Contest Number 2  November 12, 2019

Name ___________________  Teacher _________  Grade Level _____  Score ____

Time Limit: 30 minutes  NEXT CONTEST: DEC. 10, 2019  Answer Column

2-1. If \( \frac{x-1}{x+1} = 2019 \), what is the value of \( \frac{x^2 - 2x + 1}{x^2 + 2x + 1} \)?

Answer: 2-1.

2-2. What is the least prime number which can be written as a sum of two composite numbers?

Answer: 2-2.

2-3. If we define the separation between two points in the x-y plane as the length of the shortest path from one point to the other along the axes and/or along lines parallel to the axes, then there are exactly four points with integral coordinates whose separation from the origin is 1. How many points with integral coordinates have a separation from the origin of 5?

Answer: 2-3.

2-4. From a point inside an equilateral triangle, if the distances to the three sides are \( 2\sqrt{3}, 4\sqrt{3}, \) and \( 5\sqrt{3} \), what is the area of the equilateral triangle?

Answer: 2-4.

2-5. If \( a \) and \( c \) are rational, and if \( x^3 + cx^2 - 5x + a = (x-c)(x-c)(x+ \frac{a}{c^2}) \), what are all possible values of \( a \)?

Answer: 2-5.

2-6. What is the greatest real number \( x \) for which \( \sqrt{x} + [x] - x = 2 \), where \([x]\) is the greatest integer \( \leq x \)? [Note: For this question, the instructions have been changed: your answer must be exact.]

Answer: 2-6.