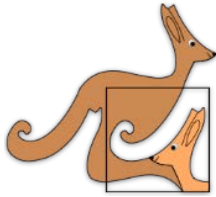


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## INTERNATIONAL CONTEST-GAME MATH KANGAROO CANADA, 2019

### INSTRUCTIONS GRADE 7-8



1. You have 75 minutes to solve 30 multiple choice problems. For each problem, circle only one of the proposed five choices. If you circle more than one choice, your response will be marked as wrong.
2. Record your answers in the response form. Remember that this is the only sheet that is marked, so make sure you have all your answers transferred to that form before giving it back to the contest supervisor.
3. The problems are arranged in three groups. A correct answer of the first 10 problems is worth 3 points. A correct answer of problems 11-20 is worth 4 points. A correct answer of problems 21-30 is worth 5 points. For each incorrect answer, one point is deducted from your score. Each unanswered question is worth 0 points. To avoid negative scores, you start from 30 points. The maximum score possible is 150.
4. The use of external material or aid of any kind is **not permitted**.
5. The figures *are not* drawn to scale. They should be used only for illustration purposes.
6. Remember, you have about 2 to 3 minutes for each problem; hence, if a problem appears to be too difficult, save it for later and move on to another problem.
7. At the end of the allotted time, please **give the response form to the contest supervisor**.
8. Do not forget to pick up your Certificate of Participation on your way out!

**Good luck!**

*Canadian Math Kangaroo Contest team*

[www.mathkangaroocanada.com](http://www.mathkangaroocanada.com)

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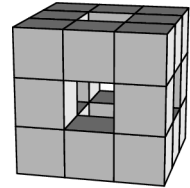


## Canadian Math Kangaroo Contest

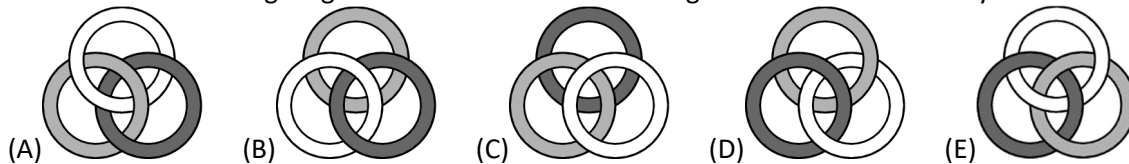
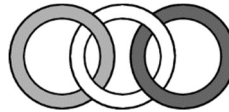
### Part A: Each correct answer is worth 3 points

1. How many hours are there in ten quarters of an hour?  
(A) 40      (B) 5 and a half      (C) 4      (D) 3      (E) 2 and a half

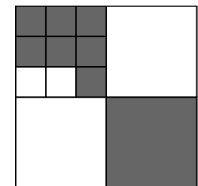
2. A  $3 \times 3 \times 3$  cube is built from  $1 \times 1 \times 1$  cubes. Then some cubes are removed from front to back, from left to right and from top to bottom, as shown. How many  $1 \times 1 \times 1$  cubes are left?  
(A) 15      (B) 18      (C) 20      (D) 21      (E) 22



3. Three rings are linked as shown in the diagram. Which of the following diagrams also shows the three rings linked in the same way?



4. Five children played a card game. At some point, each of them had to give a card to each of the other ones. Then, everybody had to discard the cards just received, and continue the game without them. How many cards in total were in the game before this exchange if after it only one half of the cards were played with?  
(A) 20      (B) 24      (C) 30      (D) 40      (E) 60
5. In a race, Lotar finished before Manfred, Victor finished after Jan, Manfred finished before Jan, and Eddy finished before Victor. Who finished last of these five runners?  
(A) Victor      (B) Manfred      (C) Lotar      (D) Jan      (E) Eddy
6. The pages of the book Juliet is reading are all numbered in order. The first page number is 1. What is the last page number if in all page numbers the digit 0 appears exactly five times and the digit 8 appears exactly six times?  
(A) 48      (B) 58      (C) 60      (D) 68      (E) 88
7. A large square is divided into smaller squares and some of these are shaded, as shown. What fraction of the large square is shaded?  
(A)  $\frac{2}{3}$       (B)  $\frac{2}{5}$       (C)  $\frac{4}{7}$       (D)  $\frac{4}{9}$       (E)  $\frac{5}{12}$
8. Andrew and Boris picked the same number of apples from the orchard. Andrew divided his apples into six equal piles. Boris divided his apples into five equal piles. Boris noticed that each of his piles contained two more apples than each of Andrew's piles. How many apples does Andrew have?  
(A) 60      (B) 90      (C) 70      (D) 75      (E) 120



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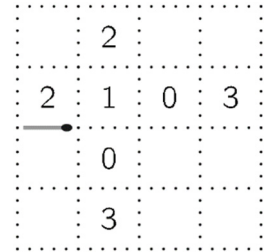


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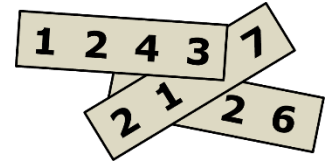
9. Aylin wants to create a path of matches using as few matches as possible. She places each match on a piece of paper like the one shown, along one of the dotted lines. Her path returns to the left-hand end of her original match. The numbers shown in some of the cells are equal to the number of matches around that cell. How many matches are there in this path?

(A) 12 (B) 14 (C) 16 (D) 18 (E) 20



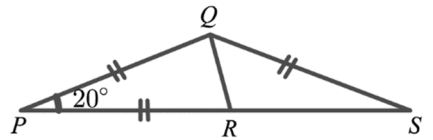
10. On each of three pieces of paper, a four-digit number is written. The pieces of paper are arranged so that three of the digits are covered, as shown. The sum of the three four-digit numbers is 10126. Which are the covered digits?

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



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

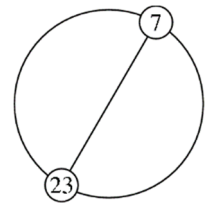
11. In the diagram,  $PQ = PR = QS$  and angle  $\widehat{QPR} = 20^\circ$ . What is the size of angle  $\widehat{RQS}$ ?



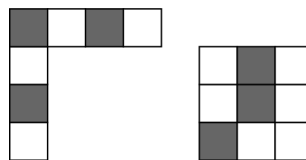
(A)  $50^\circ$  (B)  $60^\circ$  (C)  $65^\circ$  (D)  $70^\circ$  (E)  $75^\circ$

12. Several consecutive integer numbers were placed around a circle, equally spaced. The diagram shows two of these numbers, 7 and 23, which are directly opposite to each other. How many numbers in total were placed around the circle?

(A) 30 (B) 32 (C) 34 (D) 36 (E) 38



13. Which of the following  $4 \times 4$  tiles cannot be formed by combining the two given pieces?



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

14. Alan, Bella, Claire, Dora, and Erik met at a party. Some of them have not met before, so, some of them have been introduced and greeted their new friends with a high-five. Alan did high five once. Bella did high five twice. Claire did high five three times and Dora did high five four times. How many high-five greetings did Erik do?

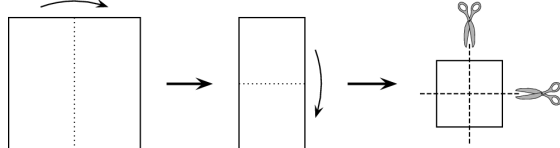
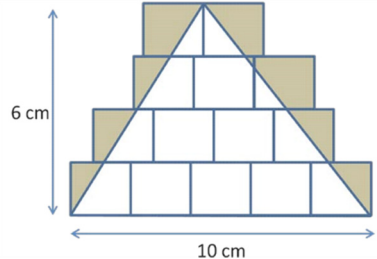
(A) 1 (B) 2 (C) 3 (D) 4 (E) 0

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15. During a basketball practice, Jane scored 55% of the time, out of a series of 20 shots. After five more shots, her scoring rate increased to 56%. On how many of the last five shots did she score?  
(A) 1      (B) 2      (C) 3      (D) 4      (E) 5
16. Cathie folded a square sheet of paper twice along the dotted lines, as shown on the first two diagrams, and then she made two cuts along the dotted lines, as shown on the third diagram. How many of the pieces obtained after that were squares?  
(A) 3      (B) 4      (C) 5      (D) 6      (E) 8
- 
17. Alex, Bob and Carl go for a walk every day. If Alex doesn't wear a hat, then Bob wears a hat. If Bob doesn't wear a hat, then Carl wears a hat. Today Bob is not wearing a hat. Who is wearing a hat?  
(A) Both Alex and Carl      (B) Only Alex      (C) Only Carl  
(D) Neither Alex, nor Carl      (E) It is not possible to determine.
18. Michael drew 24 pictures of dogs, cows, cats and kangaroos. Helen observed that on  $\frac{1}{8}$  of the drawings there were dogs, on  $\frac{3}{4}$  of them were NOT cows, and on  $\frac{2}{3}$  of the drawings were NOT cats. How many kangaroos did Michael draw?  
(A) 4      (B) 5      (C) 6      (D) 7      (E) 8
19. The diagram shows several identical rectangles arranged in layers, and a triangle of base 10 cm and height 6 cm drawn over them. The region inside the rectangles and outside the triangle is shaded. What is the area of the shaded region?  
(A)  $10 \text{ cm}^2$       (B)  $12 \text{ cm}^2$       (C)  $14 \text{ cm}^2$       (D)  $15 \text{ cm}^2$       (E)  $21 \text{ cm}^2$
- 
20. Emily took selfies with her 8 cousins. Each of the 8 cousins is in two or three pictures. In each picture, there are Emily and exactly 5 cousins. How many selfies did Emily take?  
(A) 3      (B) 4      (C) 5      (D) 6      (E) 7

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

21. Julio has two cylindrical candles with different heights and diameters. The first candle is designed to last 6 hours, while the second candle is designed to last 8 hours. Julio lit both candles at the same time and three hours later both candles were the same height. What was the ratio of their original heights?  
(A) 4:3      (B) 8:5      (C) 5:4      (D) 3:5      (E) 7:3
22. Linas builds a  $4 \times 4 \times 4$  cube using 32 white and 32 black  $1 \times 1 \times 1$  cubes. He arranges the cubes so that as much of the surface of his large cube is white. What fraction of the surface of his cube is white?  
(A)  $\frac{1}{4}$       (B)  $\frac{1}{2}$       (C)  $\frac{2}{3}$       (D)  $\frac{3}{4}$       (E)  $\frac{3}{8}$

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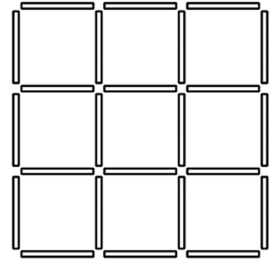


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23. Natasha has many sticks of length 1. The sticks are coloured in one of the colours blue, red, yellow or green. She constructs the  $3 \times 3$  grid shown, in a way that the sides of each  $1 \times 1$  square are of different colours. At least how many green sticks should she use?

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



24. A polygon has an even number of angles. Half of the angles are  $120^\circ$  each and the other half are  $150^\circ$  each. How many angles does the polygon have?

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

25. There are 50 envelopes, each contains one piece of paper with either 1 or -1 written on it. John cannot see the number in each individual envelop, but he can pick any 3 envelops and then an oracle will tell him the product of the 3 numbers hidden in these envelops. What is the least number of times John has to repeat the procedure in order to find out the product of all 50 numbers hidden in the envelops?

(A) 17 (B) 18 (C) 19 (D) 25 (E) 48

26. Ria and Flora had money savings, which were in a ratio 5 : 3. After Ria bought a tablet for \$160, the ratio of their savings changed to 3 : 5. How many dollars did Ria have before buying the tablet?

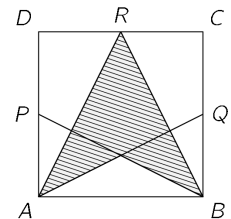
(A) 192 (B) 200 (C) 250 (D) 400 (E) 420

27. In a team chess tournament, each team consists of three players and each player plays exactly once against every player from all the other teams. For organisational reasons, no more than 250 games can be played in total. At most, how many teams can enter the tournament?

(A) 11 (B) 10 (C) 9 (D) 8 (E) 7

28. The diagram shows the square  $ABCD$  with  $P$ ,  $Q$  and  $R$  the midpoints of the sides  $DA$ ,  $BC$  and  $CD$  respectively. What fraction of the square  $ABCD$  is shaded?

(A)  $\frac{3}{4}$  (B)  $\frac{5}{8}$  (C)  $\frac{1}{2}$  (D)  $\frac{7}{16}$  (E)  $\frac{3}{8}$



29. A train consists of 18 carriages. There are 700 passengers travelling on the train. In any block of five adjacent carriages, there are 199 passengers in total.

How many passengers are in the middle two carriages of the train?

(A) 70 (B) 77 (C) 78 (D) 96 (E) 103

30. A closed line is drawn along the surface of a cube. Which of the following nets could be the net of this cube?

