Bergen County Mathematics League

Good Luck To You — Good Luck To All

Contest #6 (Calculators Allowed) — **2009-2010**

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

6-1. How many of the integers between 20 000 and 80 000 are squares of integers?

6-2. Simplify completely: $\sqrt{12+\sqrt{12+\sqrt{12+\sqrt{12+\ldots}}}}$ (The indicated pattern continues forever.)

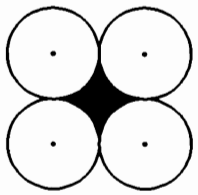
Part II *Time Limit: 12 minutes* Answers must be exact ***or*** have 4 (or more) significant digits, correctly rounded.

6-3. 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 seconds does it take for a step on the escalator to move from the bottom to the top?

6-4. What is the area of the circle that can be circumscribed about a regular dodecagon (12-sided polygon) whose area is 300?

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

6-5. Four coplanar circles of area π are externally tangent as shown. If the centers of the circles are vertices of a square, what is the area of the shaded region?



6-6. At random, I place 9 pennies and 3 dimes into 4 containers, 3 per container. What is the probability that all 3 dimes are placed in the same container?

Answers

6-1. 141

6-2. 4

6-3. 25

6-4. 100π

6-5. $4-\pi$

6-6. $\frac{1}{55}$