



Knights of Pi Math Tournament – March 17,  
2018

## Individual Test 5th/6th

1	At the Newport Farm, there are chickens and goats. There are 50 heads and 164 legs in total. How many goats are there in total?
2	Evaluate: $6 - (-3^2 + 8^2) - 5^3$
3	Evaluate: $187 \times 781$
4	My coin pouch contains the same number of pennies, nickels, and dimes. I also have a number of quarters equal to half the total number of other coins. The coins total \$3.42. If I lose all of my quarters, how much money is left in my pouch?
5	In a standard 52-card deck, what is the probability of first pulling 2 face cards in a row without replacement?
6	Solve: $6 + 4 \times 3 - 10 / 5 = ?$
7	I have 4 pairs of socks, 3 pairs of pants, and 6 shirts. If I need one of each to make a complete outfit, how many distinct complete outfits can I make?
8	I am going out to a buffet dinner with my 4 friends. If we must stand in a line to get our food, how many different ways can we line up?
9	What is the area of a right triangle with legs of length 3 and 4?
10	Luke has a sphere that has a radius of 6 cm, and a cone that has a radius 3 cm and height 8 cm, what is their difference in volume in $\text{cm}^3$ ?
11	What is 50% of 75% of 280?
12	If $x > 0$ , $x^2 = 2^6$ and $x^x = 2^y$ , then what is the value of $y$ ?
13	If March 17th, 2018 is a Saturday, what day of the week is July 3rd, 2019?
14	It takes Andy $x$ minutes to write a problem. It takes Michael $\frac{3}{2}$ times longer to write a problem. If they work together, they can write 25 problems in an hour. What is $x$ ?
15	If $x$ , $y$ , and $z$ are defined according to the following three equations, what is the product $xyz$ ? $7x + 5y - 3z = 16$ $3x - 5y + 2z = -8$

	$5x + 3y - 7z = 0$
16	A square is inscribed in a circle of radius 2. What is the area of the square?
17	What is the smallest integer value of $x$ in the equation below? $5x+7 > 3(x+1)$
18	Equilateral triangle ACE is inscribed within regular hexagon ABCDEF. What is the value, in degrees, of angle CED?
19	A snail climbs a 6-foot slope at a rate of 6 inches per day, but at night, it slips 2 inches as it sleeps. If it starts its climb on Tuesday morning, on what day of the week will it reach the top?
20	Sai is a very good long jumper. He has three tries at jumping. The first time, he jumps 6 feet. On his second try, he jumps $\frac{2}{3}$ times as far as his first try. On his third try, he jumps $\frac{5}{2}$ times as far as his second try. What was his average distance, in feet?
21	In triangle ABC, angle A has a value of 80 degrees. Points D, E, and F lie on BC, AC, and AB respectively. AB and AC have equal length. If CE = CD and BF = BD, then what is the value of angle EDF?
22	I like mixing drinks. I add 2 cups of Juicy Juice to 1 cup of Fruity Fruit, and top it off with 2 cups of Groovy Gulp. After the mix is evenly mixed, I accidentally spill a cup of the mix. To make up for it, I frantically add a cup of Juicy Juice. By how much has the % concentration of Juicy Juice in the mix changed? Answer as a percentage.
23	Beginning at the origin, Alicia travels for $m$ minutes along a number line at a speed of 15 units per minute. She suddenly realizes that she forgot her prized plush piggy back at the origin, and goes speeding back at 30 units per minute. However, a thief has stolen it, having sped off in the other direction at 20 units per minute as soon as she had turned around. She catches up to the thief 12 minutes after she turns around. What is $m$ ?
24	If $7x + 2y = 10$ and $2x+7y = 15$ , what is $9y$ ?
25	It takes me 5 minutes to grade a test. I hope to start grading 150 tests at 12 AM and finish before I leave for school. At 2 AM, Terrance, who takes 40% less time to grade each test than I do, starts to help me grade. At 4 AM, Shifa, who takes 60% less time to grade each test than I do, starts to help us grade. At what time is the grading complete?
26	What is the sum of all possible values of $x$ in the following equation? $\frac{2}{5} = \frac{4x-2}{x^2+4}$
27	Frank has a favorite number. He loves it so much that he decides to transcribe it to binary: 101100101 However, he realizes that he dropped one digit. What is the range of the set of values

	that his number could be? Answer in base 10.
28	Starting from my home, I travel 5 miles east to my friend's house. Afterwards, I travel 6 miles north and 3 miles further east to another friend's house. Feeling lazy, I decide to go home walking diagonally, straight towards my home. How many fewer miles do I travel by going this way rather than retracing my original path?
29	The angles of a triangle are 38 degrees, $8x + 24$ degrees, and $5x - 12$ degrees. What is the value of $x$ ?
30	How many integers fit $x$ in the equation below? $2 < 3x - 10 < 32$
31	Evaluate $C^4 + C^{-4}$ if $C + C^{-1} = 5$ .
32	What is the units digit of $2^{2018} + 3^{2018} + 5^{2018} + 7^{2018}$ ?
33	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?
34	What is the largest of the following values? a. $3^{138}$ b. $9^{92}$ c. $27^{71}$ d. $81^{40}$
35	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 an improper fraction. Do not include units.
36	If $x^2 - y^2 = 23$ and $x - y = 3$ , what is $x^2 + 2xy + y^2$ ? Express your answer as an improper fraction.
37	How many degrees will an exterior angle of a regular octagon have?
38	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?
39	If Sai rolls a standard 6-sided die 16 times, how many times can he expect to obtain a prime number?
40	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?