NEW ENGLAND MATHEMATICS LEAGUE

P.O. Box 6, Sharon, Massachusetts 02067-0006

All official participants must take this contest at the same time.

Contest Number 3

Any calculator without a QWERTY keyboard is allowed. Answers must be exact *or* have 4 (or more) significant digits, correctly rounded.

December 8, 2015

Name ____________________ **Teacher** __________ **Grade Level** _____ **Score** ____

Time Limit: 30 minutes

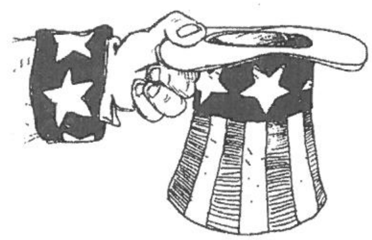
NEXT CONTEST: JAN. 12, 2016

Answer Column

3-1. What is the largest possible degree-measure of an angle of a triangle if the degree-measures of all three angles are positive integers?

3-1.

3-2. A magical hat takes any number fed into it and divides 1492 by that number. If 2015 is fed into the machine and the first output is fed back into the machine, what is the value of the second output?

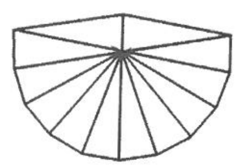


3-2.

3-3. In a certain sequence of numbers, each number after the first is the sum of all the preceding numbers. If this sequence's 100th term is 2015, what is its 101st term?

3-3.

3-4. Twelve congruent isosceles triangles share a common vertex, as shown. If the sum of the measures of all the angles that share the common vertex is 360°, what is the measure of each triangle's smallest angle?



3-4.

3-5. For what integer $k > 0$ can $(\sqrt{2}-1)^5$ be written as $\sqrt{k+1} - \sqrt{k}$, the difference between the square roots of two consecutive integers?

3-5.

3-6. There are an infinite number of ordered pairs of positive integers (m,n) such that $m^3 = n^2$ and $m + n$ is a perfect square. One such pair is $(m,n) = (9,27)$. What is the largest value of $m < 1000$ for which such an ordered pair exists?

3-6.