



Knights of Pi Math Tournament – March 17,
2018

Geometry Test 5th/6th

1	The angles of a pentagon are x , $3x - 10$, $3x + 10$, $2x$, and 45 degrees. What is the value of the smallest angle?
2	What is the area of a circle with diameter 4π ?
3	In an $8 \times 8 \times 8$ cube, I colored all six faces red. If I then cut up the cube into 512 unit cubes, then what fraction of the unit cubes will have an even (including 0) number of faces colored red?
4	Suppose you are given a 6×6 grid of points (containing 36 points), and you color each point such that no two adjacent points (directly up, down, left, or right) share a color. What is the least number of colors necessary to fully color the grid?
5	Two of the side lengths of a triangle are 7 and 21. How many integer values are possible for the length of the third side of the triangle?
6	What is the area of an equilateral triangle with two of its vertices at $(0,0)$ and $(6,0)$?
7	Let ABC be an equilateral triangle, and let E be the point on AC such that EB bisects AC . Also, let point D be the midpoint of BC . If $\angle CAD = \angle CBE = 30$ degrees, then what is the measure of $\angle BAC$?
8	A sphere is inscribed in a cube, and has surface area 36π , and another sphere circumscribes the cube. What is the surface area of the larger sphere?
9	What is the largest possible of a square with two of its vertices at $(0,0)$ and $(4,4)$?
10	Find the area of the innermost circle in the following figure, if the outermost circle has an area of 9π . Assume that the figure only consists of circles and one square. 