

Name _____

RELEASED FORM

Algebra I

Form H



North Carolina Test of Algebra I

Public Schools of North Carolina

www.ncpublicschools.org

State Board of Education

Department of Public Instruction

Division of Accountability Services/North Carolina Testing Program

Raleigh, North Carolina 27699-6314



1. Simplify:

$$\frac{64x^5}{4x^2}$$

- A $60x^{2.5}$
- B $60x^3$
- C $16x^{2.5}$
- D $16x^3$

2. If y varies directly as x , and $y = 12$ when $x = 72$, then what is the value of x when $y = 3$?

- A 18
- B 2
- C $\frac{1}{2}$
- D $\frac{1}{6}$

3. Which expression is the greatest common factor of $125t^3m^5$, $60t^4m^4$, $85t^5m^2$?

- A $5t^3m^2$
- B $5t^4m^2$
- C $5t^4m^4$
- D $5t^5m^5$

4. The balance, B_{n+1} , in Mr. Smith's savings account at the end of a year is calculated by the equation $B_{n+1} = 1.065 B_n$, where B_n is the balance at the end of the previous year. Mr. Smith made a deposit to

5. On a map, Luis's house is located at $(-7, 6)$ and Melvin's house is at $(4, -5)$. What are the coordinates for Raquel's home if she lives exactly halfway between Luis and Melvin?

- A $(6, -5.5)$
B $(-1.5, 0.5)$
C $(-3, 1)$
D $(-5.5, 0.5)$
-

6. The matrix below shows the yearly

7. Matrix X and matrix Y represent the inventories of two stores.

$$\begin{array}{cc} & \begin{matrix} 26 & 37 \\ 18 & 49 \\ 95 & 60 \end{matrix} & & \begin{matrix} 15 & 23 \\ 26 & 48 \\ 81 & 55 \end{matrix} \\ X & & Y & \end{array}$$

Which matrix, S , lists their combined inventories?

- A $\begin{pmatrix} 11 & 14 \\ 8 & 1 \\ 14 & 5 \end{pmatrix}$
- B $\begin{pmatrix} 26 & 23 \\ 18 & 48 \\ 95 & 55 \end{pmatrix}$
- C $\begin{pmatrix} 41 & 60 \\ 44 & 97 \\ 176 & 115 \end{pmatrix}$

8. A caterer's recipes are each designed to make 4 servings. The ingredients are shown in the matrix below.

$$\begin{matrix} & \begin{bmatrix} 3 & 2 & 1 \\ 3 & 4 & 2 \\ 2 & 1 & 0.5 \end{bmatrix} \\ \begin{matrix} \text{(cups)} \\ \text{(cups)} \end{matrix} & \end{matrix}$$

How much flour is needed to make 60 servings of bread and 60 servings of cake?

- A 7 cups
- B 9 cups
- C 105 cups
- D 420 cups

9. Given $X = \begin{bmatrix} 2 & 3 & 1 \\ -1 & 5 & 4 \end{bmatrix}$ and $Y = \begin{bmatrix} 6 & 0 & -2 \\ 4 & 1 & 5 \end{bmatrix}$. What is $2X - 3Y$?

- A $\begin{bmatrix} -14 & 6 & 8 \\ -14 & 7 & -7 \end{bmatrix}$
- B $\begin{bmatrix} 22 & 6 & -4 \\ 10 & 13 & 23 \end{bmatrix}$
- C $\begin{bmatrix} -14 & 3 & 8 \\ -14 & 7 & -7 \end{bmatrix}$
- D $\begin{bmatrix} 22 & 9 & -4 \\ 10 & 13 & 23 \end{bmatrix}$

10. The chart below shows the latitudes and average January temperatures for 8 cities.

Albany, NY	43°	22°F
Baltimore, MD	39°	32°F
Boston, MA	42°	29°F
Columbia, SC	34°	47°F
Philadelphia, PA	40°	33°F
Raleigh, NC	36°	40°F
Savannah, GA	32°	49°F
Tampa, FL	28°	61°F

According to the line of best fit, what is the **approximate** decrease in average temperature per degree change in latitude?

- A 5°
- B 4°
- C 2°
- D 1°

11. In the formula $A = P(1 + r)^t$, P is the principal, r is the annual rate of interest, and A is the amount after t years. An account earning interest at a rate of 4% has a principal of \$500,000. If no more deposits or withdrawals are made, **about** how much money will be in the account after five years?

A \$705,200
B \$620,700
C \$608,300
D \$575,000

12. Given:

$$\frac{2x}{2x} = \frac{3y}{y} = \frac{12}{4}$$

What is the value of $x + y$?

A -5
B -1
C 1
D 5

13. The height, $h(t)$, in feet of an object thrown into the air with an initial upward velocity of 63 feet per second is given by the formula $h(t) = -16t^2 + 63t$, where t is the time in seconds. What is the height of the object after 3 seconds?

A 45 ft
B 59 ft
C 81 ft
D 93 ft

14. A taxi ride cost \$29.40. The driver charged \$3 plus \$0.40 per 0.2 mile traveled. How far did the taxi travel on this trip?

A 9.8 miles
B 13.2 miles
C 66 miles
D 73.5 miles

15. The average price of a movie ticket in the year 2000 was \$5.39. The average price of a movie ticket in the year 2004 was \$6.21. Assuming the increase is linear, what would be the **approximate** price of a movie ticket in the year 2009?

A \$6.42
B \$7.03
C \$7.24
D \$8.06

16. What is the value of y in the system of equations below?

$$\begin{array}{rclcrcl} 2x & 6y & 9 & & \\ & y & \frac{1}{2}x & 2 & \end{array}$$

A -7
B 0.5
C 3
D 5.5

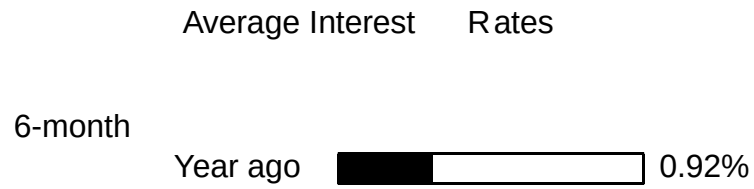
20. At the airport, the new runway will be parallel to a nearby highway. On the scale drawing of the airport, the equation that represents the highway is $6y = 8x - 11$. Which equation could represent the new runway?

A $9y = 12x - 5$
B $9x = 12y - 8$
C $12y = -9x - 2$
D $12x = -9y - 4$

21. The midpoint of $\overline{XY}$ is point $M(-12, 5)$. If the coordinates of X are $(3, -3)$, what are the coordinates of Y ?

A $(-4.5, 1)$
B $(-7.5, 4)$
C $(-15, 8)$
D $(-27, 13)$

22. The average interest rates for certificates of deposit are given in percents in the graph below.



23. Matrix G shows the number of students at a gym in the year 2000. Matrix M shows the number of students at the same gym in 2005.

	ages 2—5	ages 6—10	ages 11—15	boys	girls
Matrix G:	18	21	16	26	21
					23

	ages 2—5	ages 6—10	ages 11—15	boys	girls
Matrix M:	24	26	13	18	18
					32

Which matrix represents the change from 2000 to 2005?

- A
- | | | |
|----|----|----|
| 8 | 6 | 0 |
| 0 | 8 | 8 |
| 10 | 16 | 16 |
- B
- | | | |
|---|---|---|
| 6 | 8 | 0 |
| 5 | 3 | 8 |
| 3 | 9 | 9 |
- C
- | | | |
|----|----|----|
| 21 | 26 | 0 |
| 21 | 26 | 8 |
| 16 | 32 | 16 |
- D
- | | | |
|----|----|----|
| 39 | 50 | 0 |
| 39 | 47 | 8 |
| 29 | 55 | 16 |

M

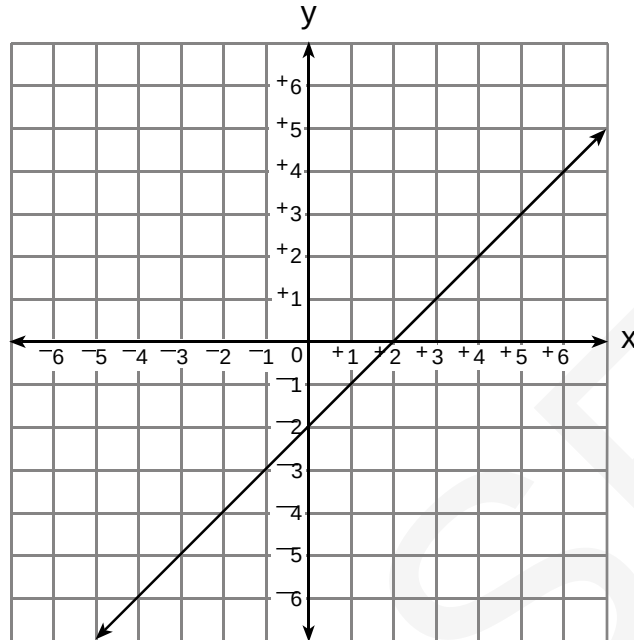
25. The table below displays the average number of pounds of milk and milk fat produced per cow in seven states in 2001.

State	Pounds of Milk	Pounds of Milk Fat
Colorado	21,400	760
Georgia	16,700	607
Maryland	15,800	578
Nebraska	16,200	601
Oklahoma	14,500	524
Tennessee	14,500	530
Utah	17,600	640

Source: National Agricultural Statistics Service,
U.S. Department of Agriculture

In North Carolina in 2001, the production of milk per cow was 17,200 pounds. According to the line of best fit for the data above,

30. For the line graphed below, the x -intercept is changed to -2 and the slope is unchanged.



How will the graph of the line change?

- A The new line will be parallel to the original line.
- B The new line will be perpendicular to the original line.
- C The new line will intersect the original line.
- D The new line will be the same line as the original line.

31. Solve: $x^2 - 7x + 10 = 28$

- A $\{-4, 7\}$
- B $\{-2, 9\}$
- C $\{5, 2\}$
- D $\{30, 33\}$

32. Given the system of equations:

$$\begin{array}{rcl} 6x & + & y = 9.7 \\ 4x & + & 2y = 9.8 \end{array}$$

What is the value of x ?

- A 1.0
- B 1.2
- C 1.9
- D 2.5

33. Simplify: $2x^0y - 3xy^5$

A $-3y^6$

B $-6y^5$

C $-3xy^5$

D $-6xy^6$

34. The cost of mailing a box varies directly with the weight of the box in pounds. It costs \$8 to mail a 5-pound box. How much would it cost to mail a 12-pound box?

A \$19.20

B \$16.00

C \$15.00

D \$7.50

35. Which expression is equivalent to $x^3 - 3x^2 + 4x - 5$?

A $3x^3 - 5x^2 - 17x - 15$

B $3x^3 - 9x^2 - 13x - 15$

C $3x^3 - 9x^2 - 5x - 15$

D $3x^3 - 13x^2 - 17x - 15$

36. Each year, Cathy invests \$1,200 in her account. The account pays an interest rate of 6.3%. The formula to calculate the balance in her account

is $B = \frac{A(1 + r)^{n+1} - A}{r}$, where

A is the amount invested per year, r is the interest rate, and n is the number of years investing.

Approximately how much will Cathy have in her account after 45 years?

A \$217,000

B \$248,000

C \$279,000

D \$297,000

37. The endpoints of $\overline{GH}$ are G $(-3, 7)$ and H $(2, 9)$. What are the coordinates of the midpoint of $\overline{GH}$?

A $(8, \frac{1}{2})$

B $(\frac{1}{2}, 8)$

C $(-\frac{1}{2}, 8)$

38. Which is an equation of a line that is parallel to _____ ?

39. The graph below displays the number of newspapers and magazines sold at a store for three days in one week.



40. An algebra teacher recorded the number of boys and girls absent in her class last week. On Monday, 3 boys and 2 girls were absent. On Tuesday, 1 boy and no girls were absent. On Wednesday, no boys and 5 girls were absent. On Thursday, no boys or girls were absent. On Friday, 1 boy and 3 girls were absent. Which matrix correctly displays the number of boys and girls absent each day last week?

A $\begin{bmatrix} 3 & 2 & 1 & 0 \\ 5 & 0 & 0 & 1 \end{bmatrix}$

$\begin{bmatrix} 0 & 3 \\ 1 & 5 \end{bmatrix}$

B $\begin{bmatrix} 3 & 1 & 5 & 0 \\ 2 & 0 & 0 & 0 \end{bmatrix}$

$\begin{bmatrix} 0 & 3 \\ 1 & 5 \end{bmatrix}$

42. What value of x makes the equation true?

$$3^5 - 1^a = 2^{\frac{1}{2}} \quad 4^6 - 0 = 11 - 9^a$$

- A 0
- B 2
- C 4
- D 6

43. The equation $y = 461.19x + 3,492$ represents the value of a work of art from 1964 to 2005. What does the number 461.19 represent?

- A value of the work of art in 1964
- B value of the work of art in 2005
- C yearly decrease in value
- D yearly increase in value

44. A computer is purchased for \$1,200 and depreciates at \$140 per year. Which linear equation represents the value, V , of the computer at the end of t years?

$$A \quad V = 1,200 - 140t$$

46. Henry wants to join a book-of-the-month club. The first club costs \$40 to join and \$10 per book. The second club costs \$15 per book and has no fee to join. How many books would need to be purchased from each club for the clubs to cost the same?
- A 15
B 10
C 8
D 6
47. A group of 3 children and 2 adults pay a total of \$120 to take a karate class. A group of 5 children and 1 adult take the same karate class for \$95. What is the total cost for 1 child and 1 adult to take the karate class?
- A \$60
B \$55
C \$51
D \$48
48. For the line $y = mx + b$, where $m \neq 0$ and $b \neq 0$, what change would occur if b is multiplied by -1 and m remains the same?
- A The y-intercept would become negative.
B The slope would become negative.
C The resulting line would be perpendicular to the original line.
D The resulting line would be parallel to the original line.

49.

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54. On a map of downtown, 12th Street is perpendicular to Avenue J. The equation $y = -4x + 3$ represents 12th Street. What is the equation representing Avenue J if it passes through the point $(8, 16)$?

- A $y = -4x + 48$
- B $y = -4x + 14$
- C $y = \frac{1}{4}x + 3$
- D $y = \frac{1}{4}x + 14$

55. The matrix below displays prices of pizzas at different pizza shops.

	Sal's Pizza	Quick Stop Pizza	Romero's Pizza	John's Pizza
Small	\$8.00	\$6.00	\$9.50	\$7.00
Medium	\$10.00	\$9.00	\$12.75	\$10.00
Large	\$12.00	\$13.00	\$14.75	\$13.00

Mrs. Hughes is ordering 6 large pizzas and 2 medium pizzas. Which pizza shop will charge the least for the order?

- A Sal's Pizza
- B Quick Stop Pizza
- C Romero's Pizza
- D John's Pizza

56. The matrices below display the number of wins, losses, and ties during two seasons.

First Season				Second Season					
	Wins	Losses	Ties		Wins	Losses	Ties		
Team 1	13	15	12		Team 1	19	14	9	
Team 2	17	12	10		Team 2	14	19	10	

What is the total number of losses by Team 2 for these two seasons?

- A 27
- B 31
- C 33
- D 60

57. The matrix below shows women's real hourly wages for the period of years from 1975 to 1995, based on level of education.

	High School Diploma	College Degree
1975	\$9.27	\$13.24
1980	\$9.33	\$12.64
1985	\$9.31	\$13.59
1990	\$9.24	\$14.73
1995	\$9.21	\$15.28

Over the 20-year period, how did the real hourly wages of women with only a high school diploma compare with the real hourly wages of women with a college degree?

- A Both groups showed an overall

58. The table below shows the costs for visits of different lengths by cleaning companies in a town. The length of a visit is represented by x , and the cost of a visit is represented by y . Each cleaning company charges a flat fee for visiting the house or apartment and an hourly rate.

Length of Visit (in hours)	Cost of Visit
2	\$72
2	\$76
3	\$91
3.5	
4	
4.5	
5.5	

59. An amusement park charges \$15 to enter the park and an additional fee for each time a guest rides a roller coaster. Susan rode 6 times on a roller coaster. Her total payment was \$33. Maria rode 11 times on a roller coaster. What was her total payment?

A \$44
B \$48
C \$50
D \$58

60. Which equation describes the function below?

x	y
-2	6
5	27
4	18
7	51

A $y = -3x$
B $y = 5x + 16$
C $y = x^2 + 2$
D $y = 2x^2 + 2$

61. Carol has three times as many 10-dollar bills as 5-dollar bills. She has a total of \$350. How many 5-dollar bills does Carol have?

A 10
B 14
C 30
D 42

62. In 2000 Jim planted a tree that was $4\frac{1}{2}$ feet tall. In 2005 the tree was $15\frac{3}{4}$ feet tall. Assuming the growth of the tree is linear, what was the rate of growth of the tree?

A $2\frac{1}{4}$ feet per year
B $4\frac{1}{2}$ feet per year
C $5\frac{5}{8}$ feet per year
D $11\frac{1}{4}$ feet per year

63. The number of cell phones, y (in thousands), from 1985 to 1995 can be modeled using the equation $y = 0.432(1.55)^x$, where x is the number of years after 1985. In what year were there approximately 6 thousand cell phones?

A 1989
B 1991
C 1993
D 1995

64. Given the system of equations:

$$\begin{array}{rcl} 4x & 6y & 12 \\ 2x & 2y & 6 \end{array}$$

What is the value of y ?

A 3
B 1.2
C 0
D -1.8



North Carolina Test of Algebra I
Form H RELEASED Fall 2009
Answer Key

Item Number	Correct Answer	Goal
1	D	1 – Number and Operations
2	A	1 – Number and Operations
3	A	1 – Number and Operations
4	B	1 – Number and Operations
5	B	2 – Measurement and Geometry
6	D	3 – Data Analysis and Probability
7	C	3 – Data Analysis and Probability
8	C	3 – Data Analysis and Probability
9	A	3 – Data Analysis and Probability
10	C	3 – Data Analysis and Probability
11	C	4 – Algebra
12	D	4 – Algebra
13	A	4 – Algebra
14	B	4 – Algebra
15	C	4 – Algebra
16	B	4 – Algebra
17	C	1 – Number and Operations
18	C	1 – Number and Operations
19	B	1 – Number and Operations
20	A	2 – Measurement and Geometry
21	D	2 – Measurement and Geometry
22	A	3 – Data Analysis and Probability
23	B	3 – Data Analysis and Probability
24	A	3 – Data Analysis and Probability
25	D	3 – Data Analysis and Probability
26	D	3 – Data Analysis and Probability
27	C	4 – Algebra
28	C	4 – Algebra
29	B	4 – Algebra
30	A	4 – Algebra
31	B	4 – Algebra
32	B	4 – Algebra
33	D	1 – Number and Operations
34	A	1 – Number and Operations
35	A	1 – Number and Operations
36	D	1 – Number and Operations
37	B	2 – Measurement and Geometry
38	B	2 – Measurement and Geometry
39	C	3 – Data Analysis and Probability
40	C	3 – Data Analysis and Probability
41	A	3 – Data Analysis and Probability
42	B	3 – Data Analysis and Probability

**North Carolina Test of Algebra I
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Raw to Scale Score Conversion**

42	152
43	153
44	154
45	155
46	156
47	156
48	157
49	158
50	159
51	160