

Middleton

3/8/2003

Algebra 2

March Regional

Team Question #1

Let $f(x) = x^2 + 4x$. Find the sum of all values of x if $f(f(x)) = f(x)$.

Algebra 2

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Team Question #2

Three consecutive positive integers are raised, respectively, to the 1st, 2nd, and 3rd powers. The resulting integers are then added together. This sum is a perfect square whose principle square root is the sum of the original 3 consecutive integers. Find the largest of the 3 original integers.

Algebra 2

March Regional

Team Question #3

For all real numbers x and y , the function f has the property that $f(x + y) = f(x) + f(y)$. If $f(1) = 3$, find the value of $f(10)$.

Algebra 2

March Regional

Team Question #4

Find the value(s) of x which satisfy: $\log_5(x - 2) + \log_{\sqrt{5}}(x^3 - 2) + \log_{0.2}(x - 2) = 4$.

Algebra 2

March Regional

Team Question #5

Ten people, among whom are Suzanne and Julian, stand in a row. Find the probability that there are 3 or more people between Suzanne and Julian.

Algebra 2

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Team Question #6

The cost for one print run of a book is jointly proportional to the number of pages in the book and the number of books in the print run. It costs \$20,000 to print 4000 copies of a 100-page book. Find the cost to print 400 copies of a 293-page book.

Algebra 2

March Regional

Team Question #7

If $f(x) = \frac{2x+3}{x-1}$ and

Let $y = A$ be the horizontal asymptote of $f(x)$

Let $x = B$ be the vertical asymptote of $f(x)$

Let $C =$ the x -intercept of $f(x)$

Find: $A + B - 2C$

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Algebra 2

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Team Question #8

Conic A has the equation $64x^2 + y^2 - 128x - 10y + 73 = 0$ and Conic B has the equation $x^2 + 4x - 8y + 36$.

W = the length of the major axis of Conic A
X = the y-coordinate of the center of Conic A
Y = the y-coordinate of the vertex of Conic B
Z = the y-coordinate of the focus of Conic B

Find: WXYZ

Algebra 2

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Team Question #9

Suppose f and g are functions defined by $f(x) = x + 2$ and $g(x) = x$. Find all $x > -2$ for which $3^{g(x) \cdot \log_3 f(x)} = f(x)$.

Algebra 2

March Regional

Team Question #10

The sum of the squares of the 1st and 4th terms of an arithmetic progression is 200. The sum of the squares of the 2nd and 3rd terms of the same progression is 136. Find the product of these 4 terms.

Algebra 2

March Regional

Team Question #11

In a simple code, each letter of the alphabet is assigned its numerical position in the alphabet. A one-word message was received in this code, but was lost. All that the operator remembered was that the message had the form $x, x + 7, x + 6, x + 5$, that the 2nd letter was a vowel, and that the word was an English word. What was this one-word message?

Algebra 2

March Regional

Team Question #12

If $\log 80 = a$ and $\log 45 = b$, find $\log 36$ in terms of a and b.

Algebra 2

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Team Question #13

After traveling 1.5 hours at a constant rate of speed, a train suffers a breakdown. The repair takes 30 minutes and then the train continues at four-fifths of its former rate. It arrives at its destination 3 hours late. Find the ratio of the length of the entire trip, in miles, to the starting rate in mph.

Algebra 2

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Team Question #14

Find the value of x that satisfies $\log_3 x = (-2 + \log_2 100)(\log_3 \sqrt{2})$.