Bergen County Mathematics League

Good Luck To You

Good Luck To All

Contest #2 (Calculators Allowed) **2017-2018**

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

2-1. In part, the inscription on Diophantus' tomb reads "One-sixth of his life was spent in childhood, one-twelfth in adolescence, and one-seventh (plus 5 years) in childless wedlock. He rejoiced in the birth of his first son, who lived only half as long as his father. Diophantus' days on Earth ended 4 years after losing his son." At what age did Diophantus marry?

2-2. Factor $x^4 + 4$ as far as possible using only polynomials with integral coefficients.

Part II *Time Limit: 12 minutes*

2-3. What is the maximum possible area of a triangle in which the length of one side is 6 and the sum of the lengths of the other two sides is 10?

2-4. Let $[x]$ represent the greatest integer $\leq x$. Let $f(x)$ be the product of $[x/12.5]$ and $[-12.5/x]$. If $0 < x < 90$, then the range of f consist of k elements. What is the value of k?

Part III *Time Limit: 12 minutes*

2-5. What is the surface area of a rectangular solid whose volume is 1001 if the length of every edge is a prime number?

2-6. What ordered pair of real numbers (x,y) satisfies $x+y+\sqrt{x+y} = 56$ and $x-y+\sqrt{x-y} = 30$?

Answers

2-1. 21

2-2. $(a^2-2a+2)(a^2+2a+2)$

2-3. 12

2-4. 8

2-5. 622

2-6. (37,12)