Kangourou Sans Frontières

Math Kangaroo in USA

Math Kangaroo 2015 in USA

International Competition in Mathematics
Thursday, March 19, 2015

This test consists of 30 questions on 4 pages.

You have 75 minutes to complete it.

Calculators are not allowed!
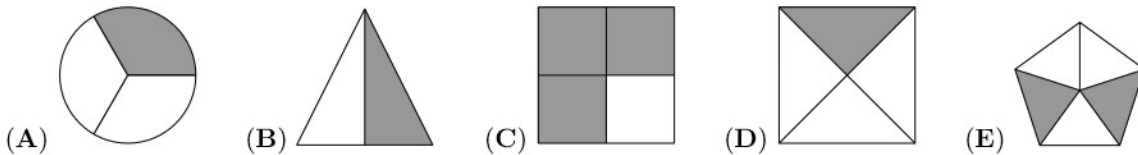
Please enter your answers on the answer form provided.

Please put your name and ID number on the line below.
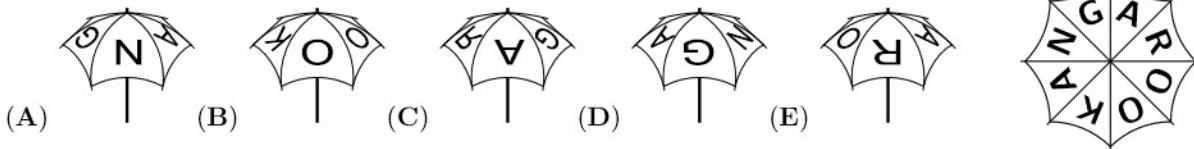
Levels
5 and 6

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3 points

 # 1. Which figure has one half of its area shaded?
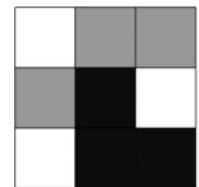
(A)   (B)   (C)   (D)   (E)

 # 2. My umbrella has KANGAROO written on top. It is shown in the picture to the right. Which of the pictures below does not show my umbrella?

(A)   (B)   (C)   (D)   (E)

 # 3. Sam painted the 9 squares as shown in the figure to the right using the colors black, white, and gray. At least how many squares does he need to repaint so that no two squares with a common side are the same color?

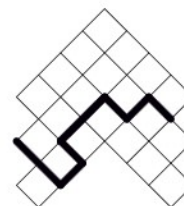(A) 2   (B) 3   (C) 4   (D) 5   (E) 6

 # 4. There are 10 ducks. 5 of these ducks lay an egg every day. The other 5 lay an egg every other day. How many eggs do the 10 ducks lay in a period of 10 days?

(A) 75   (B) 60   (C) 50   (D) 25   (E) 10

 # 5. The figure to the right shows a board where each small square has an area of 4 cm^2. What is the length of the thick black line?

(A) 16 cm   (B) 18 cm   (C) 20 cm   (D) 21 cm   (E) 23 cm

 # 6. Which of the following improper fractions is smaller than 2?

(A) $\dfrac{19}{8}$ (B) $\dfrac{20}{9}$ (C) $\dfrac{21}{10}$ (D) $\dfrac{22}{11}$ (E) $\dfrac{23}{12}$

 # 7. A pumpkin and a watermelon together weigh 8 kg. The watermelon is 2 kg lighter than the pumpkin. How much does the pumpkin weigh?
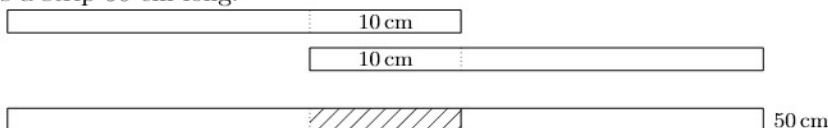
(A) 2 kg   (B) 3 kg   (C) 4 kg   (D) 5 kg   (E) 6 kg

 # 8. Each plant in John's garden has either 5 leaves only, or 2 leaves and 1 flower. In total, the plants have 6 flowers and 32 leaves. How many plants are there?

(A) 10   (B) 12   (C) 13   (D) 15   (E) 16

 # 9. Alva has 4 paper strips of the same length. She glues 2 of them together with a 10 cm overlap, and gets a strip 50 cm long.
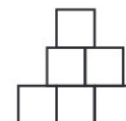
With the other two paper strips, she wants to make a strip 56 cm long. How long should the overlap be?

(A) 4 cm   (B) 6 cm   (C) 8 cm   (D) 10 cm   (E) 12 cm

 # 10. Tom used 6 squares with a side length of 1 to form the shape shown in the picture. What is the perimeter of the shape?

(A) 9   (B) 10   (C) 11   (D) 12   (E) 13

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4 points

 # 11. Every day Mary writes down the date and calculates the sum of the digits written. For example, on March 19 she writes 03/19 and calculates $1+9+0+3 = 13$. What is the largest sum that she calculates during a year?

(A) 7   (B) 13   (C) 14   (D) 16   (E) 20

 # 12. The rectangle $ABCD$ in the picture consists of 4 equal rectangles. If BC has a length of 1 cm, what is the length of AB?

(A) 4 cm   (B) 3 cm   (C) 2 cm   (D) 1 cm   (E) 0.5 cm
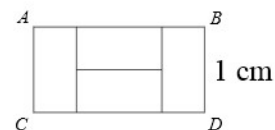
 # 13. Which of these five nets cannot be the net of a pyramid?

(A)   (B)   (C)   (D)   (E)

 # 14. Lucy and her mother were both born in February. On March 19, 2015, Lucy adds the year of her birth, the year of her mother's birth, her age, and her mother's age. What result does she get?

(A) 4028   (B) 4029   (C) 4030   (D) 4031   (E) 4032

 # 15. A student wrote down a natural number. When she divided the number by 9, the remainder was 7. What is the remainder when twice that number is divided by 9?

(A) 1   (B) 2   (C) 5   (D) 6   (E) 7

 # 16. The area of a rectangle is 12. The lengths of its sides are natural numbers. The perimeter of this rectangle could be:

(A) 20   (B) 26   (C) 32   (D) 28   (E) 24

 # 17. Each of the segments in the figure needs to be colored one of three colors: red, green, or blue. Each of the 4 triangles needs to have one side of each of the different colors. Three of the segments have already been colored, as indicated. What color can the segment marked with x be?
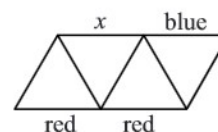
(A) only blue   (B) only green   (C) only red

(D) any of the three colors (E) Such a coloring is not possible.

 # 18. In a bag there are 3 green apples, 5 yellow apples, 7 green pears and 2 yellow pears. Simon randomly takes fruit out of the bag one by one. How many pieces of fruit must he take out in order to be sure that he has at least one apple and one pear of the same color?

(A) 9   (B) 10   (C) 11   (D) 12   (E) 13

 # 19. A new chess piece called "kangaroo" has been introduced. In each move, it jumps either 3 squares vertically and 1 square horizontally, or 3 squares horizontally and 1 square vertically, as shown in the picture. What is the minimum number of moves the kangaroo needs to make in order to get from its current position to the square marked with A?
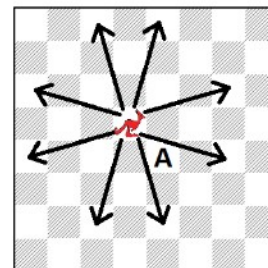
(A) 2   (B) 3   (C) 4   (D) 5   (E) 6

 # 20. In this sum, the same letters represent the same digits, and different letters represent different digits.

$$
\begin{array}{r}
X \\
+\quad X \\
+\;\; Y\;\; Y \\
\hline
Z\;\; Z\;\; Z
\end{array}
$$

Which digit does the letter X represent?

(A) 2   (B) 3   (C) 4   (D) 5   (E) 6

5 points

 # 21. The sum of four natural numbers is 39. The product of two of these numbers is equal to 80, and the product of the other two numbers is also equal to 80. What is the largest of these four numbers?

(A) 8   (B) 10   (C) 16   (D) 20   (E) 25

 # 22. Jane bought some books. For the first book, she paid half of her money and 1 dollar more. For the second book, she paid half of the remaining money and 2 dollars more. Finally, for the third book, she paid half of the remaining money and 3 dollars more, thus spending all of her money. How much did the three books cost altogether?

(A) 36 dollars   (B) 45 dollars   (C) 34 dollars   (D) 65 dollars   (E) 100 dollars

 # 23. On Jump Street, there are 9 houses in a row. At least one person lives in each house. Any two neighboring houses together are inhabited by at most six people. What is the largest number of people that could be living on Jump Street?

(A) 23   (B) 25   (C) 27   (D) 29   (E) 31

 # 24. The number 100 is multiplied either by 2 or by 3, then the result is increased either by 1 or by 2, and then the new result is divided either by 3 or by 4. The final result is a natural number. What is this final result?

(A) 50   (B) 51   (C) 67   (D) 68

(E) There is more than one possible final result.

 # 25. In a 4-digit number $\overline{abcd}$, the digits $a < b$, $b < c$, and $c < d$. What is the largest possible difference $\overline{bd} - \overline{ac}$ for 2-digit numbers $\overline{bd}$ and $\overline{ac}$?

(A) 86   (B) 61   (C) 56   (D) 50   (E) 16

 # 26. Mary wrote a number on each face of a cube. Then, for each vertex, she added the numbers on the three faces on which that vertex lies (for example, for vertex B she adds the numbers on faces $BCDA$, $BAEF$ and $BFGC$). She obtained 8 numbers. The numbers obtained by Mary for vertices C, D and E are 14, 16 and 24, respectively. What number did she obtain for vertex F?
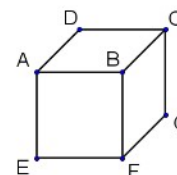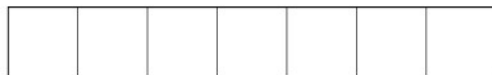

(A) 15   (B) 19   (C) 22   (D) 24   (E) 26

 # 27. Jane is traveling on a train in which each coach has the same number of compartments. She is sitting in the 7th coach, in the 50th compartment from the engine. How many compartments are there in each coach?

(A) 7   (B) 8   (C) 9   (D) 10   (E) 12

 # 28. In how many ways can you color 3 different cells in the strip shown below so that no 2 neighboring cells are colored?

(A) 6   (B) 7   (C) 8   (D) 9   (E) 10

 # 29. Four points lie on a line. The distances between them are, in increasing order: 2, 3, k, 11, 12, 14. What is the value of k?

(A) 5   (B) 6   (C) 7   (D) 8   (E) 9

 # 30. Basil used small cubes with a side length of 1 to construct a cube with a side length of 4. After that, he painted 3 faces of the big cube red and the other 3 faces blue. After he finished, there was no small cube with 3 red faces. How many small cubes have both red and blue faces?

(A) 0   (B) 8   (C) 12   (D) 24   (E) 32