

Released Form

Student Name: _____

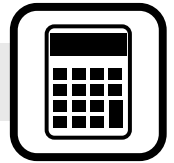
Spring 2013
North Carolina
Measures of Student Learning:
NC's Common Exams
Common Core Math II



Student Booklet



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



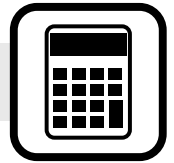
- 1 The equation $s = 2\sqrt{5x}$ can be used to estimate the speed, s , of a car in miles per hour, given the length in feet, x , of the tire marks it leaves on the ground. A car traveling 90 miles per hour came to a sudden stop. According to the equation, how long would the tire marks be for this car?
- A 355 feet
B 380 feet
C 405 feet
D 430 feet

- 2 The heights of two different projectiles after they are launched are modeled by $f(x)$ and $g(x)$. The function $f(x)$ is defined as $f(x) = -16x^2 + 42x + 12$. The table contains the values for the quadratic function g .

x	$g(x)$
0	9
1	33
2	25

What is the **approximate** difference in the maximum heights achieved by the two projectiles?

- A 0.2 feet
B 3.0 feet
C 5.4 feet
D 5.6 feet



- 3 A city map is placed on a coordinate grid. The post office is located at the point $P(5, 35)$, the library is located at the point $L(15, 10)$, and the fire station is located at the point $F(9, 25)$. What is the ratio of the length of \overline{PF} to the length of \overline{LF} ?
- A 2 : 3
B 3 : 2
C 2 : 5
D 3 : 5
- 4 Twenty-one students at a school have an allergy to peanuts, shellfish, or both.
- Fourteen students at the school are allergic to peanuts.
 - Twelve students at the school are allergic to shellfish.
- How many of the students are allergic to both peanuts and shellfish?
- A 12
B 7
C 5
D 2
- 5 Events M and N have probabilities such that $P(M) = 0.4$, $P(N) = 0.28$, $P(M \cup N) = 0.56$, and $P(M \cap N) = 0.12$. Are event M and event N independent?
- A no, because $P(M) - P(N) = P(M \cap N)$
B no, because $P(M) \cdot P(N) \neq P(M \cap N)$
C yes, because $P(M) + P(N) = P(M \cup N)$
D yes, because $P(M) \cdot P(N) \neq P(M \cup N)$



6 Which expression is equivalent to $(3x^5 + 17x^3 - 1) + (-2x^5 - 6)$?

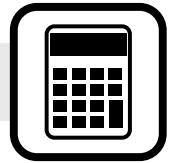
A $x^5 + 17x^3 - 7$

B $x^5 - 11x^3 - 1$

C $5x^5 + 17x^3 + 7$

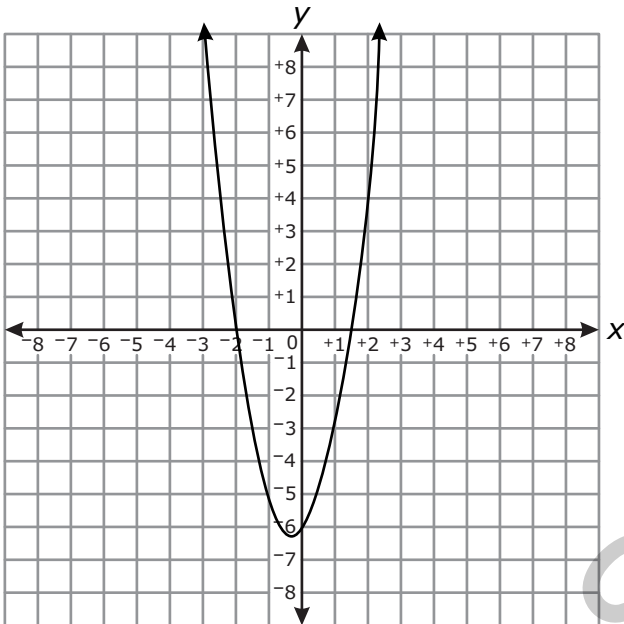
D $-6x^5 + 17x^3 + 6$

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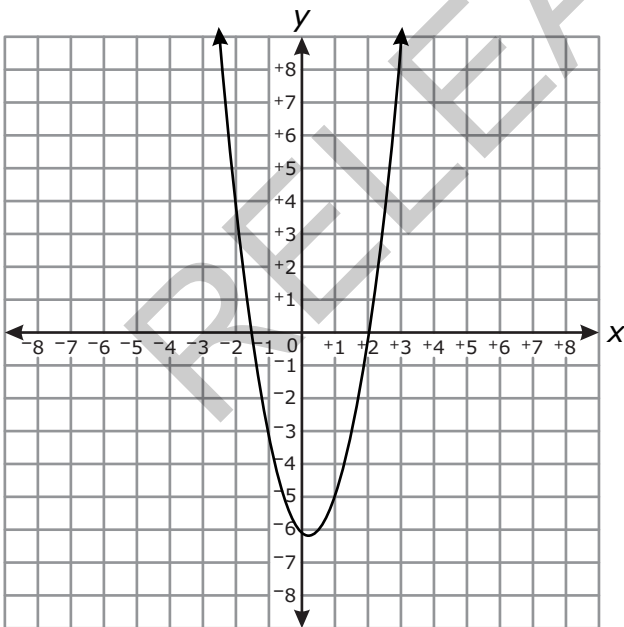


7 Which graph displays the function $f(x)=(2x + 3)(x - 2)$?

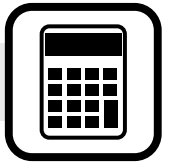
A



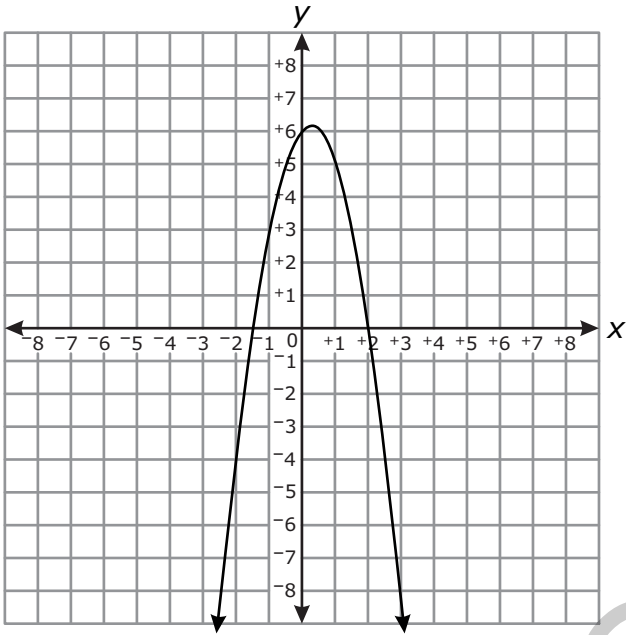
B



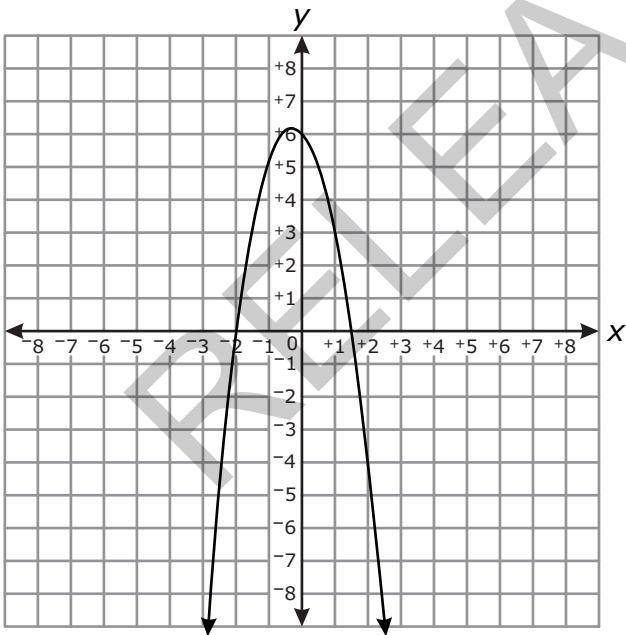
Answer choices C and D are on the following page.

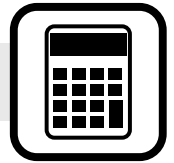


C

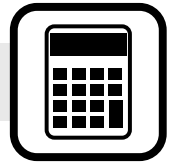


D





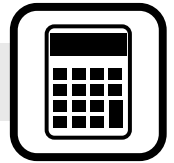
- 8 The sum of two numbers is 24. The sum of the squares of the two numbers is 306. What is the product of the two numbers?
- A 119
B 128
C 135
D 144
- 9 Which equation has exactly one real solution?
- A $4x^2 - 12x - 9 = 0$
B $4x^2 + 12x + 9 = 0$
C $4x^2 - 6x - 9 = 0$
D $4x^2 + 6x + 9 = 0$
- 10 A circular pond is modeled by the equation $x^2 + y^2 = 225$. A bridge over the pond is modeled by a segment of the equation $x - 7y = -75$. What are the coordinates of the points where the bridge meets the edge of the pond?
- A (9, 12) and (-12, 9)
B (9, 12) and (12, 9)
C (9, -12) and (-12, -9)
D (-9, 12) and (12, -9)



- 11 The volume, V , of a certain gas varies inversely with the amount of pressure, P , placed on it. The volume of this gas is 175 cm^3 when 3.2 kg/cm^2 of pressure is placed on it. What amount of pressure must be placed on 400 cm^3 of this gas?
- A 1.31 kg/cm^2
B 1.40 kg/cm^2
C 2.86 kg/cm^2
D 7.31 kg/cm^2
- 12 A company manufactures DVDs.
- The company spent \$247,000 to develop its process for manufacturing the DVDs.
 - The company spends an additional \$1.25 to manufacture each DVD.

Which function represents the average total cost per DVD, y , for the company to manufacture x total DVDs?

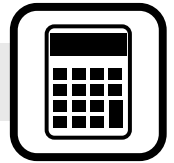
- A $y = \frac{x}{1.25x}$
B $y = \frac{1.25x}{x}$
C $y = \frac{x}{1.25x + 247,000}$
D $y = \frac{1.25x + 247,000}{x}$



- 13 For a carnival game, a jar contains 20 blue marbles and 80 red marbles.
- Children take turns randomly selecting a marble from the jar.
 - If a blue marble is chosen, the child wins a prize.
 - After each turn, the marble is replaced.
 - Casey has drawn six red marbles in a row.

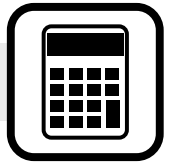
Which statement is true?

- A If Casey selects another red marble, then 2 of her next 3 picks will be blue marbles because 2 blue marbles are selected for every 8 red marbles selected.
- B The probability that Casey selects a blue marble on the next turn is higher than it was on her last turn because she has chosen so many red marbles in a row.
- C The probability that Casey selects a blue marble on her next turn is the same as it was on the last turn because selections are independent of each other.
- D If Casey draws 4 more times, she will select 2 blue marbles because the probability that a blue marble will be selected is 2 out of every 10 turns.
- 14 A plane intersects a regular triangular pyramid. The plane is parallel to one of the faces of the pyramid. What type of polygon is formed at the intersection?
- A square
- B right triangle
- C isosceles trapezoid
- D isosceles triangle

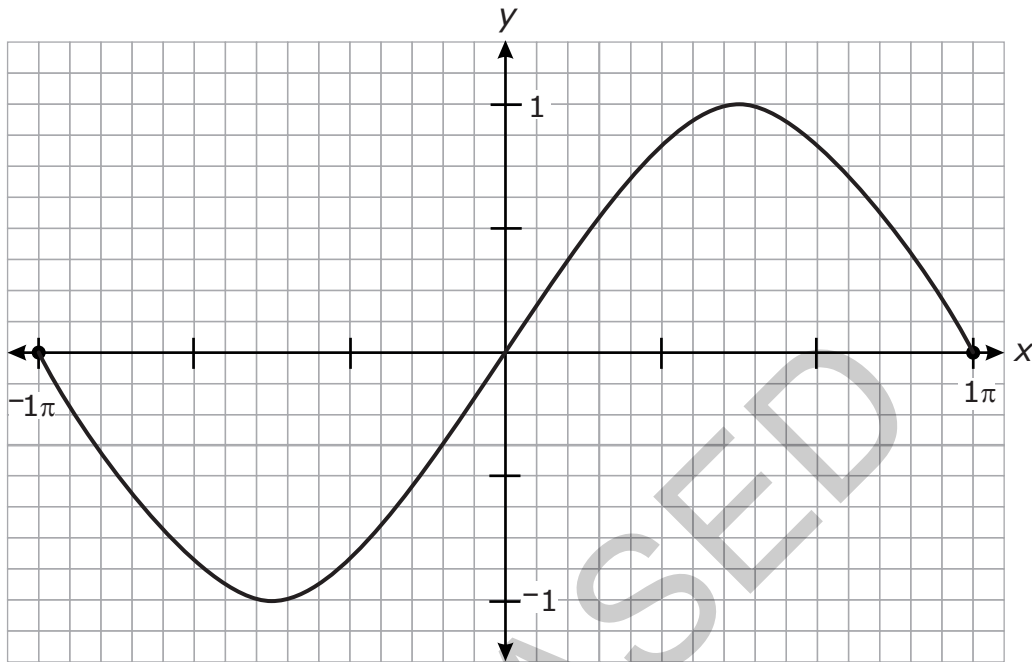


- 15 The number of bacteria in a culture can be modeled by the function $N(t) = 28t^2 - 30t + 160$, where t is the temperature, in degrees Celsius, the culture is being kept. A scientist wants to have fewer than 200 bacteria in a culture in order to test a medicine effectively. What is the **approximate** domain of temperatures that will keep the number of bacteria under 200?
- A $-1.01^\circ\text{C} < t < 2.03^\circ\text{C}$
 - B $-0.90^\circ\text{C} < t < 1.97^\circ\text{C}$
 - C $-0.86^\circ\text{C} < t < 1.93^\circ\text{C}$
 - D $-0.77^\circ\text{C} < t < 1.85^\circ\text{C}$

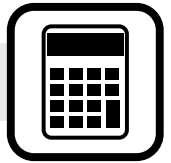
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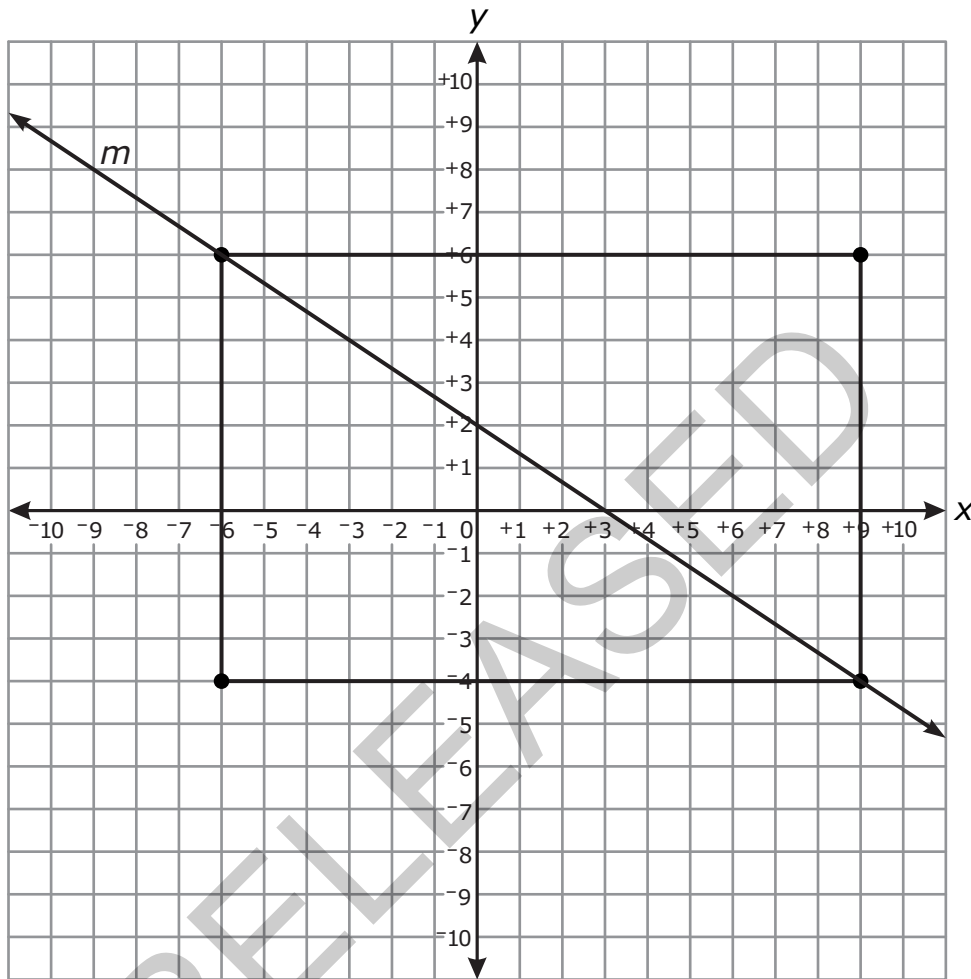
16 Which function is graphed below?



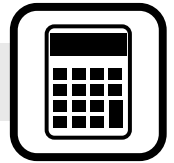
- A $y = \sin x$
- B $y = \cos x$
- C $y = \tan x$
- D $y = \cot x$



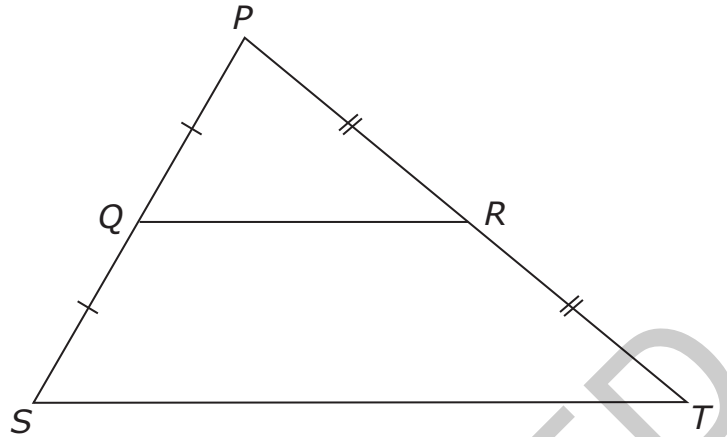
- 17 Which transformation will carry the rectangle shown below onto itself?



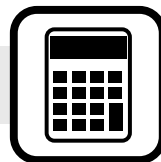
- A a reflection over line m
- B a reflection over the line $y = 1$
- C a rotation 90° counterclockwise about the origin
- D a rotation 270° counterclockwise about the origin



- 18 Which statement must be true about the triangle below?



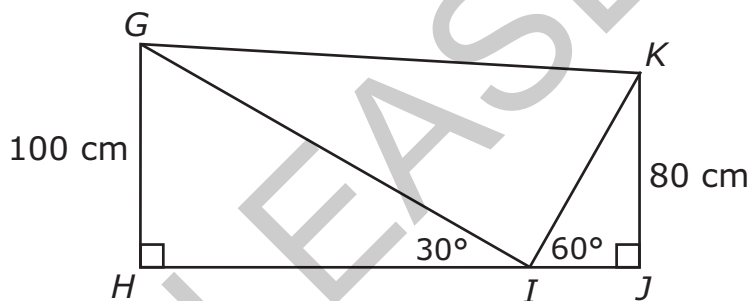
- A $PQ + QS = PR + RT$
- B $\triangle PQR \cong \triangle PST$
- C $ST = 2 \cdot QR$
- D $\angle S \cong \angle T$
- 19 The graph of $f(x) = x^2$ will be translated 5 units up and 2 units to the right. Which function describes the graph produced by the translation?
- A $g(x) = x^2 - 4x + 9$
- B $g(x) = x^2 + 4x - 1$
- C $g(x) = x^2 - 10x + 27$
- D $g(x) = x^2 + 10x + 23$



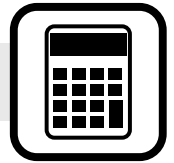
- 20 An investment has a balance of \$2,000 and earns 3.2% interest each year. If \$150 is added at the end of each year by the account holder and no money is withdrawn from the investment, which represents a function that can be used to calculate the investment balance for successive years?

- A $B_n = 0.032B_{n-1} + 2,000, B_0 = 150$
 B $B_n = 0.032B_{n-1} + 150, B_0 = 2,000$
 C $B_n = 1.032B_{n-1} + 2,000, B_0 = 150$
 D $B_n = 1.032B_{n-1} + 150, B_0 = 2,000$

- 21 What is the **approximate** length of \overline{HJ} in the diagram below?



- A 292 cm
 B 265 cm
 C 219 cm
 D 196 cm



- 22 Angles F and G are complementary angles.
- As the measure of angle F varies from a value of x to a value of y , $\sin(F)$ increases by 0.2.

How does $\cos(G)$ change as F varies from x to y ?

- A It increases by a greater amount.
- B It increases by the same amount.
- C It increases by a lesser amount.
- D It does not change.
- 23 If t is an unknown constant, which binomial must be a factor of $7m^2 + 14m - tm - 2t$?
- A $7m + t$
- B $m - t$
- C $m + 2$
- D $m - 2$
- 24 The value, V , of a car can be modeled by the function $V(t) = 13,000(0.82)^t$, where t is the number of years since the car was purchased. To the nearest tenth of a percent, what is the monthly rate of depreciation?
- A 1.5%
- B 1.6%
- C 9.2%
- D 18.0%



25 Which expression is equivalent to $\left(\frac{16x^{\frac{1}{6}}y^{-2}}{x^{-\frac{1}{6}}y^6}\right)^{\frac{3}{2}}$?

A $24x^{\frac{9}{2}}y^{\frac{9}{2}}$

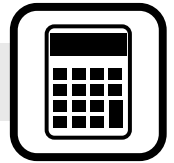
B $\frac{24x^{\frac{3}{4}}}{y^9}$

C $\frac{64}{x^{\frac{1}{2}}y^8}$

D $\frac{64x^{\frac{1}{2}}}{y^{12}}$

This is the end of the multiple-choice portion of the test.

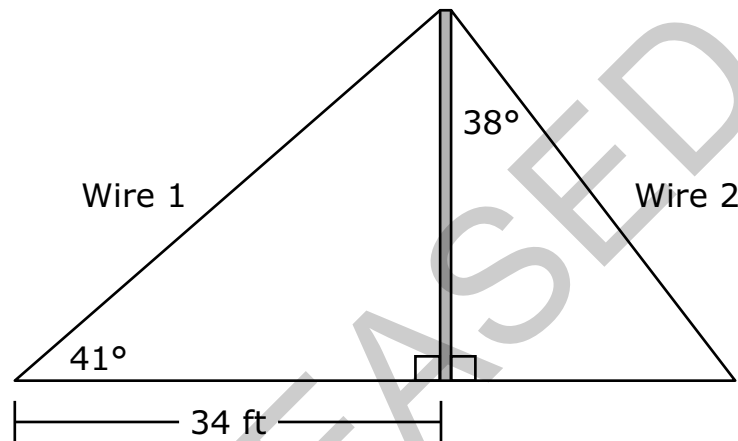
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The questions you read next will require you to answer in writing.

1. Write your answers on separate paper.
2. Be sure to write your name on each page.

- 1 In the figure below, a pole has two wires attached to it, one on each side, forming two right triangles.



Based on the given information, answer the questions below.

- How tall is the pole?
 - How far from the base of the pole does Wire 2 attach to the ground?
 - How long is Wire 1?
- 2 The amount of time it takes to build a road varies inversely with the number of workers building the road. Suppose it takes 50 workers 8 months to build the road.
- What is the constant of variation?
 - Write an equation that could be used to determine how long it would take n workers to build the road. (Be sure to define the variables.)
 - How much faster would 60 workers build the road than 50 workers?



- 3 The function $f(x)$ is defined as $f(x) = x^2 + 2x - 4$. The function $g(x)$ is defined as $g(x) = -3f(x) + 2$.
- Graph $g(x)$ for $-2 \leq x \leq 2$.
 - Describe the transformations that take the function $f(x)$ onto $g(x)$.
 - Write a new function, $h(x)$, that transforms $g(x)$ back onto $f(x)$.

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This is the end of the Common Core Math II test.

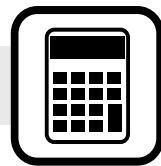
- 1. Look back over your answers.**
- 2. Put all of your papers inside your test book and close the test book.**
- 3. Place your calculator on top of the test book.**
- 4. Stay quietly in your seat until your teacher tells you that testing is finished.**

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Common Core Math II
RELEASED Form
Spring 2013
Answer Key

Item number	Type	Key	Conceptual Category
1	MC	C	F — Function
2	MC	D	F — Function
3	MC	A	G — Geometry
4	MC	C	S — Statistics and Probability
5	MC	B	S — Statistics and Probability
6	MC	A	A — Algebra
7	MC	B	A — Algebra
8	MC	C	A — Algebra
9	MC	B	A — Algebra
10	MC	A	A — Algebra
11	MC	B	A — Algebra
12	MC	D	A — Algebra
13	MC	C	S — Statistics and Probability
14	MC	D	G — Geometry
15	MC	D	F — Function
16	MC	A	F — Function
17	MC	B	G — Geometry
18	MC	C	G — Geometry
19	MC	A	F — Function
20	MC	D	F — Function
21	MC	C	G — Geometry
22	MC	B	G — Geometry
23	MC	C	A — Algebra



Item number	Type	Key	Conceptual Category
24	MC	B	A — Algebra
25	MC	D	N — Number and Quantity
26	CR	Rubric	G — Geometry
27	CR	Rubric	A — Algebra
28	CR	Rubric	F — Function

Item Types:

MC = multiple choice

CR = constructed response

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