

Individual Round

Sample Problems

December 2, 2025

Instructions

The individual round will have a similar format to the American Mathematics Competition. Each problem will have 4 answer options, one of which will be correct. We will not show the answer choices or the solutions, as the problems are left as an exercise to the reader.

Sample Problems

1. Let x be the three-digit integer \overline{abc} such that

$$x = a^3 + b^3 + c^3.$$

Find the number of unique x .

2. What is $(6 + 7) + 67$?
3. Let a and b be the two real solutions to

$$x^4 - 18x^2 + 81 = 0.$$

Find $a + b$.

4. A sequence satisfies $a_1 = 5$, $a_2 = 11$, and

$$a_{n+2} = 3a_{n+1} - 2a_n.$$

Find a_{10} .

5. Let T be the number of trailing zeros in $1000!$. Find the remainder when T is divided by 100.
6. Let triangle ABC have side lengths $AB = 15$, $BC = 14$, and $AC = 13$. Find the area of triangle ABC .
7. Compute the number of integer solutions (x, y) to

$$x^2 + y^2 \leq 2024.$$

8. Let N be the number of divisors of $3^{10} \cdot 5^7 \cdot 7^3$. Compute N .

9. A fair six-sided die is rolled repeatedly until the sum of all rolls first exceeds 50. Let E be the expected number of rolls. Compute $\lfloor E \rfloor$.

10. Let p be the smallest prime such that

$$p \mid (2^{100} - 1).$$

Find p .

11. Let z satisfy $z^6 = 64$ and $\text{Im}(z) > 0$. Let S be the sum of all possible values of $\text{Re}(z)$. Compute S .

12. How many permutations of the digits $\{0, 1, 2, 3, 4, 5, 6\}$ form a 7-digit integer divisible by 11 and not beginning with 0?

13. Let

$$f(n) = \sum_{k=1}^n \gcd(k, n).$$

Find $f(84)$.

14. Let r be the real number such that

$$\sum_{n=0}^{\infty} \frac{1}{(n+r)^2} = \frac{\pi^2}{6}.$$

Compute $100r$.

15. A circle of radius 10 has two parallel chords of lengths 12 and 16. The distance between the chords is d . Compute d .

Credits

This document uses the latex styling package developed by Andrew Lin. [Here's](#) the link to his website.