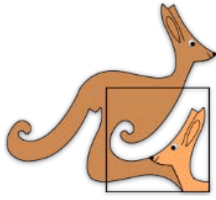


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INTERNATIONAL CONTEST-GAME MATH KANGAROO CANADA, 2018

INSTRUCTIONS GRADE 5-12



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

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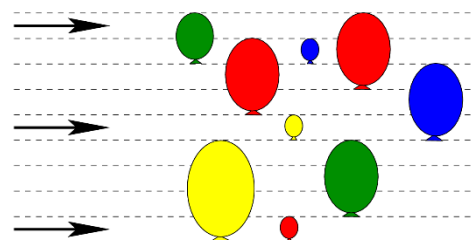


Canadian Math Kangaroo Contest

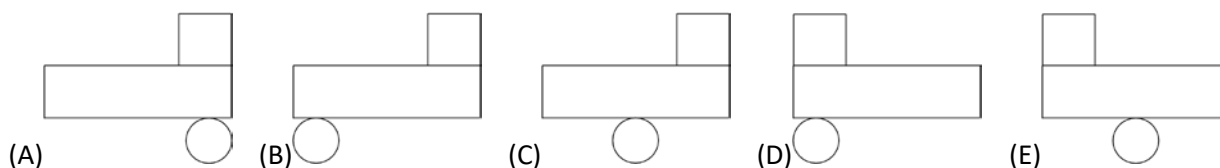
Part A: Each correct answer is worth 3 points

1. The drawing shows 3 flying arrows and 9 fixed balloons. When an arrow hits a balloon, it bursts, and the arrow flies further in the same direction. How many balloons will not be hit by arrows?

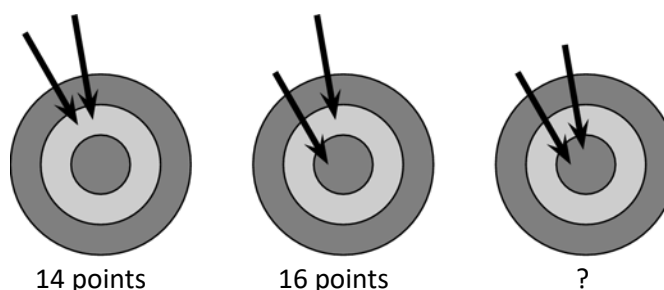
(A) 3 (B) 2 (C) 6
(D) 5 (E) 4



2. The image shows a structure made of three objects. What does Peter see if he looks at the structure from above?

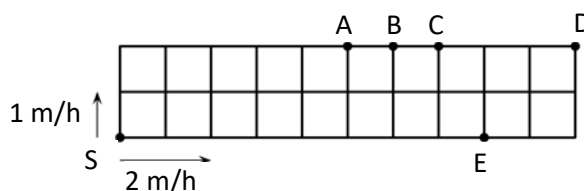


3. Diana played darts throwing arrows toward a target with three sections. First she got 14 points with two arrows on the target. The second time she got 16 points. How many points did she get the third time?



(A) 17 (B) 18 (C) 19 (D) 20 (E) 22

4. A garden is divided into identical squares. A fast snail and a slow snail move along the perimeter of the garden starting *simultaneously* from the corner S but in different directions. The slow snail moves at the speed of 1 metre per hour (1 m/h) and the fast one at 2 metres per hour (2 m/h). At what point will the two snails meet?



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

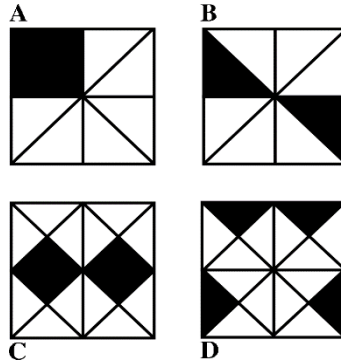
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Grade 5-6

2018

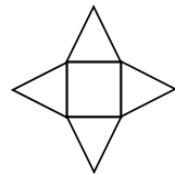
5. In which of the four squares is the fraction of the black area the largest?



- (A) A (B) B (C) C (D) D (E) they are all the same

6. A star is made out of four equilateral triangles and a square. The perimeter of the square is 36 cm. What is the perimeter of the star?

- (A) 144 cm (B) 120 cm (C) 104 cm (D) 90 cm (E) 72 cm



7. From the list 3, 5, 2, 6, 1, 4, 7 Masha chose 3 different numbers whose sum is 8. From the same list Dasha chose 3 different numbers whose sum is 7. How many common numbers have been chosen by both girls?

- (A) none (B) 1 (C) 2 (D) 3 (E) impossible to determine

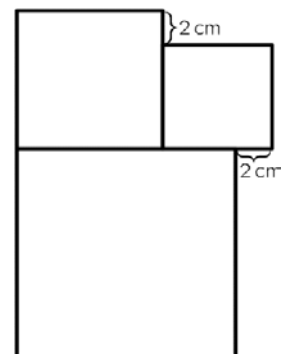
8. We move a bead along a piece of wire. What shall we see when the bead comes to the end of the wire?

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



9. There are 3 squares in the figure. The side length of the smallest square is 6 cm. What is the side length of the biggest square?

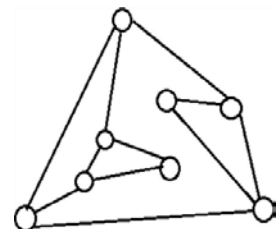
- (A) 8 (B) 10 (C) 12 (D) 14 (E) 16



10. In the following figure, the circles are light bulbs connected to some other light bulbs. Initially, all light bulbs are off. When you touch a light bulb, this light bulb and all its neighbours (e.g., the light bulbs connected to it) are lit.

At least how many light bulbs do you have to touch to turn on all the light bulbs?

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



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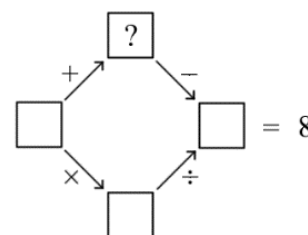
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Part B: Each correct answer is worth 4 points

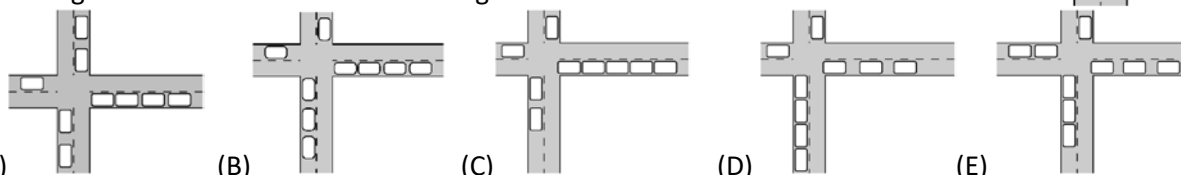
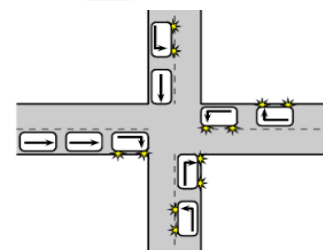
11. Each square contains one of the numbers 1, 2, 3, 4, or 5, so that both of the calculations following the arrows are correct. A number may be used more than once. What number goes into the box with the question mark?

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



12. Nine cars arrive at a crossroads and drive off as indicated by the arrows. Which figure shows these cars after leaving the crossroads?

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



13. The faces of a cube are painted black, white or grey so that opposite faces are of different colour. Which of the following is not a possible net of this cube?

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



14. In a box there are many one-euro, two-euro and five-euro coins. A dispenser draws coins out of the box – one at a time, and stops when three identical coins are taken out. What is the largest possible amount that can be withdrawn?

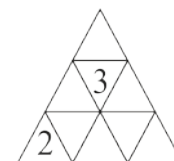
(A) 24 (B) 23 (C) 22 (D) 21 (E) 15

15. Two girls, Eva and Olga and three boys, Adam, Isaac and Urban play with a ball. When a girl has the ball, she throws it to the other girl or to a boy. When a boy has the ball, he throws it to another boy but never to the boy from whom he just received it. Eva starts by throwing the ball to Adam. Who will do the fifth throw?

(A) Adam (B) Eva (C) Isaac (D) Olga (E) Urban

16. Emily wants to enter a number into each cell of the triangular table. The sum of the numbers in any two cells with a common edge must be the same. She has already entered two numbers. What is the sum of all the numbers in the table?

(A) 18 (B) 20 (C) 21 (D) 22 (E) impossible to determine



17. John coded a correct addition calculation naming the digits A , B , C and D . Which digit is represented by B ?

(A) 0 (B) 2 (C) 4 (D) 5 (E) 6

$$\begin{array}{r} A \ B \ C \\ + \ C \ B \ A \\ \hline D \ D \ D \ D \end{array}$$

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18. On Monday Alexandra shares a picture with 5 friends. For several days, everybody who receives the picture, sends it once on the next day to two friends. On which day does the number of people who have seen the picture (including Alexandra) become greater than 75, if it is known that no one receives the picture more than once?
- (A) Wednesday (B) Thursday (C) Friday (D) Saturday (E) Sunday
19. The sum of the ages of Kate and her mother is 36, and the sum of the ages of her mother and her grandmother is 81. How old was the grandmother when Kate was born?
- (A) 28 (B) 38 (C) 45 (D) 53 (E) 56
20. Annie replaced the letters with numbers in the word KANGAROO (identical letters with the same digits, different letters with different digits) so that she got the largest possible 8-digit number, which is not a multiple of 4. What is the sum of the last three digits replacing the word ROO?
- (A) 13 (B) 14 (C) 12 (D) 15 (E) 11

Part C: Each correct answer is worth 5 points

21. Captain Hook has plundered a safe that contains 2520 gold coins. During the night, each of his pirates secretly took out some coins just for themselves. The first one took out $\left(\frac{1}{2}\right)$ of the coins, the second one $\left(\frac{1}{3}\right)$ of the remaining coins, the third one $\left(\frac{1}{4}\right)$ of the remaining coins and so on. When Captain Hook opened the safe in the morning, he found only 252 coins inside. How many pirates are commanded by Captain Hook?
- (A) 8 (B) 9 (C) 10 (D) 11 (E) 12

22. In the figure on the right, the five balls A, B, C, D and E weigh 30, 50, 50, 50 and 80 grams, but not necessarily in this order. Which ball weighs 30 grams?
- (A) A (B) B (C) C
(D) D (E) E



23. If A, B, C are distinct digits, which of the following numbers **cannot** be the largest possible 6-digit number written using three digits A, two digits B, and one digit C?
- (A) AAABBC (B) CAAABB (C) BBAAAC (D) AAABCB (E) AAACBB
24. In the World of Numbers, there are many number-machines, which work in the following way: the machine adds the two beginning digits of the number and replaces them by their sum. For example, beginning with the number 87312 and using six such machines we obtain:

$$87312 \longrightarrow 15312 \longrightarrow 6312 \longrightarrow 912 \longrightarrow 102 \longrightarrow 12 \longrightarrow 3$$

How many such machines should be used in order to get the number $\underbrace{9\dots9}_{50 \text{ times}}$ from the number $\underbrace{9\dots9}_{100 \text{ times}}$?

- (A) 50 (B) 60 (C) 100 (D) 80 (E) Not possible to obtain this number

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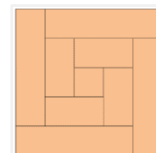


Grade 5-6

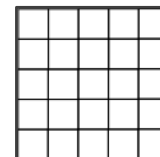
2018

25. Nick wants to arrange the numbers 2, 3, 4, ..., 10 into several groups such that the sum of the numbers in each group is the same. What is the largest number of groups he can get?
(A) 2 (B) 3 (C) 4 (D) 6 (E) other answer

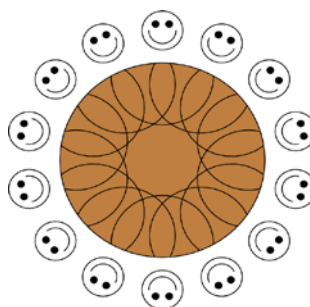
26. Peter cut an 8-cm wide wooden plank with a saw into 9 parts across the width of the plank. One piece was a square, the other were rectangles. Then he arranged all the pieces together as shown in the picture. What was the length of the plank?
(A) 150 cm (B) 168 cm (C) 196 cm (D) 200 cm (E) 232 cm



27. Write 0 or 1 in each cell of the 5×5 table so that each 2×2 square of the 5×5 table contains exactly 3 equal numbers. What is the largest possible sum of all the numbers in the table?
(A) 22 (B) 21 (C) 19 (D) 17 (E) 15

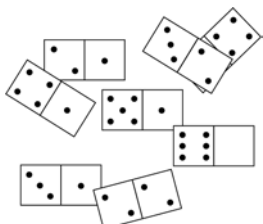


28. 14 people are seated at a round table. Each person is either a liar or tells the truth. Everybody says: "Both my neighbours are liars". What is the maximum number of liars at the table?
(A) 7 (B) 8 (C) 9 (D) 10 (E) 14

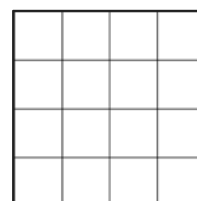


Both my neighbours are liars.

29. There are eight domino tiles on the table (pic 1). One half of one tile is covered. The 8 tiles can be arranged into a 4×4 square (pic 2), so that the number of dots in each row and column is the same.



pic 1



pic 2

How many dots are on the covered part?

- (A) 1 (B) 2 (C) 3 (D) 4 (E) 5
30. Four ladybugs sit on different cells of a 4×4 grid. One of them is sleeping and does not move. Each time you whistle, the other three ladybugs move to a free neighbouring cell. They can move up, down, right or left but they are not allowed to go back to the cell they just came from. Which of the following images might show the result after the fourth whistle?

