Bergen County Mathematics League

Good Luck To You

Good Luck To All

Contest #4 (Calculators Allowed) **2017-2018**

Part I *Time Limit: 12 minutes* Answers must be exact *or* have 4 (or more) significant digits, correctly rounded.

4-1. A man placed 1¢ on the first square, 2¢ on the second, 4¢ on the third, and so on, doubling the value each successive time. If it cost the man $655.35 to cover all the squares, then how many squares were there?

4-2. Write, in simplest form, the numerical value of $\frac{1}{\log_3 12} + \frac{1}{\log_4 12}$.

Part II *Time Limit: 12 minutes*

4-3. What is the area of an isosceles trapezoid whose bases have lengths 10 and 14, and one of whose diagonals has length 13?

4-4. The product of the first 100 terms of the form $2^{2^{n-1}}+1$, $n = 1, 2, 3, \ldots, 100$ is $2^x - 1$. What is the numerical value of x?

Part III *Time Limit: 12 minutes*

4-5. What are all ordered pairs of real numbers (x,y) which satisfy

$$2x^2-2xy+y^2 = 2 \text{ and } 3x^2+2xy-y^2 = 3?$$

4-6. What are the only integral values of A for which a rectangle with positive integer side-lengths can have area A cm^2 and perimeter A cm?

Answers

4-1. 16

4-2. 1

4-3. 60

4-4. 2^{100}

4-5. (1,0), (−1,0), (1,2), (−1,−2)

4-6. 16, 18