TEXAS STATE MATHEMATICS LEAGUE

P.O. Box 11038, Spring, Texas 77391-9998

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 13, 2009

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

Time Limit: 30 minutes

NEXT CONTEST: FEB. 24, 2009

Answer Column

4-1. What is the smallest integer greater than 2009 which can be the perimeter of a square whose sides have integral lengths?

4-1.

4-2. When the 30th Mersenne prime (a prime of the form 2^p-1, where p is prime,) was found in 1983, the *Times* said $p = 131\,049$, the *Globe* claimed $p = 132\,049$, the *News* reported $p = 131\,094$, and the *Post* wrote $p = 132\,094$. Only one of these values is correct. What is the correct value of p? [NOTE: This story may be apocryphal!]

4-2.

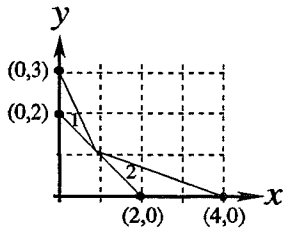
4-3. If n is positive, and $n^{10} - n^5 = n^5$, what is the value of n^5?

4-3.

4-4. What are all values of $x > 1$ which satisfy $x^{3\sqrt{x}} = \sqrt{x}^{x}$?

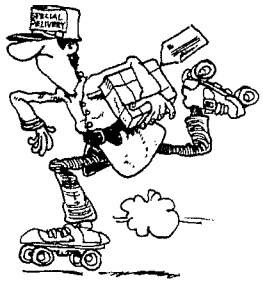
4-4.

4-5. In the diagram shown at the right, there's exactly one point on the segment connecting (0,2) to (2,0) for which the angles marked 1 and 2 will be congruent. What are the coordinates of this point?



4-5.

4-6. Starting from opposite ends of a street, each of two messenger boys skated at his top speed towards the other's starting point. From the time they passed each other, one messenger took 1 more minute, and the other took 2 more minutes, to reach their respective destinations. How many minutes did it take the faster messenger to skate the entire distance?



4-6.