Mu Ciphering
Question #0

Name:_____

ID#:_____

School:_____

Answer:

Mu Ciphering
Question #0

Name:_____

ID#:_____

School:_____

Answer:

Mu Ciphering
Question #0

Name:_____

ID#:_____

School:_____

Answer:

Mu Ciphering
Question #0

Name:_____

ID#:_____

School:_____

Answer:

#0 Ciphering – Mu Division
MAΘ National Convention 2013

What is the slope of the line with equation $3x + 4y = 5$? Express your answer as a common fraction.

#0 Ciphering – Mu Division
MAΘ National Convention 2013

What is the slope of the line with equation $3x + 4y = 5$? Express your answer as a common fraction.

#0 Ciphering – Mu Division
MAΘ National Convention 2013

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#0 Ciphering – Mu Division
MAΘ National Convention 2013

What is the slope of the line with equation $3x + 4y = 5$? Express your answer as a common fraction.

Mu Ciphering
Question #1

Name:_____

ID#:_____

School:_____

Answer:

Mu Ciphering
Question #1

Name:_____

ID#:_____

School:_____

Answer:

Mu Ciphering
Question #1

Name:_____

ID#:_____

School:_____

Answer:

Mu Ciphering
Question #1

Name:_____

ID#:_____

School:_____

Answer:

#1 Ciphering – Mu Division
MAΘ National Convention 2013

For what value of $x \in [-1, 3]$ does $f'(x)$ equal the slope of the secant line connecting the points $(-1, f(-1))$ and $(3, f(3))$ for the graph of $y = f(x) = x^2 - 5x + 7$?

#1 Ciphering – Mu Division
MAΘ National Convention 2013

For what value of $x \in [-1, 3]$ does $f'(x)$ equal the slope of the secant line connecting the points $(-1, f(-1))$ and $(3, f(3))$ for the graph of $y = f(x) = x^2 - 5x + 7$?

#1 Ciphering – Mu Division
MAΘ National Convention 2013

For what value of $x \in [-1, 3]$ does $f'(x)$ equal the slope of the secant line connecting the points $(-1, f(-1))$ and $(3, f(3))$ for the graph of $y = f(x) = x^2 - 5x + 7$?

#1 Ciphering – Mu Division
MAΘ National Convention 2013

For what value of $x \in [-1, 3]$ does $f'(x)$ equal the slope of the secant line connecting the points $(-1, f(-1))$ and $(3, f(3))$ for the graph of $y = f(x) = x^2 - 5x + 7$?

Mu Ciphering
Question #2

Name:_____

ID#:_____

School:_____

Answer:

Mu Ciphering
Question #2

Name:_____

ID#:_____

School:_____

Answer:

Mu Ciphering
Question #2

Name:_____

ID#:_____

School:_____

Answer:

Mu Ciphering
Question #2

Name:_____

ID#:_____

School:_____

Answer:

#2 Ciphering – Mu Division
MAΘ National Convention 2013

What is the product of the positive integral factors of 16?

#2 Ciphering – Mu Division
MAΘ National Convention 2013

What is the product of the positive integral factors of 16?

#2 Ciphering – Mu Division
MAΘ National Convention 2013

What is the product of the positive integral factors of 16?

#2 Ciphering – Mu Division
MAΘ National Convention 2013

What is the product of the positive integral factors of 16?

Mu Ciphering
Question #3

Name:_____

ID#:_____

School:_____

Answer:

Mu Ciphering
Question #3

Name:_____

ID#:_____

School:_____

Answer:

Mu Ciphering
Question #3

Name:_____

ID#:_____

School:_____

Answer:

Mu Ciphering
Question #3

Name:_____

ID#:_____

School:_____

Answer:

#3 Ciphering – Mu Division
MAΘ National Convention 2013

Evaluate the following limit:

$$\lim_{x \to 0} \frac{1 - \sec^2 x}{x^2}$$

#3 Ciphering – Mu Division
MAΘ National Convention 2013

Evaluate the following limit:

$$\lim_{x \to 0} \frac{1 - \sec^2 x}{x^2}$$

#3 Ciphering – Mu Division
MAΘ National Convention 2013

Evaluate the following limit:

$$\lim_{x \to 0} \frac{1 - \sec^2 x}{x^2}$$

#3 Ciphering – Mu Division
MAΘ National Convention 2013

Evaluate the following limit:

$$\lim_{x \to 0} \frac{1 - \sec^2 x}{x^2}$$

Mu Ciphering
Question #4

Name:_____

ID#:_____

School:_____

Answer:

Mu Ciphering
Question #4

Name:_____

ID#:_____

School:_____

Answer:

Mu Ciphering
Question #4

Name:_____

ID#:_____

School:_____

Answer:

Mu Ciphering
Question #4

Name:_____

ID#:_____

School:_____

Answer:

#4 Ciphering – Mu Division
MAΘ National Convention 2013

Evaluate:

$$\sqrt{10+3\sqrt{10+3\sqrt{10+\cdots}}}$$

#4 Ciphering – Mu Division
MAΘ National Convention 2013

Evaluate:

$$\sqrt{10+3\sqrt{10+3\sqrt{10+\cdots}}}$$

#4 Ciphering – Mu Division
MAΘ National Convention 2013

Evaluate:

$$\sqrt{10+3\sqrt{10+3\sqrt{10+\cdots}}}$$

#4 Ciphering – Mu Division
MAΘ National Convention 2013

Evaluate:

$$\sqrt{10+3\sqrt{10+3\sqrt{10+\cdots}}}$$

Mu Ciphering
Question #5

Name:_____

ID#:_____

School:_____

Answer:

Mu Ciphering
Question #5

Name:_____

ID#:_____

School:_____

Answer:

Mu Ciphering
Question #5

Name:_____

ID#:_____

School:_____

Answer:

Mu Ciphering
Question #5

Name:_____

ID#:_____

School:_____

Answer:

#5 Ciphering – Mu Division
MAΘ National Convention 2013

Find the period of the graph of

$$y = 5\sin\left(\frac{x}{4}\right)\cos\left(\frac{x}{5}\right) + 12\cos(4x)\sin(5x).$$

#5 Ciphering – Mu Division
MAΘ National Convention 2013

Find the period of the graph of

$$y = 5\sin\left(\frac{x}{4}\right)\cos\left(\frac{x}{5}\right) + 12\cos(4x)\sin(5x).$$

#5 Ciphering – Mu Division
MAΘ National Convention 2013

Find the period of the graph of

$$y = 5\sin\left(\frac{x}{4}\right)\cos\left(\frac{x}{5}\right) + 12\cos(4x)\sin(5x).$$

#5 Ciphering – Mu Division
MAΘ National Convention 2013

Find the period of the graph of

$$y = 5\sin\left(\frac{x}{4}\right)\cos\left(\frac{x}{5}\right) + 12\cos(4x)\sin(5x).$$

Mu Ciphering
Question #6

Name:_____

ID#:_____

School:_____

Answer:

Mu Ciphering
Question #6

Name:_____

ID#:_____

School:_____

Answer:

Mu Ciphering
Question #6

Name:_____

ID#:_____

School:_____

Answer:

Mu Ciphering
Question #6

Name:_____

ID#:_____

School:_____

Answer:

#6 Ciphering – Mu Division
MAΘ National Convention 2013

Given a circle, what is the ratio of the area of the inscribed hexagon of the circle to the area of the circumscribed hexagon of the circle? Express your answer as a common fraction.

#6 Ciphering – Mu Division
MAΘ National Convention 2013

Given a circle, what is the ratio of the area of the inscribed hexagon of the circle to the area of the circumscribed hexagon of the circle? Express your answer as a common fraction.

#6 Ciphering – Mu Division
MAΘ National Convention 2013

Given a circle, what is the ratio of the area of the inscribed hexagon of the circle to the area of the circumscribed hexagon of the circle? Express your answer as a common fraction.

#6 Ciphering – Mu Division
MAΘ National Convention 2013

Given a circle, what is the ratio of the area of the inscribed hexagon of the circle to the area of the circumscribed hexagon of the circle? Express your answer as a common fraction.

Mu Ciphering
Question #7

Name:_____

ID#:_____

School:_____

Answer:

Mu Ciphering
Question #7

Name:_____

ID#:_____

School:_____

Answer:

Mu Ciphering
Question #7

Name:_____

ID#:_____

School:_____

Answer:

Mu Ciphering
Question #7

Name:_____

ID#:_____

School:_____

Answer:

#7 Ciphering – Mu Division
MAΘ National Convention 2013

Out of the Top Ten contestants in Mu Ciphering last year, four were female. What is the probability that three of them were in the Top Five? Express your answer as a common fraction.

#7 Ciphering – Mu Division
MAΘ National Convention 2013

Out of the Top Ten contestants in Mu Ciphering last year, four were female. What is the probability that three of them were in the Top Five? Express your answer as a common fraction.

#7 Ciphering – Mu Division
MAΘ National Convention 2013

Out of the Top Ten contestants in Mu Ciphering last year, four were female. What is the probability that three of them were in the Top Five? Express your answer as a common fraction.

#7 Ciphering – Mu Division
MAΘ National Convention 2013

Out of the Top Ten contestants in Mu Ciphering last year, four were female. What is the probability that three of them were in the Top Five? Express your answer as a common fraction.

Mu Ciphering
Question #8

Name:_____

ID#:_____

School:_____

Answer:

Mu Ciphering
Question #8

Name:_____

ID#:_____

School:_____

Answer:

Mu Ciphering
Question #8

Name:_____

ID#:_____

School:_____

Answer:

Mu Ciphering
Question #8

Name:_____

ID#:_____

School:_____

Answer:

#8 Ciphering – Mu Division
MAΘ National Convention 2013

The edges of a cube are growing such that the shape remains a cube. If the rate at which the edges are growing is 3 centimeters per second, how fast is the volume of the cube changing the instant the surface area of the cube is equal to 54 square centimeters? Express your answer in cubic centimeters per second.

#8 Ciphering – Mu Division
MAΘ National Convention 2013

The edges of a cube are growing such that the shape remains a cube. If the rate at which the edges are growing is 3 centimeters per second, how fast is the volume of the cube changing the instant the surface area of the cube is equal to 54 square centimeters? Express your answer in cubic centimeters per second.

#8 Ciphering – Mu Division
MAΘ National Convention 2013

The edges of a cube are growing such that the shape remains a cube. If the rate at which the edges are growing is 3 centimeters per second, how fast is the volume of the cube changing the instant the surface area of the cube is equal to 54 square centimeters? Express your answer in cubic centimeters per second.

#8 Ciphering – Mu Division
MAΘ National Convention 2013

The edges of a cube are growing such that the shape remains a cube. If the rate at which the edges are growing is 3 centimeters per second, how fast is the volume of the cube changing the instant the surface area of the cube is equal to 54 square centimeters? Express your answer in cubic centimeters per second.

Mu Ciphering
Question #9

Name:_____

ID#:_____

School:_____

Answer:

Mu Ciphering
Question #9

Name:_____

ID#:_____

School:_____

Answer:

Mu Ciphering
Question #9

Name:_____

ID#:_____

School:_____

Answer:

Mu Ciphering
Question #9

Name:_____

ID#:_____

School:_____

Answer:

#9 Ciphering – Mu Division
MAΘ National Convention 2013

What is the surface area of the paraboloid created by rotating the graph of $y = \frac{1}{2}x^2$ on the interval $0 \leq x \leq \sqrt{3}$ about the y-axis?

#9 Ciphering – Mu Division
MAΘ National Convention 2013

What is the surface area of the paraboloid created by rotating the graph of $y = \frac{1}{2}x^2$ on the interval $0 \leq x \leq \sqrt{3}$ about the y-axis?

#9 Ciphering – Mu Division
MAΘ National Convention 2013

What is the surface area of the paraboloid created by rotating the graph of $y = \frac{1}{2}x^2$ on the interval $0 \leq x \leq \sqrt{3}$ about the y-axis?

#9 Ciphering – Mu Division
MAΘ National Convention 2013

What is the surface area of the paraboloid created by rotating the graph of $y = \frac{1}{2}x^2$ on the interval $0 \leq x \leq \sqrt{3}$ about the y-axis?

Mu Ciphering
Question #10

Name:_____

ID#:_____

School:_____

Answer:

Mu Ciphering
Question #10

Name:_____

ID#:_____

School:_____

Answer:

Mu Ciphering
Question #10

Name:_____

ID#:_____

School:_____

Answer:

Mu Ciphering
Question #10

Name:_____

ID#:_____

School:_____

Answer:

#10 Ciphering – Mu Division
MAΘ National Convention 2013

Calculate $\frac{d}{dx}f\big(f(f(x))\big)$ evaluated at $x = 1$ if $f(x) = x^2 + 5$.

#10 Ciphering – Mu Division
MAΘ National Convention 2013

Calculate $\frac{d}{dx}f\big(f(f(x))\big)$ evaluated at $x = 1$ if $f(x) = x^2 + 5$.

#10 Ciphering – Mu Division
MAΘ National Convention 2013

Calculate $\frac{d}{dx}f\big(f(f(x))\big)$ evaluated at $x = 1$ if $f(x) = x^2 + 5$.

#10 Ciphering – Mu Division
MAΘ National Convention 2013

Calculate $\frac{d}{dx}f\big(f(f(x))\big)$ evaluated at $x = 1$ if $f(x) = x^2 + 5$.