Alabama Statewide Math Contest - Round 4 Division 2

University of North Alabama

April 8, 2017

Round 4

Geometry

Geometry Question # 1

Geometry Question # 1

RESET

A secant line intersects a circle of radius 3 at points A and B. If the measure of arc $\overset{\frown}{AB}$ is $90°$, find the length of segment $\overline{AB}$.

Geometry Question # 1

Answer:

Geometry Question # 1

Answer: $3\sqrt{2}$

Geometry Question # 2

Geometry Question # 2

RESET

The point $(-3, 4)$ is first translated $T_{(6,-2)}$, and then reflected about the x-axis. What is the resulting point?

Geometry Question # 2

Answer:

Geometry Question # 2

Answer: $(3, -2)$

Round 4

Algebra II & Trig

Algebra II & Trig Question # 3

Algebra II & Trig Question # 3

RESET

Find the largest solution of the equation

$$(2x^2 + 3x)(x - 4) - (2x + 3)(10 - x) = 0$$

Algebra II & Trig Question # 3

Answer:

Algebra II & Trig Question # 3

Answer: 5

Algebra II & Trig Question # 4

Algebra II & Trig Question # 4

RESET		

If $f(2x+1) = x^2 - 3x - 4$, find $f(5)$.

Algebra II & Trig Question # 4

Answer:

Algebra II & Trig Question # 4

Answer: -6

Round 4

Comprehensive Part 1

Comprehensive Part 1
Question # 5

Comprehensive Part 1 Question # 5

RESET

What is the period of the function $f(x) = 4\cos(3\pi x)$?

Comprehensive Part 1 Question # 5

Answer:

Comprehensive Part 1 Question # 5

Answer: $\frac{2}{3}$

Comprehensive Part 1
Question # 6

Comprehensive Part 1 Question # 6

RESET

Find the y-coordinate of the intersection point of the graphs of $y = 2^{2x+12}$ and $y = 8^{x+5}$.

Comprehensive Part 1 Question # 6

Answer:

Comprehensive Part 1 Question # 6

Answer: 64

Round 4

Comprehensive Part 2

Comprehensive Part 2
Question # 7

Comprehensive Part 2 Question # 7

RESET

What is the distance between the numbers $1 + 4i$ and $2 - i$ in the complex plane?

Comprehensive Part 2 Question # 7

Answer:

Comprehensive Part 2 Question # 7

Answer: $\sqrt{26}$

Comprehensive Part 2
Question # 8

Comprehensive Part 2 Question # 8

RESET

Find the largest value of x in radians on the interval $[0, 2\pi)$ which satisfies

$$2 \sin x \cos^2 x = \sin x$$

Comprehensive Part 2 Question # 8

Answer:

Comprehensive Part 2 Question # 8

Answer: $\frac{7\pi}{4}$

Round 4

Team

Team Question # 9

Team Question # 9

RESET		

Two six-sided dice are rolled. Given that the sum was eight, what is the probability that at least one of the dice showed a four?

Team Question # 9

Answer:

Team Question # 9

Answer: $\frac{1}{5}$

Team Question # 10

Team Question # 10

RESET

How many solutions to the inequality $(x-3)(x+4)^2(x+1) < 0$ are integers?

Team Question # 10

Answer:

Team Question # 10

Answer: 3

End of Round 4