#1 Algebra - Hustle MA⊕ National Convention 2024

If an acute triangle has sides of length 9 and 12 and an area of $27\sqrt{3}$, what is the measure of the angle (**in degrees**) formed by the two given sides?

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Answer		
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Round 1 2 3 4 5

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Answer : ______

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Round 1 2 3 4 5

#2 Algebra - Hustle MA⊕ National Convention 2024

Evaluate:

$$\sum_{s=1}^{5} \left(\left(\sum_{n=1}^{4} (6n-7) \right) \cdot s - 11 \right)$$

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Round 1 2 3 4 5

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Answer : _____

_ _ _ _ _ _

Round 1 2 3 4 5

Round 1 2 3 4 5

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#3 Algebra - Hustle MA⊕ National Convention 2024

Simplify:

$$\frac{3-2i}{2+\frac{5i}{1+2i}}$$

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Round 1 2 3 4 5

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Round 1 2 3 4 5

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#4 Algebra - Hustle MA⊕ National Convention 2024

Evaluate the product:

$$\prod_{n=10}^{9999} \log_n(n+1)$$

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Answer	
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Round 1 2 3 4 5

#4 Algebra – Hustle MA⊖ National Convention 20244

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Answer : _____

Round 1 2 3 4 5

#4 Algebra - Hustle MA® National Convention 2024

Evaluate the product:

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Answer : _____

Answer : _____

Round 1 2 3 4 5

#5 Algebra - Hustle MA⊕ National Convention 2024

Solve for x:

$$\frac{1}{3}\log_{20}(2x-1) = \log_{20}11 - 2\log_{20}(\sqrt[3]{2x-1})$$

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Round 1 2 3 4 5

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Answer : ______

Answer : _____

Round 1 2 3 4 5

#6 Algebra - Hustle MA⊕ National Convention 2024

Find the length of the transverse axis of the hyperbola with equation:

$$9x^2 - 90x - 16y^2 + 64y + 17 = 0$$

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Round 1 2 3 4 5

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#7 Algebra - Hustle MA⊕ National Convention 2024

Find the sum of the reciprocals of the roots taken 4 at a time:

$$6x^5 + 5x^4 + 4x^3 + 3x^2 + 2x + 7 = 0$$

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Answer : _____

Round 1 2 3 4 5

Answer : _____

#8 Algebra – Hustle MA© National Convention 2024 What is the 5 th triangular number?	#8 Algebra – Hustle MA© National Convention 2024 What is the 5 th triangular number?
Answer:	Answer :
	 -
Round 1 2 3 4 5	Round 1 2 3 4 5
#8 Algebra - Hustle	#8 Algebra – Hustle
MA© National Convention 2024	MA® National Convention 2024
What is the 5 th triangular number?	What is the 5 th triangular number?

Answer : ______ Answer : _____

Round 1 2 3 4 5

#9 Algebra – Hustle	
MA® National Convention 2	024

Express 10431₅ in base 12.

#9 Algebra - Hustle MA⊕ National Convention 2024

Express 10431₅ in base 12.

Answer :	Answer :
Round 1 2 3 4 5	Round 1 2 3 4 5
#9 Algebra – Hustle MA⊕ National Convention 2024	#9 Algebra – Hustle MA⊕ National Convention 2024
Express 10431 ₅ in base 12.	Express 10431 ₅ in base 12.

Answer : _____ Answer : _____

Round 1 2 3 4 5

#10 Algebra - Hustle	
MA® National Convention	2024

What is the units digit of 8³⁰⁰⁴?

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Answer :	Answer :
Round 1 2 3 4 5	Round 1 2 3 4 5
#10 Algebra – Hustle MA⊕ National Convention 2024	#10 Algebra – Hustle MA® National Convention 2024
What is the units digit of 8 ³⁰⁰⁴ ?	What is the units digit of 8 ³⁰⁰⁴ ?

Answer : _____ Answer : _____

Round 1 2 3 4 5 Round 1 2 3 4 5

#11 Algebra - Hustle MA⊕ National Convention 2024

For the polynomial

$$f(x) = 7x^5 - 6x^4 - 5x^3 + 2$$

Let N be the remainder when it is divided by (x-1) and S be the remainder when it is divided by (x+1). Compute N+S.

Answer : _____

Round 1 2 3 4 5

#11 Algebra - Hustle MA® National Convention 2024

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Round 1 2 3 4 5

Answer : _____

#12 Algebra – Hustle MA⊕ National Convention 2024

Solve for x:

$$x = \sqrt{132 - \sqrt{132 - \dots}}$$

#12 Algebra – Hustle MA⊕ National Convention 2024

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Answer : ______

Round 1 2 3 4 5

#12 Algebra - Hustle MA⊕ National Convention 2024

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Answer : _____

Round 1 2 3 4 5

#12 Algebra - Hustle MA⊕ National Convention 2024

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$$x = \sqrt{132 - \sqrt{132 - \cdots}}$$

Answer : _____

Round 1 2 3 4 5

Answer : _____

#13 Algebra - Hustle
MA® National Convention 2024

What is the sum of the coefficients in the expansion of $(7x - 6y)^{11}$?

#13 Algebra - Hustle MA⊕ National Convention 2024

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Round 1 2 3 4 5

#13 Algebra - Hustle MA⊕ National Convention 2024

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Round 1 2 3 4 5

#13 Algebra - Hustle MA⊕ National Convention 2024

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Answer : _____

Answer : _____

Round 1 2 3 4 5

#14 Algebra - Hustle MA⊕ National Convention 2024

The endpoints of the major axis of an ellipse are (13,0) and (-13,0). The coordinates of the foci are $(\sqrt{5},0)$ and $(-\sqrt{5},0)$. What is the area enclosed by the ellipse?

#14 Algebra – Hustle MA⊕ National Convention 2024

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Answer	
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Round 1 2 3 4 5

#14 Algebra – Hustle MA© National Convention 2024

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Answer : _____

Round 1 2 3 4 5

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Answer : ______

Round 1 2 3 4 5

Answer : _____

#15 Algebra - Hustle MA® National Convention 2024

Let
$$N = \begin{bmatrix} 7 & 11 \\ 12 & 6 \end{bmatrix}$$
 and let $S = \begin{bmatrix} 6 & 4 \\ 5 & 7 \end{bmatrix}$.
If $SN = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$, then what is $b - c$?

#15 Algebra - Hustle MA® National Convention 2024

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Round 1 2 3 4 5

#15 Algebra - Hustle

MA© National Convention 2024

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Round 1 2 3 4 5

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MA© National Convention 2024

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Answer : _____

Round 1 2 3 4 5

Answer : _____

#16 Algebra – Hustle MA© National Convention 2024

Two **different** 2-digit positive integers are randomly chosen and multiplied together. What is the probability that the resulting product is odd?

#16 Algebra - Hustle MA® National Convention 2024

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Answer:		

Round 1 2 3 4 5

#16 Algebra – Hustle MA® National Convention 2024

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Answer : _____

Round 1 2 3 4 5

#16 Algebra - Hustle MA® National Convention 2024

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Answer : ______

Round 1 2 3 4 5

Answer : _____

#17 Algebra – Hustle MA⊕ National Convention 2024

Find the eccentricity of the conic section defined by:

$$\frac{(x-6)^2}{49} + \frac{(y-7)^2}{36} = 1$$

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Round 1 2 3 4 5

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Answer : _____

Round 1 2 3 4 5

Answer : _____

#18 Algebra - Hustle MA® National Convention 2024

Find the equations of all vertical asymptotes of $y = \frac{x^3 - 2x^2 - 29x + 30}{x^3 - 19x + 30}$

$$y = \frac{x^3 - 2x^2 - 29x + 30}{x^3 - 19x + 30}$$

#18 Algebra - Hustle MA® National Convention 2024

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Round 1 2 3 4 5

#18 Algebra - Hustle MA® National Convention 2024

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Round 1 2 3 4 5

#18 Algebra - Hustle MA® National Convention 2024

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$$y = \frac{x^3 - 2x^2 - 29x + 30}{x^3 - 19x + 30}$$

Answer : _____

Answer : _____

Round 1 2 3 4 5

#19 Algebra - Hustle
MA® National Convention 2024

What is the tens digit of 7^{2024} ?

#19 Algebra - Hustle MAΘ National Convention 2024

What is the tens digit of 7^{2024} ?

Answer :	Answer :
Round 1 2 3 4 5	Round 1 2 3 4 5
#19 Algebra - Hustle	#19 Algebra - Hustle
MA⊕ National Convention 2024	MA⊕ National Convention 2024
What is the tens digit of 7 ²⁰²⁴ ?	What is the tens digit of 7 ²⁰²⁴ ?

Answer : _____ Answer : _____

Round 1 2 3 4 5

Round 1 2 3 4 5

#20 Algebra – Hustle MA⊕ National Convention 2024

What is the ordinate of the highest point on the graph of $f(x) = -2x^2 + 4x - 17$?

#20 Algebra - Hustle MA⊖ National Convention 2024

What is the ordinate of the highest point on the graph of $f(x) = -2x^2 + 4x - 17$?

Answer : _____

Round 1 2 3 4 5

#20 Algebra – Hustle MA⊕ National Convention 2024

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Answer : _____

Round 1 2 3 4 5

#20 Algebra - Hustle MA⊖ National Convention 2024

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Round 1 2 3 4 5

Answer : _____

#21 Algebra - Hustle
MAΘ National Convention 2024

If two real numbers differ by 7, what is their least possible product?

#21 Algebra - Hustle MA⊕ National Convention 2024

If two real numbers differ by 7, what is their least possible product?

Amarican		
Answer	-	

Round 1 2 3 4 5

#21 Algebra – Hustle MA⊕ National Convention 2024

If two real numbers differ by 7, what is their least possible product?

Answer : _____

Round 1 2 3 4 5

#21 Algebra - Hustle MA⊖ National Convention 2024

If two real numbers differ by 7, what is their least possible product?

Answer : _____

Answer : _____

Round 1 2 3 4 5

#22 Algebra - Hustle	
MAO National Convention	2024

Compute the sum of the arithmetic series $2 + 8 + 14 + \cdots + 398$.

#22 Algebra – Hustle MA⊕ National Convention 2024

Compute the sum of the arithmetic series $2 + 8 + 14 + \cdots + 398$.

Answer : _____

Round 1 2 3 4 5

#22 Algebra – Hustle MA⊕ National Convention 2024

Compute the sum of the arithmetic series $2 + 8 + 14 + \cdots + 398$.

Answer : _____

Round 1 2 3 4 5

#22 Algebra – Hustle MA⊕ National Convention 2024

Compute the sum of the arithmetic series $2 + 8 + 14 + \cdots + 398$.

Answer : _____

Round 1 2 3 4 5

Answer : _____

#23 Algebra – Hustle	
MA® National Convention 20	124

Determine how many consecutive zeros are at the end of the expansion of 11760!.

#23 Algebra - Hustle MA© National Convention 2024

Determine how many consecutive zeros are at the end of the expansion of 11760!.

Amarican		
Answer	-	

Round 1 2 3 4 5

#23 Algebra – Hustle MA© National Convention 2024

Determine how many consecutive zeros are at the end of the expansion of 11760!.

Answer : _____

Round 1 2 3 4 5

#23 Algebra - Hustle MA® National Convention 2024

Determine how many consecutive zeros are at the end of the expansion of 11760!.

Answer : _____

Answer : _____

Round 1 2 3 4 5

#24 Algebra - Hustle	
MAO National Convention 2024	

Find the sum of the reciprocals of the positive integral divisors of 496.

#24 Algebra - Hustle	
MA® National Convention 2	024

Find the sum of the reciprocals of the positive integral divisors of 496.

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Answer		
7112 W C1		

Round 1 2 3 4 5

#24 Algebra – Hustle MA© National Convention 2024

Find the sum of the reciprocals of the positive integral divisors of 496.

Answer : ______

Round 1 2 3 4 5

#24 Algebra - Hustle MA⊕ National Convention 2024

Find the sum of the reciprocals of the positive integral divisors of 496.

Answer : _____

Answer : _____

Round 1 2 3 4 5

#25 Algebra – Hustle MA© National Convention 2024

When 0.5 (base 10) is expressed in base 5 notation, what is the sum of the first six digits after the decimal point?

#25 Algebra – Hustle MA© National Convention 2024

When 0.5 (base 10) is expressed in base 5 notation, what is the sum of the first six digits after the decimal point?

Answer	-	
Answer	•	

Round 1 2 3 4 5

#25 Algebra – Hustle MA© National Convention 2024

When 0.5 (base 10) is expressed in base 5 notation, what is the sum of the first six digits after the decimal point?

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Round 1 2 3 4 5

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Round 1 2 3 4 5

Answer : ______