

# Released Items

Student Name: \_\_\_\_\_

## NC Math 3



## 2017–2018



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

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# NC Final Exam



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

2 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



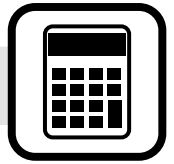
3 The diameter of a circle is 8 centimeters. A central angle of the circle intercepts an arc of 12 centimeters. What is the radian measure of the angle?

- A  $\frac{3}{2}$
- B 3
- C 4
- D  $8\pi$

4 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  $27\pi$  cubic inches
- B  $36\sqrt{\pi}$  cubic inches
- C  $\frac{36}{\sqrt{\pi}}$  cubic inches
- D  $\frac{27}{\pi}$  cubic inches



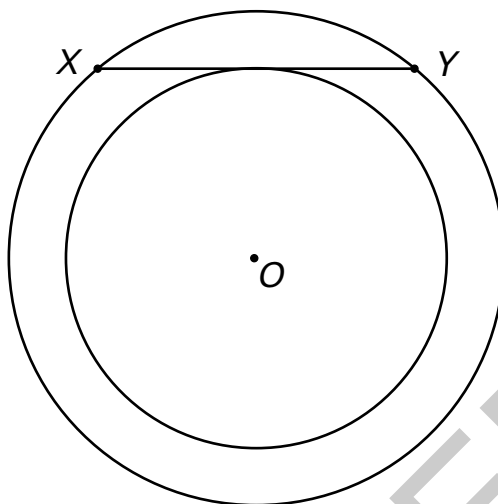
- 5 A farmer wants to buy between 90 and 100 acres of land.
- He is interested in a rectangular piece of land that is 1,500 yards long and 300 yards wide.
  - The piece of land is being sold as one complete unit for \$87,000.

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 ft<sup>2</sup>)

- 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.
- 6 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



- 7 The figure below shows concentric circles, both centered at  $O$ .



- Chord  $XY$  is tangent to the smaller circle.
- The radius of the larger circle is 15 cm.
- The radius of the smaller circle is 12 cm.

What is the length of chord  $XY$ ?

- A 27 cm
- B 24 cm
- C 18 cm
- D 10 cm
- 8 What is the **approximate** length of the arc subtended by an angle of  $\frac{4\pi}{3}$  radians on a circle with a radius of 6.00 meters?
- A 12.57 meters
- B 14.14 meters
- C 25.13 meters
- D 28.27 meters



- 9 What is the solution to the equation  $\frac{2x - 3}{x - 1} = \frac{8x + 1}{4x + 5}$ ?
- A  $-\frac{14}{5}$
- B  $-\frac{14}{9}$
- C  $\frac{14}{9}$
- D  $\frac{14}{5}$
- 10 Which expression is equivalent to  $\frac{x + 7}{x^2 + 4x - 21} \div \frac{x + 5}{x^2 + 8x + 15}$  when  $x$  is restricted so that the expressions are defined?
- A  $\frac{x + 3}{x - 3}$
- B  $\frac{x - 3}{x + 3}$
- C 1
- D -1



11 Which function has a point of discontinuity at  $x = 3$  when graphed?

A  $f(x) = \begin{cases} 3x + 1 & \text{for } x < 3 \\ x^2 + 1 & \text{for } x \geq 3 \end{cases}$

B  $f(x) = |x - 3| + 2$

C  $f(x) = \frac{x - 3}{x^2}$

D  $f(x) = \frac{x + 2}{x^2 - 9}$

12 Joshua is constructing a triangle with a circle inscribed in it. Each vertex of the triangle will have a line passing through it bisecting the angle. No matter where he places the third vertex, the following conditions will be true:

- Each line will always bisect its corresponding vertex angle.
- The three lines will always intersect at the center of the circle.
- The circle will always be inscribed in the triangle.

Which type of center exists where the three lines intersect?

A centroid

B circumcenter

C midpoint

D incenter



- 13 The function  $y = a(1.20)^t$  models the value of an investment after  $t$  years. Based on the function, what is the **approximate** monthly interest rate?
- A 8.9%
  - B 8.3%
  - C 1.5%
  - D 1.0%

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