Knights of Pi Math Tournament – December 14th, 2013

Individual Test 5th/6th

1	Evaluate: 15^2
2	Steven ate half of the cookies that were in a jar. If the jar contained 14 cookies, how many cookies are left in the jar?
3	What is the remainder when 13064 is divided by 568?
4	Evaluate: $14 \times 96 \div 8 + 116 - 170$
5	What angle is supplementary to 39/2 degrees? Express your answer as a decimal.
6	Solve for x: $x \times 0.333333 \ldots = 1$
7	Compute the following sum: $101^2 + 404 + 4$
8	When a positive integer n is doubled and then reduced by 5, it is less than 7. When n is tripled and then subtracted by 5, it is larger than 7. Find the value of n.
9	Evaluate: $\frac{\frac{2+\frac{2}{2}\times 2^2}{2}+2}{2} + 2\left(\frac{2}{2+2}\right)$
10	What power of 2 is equivalent to 4,096?
11	Steven, Irving, and Brian are writing KPMT problems. 10% of the problems are geometry problems, 20% are algebra and operations problems, 15% are mental math problems, 5% are relay problems, and the rest are individual test problems. If they write 150 problems in total, how many individual problems did they write?
12	How many space diagonals does a rectangular prism have?
13	Steven is hungry after KPMT, so he decides to order a burger that consists of lettuce, tomato, a bun, a patty, and 2 pickles. The restaurant offers him 2 different types of lettuce, 3 different types of tomatoes, 4 different types of buns, 5 different types of patties, and 3 different types of pickles. How many different burgers can he order?
14	How many integers less than or equal to 12 are relatively prime with 12?
15	How many 4 digit numbers can be formed using the digits 0, 3, 5, and 7 no more than once each?
16	Matthew, Irving, Steven, and Cathy are each thinking of a number. Matthew is thinking of⅓, Irving is thinking of 0.5, Steven is thinking of the square root of 9/100, and Cathy is thinking of 10% of 5. Who is thinking of the smallest number?
17	What is the difference between the least common multiple and the greatest common divisor of 21 and 56?
18	What is the sum of the first five perfect squares?
19	It takes an average of 3 teaspoons of ink to print one page of a newspaper. How many cups of ink does it take to print 1,000 copies of a 20-page newspaper issue? (Note: there are 48 teaspoons in 1 cup.)

20	4 students are sitting around a round table. How many different ways can they sit?
21	How many ways can one rearrange the letters in the word KNIGHTS?
22	Brian has 5 wires with lengths of 5, 6, 8, 9, and 12. How many different ways can he arrange 3 of the wires into triangles?
23	The remainder when x is divided by 21 is 12. What is the remainder when x is divided by 7?
24	Varun steals 3 pencils from his office every time he goes to work at his new job. If he works twice a week, how many pencils has he stolen after one full month at his new job?
25	Matthew, Steven, Cathy, Foris, and Irving took a math test scored out of 100. If Matthew, Steven, Cathy, and Foris scored 89, 96, 92, and 87 points respectively, how many points does Irving need to score so that the average score of the 5 people above will be 91 points?
26	In a class of N people, Steven is the 50th tallest and 49th shortest person. What is the value of N?
27	Hoi is eating tacos at Chipotle, which are 176 calories each. If Hoi's girlfriend doesn't want him to eat more than 1,200 calories in one sitting, what is the maximum number of tacos he may eat?
28	What is the maximum number of 2" by 3" homecoming pictures Candace can print on a standard 5" by 7" sheet of photo paper?
29	Two different integers are randomly chosen from the set $\{1, 2, 3, 4, 5, 6, 7, 8, 9\}$. What is the probability that the sum of these two integers will be 5?
30	Sean chooses a number between 1 and 100. If the number has a remainder of 1 when divided by 2, 3, 4, 5, and 6, what is Sean's number?
31	A unit square is inscribed in a circle. If the side length of the square is 5, find the circumference of the circle.
32	How many diagonals does a regular decagon have?
33	What is the name of the 3-D figure obtained by taking the convex hull of the centers of the faces on a cube?
34	Evaluate: $\frac{32}{\sqrt{8}} + \sqrt{2} \times \frac{\sqrt{6}}{\sqrt{3}}$
35	The probability that it will rain on a Tuesday is 0.5. If the probability that Karl will bring a raincoat that protects him from rain on a Tuesday is 1%, what is the probability that Karl will not be protected from rain on a Tuesday? Express your answer as a reduced fraction.
36	Steven is creating x problems per day. If he increases his daily productivity by $y\%$, express, in terms of x and y, the number of problems per day he can create now.
37	The side length of a cube is equal to a sphere's diameter. What is the ratio of the volume of the sphere to that of the cube?
38	Alex is helping to build a new fish tank at the Seattle Aquarium to hold 2 sharks, 3 octopi, 5 jellyfish, and 7 clownfish. Sharks and octopi each need at least 10 cubic feet of space, while jellyfish and clownfish each need at least 2 cubic feet of space. What is the minimum volume of water the tank should hold?
39	When divided by 7, positive integers a and b have remainders of 3 and 2, respectively. Find the remainder when $ab + a + b$ is divided by 7.
40	Cathy wants to start growing her own bananas. To speed up the process, she uses banana mega-trees. Each year, banana mega-trees drop 4 seeds on the ground, all of which grow into full banana mega-trees by the next year. If Cathy starts out by planting 4 banana mega-trees, how many trees are in her orchard after 4 years?

