

Name:

MVMSC Monthly Math Contest

Time: Whole lunch period.

Directions: No calculators. For answers expressible in multiple ways, any is allowed, but fractions must be simplified and denominators rationalized. Your score is the sum of the point values of problems you solve.

#	Question	Answer
1 (1)	What is the largest possible area of a triangle with side lengths 28 and 45?	
2 (1)	Find the largest integer value of x such that $\frac{2x^2+52x+120}{x+26}$ is an integer.	
3 (2)	How many zeroes are at the end of $1^1 \times 2^2 \times \dots \times 30^{30}$?	
4 (2)	8 distinct equilateral triangles with side length 12 are constructed on the side of a square with side length 12 so that each triangle shares a side with the square. What is the area of the region inside the quadrilateral formed by the 4 triangle centers outside the square but not the quadrilateral formed by the 4 triangle centers inside the square?	
5 (2)	Alice randomly selects a positive integer between 1 and 2047, inclusive. Bob guesses Alice's integer, to which Alice replies if her integer is larger, smaller, or equal to Bob's guess. What is the minimum number of guesses needed so that Bob is guaranteed to know Alice's number?	
6 (3)	Find the last three digits of the closest integer to $(\sqrt{13} + \sqrt{10})^{804}$.	
7 (3)	Eric has red, blue and, yellow paint. In how many ways, distinct up to rotation, can he color a cube?	