle $3 \text{ cm} \times 2 \text{ cm}$ in size. John ate 6 pieces in all. Then John has $66 - 6 = 60$ pieces of chocolate left.



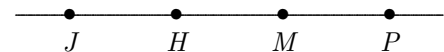
4. Kaysia gave her mother 1ℓ of berries on the first day, 2ℓ of berries on the second day, 4ℓ of berries on the third day, 8ℓ of berries on the fourth day, and 16ℓ of berries on the fifth day. She gave her mother $1 + 2 + 4 + 8 + 16 = 31$ litres of berries in all.

5. Since Carol and Ellen do not live on the that floor Dora lives on, they live on the same floor as each other. Since Ann and Carol do not live on the floor that Barb lives on, they also live on the same floor as each other. So, Carol, Ellen, and Ann all live on the same floor. This is the second floor. This means that Barb and Dora live on the first floor.

6. Mrs. Rabbit has 11 children. Since each of her children has 11 children, Mrs. Rabbit has $11 \times 11 = 121$ grandchildren. Since each of them also has 11 children, Mrs. Rabbit has $121 \times 11 = 1331$ great-grandchildren.

7. The largest three-digit number is 999 and the smallest two-digit number is 10. Their difference is 989. Suppose Mike wrote down a three-digit number less than 999, or a two-digit number greater than 10 (or both). Then the difference of his numbers would be less than 989. Since this is not so, Mike wrote down the numbers 999 and 10. Their sum is 1009.

8. Heckle is sitting halfway between Jeckle and Meckle (see the figure on the right). Also, the distance between Jeckle and Heckle is exactly the same as the distance between Meckle and



Peckle. If Peckle were sitting between Jeckle and Meckle, he would be sitting on top of Heckle. Since this is not so, Peckle is on the outside of the other three birds (and opposite to Jeckle). Also, the birds

are equally spaced. Since Heckle sits 4 m from Peckle, all birds are 2 m from their nearest neighbor. The distance from Jeckle to Peckle is 6 m.

9. Jumbo is 4 years older than Gumbo, and Gumbo is 4 years older than Mumbo. So, Jumbo is 8 years older than Mumbo. Let x be the age of Mumbo. The age of Jumbo is $x + 8$. Since Jumbo is five times as old as Mumbo, $x + 8 = 5x$. Subtracting x from both sides gives $8 = 4x$. Dividing both sides by 4 gives $x = 2$. Mumbo is 2 years old.

10. Maria has 201 coins and one-third of them are one-peso coins. So, Maria has 67 one-peso coins. She also has 67 two-peso coins. The rest of the coins, and there are 67 of them, are five-peso coins. The value of her coins, measured in pesos, is $(67 \times 1) + (67 \times 2) + (67 \times 5)$. This is equal to $67 + 134 + 335 = 536$ pesos.

11. The bar code has alternating black and white bars, starts and ends with a black bar, and has 17 black bars in all. This means that there are 16 white bars in the code. This is three more than the number of wide black bars. So, there are 13 wide black bars. There are 4 narrow black bars in the code.

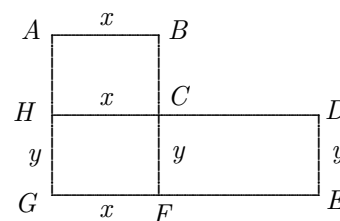


12. One million, written as a numeral, is 1,000,000. When this is divided by 100 the quotient is 10,000. So, the machine will take 10,000 minutes to print one million forms. To convert 10,000 minutes into hours we divide it by 60. But $10,000 \div 60$ is equal to 166 with a remainder of 40. It will take 166 hours and 40 minutes for the machine to print the forms.

13. If an integer is divisible by 2 and by 7, it is a multiple of 2 and a multiple of 7. This means that the integer is also a multiple of 14. (This is true because 2 and 7 have no common factors.) So, the two-digit numbers divisible by 2 and by 7 are the two-digit numbers that are multiples of 14. These are 14, 28, 42, 56, 70, 84, and 98. There are 7 such numbers in all.

14. Let $x = AB = HC = GF$ and $y = HG = CF = DE$. Bus B3 follows the route $A-B-C-D-E-F-G-H-A$. The distance it travels is $2x + 2y + AH + BC + CD + FE$. So,

$$2x + 2y + AH + BC + CD + FE = 20 \text{ km.} \quad (1)$$



Bus B1 has the route $C-D-E-F-G-H-C$. The total distance it travels is $2x + 2y + CD + FE$. So, $2x + 2y + CD + FE = 17$ km. Comparing this equation with equation (1) shows that $AH + BC = 3$ km. Then $AH = 3/2$ km and $BC = 3/2$ km. Bus B2 follows the route $A-B-C-F-G-H-A$. The distance it travels is $2x + 2y + 3/2$ km + $3/2$ km. So, $2x + 2y + 3$ km = 12 km. Subtracting 3 km from both sides gives $2x + 2y = 9$ km. But the route of Bus B4 is $C-F-G-H-C$. The distance it travels is exactly $2x + 2y$. So, the distance it travels is exactly 9 km.

15. After Darien poured water into the first container, both containers held an equal amount of water. So, both containers held 20 ℓ of water. When Darien poured the water, he doubled the amount of water in the first container. So, before he started pouring, the first container held 10 ℓ of water. Since Susan had just poured 5 ℓ of water from the first container, it originally held 15 ℓ of water.