Bergen County Mathematics League

Good Luck To You

Good Luck To All

Contest #3 (No Calculators) **2012-2013**

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

3-1. What is the only real value of x which satisfies $\left(x+\frac{1}{x}\right)^3 + \left(x-\frac{1}{x}\right)^3 = \frac{6}{x}+16$? [Note: You must write your answer in simplest form.]

3-2. Parallelogram $ABCD$ has its vertices connected to interior point P so that the areas of $\triangle APB$, $\triangle BPC$, and $\triangle CPD$ are 8, 9, and 12 respectively. What is the area of $\triangle DPA$?

Part II *Time Limit: 12 minutes*

3-3. Two circles, with radii of lengths 3 and 4, overlap. What is the difference in the areas of their non-overlapping regions?

3-4. If f is a real-valued function defined by $f(x) = (x^{1/6}-2)(x^{1/6}+2)-(x+3x^{2/3}+3x^{1/3}+1)^{1/3}$, what is the value of $f(1/6)$? (Note: You must write your answer in simplest form.)

Part III *Time Limit: 12 minutes*

3-5. Starting at noon, a car traveled due south. The car passed point P exactly $1\frac{2}{7}$ hours later. It passed point Q at 1:20 P.M. the same afternoon. If the speed of the car was 36 km/h, then how many kilometers did the car travel in going from P to Q?

3-6. What are all real numbers x which satisfy $\sqrt{2x^2+3x+2} + \sqrt{2x^2-3x+2} = \sqrt{7x^2+8}$?

***Notice*: A question next meet will repeat the theme of question 2-5.**

Answers

3-1. 2

3-2. 11

3-3. 7π

3-4. –5

3-5. 12/7 or 12/7 km

3-6. 0, 2, –2