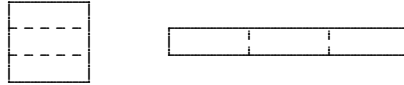


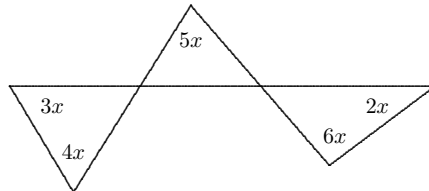
# The 2015 Jamaican Mathematical Olympiad

## Practice Problem Set 4

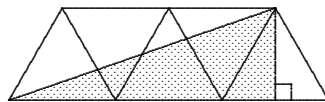
- 1) If  $\frac{x/4}{2} = \frac{4}{x/2}$ , what is  $x$ ?
- 2) A square of area  $81 \text{ cm}^2$  is cut into three equal rectangles and they are placed end-to-end, as shown below. What is the perimeter of the new rectangle?



- 3) Let  $a = 70$  and  $b = 28$ . If  $a$  is reduced by 20% and  $b$  by 25%, what is the product of the reduced numbers?
- 4) Five chairs are arranged around a circular table and Ashley, Brian, Carl, Dean, and Elton are sitting in them. Ashley and Brian are not sitting together, Brian and Carl are not sitting together, and Carl and Dean are not sitting together. Which two people are sitting next to Elton?
- 5) In the figure below, some of the angles have the measures shown (where  $x$  is measured in degrees). What is  $x$ ?



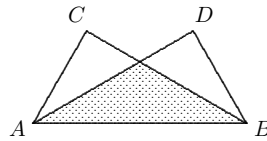
- 6) The first three terms in a sequence of numbers are 1, 2, and 3. After that, each term is the sum of the last three numbers that come before it. So, the fourth number in the sequence is 6, and so on. What is the eighth number in this sequence?
- 7) A small box of chocolates costs \$100. There is a coupon inside each of the boxes of chocolate. With three coupons, you can get an additional box of chocolates free. What is the greatest number of boxes you can get for \$1,500?
- 8) In the figure below, five equilateral triangles have been arranged to form a trapezoid. What fraction of this trapezoid is shaded?



9) If  $\frac{2x - y}{x + y} = \frac{2}{3}$ , what is  $\frac{x}{y}$ ?

10) Eighteen years ago, Marco was three times older than his niece Shawana. Now he is twice as old as she is. How old is Shawana?

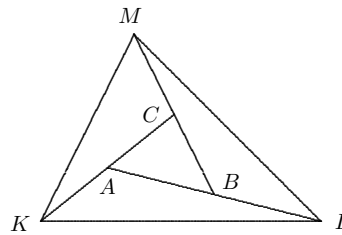
11) In the figure below,  $ABC$  and  $ABD$  are right triangles with right angles at  $C$  and  $D$ , respectively. If  $\angle CAB = 60^\circ$ ,  $\angle DBA = 60^\circ$ , and  $AB = 12$  cm, what is the area of the shaded region?



12) We say that a number is *lowly* to mean that all of its digits are either 1 or 2. Suppose all of the lowly 4-digit numbers are listed from least to greatest. What is the sum of the 8th and 9th numbers on the list?

13) In a certain market, bananas cost \$10, apples cost \$20, and mangos cost \$30. In how many ways can you spend \$80 on fruit in this market? (You are not required to purchase at least one of each type. For example, you may buy 5 bananas and 1 mango.)

14) In the figure below, each side of triangle  $ABC$  has been extended by a segment equal in length to that side. (So,  $AB = BL$ ,  $BC = CM$ , and  $CA = AK$ . If the area of triangle  $ABC$  is 1, what is the area of triangle  $KLM$ ?



15) The weight of each possible pair of boys from a group of five was recorded. The following results were obtained: 90 kg, 92 kg, 93 kg, 94 kg, 95 kg, 96 kg, 97 kg, 98 kg, 100 kg, and 101 kg. What is the total weight of all five boys.

16) In the figure below,  $ABC$  is a right triangle with a right angle at  $B$ ,  $D$  is the foot of the altitude from  $B$ ,  $AD = 3$ , and  $DC = 4$ . What is the area of  $ABC$ ?

