Elimination Tournament Round 2

3nd Annual WSMA Math Bowl

March 2, 2013

Problem 1

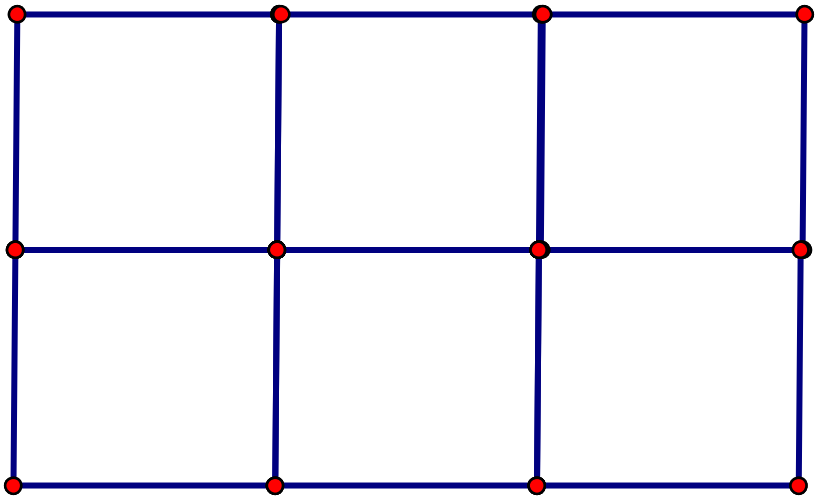
The sum of three positive integers is 1111. What is the greatest possible value for the greatest common factor of the three integers?

Problem 2

Find the value of $p + q$ if p, q, and $p^q + q^p$ are all prime numbers.

Problem 3

Find the number of rectangles that can be formed from the diagram below:



Problem 4

What is the smallest positive integer x for which $x^2 + x + 41$ is a composite number?

Problem 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 $a_1 + a_2 + a_3 + a_4$.

Problem 6

What is the sum of the maximum number of regions and points of intersection formed if four lines lie on a plane?

Problem 7

How many times will the function $f(x) = 2x^2 - x + 19$ intersect the x-axis?

Problem 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.

Problem 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.

Extra Question

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?