Bergen County Mathematics League

Good Luck To You — Good Luck To All

Contest #6 (Calculators Allowed) — **2007-2008**

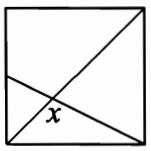
Part I *Time Limit: 12 minutes* Answers must be exact ***or*** have 4 (or more) significant digits, correctly rounded.

6-1. If the area of a square's inscribed circle is 60, what is the area of its circumscribed circle?

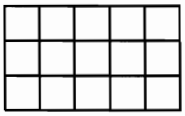
6-2. Find the sum of all 120 five-digit numbers formed by rearranging the digits 1, 2, 3, 4, and 5.

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

6-3. In the square at the right, a segment that connects one vertex of the square to the midpoint of an opposite side intersects one diagonal of the square, as shown. What is the value of $\tan x$?



6-4. In the diagram, 15 different 1×1 rectangles can be traced along the grid lines. What is the total number of different rectangles of *all* sizes that can be traced along grid lines of the diagram?



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

6-5. At most how many $3 \times 2 \times 2$ rectangular solids can fit into a space in the shape of a $3 \times 4 \times 5$ rectangular solid?

6-6. If the observable pattern continues, what value of n will satisfy the equation directly below?

$$\frac{1}{\sqrt{4}+\sqrt{5}} + \frac{1}{\sqrt{5}+\sqrt{6}} + \frac{1}{\sqrt{6}+\sqrt{7}} + \ldots + \frac{1}{\sqrt{n}+\sqrt{n+1}} = 11$$

Answers

6-1. 120

6-2. 3 999 960

6-3. -3

6-4. 90

6-5. 4

6-6. 168