OCMC

Results

Ontario Invitational Mathematics Exam

2024

Comments on the Paper

Overall Comments

The OIME is extremely challenging, and it is an accomplishment to even qualify for the contest. This year's paper was especially difficult, featuring a few less well-known techniques. Still, we were pleased to see that almost all of the contestants made significant progress on at least one problem. Congratulations to the winners, and thank you all for making the commute to attend this event in-person. We hope that you enjoyed solving the problems, and please consider joining us again in Waterloo next year.
Average: 38.7/100
Median: 38/100

Specific Comments

1. Average: 7.67/10 (Median: 10/10)
   Most contestants were able to solve this problem. The most common error was some kind of calculation mistake when adding together the numbers. Some solutions used the Chinese Remainder Theorem, which simplified the calculation. The other popular approach was taking the sum of the two digit numbers in similar fashion to the official solution.

2. Average: 7.74/10 (Median: 10/10)
   This was also very well done. Some contestants incorrectly assumed the position of the liar rather than the robber which led to a wrong conclusion. The logical reasoning was fairly straightforward after assuming the robber, and some solutions included a truth table which helps to visualize the relations.

3. Average: 6.04/10 (Median: 8/10)
   The main difficulty in this problem is making sense of the conditions and translating them into equations. Many contestants earned partial marks for useful progress towards the answer. Common approaches included trying to work backwards and dividing the trip into sections based on when Shanna and Elaine meet. This problem was also quite calculation heavy, and many solutions made calculation mistakes.

4. Average: 2.3/10 (Median: 0/10)
   The idea of transforming an ellipse into a circle is not as commonly seen in contests, and this problem posed a lot of difficulty for many contestants. Some solutions attempted to directly draw a triangle over the ellipse which is extremely difficult to formalize. Solutions that used calculus did not generally make significant progress.

5. Average: 6.56/10 (Median: 8/10)
   For this problem, most contestants were able to notice that the line had to pass through the center of the square. However, many papers made small mistakes such as including the boundary of the square when counting points, counting some of the pairs more than once, and accounting for order when choosing the pair of points.

6. Average: 2.56/10 (Median: 0/10)
   Out of those who solved this problem, the majority noticed that the circle with diameter CM is tangent to the circle centered at A with radius 1. Some papers assumed that triangle CEM is isosceles, which is false. Partials were awarded for progress made using the cosine law, though most papers failed to make progress after this observation.

7. Average: 2.78/10 (Median: 2/10)
   This problem was difficult and very few contestants achieved full marks, but many earned partials for finding the equation for d or making nontrivial observations about the sequence. A common mistake was overcounting the number of solutions for d by assuming that all multiples of 7 up to 119 are valid.

8. Average: 1.67/10 (Median: 0/10)
   Only a few contestants attempted this problem. Of the papers that had the correct idea, most were able to notice that the conditions led to the existence of a negative coefficient when the degree of the polynomial was 3 or less. However, some solutions did not account for the possibility that the coefficients could be zero, losing partial marks.

9. Average: 0.56/10 (Median: 0/10)
   Very few contestants attempted this problem. Some partials were earned for correctly guessing the sequence, but most papers did not make significant progress towards proving that it is minimal. No contestant achieved full marks on this problem.

10. Average: 0.85/10 (Median: 0/10)
    This problem was difficult and required the knowledge of more advanced theory. All of the solutions that made meaningful progress used Pell's equation. An alternative solution to the official one includes finding solutions to a variant of Pell's equation and constructing solutions based on it.

Please visit our website at ontariocmc.ca/past-contests to download the OIME 2024 papers and solutions.

Awards

Champion	Leo Wu	Bayview Secondary School	Grade 10
Second	Jiahao Yu	Oakville Trafalgar High School	Grade 12
Third	Zheng Wang	Iroquois Ridge High School	Grade 12
Fourth	Alex Wu	St. Robert Catholic High School	Grade 11
Fifth-	Andrew Lin	Marc Garneau Collegiate Institute	Grade 12
Tenth	Lei He	Oakville Trafalgar High School	Grade 10
	Jerry Wang	Laurel Heights Secondary School	Grade 11
	Daksh Srivastava	Iroquois Ridge High School	Grade 9
	Jacob Lu	Earl Haig Secondary School	Grade 12
	Qi Ning	The Woodlands Secondary School	Grade 11

Each award winner will receive a cash prize between \$100 and \$20 from the Ontario Competitive Mathematics Committee.

Student Ranking

Score	Rank
91	1
80	2
77	3
61	4
53	5
47	6
46	7
45	8

Score	Rank
44	9
43	10
39	11
38	13
34	15
33	16
32	18
29	19

Score	Rank
28	20
24	21
23	22
21	23
20	25
6	26
0	27