Bergen County Mathematics League

Good Luck To You

Good Luck To All

Contest #3 (No Calculators) **2010-2011**

Part I *Time Limit: 12 minutes* On contests #4 & #6, ***any S.A.T. calculator will be allowed.***

3-1. The lengths of the sides of a certain right triangle form an arithmetic progression. If the the hypotenuse has a length of 100, what is positive difference between the lengths of the legs?

3-2. What are all real values of x which satisfy $\dfrac{\frac{1}{3}+\frac{1}{x}}{\frac{1}{3}-\frac{1}{x}} \geq -1$?

Part II *Time Limit: 12 minutes*

3-3. What are all real values of x for which $x + 1 = \dfrac{1}{1+\frac{1}{1+x}}$?

3-4. What are all ordered triples of non-zero integers (a,b,c) for which a, b, and c form a 3-term geometric sequence, while $a+4$, b, and c form a 3-term arithmetic sequence?

Part III *Time Limit: 12 minutes*

3-5. What is the area of the planar region defined by $|x| + |y| \leq 10$?

3-6. What is the sum of all 120 different 4-digit numbers, none of which has a repeated digit, and all of whose digits are selected from {1,2,3,4,5}?

***Notice*: A question on the next meet will repeat the theme of question 3-3.**

Answers

3-1. 20

3-2. $\{x|x > 3 \text{ or } x < 0\}$ or equivalent DISJUNCTION (set notation not required)

3-3. none or $\varnothing$, but NOT $\{\varnothing\}$

3-4. (−1,−3,−9), (−4,−8,−16), (−1,1,−1) All three required

3-5. 200

3-6. 399 960