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 4

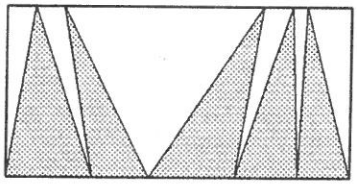
Any calculator without a QWERTY keyboard is allowed. Answers must be exact *or* have 4 (or more) significant digits, correctly rounded.

January 12, 2016

Name _____ **Teacher** _____ **Grade Level** _____ **Score** _____

Time Limit: 30 minutes

NEXT CONTEST: FEB. 9, 2016

	Answer Column
4-1. For all real numbers x, the function f is defined by $f(x) = 2016$. What is the value of $f(x+2016)$?	4-1.
4-2. What is the sum of the areas of the five shaded triangles shown at the right that are drawn interior to a 3 by 6 rectangle? 	4-2.
4-3. If $A^{2x} = 4$ and $A > 0$, what is the numerical value of $\frac{A^{3x} - A^{-3x}}{A^{x} - A^{-x}}$, written as a ratio of positive integers in lowest terms?	4-3.
4-4. Al runs three times as fast as he walks. It takes Al 21 minutes to get to work from home if he walks for twice the amount of time that he runs. How many minutes does it take Al to get to work from home if he runs for twice the amount of time that he walks? 	4-4.
4-5. At most how many of the first 100 positive integers can be chosen if no two of the chosen numbers have a sum divisible by 5?	4-5.
4-6. What is the area of quadrilateral $ABCD$ whose vertices have polar coordinates $A(0,0)$, $B(4,0)$, $C(3,\frac{\pi}{8})$, $D(1,\frac{3\pi}{8})$?	4-6.