Bergen County Mathematics League

Good Luck To You

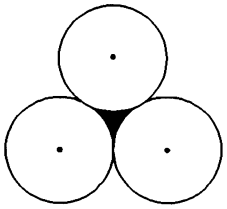
Good Luck To All

Contest #5 (No Calculators) **2009-2010**

Part I *Time Limit: 12 minutes*

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

5-1. Three coplanar circles of area π are externally tangent as shown. What is the area of the shaded region?



5-2. What ordered pair of real numbers (x,y) satisfies $269x + 231y = 288$ and $231x + 269y = 212$?

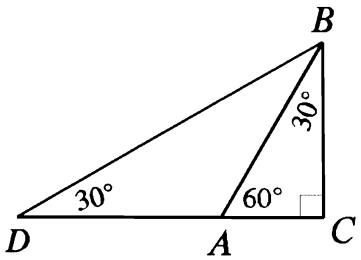
Part II *Time Limit: 12 minutes*

5-3. I averaged 4 feet per second when I rode my bike from Here to There. Returning over the same route, I averaged k feet per second. For what value of k would my average speed for the round trip have been 6 feet per second?

5-4. A certain escalator (moving stairway) always moves at a constant rate. A man walked up this escalator at a constant rate, his speed adding 3 steps per second to the speed of the escalator. The trip from bottom to top took 10 seconds. He then walked down the same *up-moving* escalator at his constant rate of 3 steps per second. The trip from top to bottom took 50 seconds. How many steps-per-second is each step of the escalator moving?

Part III *Time Limit: 12 minutes*

5-5. As shown, $\triangle DBC$ and $\triangle ABC$ are 30°-60°-90° right triangles. If $DA = 100$, what is BC?



5-6. Simplify $(\log_{16} 9)(\log_3 25)(\log_5 4)$ as much as possible.

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

Answers

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

5-2. $(\frac{3}{2}, -\frac{1}{2})$

5-3. 12

5-4. 2 or 2 steps per second

5-5. $50\sqrt{3}$

5-6. 2