



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 7, 2020

Name _____ Teacher _____ Grade Level _____ Score _____

Time Limit: 30 minutes

NEXT CONTEST: FEB. 11, 2020

Answer Column

4-1. What is the only value of x for which (x^2 - 2019^2) / (x - 2019) = 2020?

4-1.

4-2. Two of the numbers I wrote on my paper are the greatest prime numbers less than 100 that differ by 4. What is their sum?

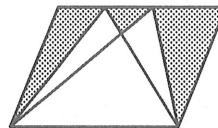


4-2.

4-3. For what integer k will 2^k - 1 be the greatest divisor of 2^22 - 2 that is less than 2^22 - 2?

4-3.

4-4. The area of the parallelogram shown is 44. If the total area of the shaded regions is 14, what is the area of the region common to the two large unshaded triangles that share a common base?



4-4.

4-5. What is the only value of x for which there are 24 positive integers (not necessarily distinct) whose sum is x and whose product is x?

4-5.

4-6. Point P is on the angle bisector of a base angle of an isosceles triangle whose base-length is 12 and whose leg-lengths are 10. If the distance from P to the base is 2, what is the sum of the squares of the distances from P to the three vertices of the triangle?

4-6.

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.



GEORGIA MATHEMATICS LEAGUE

P.O. Box 12014, Columbus, Georgia 31917-2014

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Contest Number 5 *Any calculator without a QWERTY keyboard is allowed. Answers must be exact or have 4 (or more) significant digits, correctly rounded.* February 11, 2020

Name _____ Teacher _____ Grade Level _____ Score _____

Time Limit: 30 minutes

NEXT CONTEST: MAR. 17, 2020

Answer Column

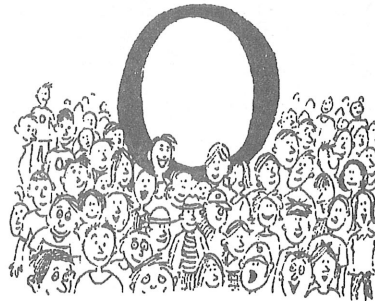
5-1. What is the sum of the reciprocals of the solutions of the equation $(x+1)(x+2)(x+3) = 0$?

5-1.

5-2. What is the largest integer n for which $2020-n$, 2020 , and $2020+n$ could be the lengths of the sides of a triangle?

5-2.

5-3. The only possible scores on an exam are the 16 integers from 0 to 15. The most frequent score earned by the 100 students who took the exam was 0 (a score achieved by k students). If no other score was earned as frequently, what is the least possible value of k ?



5-3.

5-4. Two isosceles triangles with supplementary vertex angles share a common base. The lengths of the legs of one triangle are 12 and of the other triangle are 5. What is the sum of the lengths of the altitudes that can be drawn to the common base of the triangles?



5-4.

5-5. Two numbers are called reversal numbers if one is obtained from the other by reversing the order of digits—for example, 123 and 321. What are the two reversal numbers whose product is 92,565?

5-5.

5-6. What are all ordered triples of non-zero integers (a,b,c) for which a , b , and c form a geometric sequence whose common ratio is a non-zero integer, while $a+4$, b , and c form an arithmetic sequence?

5-6.

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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

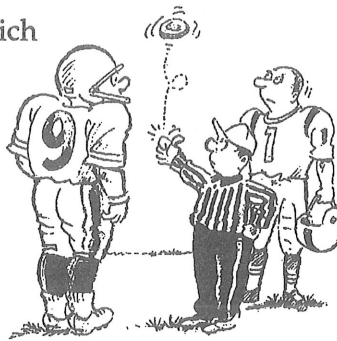
Name _____ Teacher _____ Grade Level _____ Score _____

Time Limit: 30 minutes FINAL CONTEST OF THE YEAR Answer Column

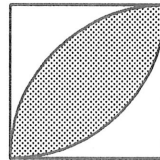
6-1. What is the greatest five-digit number that is divisible by 11? 6-1.

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 un magnified 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 a/b? 6-6.

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