C of C Math Meet 2008
MARATHON

Rules:

i. 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.

ii. 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.

iii. All entrants must be students who have not graduated from high school. All entrants must be registered for the Math Meet.

iv. The judges' decisions will be final.

v. All papers are to be mailed to the following address or submitted electronically to `mathmeet@cofc.edu`

Math Meet (Marathon)
Department of Mathematics
College of Charleston
Robert Scott Small Building / Room 339
Charleston, SC 29424

vi. The cover paper for each entry must have the following information: (This may be turned in the day of the Math Meet if submitted electronically and not mailed.) Student Name, Math Marathon, Home Address, E-mail Address, School; Year of Graduation, School Address, Signature of a Math Teacher for Verification .

vii. All entries must be received or postmarked by February 12, 2008.

1. Find all possible ways to express 2008 as a sum of three positive cubes.

2. A regular octagon is inscribed in a regular octagon of area 1 square unit. Find the smallest area the inscribed regular octagon could have.

3. A cafe sells spicy chicken wings in orders of 6, 9, and 20. What is the largest number of spicy chicken wings which cannot be ordered at this cafe?

4. Every integer can be expressed as a sum of at least two consecutive integers; for example, 11 can be expressed as a sum of two consecutive integers and 2 can be expressed as a sum of four consecutive integers. Among the first 2008 positive integers, which integer requires the most consecutive integers in such an expression?

5. As part of a game a positive integer n is selected and a coin is tossed until it has either landed heads n times or tails n times, at which point the game ends. Alex is the winner if the game takes at least $2n-2$ coin tosses, and Bob is the winner if the game takes fewer than $2n-2$ coin tosses. For which values of n is Alex more likely to win than Bob?