



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

Contest Number 6 Any calculator without a QWERTY keyboard is allowed. Answers must be exact or have 4 (or more) significant digits, correctly rounded. March 17, 2020

Name _____ Teacher _____ Grade Level _____ Score _____

Time Limit: 30 minutes

FINAL CONTEST OF THE YEAR

Answer Column

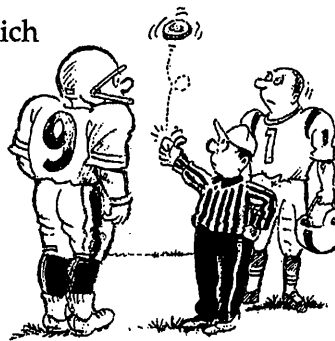
6-1. What is the greatest five-digit number that is divisible by 11?

6-1.

6-2. What is the least integer $n > 0$ for which $2020 - n$ is the square of an integer?

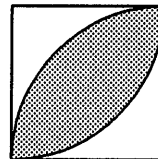
6-2.

6-3. In tossing a fair coin, what is the probability that the second "heads" occurs on the ninth toss?



6-3.

6-4. The square at the right has an area of 4. Quarter-circles, centered at two opposite vertices of the square, overlap in the shaded region as shown. What is the area of the shaded region?



6-4.

6-5. A drawing of the parabola $y = x^2$ is photographed using a microscope that magnifies by a factor of 200 in each direction. The photographed parabola is traced on (unmagnified) graph paper so the parabola's vertex, orientation, and axis of symmetry are unchanged. When compared to the drawing of $y = x^2$ (also drawn on unmagnified graph paper), for what real number a does the photograph of the parabola look like the graph of $y = ax^2$?

6-5.

6-6. The lengths of the sides of an equilateral triangle are $\log_4 a$, $\log_{10} b$, and $\log_{25}(a+b)$, where a and b are positive numbers. What is the value of $\frac{a}{b}$?

6-6.

Twenty-one books of past contests, Grades 4, 5, & 6 (Volumes 1-7), Grades 7 & 8 (Volumes 1-7), and HS (Volumes 1-7), are available, for \$12.95 each volume (\$15.95 Canadian), from Math League Press, P.O. Box 17, Tenafly, NJ 07670-0017.