Bergen County Mathematics League

Good Luck To You

Good Luck to All

Part I *Time Limit:* 12 *minutes* On contest #6, ***any S.A.T. calculator will be allowed.***

5-1. If $\frac{\frac{1}{x}+\frac{1}{y}}{\frac{1}{x}-\frac{1}{y}} = 2017$, what is the value of $\frac{x+y}{x-y}$?

5-2. What is the only ordered pair of real numbers (x, y) for which

$$(x + 3y)^2 + |2x - 7y + 14| = 6xy + 9y^2?$$

Part II *Time Limit:* 12 *minutes*

5-3. If i represents the imaginary unit, what is the value of $i + i^2 + i^3 + \ldots + i^{2017}$?

5-4. In rectangle $ABCD$, $AB = 20$ and $BC = 25$. Points E and F are on $\overline{AB}$ and $\overline{BC}$ respectively. If we fold the rectangle along $\overline{DE}$, then A will touch F. What is the area of the quadrilateral $BCDE$?

Part III *Time Limit:* 12 *minutes*

5-5. If $x - 1 = \frac{y+7}{2} = \frac{z+2}{4}$, what is the minimum value of $x^2 + y^2 + z^2$?

5-6. In the problem, $[x]$ represents the greatest integer that does not exceed x. What is the only positive real number x for which the sequence $x - [x]$, $[x]$, x is geometric? [Note: Your answer must be exact.]

Answers

5-1. -2017

5-2. (0, 2)

5-3. i or $\sqrt{-1}$

5-4. 343.75

5-5. 33

5-6. $\frac{1+\sqrt{5}}{2}$