

FLORIDA STATE MU ALPHA THETA 1989

THETA BOWL QUESTION 1

Find the sum of the roots of the equation:

$$8 \left(x^2 + 3x + 10 \right) = 4 \left(x^2 - x \right)$$

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THETA BOWL QUESTION 2

If $\log_{10} \sqrt{a} = 2/5$ and $\log_{10} b^4 = 20$, then find: $\log_{10} ab + \log_{10} a^5$

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THETA BOWL QUESTION 3

Find the area of a right triangle given that the altitude to the hypotenuse separates the hypotenuse into segments with lengths of 9 and 16.

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THETA BOWL QUESTION 4

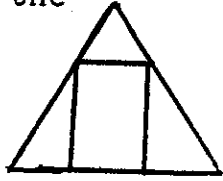
Find all ordered triples (x, y, z) for which the following is true:

$$\begin{bmatrix} 4 & 4x \\ y^2 - 2y & 5z \end{bmatrix} - \begin{bmatrix} 4 & 8 \\ 8 & -(6 + z^2) \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$$

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THETA BOWL QUESTION 5

A rectangle is inscribed in an isosceles triangle so that one side of the rectangle rests on the base of the triangle as shown. If the triangle has base of length 4 and altitude of length 6, what values for the height of the rectangle will give a rectangle with area of 5?



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THETA BOWL QUESTION 6

A non-regular n-gon is circumscribed about a circle. The area of the circle is 1024π and the perimeter of the n-gon is 64. FIND THE AREA OF THE N-GON.

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THETA BOWL QUESTION 7

Solve for x:

$$\begin{vmatrix} x^2 & 3x^2 & 12x \\ 1 & 1 & 7x \\ 5x & 15x & 61 \end{vmatrix} = -8$$

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THETA BOWL QUESTION 8

How many 5-letter "words" can be formed using the letters in the word CREATION if each "word" has 3 vowels and 2 consonants and if no letter is repeated?

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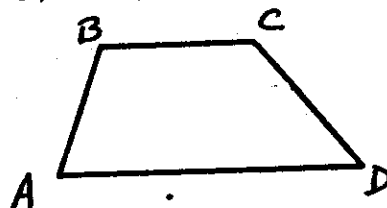
THETA BOWL QUESTION 9

From a rectangular sheet of metal 20 units long and 12 units wide an open rectangular box of largest volume is made by cutting squares of equal area from each corner and then folding up the ends. The area of the base of the box formed is 48 sq. units. With the four discarded squares, a cube is formed, FIND THE VOLUME OF SUCH A CUBE.

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THETA BOWL QUESTION 10

Given the trapezoid ABCD shown with $\overline{BC} \parallel \overline{AD}$; $AB=6$; $BC=3$; $CD=4$; $AD=9$
Find the height of ABCD.



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THETA BOWL QUESTION 11

Find an equation in standard form of the hyperbola with foci at $(0,4)$ and $(0,-4)$ and containing the point $(\sqrt{15}, 3)$

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THETA BOWL QUESTION 12

Find x: $\log_4 (\log_5 25) = \log_3 x$

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THETA BOWL QUESTION 13

Using only the digits 2 , 1, and 0 what is the largest number that can be written?

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THETA BOWL QUESTION 14

Determine the term in the expansion of $(a - 2b^{-2})^7$ that involves a^4

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THETA BOWL QUESTION 15

Find the solution set:

$$x + \sqrt{x + 5} = 7$$