#1 Algebra II – Hustle
MAΘ National Convention 2010

Solve $(3x-1)^{\frac{1}{5}} = 2$

Answer : _____

Round 1 2 3 4 5

#2 Algebra II – Hustle
MAΘ National Convention 2010

After taking 5 quizzes, Mia Lee has an average of 73 out of 100. What must her average score be on the next five quizzes to increase her average to 81?

Answer : _____

Round 1 2 3 4 5

#3 Algebra II – Hustle
MAΘ National Convention 2010

Consider the following information about the polynomial P(x).

P is degree 3
P(0) = – 24
Zeros: $-3, -4, 2$

Evaluate P(– 1).

Answer : _____

Round 1 2 3 4 5

#4 Algebra II – Hustle
MAΘ National Convention 2010

Let $A = \begin{bmatrix} 1 & 5 \\ 5 & 6 \end{bmatrix}$; $B = \begin{bmatrix} -5 & 6 \\ 0 & 5 \end{bmatrix}$; $C = \begin{bmatrix} 1 & 1 \\ -5 & 5 \end{bmatrix}$.

If $AC - CB = \begin{bmatrix} w & x \\ y & z \end{bmatrix}$, then find $(x+y)$.

Answer : _____

Round 1 2 3 4 5

#5 Algebra II – Hustle
MAΘ National Convention 2010

Evaluate the sum of the series:

$$\sum_{k=5}^{9} (2k+3)$$

Answer : _____

Round 1 2 3 4 5

#6 Algebra II – Hustle
MAΘ National Convention 2010

Find the focus of the parabola given by the equation $x^2 + 4x = -8y - 12$.

Answer : _____

Round 1 2 3 4 5

#7 Algebra II – Hustle
MAΘ National Convention 2010

What is the multiplicity of the root -1 in the equation $y = x^4 - 2x^3 - 3x^2 + 4x + 4$?

Answer : _____

Round 1 2 3 4 5

#8 Algebra II – Hustle
MAΘ National Convention 2010

Write the expression as a single common logarithm, where all exponents and coefficients are positive, and simplify:
$\log 4x + 3(\log x - \log y)$

Answer : _____

Round 1 2 3 4 5

#9 Algebra II – Hustle
MAΘ National Convention 2010

Find the 8^{th} term of the geometric sequence
$\frac{2}{5}, \frac{6}{5}, \frac{18}{5}, \frac{54}{5} \ldots$

Answer : _____

Round 1 2 3 4 5

#10 Algebra II – Hustle
MAΘ National Convention 2010

Simplify, for $i = \sqrt{-1}$:

$$\left(7i^2\right)\left(-8i\right)^2 + \left(5i^5\right)\left(-4i\right) + \left(\frac{\sqrt{441}}{i^2}\right)\left(\frac{\sqrt{-9}}{i}\right)$$

Answer : _____

Round 1 2 3 4 5

#11 Algebra II – Hustle
MAΘ National Convention 2010

There are 7 international runners competing in the Penn Relays 100m women's final. How many different ways can three of the 7 different runners finish in first, second and third place in the race?

Answer : _____

Round 1 2 3 4 5

#12 Algebra II – Hustle
MAΘ National Convention 2010

Graceful Living Senior Citizens Drama Club is planning a bus trip to New York City to see the Color Purple Broadway play. The cost per person for the bus rental varies inversely as the number of people going on the trip. It will cost $26 per person if 63 people go on the trip. How much (in dollars and cents) will it cost per person if 72 people go on the trip?

Answer : _____

Round 1 2 3 4 5

#13 Algebra II – Hustle
MAΘ National Convention 2010

The equation for a line that passes through the points $(-6,-3)$ and $(-3,-10)$ is $y = mx + b$. Evaluate $\frac{b}{m}$.

Answer : _____

Round 1 2 3 4 5

#14 Algebra II – Hustle
MAΘ National Convention 2010

The function $f(x) = x^2 + Bx + C$ has solutions $1 + 3i$ and $1 - 3i$.
Evaluate $(2B + C)$.

Answer : _____

Round 1 2 3 4 5

#15 Algebra II – Hustle
MAΘ National Convention 2010

Simplify: $5\sqrt{27} + 6\sqrt{3} - 4\sqrt{48}$

Answer : _____

Round 1 2 3 4 5

#16 Algebra II – Hustle
MAΘ National Convention 2010

For the pair of functions, f(x) and g(x), find $g(f(-1))$ when
$f(x) = 2 - 7x$ and $g(x) = 3x^2 - 2$.

Answer : _____

Round 1 2 3 4 5

#17 Algebra II – Hustle
MAΘ National Convention 2010

Simplify the rational expression and express as a single fraction, where defined:

$$\frac{\dfrac{x^2-16x+64}{10x}}{\dfrac{x-8}{2x}}$$

Answer : _____

Round 1 2 3 4 5

#18 Algebra II – Hustle
MAΘ National Convention 2010

Solve the equation:

$$\frac{1}{9^{4x}} = 27^{8-2x}$$

Answer : _____

Round 1 2 3 4 5

#19Algebra II – Hustle
MAΘ National Convention 2010

Find the positive x-intercept of a circle with the given radius and center:
Radius: 4
Center: $(3,-1)$

Answer : _____

Round 1 2 3 4 5

#20 Algebra II – Hustle
MAΘ National Convention 2010

When $3x^2 - x - 10$ is factored as $(Ax+B)(Cx-D)$, where A,B,C, and D are positive integers, find BC.

Answer : _____

Round 1 2 3 4 5

#21 Algebra II – Hustle
MAΘ National Convention 2010

The solution to the system below is the point (x, y, z). Evaluate $(z - x)$.

$$\begin{cases} 3y = 6 \\ x + 3y + 3z = 10 \\ y - z = \end{cases}$$

Answer : _____

Round 1 2 3 4 5

#22 Algebra II – Hustle
MAΘ National Convention 2010

Write an explicit formula for the nth term of the geometric sequence 3, 6, 12, 24…

Answer : _____

Round 1 2 3 4 5

#23 Algebra II – Hustle
MAΘ National Convention 2010

What is the 17^{th} prime number?

Answer : _____

Round 1 2 3 4 5

#24 Algebra II – Hustle
MAΘ National Convention 2010

Find the least value of x that satisfies the equation:

$$\frac{x-3}{4x} - \frac{-2x+2}{9} = -\frac{29}{36}$$

Answer : _____

Round 1 2 3 4 5

#25 Algebra II – Hustle
MAΘ National Convention 2010

Find the greatest integer that is not in the solution set of the inequality:

$$\frac{2x-2}{x-25} \geq \frac{1}{x+5}$$

Answer : _____

Round 1 2 3 4 5