Countdown Round

Berkeley Math Tournament – Fall 2012

An isosceles triangle is inscribed in a circle with perimeter 4π . If the base of the triangle has length equivalent to the radius of the circle, find the area of the triangle.

Derek drops a ball from the top of a 30 foot building. Each time it bounces, it rebounds to 2/3 of its previous height. How far has it traveled by the time it finally stops bouncing?

Given a rectangle with dimensions 100×27 , what is the maximum number of 5×6 rectangles that can simultaneously fit inside, without overlap?

Brandon is located at (3,2), and Chuck is located at (6,-5). Brandon can only move unit distance to the right or down, and Chuck is stationary. In how many different ways can Brandon move to Chuck?

Four points A, B, C, and D are randomly chosen on a circle. What is the probability that AB and CD intersect inside the circle?

A point at (3, 4) is rotated by 90° about the origin. How much distance does the point travel?

Amanda and Erica are in a race. Erica runs at 15 mph, while Amanda runs at 5 mph. Additionally, Amanda begins 8 miles away from the finish line, while Erica is 12 miles away. If Amanda and Erica reach the finish line at the same time, how much earlier, in minutes, did Amanda start running than Erica?

How many ways can you arrange the letters in MATHISHARD such that the permutation begins with MR?

Circle O is externally tangent to 6 congruent and mutually tangent smaller circles. If the area of one of these smaller circles is 4π , what is the area inside circle O but outside the smaller circles?

What is the smallest possible value of n such that ${}^{10}/_{27} < {}^{m}/_n < {}^{11}/_{27}$?

What is the sum of the coefficients of the multinomial $(4x + 3y)^3$?

If *f* is a function such that $f(x/_3) = x^2 + 1$, what is the product of the solutions in *y* to $f(y/_2) = 2$?

What is the real part of a solution to $x^2+3x+7=0?$

There are 4 distinct juice boxes, and 4 students have unique preferences for each of the juice boxes. If one juice box is randomly given to each student, what is the probability that no student gets the drink he or she wants?

Given 2012 feet of fence, what is the maximum possible area contained by the fence?

Question Sixteen.

If a 12-inch ruler is marked at $\frac{1}{3}$ and $\frac{1}{2}$ -inch intervals (excluding the beginning and end), how many marks are on the ruler?

ANN NATION

Question Seventeen.

+ MAN HANNIN HIN HANNIN HANNIN

In a cryptarithm, each letter represents a distinct digit. In the cryptarithm ABC + AB = BCCB, a three-digit number is added to a two-digit number to get a four-digit number. Find the three-digit number.

Question Eighteen.

A ANN HUMAN

Bernadette the bee has just found a field of flowers! Each minute, she tells two other bees who do not know the location of the field where it is. Similarly, each bee who knows the location tells it to two other bees every minute. After five minutes, how many other bees (besides Bernadette) know the location of the flower field?

Question Forty-Eight.

ANN NATION

If a right triangle has one leg of length 21 and an area of 294, what is the hypotenuse of the triangle?

Question Forty-Nine.

ANN NOTINITION

In the months of March and April, it rained on every odd-numbered day and no other day. In those two months, how many days did it rain?

Question Fifty.

In a convex 20-sided polygon, the sum of the 10 larger angles is 160 degrees more than the sum of the 10 smaller angles. What is the average measure of the 10 larger angles?



Tiebreaker.

Let $A = \pi^{\pi}$. Estimate π^{A} . (You may use Scientific Notation)