



**GLENCOE
MATHEMATICS**

Preparing for the North Carolina Algebra 2 End-of-Course (EOC) Test Practice and Sample Test Workbook

Includes:

- North Carolina 2003 Course of Study Content Standards Covered on the Algebra 2 EOC Test
- Formula Sheet
- Diagnostic Test
- Numerous Practice Questions for each Content Standard
- Full-Size Sample Test
- Student Recording Chart

Test-Taking Tips

- Go to bed early the night before the test. You will think more clearly after a good night's rest.
- Read each problem carefully and think about ways to solve the problem before you try to answer the question.
- Relax. Most people get nervous when taking a test. It's natural. Just do your best.
- Answer questions you are sure about first. If you do not know the answer to a question, skip it and go back to that question later.
- Think positively. Some problems may seem hard to you, but you may be able to figure out what to do if you read each question carefully.
- If no figure is provided, draw one. If one is furnished, mark it up to help you solve the problem.
- When you have finished each problem, reread it to make sure your answer is reasonable.
- Become familiar with a variety of formulas and when they should be used.
- Make sure that the number of the question on the answer sheet matches the number of the question on which you are working in your test booklet.



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*Preparing for the North Carolina Algebra 2 End-of-Course Test
Practice and Sample Test Workbook*

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Overview

The material in this booklet is designed to help you prepare for the North Carolina Algebra 2 End-of-Course Test (EOC).

It contains:

- a Student Recording Chart,
- the competency goals tested on the EOC,
- a Diagnostic Test,
- practice for each competency goal, and
- a Sample Test.

How to Use This Book

Diagnostic Test This test will help you identify any weaknesses you may have as you prepare to take the EOC. Once you've taken the test and it's been graded, complete the Student Recording Chart that is found on page v. Mark an \times in the square for each question that you answered *incorrectly*.

Practice If you missed one or two of the questions for a particular competency goal, you could probably use some extra practice with that goal. The Student Recording Chart lists practice pages for each competency goal. Complete the appropriate practice pages. If you are unsure about how to do some of the problems, you may want to refer to your mathematics book.

Sample Test After you have completed your practice worksheets, take the Sample Test on pages 43 to 54.

Student Recording Chart

Directions Mark an \times by each question from the Diagnostic Test that you answered *incorrectly*. If there are one or two \times s marked for a competency goal, write **Yes** in the **Need Practice?** box. Then complete the practice pages for that competency goal.

Strand	Number and Operations				
Standard	1.01	1.02	1.03	1.04	1.05
Test Questions	5 <input type="checkbox"/> 25 <input type="checkbox"/> 35 <input type="checkbox"/> 57 <input type="checkbox"/>	8 <input type="checkbox"/> 12 <input type="checkbox"/> 29 <input type="checkbox"/> 51 <input type="checkbox"/>	1 <input type="checkbox"/> 22 <input type="checkbox"/> 47 <input type="checkbox"/> 59 <input type="checkbox"/>	17 <input type="checkbox"/> 42 <input type="checkbox"/> 48 <input type="checkbox"/>	10 <input type="checkbox"/> 13 <input type="checkbox"/> 40 <input type="checkbox"/> 54 <input type="checkbox"/>
Need Practice?					
Practice Pages	13–14	15–16	17–18	19–20	21–22

Strand	Algebra				
Standard	2.01	2.02	2.03	2.04	2.05
Test Questions	15 <input type="checkbox"/> 37 <input type="checkbox"/> 44 <input type="checkbox"/> 60 <input type="checkbox"/>	18 <input type="checkbox"/> 31 <input type="checkbox"/> 38 <input type="checkbox"/> 39 <input type="checkbox"/>	11 <input type="checkbox"/> 21 <input type="checkbox"/> 32 <input type="checkbox"/> 49 <input type="checkbox"/>	14 <input type="checkbox"/> 27 <input type="checkbox"/> 45 <input type="checkbox"/> 46 <input type="checkbox"/> 58 <input type="checkbox"/>	2 <input type="checkbox"/> 3 <input type="checkbox"/> 6 <input type="checkbox"/> 9 <input type="checkbox"/>
Need Practice?					
Practice Pages	23–24	25–26	27–28	29–30	31–32

Strand	Algebra				
Standard	2.06	2.07	2.08	2.09	2.10
Test Questions	23 <input type="checkbox"/> 24 <input type="checkbox"/> 30 <input type="checkbox"/> 52 <input type="checkbox"/>	4 <input type="checkbox"/> 33 <input type="checkbox"/> 34 <input type="checkbox"/> 55 <input type="checkbox"/>	19 <input type="checkbox"/> 20 <input type="checkbox"/> 26 <input type="checkbox"/> 43 <input type="checkbox"/>	7 <input type="checkbox"/> 28 <input type="checkbox"/> 41 <input type="checkbox"/> 50 <input type="checkbox"/>	16 <input type="checkbox"/> 36 <input type="checkbox"/> 53 <input type="checkbox"/> 56 <input type="checkbox"/>
Need Practice?					
Practice Pages	33–34	35–36	37–38	39–40	41–42

Competency Goals Tested on the EOC

COMPETENCY GOAL 1: The learner will perform operations with complex numbers, matrices, and polynomials.	
1.01	Simplify and perform operations with rational exponents and logarithms (common and natural) to solve problems.
1.02	Define and compute with complex numbers.
1.03	Operate with algebraic expressions (polynomial, rational, complex fractions) to solve problems.
1.04	Operate with matrices to model and solve problems.
1.05	Model and solve problems using direct, inverse, combined and joint variation.
COMPETENCY GOAL 2: The learner will use relations and functions to solve problems.	
2.01	Use the composition and inverse of functions to model and solve problems; justify results.
2.02	Use quadratic functions and inequalities to model and solve problems; justify results. <ol style="list-style-type: none"> a. Solve using tables, graphs, and algebraic properties. b. Interpret the constants and coefficients in the context of the problem.
2.03	Use exponential functions to model and solve problems; justify results. <ol style="list-style-type: none"> a. Solve using tables, graphs, and algebraic properties. b. Interpret the constants, coefficients, and bases in the context of the problem.
2.04	Create and use best-fit mathematical models of linear, exponential, and quadratic functions to solve problems involving sets of data. <ol style="list-style-type: none"> a. Interpret the constants, coefficients, and bases in the context of the data. b. Check the model for goodness-of-fit and use the model, where appropriate, to draw conclusions or make predictions.
2.05	Use rational equations to model and solve problems; justify results. <ol style="list-style-type: none"> a. Solve using tables, graphs, and algebraic properties. b. Interpret the constants and coefficients in the context of the problem. c. Interpret the asymptotes and intercepts graphically and algebraically.
2.06	Use cubic equations to model and solve problems. <ol style="list-style-type: none"> a. Solve using tables, graphs, and algebraic properties. b. Interpret the constants and coefficients in the context of the problem.
2.07	Use equations with radical expressions to model and solve problems; justify results. <ol style="list-style-type: none"> a. Solve using tables, graphs, and algebraic properties. b. Interpret the constants and coefficients in the context of the problem.
2.08	Use equations and inequalities with absolute value to model and solve problems; justify results. <ol style="list-style-type: none"> a. Solve using tables, graphs, and algebraic properties. b. Interpret the constants and coefficients in the context of the problem.
2.09	Use the equations of parabolas and circles to model and solve problems; justify results. <ol style="list-style-type: none"> a. Solve using tables, graphs, and algebraic properties. b. Interpret the constants and coefficients in the context of the problem.
2.10	Use systems of two or more equations or inequalities to model and solve problems; justify results. Solve using tables, graphs, matrix operations, and algebraic properties.

Formulas

The following information is for your reference in solving some of the problems on the test.

Exponential Functions

$$f(x) = a \cdot b^x$$

$$f(x) = (1 + r)^x$$

or

$$f(x) = P(1 + r)^x$$

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

$$A = Pe^{rt}$$

Probability If A and B are independent, mutually exclusive events, then

$$P(A \text{ and } B) = P(A) \cdot P(B)$$

$$P(A \text{ or } B) = P(A) + P(B).$$

$$P(n, r) = \frac{n!}{(n-r)!}$$

$$C(n, r) = \frac{n!}{(n-r)!r!}$$

Sequences and Series

Arithmetic

$$a_n = a_1 + (n - 1)d$$

$$S_n = \frac{n}{2}(a_1 + a_n)$$

Variation

$$y = kx$$

$$y = \frac{k}{x}$$

$$y = kxz$$

Geometric

$$a_n = a_1 \cdot r^{n-1}$$

$$S_n = \frac{a_1(1 - r^n)}{1 - r}, \text{ where } r \neq 1$$

$$S = \frac{a_1}{1 - r}, \text{ where } |r| < 1$$

Factoring

$$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

$$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$$

Other Formulas

$$(f \circ g)(x) = f(g(x))$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Conics

Parabola

$$y = a(x - h)^2 + k \quad \text{or} \quad y = a(y - k)^2 + h$$

or

$$y = \frac{1}{4p}(x - h)^2 + k \quad \text{or} \quad x = \frac{1}{4p}(y - k)^2 + h$$

Circle

$$(x - h)^2 + (y - k)^2 = r^2$$

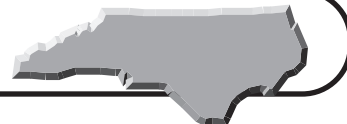
Ellipse

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1 \quad \text{or} \quad \frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$$

Hyperbola

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1 \quad \text{or} \quad \frac{y^2}{a^2} - \frac{x^2}{b^2} = 1$$

Diagnostic Test



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 Factor $4y^3 - 32$ completely. **1.03**

A $4(y^3 - 8)$

B $4(y - 2)(y + 2)^2$

C $4(y - 2)^2(y + 2)$

D $4(y - 2)(y^2 + 2y + 4)$

1 _____

Use the following information for Questions 2 and 3.

Members of a boating club in Morehead City voted to assess themselves each an equal amount to raise a total of \$900 for a new sail. Before the assessments were sent out, six new members joined the club, so the amount of each individual assessment was decreased by \$7.50.

2 Which equation can be used to determine the amount x that each member will now be assessed? **2.05**

A $\frac{900}{x} - 6 = \frac{900}{x + 7.5}$

B $\frac{900}{x} = \frac{900}{x + 6} + 7.5$

C $\frac{900}{x} = \frac{900}{x - 6} - 7.5$

D $\frac{900}{x} = \frac{900}{7.5x + 6}$

2 _____

3 How many members are in the boating club now? **2.05**

A 18 members

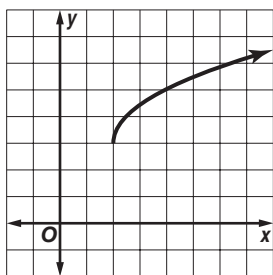
B 24 members

C 27 members

D 30 members

3 _____

4 Which equation does the graph represent? **2.07**



A $y = \sqrt{2x - 4} + 3$

B $y = \sqrt{2x - 4} - 3$

C $y = \sqrt{2x + 4} + 3$

D $y = \sqrt{2x + 4} - 3$

4 _____

5 Solve $3w^{-\frac{2}{3}} + 6 = 198$ for w . **1.01**

A -512

B $\frac{1}{512}$

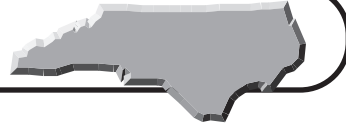
C $42\frac{2}{3}$

D 96

5 _____



Diagnostic Test (continued)

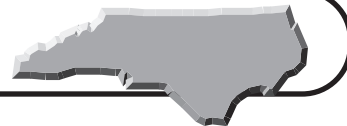


Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

- 6** Solve $\frac{5}{x^2 - x - 6} = \frac{1}{x - 3} - \frac{x}{x + 2}$ for x . **2.05** **6** _____
- A** $-1 \pm i\sqrt{2}$ **B** $3, -2$
C $1, 3$ **D** 1
- 7** What is the equation of the circle that has its center at $(-3, 1)$ and passes through the point at $(1, 2)$? **2.09** **7** _____
- A** $(x + 3)^2 + (y - 1)^2 = 15$
B $(x - 3)^2 + (y + 1)^2 = 15$
C $(x + 3)^2 + (y - 1)^2 = 17$
D $(x - 3)^2 + (y + 1)^2 = 17$
- 8** According to Ohm's Law, the impedance Z of an AC circuit is related to the current I and the voltage V by the formula $I = \frac{V}{Z}$. Two AC circuits are connected such that the total impedance is $(4 - 7i)$ ohms and the total voltage is 18 volts. What is the current? **1.02** **8** _____
- A** $\frac{72 + 126i}{65}$ amperes **B** $\frac{18}{11}$ amperes
C $\frac{198i}{65}$ amperes **D** $6i$ amperes
- 9** A train has been traveling the 240 kilometers from Wilmington to Rocky Mount. If it traveled the first 120 kilometers at an average speed of 75 kilometers per hour, what speed must it travel the remaining distance to average 100 kilometers per hour for the entire trip? **2.05** **9** _____
- A** 115 kilometers per hour
B 125 kilometers per hour
C 140 kilometers per hour
D 150 kilometers per hour
- 10** The speed of an object falling from rest varies directly as the square root of the distance it has fallen. When an object has fallen 36 feet, its speed is 48 feet per second. Find the object's speed when it has fallen 121 feet. **1.05** **10** _____
- A** $26\frac{2}{11}$ feet per second
B 64 feet per second
C 88 feet per second
D $161\frac{1}{3}$ feet per second



Diagnostic Test (continued)

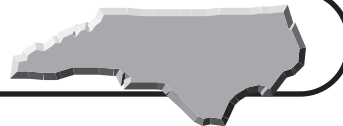


Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

- 11** If $f(x) = ab^x$, what values of b represent exponential decay? **2.03** **11** _____
A $b < 0$ **B** $b \leq 0$
C $0 < b < 1$ **D** $b > 1$
- 12** Simplify $5\sqrt{-2} + 2\sqrt{-8}$. **1.02** **12** _____
A $9i\sqrt{2}$ **B** $-9\sqrt{2}$
C $7i\sqrt{10}$ **D** $7i\sqrt{2}$
- 13** Newton's law of gravitation states that the force of attraction F between two spherical bodies varies jointly as their masses m_1 and m_2 , and varies inversely as the square of the distance r between their centers. Which equation represents this relationship? **1.05** **13** _____
A $F = \frac{km_1m_2}{r^2}$
B $F = \frac{kr^2}{m_1m_2}$
C $F = km_1m_2r^2$
D $F = \frac{km_1m_2}{r}$
- 14** If the equation for a set of population data over x years is $y = 3(1.014)^x$, what does the value 1.014 in the equation indicate about the population? **2.04** **14** _____
A The population is declining by 1.014% per year.
B The population is growing by 1.014% per year.
C The population is declining by 1.4% per year.
D The population is growing by 1.4% per year.
- 15** If $f(x) = 3x^2 + 4x - 1$ and $g(x) = -2x^2 + 27$, what is $g(f(-3))$? **2.01** **15** _____
A $(-2x^2 + 27)(3x^2 + 4x - 1)$
B -365
C $(-2x^2 + 27)(3x^2 + 4x - 1)(-3)$
D 278
- 16** Solve the system $\begin{cases} x + 4y = -5 \\ 8x - y = -7 \end{cases}$ for x and y . **2.10** **16** _____
A (3, -1)
B (-1, -1)
C (0, 7)
D (2, -9)



Diagnostic Test (continued)



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

17 Find AB if $A = \begin{bmatrix} -3 & 5 \\ 6 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} -5 & 2 \\ -7 & 4 \end{bmatrix}$. 1.04 17 _____

A $\begin{bmatrix} -8 & 7 \\ -1 & 8 \end{bmatrix}$

B $\begin{bmatrix} -20 & -58 \\ 14 & 28 \end{bmatrix}$

C $\begin{bmatrix} -20 & 14 \\ -58 & 28 \end{bmatrix}$

D $\begin{bmatrix} 27 & -17 \\ 45 & -19 \end{bmatrix}$

18 Solve $x^2 > -3x + 70$. 2.02 18 _____

A $x < -7$ or $x > 10$

B $x < -10$ or $x > 7$

C $-7 < x < 10$

D $-10 < x < 7$

19 When a thermometer reads d° , the actual temperature t is within 0.5° of d . Which absolute value inequality gives the possible range of actual temperatures? 2.08 19 _____

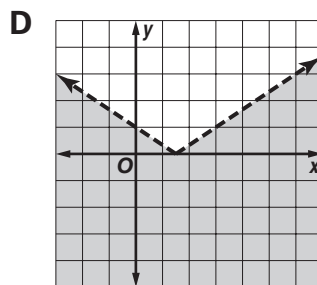
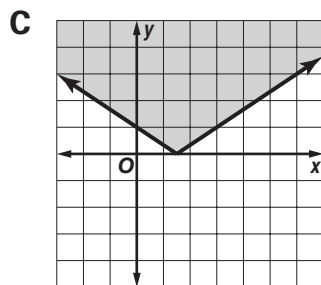
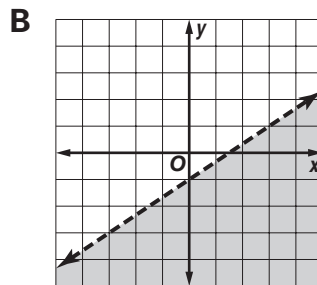
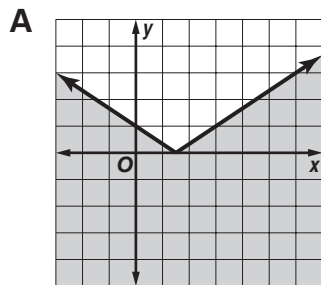
A $|t - d| \leq 0.5$

B $|t - d| \geq 0.5$

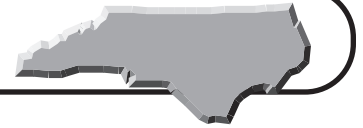
C $|t - d| \leq -0.5$

D $|t - d| \geq -0.5$

20 Which graph represents $y < \left| \frac{2}{3}x - 1 \right|$? 2.08 20 _____



Diagnostic Test (continued)



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

- 21** Paige bought a new house near Jordan Lake for \$250,000. Suppose the house depreciates at a rate of 3% per year. Which equation models the value $V(x)$ of her house in x years, assuming she has no improvements made to the house during those years? **2.03** **21** _____
- A** $V(x) = 250,000(0.03)^x$
B $V(x) = 250,000(0.97x)$
C $V(x) = 250,000(0.97)^x$
D $V(x) = 250,000(0.03x)$

- 22** Simplify $\frac{\frac{3}{4} + \frac{x-2}{8}}{2 + \frac{x}{4}}$. **1.03** **22** _____
- A** $\frac{x+4}{2x+16}$ **B** $\frac{x+1}{2x+4}$
C $\frac{x+1}{3x+6}$ **D** $\frac{x+4}{4x+8}$

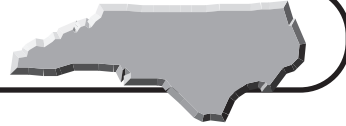
Use the following information for Questions 23 and 24.

A sheet of cardboard with dimensions 20 centimeters by 22 centimeters is made into a box by cutting squares of length x out of each corner.

- 23** Which equation models the volume V of the box? **2.06** **23** _____
- A** $V = 440x$
B $V = x^3 - 42x^2 + 440x$
C $V = 440 - 4x^2$
D $V = 4x^3 - 84x^2 + 440x$
- 24** What value of x , to the nearest hundredth, results in the greatest volume? **2.06** **24** _____
- A** 2.42 centimeters
B 3.49 centimeters
C 6.98 centimeters
D 8.25 centimeters
- 25** Solve $2e^{x+4} = 268$ for x . Round to the nearest tenth. **1.01** **25** _____
- A** -1.9
B -1.2
C 0.9
D 2.3



Diagnostic Test (continued)



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

26 Solve $4|2x + 14| - 2 = 22$. **2.08** **26** _____

A $-4, -10$

B $-4.5, -9.5$

C -4

D $4, 10$

27 What is the determinant of $\begin{bmatrix} 4 & -6 \\ 2 & 8 \end{bmatrix}$? **1.04** **27** _____

A -144

B 20

C 44

D 52

28 Which ordered pair of coordinates is the point that is the vertex of the parabola whose equation is $2x^2 - 4x + y + 4 = 0$? **2.09** **28** _____

A $(-2, -4)$

B $(2, -2)$

C $(1, 1)$

D $(1, -2)$

29 Simplify $\frac{4 - 5i}{4 + 2i} - \frac{2 + 7i}{3 - i}$. **1.02** **29** _____

A $\frac{4 - 74i}{10}$

B $\frac{4 - 37i}{10}$

C $\frac{27 - 51i}{10}$

D $\frac{13 - 5i}{10}$

30 Find the x -intercept(s) of the graph of $y = x^3 - 7x + 6$. **2.06** **30** _____

A $-3, 1, 2$

B -7

C 0

D 6

31 Solve $(q + 4)^2 = 8$. **2.02** **31** _____

A $-4 \pm 2\sqrt{2}$

B $-2 \pm \sqrt{2}$

C $2\sqrt{2} - 4$

D 60

32 If $f(x) = 3(2)^x$, find the value of $f(-3)$. **2.03** **32** _____

A -24

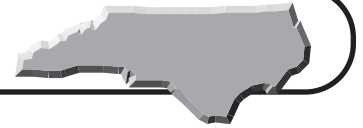
B -18

C $\frac{1}{24}$

D $\frac{3}{8}$



Diagnostic Test (continued)



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

Use the following information for Questions 33 and 34.

A company manufactures several sizes of ice cream cones. The different sizes all have a height of 5 inches, but the radii of the cones vary.

33 Which equation gives the radius r as a function of the volume V ? **2.07** **33** _____

A $r = \frac{\sqrt{5\pi}}{3V}$

B $r = \frac{\sqrt{3V}}{5\pi}$

C $r = \sqrt{\frac{3V}{5\pi}}$

D $r = \sqrt{\frac{5\pi}{3V}}$

34 What must be the radius, to the nearest tenth, of one of the company's cones if it is to have a volume of 12 cubic inches? **2.07** **34** _____

A 0.1 inches

B 0.4 inches

C 0.7 inches

D 1.5 inches

35 Bailey opened a savings account at a bank in Monroe. She deposited \$3,750 at 6% interest compounded semiannually. To the nearest year, how long will it be before Bailey has \$6,000 in her account if she makes no additional deposits and no withdrawals? **1.01** **35** _____

A 4 years

B 8 years

C 12 years

D 16 years

36 On Tuesday, Zachary spent \$8.60 on 2 dozen eggs and 4 loaves of bread at a grocery store in Pinehurst. The following Saturday, he bought 3 dozen eggs and 7 loaves of bread for \$14.65. If the prices on Saturday were the same as they were on Tuesday, what is the price of one loaf of bread? **2.10** **36** _____

A \$0.80

B \$1.40

2.10

C \$1.75

D \$2.20

37 Find $g^{-1}(x)$ if $g(x) = 2x^3 - 12$. **2.01** **37** _____

A $g^{-1}(x) = \sqrt[3]{\frac{x+12}{2}}$

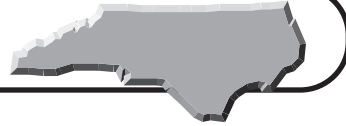
B $g^{-1}(x) = \frac{\sqrt[3]{x+12}}{2}$

C $g^{-1}(x) = \sqrt[3]{x+6}$

D $g^{-1}(x) = -2x^3 + 12$



Diagnostic Test (continued)



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

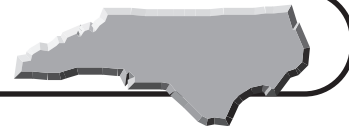
Use the following information for Questions 38 and 39.

A floor rug is to cover two-thirds of a rectangular floor that measures 12 feet by 16 feet. The rug will be centered in the room so that the uncovered portion of the floor is a uniform strip around the rug of width x feet.

- 38** Which equation represents this situation? **2.02** **38** _____
- A** $(12 - x)(16 - x) = 128$
B $(6 - x)(8 - x) = 128$
C $\frac{2}{3}(12 - 2x)(16 - 2x) = 192$
D $(12 - 2x)(16 - 2x) = 128$
- 39** Find the width, to the nearest hundredth, of the uncovered strip of floor around the rug. **2.02** **39** _____
- A** 1.26 feet
B 4.45 feet
C 8 feet
D 12.74 feet
- 40** If y varies inversely as the square root of x , and $y = 4$ when $x = 9$, find y when $x = 4$. **1.05** **40** _____
- A** 4
B 6
C $8\frac{2}{3}$
D 9
- 41** A dog's leash is tied loosely to a pole in a yard. When the leash is fully extended, the path that the dog can travel along is modeled by a circle with equation $x^2 - 4x + y^2 + 6y = 36$. What is the radius, in feet, of this circular path? **2.09** **41** _____
- A** 6 feet
B 7 feet
C 36 feet
D 49 feet
- 42** Find the values of x and y if $\begin{bmatrix} 3x + 4 \\ 2y - 8 \end{bmatrix} = \begin{bmatrix} 43 \\ 24 \end{bmatrix}$. **1.04** **42** _____
- A** $x = 15\frac{2}{3}, y = 8$
B $x = 14, y = 13$
C $x = 13, y = 16$
D $x = 13, y = 8$



Diagnostic Test (continued)



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

43 Solve $|2t - 15| \geq 5$ for t . **2.08** **43** _____

- A** $5 \leq t \leq 10$
B $-10 \leq t \leq -5$
C $t \leq 5$ or $t \geq 10$
D $t \leq -10$ or $t \geq -5$

44 If $f(x) = 4x - 12$, and $g(x) = x^2 + 12$, what is $f(g(x))$? **2.01** **44** _____

- A** $(4x - 12)(x^2 + 12)$
B $4x^2$
C $(4x - 12)^2 + 12$
D $4x^2 + 36$

Use the following information for Questions 45 and 46.

The chart gives the windchill for an actual temperature of 15°F at different wind speeds.

Wind Speed (mph)	5	10	15	20	25	30	35	40	45
Windchill ($^\circ\text{F}$)	7	3	0	-2	-4	-5	-7	-8	-9

45 Find a quadratic regression equation for the windchill y in terms of the wind speed x . **2.04** **45** _____

- A** $y = 0.007x^2 - 0.735x + 9.976$
B $y = -0.38x^2 + 6.722x + 15$
C $y = 0.115x^2 - 2.207x + 15.057$
D $y = -2.505x^2 + 18.042x - 0.976$

46 To the nearest degree, what does the equation predict the windchill will be if the wind speed is 12 miles per hour? **2.04** **46** _____

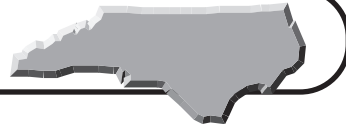
- A** 1°F **B** 2°F
C 3°F **D** 5°F

47 Simplify $(4x^2 + 2x - 2)(4x^2 - 1)^{-1}$. **1.03** **47** _____

- A** $\frac{2x + 2}{2x - 1}$
B $\frac{2x + 2}{2x + 1}$
C 1
D 2



Diagnostic Test (continued)



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

48 What is the inverse of the matrix $\begin{bmatrix} -5 & 3 \\ -3 & 2 \end{bmatrix}$? **1.04** **48** _____

A $\begin{bmatrix} -5 & 3 \\ -3 & 2 \end{bmatrix}$

B $\begin{bmatrix} -2 & 3 \\ -3 & 5 \end{bmatrix}$

C $\begin{bmatrix} 2 & -3 \\ 3 & -5 \end{bmatrix}$

D $\begin{bmatrix} 5 & -3 \\ 3 & -2 \end{bmatrix}$

49 Alfonzo opened a savings account at a bank in Boone. He deposited \$4,000 at 4.5% interest compounded continuously. To the nearest cent, how much will he have in his savings account in 12 years if he makes no additional deposits and no withdrawals? **2.03** **49** _____

A \$6,160.00

B \$6,783.53

C \$6,864.03

D \$7,342.71

50 What is the equation of a parabola with focus $(6, -10)$ and directrix $x = -2$? **2.09** **50** _____

A $(y + 10)^2 = 16(x - 2)$

B $(y + 4)^2 = 16(x - 6)$

C $(y - 10)^2 = 16(x + 2)$

D $(y - 4)^2 = 16(x + 6)$

51 Simplify $(4 + 7i) - (8 - 9i) - (7 + 6i)$. **1.02** **51** _____

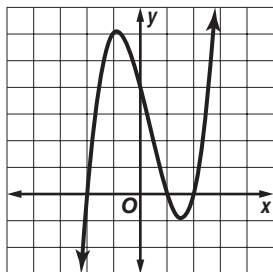
A $-11 + 4i$

B $-11 + 10i$

C $25i$

D $-i$

52 Use the graph to find the zeros of the function $y = x^3 - x^2 - 4x + 4$. **2.06** **52** _____



A $-2, 1, 2$

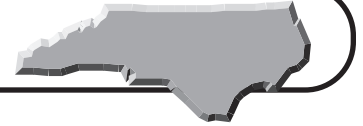
B $-1, 6$

C $-0.5, 1.5$

D 4



Diagnostic Test (continued)



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

53 Solve the system
$$\begin{aligned} 3x + 8y - 2z &= -8 \\ 2x + 4y + 5z &= 13 \\ -x - 6y + 3z &= 8 \end{aligned}$$
 for x , y , and z . **2.10** **53** _____

- A** $(-\frac{1}{2}, 2, 1)$ **B** $(-2, \frac{1}{2}, 3)$
C $(2, -3, -5)$ **D** $(1, 0, 3)$

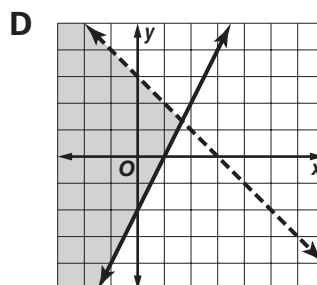
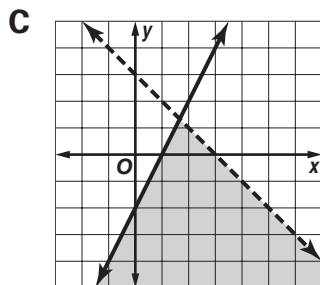
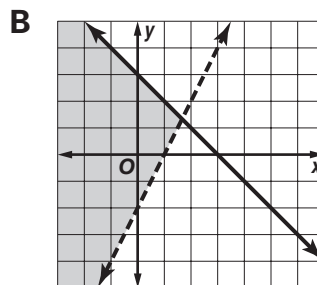
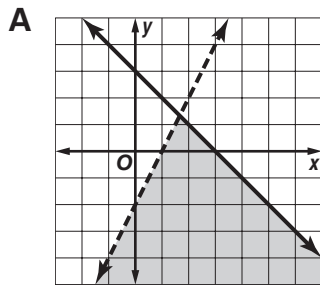
54 The amount that a beam bends downward when it is supported at each end and centrally loaded varies jointly as the mass of the load and the cube of the length, and varies inversely as the cube of the depth of the beam. A beam 4 meters long that has a depth of 15 centimeters bends 0.7 centimeter downward when loaded with a mass of 1,000 kilograms. To the nearest tenth, what is the maximum load that a beam 5 meters long and with a depth of 10 centimeters can carry at its center without bending more than 3.2 centimeters? **1.05** **54** _____

- A** 693.5 kilograms **B** 1,274.3 kilograms
C 1,543.5 kilograms **D** 2,438.1 kilograms

55 Solve $\sqrt{x-1} = 2x - 8$ for x . **2.07** **55** _____

A $-3.25, -5$ **B** $3.25, 5$
C 3.25 **D** 5

56 What graph represents the system of inequalities $x + y < 3$ and $2x - y \geq 2$? **2.10** **56** _____



Diagnostic Test (continued)



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

57 Express $3 \ln x - \ln 4$ as a single logarithm. **1.01**

57 _____

- A** $\ln(x^3 - 4)$ **B** $\ln \frac{3x}{4}$ **C** $\ln \frac{x^3}{4}$ **D** $\ln(3x - 4)$

58 If a line of best fit for a set of data has a correlation coefficient of 0, what does this indicate? **2.04**

58 _____

- A** The line is an exact fit for the data.
B The data model a cause and effect relationship.
C The data are not related linearly.
D The data have a strong negative correlation.

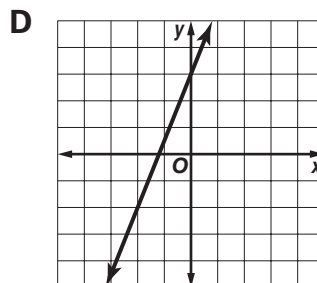
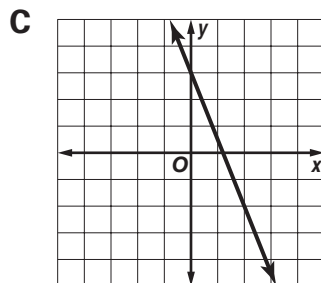
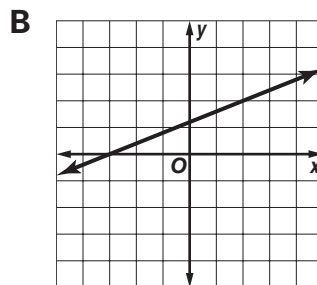
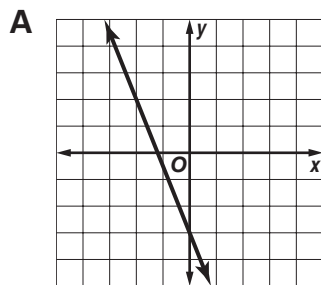
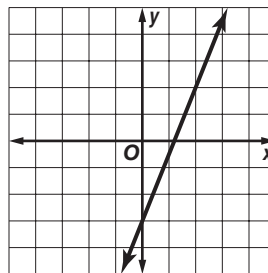
59 A chemist working in her lab in Raleigh wishes to know how much of a 75% solution of ethanol she should add to 1,500 milliliters of a 40% ethanol solution to obtain a 50% ethanol solution. **1.03**

59 _____

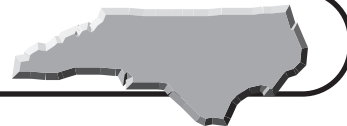
- A** 120 milliliters **B** 600 milliliters
C 750 milliliters **D** 900 milliliters

60 Which graph is the inverse of this graph? **2.01**

60 _____



Standards Practice

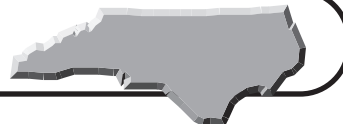


Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

STANDARD 1.01 Simplify and perform operations with rational exponents and logarithms (common and natural) to solve problems.

- 1 Express $9^{\frac{1}{2}} = 3$ in logarithmic form. 1 _____
- A $\log_3 9 = \frac{1}{2}$
B $\log_9 3 = \frac{1}{2}$
C $\log_3 \frac{1}{2} = 9$
D $\log_9 \frac{1}{2} = 3$
- 2 Express $\log_2 x + 4 \log_2 y$ as a single logarithm. 2 _____
- A $\log_2 xy^4$
B $\log_2 x + y^4$
C $\log_2 x + 4y$
D $\log_2 4xy$
- 3 Given $\log 6 \approx 0.7782$ and $\log 3 \approx 0.4771$, approximate the value of $\log 18$. 3 _____
- A 0.1771
B 0.3011
C 1.2553
D 1.6311
- 4 Given $\ln 3 \approx 1.0986$, approximate the value of $\ln 27$. 4 _____
- A 0.3662
B 1.3259
C 3.2958
D 9.8874
- 5 Express $\ln 20 = 3$ in exponential form. 5 _____
- A $20^3 = e$
B $3^{20} = e$
C $e^{20} = 3$
D $e^3 = 20$

Standards Practice

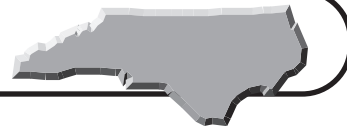


Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

STANDARD 1.01 (continued)

- 6** Solve $\log_8 x = 2.3$ for x to the nearest tenth. **6** _____
- A** 1.1
B 2.5
C 119.4
D 783.1
- 7** Solve $4y^{-\frac{1}{2}} = 16$ for y . **7** _____
- A** -3.46
B 0.0625
C 0.5
D 64
- 8** Joffre opened a savings account at a bank in Raleigh. He deposited \$1,000 at 4% interest compounded quarterly. To the nearest year, how long will it take Joffre's money to double? **8** _____
- A** 5 years
B 15 years
C 17 years
D 174 years
- 9** Solve $e^{x-3} = 455$ for x . Round to the nearest tenth. **9** _____
- A** 3.1
B 7.7
C 9.1
D 22.7
- 10** For a biology lab, a group of students at Western Carolina University are given a culture of 1,000 bacteria. The number of bacteria after t hours is represented by the function $A(t) = 1,000(10)^{\frac{t}{48}}$. About how long will it take for there to be 1,155 bacteria in the culture? **10** _____
- A** 3 hours
B 7 hours
C 45 hours
D 105 hours

Standards Practice



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

STANDARD 1.02 Define and compute with complex numbers.

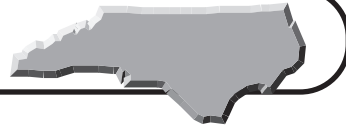
- 1 What is the conjugate of $3 - 4i$? 1 _____
A $3 + 4i$ B $-3 - 4i$
C $-3 + 4i$ D $-i$
- 2 Simplify $(4 - 2i)^2$. 2 _____
A $20 - 16i$ B $12 - 16i$
C $16 + 4i$ D 20
- 3 Simplify $7\sqrt{-48}$. 3 _____
A $-112\sqrt{3}$
B $-28\sqrt{3}$
C $28i\sqrt{3}$
D $112i\sqrt{3}$

Use the following information for Questions 4 and 5.

The total impedance Z_t , in ohms, in a circuit is a function of the impedances Z_1 and Z_2 of the individual circuits. In a parallel circuit, $Z_t = \frac{Z_1 Z_2}{Z_1 + Z_2}$. In a series circuit, $Z_t = Z_1 + Z_2$. Let $Z_1 = (6 + i)$ ohms and $Z_2 = (6 - i)$ ohms.

- 4 Find the total impedance for a parallel circuit. 4 _____
A $\frac{12}{37}$ ohms
B $\frac{35}{12}$ ohms
C $\frac{37}{12}$ ohms
D 12 ohms
- 5 Find the total impedance for a series circuit. 5 _____
A $\frac{12}{37}$ ohms
B $\frac{35}{12}$ ohms
C $\frac{37}{12}$ ohms
D 12 ohms

Standards Practice

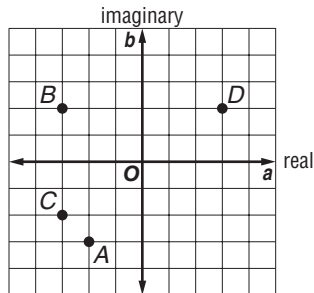


Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

STANDARD 1.02 (continued)

6 Which point in the complex number plane represents $-3 - 2i$?

6 _____



- A A
- B B
- C C
- D D

7 Simplify $(5 - 3i) + 2(2 + 4i) - (3 - 8i)$.

7 _____

- A $6 + 13i$
- B $6 - 3i$
- C $6 - 7i$
- D $15i$

8 Simplify $\frac{3 + i}{2 + 5i}$.

8 _____

- A $\frac{1 - 13i}{21}$
- B $\frac{11 - 13i}{29}$
- C $\frac{5 - 4i}{4}$
- D $\frac{11}{29}$

9 Solve $x^2 + 2x + 7 = 0$ for x .

9 _____

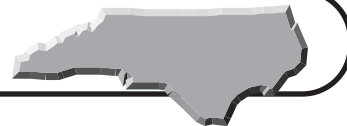
- A $-1 \pm i\sqrt{6}$
- B $-1 \pm 2i\sqrt{6}$
- C $\pm i\sqrt{6}$
- D $\pm 2i\sqrt{6}$

10 Simplify $\frac{2 + 3i}{3 - 2i} + \frac{7 - 2i}{8 + i}$.

10 _____

- A $\frac{54 - 10i}{78}$
- B $\frac{49 + 10i}{61}$
- C $\frac{20 + 2i}{65}$
- D $\frac{54 + 42i}{65}$

Standards Practice



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

STANDARD 1.03 Operate with algebraic expressions (polynomial, rational, complex fractions) to solve problems.

1 Factor $x^4 - 16$ completely. **1** _____

- A** $(x^2 + 2)(x - 2)^2$
B $(x - 4)(x + 4)(x + 2)(x - 2)$
C $(x - 2)^2(x + 2)^2$
D $(x^2 + 4)(x - 2)(x + 2)$

2 Simplify $\frac{-4y}{y^2 - 4} + \frac{y}{y - 2}$. **2** _____

- A** $\frac{-3y}{y^2 + y - 6}$ **B** $\frac{-3y}{y^2 - 4}$
C $\frac{y}{y + 2}$ **D** $\frac{y^2 - 4y + 2}{y^2 - 4}$

3 Abby mows her neighbors' lawns during the summer in Charlotte. **3** _____

Working alone, she can mow all of the lawns in 14 hours. If her brother helps her, they can mow all of the lawns in 8 hours. How long would it take her brother to mow all of the lawns alone?

- A** $5\frac{1}{11}$ hours **B** 6 hours
C $18\frac{2}{3}$ hours **D** 22 hours

4 Multiply $\frac{t^2 - 16}{t^2 + 4t + 3} \cdot \frac{3t + 9}{t^2 - 2t - 8}$. **4** _____

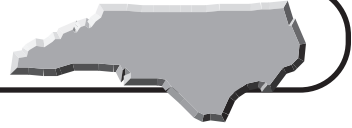
- A** $\frac{t + 5}{t^2 + 2t - 8}$ **B** $\frac{3t + 12}{t^2 + 3t + 2}$
C $\frac{12}{t + 3}$ **D** $\frac{6}{t^2 + 1}$

5 Ray and Pierre can row 12 kilometers per hour in still water. If it takes **5** _____

them the same amount of time to row 3.8 kilometers upstream in the Cashie River as it takes them to row 5.2 kilometers downstream, find the rate of the current to the nearest kilometer per hour.

- A** 2 kilometers per hour **B** 4 kilometers per hour
C 8 kilometers per hour **D** 12 kilometers per hour

Standards Practice

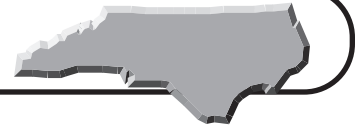


Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

STANDARD 1.03 (continued)

- 6** Stefan and Iris are 54 kilometers apart and riding toward each other on a trail in the Pisgah National Forest. Iris can ride the 54 kilometers in 6.75 hours, while Stefan can ride the 54 kilometers in 5.4 hours. If they do not stop riding, how long will it be before they meet? **6** _____
- A** 1.35 hours
B 3 hours
C 3.75 hours
D 30 hours
- 7** Simplify $\frac{p^2 - 2p - 3}{p - 2} \div \frac{p^2 + 4p + 3}{p^2 - 4}$. **7** _____
- A** $\frac{-2p - 1}{p + 2}$
B $\frac{p^2 - p - 6}{p + 3}$
C $\frac{p^2 + p - 2}{p + 1}$
D $\frac{p^2 - 6}{p + 3}$
- 8** Simplify $\frac{1 + \frac{1}{x}}{1 - \frac{1}{x}}$. **8** _____
- A** -1
B $\frac{x^2 - 1}{x^2}$
C $\frac{x - 1}{x + 1}$
D $\frac{x + 1}{x - 1}$
- 9** Simplify $(n^3 + 7n^2 + 9n - 9) \div (n + 3)$. **9** _____
- A** $n^2 + 7n + 6$
B $n^2 - 4n - 3$
C $n^2 + 2n - 3$
D $n^2 + 4n - 3$
- 10** To obtain a solution that is 50% antifreeze, how many quarts of pure antifreeze need to be added to 14 quarts of a 42% antifreeze solution? **10** _____
- A** 0.75 quart
B 1.12 quarts
C 2.24 quarts
D 6.44 quarts

Standards Practice



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

STANDARD 1.04 Operate with matrices to model and solve problems.

1 Find the values of x and y if $\begin{bmatrix} 2x - 7 \\ 3y + 4 \end{bmatrix} = \begin{bmatrix} 13 \\ 10 \end{bmatrix}$. 1 _____

A $x = 3, y = \frac{14}{3}$

B $x = \frac{17}{2}, y = 3$

C $x = 15, y = \frac{19}{3}$

D $x = 10, y = 2$

2 Solve for X : $2X + 2\begin{bmatrix} 1 & -2 \\ 0 & 3 \end{bmatrix} = 8\begin{bmatrix} \frac{1}{2} & 0 \\ -1 & \frac{1}{4} \end{bmatrix}$. 2 _____

A $\begin{bmatrix} 2 & 4 \\ -8 & -4 \end{bmatrix}$

B $\begin{bmatrix} 1 & 2 \\ -4 & -2 \end{bmatrix}$

C $\begin{bmatrix} 4 & 8 \\ -16 & -8 \end{bmatrix}$

D $\begin{bmatrix} 3 & -2 \\ -4 & 4 \end{bmatrix}$

3 Find the inverse of $\begin{bmatrix} 0 & -2 \\ 2 & 1 \end{bmatrix}$. 3 _____

A $\begin{bmatrix} 0 & -\frac{1}{2} \\ \frac{1}{2} & \frac{1}{4} \end{bmatrix}$

B $\begin{bmatrix} \frac{1}{4} & \frac{1}{2} \\ -\frac{1}{2} & 0 \end{bmatrix}$

C $\begin{bmatrix} 1 & 2 \\ -2 & 0 \end{bmatrix}$

D $\begin{bmatrix} 0 & 2 \\ -2 & -1 \end{bmatrix}$

4 What system of equations is represented by the matrix equation 4 _____

$$\begin{bmatrix} 2 & 3 \\ -1 & 4 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 10 \\ 4 \end{bmatrix}?$$

A $2x - y = 10$

B $5x = 10$

$3x + 4y = 4$

$3y = 4$

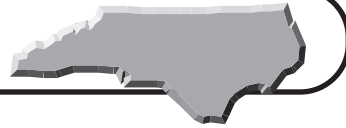
C $5 = 10x$

D $2x + 3y = 10$

$3 = 4y$

$-x + 4y = 4$

Standards Practice



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

STANDARD 1.04 (continued)

For Questions 5–7, let $A = \begin{bmatrix} 2 & 4 \\ -8 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 3 & -1 \\ 0 & -4 \end{bmatrix}$, and $C = \begin{bmatrix} 5 & 6 \\ 2 & 3 \end{bmatrix}$.

5 Find AB .

A $\begin{bmatrix} 5 & 3 \\ -8 & -4 \end{bmatrix}$

B $\begin{bmatrix} 14 & 12 \\ 32 & 0 \end{bmatrix}$

C $\begin{bmatrix} 6 & -18 \\ -24 & 8 \end{bmatrix}$

D $\begin{bmatrix} 2 & -16 \\ 0 & -24 \end{bmatrix}$

5 _____

6 Find $A - (B + C)$.

A $\begin{bmatrix} -6 & -1 \\ -10 & 1 \end{bmatrix}$

B $\begin{bmatrix} 4 & 11 \\ -6 & 7 \end{bmatrix}$

C $\begin{bmatrix} 6 & 1 \\ 10 & -1 \end{bmatrix}$

D $\begin{bmatrix} 10 & 9 \\ -6 & -1 \end{bmatrix}$

6 _____

7 Find the determinant of C .

A -1

B 0

C 3

D 24

7 _____

8 During the first semester at a technical college in North Carolina, 500 students are enrolled in a programming course and 220 students are not. A student taking a programming course the first semester has a 75% chance of taking a programming course during the second semester. A student not enrolled in a programming course during the first semester has a 20% chance of taking a programming course during the second semester. Which matrix represents the number of students enrolled in a programming course during the second semester versus those who are not enrolled in a programming course?

A $[419 \ 301]$

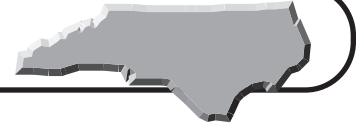
B $[419 \ 720]$

C $[301 \ 720]$

D $[500 \ 220]$

8 _____

Standards Practice



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

STANDARD 2.01 Use the composition and inverse of functions to model and solve problems; justify results.

For Questions 1–4, let $f(x) = 2x - 7$, $g(x) = x^2 + 4$, and $h(x) = x^3 - 5$.

1 _____

1 What is $f(h(3))$?

A -6

B 19

C 37

D $(2x - 7)(x^3 - 5)(3)$

2 Find $h^{-1}(x)$.

A $\sqrt[3]{x + 5}$

B $x^3 + 5$

C $\frac{x + 5}{3}$

D $\sqrt[3]{x} + 5$

2 _____

3 What is $(f \circ g)(x)$?

A $2x^3 - 7x^2 + 8x - 28$

B $2x^2 + 1$

C $2x^4 - 7x^3 + 8x^2 - 28x$

D $4x^2 - 28x + 53$

3 _____

4 Find $f^{-1}(9)$.

A -3.5

B 8

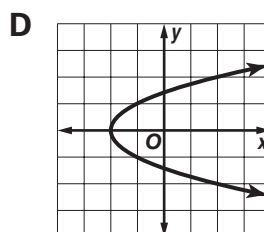
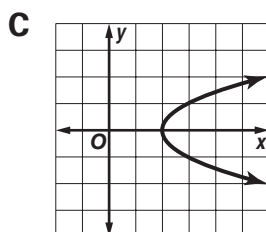
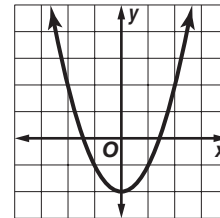
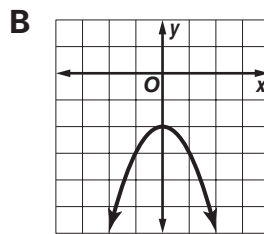
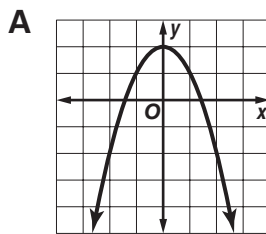
C 11

D 11.5

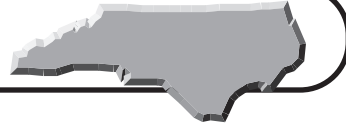
4 _____

5 Which graph is the inverse of the one at the right?

5 _____



Standards Practice



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

STANDARD 2.01 (continued)

6 What is true about the composition of two functions, $f(x)$ and $g(x)$, if they are inverses of each other? **6** _____

A $f(g(x)) = g(f(x)) = x$

B $f(g(x)) = g(f(x)) = 0$

C $f(g(x)) = g(f(x)) = 1$

D $f(g(x)) = g(f(x)) = \frac{1}{x}$

Use the following information for Questions 7–10.

Marie is going on a business trip tomorrow. She will leave from the Raleigh-Durham International Airport and fly to Mexico City, Mexico, staying there for two days. Then she will fly from Mexico City to Bombay, India, for four days. To save time, Marie plans to convert her U.S. dollars to foreign currency today. The current conversion rates are 1 U.S. dollar = 45.5312 Indian rupees and 1 U.S. dollar = 11.1305 Mexican pesos.

7 If Marie converts x U.S. dollars to Indian rupees, which function models this conversion? **7** _____

A $r(x) = x \div 45.5312$

B $r(x) = 45.5312 \div x$

C $r(x) = 45.5312x$

D $r(x) = x + 45.5312$

8 If Marie receives 5,565 Mexican pesos for some of her U.S. dollars, to the nearest dollar how many dollars did she convert? **8** _____

A \$122

B \$200

C \$500

D \$61,941

9 If the function $p(x)$ converts x U.S. dollars to Mexican pesos, the function $r(x)$ converts x U.S. dollars to Indian rupees, and the function $s(x)$ converts Mexican pesos to Indian rupees, what does the composite function $s(p(x))$ do to Marie's U.S. dollars? **9** _____

A It converts x dollars to rupees, then converts rupees to pesos.

B It converts x dollars to pesos, then converts pesos to rupees.

C It converts pesos to rupees, then converts rupees to x dollars.

D It converts rupees to pesos, then converts pesos to x dollars.

10 Which function(s) would convert Marie's foreign money back to U.S. dollars after she returns from her trip? **10** _____

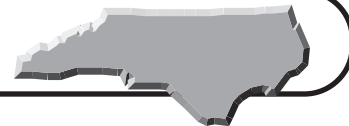
A $p^{-1}(r^{-1}(x))$

B $p^{-1}(x)$ and $r^{-1}(x)$

C $r(p(x))$

D $r^{-1}(p^{-1}(x))$

Standards Practice



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

STANDARD 2.02 Use quadratic functions and inequalities to model and solve problems; justify results.

- a) Solve using tables, graphs, and algebraic properties.
b) Interpret the constants and coefficients in the context of the problem.

1 Which function is represented by the table of values below? 1 _____

x	0	1	2	3	4	5	6
y	18	8	2	0	2	8	18

- A $y = 2(x - 3)^2$
B $y = 2(x + 3)^2$
C $y = -2(x - 3)^2$
D $y = -2(x + 3)^2$

Use the following information for Questions 2 and 3.

The Franks have 40 meters of fence with which to make a rectangular pen for their dog. They are going to use a side of their house as one of the longer sides of the pen. They want the pen to have the greatest area possible.

2 If w is the width of the pen, which function represents the area of the pen? 2 _____

- A $A(w) = 20w - w^2$
B $A(w) = 40w - 2w^2$
C $A(w) = 20w - 2w^2$
D $A(w) = 40w - w^2$

3 What is the maximum area of the pen? 3 _____

- A 100 square meters
B 200 square meters
C 400 square meters
D 1,600 square meters

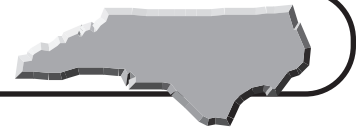
4 Solve $2x^2 - x = 6$ for x . 4 _____

- A $-\frac{3}{2}, 2$
B $-2, \frac{3}{2}$
C $-3, 2$
D $-2, 3$

5 Solve $3x^2 - 7x + 2 < 0$ for x . 5 _____

- A $x < -2$ or $x > -\frac{1}{3}$
B $-2 < x < -\frac{1}{3}$
C $x < \frac{1}{3}$ or $x > 2$
D $\frac{1}{3} < x < 2$

Standards Practice



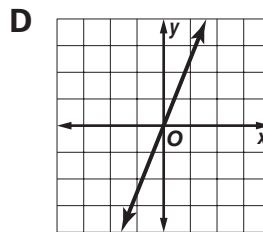
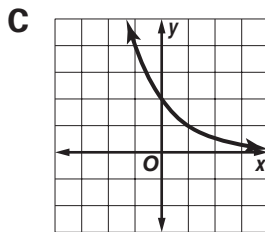
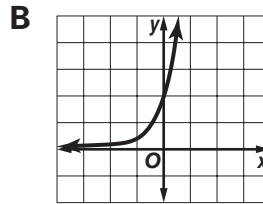
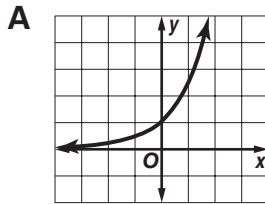
Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

STANDARD 2.03 Use exponential functions to model and solve problems; justify results.

- a) Solve using tables, graphs, and algebraic properties.
 b) Interpret the constants, coefficients, and bases in the context of the problem.

1 Which is the graph of $y = 2.5^x$?

1 _____



2 Orange County had a population growth rate of approximately 1.7% from 2000 to 2001. If the population was 118,700 in 2000 and this growth rate continues, about how many people, to the nearest hundred, will reside in Orange County in 2006?

2 _____

- A** 120,700 people **B** 124,400 people
C 130,800 people **D** 131,300 people

Use the following information for Questions 3 and 4.

A certain new car cost \$16,750 in the year 2000. Suppose the value of the car depreciates 12% each year.

3 Which equation models the value of the car x years after 2000?

3 _____

- A** $V(x) = 16,750(0.12)^x$ **B** $V(x) = 16,750(0.88)^x$
C $V(x) = 16,750(0.12x)$ **D** $V(x) = 16,750(0.88x)$

4 To the nearest hundred dollars, what will the car's value be in 2004?

4 _____

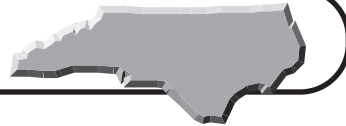
- A** \$8,700 **B** \$8,800 **C** \$10,000 **D** \$11,400

5 If \$8,000 is invested at an annual interest rate of 4% compounded continuously, how much is the investment worth in 6 years?

5 _____

- A** \$9,920.00 **B** \$10,122.55 **C** \$10,169.99 **D** \$49,958.92

Standards Practice



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

STANDARD 2.03 (continued)

Use the following information for Questions 6–8.

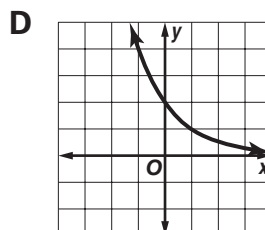
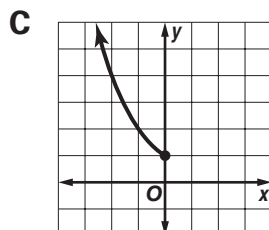
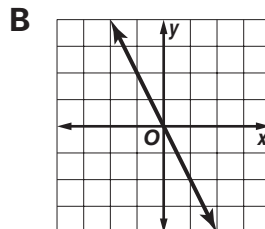
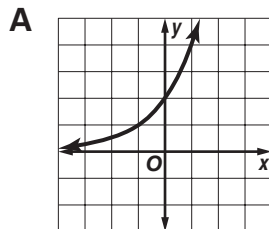
The exponential function $f(x) = 200(0.5)^x$ models the decay of a radioactive substance over time.

- 6 What does the value 200 represent? 6 _____
A rate of decay **B** original amount
C time **D** amount remaining

- 7 What does the value 0.5 represent? 7 _____
A rate of decay **B** original amount
C time **D** amount remaining

- 8 Find $f(6)$. 8 _____
A 3.125 **B** 16.67
C 300 **D** 600

- 9 Which graph could represent exponential decay? 9 _____



- 10 Which table of values represents the function $f(x) = 3(2)^x$? 10 _____

A

x	-2	-1	0	1	2
y	0.75	1.5	3	6	12

B

x	-2	-1	0	1	2
y	0.2	0.6	2	6	18

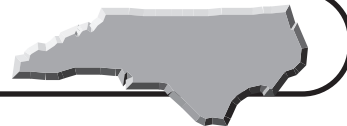
C

x	-2	-1	0	1	2
y	-12	-6	0	6	12

D

x	-2	-1	0	1	2
y	3.25	3.5	4	5	7

Standards Practice



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

STANDARD 2.04 Create and use best-fit mathematical models of linear, exponential, and quadratic functions to solve problems involving sets of data.

- a) Interpret the constants, coefficients, and bases in the context of the data.
- b) Check the model for goodness-of-fit and use the model, where appropriate, to draw conclusions or make predictions.

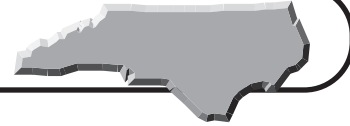
Use the following information for Questions 1–4.

Alberto turned the faucet on in a bathtub and then measured the depth of the water at 1-minute intervals. His data are displayed in the table below.

Time (min)	1	3	6	9	12	15
Depth (cm)	3	7	12	20	26	33

- 1 If x represents the time that the water is running and y represents the depth of the water in the bathtub, find an equation of the best-fit line for these data. 1 _____
- A $y = 2x + \frac{1}{2}$
 - B $y = 2.1x + 0.4$
 - C $y = 2.1x - 0.4$
 - D $y = 0.4x + 2.1$
- 2 In this situation, what does the slope of the best-fit line represent? 2 _____
- A the depth before the faucet is turned on
 - B the average number of minutes per centimeter of water depth
 - C the average change of water depth per minute
 - D the length of time the water is running
- 3 What does the y -intercept of the best-fit line represent? 3 _____
- A the depth before the faucet is turned on
 - B the average number of minutes per centimeter of water depth
 - C the average number of centimeters of water depth per minute
 - D the length of time the water is running
- 4 To the nearest centimeter, what does the equation of the best-fit line predict for the water depth after 16 minutes? 4 _____
- A 20 centimeters
 - B 32 centimeters
 - C 34 centimeters
 - D 35 centimeters

Standards Practice



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

STANDARD 2.04 (continued)

- 5 What does a correlation coefficient of 0.9 mean? 5 _____
- A** strong positive correlation **B** weak positive correlation
C strong negative correlation **D** no correlation

Use the following information for Questions 6 and 7.

During an experiment on bacteria growth, there were 56 bacteria 3 days after the experiment began and there were 124 bacteria after 5 days.

- 6 Which exponential equation could be the model for the data? 6 _____
- A** $y = 7,298(0.2)^x$ **B** $y = 17.42(1.48)^x$
C $y = 7,298(-0.2)^x$ **D** $y = 17.42(-1.48)^x$
- 7 About how many bacteria were there when the experiment began? 7 _____
- A** 0 bacteria **B** 17 bacteria **C** 25 bacteria **D** 48 bacteria

Use the following information for Questions 8 and 9.

A store in Wayne has a fall sale on lawn mowers. The model on sale normally sells for \$540. On the first day of the sale, the store reduces the price by \$20. At the beginning of the second day the price is reduced again by \$40, on the third day it is reduced again by \$60, and so on.

- 8 Which table gives the price of the lawn mower model that is on sale? 8 _____

A

Day	0	1	2	3	4	5
Price (\$)	540	520	480	420	340	240

B

Day	0	1	2	3	4	5
Price (\$)	540	520	500	480	460	440

C

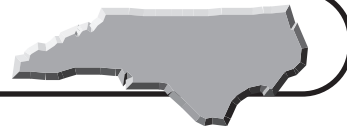
Day	0	1	2	3	4	5
Price (\$)	540	520	490	450	400	340

D

Day	0	1	2	3	4	5
Price (\$)	540	500	460	420	380	340

- 9 Which quadratic equation models the lawn mower situation? 9 _____
- A** $y = 10x^2 - 10x + 540$
B $y = -10x^2 + 10x - 540$
C $y = -10x^2 - 10x + 540$
D $y = 10x^2 + 10x - 540$

Standards Practice



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

STANDARD 2.05 Use rational equations to model and solve problems; justify results.

- a) Solve using tables, graphs, and algebraic properties.
 b) Interpret the constants and coefficients in the context of the problem.
 c) Identify the asymptotes and intercepts graphically and algebraically.

1 Solve $\frac{2}{3} = \frac{5 - 2x}{9}$. 1 _____

A -2

B $-\frac{1}{2}$

C $\frac{1}{2}$

D 2

2 Solve $1 + \frac{8}{x^2 - 16} = \frac{1}{x - 4}$ for x . 2 _____

A -3

B -3, 4

C 3

D 3, -4

For Questions 3–5, let $y = \frac{x - 2}{x^2 - 4x + 3}$.

3 Find the x -intercept(s). 3 _____

A 1 and 3

B 1, 2, and 3

C 2

D $-\frac{2}{3}$

4 Find the y -intercept(s). 4 _____

A $-\frac{2}{3}$

B 2

C 1 and 3

D 1, 2, and 3

5 Identify the vertical asymptote(s). 5 _____

A $x = 1, x = 2, x = 3$

B $x = 2$

C $x = 0$

D $x = 1, x = 3$

6 Solve $\frac{x^2 - 4}{x^2 + 3x - 4} = \frac{x^2 + x - 2}{x^2 - 16}$. 6 _____

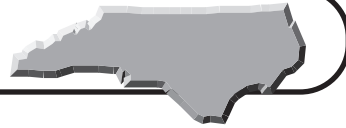
A -2

B -2 and 2

C $\frac{7}{4}$

D -2 and $\frac{7}{4}$

Standards Practice



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

STANDARD 2.05 (continued)

Use the following information for Questions 7 and 8.

An aluminum factory produces cylindrical soup cans. The function that represents the manufacturing cost, in cents, of the can as a function of its radius, in inches, is $C(r) = \frac{0.15\pi r^3 + 8.2}{r}$.

7 What value of r , to the nearest hundredth, will result in the lowest cost? **7** _____

- A** 0.21 inch
- B** 1.72 inches
- C** 2.06 inches
- D** 5.98 inches

8 What is the lowest cost to the nearest cent? **8** _____

- A** 2¢
- B** 3¢
- C** 5¢
- D** 6¢

Use the following information for Questions 9 and 10.

Eric traveled the 34 miles from Lexington to Kannapolis at an average speed of x miles per hour. On his return trip, his average speed was y miles per hour. The average rate A for his entire trip can be found by dividing the total distance traveled by the total time.

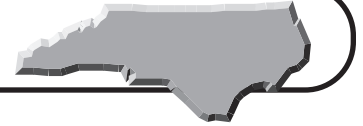
9 Find an equation for Eric's average speed for the entire trip. **9** _____

- | | |
|--------------------------------|----------------------------------|
| A $A = \frac{2}{x + y}$ | B $A = \frac{2xy}{x + y}$ |
| C $A = \frac{x + y}{2}$ | D $A = \frac{x + y}{2xy}$ |

10 Suppose Eric's average speed for the entire trip was 57 miles per hour and his average speed during the return portion of the trip was 65 miles per hour. What was his average speed going to Kannapolis, to the nearest mile per hour? **10** _____

- A** 49 miles per hour
- B** 51 miles per hour
- C** 52 miles per hour
- D** 55 miles per hour

Standards Practice



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

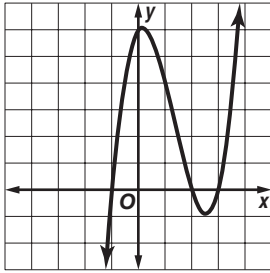
STANDARD 2.06 Use cubic equations to model and solve problems.

a) Solve using tables and graphs.

b) Interpret constants and coefficients in the context of the problem.

1 Use the graph to find the zeros of the function.

1 _____



A 0.1, 2.5

B -3, -2, 1

C 6

D -1, 2, 3

Use the following information for Questions 2–4.

A piece of metal 24 inches by 30 inches is made into an open box by cutting out a square with side length x from each corner and folding up the sides.

2 Find a formula for the volume V in terms of x .

2 _____

A $V = 720 - 4x^2$

B $V = 720x$

C $V = 4x^3 - 108x^2 + 720x$

D $V = x^3 - 54x^2 + 720x$

3 What is the volume of the box when $x = 4$?

3 _____

A 656 cubic inches

B 1,408 cubic inches

C 2,080 cubic inches

D 2,880 cubic inches

4 What value of x , to the nearest tenth, gives the greatest volume?

4 _____

A 3.0 inches

B 4.4 inches

C 8.8 inches

D 13.6 inches

5 Which value is a zero of the function $y = 6x^3 + 5x^2 - 67x - 84$?

5 _____

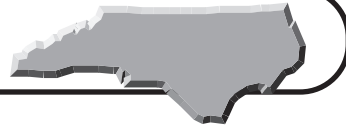
A -84

B -3.5

C -3

D -1.5

Standards Practice



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

STANDARD 2.06 (continued)

6 For $ax^3 + bx^2 + cx + d = y$, what can you determine about the graph of the function if $a < 0$? **6** _____

- A** It decreases from left to right, but has an interval in which it increases.
- B** It increases from left to right.
- C** It decreases and then increases, but has an interval in which it does neither.
- D** It increases and then decreases.

7 Which function is represented by the values in the table below? **7** _____

x	-2	-1	0	1	2
y	-14	8	10	10	26

- A** $f(x) = -3x^3 + x^2 - 2x + 10$
- B** $f(x) = x^3 + 4x^2 - 2x + 6$
- C** $f(x) = 3x^3 - x^2 - 2x + 10$
- D** $f(x) = -x^3 - 4x^2 + 2x + 6$

Use the following information for Questions 8–10.

The function $P(m) = 0.004m^3 - 0.003m^2 - 0.956m + 27.71$ models the price P of one share of a mutual fund over the past 12 months, where m is the number of months ago.

8 What does the constant 27.71 represent? **8** _____

- A** The price of 1 share of the mutual fund 27 months ago.
- B** The price of 1 share of the mutual fund 12 months ago.
- C** The price of 1 share of the mutual fund last month.
- D** The price of 1 share of the mutual fund now.

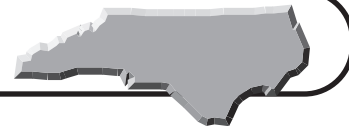
9 What does the value of $P(10)$ represent? **9** _____

- A** The price of 10 shares of the mutual fund 10 months ago.
- B** The price of 1 share of the mutual fund 2 months ago.
- C** The price of 1 share of the mutual fund 10 months ago.
- D** The price of 10 shares of the mutual fund now.

10 Find $P(4)$. **10** _____

- A** \$23.41
- B** \$24.09
- C** \$24.34
- D** \$32.02

Standards Practice



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

STANDARD 2.07 Use equations with radical expressions to model and solve problems; justify results.

- a) Solve using tables, graphs, and algebraic properties.
 b) Interpret the degree, constants, and coefficients in the context of the problem.

1 Solve $\sqrt{5m - 4} = m$. 1 _____

A $-1, -4$	B $-2, 2$
C 1	D $1, 4$

Use the following information for Questions 2 and 3.

In an art museum in Asheville, a square painting and a circular painting have the same area.

2 If the square painting has sides of length x , find an equation for the radius r of the circular painting. 2 _____

A $r = \sqrt{\frac{x^2}{\pi}}$	B $r = \frac{\sqrt{\pi}}{x}$
C $r = \frac{x}{\pi}$	D $r = \frac{x^2}{\pi}$

3 If the square painting has a side of length 4 feet, what is the radius of the circular painting to the nearest tenth? 3 _____

A 1.1 feet	B 1.6 feet
C 2.3 feet	D 5.1 feet

4 Solve $\sqrt[3]{2k - 4} = 4$. 4 _____

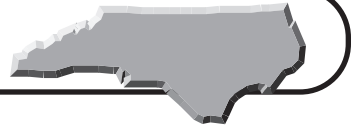
A 4	B 10
C 30	D 34

5 The formula $L = L_0 \sqrt{1 - \left(\frac{v}{c}\right)^2}$ relates the length of an object at rest L_0 to its traveling length L when traveling at a velocity of v . Determine the velocity as a function of the speed of light c for which the traveling length is half the length of the object at rest. 5 _____

to its traveling length L when traveling at a velocity of v . Determine the velocity as a function of the speed of light c for which the traveling length is half the length of the object at rest.

A $v = \frac{c}{2}$	B $v = \frac{c\sqrt{3}}{2}$
C $v = 2c$	D $v = c\sqrt{3}$

Standards Practice



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

STANDARD 2.07 (continued)

Use the following information for Questions 6 and 7.

Sebastian is building a patio in the shape of a right triangle behind his house. The longer leg of the patio is 4 feet longer than the shorter leg.

6 Which equation gives the length of the hypotenuse h of the patio if the length of the shorter leg is x feet? **6** _____

A $h = 2x^2 + 8x + 16$

B $h = 2x^2 + 16$

C $h = \sqrt{2x^2 + 8x + 16}$

D $h = \sqrt{2x^2 + 16}$

7 If the hypotenuse is 20 feet long, what is the length of the shorter leg? **7** _____

A $\sqrt{2}$ feet

B $6\sqrt{3}$ feet

C 12 feet

D 16 feet

8 Solve $\sqrt{3y + 3} - \sqrt{y + 5} = 2$ for y . **8** _____

A -2

B -1, 11

C 3

D 11

9 Solve $3 - \sqrt{x} = \sqrt{x - 3}$ for x . **9** _____

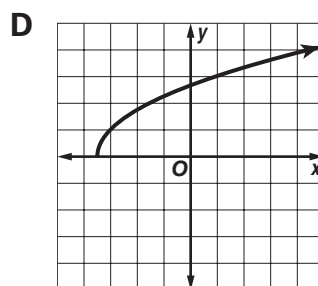
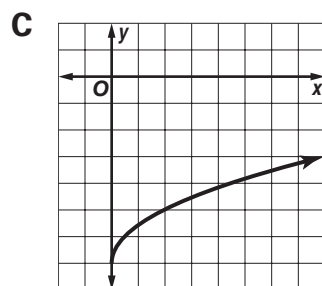
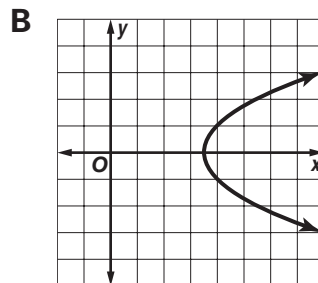
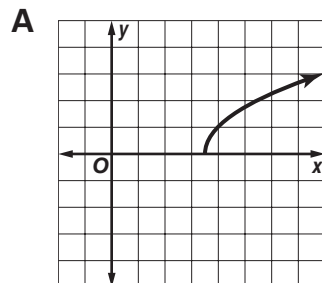
A 3

B 4

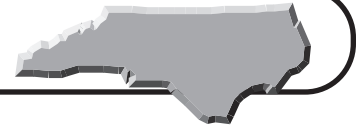
C 7

D 9

10 Which graph represents $y = \sqrt{2x - 7}$? **10** _____



Standards Practice



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

STANDARD 2.08 Use equations and inequalities with absolute value to model and solve problems; justify results.

a) Solve using tables, graphs, and algebraic properties.

b) Interpret the constants and coefficients in the context of the problem.

1 Solve $|2x + 7| = 15$.

A $-44, 16$

B $-16, 44$

C $-11, 4$

D $-4, 11$

1 _____

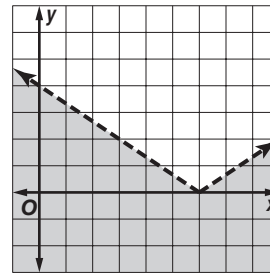
2 Which equation does this graph represent?

A $y > \left| -\frac{2}{3}x + 4 \right|$

B $y \geq \left| -\frac{2}{3}x + 4 \right|$

C $y \leq \left| -\frac{2}{3}x + 4 \right|$

D $y < \left| -\frac{2}{3}x + 4 \right|$



2 _____

In Questions 3 and 4, write an absolute value inequality for the situation.

3 In a newspaper poll taken before an election, 42% of the people favor the incumbent mayor. The margin of error for the actual percentage p is less than 4%.

A $|p - 0.42| < 0.04$

B $|p - 0.04| < 0.42$

C $|0.42 - p| > 0.04$

D $|0.04 - p| < 0.04$

3 _____

4 A company in Fayetteville manufactures piston rings that are to be 4.375 inches in diameter. A ring is rejected if its diameter d is off by more than 0.0625 inch.

A $|4.375 - 0.0625| > d$

B $|d - 4.375| < 0.0625$

C $|0.0625 - d| > 4.375$

D $|d - 0.0625| < 4.375$

4 _____

5 Solve $|4x - 7| > 5$ for x .

A $\frac{1}{2} < x < 3$

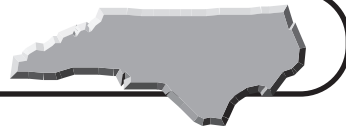
B $x > 3$

C $x < \frac{1}{2}$ or $x > 3$

D $x > \frac{1}{2}$

5 _____

Standards Practice

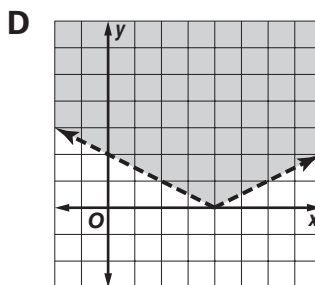
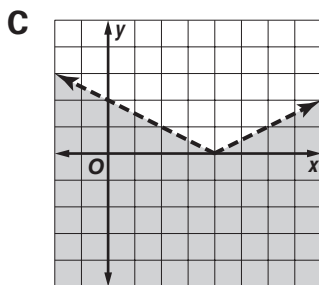
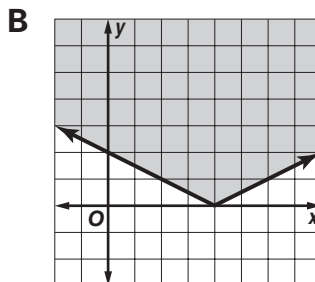
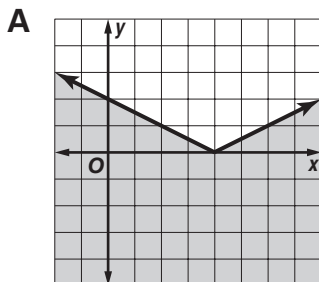


Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

STANDARD 2.08 (continued)

6 Which graph represents $y \geq |0.5x - 2|$?

6 _____



7 Solve $\frac{1}{2} \left| \frac{5}{6} - \frac{x}{2} \right| - 1 < 0$.

7 _____

A $x < -\frac{17}{3}$ or $x > \frac{7}{3}$

B $x < -\frac{7}{3}$ or $x > \frac{17}{3}$

C $-\frac{17}{3} < x < \frac{7}{3}$

D $-\frac{7}{3} < x < \frac{17}{3}$

8 Solve $4 - 8|3x + 2| = -20$.

8 _____

A no solution

B $-\frac{5}{3}$ or $\frac{1}{3}$

C $-\frac{4}{3}$ or 0

D $\frac{1}{3}$

9 Solve $4x + 2|6x - 4| = 16$.

9 _____

A -1 or $\frac{3}{2}$

B $-\frac{1}{2}$ or $\frac{3}{2}$

C $\frac{1}{2}$ or 1

D $\frac{3}{2}$

10 Solve the inequality $a|x - b| \geq c$ for x . Assume a , b , and c are positive.

10 _____

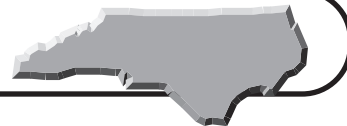
A $x \geq \frac{c}{a} + b$ or $x \leq -\frac{c}{a} + b$

B $-\frac{c}{a} + b \leq x \leq \frac{c}{a} + b$

C $x \geq \frac{c+b}{a}$ or $x \leq \frac{-c+b}{a}$

D $\frac{-c+b}{a} \leq x \leq \frac{c+b}{a}$

Standards Practice



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

STANDARD 2.09 Use the equations of parabolas and circles to model and solve problems; justify results.

- a) Solve using tables, graphs, and algebraic properties.
b) Interpret the constants and coefficients in the context of the problem.

- 1 Write an equation of a circle with center at $(2, -4)$ and radius 5. **1** _____
- A** $(x - 2)^2 + (y + 4)^2 = 5$
B $(x - 2)^2 + (y + 4)^2 = 25$
C $(x + 2)^2 + (y - 4)^2 = 5$
D $(x + 2)^2 + (y - 4)^2 = 25$

Use the following information for Questions 2 and 3.

The equation of a circle is given as $x^2 + y^2 - 6x + 4y + 7 = 0$.

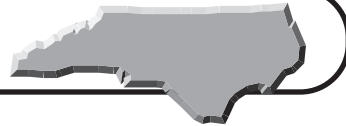
- 2 Where is the center of the circle? **2** _____
- A** $(3, -2)$ **B** $(-3, 2)$
C $(-6, 4)$ **D** $(6, -4)$
- 3 What is the radius of the circle? **3** _____
- A** $\sqrt{6}$ **B** $\sqrt{7}$
C 6 **D** 7

Use the following information for Questions 4 and 5.

A circle of radius 3 has its center in the first quadrant and is tangent to the y -axis at $(0, 2)$.

- 4 What is the equation of the circle? **4** _____
- A** $(x - 3)^2 + (y - 2)^2 = 3$
B $(x - 2)^2 + (y - 3)^2 = 9$
C $(x + 3)^2 + (y + 2)^2 = 9$
D $(x - 3)^2 + (y - 2)^2 = 9$
- 5 What are the x -intercepts of the circle? **5** _____
- A** 1, 5 **B** $3 \pm \sqrt{5}$
C -2, 2 **D** 1, 4

Standards Practice



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

STANDARD 2.09 (continued)

Use the following information for Questions 6–9.

The equation of a parabola is given as $y^2 + 8x - 6y + 1 = 0$.

6 Find the vertex of the parabola. 6 _____

- A $(-1, -3)$ B $(-8, -3)$
 C $(1, 3)$ D $(8, 3)$

7 In what direction does the parabola open? 7 _____

- A up B down
 C right D left

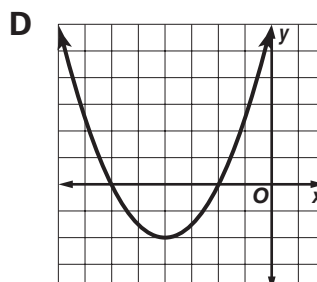
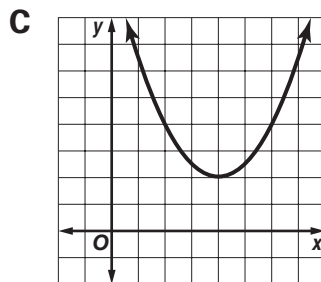
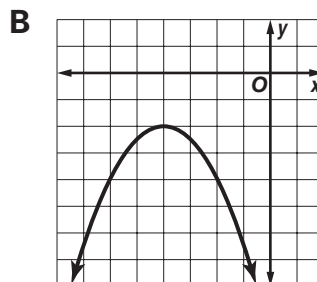
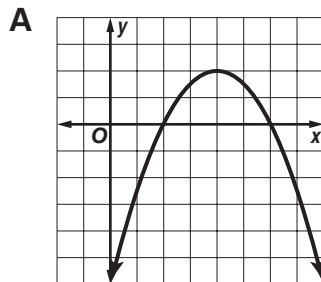
8 Find the x -intercept(s). 8 _____

- A $-\frac{1}{8}$ B 0
 C $\pm 2\frac{1}{8}$ D $3 \pm 2\sqrt{2}$

9 Find the y -intercept(s). 9 _____

- A $-\frac{1}{8}$ B 0
 C $\pm 2\frac{1}{8}$ D $3 \pm 2\sqrt{2}$

10 Graph $(x - 4)^2 = -2(y - 2)$. 10 _____



Standards Practice



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

STANDARD 2.10 Use systems of two or more equations or inequalities to model and solve problems; justify results. Solve using tables, graphs, matrix operations, and algebraic properties.

1 Find the solution of the system $\begin{cases} 3x - 6y = -42 \\ -2x + 5y = 34 \end{cases}$ **1** _____

A $(-6, 2)$

B $(-7, 4)$

C $(-2, 6)$

D $(12\frac{1}{3}, -2\frac{2}{3})$

2 Together Alan, Philip, and Grant have \$31. Use a system of equations to find the amount of money that Grant has if Philip has \$3 less than Alan, and Grant has \$1 more than Alan and Philip combined. **2** _____

A \$6

B \$9

C \$12

D \$16

Use the system $\begin{cases} 8x - 2y - z = 10 \\ -12x + 2y - 2z = 2 \\ 4x + 4y - 3z = 20 \end{cases}$ for Questions 3 and 4.

3 Which matrix represents the system of equations? **3** _____

A $\begin{bmatrix} 8 & -2 & -1 \\ -12 & 2 & -2 \\ 4 & 4 & -3 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 10 \\ 2 \\ 20 \end{bmatrix}$

B $\begin{bmatrix} 8 & 12 & 4 \\ -2 & 2 & 4 \\ -1 & -2 & -3 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 10 \\ 2 \\ 20 \end{bmatrix}$

C $\begin{bmatrix} 8 & 2 & -3 \\ -12 & 4 & -2 \\ 4 & -1 & -2 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 10 \\ 2 \\ 20 \end{bmatrix}$

D $\begin{bmatrix} 10 & 2 & 20 \\ 8 & -12 & 4 \\ -1 & -2 & 3 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 10 \\ 2 \\ 20 \end{bmatrix}$

4 Solve the system for x , y , and z . **4** _____

A $(2, 2, 2)$

B $(-1, 8, 13)$

C $(\frac{3}{4}, \frac{1}{2}, -5)$

D $(-3\frac{3}{4}, 0, 1)$

5 For a company in Goldsboro, the cost C , in thousands of dollars, of producing x tons of aluminum is given by the equation $C = 0.25x + 4$. The revenue R , in thousands of dollars, for selling x tons is given by the equation $R = 0.5x$. Find the number of tons of aluminum that the company must produce to break even. **5** _____

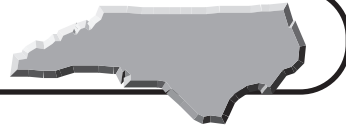
A 1 ton

B 5.3 tons

C 16 tons

D 18 tons

Standards Practice

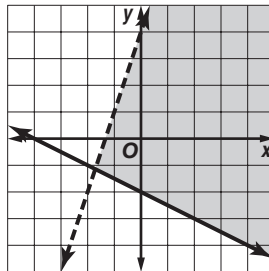


Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

STANDARD 2.10 (continued)

- 6 The graph represents which system of inequalities?

- A** $y \leq 3x + 4$
 $y > -0.5x - 2$
- B** $y < 3x + 4$
 $y \geq -0.5x - 2$
- C** $y \geq 3x + 4$
 $y < -0.5x - 2$
- D** $y > 3x + 4$
 $y \leq -0.5x - 2$



6 _____

- 7 A chemist wants to make 200 milliliters of an acid solution that will have a 48% acid concentration. She wants to make this solution by mixing a 60% acid solution with a 40% acid solution. How much of each solution should she use?

- A** 80 mL of the 40% solution, 120 mL of the 60% solution
- B** 80 mL of the 60% solution, 120 mL of the 40% solution
- C** 90 mL of the 40% solution, 110 mL of the 60% solution
- D** 90 mL of the 60% solution, 110 mL of the 40% solution

7 _____

- 8 Which system of inequalities describes a triangular region with one vertex at (2, 5) and another at (7, 3)?

- | | |
|----------------------------|----------------------------|
| A $2x + 5y \leq 29$ | B $5x + 2y \leq 29$ |
| $-3x + y \leq -1$ | $x - 3y \leq -1$ |
| $-7x + 8y \geq -25$ | $8x - 7y \geq -25$ |
| C $2x + 5y \geq 29$ | D $5x + 2y \geq 29$ |
| $-3x + y \geq -1$ | $x - 3y \geq -1$ |
| $-7x + 8y \leq -25$ | $8x - 7y \leq -25$ |

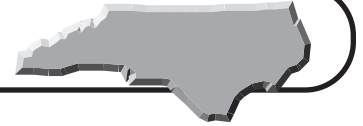
8 _____

- 9 With a headwind, Tyra flew her plane 416 kilometers from Morganton to Jacksonville in 2 hours. With a tailwind, she flew the return trip in 1.6 hours. If her airspeed was the same on both parts of the trip, what was the speed of the wind? Assume the speed of the wind was the same for both flights.

- A** 26 kilometers per hour
- B** 34 kilometers per hour
- C** 52 kilometers per hour
- D** 83 kilometers per hour

9 _____

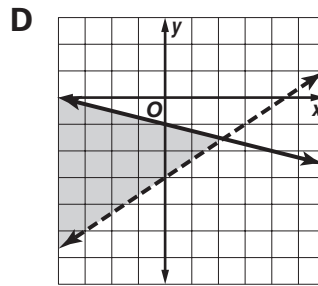
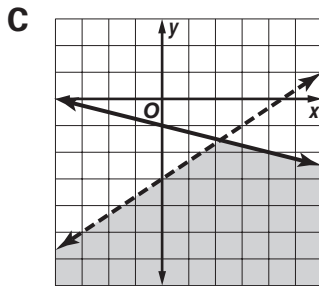
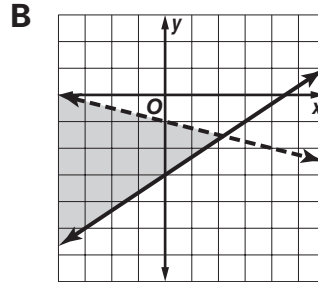
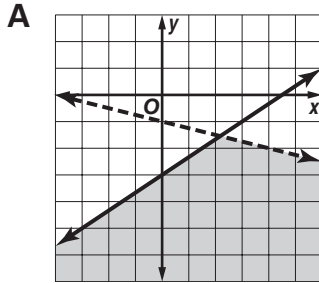
Sample Test



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

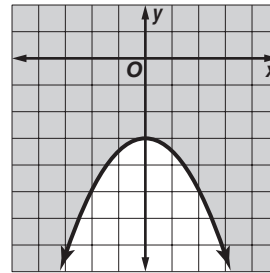
- 1 Which graph represents the system $2x - 3y \leq 9$?
 $x + 4y < -4$?

1 _____



- 2 Which inequality is represented by the graph?

- A** $y > -0.5x^2 - 3$
B $y < -0.5x^2 - 3$
C $y \geq -0.5x^2 - 3$
D $y \leq -0.5x^2 - 3$



2 _____

- 3 Solve $x^2 - 6x + 10 = 0$ for x .

- A** $6 \pm i$ **B** $3 \pm 2i$ **C** $6 \pm 2i$ **D** $3 \pm i$

3 _____

- 4 A survey reveals that 78% of people in North Carolina favor a particular law being passed. The margin of error for the actual percentage p is 5%. Which absolute value inequality models this situation?

- A** $|p - 0.78| \leq 0.05$ **B** $|p - 0.78| \geq 0.05$
C $|p - 0.05| \leq 0.78$ **D** $|p - 0.05| \geq 0.78$

4 _____

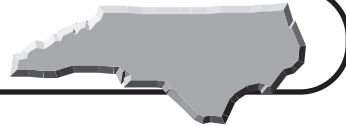
- 5 Express $\frac{\sqrt[4]{s^9 t^{13}}}{\sqrt[3]{s^3 t^6}}$ in simplest exponential form.

- A** $s^{-\frac{5}{9}} t^{-\frac{5}{26}}$ **B** st **C** $s^{\frac{5}{4}} t^{\frac{5}{4}}$ **D** $s^{\frac{13}{4}} t^{\frac{21}{4}}$

5 _____



Sample Test (continued)



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

Use the following information for Questions 6 and 7.

At a theater in Charlotte, adult tickets cost \$8 and child tickets cost \$6. The ticket sales for one weekend were as follows: Movie A—1,034 adult tickets and 273 child tickets; Movie B—439 adult tickets and 2,397 child tickets; and Movie C—3,997 adult tickets and 129 child tickets.

- 6** Which matrix expression represents the total weekend ticket sales for each of the three movies? **6** _____

A $\begin{bmatrix} 1,034 & 273 \\ 2,397 & 439 \\ 3,997 & 129 \end{bmatrix} \cdot \begin{bmatrix} 8 \\ 6 \end{bmatrix}$

B $\begin{bmatrix} 273 & 1,034 \\ 2,397 & 439 \\ 129 & 3,997 \end{bmatrix} \cdot \begin{bmatrix} 8 \\ 6 \end{bmatrix}$

C $\begin{bmatrix} 1,034 & 273 \\ 439 & 2,397 \\ 3,997 & 129 \end{bmatrix} \cdot \begin{bmatrix} 6 \\ 8 \end{bmatrix}$

D $\begin{bmatrix} 1,034 & 273 \\ 439 & 2,397 \\ 3,997 & 129 \end{bmatrix} \cdot \begin{bmatrix} 8 \\ 6 \end{bmatrix}$

- 7** Simplify the matrix expression from Question 6 to find the total weekend ticket sales for each movie. **7** _____

A $\begin{bmatrix} 8,388 \\ 21,810 \\ 25,014 \end{bmatrix}$

B $\begin{bmatrix} 21,810 \\ 8,388 \\ 25,014 \end{bmatrix}$

C $\begin{bmatrix} 9,910 \\ 17,894 \\ 32,750 \end{bmatrix}$

D $\begin{bmatrix} 9,910 \\ 21,810 \\ 32,750 \end{bmatrix}$

- 8** Solve $|3n - 7| < 26$. **8** _____

A $-\frac{19}{3} < n < 11$

B $n < -\frac{19}{3}$ or $n > 11$

C $n < \frac{19}{3}$

D $-11 < n < \frac{19}{3}$

- 9** In a classroom in Gastonia, the number of boys varies directly as the number of girls. There are 8 boys and 2 girls in this classroom. If this same relationship exists in another classroom where there are 5 girls, how many boys are in this room? **9** _____

A 1 boy

B 4 boys

C 16 boys

D 20 boys

- 10** Factor $3z^4 - 147z^2$ completely. **10** _____

A $3z^2(z - 7)^2$

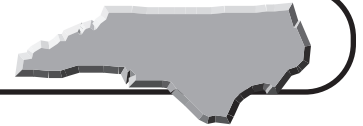
B $3z^2(z + 7)^2$

C $3z^2(z - 7)(z + 7)$

D $3z^2(z - 7)^2(z + 7)^2$

Go on

Sample Test (continued)



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

11 Simplify $\frac{x-5}{x^2-4x-5} \cdot \frac{x}{2x^2}$.

11 _____

A $\frac{2x}{x+1}$

B $\frac{10}{4x-5}$

C -10

D 2

12 Two friends in Burlington each have a tree house. The floors of Matthew's triangular tree house and Natasha's circular tree house have the same area. Write a function for the radius r of the floor in Natasha's tree house in terms of the base b and height h of the floor in Matthew's tree house.

12 _____

A $r = \sqrt{\frac{bh}{2\pi}}$

B $r = \sqrt{\frac{bh\pi}{2}}$

C $r = \pi\sqrt{\frac{bh}{2}}$

D $r = \frac{1}{\pi}\sqrt{\frac{bh}{2}}$

For Questions 13 and 14, let $f(x) = 2x^2 - 3x$ and $g(x) = x^3 - 1$.

13 Evaluate $(f \circ g)(2)$.

13 _____

A 7

B 35

C 77

D $(2x^2 - 3x)(x^3 - 1)(2)$

14 What is $g^{-1}(x)$?

14 _____

A $\sqrt[3]{x+1}$

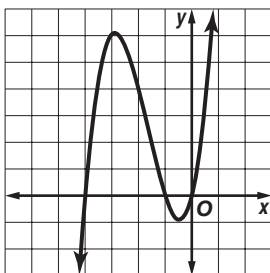
B $\sqrt[3]{x-1}$

C $\sqrt[3]{x} + 1$

D $\sqrt[3]{x} - 1$

15 Use the graph to find the zeros of the function.

15 _____



A $-1, 6$

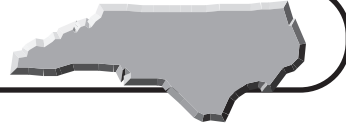
B $-4, -1, 0$

C 0

D $-5, 1$



Sample Test (continued)



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

- 16** What is the equation of the circle that has its center at $(-2, 4)$ and passes through the point at $(1, -7)$? **16** _____

A $(x + 2)^2 + (y - 4)^2 = \sqrt{130}$
B $(x + 2)^2 + (y - 4)^2 = 130$
C $(x + 2)^2 + (y - 4)^2 = \sqrt{10}$
D $(x + 2)^2 + (y - 4)^2 = 10$

- 17** The equation $y = \left(\frac{1}{2}\right)^{-x-2}$ is equivalent to which of the following equations? **17** _____

A $y = -\left(\frac{1}{4}\right)^x$ **B** $y = 4^x$
C $y = 2^x$ **D** $y = 4(2)^x$

- 18** In a parallel circuit, the total impedance Z_t , in ohms, is given by the formula $Z_t = \frac{Z_1 Z_2}{Z_1 + Z_2}$, where Z_1 and Z_2 are the impedances of the individual paths. Find the total impedance of a parallel circuit if $Z_1 = (3 + 2i)$ ohms and $Z_2 = (4 - 3i)$ ohms. **18** _____

A $\frac{41 - i}{48}$ ohms **B** $\frac{126 + 18i}{50}$ ohms
C $\frac{127 + 11i}{50}$ ohms **D** $\frac{42 + 6i}{48}$ ohms

- 19** Suppose you are graphing the function $f(x) = \frac{a}{(x - b)(x + c)}$, where a , b , and c are real numbers. Identify the equation(s) of the vertical asymptote(s) of the graph? **19** _____

A $x = a$
B $x = -b, x = c$
C $x = -a$
D $x = b, x = -c$

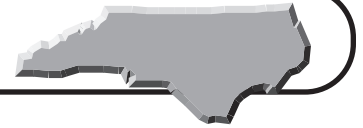
- 20** Which cubic function is represented by the table of values? **20** _____

x	-2	-1	0	1	2
y	-45	-10	-1	0	11

A $y = -3x^3 + 4x^2 + 2x - 1$
B $y = 3x^3 - 4x^2 + 2x - 1$
C $y = 4x^3 - 5x^2 + 2x - 1$
D $y = -4x^3 + 5x^2 + 2x - 1$



Sample Test (continued)



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

21 Which expression would be used to solve $-3 + 4^x = 42$ for x ? **21** _____

A $\frac{\log 42}{\log 4} + 3$

B $\frac{\log 39}{\log 4}$

C $\frac{\log 42}{\log 4} - 3$

D $\frac{\log 45}{\log 4}$

Use the following information for Questions 22–24.

The table below displays data about the relationship between atmospheric pressure and altitude above sea level.

Altitude (thousands of feet)	0	20	40	60	80	100
Pressure (psi)	14.7	6.8	2.7	1.0	0.4	0.2

22 Suppose a scatter plot of the data with altitude as the independent variable and pressure as the dependent variable is drawn. Along what curve of best fit do the data seem to lie? **22** _____

A linear

B quadratic

C inverse

D cubic

23 Find an equation for the best-fit model of the data. **23** _____

A $y = 15.254(0.957)^x$

B $y = 0.002x^2 - 0.367x + 14.096$

C $y = 10.971(0.133)^x$

D $y = -0.133x + 10.971$

24 To the nearest tenth, what does the regression equation predict the pressure will be at an altitude of 50,000 feet? **24** _____

A 0 psi

B 1.7 psi

C 1.9 psi

D 4.3 psi

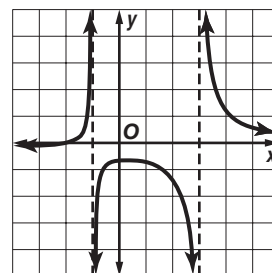
25 Which equation is represented by the graph? **25** _____

A $y = \frac{x^2 - 2x - 3}{x + 2}$

B $y = \frac{x^2 + 2x + 3}{x - 2}$

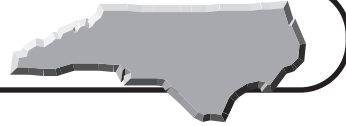
C $y = \frac{x + 2}{x^2 - 2x - 3}$

D $y = \frac{x - 2}{x^2 + 2x + 3}$



Go on

Sample Test (continued)



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

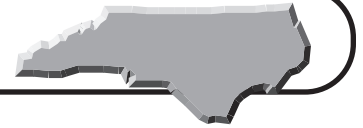
Use the following information for Questions 26 and 27.

To convert c degrees Celsius to k Kelvin units, the conversion function $k = c + 273$ is used. To convert f degrees Fahrenheit to c degrees Celsius, the conversion function $c = \frac{5}{9}(f - 32)$ is used.

- 26** Which composite function will convert x Kelvin units to degrees Fahrenheit? **26** _____
- A** $k^{-1}(c^{-1}(x))$ **B** $c(k(x))$
C $k(c(x))$ **D** $c^{-1}(k^{-1}(x))$
- 27** How many Kelvin units are equivalent to 86°F ? **27** _____
- A** 30 K
B 288.8 K
C 303 K
D 370.2 K
- 28** Solve $|8q - 2| = 30$. **28** _____
- A** $-\frac{7}{2}, 4$
B $-4, \frac{7}{2}$
C 4
D $\frac{7}{2}$
- 29** The sum of the length, width, and height of a box is 116 centimeters. The length is 10 centimeters less than twice the sum of the width and the height. The height is 6 more than twice the width. What is the height of the box? **29** _____
- A** 12 centimeters
B 30 centimeters
C 66 centimeters
D 74 centimeters
- 30** The value of s varies jointly as t and the square of r . If $s = 24$ when $t = 3$ and $r = 4$, find the value of s when $t = 4$ and $r = 6$. **30** _____
- A** 48
B 72
C 144
D 576



Sample Test (continued)

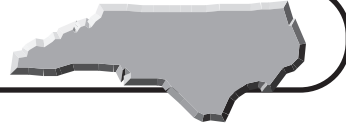


Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

- 31** The period T of an object oscillating on a spring is given by the formula **31** _____
 $T = 2\pi\sqrt{\frac{m}{k}}$, where m is the mass of the object in kilograms and k is the spring constant. What mass, to the nearest hundredth of a kilogram, will produce a 3.4 second period of oscillation if it is attached to a spring with a spring constant of 4.3 Newtons per meter?
A 0.77 kilograms
B 1.04 kilograms
C 1.26 kilograms
D 1.59 kilograms
- 32** For a line of best fit for a set of data pairs, the correlation coefficient is negative. What does this indicate about the data? **32** _____
A The data indicate a cause and effect relationship.
B The data do not indicate a cause and effect relationship.
C As one variable increases, the other variable decreases.
D As one variable increases, the other variable increases.
- 33** Solve $14 + e^{2x - 4} = 88$ for x to the nearest hundredth. **33** _____
A 0.15
B 4.15
C 5.31
D 6.33
- 34** Connor has a square deck, with sides of length 6 yards, in his backyard in Mount Airy. He is planning to increase the size of the square so the new deck will have twice the area of the old deck. To the nearest hundredth, by how many yards will each side increase? **34** _____
A 1.24 yards
B 1.68 yards
C 2.49 yards
D 3 yards
- 35** Solve $\frac{5x + 2}{x^2 - 4} = \frac{-5x}{2 - x} + \frac{2}{x + 2}$ for x . **35** _____
A $\frac{3}{5}$
B $-3, \frac{2}{5}$
C $-2, \frac{3}{5}$
D $-2, 2$



Sample Test (continued)

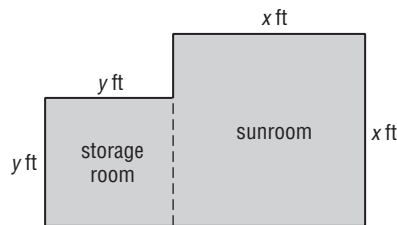


Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

36 Where is the vertex of the parabola with equation $x^2 + 4x - y + 1 = 0$? **36** _____

- A** $(-4, 1)$ **B** $(4, 3)$
C $(0, 1)$ **D** $(-2, -3)$

37 Brandon is building a square sunroom, with side length x feet, and a square storage room, with side length y feet, by his house in Rockingham as shown in the diagram. What is the length of a side of the storage room if the total area for both rooms is 544 square feet, the total perimeter is 104 feet, and the area of the storage room is at least 100 square feet? **37** _____



- A** 12 feet **B** 20 feet
C 23 feet **D** 26 feet

38 Solve for M if $3M - 2\begin{bmatrix} -3 & 4 \\ 1 & -6 \end{bmatrix} = -4\begin{bmatrix} 6 & 2 \\ -4 & 0 \end{bmatrix}$. **38** _____

- A** $\begin{bmatrix} -90 & 0 \\ 654 & -36 \end{bmatrix}$ **B** $\begin{bmatrix} -10 & 0 \\ 6 & -4 \end{bmatrix}$
C $\begin{bmatrix} 3 & 6 \\ -3 & -6 \end{bmatrix}$ **D** $\begin{bmatrix} -30 & 0 \\ 18 & -12 \end{bmatrix}$

39 Solve $3x^2 + 11x - 4 > 0$ for x . **39** _____

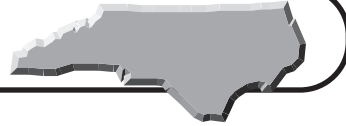
- A** $-\frac{1}{3} < x < 4$
B $-4 < x < \frac{1}{3}$
C $x < -\frac{1}{3}$ or $x > 4$
D $x < -4$ or $x > \frac{1}{3}$

40 For $f(x) = ab^x$, what values would indicate exponential growth? **40** _____

- A** $0 < b < 1$ and $a > 1$
B $0 < a < 1$ and $b < 1$
C $b > 1$ and $a > 0$
D $a > 1$ and $b < 1$



Sample Test (continued)

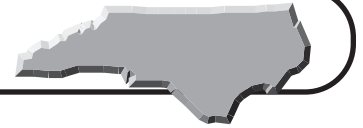


Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

- 46** If $a > 0$ in the equation $y = ax^3$, what does this indicate about the shape of the graph? **46** _____
- A** The graph decreases and then increases.
 - B** The graph increases and then decreases.
 - C** The graph increases from left to right.
 - D** The graph decreases from left to right.
- 47** Revolutions per minute vary inversely as the number of teeth in a gear. If 40 teeth result in 120 revolutions per minute (RPM), how many revolutions per minute would a gear with 50 teeth have? **47** _____
- A** 90 RPM
 - B** 96 RPM
 - C** 150 RPM
 - D** 160 RPM
- 48** Solve $\sqrt[4]{2c - 9} = 3$. **48** _____
- A** 1.5
 - B** 10.5
 - C** 36
 - D** 45
- 49** When using the Quadratic Formula to solve an equation, if the value of $b^2 - 4ac < 0$, what does this indicate about the roots? **49** _____
- A** There are 2 different real roots.
 - B** There is 1 real double root.
 - C** There are 2 complex conjugate imaginary roots.
 - D** There is 1 complex imaginary double root.
- 50** A radioactive substance has a half-life of 3.5 years. If the original sample weighed 5 pounds, to the nearest hundredth how much remains after 12.5 years? **50** _____
- A** 0.04 pound
 - B** 0.42 pound
 - C** 2.47 pounds
 - D** 4.12 pounds



Sample Test (continued)



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

- 51** A house cat must take in more food for its size than a tiger. This fact is related to the ratio of each animal's surface area to its volume. Sometimes scientists use cylinders of the appropriate size to represent the animals. If a cylinder has radius r and height h , the ratio of its surface area to its volume is $\frac{2\pi r^2 + 2\pi rh}{\pi r^2 h}$. Simplify this ratio. **51** _____
- A** $4\pi r$ **B** 4
C $\frac{4r(1+h)}{h}$ **D** $\frac{2(r+h)}{rh}$

Use the following information for Questions 52 and 53.

In 2001, the population of North Carolina was estimated to be 8 million people. It was reported that the annual growth rate from 2000 to 2001 was 1.7%. Assume that this annual growth rate in the population continues.

- 52** What function estimates the population N , in millions, as a function of time t , in years? **52** _____
- A** $N(t) = 8(1.017t)$
B $N(t) = 8(1.017)^t$
C $N(t) = 8(0.017t)$
D $N(t) = 8(0.017)^t$
- 53** To the nearest year, how long will it be before North Carolina's population reaches 12 million? **53** _____
- A** 2 years **B** 8 years
C 24 years **D** 88 years
- 54** Simplify $\frac{1}{n^2 - 3n - 10} + \frac{2n - 10}{3n + 6}$. **54** _____
- A** $\frac{2n^2 - 20n + 53}{3(n+2)(n-5)}$ **B** $\frac{2n^2 - 20n + 50}{(n+2)(n-5)}$
C $\frac{2n - 9}{n^2 - 4}$ **D** $\frac{2n - 4}{n^2 - 4}$
- 55** What is the center of the circle whose equation is $x^2 + y^2 + 8x - 4y + 11 = 0$? **55** _____
- A** (16, 4)
B (-11, 8)
C (8, 4)
D (-4, 2)



Sample Test (continued)



Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

- 56** The load s that a beam with a rectangular cross-section can support varies jointly as its width w and the square of its depth d , and varies inversely as its length ℓ . What equation models this relationship? **56** _____

A $s = \frac{kwd^2}{\ell}$

B $s = \frac{kw}{d^2\ell}$

C $s = \frac{k\ell}{wd^2}$

D $s = \frac{kw\ell}{d^2}$

- 57** The equation of a parabola is $y^2 - 8x - 4y + 22 = 0$. In what direction does the graph open? **57** _____

A up

B down

C left

D right

- 58** Simplify $(3 - 2i)^2 + (4 + i) - (2 - 7i)$. **58** _____

A $7 + 8i$

B $7 - 4i$

C $15 - 6i$

D $7 - 6i$

- 59** Find PQ if $P = \begin{bmatrix} 6 & 4 & -5 \\ 0 & 3 & -2 \\ 8 & -4 & 1 \end{bmatrix}$ and $Q = \begin{bmatrix} 0 & -2 & 4 \\ 5 & -1 & -3 \\ 8 & 2 & 3 \end{bmatrix}$. **59** _____

A $\begin{bmatrix} -20 & -26 & -3 \\ -1 & -7 & -15 \\ -12 & -10 & 47 \end{bmatrix}$

B $\begin{bmatrix} 6 & 2 & -1 \\ 5 & 2 & -5 \\ 16 & -2 & 4 \end{bmatrix}$

C $\begin{bmatrix} -28 & -19 & -11 \\ 3 & 0 & 6 \\ 49 & -19 & 47 \end{bmatrix}$

D $\begin{bmatrix} -20 & -1 & -12 \\ -26 & -7 & -10 \\ -3 & -5 & 7 \end{bmatrix}$

- 60** If $f(x) = -2x^3 + 3x^2 - 5x + 7$, evaluate $f(3)$. **60** _____

A -89

B -35

C -8

D 103

