

Released Items

Student Name: _____

Fall 2014
NC Final Exam
Math III



Student Booklet



Public Schools of North Carolina
State Board of Education
Department of Public Instruction
Raleigh, North Carolina 27699-6314



- 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 $\frac{25}{16}$



- 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 $f(-3) + 2f(-1) - f(4)$?

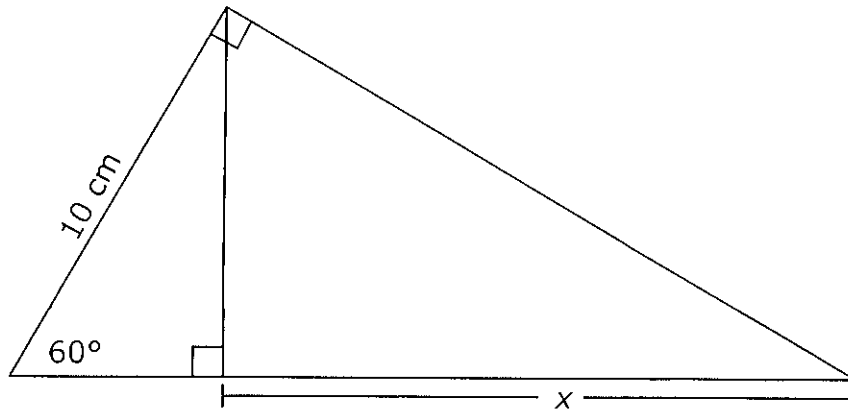
- A $\frac{101}{36}$
- B $\frac{32}{9}$
- C 4
- D 22



- 6 Which function goes to positive ∞ most quickly as x increases?
- A $y = \log(x) + 100$
- B $y = e^{x-9} - 3$
- C $y = x^2 + 5x + 6$
- D $y = 3x^5 + 4x^3 - 11x - 6$
- 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 The diameter of a circle is 8 centimeters. A central angle of the circle intercepts an arc of 12 centimeters. What is the radian measure of the angle?
- A $\frac{3}{2}$
- B 3
- C 4
- D 8π



- 9 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
- 10 To completely cover a spherical ball, a ball company uses a total area of 36 square inches of material. What is the maximum volume the ball can have?
- (Note: Surface area of a sphere = $4\pi r^2$. Volume of a sphere = $\frac{4}{3}\pi r^3$.)
- A 27π cubic inches
- B $36\sqrt{\pi}$ cubic inches
- C $\frac{36}{\sqrt{\pi}}$ cubic inches
- D $\frac{27}{\pi}$ cubic inches



- 11 A farmer wants to buy between 90 and 100 acres of land.
- He is interested in a rectangular piece of land that is 1,500 yards long and 300 yards wide.
 - The piece of land is being sold as one complete unit for \$87,000.

If the farmer does not want to spend more than \$900 an acre, does the land meet all of his requirements? (1 acre \approx 43,560 ft²)

- A Yes, the amount of land satisfies his needs, and the price is low enough.
- B No, the price is low enough, but there is too much land.
- C No, the price is low enough, but there is not enough land.
- D No, the amount of land satisfies what he needs, but the price is too high.
- 12 A reporter wants to know the percentage of voters in the state who support building a new highway. What is the reporter's population?
- A the number of people who live in the state
- B the people who were interviewed in the state
- C all voters over 25 years old in the state
- D all eligible voters in the state
- 13 In a set of test scores that are normally distributed, a test score of 76 is 3 standard deviations below the mean. A score of 88 is 1 standard deviation above the mean. What is the mean of the data?
- A 79
- B 82
- C 84
- D 85