THE UNIVERSITY OF THE WEST INDIES, MONA

Presents

The 2013 Jamaican Mathematical Olympiad

Test for Grades 7 and 8

NAME: ⎯⎯

GRADE: ⎯⎯⎯

SCHOOL: ⎯⎯⎯

PRINCIPAL: ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

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CONTACT TEACHER: ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

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EXAMINATION QUESTIONS

1) Daniel walked for 35 minutes after his dinner. He finished at 7:10 pm. At what time, pm, did he start?

   (a) 6:30   (b) 6:35   (c) 6:40   (d) 6:25   (e) 6:45

2) Which of the following quantities is largest?

   (a) $\dfrac{1}{4}$ (b) $\dfrac{1}{4} + \dfrac{1}{4}$ (c) $\dfrac{1}{4} \times \dfrac{1}{4}$ (d) $\dfrac{1}{4} - \dfrac{1}{4}$ (e) $\dfrac{1}{4} \div \dfrac{1}{4}$

3) Brenda bought some bananas at the supermarket. She gave half of them to her friend Ana, gave 3 to Catalina, and had 4 left for herself. How many bananas did Brenda buy?

   (a) 11   (b) 4   (c) 7   (d) 14   (e) 3

4) In the figure below, $\angle RPQ = 20°$ and $\angle RQU = 120°$. What is the measure, in degrees, of $\angle SRT$?
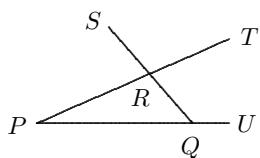

   (a) 60   (b) 140   (c) 100   (d) 80   (e) 120

5) The figure below shows the net of a cube. When it is folded into a cube, what letter will be on the side opposite the one with the X?
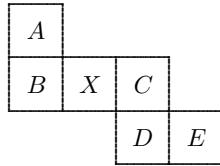
(a) A (b) B (c) C (d) D (e) E

6) What number do we need to place inside $\square$ so that $0.1 \times 0.2 \times 0.3 \times 0.4 \times \square = 0.12$?

(a) 500   (b) 50   (c) 5   (d) 0.5   (e) 0.05

7) In the figure below, the rectangle $ABCD$ has been divided into 10 equal squares. If the perimeter of $ABCD$ is 21 cm, what is the perimeter, in centimetres, of each small square?
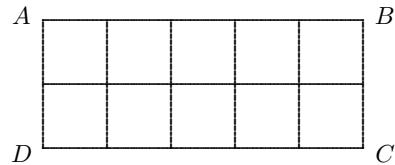

(a) 6   (b) 3   (c) 2.1   (d) 8.4   (e) 12

8) In a certain country, 800 pennies have the value of 100 ducats and 100 pennies have the value of 250 talars. How many ducats have the value of 100 talars?

(a) 50   (b) 25   (c) 10   (d) 5   (e) 2

9) The figure below shows part of a magic square. The sum in each row, column, and diagonal is the same. What is $x + y$?

(a) 34   (b) 35   (c) 36   (d) 37   (e) 38

10) Three points were chosen to divide a line segment into four equal parts. Then two other points were chosen to divide the same segment into three equal parts. Thus the segment is divided into six parts. If the segment has length 1, how many different numbers represent the lengths of these six parts?

(a) 6   (b) 5   (c) 3   (d) 4   (e) 2

11) In the figure below, $ABCDE$ is a pentagon with $AB = AC = AD = AE$. If $\angle BAE = 90°$, $\angle EAD = 2x°$, $\angle BAC = 2x°$, and $\angle ACD = 5x°$, what is the value of x?
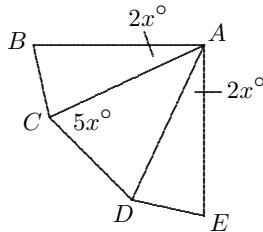
(a) 10   (b) 12   (c) 14   (d) 15   (e) 20

12) Five boys, Alex, Bob, Carl, Doug, and Ed, met recently. Several handshakes took place. Alex and Bob each shook hands with one person, and Carl, Doug, and Ed each shook hands with two persons. If Alex shook hands with Ed, which of the following handshakes definitely did not take place?

(a) Bob and Ed

(b) Ed and Carl

(c) Bob and Carl

(d) Ed and Doug

(e) Bob and Doug

13) In the subtraction problem below, different letters stand for different digits. Assuming that the subtraction is correct, what is the value of $W \times X \times Y \times Z$?

$$\begin{array}{r} 4\ W\ X\ Y \\ -\ \ Y\ 5\ 3\ Z \\ \hline 2\ 0\ 0\ 9 \end{array}$$

(a) 0   (b) 96   (c) 90   (d) 135   (e) 120

14) In the figure below, the sector AOB of a circle with centre O is shaded. If the shaded area is 15% of the area of the circle, what is the measure of $\angle AOB$?
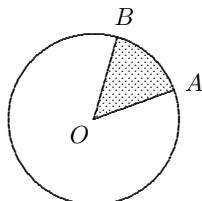
(a) 15°   (b) 36°   (c) 54°   (d) 90°   (e) 150°

15) In three years, Stephen will be three times older than he was three years ago. In four years, he will be n times older than he was four years ago. What is n?

(a) two   (b) three   (c) four   (d) five   (e) six

16) Jose, Andres, and Miguel went fishing and caught fewer than 100 fish. The number of fish that Jose caught was exactly three times the number of fish Andres caught and four times the number of fish Miguel caught. What is the largest number of fish that Jose could have caught?

    (a) 50   (b) 48   (c) 72   (d) 66   (e) 60

17) The figure below is made of four squares and a line segment from A to B. The siddes of each square have length 1. What is the length of the segment AB?
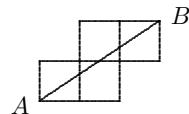
    (a) 5   (b) $\sqrt{13}$ (c) $\sqrt{5}+\sqrt{2}$ (d) $\sqrt{5}$ (e) $\sqrt{3}+\sqrt{2}$

18) How many numbers between 100 and 1000 have the product of their digits equal to 24?

    (a) 21   (b) 15   (c) 18   (d) 12   (e) 24

19) What is the measure of the angle formed by the hands of a clock at 4:40 pm?

    (a) $105°$ (b) $100°$ (c) $90°$ (d) $80°$ (e) $20°$

20) What is the greatest number of triangles that one can form if their vertices are points in the figure below, none of them are right triangles, and no two of them are congruent?
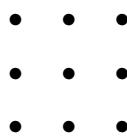
    (a) 1   (b) 2   (c) 3   (d) 4   (e) 5

21) In the figure below, $ABCD$ is a rectangle with area S. Each of the points E, F, G, and H lie on a side of the rectangle and divide that side in the ratio of $1 : 2$. What is the area of the parallelogram $EFGH$?
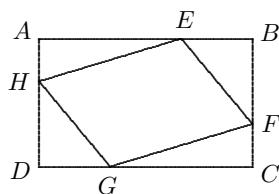
    (a) $\dfrac{2S}{5}$ (b) $\dfrac{5S}{9}$ (c) $\dfrac{3S}{5}$ (d) $\dfrac{2S}{3}$ (e) $\dfrac{4S}{9}$

22) The numbers x and y are the two smallest positive integers for which the product of 360 and x is a perfect square and the product of 360 and y is a perfect cube. What is the sum of x and y?

    (a) 80   (b) 610   (c) 115   (d) 165   (e) 85

23) How many numbers between 1 and 1000 do not contain the digit 1?

    (a) 728   (b) 648   (c) 720   (d) 512   (e) 800

24) In the figure below, a square of area 40 is inscribed in a semicircle. What is the area of the semicircle?

    (a) 20π (b) 40π (c) 30π (d) 25π (e) 50π
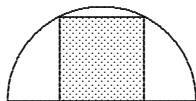
25) What is the last digit of the number $\dfrac{1}{5^{2012}}$ in decimal notation?

    (a) 2   (b) 4   (c) 6   (d) 8   (e) 5

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 10, 2012 in order to be considered.

For more information, a copy of this question paper, or the latest updates, please visit http://myspot.mona.uwi.edu/mathematics/ (see the link to the Olympiad Resource Centre).