Bergen County Mathematics League

Good Luck To You

Good Luck To All

Contest #5 (No Calculators) **2011-2012**

Part I *Time Limit: 12 minutes*

On contest #6, ***any S.A.T. calculator will be allowed.***

5-1. Lines a, b, c, e, and f are coplanar lines, with $a \parallel b$, $c \perp b$, $e \parallel f$, and $a \perp f$. If the slope of b is $\frac{2}{3}$, what is the slope of e?

5-2. I wrote each natural number from 1 through 100 on its own slip of paper. I next tore each paper so exactly 1 digit appeared on each resulting piece of paper. What is the mean of the numbers on all these pieces of paper?

Part II *Time Limit: 12 minutes*

5-3. The area of square $ABCD$ is 256. Point F is between points A and D, and point B is between points A and E, such that $\overline{FC} \perp \overline{CE}$. If the area of $\triangle EFC = 200$, how long is $\overline{BE}$?

5-4. In $\triangle ABC$, if $\sin A = \frac{3}{5}$ and $\sin B = \frac{12}{13}$, what is the value of $\sin C$?

Part III *Time Limit: 12 minutes*

5-5. What integer x satisfies $0.\overline{24} \div 0.1\overline{3} = \frac{x}{11}$?

5-6. If $x^4 - x^3 + x^2 - x^1 + x^0 = 0$, what is the numerical value of $x^{40} - x^{30} + x^{20} - x^{10} + x^0$?

***Notice*: Questions next meet will repeat the themes of questions 4-1 and 5-6.**

Answers

5-1. $-\frac{3}{2}$

5-2. $\frac{901}{192}$

5-3. 12

5-4. $\frac{63}{65}$

5-5. 20

5-6. 1