

#0 Alpha Ciphering
MAO National Convention 2018

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#1 Alpha Cipherring
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Given: $y = \cos\left(x + \frac{\pi}{3}\right) + \sin\left(x + \frac{\pi}{6}\right)$, what is the product of the amplitude and the period of y ?

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Three fair 6 sided dice are rolled. The probability that the sum is 6, given at least one die shows a 1, is $\frac{L}{U}$ in simplest form. What does L+U=?

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Given $|3k - 6| + |k + 8| = 5$: How many real solutions exist for this equation?

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#6 Alpha Cipherring
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Using Cramer's rule you are given:

$$x = \frac{\begin{vmatrix} 8 & 1 & -2 \\ 5 & 2 & -1 \\ 9 & -3 & 1 \end{vmatrix}}{\begin{vmatrix} 4 & 1 & -2 \\ 3 & 2 & -1 \\ 0 & -3 & 1 \end{vmatrix}}$$

What is the numerical value of z for this system?

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#7 Alpha Ciphering
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Given: $\sqrt{167 + \frac{1}{169}}$ Simplify the radical as a mixed number, $Z\frac{L}{U}$, where Z , L , and U are positive integers with $L < U$, and then find $Z+L+U$.

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#9 Alpha Ciphering
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$$x^2 - 12y - 51 = 6x$$

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A sphere of radius 5 is inscribed in a right circular cone whose height is 18. What is the diameter of the base of the cone?

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#11 Alpha CIPHERING
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In a geometric series of positive terms, the 5th term minus the 4th term is 576, and the 2nd term minus the 1st term is 9. What is the sum of the 1st and 2nd terms of the series?

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