Kangourou Sans Frontières *Math Kangaroo in USA*

Math Kangaroo 2014 in USA

International Competition in Mathematics
Thursday, March 20, 2014

Levels 5 and 6

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.

Problems 3 points each

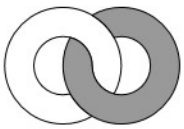
 # 1. Arnold spelled the word KANGAROO with cards showing one letter at a time. Unfortunately, some cards were rotated. By turning the K card back by 90° twice he can correct the letter K, and by turning the first A card once he can correct the first A (see the figures). How many times does he need to rotate by 90° for all of the letters to be correct?

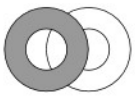
(A) 4 **(B)** 5 **(C)** 6 **(D)** 7 **(E)** 8

 # 2. A cake weights 900 g. Paul cuts it in 4 pieces. The biggest piece weighs as much as the 3 other pieces weigh together. What is the weight of the biggest piece?

(A) 250 g **(B)** 300 g **(C)** 400 g **(D)** 450 g **(E)** 600 g

 # 3. Two large rings, one gray and one white, are linked together. Peter, in front of the rings, sees the rings as in the picture to the right. Paul is behind the rings. What does he see?



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

 # 4. In the addition problem to the right, some of the digits have been replaced by stars. What is the sum of the missing digits?

(A) 0 **(B)** 1 **(C)** 2 **(D)** 3 **(E)** 10

$$\begin{array}{r} 1\bigstar 2 \\ 1\bigstar 3 \\ +\ 1\bigstar 4 \\ \hline 309 \end{array}$$

 # 5. What is the difference between the smallest 5-digit number and the largest 4-digit number?

(A) 1 **(B)** 10 **(C)** 1111 **(D)** 9000 **(E)** 9900

 # 6. A square with a perimeter of 48 cm is cut into 2 pieces to make a rectangle (see picture). What is the perimeter of the rectangle?

(A) 24 cm **(B)** 30 cm **(C)** 48 cm **(D)** 60 cm **(E)** 72 cm

 # 7. Katrina has 38 matches. Using all the matches, she builds a triangle and a square. Each side of the triangle consists of 6 matches. How many matches are used for one side of the square?

(A) 4 **(B)** 5 **(C)** 6 **(D)** 7 **(E)** 8

 # 8. The pearl necklace in the picture contains dark gray pearls and shiny white pearls.

Alex wants to have 5 of the dark gray pearls. He can only take pearls from either end of the necklace, and so he has to take some of the white pearls as well. What is the smallest number of white pearls Alex has to take?

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

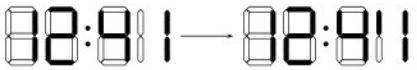
 # 9. Harry participated in a broom flight contest which consisted of 5 laps. The times when Harry passed the starting point are shown in the picture. Which lap took the shortest time?

	Time
start	09:55
after lap 1	10:26
after lap 2	10:54
after lap 3	11:28
after lap 4	12:03
after lap 5	12:32

(A) the first **(B)** the second **(C)** the third

(D) the fourth **(E)** the fifth

 # 10. Ben's digital watch is not working properly. The three horizontal lines in the digit on the far right on the watch do not display. Ben is looking at his watch and the time has just changed from the one shown on the left to the one shown on the right. What time is it now?

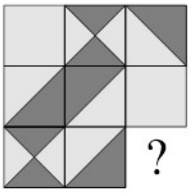


(A) 12:40 **(B)** 12:42 **(C)** 12:44 **(D)** 12:47 **(E)** 12:49

Problem 4 points each

 # 11. Which tile must be added to the picture so that the light gray area is as large as the dark gray area?

(A)  **(B)**  **(C)**  **(D)**  **(E)** It is impossible.



 # 12. Henry and John started walking from the same point. Henry went 1 km north, 2 km west, 4 km south and finally 1 km west. John went 1 km east, 4 km south and 4 km west. Which of the following must be the final part of John's walk in order to reach the point where Henry ended his walk?

(A) He has already reached the same point.

(B) 1 km north

(C) 1 km north-west

(D) More than 1 km north-west

(E) 1 km west

 # 13. At the summer camp, 7 children eat ice cream every day, 9 children eat ice cream only every other day, and the rest of the children don't eat ice cream at all. Yesterday, 13 children had ice cream. How many children will eat ice cream today?

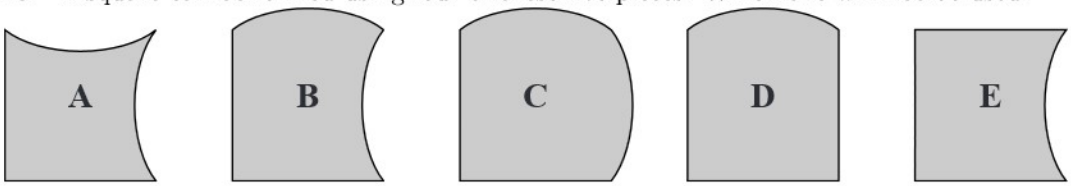
(A) 7 **(B)** 8 **(C)** 9 **(D)** 10

(E) It cannot be determined.

 # 14. Kangaroos A, B, C, D and E are sitting in that order, clockwise, around a round table. Exactly when the bell rings, each kangaroo except for one exchanges its place with a neighbor. The resulting order, clockwise and starting with kangaroo A, is A, E, B, D, C. Which kangaroo did not move?

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

 # 15. A square can be formed using four of these five pieces. Which one will not be used?



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

 # 16. A certain natural number has three digits. When we multiply the digits we get 135. What result do we get if we add the digits?

(A) 14 **(B)** 15 **(C)** 16 **(D)** 17 **(E)** 18

 # 17. In a restaurant there are 16 tables, each with 3, 4 or 6 chairs. Together, the tables which have 3 or 4 chairs can accommodate 36 people. If the restaurant can accommodate 72 people, how many tables are there with 3 chairs?

(A) 4 **(B)** 5 **(C)** 6 **(D)** 7 **(E)** 8

 # 18. The points A, B, C, D, E, and F are on a straight line in that order. We know that $AF = 35$, $AC = 12$, $BD = 11$, $CE = 12$ and $DF = 16$. What is the distance BE?

(A) 13 **(B)** 14 **(C)** 15 **(D)** 16 **(E)** 17

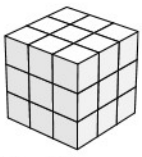
 # 19. Marisa set her stones in groups on the desk. After she arranged the stones in groups of 3, she found that there were 2 stones left. Then she arranged the stones in groups of 5, and again there were 2 stones left. At least how many more stones does she need so that there won't be any left when she arranges them in groups of 3 and when she arranges them in groups of 5?

(A) 3 **(B)** 1 **(C)** 4 **(D)** 10 **(E)** 13

 # 20. The faces of a cube are numbered 1, 2, 3, 4, 5, and 6. The faces numbered 1 and 6 have a common edge. The same is true for faces numbered 1 and 5, faces numbered 1 and 2, faces numbered 6 and 5, faces numbered 6 and 4, and faces numbered 6 and 2. Which number is on the face opposite the face with number 4?

(A) 1 **(B)** 2 **(C)** 3 **(D)** 5 **(E)** It cannot be determined.

Problems 5 points each



 # 21. The $3 \times 3 \times 3$ cube in the picture is made of 27 small cubes. How many small cubes do you have to take away to see the picture on the right as the result when looking from the right, from above, and from the front?

(A) 4 **(B)** 5 **(C)** 6 **(D)** 7 **(E)** 9

 # 22. There are 5 songs: song A lasts 3 minutes, song B 2 minutes and 30 seconds, song C 2 minutes, song D 1 minutes 30 seconds, and song E 4 minutes. These 5 songs are playing in the order A, B, C, D, E in a loop without any breaks. Song C was playing when Andy left home. He returned home exactly one hour later. Which song was playing when Andy got home?

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

 # 23. Dan entered the numbers 1 to 9 in the cells of a 3×3 table. He began by placing the numbers 1, 2, 3 and 4 as shown in the picture. After he was finished, the sum of the numbers in the cells adjacent to (having a common side with) the cell with the number 5 is equal to 9. What is the sum of the numbers in the cells adjacent to the number 6?

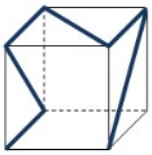
1		3
2		4

(A) 14 **(B)** 15 **(C)** 17 **(D)** 28 **(E)** 29

 # 24. Trees grow on only one side of Park Avenue. There are 60 trees in total. Every other tree is a maple, and every third tree is either a linden or a maple. The rest of the trees are birches. How many birches are there?

(A) 10 **(B)** 15 **(C)** 20 **(D)** 24 **(E)** 30

 # 25. A thin colorful ribbon is glued on a transparent plastic cube (see the picture). Which of the following pictures doesn't show the cube from any perspective?



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

 # 26. The king and his messengers are travelling from the castle to the summer palace at a speed of 5 km/hr. Every hour, the king sends a messenger back to the castle, who travels at a speed of 10 km/hr. What is the time interval between any two consecutive messengers arriving at the castle?

(A) 30 min **(B)** 60 min **(C)** 75 min **(D)** 90 min **(E)** 120 min

 # 27. There were 3 one-digit numbers on the blackboard. Ali added them up, and got 15. Then he erased one of the numbers and wrote the number 3 in its place. Then Reza multiplied the three numbers on the blackboard and got 36. What are the possibilities for the number that Ali erased?

(A) either 6 or 7 **(B)** either 7 or 8 **(C)** only 6 **(D)** only 7 **(E)** only 8

 # 28. Peter Rabbit loves cabbages and carrots. In a day, he eats 9 carrots only, or 2 cabbages only, or 1 cabbage and 4 carrots only. But some days he only eats grass. Over the last 10 days, Peter ate a total of 30 carrots and 9 cabbages. On how many of these 10 days did he eat only grass?

(A) 0 **(B)** 1 **(C)** 2 **(D)** 3 **(E)** 4

 # 29. In Fabuland, every sunny day is immediately preceded by two consecutive rainy days. Also, five days after any rainy day, it is another rainy day. It is sunny today. For how many days at most can we predict the weather with certainty?

(A) 1 day **(B)** 2 days

(C) 4 days **(D)** We cannot predict even one day ahead.

(E) We can predict the weather every day from here on.

 # 30. Granny has 10 grandchildren. Alice is the oldest. One day, Granny notices that her grandchildren all have different ages. If the sum of her grandchildrens' ages is 180, what is the youngest Alice can be?

(A) 19 **(B)** 20 **(C)** 21 **(D)** 22 **(E)** 23