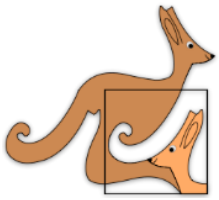


INTERNATIONAL CONTEST-GAME
MATH KANGAROO
CANADA, 2020

INSTRUCTIONS
GRADE 5-6

1. You have 75 minutes to solve 30 multiple choice problems. For each problem, decide which answer is correct and fill in (blacken) the oval that has the same letter as the appropriate answer. If you fill in (blacken) more than one oval for a question, your response will be marked as wrong.

1. 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.
2. 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.
3. The use of external material or aid of any kind is **not permitted**.
4. The figures *are not* drawn to scale. They should be used only for illustration purposes.
5. 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.
6. At the end of the allotted time, please **give the response form to the contest supervisor**.
7. Do not forget to pick up your Certificate of Participation on your way out!

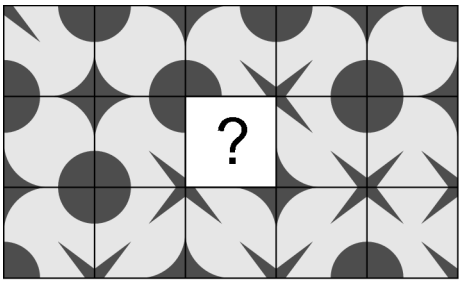
Good luck!

Canadian Math Kangaroo Contest team

CANADIAN MATH KANGAROO CONTEST PROBLEMS

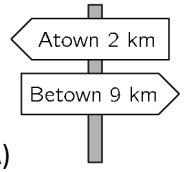
PART A: EACH CORRECT ANSWER IS WORTH 3 POINTS

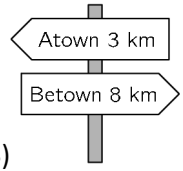
1. Which piece completes the pattern?

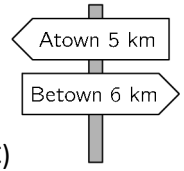


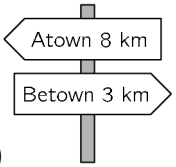
(A)  (B)  (C)  (D)  (E) 

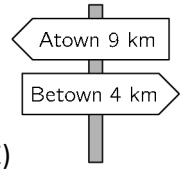
2. As Amira is walking from Atown to Betown she passes the five signposts shown. One of them is incorrect. Which one?

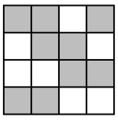
(A) 

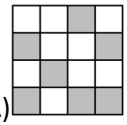
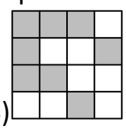
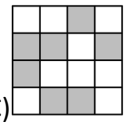
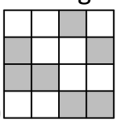
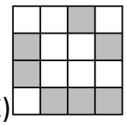
(B) 

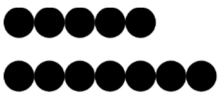
(C) 

(D) 

(E) 

3. A large square is made up of smaller white and grey squares. 
What does the large square look like if the colors of the white and grey squares are interchanged?

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

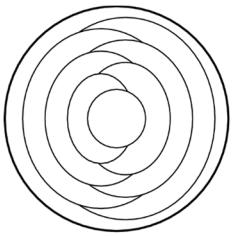
4. Kim has several chains of length 5 and of length 7. 
By joining chains one after the other, Kim can create different lengths.
Which of these lengths is impossible to make?

(A) 10 (B) 12 (C) 13 (D) 14 (E) 15

5. When Elyse the bat leaves her cave, a digital clock shows 20:20.
After she returns and is hanging upside down, she sees 20:20 on the clock again.
How long has she been away from her cave?

(A) 3 hours, 28 minutes (B) 3 hours, 40 minutes (C) 3 hours, 42 minutes
(D) 4 hours, 18 minutes (E) 5 hours, 42 minutes

6. Cindy colors each region of the pattern either red, blue or yellow. She colors regions that touch each other different colors. She colors the outer region blue. How many regions of the completed pattern are colored blue?

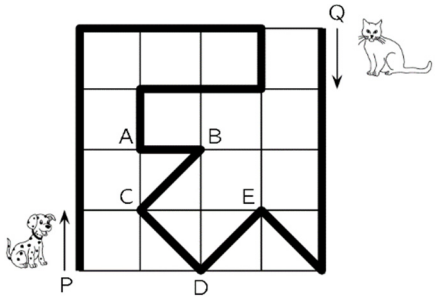


(A) 2 (B) 3 (C) 4 (D) 5 (E) 6

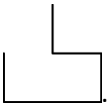
7. Maria had 10 sheets of paper. She cut some of the sheets into five parts each. After that Maria has 22 pieces in total. How many sheets did she cut?

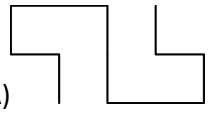
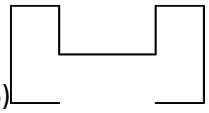
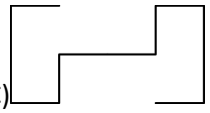
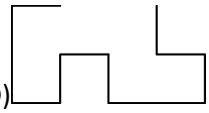
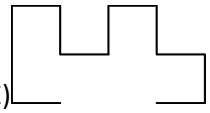
(A) 3 (B) 2 (C) 6 (D) 7 (E) 8

8. A dog and a cat walk in the park along the path marked by the thick black line. The dog starts from P at the same time as the cat starts from Q. The dog walks three times as fast as the cat. At which point are they going to meet?



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

9. Giorgio has two identical pieces of wire of shape  .
Which of the following shapes cannot be obtained putting together these two pieces?

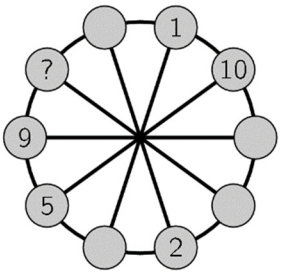
(A)  (B)  (C)  (D)  (E) 

10. Mikas wants to bake 24 muffins for his birthday party. To bake six muffins two eggs are needed. Eggs are sold in boxes of six. How many boxes does Mikas need to buy?

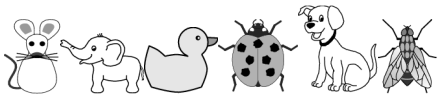
(A) 1 (B) 2 (C) 3 (D) 4 (E) 8

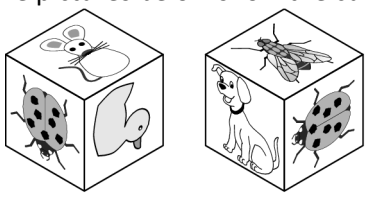
PART B: EACH CORRECT ANSWER IS WORTH 4 POINTS

11. The numbers from 1 to 10 have to be placed in the small circles, one in each circle. Numbers in any two neighboring circles must have the same sum as the numbers in the two diametrically opposite circles. Some of the numbers are already placed. What number should be placed in the circle with the question mark?



(A) 3 (B) 4 (C) 6
(D) 7 (E) 8

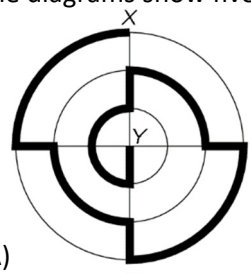
12. Amy glues the six stickers shown onto the faces of a cube: 
The pictures below show the cube in two different positions.

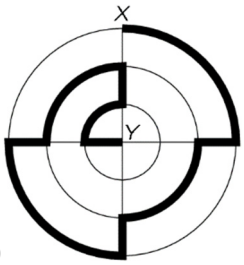


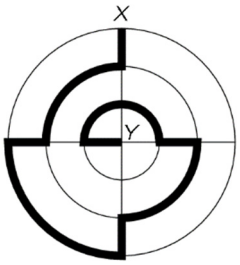
Which sticker is on the face opposite the face with the mouse on?

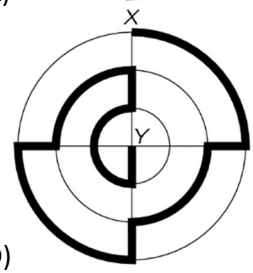
(A)  (B)  (C)  (D)  (E) 

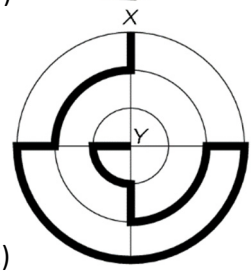
13. The diagrams show five paths from X to Y marked with a thick line. Which path is the shortest?

(A) 

(B) 

(C) 

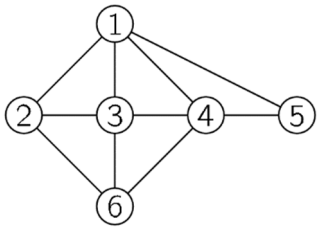
(D) 

(E) 

14. A father kangaroo lives with his three children. They decide on all matters by vote, and each member of the family gets as many votes as its age. The father is aged 36 and the children are 13, 6 and 4 years old, so the father always wins. How many years will it take for the children to win all votes, if they all agree?

(A) 5 (B) 6 (C) 7 (D) 13 (E) 14

15. The picture shows the friendship of the six girls Ann, Beatrice, Chloe, Diana, Elisabeth and Fiona. Each number represents one of the girls and each line joining two numbers represents a friendship between those two girls. Chloe, Diana and Fiona each have four friends. Beatrice is friends with only Chloe and Diana. Which number represents Fiona?



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

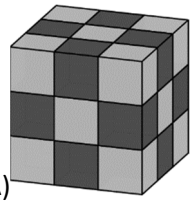
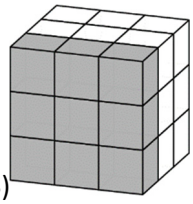
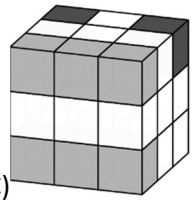
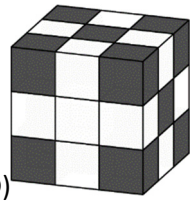
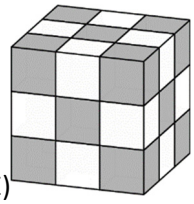
16. An elf and a troll meet. The troll always lies, while the elf always tells the truth. If they both have just said one sentence, which one could the sentence be?

(A) I am telling the truth (B) You are telling the truth
(C) We both are telling the truth (D) I always lie (E) One and only one of us is telling the truth

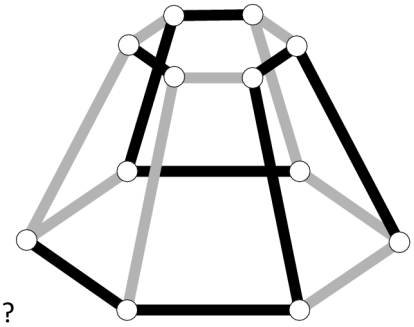
17. We call a 3-digit number *nice* if its middle digit is greater than the sum of its first and last digits. What is the largest number of consecutive *nice* 3-digit numbers?

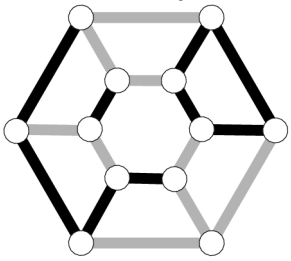
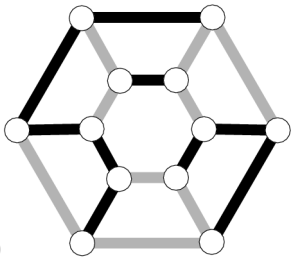
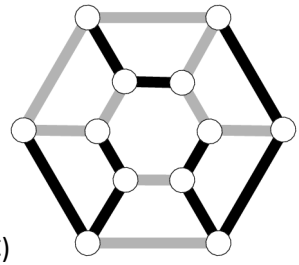
(A) 5 (B) 6 (C) 7 (D) 8 (E) 9

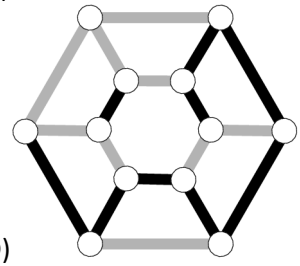
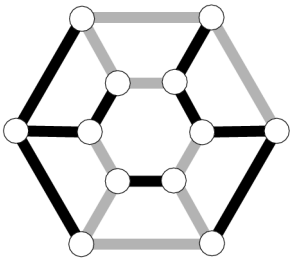
18. Mary has exactly 10 white cubes, 9 light grey cubes and 8 dark grey cubes, all of the same size. She glues all these cubes together to build a big cube. One of the cubes below is the one she builds. Which one is it?

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

19. What does the object in the picture look like when viewed from above?



(A)  (B)  (C) 

(D)  (E) 

20. Magnus has to play 15 games in a chess tournament. At some point during the tournament he has won half of the games he has played, he has lost one third of these games, and two have ended in a draw. How many games has Magnus still to play in the tournament?

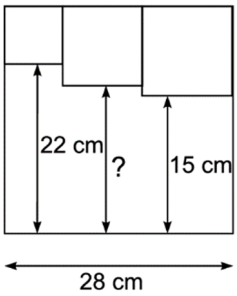
(A) 2 (B) 3 (C) 4 (D) 5 (E) 6

PART C: EACH CORRECT ANSWER IS WORTH 5 POINTS

21. Anne, Ben, Catherine, David, Ella and Fred (in that order) are standing in line for a candy at the fair. The clown that is giving away the candy does it in the following way: sends the child in front of the line to the end of the line, then gives candy to the child in front of the line, then sends the child in front of the line to the end of the line, then gives candy to the child in front of the line, etc. until all children get candy. Which of the following is true?

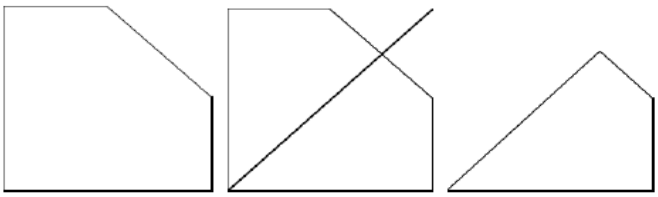
(A) Anne gets candy before Catherine (B) Catherine gets candy after Ella
(C) Ben gets candy after David (D) Catherine gets candy after David
(E) Fred gets candy last

22. Three small squares are drawn inside a larger square as shown.
What is the length of the line marked with the question mark?



(A) 17 cm (B) 17.5 cm (C) 18 cm
(D) 18.5 cm (E) 19 cm

23. Stefie took a square piece of paper and folded one vertex to the center of the square. Next, he folded the paper along the symmetry axis of the figure, obtaining a quadrilateral.



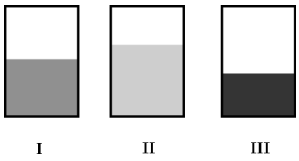
What is the measure of the quadrilateral's largest angle?

(A) 135° (B) 120° (C) 150° (D) 100° (E) 125°

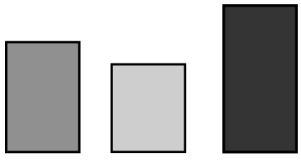
24. Three positive integers have product 12 (repetition of the factors is allowed). Which of the following numbers could not be the sum of the three integers?

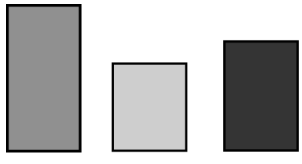
(A) 7 (B) 8 (C) 9 (D) 12 (E) 14

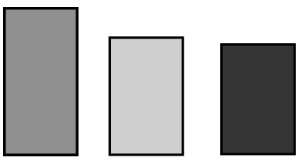
25. Mary put the same amount of liquid in three rectangular vessels.
Viewed from the front, they seem to have the same size, but the liquid has risen to different levels in the three vessels.

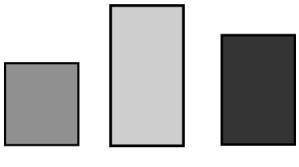


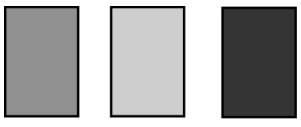
Which of the following images represents the three vessels when viewed from above?

(A)


(B)


(C)


(D)


(E)


26. There are 8 cards with digits 1, 2, 3, …, 8. Two boys and two girls sit in some order around a table. Starting from one of them, and going clockwise, they take one of the cards and put them from left to right. The boys want the final number to be as large as possible, and the girls want it to be as small as possible. Which of the following numbers cannot be the final number?

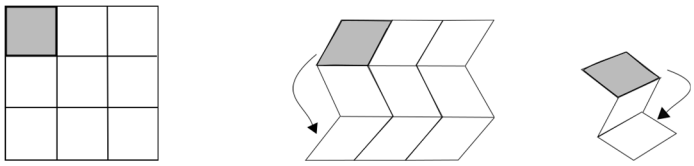
(A) 81726354 (B) 12873465 (C) 18723654 (D) 81276435 (E) 18273645

27. A rafter takes people across the Avaro River, doubling everyone's money in their pockets during the trip. One trip costs 24 coins and you pay at the end of the trip. Alfonso went across the river three times. Unfortunately, after paying for the last trip, he had no coins left in his pocket. How many coins did Alfonso have before the first trip?

(A) 9 (B) 12 (C) 18 (D) 21 (E) 24

28. Vadim has a square piece of paper divided into nine cells. He folds the paper as shown - overlapping horizontally, and then, vertically so that the grey square ends on top.

1	*a*	
		c
	b	



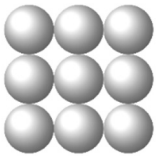
Vadim wants to write the numbers from 1 to 9 into the cells so that, once the paper is folded, the numbers would be in increasing order with number 1 on the top layer.

What numbers should he write instead of a, b and c?

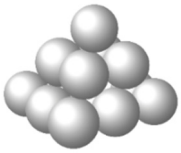
(A) $a = 6, b = 4, c = 8$ (B) $a = 4, b = 6, c = 8$ (C) $a = 5, b = 7, c = 9$

(D) $a = 4, b = 5, c = 7$ (E) $a = 6, b = 4, c = 7$

29. Don builds a pyramid with balls. The square base consists of 3×3 balls:



The middle layer has 2×2 balls, and there is one ball at the top.



There is glue at each contact point between two balls. How many glue points are there?

(A) 20 (B) 24 (C) 28 (D) 32 (E) 36

30. The figure shows a map of some islands and how they are connected by bridges. A postman has to visit each island exactly once. He starts on the island marked "start" and would like to finish on the island marked "finish". He has just reached the black island at the centre of the map. In which direction should he move to be able to complete his route?

(A) by going North (B) by going East

(C) by going South (D) by going West

(E) there is no such path as the postman wishes to follow