WSMA Math Bowl - March 2, 2013

College Bowl Round 2 Proctors' Answer Sheet

1	The sum of three positive integers is 1111. What is the greatest possible value for the greatest common factor of the three integers?	101
2	Find the value of $p + q$ if p, q, and $p^q + q^p$ are all prime numbers.	5
3	Find the number of rectangles that can be formed from the diagram below:	18
4	What is the smallest positive integer x for which $x^2 + x + 41$ is a composite number?	40
5	For k = 1, 2, 3, or 4, let a_k be an integer that satisfies $0 \leq a_k \leq k$. If $\frac{67}{24} = \frac{a_1}{24} + \frac{a_2}{12} + \frac{a_3}{4} + a_4$, find the value of $a_1 + a_2 + a_3 + a_4$.	6
6	What is the sum of the maximum number of regions and points of intersection formed if four lines lie on a plane?	17
7	How many times will the function $f(x) = 2x^2 - x + 19$ intersect the x-axis?	0
8	Water is flowing into a cylindrical can at a rate of 3 cubic centimeters per second. If the can has a base with radius of 5 cm, at what rate is the height of the water in the can increasing? Express your answer in terms of centimeters per second.	$\frac{3}{25\pi}$
9	Susan has 4 pigs, and two of them are twins. The youngest pig is 1 year old while the oldest one is 2 years younger than 3 times the age of the twin pigs. The sum of the ages of the pigs is 29 years. Find the age, in years, of the twin pigs.	6
Extra	Daniel has 3 different Taylor Swift songs, 1 Straight No Chaser song, and 4 different Hans Zimmer songs on his playlist. What is the probability that, when he shuffles this playlist, the Taylor Swift songs will end up together?	3/28