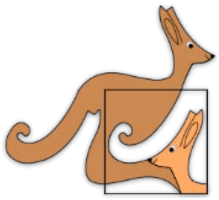


INTERNATIONAL CONTEST-GAME
MATH KANGAROO
CANADA

INSTRUCTIONS
GRADE 7-8

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. Your score and electronic Certificate of Participation will be available in your account after June 1.

Good luck and enjoy!

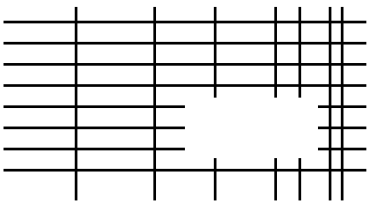
Canadian Math Kangaroo Contest team

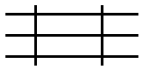
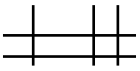
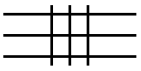
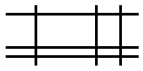
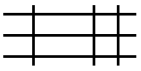
CANADIAN MATH KANGAROO CONTEST PROBLEMS

PART A: EACH CORRECT ANSWER IS WORTH 3 POINTS

1. The figure shows a set of horizontal and vertical lines with one part removed.

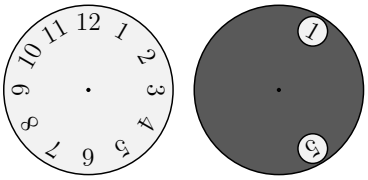
Which of the following could be the missing part?



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

2. The dark circle with two holes is placed on the clock face and is rotated around its center so that an 8 appears in a hole.

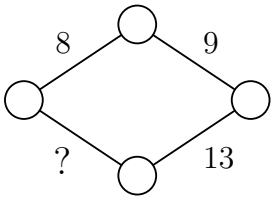
What two numbers is it possible to see in the other hole?



(**A**) 4 or 12 (**B**) 1 or 5 (**C**) 1 or 4 (**D**) 7 or 11 (**E**) 5 or 12

3. A natural number is hiding in each of the four vertices of a rhombus. The numbers in every two vertices connected by a side are added, and the sum is written on the side.

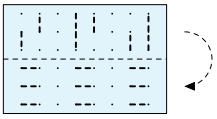
What number should be written on the fourth side of the rhombus?

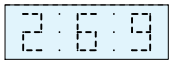
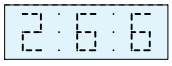
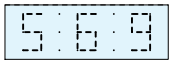
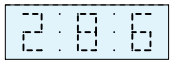
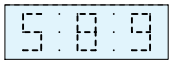


(**A**) 11 (**B**) 12 (**C**) 13 (**D**) 14 (**E**) 15

4. Kristina has a piece of transparent paper with some lines marked on it. She folds it along the dashed line.

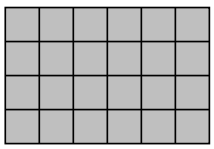
What can she now see?

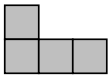
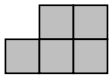


(**A**)  (**B**)  (**C**)  (**D**)  (**E**) 

5. A tiler wants to tile a floor of dimensions 4 m × 6 m using identical tiles. No overlaps or gaps are allowed.

Which of the following tiles could not be used?



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

6. Theodorika wrote down three consecutive positive integers in order, but instead of digits she used symbols so wrote: □◊◊, ♡△△, ♡△□.

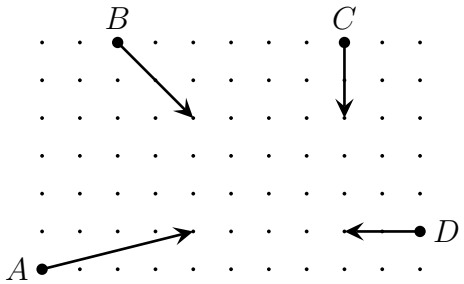
What would she write next?

(A) ♡♡◊ **(B)** □♡□ **(C)** ♡△◊ **(D)** ♡◊□ **(E)** ♡△♡.

7. Some edges of a cube are to be coloured red so that every face of the cube has at least one red edge. What is the smallest possible number of edges that must be coloured red?

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

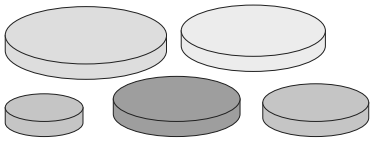
8. The figure shows the initial position, the direction of travel and how far four bumper cars move in five seconds.



Which two cars will collide first?

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

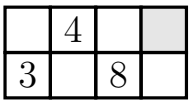
9. Anna has five discs of different radii. She decides to build a tower using three of her discs so that each disc in her tower has a radius smaller than the disc below it.



How many different towers could Anna construct?

(A) 5 **(B)** 6 **(C)** 8 **(D)** 10 **(E)** 15

10. Evita wants to write the numbers 1 to 8 in the squares of the grid shown, so that the sums obtained by adding each row are equal and that the sums obtained by adding each column are equal.
She has already written the numbers 3, 4 and 8, as shown.



What number should she write in the shaded box?

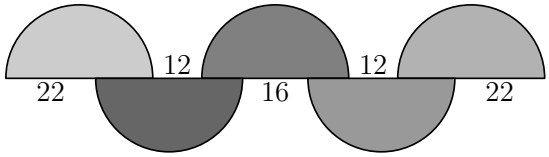
(A) 1 **(B)** 2 **(C)** 5 **(D)** 6 **(E)** 7

PART B: EACH CORRECT ANSWER IS WORTH 4 POINTS

11. John has 150 coins. When he throws them on the table, 40% of them show heads and 60% of them show tails. How many coins showing tails does he need to turn over to have the same number show heads as show tails?

(**A**) 10 (**B**) 15 (**C**) 20 (**D**) 25 (**E**) 30

12. The figure shows five equal semicircles and the lengths of some line segments.



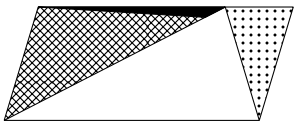
What is the radius of the semicircles?

(**A**) 12 (**B**) 16 (**C**) 18 (**D**) 22 (**E**) 36

13. Martin is standing in a queue. The number of people in the queue is a multiple of 3. He notices that he has as many people in front of him as behind him. He sees two friends, both standing behind him in the queue, one in 19th place and the other in 28th place.
In which position in the queue is Martin?

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

14. The area of the parallelogram in the figure is 300 cm^2.
The areas of the hatched triangle is 100 cm^2 and that of the dotted triangle is 40 cm^2.
What is the area, in cm^2, of the black triangle?



(**A**) 10 (**B**) 20 (**C**) 25 (**D**) 30 (**E**) 50

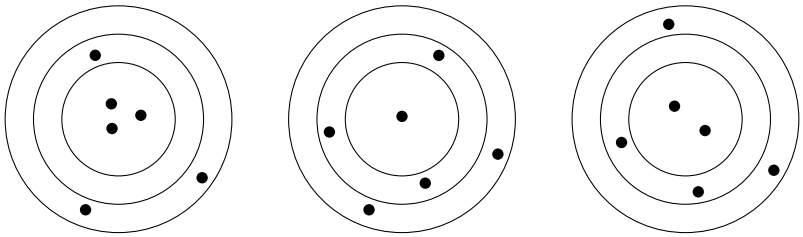
15. The sides of a square are 1 cm long. How many points in the plane are exactly 1 cm away from any two vertices of this square?

(**A**) 4 (**B**) 6 (**C**) 8 (**D**) 10 (**E**) 12

16. Some beavers and some kangaroos are standing in a circle. There are three beavers in total and there are no two beavers who are standing next to another beaver. There are exactly three kangaroos who are standing next to another kangaroo. What is the largest possible amount of kangaroos in the circle?

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

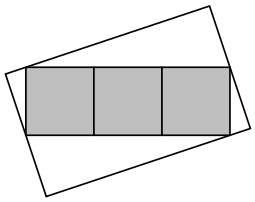
17. Tom, John and Lily each shot six arrows at a target. Arrows hitting anywhere within the same ring score the same number of points. Tom scored 46 points and John scored 34 points, as shown.



How many points did Lily score?

(**A**) 37 (**B**) 38 (**C**) 39 (**D**) 40 (**E**) 41

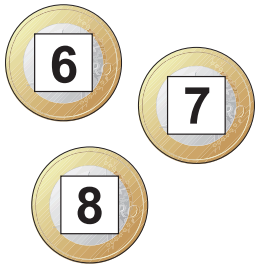
18. The figure shows a rectangle made from three gray squares, each of area 25 cm^2, inside a white rectangle.
Two of the vertices of the gray rectangle touch the mid-points of the shorter sides of the white rectangle and the other two vertices of the gray rectangle touch the other two sides of the white rectangle.



What is the area, in cm^2, of the white rectangle?

(**A**) 125 (**B**) 136 (**C**) 149 (**D**) 150 (**E**) 172

19. Jake wrote six consecutive numbers onto six white pieces of paper, one number on each piece.
He stuck these bits of paper onto the top and bottom of three coins.
Then he tossed these three coins three times.
On the first toss, he saw the numbers 6, 7 and 8, as shown, and then coloured them red. On the second toss, the sum of the numbers he saw was 23 and on the third toss the sum was 17.



What was the sum of the numbers on the remaining three white pieces of paper?

(**A**) 18 (**B**) 19 (**C**) 23 (**D**) 24 (**E**) 30

20. The sum of 2023 consecutive integers is 2023.

What is the sum of digits of the largest of these integers?

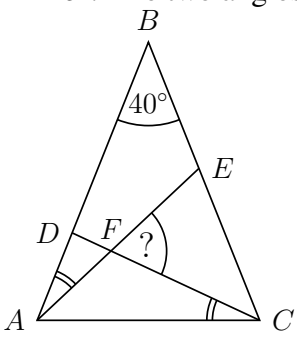
(**A**) 4 (**B**) 5 (**C**) 6 (**D**) 7 (**E**) 8

PART C: EACH CORRECT ANSWER IS WORTH 5 POINTS

21. Charlie rolled a pair of dice three times and recorded the sum of the numbers he rolled. These sums were 5, 7, and 9. One odd number appeared in all three rolls.
Which of the following pairs of numbers was rolled in one of the attempts?

(**A**) (1, 4) (**B**) (1, 6) (**C**) (2, 3) (**D**) (2, 5) (**E**) (4, 5)

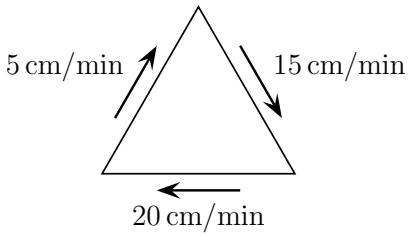
22. Triangle ABC is isosceles with $\angle ABC = 40°$. The two angles, $\angle EAB$ and $\angle DCA$, are equal.



What is the size of the angle $\angle CFE$?

(**A**) 55° (**B**) 60° (**C**) 65° (**D**) 70° (**E**) 75°

23. An ant is walking along the sides of an equilateral triangle. The speeds at which it travels along the three sides are 5 cm/min, 15 cm/min and 20 cm/min, as shown.
What is the average speed, in cm/min, at which the ant walks the whole perimeter of the triangle?

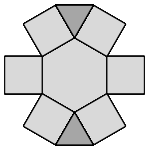


(**A**) 10 (**B**) $\frac{80}{11}$ (**C**) $\frac{180}{19}$ (**D**) 15 (**E**) $\frac{40}{3}$

24. Snow White organized a chess competition for the seven dwarves, in which each dwarf played one game with every other dwarf. On Monday, Grumpy played 1 game, Sneezy played 2, Sleepy 3, Bashful 4, Happy 5 and Doc played 6 games. How many games did Dopey play on Monday?

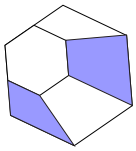
(**A**) 1 (**B**) 2 (**C**) 3 (**D**) 4 (**E**) 5

25. Elizabetta wants to write the numbers 1 to 9 in the regions of the figure shown so that the product of the numbers in any two adjacent regions is not more than 15. Two regions are said to be adjacent if they have a common edge.
In how many ways can she do this?



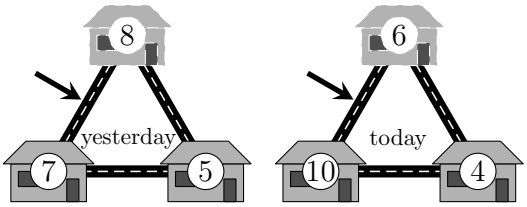
(**A**) 12 (**B**) 8 (**C**) 32 (**D**) 24 (**E**) 16

26. A regular hexagon is divided in four quadrilaterals and one smaller regular hexagon. The ratio of the total area of the coloured regions to the area of the small hexagon is $\frac{4}{3}$. What is the ratio $\frac{\text{area small hexagon}}{\text{area big hexagon}}$?



(A) $\frac{3}{11}$ **(B)** $\frac{1}{3}$ **(C)** $\frac{2}{3}$ **(D)** $\frac{3}{4}$ **(E)** $\frac{3}{5}$

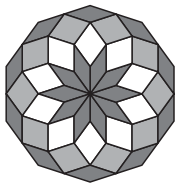
27. Some mice live in three neighbouring houses. Paths of the same length connect every two houses, as shown. Last night, every mouse randomly chose one of the other two houses and ran there along one of the paths. The numbers in the figure show the number of mice in each house, yesterday and today.



How many mice used the path pointed by the arrow?

(A) 9 **(B)** 11 **(C)** 12 **(D)** 16 **(E)** 19

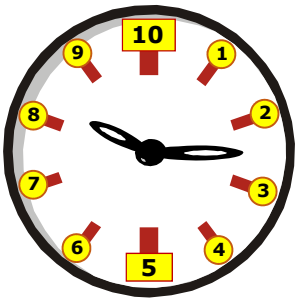
28. The "rose" shown is formed from two kinds of rhombuses, the thin ones coloured dark gray and the big ones coloured either white or light gray.



What is the largest angle of a big rhombus?

(A) 106° **(B)** 108° **(C)** 110° **(D)** 112° **(E)** 120°

29. In a country far, far away they have decided to use a new method for measuring the time of the day. One full day is divided in two equal parts, at midnight and midday. However, instead of dividing these time intervals in 12 hours of 60 minutes each, they decided to use 10 “new hours” of 100 “new minutes” each. A clock made for "new hours and minutes" shows the time as 8:25.



What time would a traditional clock show?

(A) 7:54 **(B)** 8:15 **(C)** 8:25 **(D)** 9:15 **(E)** 9:54

30. A rugby team scored 24 points, 17 points and 25 points in the seventh, eighth and ninth games of the 2023 season. Their average points-per-game was higher after 9 games than it was after their first 6 games. Their average after 10 games was more than 22.

What is the smallest number of points that they could have scored in their 10th game?

(A) 22 **(B)** 23 **(C)** 24 **(D)** 25 **(E)** 26

CMKC 2023 Grade 7-8 Answers

PART A					
1	A	B	C	D	**E**
2	**A**	B	C	D	E
3	A	**B**	C	D	E
4	A	B	**C**	D	E
5	A	B	C	**D**	E
6	A	B	C	D	**E**
7	A	**B**	C	D	E
8	A	**B**	C	D	E
9	A	B	C	**D**	E
10	A	B	C	D	**E**

PART B					
11	A	**B**	C	D	E
12	A	B	**C**	D	E
13	A	B	C	**D**	E
14	**A**	B	C	D	E
15	A	B	C	D	**E**
16	A	**B**	C	D	E
17	A	B	C	**D**	E
18	A	B	C	**D**	E
19	**A**	B	C	D	E
20	**A**	B	C	D	E

PART C					
21	A	B	**C**	D	E
22	A	B	C	**D**	E
23	A	B	**C**	D	E
24	A	B	**C**	D	E
25	A	B	C	D	**E**
26	**A**	B	C	D	E
27	A	**B**	C	D	E
28	A	**B**	C	D	E
29	A	B	C	D	**E**
30	A	B	**C**	D	E