

MOAA 2026: Speed Round

October 10th, 2026

Rules

- You have 20 minutes to complete 10 problems. Each answer is a nonnegative integer no greater than 1,000,000.
- If m and n are relatively prime, then the greatest common divisor of m and n is 1.
- No mathematical texts, notes, or online resources of any kind are permitted. Rely on your brain!
- Compasses, protractors, rulers, straightedges, graph paper, blank scratch paper, and writing implements are generally permitted, so long as they are not designed to give an unfair advantage.
- No computational aids (including but not limited to calculators, phones, calculator watches, and computer programs) are permitted on any portion of the MOAA.
- No individual may receive help from any other person, including members of their team. Consulting any other individual is grounds for disqualification.

How to Compete

- **In Person:** After completing the test, write your answers down in the provided Speed Round answer sheet. The proctors will collect your answer sheets immediately after the test ends.
- **Online:** Log into the Classtime session to access the test. Input all answers directly into the provided form. Select for the test to be handed in once you are ready.

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Speed Round Problems

- S1. [2] Compute $20 \cdot 26 + 202 - 6$.
- S2. [2] Notebooks at Areteem are sold in two pack sizes: a pack of 3 notebooks costs \$4, and a pack of 5 notebooks costs \$6. If Carolyn can only buy a whole number of packs, determine the minimum number of dollars she must spend to buy *at least* 37 notebooks.
- S3. [2] The product of three consecutive positive integers is equal to 33 times their sum. Find the largest of the three integers.
- S4. [3] Let $ABCD$ be a rectangle with $AB = 15$ and $BC = 20$. The incircle of $\triangle ABC$ touches sides $\overline{AB}$ and $\overline{BC}$ at points X and Y , respectively. If the circumcircle of $\triangle DXY$ has area $K\pi$, find K .
- S5. [3] Eugenia and Niki are eating letter cupcakes that spell out "JANESTREET". If they both eat five cupcakes at random, the probability that Eugenia eats all of the cupcakes with the letter "E" can be written as $\frac{m}{n}$, where m and n are relatively prime positive integers. Find $m + n$.
- S6. [4] Let
$$S = (1^3 + 3^3 + 5^3 + \cdots + 2025^3) + 2026^3.$$
Find the remainder when S is divided by 1000.
- S7. [5] Ten chairs are placed in a circle. The five MOAA tournament directors are to select their seats, one after the other. A chair is considered available if it is empty and both its adjacent chairs are also empty. Each person will randomly select an available chair to sit in, and they will not sit down if there are no available chairs left. The probability that all five people sit down can be written as $\frac{m}{n}$, where m and n are relatively prime positive integers. Find $m + n$.
- S8. [6] Let $ABCD$ be a nondegenerate quadrilateral with integer side lengths that satisfies $AB + CD = BC + DA$ and $AB \cdot CD = BC \cdot DA = [ABCD]$. Given that the longer diagonal of $ABCD$ has length 37, find the perimeter of $ABCD$.
Note: $[ABCD]$ denotes the area of quadrilateral $ABCD$.
- S9. [6] Find the number of ordered pairs of positive integers (m, n) such that $m + n = 2026$ and $\gcd(m, n) = \gcd(m + 2, n + 2)$.
- S10. [7] Triangle ABC has $AB = 20$ and $BC = 26$. Points X and Y are chosen on segments $\overline{AB}$ and $\overline{BC}$, respectively, such that $AX = CY = 2$. The perpendicular bisectors of AY and CX meet at P . Given that $PB = 24$, find $PA^2 + PC^2$.