



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

1	A white 5x5 square is divided into 25 1x1 unit squares. If we paint the perimeter of the larger square red, how many of the smaller 1x1 squares will have no red on any of their side lengths?
2	If November 11, 2011 was a Friday. What day was February 29, 2012?
3	<p>A naughty student has put a pin on the teacher's chair. The teacher has eliminate the suspects down to Philip, Sean, and Chris. The teacher asked them who did it. They all answered but only the naughty student lied. Here are what they said.</p> <p>Philip: <i>Sean did it.</i> Sean: <i>I didn't do it, Chris did it.</i> Chris: <i>Neither I nor Philip did it.</i></p> <p>Who is the naughty student?</p>
4	Donald continually chooses numbers from 1 to 10, inclusive, with each having an equal probability. If he picks a number bigger than 5, he stops. What is the probability that he will stop after choosing a 7?
5	How many different arrangement are there of the word <i>random</i> if neither the starting nor ending letter is a consonant (not a vowel)?
6	In a group of fifty 6th graders, almost all of them like to play video games. In particular, they like to play Minecraft, League of Legends, and Dota 2. There are 10 kids who like to play Dota 2, 25 that like League of Legends, and 35 that like Minecraft. Furthermore, there are 3 kids that like Dota 2 and League of Legends, 13 kids who like League of legends and Minecraft, 8 kids who like Dota 2 and Minecraft, and 2 kids who like all three. How many kids don't like any of the three?
7	If a, b are both prime numbers and $a * b$ is nine more than $a + b$ . What is the positive difference between a and b?
8	<p>Let K, P, M, and T be positive real numbers.</p> $\log(K * T) + \log(K * M) = 5$ $\log(M * T) + \log(P * M) = 9$ $\log(T * P) + \log(P * K) = 1$ <p>What is the value of <math>K * P * M * T</math>?</p>

9	Three perfectly logical men are told to stand in a straight line, one in front of the other. A hat is put on each of their heads. Each of these hats was selected from a group of five hats: two identical black hats and three identical white hats. None of the men can see the hat on his own head, and they can only see the person's hat in front of him. In how many distributions of the hats can the person in front deduce his own hat color?
10	Let ABC be an equilateral triangle of length 3 that has mirrors as sides. What is the shortest distance a light beam, emanating from point A and travelling in a trajectory not parallel to a side of the triangle, would have to travel to end at point B?