



Knights of Pi Math Tournament – March 17, 2018

Individual Test 7th/8th

1	Evaluate $1234 + 9876 + 2018$.
2	If the diameter of a circle is 10, what is its circumference?
3	What is the sum of x and y in the geometric sequence $1, 3, 9, x, 81, 243, 729, 2187, y$?
4	Solve for x : $5x + 17 = 37$
5	If Frank move 9 feet downwards and 12 feet to the left, how far has he gone from my original location?
6	Express 632_7 in base 9. Do not include the subscript in your answer.
7	If Sai rolls a standard 6 sided die 16 times, how many times can he expect to obtain a prime number?
8	How many 2 by 2 rectangles can fit into a 20 by 18 rectangle?
9	If $x^2 - y^2 = 23$ and $x - y = 3$, what is $x^2 + 2xy + y^2$? Express your answer as a improper fraction.
10	Find the vertex of the parabola $y = 20x^2 + 80x + 80$. Express your answer as an ordered pair.
11	I have 4 shirts, 5 pairs of pants, and 2 pairs of sunglasses. How many outfits can I make if I must choose a shirt and a pair of pants, but sunglasses are optional?
12	What is the units digit of 7^{2018} ?
13	If I have flip three fair coins, what are my chances of getting two heads and a tail? Assume that the order does not matter.
14	If I am at the point $(-3, 4)$ on the coordinate plane and I want to throw a baseball to my friend who is at the point $(3, -6)$, how far do I need to throw the baseball? Answer in the simplest radical form.
15	What is the hexadecimal number $C9$ in base 10? Do not include the subscript in your answer.
16	Given the following, what is $A^2 + B^2 + C^2$? $A^2 + B^2 = 24$ $B^2 + C^2 = 30$ $C^2 + A^2 = 36$

17	Evaluate $C^4 + C^{-4}$ if $C+C^{-1} = 5$
18	What is the sum of the roots of $x^2 + 11x + 24$?
19	For every 3 patients diagnosed with adenovirus, 8 patients are diagnosed with Bacillus anthracis, and for every 2 patients diagnosed with Bacillus anthracis, 7 patients are diagnosed with cancer. For every 5 patients diagnosed with cancer, 6 patients are diagnosed with Demodicidosis. If Sai knows that this ratio is consistent and there are 10 patients diagnosed with adenovirus, how many patients are diagnosed with Demodicidosis?
20	What is the area of a triangle with side lengths 17, 25 and 26?
21	What is the y-intercept of a line passing through the points $(10/17, 10/9)$ and $(9/10, 17/10)$?
22	How many three-digit whole numbers do not contain the number 3?
23	The sum of three consecutive prime numbers is 223. What is the middle number?
24	What is the units digit of $2^{2018} + 3^{2018} + 5^{2018} + 7^{2018}$?
25	What is the largest of the following values? a. 3^{138} b. 9^{92} c. 27^{71} d. 81^{40}
26	If the first two side lengths of a triangle are 9 and 13, what is the sum of all possible integer side lengths of the remaining side?
27	A and B are nonnegative integers. Given that $X = A^2 = B^6$ and that $X \neq 1$, what is the smallest possible sum of A and B?
28	What is the product of the possible positive integer solutions of x if $3 \leq 4x+2 \leq 37$?
29	How many zeroes are at the end of 2018 factorial?
30	Today's date is 03/17/18. The box volume of today's date is defined as the volume of a box with side lengths mm, dd, and yy. What is the box volume of today's date?
31	Andy received a 67, 73, 79, 72, 71 on his math tests. In order for him to pass his class, he needs an 80 average on his tests. He has two more tests left. What does he have to average on the next two tests in order for him to pass the class?
32	How many distinct ways can the letters of the word "RESPECT" be rearranged?
33	How many integers greater than 70 but smaller than 150 are factors of 11 but not of 5?
34	How many degrees will an exterior angle of a regular octagon have?
35	Shifa chooses a number between 100 and 180. If the number has a remainder of 3 when

	divided 4, 5, and 6, what is her number?
36	Frank, Alicia, and Luke are making a phone. When they are all working alone, Frank is capable of making a phone in 6 hours, Alicia is capable of making one in 7 hours, and Luke is capable of making one in 8 hours. If they all work together, how many hours will it take them to build 3 phones together? Express your answer as a improper fraction. Do not include units.
37	Terrance has only 12 coins in his wallet after a long day of shopping. Each coin in his pocket is either a dime or a nickel. If there are exactly 17 different values that are attainable with his set of coins, how many nickels does Terrance have?
38	What is the sum of the next two terms in the following geometric sequence? 4, 16, 64, 256, __, __ ?
39	Frank and Sai are racing on a circular track with radius 10 meters. Sai is really fast, and travels at 10 meters per second, while Frank is much slower, and travels at 2 meters per second. After Frank finishes one lap, how many full laps will Sai have finished?
40	How many regular hexagons exist with two of its vertices at (0,0) and (4,4)?