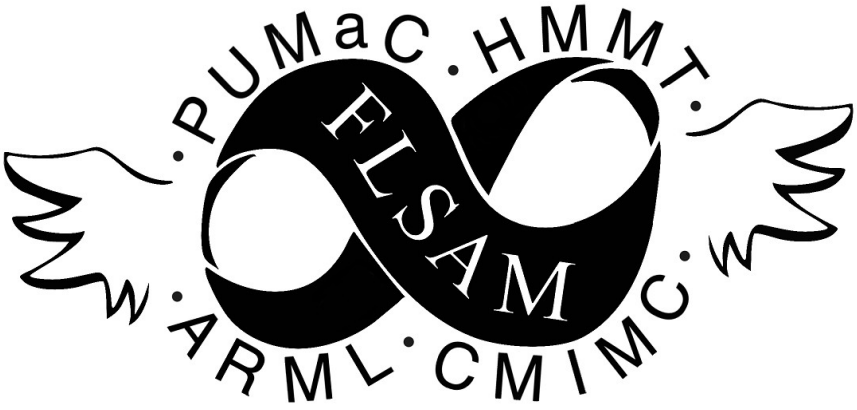
Florida Student Association of Mathematics



2025-2026 ARML Tryout

April 2026

Welcome to the **2025-2026 FLSAM ARML Tryout!** The tryout will consist of **7 sets** of **2 problems each**. You will have **10 minutes** to work on each set. Write your name and answers directly on each problem set. Scoring is based on the number of correct answers; there is no penalty for wrong answers. Good luck!

Round 1

Name: _____

1. _____ **2.** _____

1. Let AB be a line segment with midpoint M. Distinct points X_1, X_2, X_3, and X_4 lie on segment AB such that

$$AX_1 = X_1X_2 = X_2X_3 = X_3X_4 = X_4B.$$

Given that $MX_2 = 2$, compute the length AB.

2. Polynomials $A(x)$ and $B(x)$ with nonnegative integer coefficients are such that

$$A(x)B(x) - (x^2 + 1) = A(x) + xB(x)$$

for all real x. Compute the sum of all distinct possible values of $A(10)$.

Round 2

Name: _____

3. _____ **4.** _____

3. For a positive integer n, let $s_{10}(n)$ be the sum of the digits of n. Compute the product of all distinct possible values of $s_{10}(n+6) - s_{10}(n)$ over all two-digit positive integers n.

4. Let ABC be a triangle with centroid G. The circle centered at G passing through A intersects segment BC at P and Q such that $BP = 6$, $PQ = 10$, and $QC = 2$. Compute the area of ABC.

Round 3

Name: _____

5. _____ **6.** _____

5. An arithmetic sequence $s_1, s_2, s_3, \ldots$ of reals is such that

$$\frac{s_1}{2} = \frac{s_{s_1}}{11} = \frac{s_{s_{s_1}}}{53} \neq 0.$$

Compute s_{10}.

6. Find the number of ways to place 9 standard six-sided dice onto a 3×3 grid such that for every pair of orthogonally adjacent dice, their touching faces have the same number.

Round 4

Name: _____

7. _____ **8.** _____

7. Let $ABCD$ be a rhombus. Suppose X is a point on segment BD such that $\angle AXC = 90^\circ$. Given that $BX = 20$ and $DX = 26$, compute the area of $ABCD$.

8. For a positive integer n, let $\mathcal{D}_n$ denote the set of positive divisors of n. Find the number of functions $f\colon \mathcal{D}_{2100} \longrightarrow \mathcal{D}_{2100}$ such that $f(ab) = f(a)f(b)$ for all integers a and b such that a, b, and ab are in $\mathcal{D}_{2100}$.

Round 5

Name: _____

9. _____ **10.** _____

9. Find the unique positive integer N such that

- exactly 12 divisors of N are divisible by 12, and
- exactly 15 divisors of N are divisible by 15.

10. Let ABC be an acute triangle with circumcenter O and altitudes BP and CQ such that $PQ = 12$ and $BC = 20$. Suppose that AO intersects PQ at R with $\frac{AR}{AO} = \frac{3}{4}$. Compute the area of ABC.

Round 6

Name: _____

11. _____ **12.** _____

11. Find the unique four-digit positive integer $\overline{ABCD}$ with $A \neq 0$ such that 39 divides $\overline{A4BCD}$, $\overline{AB4CD}$, and $\overline{ABC4D}$.

12. A degree 4 polynomial $P(x)$ with positive real coefficients is such that the coefficient of x^4 in $P(x)^n$ is n^4 for all positive integers n. Compute $P\left(\sqrt[4]{6}\right)$.

Round 7

Name: _____

13. _____ **14.** _____

13. Let $\mathcal{A} = (1, 1, 1, 1, 2, 2, 2, 3, 3, 4)$. For a permutation of $\mathcal{A}$, let its *quintessentiality* be the number of entries of the permutation (before the final entry) that are at most the next entry. Let m be the minimum possible quintessentiality of a permutation of $\mathcal{A}$. Find the number of permutations of $\mathcal{A}$ with quintessentiality m.

14. Find the number of nonnegative integers less than $820 \cdot 10^6$ that cannot be written in the form $2^a + 820b + 1435c$ for nonnegative integers a, b, and c.