Bergen County Mathematics League

Good Luck To You — Good Luck To All

Contest #4 (Calculators Allowed) — **2010-2011**

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

4-1. If $mb + an - am - bn \neq 0$, reduce $\dfrac{bx - ay + by - ax}{mb + an - am - bn}$ to lowest terms.

4-2. In $\triangle ABC$, $m\angle A = 30$, $m\angle B = 60$, and $AB = 12$. Squares are drawn on $\overline{AB}$ and $\overline{BC}$ as sides of the squares so that the interiors of the squares have no points in common with the interior of $\triangle ABC$. If D and E are the centers of these squares, the area of a square with side $\overline{DE}$ is $a + b\sqrt{3}$, where a and b are integers. What is the value of $a + b$?

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

4-3. What are all values of x for which $\dfrac{1}{1+\dfrac{1}{1+\dfrac{x}{x-4}}}$ is undefined?

4-4. Each of 3 people play golf one day a week, always on a weekday (Monday through Friday inclusive). What is the probability that no two of them play golf the same day next week?

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

4-5. If $\dfrac{a}{3-a} = \dfrac{b}{5-b} = \dfrac{c}{16-c} = 3$, what is the value of $a + b + c$?

4-6. What is the largest possible product of positive integers whose sum is 50?

***Notice*: Questions on the next meet will repeat the themes of questions 4-1 and 4-2.**

Answers

4-1. $\dfrac{x+y}{m-n}$

4-2. 126

4-3. $2, \dfrac{8}{3}, 4$

4-4. $\dfrac{12}{25}$ or 0.48 (a fractional answer need not be reduced)

4-5. 18

4-6. 2×3^{16} or 86 093 442