



Knights of Pi Math Tournament – Dec. 12, 2015  
Individual Test 7th/8th

1	Evaluate $1724 + 5648 - 6589$
2	What is the smallest square number bigger than 350?
3	The sum of 5 consecutive integers is 2520, what is the average of the 5?
4	Johnny the Janitor is a low income worker. He earns \$7.25 an hour. Every week he works 40 hours. Every week Johnny spends an average of 300 dollars on housing, 150 dollars on food, 100 dollars on insurance, and 50 dollars on tuition. If he wants to break even, how much more an hour must he make?
5	How many two digit numbers are divisible by 6?
6	Sean the Sheep is driving along a road. He first drives for 40 miles at 20 miles per hour, and completes the rest of his trip at half the speed and double the time. What is Sean's average speed throughout the entire trip?
7	If $x^2 + y^2 = 10$ and $x+y = 4$ , what is the value of $xy$ ?
8	Ken the Chemist has two solutions: solution A, which is 20% acid and solution B, which is 40% acid. When Ken pours different volumes of solution A and solution B together, he obtains a mixture that is 35% acid. If there are 2 gallons of solution A, how many gallons of solution B are there in the mixture?
9	The difference between two consecutive perfect squares is 11. What is their sum?
10	How many ways are there to pick a Homecoming king and queen from a class of 150 boys and 50 girls?
11	A fair coin is flipped three times, and the results are head, head, tail. What is the probability that, if we flip the coin again, it will show up tail?
12	The sum of three numbers is 1 more than 3 times the smallest of the three. If the sum is 151, what is the largest of the numbers?
13	What is the longest distance between two vertices of a regular hexagon of length 6?
14	How many points are there on the line $y = \frac{5x}{4}$ have both coordinates as integers where $x$ is an integer between 1 and 100 inclusive?
15	Consider the rectangle that has coordinates A: (0, 0), B: (4, 0), C: (4, 7), and D: (0, 7). How many lattice points lie inside (not on the perimeter of) rectangle ABCD that do not lie on the diagonal AC?

16	Dave rolls a standard 6 sided die 12 times. What is the expected number of primes he gets?
17	What is the units digit of $2^{2015}$ ?
18	How many squares of any size can be made from the unit squares of a 5 by 7 grid?
19	Let $F_n$ be the nth Fibonacci Number. What is $F_6 - F_7 + F_5$ ?
20	Construct triangle ABC such that $AB=6$ , $BC=8$ , and $AC=10$ . Then, take the point D on AC such that ADB is an isosceles triangle where $AD = DB$ . Find the length of the altitude from D to BC.
21	What is the length of the longest string of consecutive odd positive integers that are all primes?
22	Kole is playing a game. He starts with his favorite number, 7 and every minute he adds 6 to that number. If the number he ends up at is larger than or equal to 15, then he subtracts 15 from his number. After playing this game indefinitely, how many different numbers will Kole go through?
23	How many triangles can be drawn from the vertices of a regular hexagon?
24	Sam the Snake slithers on the number line. He starts at 0, and either slithers right with $\frac{2}{3}$ probability or left with $\frac{1}{3}$ probability. What is the expected point on the number line that Sam will end up on after 3 moves?
25	What is the largest 3 digit number that is either a square number or a cube number?
26	A cone shaped cup that opens upwards has radius 4 feet and height 10 feet. Water is poured into the cup until it is $\frac{1}{8}$ full. What is the height of the portion of the cup that is empty?
27	Sam the stud starts dating a new girl every 3 hours, breaks up with one every 5 hours, and solves a math problem every 7 hours. Assuming that he starts dating a girl and solves a math problem at 12 AM (Midnight), and breaks up with one of his girls at 2 AM, when is the first time Sam starts dating a new girl, breaks up with a girl, and solves a math problem all at the same time? Give your answer in terms of a time, AM or PM.
28	Three primes add to 22. What is the smallest of these three?
29	A shape on the Cartesian Plane is bounded above the lines $y = 2x+3$ and $x+y = 6$ and below by the X and Y coordinates. What is this shapes perimeter?
30	Real numbers x and y exist such that $x + y = 2$ and $\frac{1}{x} + \frac{1}{y} = 2$ . What is xy?
31	Phillip the Flunk is a bad student. Every test he takes, he has a $\frac{2}{5}$ chance to fail. If he takes 5 tests on Friday, what is the probability that he fails exactly 3 of them?

32	Let AB be the diameter of a circle of radius 5, and C be another point on or within the circle. What is the maximum area of triangle ABC?
33	Kermit the Frog lies on the circle on the coordinate plane described by $x^2 + y^2 = 65$ . After completing one full rotation around the circle, how many distinct lattice points does Kermit go over?
34	Sean the super slacker sleeps for the first 12 consecutive hours in every day. Given a random block of two hours in a day, what is the probability that Sean is sleeping throughout the entire thing?
35	Every day Phillip the publisher publishes at least 5 articles every day, 7 days a week. Since he is an aspiring publisher, so he wants to meet his goal of publishing 40 articles this week. In how many ways can he do this?
36	Two sides of a triangle have lengths 7 and 11. What is the largest possible area of that triangle?
37	A meteor crashes into the face of earth, creating a spherical crater that is 32 feet wide and 8 feet deep. What is the radius of the crater, in feet?
38	Foris is stuck in a forest. This forest is actually a lattice grid, and Foris is currently located at (0, 0). Every minute he can move exactly one unit up, down, left, or right. He wants to find his treasure, located at (3, 5) within 10 minutes. How many ways can he accomplish this?
39	In how many ways can you select three of the numbers (without replacement) from the set {3, 4, 5, 7, 8, 9} to sum to 16?
40	If the two roots to the polynomial $P(x) = x^2 - 7x + 6$ are also roots of the polynomial $Q(x) = x^3 - 9x^2 + 5x - 42$ , then what is the third root of $Q(x)$ ?