Theta Ciphering
Test #631
Question #0

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Test #631
Question #0

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Question #0

#0 Theta Ciphering
MAΘ National Convention 2023

If the two lines below are parallel, what is the value of $7n$?

$$4x + ny = -2$$
$$-3x + (n-1)y = 5$$

#0 Theta Ciphering
MAΘ National Convention 2023

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MAΘ National Convention 2023

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Theta Ciphering
Test #631
Question #1

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Test #631
Question #1

Theta Ciphering
Test #631
Question #1

Theta Ciphering
Test #631
Question #1

#1 Theta Ciphering
MAΘ National Convention 2023

The area of a circle is between 100 and 120 square units. What is the circle's diameter, given that it is an integer?

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MAΘ National Convention 2023

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MAΘ National Convention 2023

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Theta Ciphering
Test #631
Question #2

Theta Ciphering
Test #631
Question #2

Theta Ciphering
Test #631
Question #2

Theta Ciphering
Test #631
Question #2

#2 Theta Ciphering
MAΘ National Convention 2023

Find the largest solution for the inequality

$$\frac{k^2-4}{k^2-1} \leq \frac{k}{k+3}$$

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MAΘ National Convention 2023

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MAΘ National Convention 2023

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Theta Ciphering
Test #631
Question #3

Theta Ciphering
Test #631
Question #3

Theta Ciphering
Test #631
Question #3

Theta Ciphering
Test #631
Question #3

#3 Theta Ciphering
MAΘ National Convention 2023

The solution to: $3^{2k-1} = 2^{k+3}$ can be written as $\log_{\sqrt{B}} 8 + \log_B 9$. What is B?

#3 Theta Ciphering
MAΘ National Convention 2023

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MAΘ National Convention 2023

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MAΘ National Convention 2023

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Theta Ciphering
Test #631
Question #4

Theta Ciphering
Test #631
Question #4

Theta Ciphering
Test #631
Question #4

Theta Ciphering
Test #631
Question #4

#4 Theta Ciphering
MAΘ National Convention 2023

Find the x-coordinate of the circumcenter of the triangle who vertices are $(-3,-4)$, $(5,2)$, and $(-3,8)$.

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MAΘ National Convention 2023

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MAΘ National Convention 2023

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Theta Ciphering
Test #631
Question #5

Theta Ciphering
Test #631
Question #5

Theta Ciphering
Test #631
Question #5

Theta Ciphering
Test #631
Question #5

#5 Theta Ciphering
MAΘ National Convention 2023

Given quadrilateral WXYZ: If WX = XZ = YZ, $\overline{WX} \perp \overline{XY}$ and the measure of angle W is 10 degrees more than the measure of angle Y, What is the degree measure of angle W?

#5 Theta Ciphering
MAΘ National Convention 2023

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MAΘ National Convention 2023

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MAΘ National Convention 2023

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Theta Ciphering
Test #631
Question #6

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Test #631
Question #6

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Test #631
Question #6

Theta Ciphering
Test #631
Question #6

#6 Theta Ciphering
MAΘ National Convention 2023

Liarnacci's favorite sequence contains positive integers where every term after the first 2 terms is the sum of the 2 previous terms in the sequence. If the 5^{th} term is 2023, what is the maximum possible value of the 1^{st} term?

#6 Theta Ciphering
MAΘ National Convention 2023

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MAΘ National Convention 2023

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MAΘ National Convention 2023

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Theta Ciphering
Test #631
Question #7

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Test #631
Question #7

Theta Ciphering
Test #631
Question #7

Theta Ciphering
Test #631
Question #7

#7 Theta Ciphering
MAΘ National Convention 2023

In rectangle SNOW, SN = 6, the measure of angle WNO is 30 degrees. R is the midpoint of segment SW and segments OR and NW intersect at point K. What is the length of segment RK?

#7 Theta Ciphering
MAΘ National Convention 2023

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MAΘ National Convention 2023

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MAΘ National Convention 2023

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Theta Ciphering
Test #631
Question #8

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Test #631
Question #8

Theta Ciphering
Test #631
Question #8

Theta Ciphering
Test #631
Question #8

#8 Theta Ciphering
MAΘ National Convention 2023

$f(x) = x^2 + 296x + 2023$ has roots r and s. If $g(x)$ is a quadratic with leading coefficient 1, and has roots $r + 3$ and $s + 3$, what is the sum of the coefficients of $g(x)$?

#8 Theta Ciphering
MAΘ National Convention 2023

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MAΘ National Convention 2023

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MAΘ National Convention 2023

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Theta Ciphering
Test #631
Question #9

Theta Ciphering
Test #631
Question #9

Theta Ciphering
Test #631
Question #9

Theta Ciphering
Test #631
Question #9

#9 Theta Ciphering
MAΘ National Convention 2023

Find the sum of all the integer values of h that make k nonnegative for the equation

$$k = 3 - \sqrt{\frac{4-h}{2}}$$

#9 Theta Ciphering
MAΘ National Convention 2023

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Theta Ciphering
Test #631
Question #10

Theta Ciphering
Test #631
Question #10

Theta Ciphering
Test #631
Question #10

Theta Ciphering
Test #631
Question #10

#10 Theta Ciphering
MAΘ National Convention 2023

A sphere of radius 5m has a right cylinder with a base radius of 3m inscribed in it. The total volume, in m^3, of the space inside the sphere but outside the cylinder is $L\pi$. What is L?

#10 Theta Ciphering
MAΘ National Convention 2023

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MAΘ National Convention 2023

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MAΘ National Convention 2023

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Theta Ciphering
Test #631
Question #11

Theta Ciphering
Test #631
Question #11

Theta Ciphering
Test #631
Question #11

Theta Ciphering
Test #631
Question #11

#11 Theta Ciphering
MAΘ National Convention 2023

If $k^2 + \frac{1}{k^2} - 3 = 0$, what is $\frac{2020k^2}{(k^2+1)^2}$

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MAΘ National Convention 2023

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MAΘ National Convention 2023

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Theta Ciphering
Test #631
Question #12

Theta Ciphering
Test #631
Question #12

Theta Ciphering
Test #631
Question #12

Theta Ciphering
Test #631
Question #12

#12 Theta Ciphering
MAΘ National Convention 2023

What is the sum of all the 3-digit perfect squares that are multiples of both 3 and 4?

#12 Theta Ciphering
MAΘ National Convention 2023

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MAΘ National Convention 2023

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