

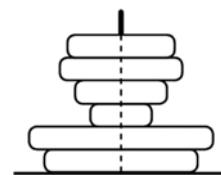



## Canadian Math Kangaroo Contest






### Part A: Each correct answer is worth 3 points

1. Little Theodor assembled a stacking toy as shown. How many rings would he see looking at it from above?



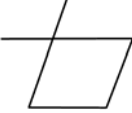
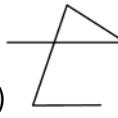

(A) 1 (B) 2 (C) 3 (D) 4 (E) 5

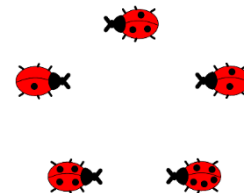


2. What do you get when you invert the colours of  ?

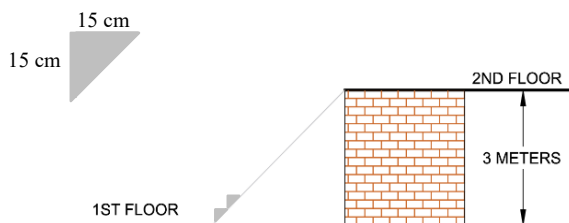
(A)  (B)  (C)  (D)  (E) 

3. Alice draws lines connecting the ladybugs in the order of increasing number of their dots. She starts with the ladybug with one dot. Which figure will she get?

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



4. Bertie the Builder is assembling stairs. Each step is 15 cm tall and 15 cm deep, as shown in the diagram.

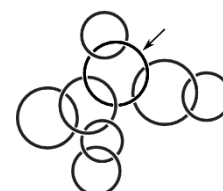


How many steps does he need in the stairs in order to reach the second floor, which is 3 meters above the first floor in the building?

(A) 8 (B) 10 (C) 15 (D) 20 (E) 25

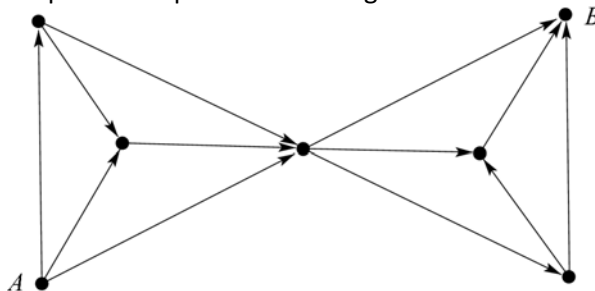
5. Some of the rings in the picture form a chain that includes the ring indicated by the arrow. How many rings are there in the longest possible chain?

(A) 3 (B) 4 (C) 5 (D) 6 (E) 7



## Part B: Each correct answer is worth 4 points

6. In the diagram, you go from point  $A$  to point  $B$  following the direction of the arrows.



How many distinct routes are there from  $A$  to  $B$  along the lines following the directions of the arrows?

- (A) 20 (B) 16 (C) 12 (D) 9 (E) 6
7. Annie puts the two transparent squares on top of each other.



What will she see?

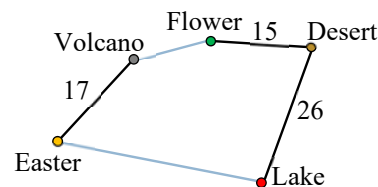
- (A) (B) (C) (D) (E)

8. The number of dwarfs that can fit under a mushroom is equal to the number of dots on the mushroom cap. The picture below shows one side of each mushroom, the number of dots on the other side is the same. If 30 dwarfs are seeking shelter from the rain, how many dwarfs will get wet?



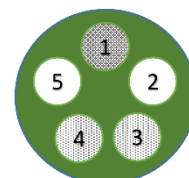
- (A) 2 (B) 3 (C) 4 (D) 5 (E) 6

9. Captain Kook wants to sail from the island called Easter through every island on the map and back to Easter. The total journey is 100 kilometers (km) long. The distance between Desert and Lake is the same as the distance between Easter and Flower via Volcano.



How far is it directly from Easter to Lake?

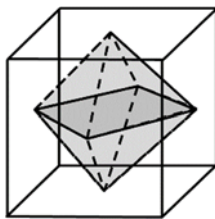
- (A) 17 km (B) 23 km (C) 26 km (D) 33 km (E) 35 km
10. Maria forgot the code for her grandmother's house door, which can be unlocked using a five-digit code. The buttons are labelled with the digits 1, 2, 3, 4, and 5, as shown. Maria could see that buttons 2 and 5 were not used at all, buttons 3 and 4 were used equally and less than button 1. How many ways can Maria try in order to open the door?



- (A) 60 (B) 40 (C) 20 (D) 12 (E) 6

## Part C: Each correct answer is worth 5 points

11. An octahedron is inscribed in a cube of side length 1. The vertices of the octahedron are at the center of the faces of the cube.



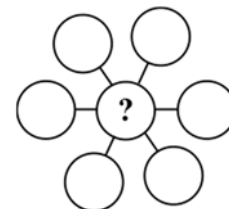
What is the volume of the octahedron?

- (A)  $\frac{1}{3}$                       (B)  $\frac{1}{4}$                       (C)  $\frac{1}{5}$                       (D)  $\frac{1}{6}$                       (E)  $\frac{1}{8}$
12. Alice has 3 white, 2 black and 2 grey pieces of paper. She cuts every non-black piece of paper in half. Then she cuts every non-white piece of paper in half. How many piece of paper will she have?
- (A) 14                      (B) 16                      (C) 17                      (D) 18                      (E) 20

13. Write the numbers 3, 4, 5, 6, 7, 8 and 9 in the seven circles to obtain equal sums along each of the three lines.

What is the sum of all possible numbers in the circle with the question mark?

- (A) 3                      (B) 6                      (C) 9                      (D) 12                      (E) 18



14. Domino tiles are arranged correctly if the number of dots at the ends that touch for any two adjacent dominoes is the same. Paulus laid six dominoes in a line as shown in the diagram.



He can make a move by either swapping the position of any two dominoes or by rotating one domino. What is the smallest number of moves he should make to arrange all the tiles correctly?

- (A) 1                      (B) 2                      (C) 3                      (D) 4                      (E) it is impossible to do
15. How many digits does the number resulting from this calculation  $\frac{1}{9} \times 10^{2021} \times (10^{2021} - 1)$  have?
- (A) 2020                      (B) 2021                      (C) 4041                      (D) 4042                      (E) 4043