THE UNIVERSITY OF THE WEST INDIES, MONA

Presents

The 2012 Jamaican Mathematical Olympiad

Test for Grades 7 and 8

NAME: _____

GRADE: _____

SCHOOL: _____

PRINCIPAL: _____

YEAR OF BIRTH: _____

STUDENT PHONE: _____

CONTACT TEACHER: _____

CONTACT PHONE: _____

EXAMINATION QUESTIONS

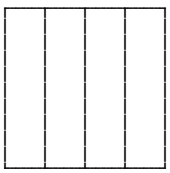
1) Which number is half way between 2006 and 6002?

(a) 1998 (b) 3996 (c) 4002 (d) 4004 (e) 4006

2) The fraction $\dfrac{2012+2012}{2012+2012+2012}$ is equal to:

(a) 5(2012) (b) $\dfrac{2}{3}$ (c) $\dfrac{1}{2012}$ (d) $\dfrac{2013}{4025}$ (e) $\dfrac{1}{1007}$

3) A square of area $64\,\text{cm}^2$ is cut into four equal rectangles, as indicated below. What is the perimeter of one of the rectangles?



(a) 18 cm (b) 8 cm (c) 16 cm (d) 10 cm (e) 20 cm

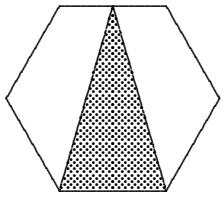
4) What is the ones digit (or units digit) in the product of all the prime numbers less than 2012?

(a) 0 (b) 2 (c) 4 (d) 6 (e) 8

5) How many times between 00:00 and 23:59 does an electronic watch show all of the following four digits, 2, 0, 1, 2, in any order?

(a) 2 (b) 12 (c) 5 (d) 4 (e) 6

6) In the figure below, a triangle is inscribed in a regular hexagon. What proportion of the area of the hexagon is shaded?

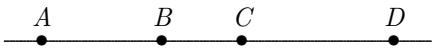


(a) $\frac{1}{6}$ (b) $\frac{1}{4}$ (c) $\frac{1}{3}$ (d) $\frac{2}{5}$ (e) $\frac{1}{12}$

7) Two litres of fruit juice containing 10% sugar are mixed with 3 litres of another juice containing 15% sugar. What percentage of the mixture consists of sugar?

(a) 13% (b) 5% (c) 25% (d) 12.5% (e) 12.75%

8) In the figure below, $AC = 10$, $BD = 15$, and $AD = 22$. What is the length of BC?



(a) 2 (b) 5 (c) 1 (d) 4 (e) 3

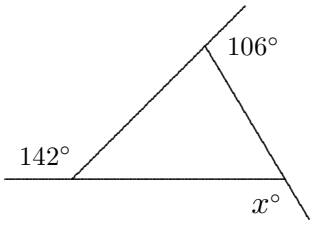
9) In a certain year, there were four Mondays and four Fridays in January. Which day of the week was January 1 of that year?

(a) Sunday (b) Tuesday (c) Wednesday (d) Thursday (e) Saturday

10) The positive real numbers a, b, c, d, and e satisfy the conditions $ab = 2$, $bc = 3$, $cd = 4$, and $de = 5$. What is e/a?

(a) $\frac{4}{5}$ (b) $\frac{5}{6}$ (c) 120 (d) $\frac{15}{8}$ (e) $\frac{3}{2}$

11) In the figure below, the sides of a triangle have been extended to form three angles as shown. What is the value of x?



(a) 112 (b) 144 (c) 108 (d) 120 (e) 68

12) There are three married couples attending a party. In how many ways can they form a three-person group in which there will not be a married couple?

(a) 1 (b) 2 (c) 6 (d) 8 (e) 20

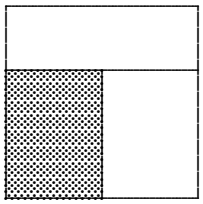
13) A small box of chocolates costs \$100. There is a coupon inside each of the boxes of chocolate. With three coupons, you can get an additional box of chocolates free. What is the greatest number of boxes you can get for \$1,500?

(a) 15 (b) 18 (c) 20 (d) 21 (e) 22

14) How many right triangles have one side of length $\sqrt{60}$ and integer values for the lengths of the hypotenuse and the other side?

(a) 0 (b) 1 (c) 2 (d) 3 (e) 6

15) In the figure below, a square with side length 12 cm has been divided into three rectangles with equal perimeter. What is the area of the shaded rectangle?



(a) $72\,\text{cm}^2$ (b) $54\,\text{cm}^2$ (c) $40\,\text{cm}^2$ (d) $48\,\text{cm}^2$ (e) $36\,\text{cm}^2$

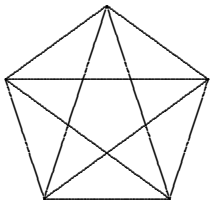
16) What is the sum of the digits of the square of $111,111,111$?

(a) 18 (b) 27 (c) 81 (d) 63 (e) 45

17) In a room there are stools and chairs. On each stool and each chair there is a child. Each stool has three legs, each chair has four legs, and each child has two legs. All together there are 39 legs. How may chairs are in the room?

(a) 4 (b) 3 (c) 6 (d) 9 (e) 5

18) How many isosceles triangles may be found in the figure below?

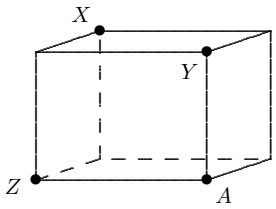


(a) 15 (b) 13 (c) 25 (d) 20 (e) 10

19) 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?

(a) 18 (b) 24 (c) 28 (d) 36 (e) 72

20) The diagram below shows a cuboid with four of its vertices marked X, Y, Z, and A, respectively. If $XY = 8$, $XZ = \sqrt{55}$, and $YZ = 9$, what is the length of XA?



(a) $\sqrt{90}$ (b) 10 (c) $\sqrt{120}$ (d) 11 (e) $10\sqrt{2}$

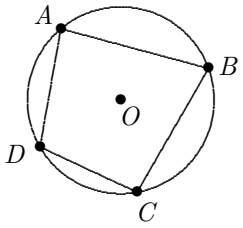
21) How many four-digit numbers *abcd* are multiples of 3, 4, and 5 and satisfy the conditions that a is the double of c and b is 6?

(a) 5 (b) 1 (c) 4 (d) 0 (e) 2

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

(a) $\dfrac{1}{5}$ (b) $\dfrac{4}{5}$ (c) 1 (d) $\dfrac{5}{4}$ (e) $\dfrac{6}{5}$

23) In the figure below, the quadrilateral $ABCD$ is inscribed in a circle with center O. It is known that $\angle OAB = 35°$, $\angle OBC = 40°$, and $\angle OCD = 55°$. What is $\angle ODA$?



(a) 50° (b) 40° (c) 100° (d) 55° (e) 35°

24) How many positive integers less than 1,000 are neither multiples of 5 nor of 7?

(a) 326 (b) 686 (c) 692 (d) 682 (e) 658

25) What is the greatest number of elements that can be chosen from the set $S = \{1, 2, 3, \ldots, 24, 25\}$ so that the sum of any two elements is not divisible by 3?

(a) 4 (b) 8 (c) 10 (d) 5 (e) 9

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. In all cases, an entry must be received by February 27, 2012 in order to be considered.

For more information and the latest updates, please visit
http://myspot.mona.uwi.edu/mathematics/ (see the link to the Olympiad Resource Centre).

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