**Pre-Calculus Released Exam Practice**

1 A board is made up of 9 squares. A certain number of pennies is placed in each square, following a geometric sequence. The first square has 1 penny, the second has 2 pennies, the third has 4 pennies, etc. When every square is filled, how many pennies will be used in total?

A 512

B 511

C 256

D 81

2 Let $f(x) = 14x^3 + 28x^2 - 46x$ and $g(x) = 2x + 7$. Which is the solution set to the equation $\frac{1}{12}f(x) = g(x)$?

A $\{^{-}3, 0, 1\}$

B $\{^{-}3, ^{-}1, 2\}$

C $\{^{-}2, 1, 3\}$

D $\{1, 5, 11\}$

3 The equation $2x^2 - 5x = ^{-}12$ is rewritten in the form of $2(x - p)^2 + q = 0$. What is the value of $q$?

A $\frac{167}{16}$

B $\frac{71}{8}$

C $\frac{25}{8}$

D $\frac{25}{16}$

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4 A box with an open top will be constructed from a rectangular piece of cardboard.

- The piece of cardboard is 8 inches wide and 12 inches long.
- The box will be constructed by cutting out equal squares of side $x$ at each corner and then folding up the sides.

What is the entire domain for the function $V(x)$ that gives the volume of the box as a function of $x$?

A $0 < x < 4$

B $0 < x < 6$

C $0 < x < 8$

D $0 < x < 12$

5 A function is shown below.

$$f(x) = \begin{cases} -x^2 + 2x & \text{for } x \leq -3 \\ 2\left(\frac{1}{3}\right)^{2x} & \text{for } -3 < x < 4 \\ \frac{2x - 5}{x - 7} & \text{for } x \geq 4 \end{cases}$$

What is the value of the expression $f(-3) + 2f(-1) - f(4)$?

A $\frac{101}{36}$

B $\frac{32}{9}$

C 4

D 22

6 Which function goes to positive $\infty$ most quickly as $x$ increases?

A $y = \log(x) + 100$

B $y = e^{x-9} - 3$

C $y = x^2 + 5x + 6$

D $y = 3x^5 + 4x^3 - 11x - 6$

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7 Which expression is equivalent to $\frac{\sin^4(\theta) - \cos^4(\theta)}{\sin^2(\theta) - \cos^2(\theta)}$, where $\sin^2(\theta) \neq \cos^2(\theta)$?

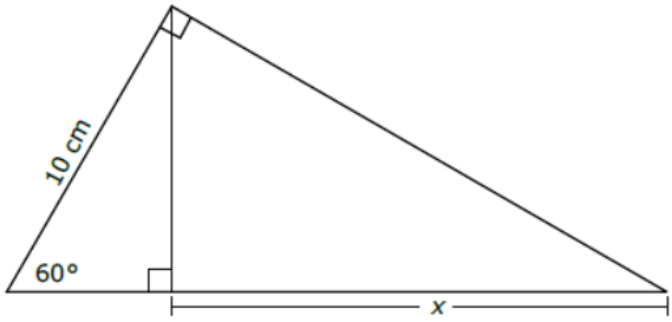
A $\sin^2(\theta) - \cos^2(\theta)$

B $\cos^2(\theta) - \sin^2(\theta)$

C 2

D 1

8 What is the value of $x$ in the triangle below?




A $\frac{5\sqrt{3}}{2}$ cm

B $5\sqrt{3}$ cm

C 10 cm

D 15 cm

**Pre-Calculus Released Exam Practice**

9 Which expression is equivalent to $(x + 3)^3 - 9x(x + 3)$?

A $x^3 + 27$

B $x^3 - 27$

C $x^3 - 9x^2 - 27x + 27$

D $x^3 - 9x^2 + 27x + 27$

10 Suppose $p(x) = x^3 - 2x^2 + 13x + k$. The remainder of the division of $p(x)$ by $(x + 1)$ is $^-8$. What is the remainder of the division of $p(x)$ by $(x - 1)$?

A $^-8$

B 8

C 16

D 20

11 What is the ***approximate*** solution to the equation $3^{x-1} = 4^{2x+5}$?

A 3.875

B 1.262

C $^-2.354$

D $^-4.797$

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12 Samantha invested $10,000 in each of two different financial plans in 2013. The predicted value of each plan is modeled below.

- Plan M: a rate of 7.5%, compounded continuously.
- Plan N: The value is determined by the function $y = 5x^3 - 50x^2 + 4x + 10{,}000$, where $x$ is the number of years after 2013.

Plan N has a greater predicted value than Plan M during which years?

A from 2014 to 2041

B from 2028 to 2055

C from 2042 to 2073

D Plan N never has a greater value than Plan M.

13 Which is an equation of a parabola that has a directrix of $y = -5$ and a focus at $(2, -1)$?

A $y = \frac{1}{2}(x + 2)^2 + 2$

B $y = \frac{1}{8}(x + 2)^2 + 3$

C $y = \frac{1}{8}(x - 2)^2 - 3$

D $y = \frac{1}{2}(x - 2)^2 - 2$

14 Which choice shows the solutions to the equation $8x^2 + 3x = -7$?

A $\frac{-3 \pm i\sqrt{215}}{16}$

B $\frac{3 \pm i\sqrt{215}}{16}$

C $\frac{-3 \pm \sqrt{233}}{16}$

D $\frac{3 \pm \sqrt{233}}{16}$

**Pre-Calculus Released Exam Practice**

15 Fred drives an average of 15,000 miles per year, and his car gets 20 miles per gallon of gasoline.

- The average cost of gasoline is $3.25 per gallon.
- He buys a new car.
- In his new car, Fred continues to average 15,000 miles per year, and the average cost of gasoline remains the same.

***Approximately*** how many more miles per gallon does the new car get if Fred has a savings of $650 per year on gasoline?

A 5.8 mpg

B 7.3 mpg

C 8.8 mpg

D 10.3 mpg

16 What is the ***approximate*** value of the sum:

$$8 - \frac{8}{7} + \frac{8}{49} - \ldots + 8 \cdot \left(\frac{-1}{7}\right)^{2,500} ?$$

A 1

B 7

C 8

D 9