Math Marathon 2026

Math Meet 2026

Instructions

- The problems are to be worked out individually and independently. Only textbooks and library sources may be used. Calculators and computers may be used. Each entry must be signed by a math teacher within the school to certify that all rules have been followed. Any number of entries from a school may be submitted.
- Work must be shown neatly and concisely. Explain how you got your answer. It is possible that several entries will have correct solutions, so work will be judged on exposition, clarity of thought and ingenuity, as well as correctness. The date of submission will also be considered. Electronic submissions will be accepted only once.
- Include a cover sheet for each entry with the following information: Student Name, Math Marathon, Home Address, E-mail Address, School; Year of Graduation, School Address, Signature of a Math Teacher for Verification.
- All entrants must be students who have not graduated from high school. All entrants must be registered for the Math Meet.
- The judges' decisions will be final.
- All papers are to be submitted electronically to `mathmeet@charleston.edu` or mailed to the following address:

  Math Meet (Marathon)
  Department of Mathematics
  College of Charleston
  66 George Street
  Charleston, SC 29424

- All entries must be received or postmarked by February 13, 2026.

Problems

1. Find the smallest pair of positive integers x and y such that $x^2 - 2026y^2 = 1$.
2. A diagram consists of three circles, each of which passes through the centers of the other two. The area of the central region formed is one square unit. Find the areas of the other regions formed.
3. A fair six-sided die is cast repeatedly until the same number appears on two consecutive throws. What is the probability that the number of throws required is larger than the expected value of the number of throws required?
4. Find all expressions of 2026 as a sum of two positive integers, each of which has an odd number of odd divisors.
5. A truncated pyramid (or *frustum*) has a square base of side length b and a square top of side length a at height h above the base. The lengths b and a, the altitude h, and its volume V (in cubic units) are all distinct positive integers. Find the minimum volume V such a truncated pyramid could have.