



★ REGIONAL LEVEL ★

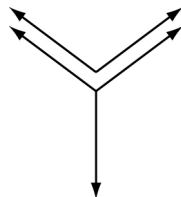
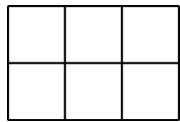
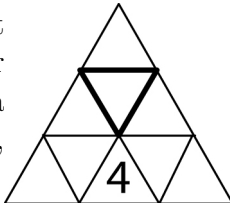
January 2010

The Mandelbrot Competition

Round Three Test

Name: _____

Time Limit:
40 minutes

1. Warren constructs wooden puzzles as a hobby. He can build four puzzles per hour, and can make ten puzzles from a single board of wood, which costs \$13. If he works steadily for five hours and sells every puzzle that he builds for \$7.50 each, what is his hourly profit, to the nearest dollar?		1
2. How many letters of the alphabet either do not appear within the word INFINITESIMAL or do not appear in the word GARGANTUAN, but don't not appear in both?		1
3. The geometric object at right consists of five rays. All angles in the diagram measure 120° , and the rays that point in the same direction are parallel. What is the largest number of points in which a circle could intersect this configuration of rays? (Count all points of intersection with all five rays.)		2
4. How many ways are there to place the letters A, B, C, D, E, F into the grid at right, with one letter per box, so that no row or column contains two adjacent letters of the alphabet? (Thus the C and D cannot both be placed in the bottom row.)		2
5. There is a unique positive integer n with the property that if we were to add up all the prime numbers that divide either n or $n + 1$, their sum would be exactly $n - 1$. Determine this number n .		2
6. Write the digits from 1 to 9 in the small triangles so that the sum of any "three-in-a-row," in any direction, is either even or a multiple of 7. (Three numbers in a row occupy a shape that is congruent to $\triangle \nabla \triangle$.) If the 4 is placed as shown, which digit must appear within the highlighted triangle?		3
7. A point P has coordinates $P(2009, 2010)$. Let d be the distance from P to the line $\frac{1}{4}x + \frac{1}{3}y = 1$. Determine the value of $3(2009) + 4(2010) - 5d$.		3

SCORE: