Knights of Pi Math Tournament – December 20th, 2014

Individual Test 7th/8th

1	25 is 125% of what number?
2	Evaluate: 1 - 2 + 3 - 4 + … + 61 - 62.
3	What is the greatest prime factor of 357?
4	What is the larger root of the quadratic $x^2 - 7x + 12$?
5	5 pencils and 3 erasers cost 8 dollars. 2 pencils and 1 eraser costs 3 dollars. How much does a pencil cost?
6	Find the sum of all x which satisfy the equation $3^x + 4^x = 5^x$
7	Using only pennies, nickels, and dimes, how many ways are there to make 31 cents?
8	Compute $(14641)^{\frac{1}{4}}$
9	How many distinct ways can the letters of the word "ANACONDA" be rearranged?
10	Gel the gluttonous glob likes to consume things. For every 4 kilograms of mass he weighs in the morning of each day, he must consume exactly 1 kilogram of mass by nighttime. His initial mass is 64. Assuming all mass he consumes becomes part of him and that he loses no mass, how many days of eating must pass for Gel to be heavier than 125 kilos?
11	In a certain clique, each friend's height is listed as follows in inches: 55, 57, 56, 55, 70, 58, what is the probability that a random person selected from the clique is taller than the mean height of the clique?
12	How many positive integer solutions in x,y,z,w are there to the equation 6wxyz+2015xyz = -4030?
13	Find the sum of the coefficients in the expansion of $(5x - 2y)^6$.
14	A trapezoid has base lengths 5 and 9, and its slant lengths are both 6. What is the trapezoid's area?
15	How many degrees will an interior angle of a heptagon have?
16	Evaluate the sum: $20^2 + 19^2 + \ldots + 11^2 - 10^2 - 9^2 - \ldots - 1^2$.

17	How many whole tables can I buy if each table costs 500 dollars, and I have 1950 dollars
18	Three prime distinct integer lengths of a triangle a,b, and c sum up to 27. What is the product abc?
19	Evaluate: 10101*1010
20	We have a geometric sequence of $a_1, a_2, \ldots$ such that the first term is 3 and the ratio is -3(in other words, $a_1 = 3, a_2 = -9, a_3 = 27$, continuing in this manner with $a_{n+1} = -3 * a_n$). How many of the numbers in the sequence $a_1, a_2, \ldots, a_{100}$ are less than 700?
21	Find the solution to x in the equation |12-7x| > 100 which has the smallest magnitude.
22	Given 12 points in a plane, no three collinear, find the maximum number of line segments that could be drawn using the points as endpoints of the segments.
23	What is the perimeter of a regular dodecagon with side length 5?
24	Find the value of the following expression: 1+2+3+4+5+.....+35+36
25	George the Genie is thinking of a number. He tells you that the number has two digits, its two digits have a product of 12, and it is prime. What is his number?
26	A clock tower rings every 7 hours, starting from right now, midnight on Monday. How many times does it ring between now and exactly 5 days from now?
27	A square on the coordinate plane has vertices (5,12),(-5,-12),(12,-5),and (-12,5). What is the length of the diagonal of this square?
28	How many integers less than 50 are factors of 7 but not of 5?
29	What is the probability that either an ace or a spade or both is drawn out of a standard 52-card deck?
30	After a grueling math competition, Anna, Bob, Charles, and David each receive at least one cookie from their math coach. If the math coach has 6 identical cookies overall, what are the number of distinct ways in which he can distribute the cookies, assuming each student gets at least one cookie?
31	A square has diagonal length of $\sqrt{42}$. What is its perimeter?
32	How many pairs of positive integers a,b satisfy $a^2 + ab = a + b$?
33	How many cubes of side length 5 fit inside of a rectangular prism of side lengths 30, 35, and 50?
34	How many primes are there from 1 to 100 inclusive?

35	Circle A and B are concentric. A line tangent to circle B meets circle A at points M and N such that MN is length 24. What is the smallest possible area of circle B given that the radius of the two circles are integers?
36	Evan the mathlete takes a series of 5 math contests in January, the first test on January 1. He scores 21 points on a contest taken on an even number day, and scores 0 points otherwise. The number of days between consecutive contests is the number which appears on a random roll of a 4-sided tetrahedral die. What is the expected number of points which Evan receives on all 5 contests combined?
37	Joey is given three transactions from the store: Five cups and Eight pencils cost 33 dollars. Eight Cups and Five pencils cost 45 dollars. 14 cups and 11 pencils cost 68 dollars. He knows all costs are integer amounts, and also that one transaction had misreported the amount of dollars. What should the misreported cost be?
38	Barbara has three types of accessories: earrings, belly rings, and lip rings. She has 3 earrings, 2 belly rings, and 3 lip rings. All rings are distinct from one another. Given no restrictions on the number of or the type of accessories chosen, what is the number of different ways she can wear them?
39	What is the maximum number of rooks that can be placed on a standard 8x8 chessboard such that no two rooks are attacking each other? (A rook is attacking another rook if they are in the same row or column)
40	Statistics have shown that Zergling-Hydralisk rushes are effective against battles with Protoss. Kerrigan has 300 minerals and 300 Vespene Gases. If a Zergling costs 25 minerals, and a hydralisk costs 75 minerals and 25 Vespene Gases, how many different combinations of Zerglings and Hydralisks can Kerrigan make, assuming she doesn't have to use up all her resources?

