Alabama Statewide Math Contest - Round 2 Division 2

University of North Alabama

April 8, 2017

Round 2

Geometry

Geometry Question # 1

Geometry Question # 1

RESET

A right square prism has a surface area of 50 with each square base having an area of 9. What is the volume of the right square prism?

Geometry Question # 1

Answer:

Geometry Question # 1

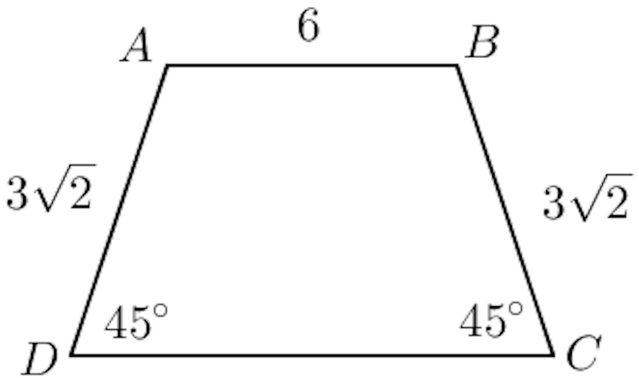
Answer: 24

Geometry Question # 2

Geometry Question # 2

RESET

Find the area of the trapezoid pictured with $AB = 6$, $AD = BC = 3\sqrt{2}$ and $m\angle ADC = m\angle BCD = 45°$.



Geometry Question # 2

Answer:

Geometry Question # 2

Answer: 27

Round 2

Algebra II & Trig

Algebra II & Trig Question # 3

Algebra II & Trig Question # 3

RESET

Find the largest real solution to the equation $\sqrt[3]{x-5}-1=x$.

Algebra II & Trig Question # 3

Answer:

Algebra II & Trig Question # 3

Answer: -3

Algebra II & Trig Question # 4

Algebra II & Trig Question # 4

RESET

Let $f(x) = \dfrac{x-5}{2x+3}$. Find the value of x for which $f^{-1}(x) = -1$.

Algebra II & Trig Question # 4

Answer:

Algebra II & Trig Question # 4

Answer: -6

Round 2

Comprehensive Part 1

Comprehensive Part 1
Question # 5

Comprehensive Part 1 Question # 5

RESET		

Find the third row, second column entry in the matrix product:

$$\begin{bmatrix} 1 & -2 & 7 & 3 \\ 2 & 0 & 9 & -4 \\ 4 & 1 & 0 & 6 \end{bmatrix} \begin{bmatrix} 3 & -1 \\ 9 & 4 \\ -2 & -3 \\ 2 & -2 \end{bmatrix}$$

Comprehensive Part 1 Question # 5

Answer:

Comprehensive Part 1 Question # 5

Answer: -12

Comprehensive Part 1
Question # 6

Comprehensive Part 1 Question # 6

RESET		

Let $\lceil x \rceil$ be the smallest integer greater than x (called the ceiling).
Find $\lceil 3 + \sqrt{139} \rceil$.

Comprehensive Part 1 Question # 6

Answer:

Comprehensive Part 1 Question # 6

Answer: 15

Round 2

Comprehensive Part 2

Comprehensive Part 2
Question # 7

Comprehensive Part 2 Question # 7

RESET

Find the center of the circle given by the equation

$$2x^2 + 2y^2 + 8x - 4y = 62$$

Comprehensive Part 2 Question # 7

Answer:

Comprehensive Part 2 Question # 7

Answer: $(-2, 1)$

Comprehensive Part 2
Question # 8

Comprehensive Part 2 Question # 8

RESET

Solve the equation for x:

$$\log_4 x^3 - \log_4 x = \log_4 25$$

Comprehensive Part 2 Question # 8

Answer:

Comprehensive Part 2 Question # 8

Answer: 5

Round 2

Team

Team Question # 9

Team Question # 9

RESET		

Find the distance between the points $A = \left(\sin\frac{\pi}{6}, \cos\frac{\pi}{6}\right)$ and $B = (\cos\pi, \sin\pi)$.

Team Question # 9

Answer:

Team Question # 9

Answer: $\sqrt{3}$

Team Question # 10

Team Question # 10

RESET

The equation of a quadratic function with a root of $2+i$ and a y-intercept of 10 is of the form $y = ax^2 + bx + c$. Find $a + b + c$.

Team Question # 10

Answer:

Team Question # 10

Answer: 4

End of Round 2