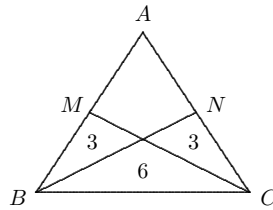
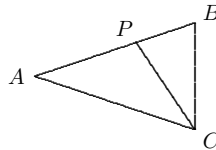




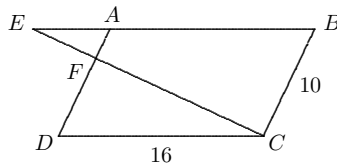
- 7) In triangle  $ABC$  below,  $M$  and  $N$  are the midpoints of the sides they lie on. Segments  $BN$  and  $CM$  divide the interior of  $ABC$  into four regions: three triangles and one quadrilateral. The areas of the triangles are 3, 6, and 3, as shown below. What is the area of the quadrilateral?



- a) 4                      b) 5                      c) 3                      d) 7                      e) 6
- 8) Adam had \$400 and needed to buy 100 chocolates which cost \$4 each. There was a sale at the store: buy six chocolates and get one free. How much money did Adam have left after he bought 100 chocolate bars, if he took advantage of the sale?
- a) \$52                      b) \$56                      c) \$60                      d) \$64                      e) \$68
- 9) When the decimal point of a certain positive decimal number is moved four places to the right, the new number is 4 times the reciprocal of the original number. What is the original number?
- a) 0.0002                      b) 0.002                      c) 0.02                      d) 0.2                      e) 2
- 10) In the figure below,  $\triangle ABC$  is isosceles with  $AB = AC$ . If  $AP = PC = CB$ , what is the measure of  $\angle A$ ?

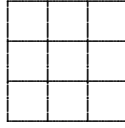


- a)  $36^\circ$                       b)  $30^\circ$                       c)  $48^\circ$                       d)  $72^\circ$                       e)  $60^\circ$
- 11) What angle do the hour hand and the minute hand of a clock form at 9:20?
- a)  $140^\circ$                       b)  $160^\circ$                       c)  $150^\circ$                       d)  $170^\circ$                       e)  $165^\circ$
- 12) In the figure below,  $ABCD$  is a parallelogram with  $DC = 16$  and  $CB = 10$ . Side  $BA$  is extended to  $E$ , and  $EC$  intersects  $AD$  at  $F$ . If  $EA = 4$ , what is the length of  $AF$ ?

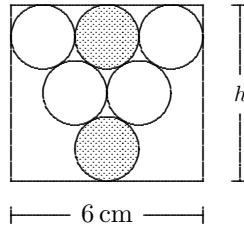


- a) 1                      b) 2                      c) 3                      d) 4                      e) 5
- 13) How many ordered pairs of positive integers  $(x, y)$  are there such that  $x + y = 60$  and the highest common factor (HCF) of  $x$  and  $y$  is 5?
- a) 4                      b) 5                      c) 6                      d) 7                      e) some other answer

- 14) In the figure below, each of the nine small squares needs to be painted one of three colours. In how many ways can this be done so that each of the three colours is present in each row and in each column?

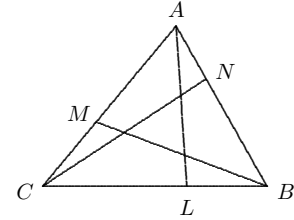


- a) 4                      b) 6                      c) 8                      d) 10                      e) 12
- 15) Suppose  $x$ ,  $y$ , and  $z$  are positive real numbers such that  $xy = 24$ ,  $xz = 48$ , and  $yz = 72$ . What is the value of  $x + y + z$ ?
- a) 18                      b) 19                      c) 20                      d) 22                      e) 24
- 16) The figure below shows six circles arranged as an “equilateral triangle” inside a rectangle with base 6 cm. What is the shortest distance between the two shaded circles?



- a)  $\sqrt{2}$                       b)  $\sqrt{3}$                       c)  $2\sqrt{3} - 2$                       d)  $\frac{\pi}{2}$                       e) 2
- 17) Suppose  $A$ ,  $B$ , and  $C$  are three numbers such that
- $$1001C - 2002A = 4004 \quad \text{and} \quad 1001B + 3003A = 5005$$
- What is the average of the three numbers  $A$ ,  $B$ , and  $C$ ?
- a) 1                      b) 3                      c) 6                      d) 9  
e) not uniquely determined
- 18) A set of tiles numbered from 1 to 100 is modified repeatedly by the following operation: remove all tiles numbered with a perfect square and renumber the remaining tiles consecutively starting with 1. How many times must the operation be performed to reduce the number of tiles in the set to one?
- a) 20                      b) 11                      c) 10                      d) 19                      e) 18
- 19) For how many positive integers  $n$  does  $1 + 2 + 3 + \dots + n$  evenly divide  $6n$ ?
- a) 5                      b) 3                      c) 9                      d) 11                      e) 7
- 20) How many distinct four-digit numbers are divisible by 3 and have 23 as their last two digits?
- a) 27                      b) 30                      c) 33                      d) 81                      e) 90

- 21) In  $\triangle ABC$  below, the segments  $AL$ ,  $BM$ , and  $CN$  determine four triangles and three quadrilaterals in the interior of  $\triangle ABC$ . The sum of the perimeters of the three quadrilaterals is 25 cm. The sum of the perimeters of the four triangles is 20 cm. If the perimeter of  $\triangle ABC$  is 19 cm, what is value of  $AL + BM + CN$ ?



- a) 15 cm                  b) 16 cm                  c) 12 cm                  d) 13 cm  
e) 11 cm

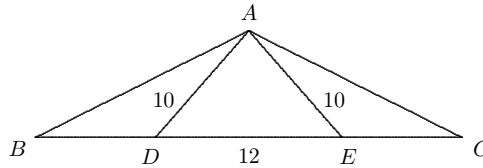
- 22) Suppose that  $a + 1 = b + 2 = c + 3 = d + 4 = a + b + c + d + 5$ . What is the value of  $a + b + c + d$ ?

- a)  $-5$                   b)  $-\frac{7}{3}$                   c)  $-\frac{10}{3}$                   d)  $\frac{5}{3}$                   e) 5

- 23) Mr. Earl E. Bird leaves his house and drives to work at exactly 8:00 am every morning. When his average driving speed is 40 k/h, he arrives at his workplace three minutes late. When his average speed is 60 k/h, he arrives three minutes early. At what average speed, in k/h, should Mr. Bird drive to arrive at his workplace precisely on time?

- a) 45                  b) 48                  c) 50                  d) 55                  e) 58

- 24) In the figure below,  $AD = AE = 10$ ,  $DE = 12$ , and  $BD = EC$ . The perimeter of  $\triangle ABC$  is twice the perimeter of  $\triangle ADE$ . What is the length of  $BD$ ?



- a)  $\frac{15}{2}$                   b) 8                  c)  $\frac{17}{2}$                   d) 9                  e)  $\frac{19}{2}$

- 25) Let  $n$  be the smallest positive integer that is divisible by both 4 and 9, uses only the digits 4 and 9 when written as a numeral, and uses both digits at least once. What are the last four digits of  $n$ ?

- a) 4444                  b) 4494                  c) 9444                  d) 9944                  e) 4944

END OF QUESTIONS

You may mail your completed question paper to:

Mathematical Olympiad  
P.O. Box 94  
Mona Post Office  
Kingston 7

You may also deliver your entry by hand or by courier directly to the Department of Mathematics at the UWI, Mona Campus. In all cases, an entry must be received by December 1, 2014 in order to be considered.