Student Name _____

P

MCAP
Maryland Comprehensive
Assessment Program

Algebra I

Test Book

Practice Test

Section 1

(Non-Calculator)

Directions:

Today, you will take Section 1 of the Algebra I Practice Test. You will not be allowed to use a calculator.

Read each question. Then, follow the directions to answer each question. Mark your answers by completely filling in the circles in your answer document. Do not make any pencil marks outside of the circles. If you need to change an answer, be sure to erase your first answer completely. If a question asks you to show or explain your work, you must do so to receive full credit. Only responses written within the space provided will be scored.

If you do not know the answer to a question, you may go on to the next question. If you finish early, you may review your answers and any questions you did not answer in this Section ONLY. Do not go past the stop sign.

GO ON ▶

Directions for Completing the Answer Grids

1. Work the problem and find an answer.

2. Write your answer in the boxes at the top of the grid.

3. Print only one number or symbol in each box. Do not leave a blank box in the middle of an answer.

4. Under each box, fill in the circle that matches the number or symbol you wrote above. Make a solid mark that completely fills the circle.

5. Do not fill in a circle under an unused box.

6. Fractions cannot be entered into an answer grid and will not be scored. Enter fractions as decimals.

7. See below for examples on how to correctly complete an answer grid.

EXAMPLES

To answer −3 in a question, fill in the answer grid as shown below.

To answer .75 in a question, fill in the answer grid as shown below.

GO ON ▶

1 A student is saving money in a bank account to buy a computer. The function $f(w) = 35w + 10$ represents the total amount of money, f, in dollars, in the student's account w weeks after the student started saving for the computer.

What does the number 10 in the function represent in this context?

A the percent interest rate that the account earns

B the increase, in dollars, in the total amount of money in the account each week

C the number of dollars in the account when the student started saving for the computer

D the number of weeks it takes for the student to save enough money in the account to buy the computer

2 The function $f(x) = x^2$ is graphed on the xy-plane. Two other functions are defined as shown.

- $g(x) = f(x - 3)$
- $h(x) = -f(x)$

Which statement correctly describes how the graph of function $f(x)$ could be transformed to create the graph of function $g(x)$ or function $h(x)$?

A The graph of function $f(x)$ could be translated 3 units downward to create the graph of $g(x)$.

B The graph of function $f(x)$ could be translated 3 units to the left to create the graph of $g(x)$.

C The graph of function $f(x)$ could be reflected across the x-axis to create the graph of $h(x)$.

D The graph of function $f(x)$ could be reflected across the y-axis to create the graph of $h(x)$.
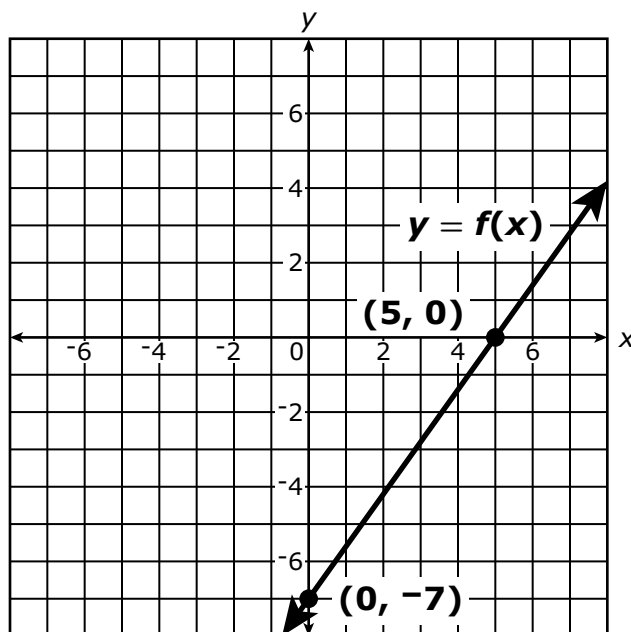
GO ON ▶

3 A system of equations is shown.

$$\begin{cases} 2x - 3y = 7 \\ 6x - 9y = 21 \end{cases}$$

Which statement about the system of equations is true?

A The system has no solutions.

B The system has exactly 1 solution.

C The system has exactly 2 solutions.

D The system has infinitely many solutions.

7

GO ON ▶

4 The graph of $y = f(x)$ is shown in the xy–plane.

Which equation defines function f?

A $f(x) = \dfrac{7}{5}x - 7$

B $f(x) = \dfrac{7}{5}x + 5$

C $f(x) = \dfrac{5}{7}x - 7$

D $f(x) = \dfrac{5}{7}x + 5$

5 The equation $x^2 - 8x - 5 = 0$ can be transformed into the equation $(x - p)^2 = q$, where p and q are real numbers.

What is the value of q?

Enter your answer in the space provided.

GO ON ▶

6 The function shown was developed by a city manager to predict the population of the city in future years for budget purposes. In the function, x represents the number of years after 2025 and $p(x)$ represents the predicted population of the city.

$$p(x) = 300{,}000\,(1.05)^x$$

Which set of numbers **best** represents the domain for the function in this context?

A all integers

B all whole numbers

C all real numbers greater than or equal to 300,000

D all whole numbers greater than or equal to 300,000

7 The solution set of an inequality is represented on the number line shown.
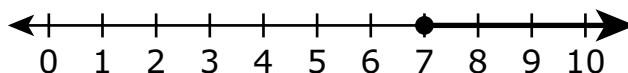
Which inequality has the same solution set as the one represented on the number line?

A $4x + 16 \leq 12$

B $4x + 16 \geq 12$

C $4x - 16 \leq 12$

D $4x - 16 \geq 12$

9

GO ON ▶

8 Function f is defined as $f(x) = x^2 - 6x + 14$.

Which equation shows an equivalent form of $f(x)$ and includes the minimum value of the function?

A $f(x) = (x - 3)^2 + (-5)$

B $f(x) = (x + 3)^2 + (-5)$

C $f(x) = (x - 3)^2 + 5$

D $f(x) = (x + 3)^2 + 5$

**9** An art teacher is purchasing paintbrushes and bottles of paint for a classroom.

- Each paintbrush costs $1.49 and each bottle of paint costs $3.49.
- The art teacher has a total of $225 to spend on the art supplies.

Let x represent the number of paintbrushes and y represent the number of bottles of paint.

Which inequality **best** represents this situation?

A $1.49x + 3.49y \leq 225$

B $1.49x + 3.49y \geq 225$

C $3.49x + 1.49y \leq 225$

D $3.49x + 1.49y \geq 225$

GO ON ▶

10 The graph of an equation is shown.
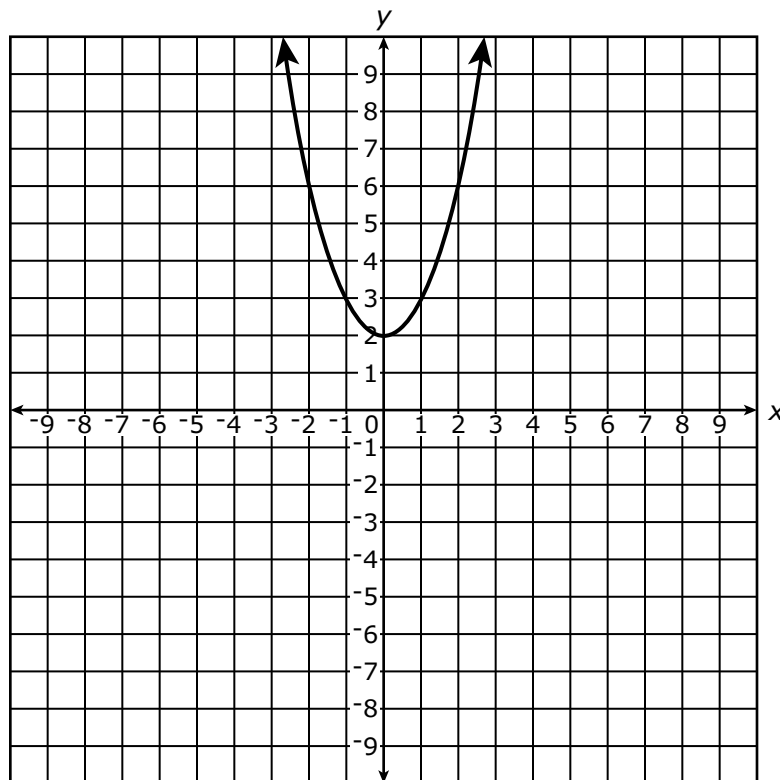
Which equation could be represented by the graph?

A $y = (x + 2)^2$

B $y = (x - 2)^2$

C $y = x^2 + 2$

D $y = x^2 - 2$

11 Let x and y be nonzero rational numbers, and let z be an irrational number.

Which phrase **best** describes the value of the expression xyz?

A always rational

B always irrational

C neither rational nor irrational

D sometimes rational and sometimes irrational

11

GO ON ▶

12 The solution set of a system of inequalities is represented on the cordinate plane shown.
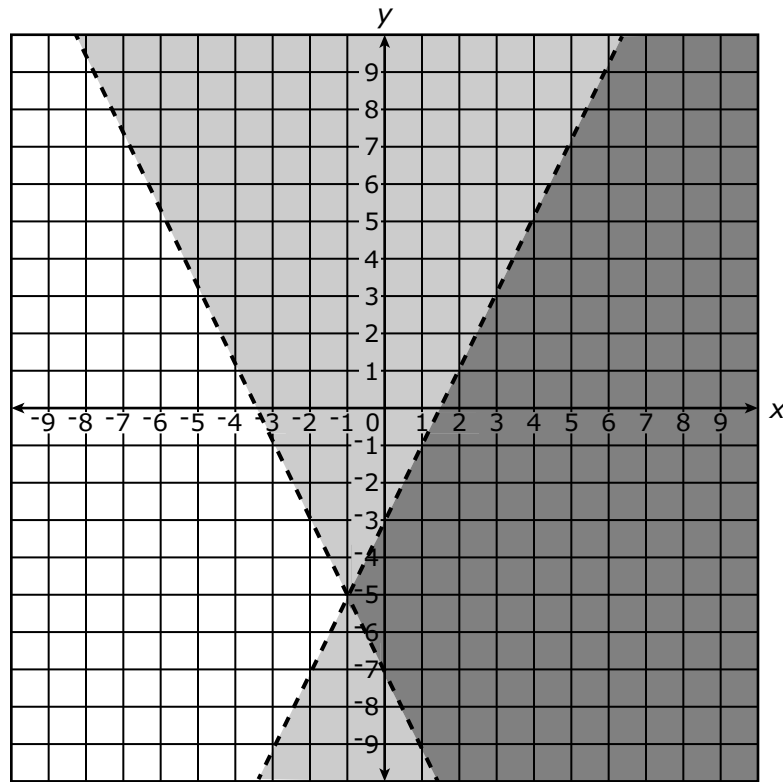
Which system of inequalities has the same solution as the one represented on the coordinate plane?

A $\begin{cases} y \le 2x - 3 \\ y \ge -2x - 7 \end{cases}$

B $\begin{cases} y \ge 2x - 3 \\ y \le -2x - 7 \end{cases}$

C $\begin{cases} y < 2x - 3 \\ y > -2x - 7 \end{cases}$

D $\begin{cases} y > 2x - 3 \\ y > -2x - 7 \end{cases}$

12

GO ON ▶

13 A partially factored polynomial is shown.

$$(x + 1)(x^2 + 2x - 15)$$

What are the zeros of the polynomial?

Select **all** that apply.

A −5

B −3

C −1

D 1

E 3

F 5

STOP

STOP

You have come to the end of Section 1 of the test. Review your answers from Section 1 only.

STOP

GO ON TO NEXT PAGE

Section 2
(Calculator)

Directions:

Today, you will take Section 2 of the Algebra I Practice Test. You will be allowed to use a calculator.

Read each question. Then, follow the directions to answer each question. Mark your answers by completely filling in the circles in your answer document. Do not make any pencil marks outside of the circles. If you need to change an answer, be sure to erase your first answer completely. If a question asks you to show or explain your work, you must do so to receive full credit. Only responses written within the space provided will be scored.

If you do not know the answer to a question, you may go on to the next question. If you finish early, you may review your answers and any questions you did not answer in this Section ONLY. Do not go past the stop sign.

GO ON ▶

Directions for Completing the Answer Grids

1. Work the problem and find an answer.

2. Write your answer in the boxes at the top of the grid.

3. Print only one number or symbol in each box. Do not leave a blank box in the middle of an answer.

4. Under each box, fill in the circle that matches the number or symbol you wrote above. Make a solid mark that completely fills the circle.

5. Do not fill in a circle under an unused box.

6. Fractions cannot be entered into an answer grid and will not be scored. Enter fractions as decimals.

7. See below for examples on how to correctly complete an answer grid.

EXAMPLES

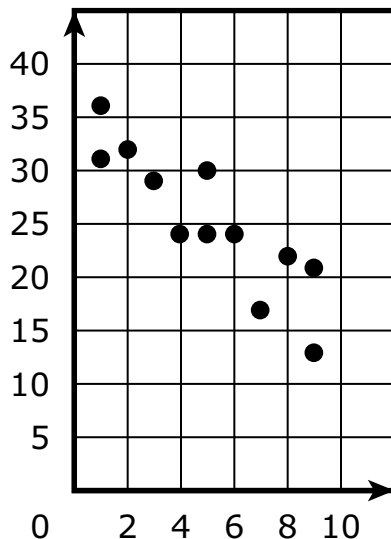To answer −3 in a question, fill in the answer grid as shown below.

To answer .75 in a question, fill in the answer grid as shown below.

GO ON ▶

1 A collection of data is shown in the scatterplot.

Which value is the **best** estimate of the correlation coefficient of a line of best fit for the data?

A -0.9

B -0.09

C 0.08

D 0.8

2 The owner of a company bought 150 tickets for a circus performance. The owner paid $10 for each adult ticket and $6 for each child ticket.

Which equation represents the relationship between x, the number of adult tickets the owner bought, and y, the total amount, in dollars, the owner paid for the tickets?

A $6x + 10y = 150$

B $10x + 6y = 150$

C $y = 6x + 10(150 - x)$

D $y = 10x + 6(150 - x)$

18

GO ON ▶

3 A scientist observed how two substances, J and M, decayed over time.

The scientist started with 100 grams of substance J and observed that 8% of the substance decayed each day.

The equation $y = 110(0.82)^x$ represents y, the number of grams of substance M the scientist observed after x days.

Which statement correctly compares the initial amounts and rates of decay for the two substances?

A There was a greater initial amount of substance J, and substance J decayed at a slower rate.

B There was a greater initial amount of substance J, and substance M decayed at a slower rate.

C There was a greater initial amount of substance M, and substance J decayed at a slower rate.

D There was a greater initial amount of substance M, and substance M decayed at a slower rate.

GO ON ▶

4   The table shows the distance, in miles, that an athlete will run each week for 6 weeks to prepare for a half marathon.

Distance to Run Each Week

Week	Distance (miles)
1	13
2	15.5
3	15.5
4	22.5
5	23
6	30

The equation $y = 3.25x + 8.5$ models the distance, y, in miles, that the athlete will run in week x.

For which weeks is the number of miles given by the equation **greater** than the actual number of miles the athlete will run?

Select **all** that apply.

A week 1

B week 2

C week 3

D week 4

E week 5

F week 6

GO ON ▶

5 The quadratic function f is defined as $f(x) = -(x+2)^2 + 3$.

The quadratic functions g and h are transformations of the function f.

Function g is defined as $g(x) = f(x) + k$, where k is a constant.

Function h is defined as $h(x) = f(x+n)$, where n is a constant.

- Determine whether there are values of k for which the graph of $y = g(x)$ has no x-intercepts. Justify your answer.

- Determine whether there are values of n for which the graph of $y = h(x)$ has no x-intercepts. Justify your answer.

Enter your answers and your justifications in the space provided.

6 A function is shown.

$$y = -\frac{2}{3}\sqrt{x} - 1$$

Which set of numbers represents the domain for this function?

A all real numbers

B all real numbers greater than or equal to 0

C all real numbers greater than or equal to 1

D all real numbers greater than or equal to -1

21

GO ON ▶

7 The function $p(x) = 18{,}500(0.86)^x$ represents the approximate value, in dollars, of a car x years after the car was purchased.

Given that 1 year is equivalent to 12 months, which function **best** represents $p(m)$, the approximate value, in dollars, of the car m months after the car was purchased?

A $p(m) = 18{,}500(0.0717)^m$

B $p(m) = 18{,}500(0.1637)^m$

C $p(m) = 18{,}500(0.8489)^m$

D $p(m) = 18{,}500(0.9875)^m$

8 A student claims that if an equation has no exponents greater than 1, then the equation is linear.

Which equation can be used to show that the student's claim is **false**?

A $y = x$

B $y = |x|$

C $x + y = 1$

D $y - x^2 = 1$

9 An equation is shown.

$$x^2 - 9x + 14 = 0$$

Which two values represent the solutions to the equation?

A 2 and 7

B −2 and 7

C −7 and 2

D −7 and −2

STOP

STOP

You have come to the end of Section 2 of the test. Review your answers from Section 2 only.

STOP

Section 3
(Calculator)

Directions:

Today, you will take Section 3 of the Algebra I Practice Test. You will be allowed to use a calculator.

Read each question. Then, follow the directions to answer each question. Mark your answers by completely filling in the circles in your answer document. Do not make any pencil marks outside of the circles. If you need to change an answer, be sure to erase your first answer completely. If a question asks you to show or explain your work, you must do so to receive full credit. Only responses written within the space provided will be scored.

If you do not know the answer to a question, you may go on to the next question. If you finish early, you may review your answers and any questions you did not answer in this Section ONLY. Do not go past the stop sign.

GO ON ▶

Directions for Completing the Answer Grids

1. Work the problem and find an answer.

2. Write your answer in the boxes at the top of the grid.

3. Print only one number or symbol in each box. Do not leave a blank box in the middle of an answer.

4. Under each box, fill in the circle that matches the number or symbol you wrote above. Make a solid mark that completely fills the circle.

5. Do not fill in a circle under an unused box.

6. Fractions cannot be entered into an answer grid and will not be scored. Enter fractions as decimals.

7. See below for examples on how to correctly complete an answer grid.

EXAMPLES

To answer −3 in a question, fill in the answer grid as shown below.

To answer .75 in a question, fill in the answer grid as shown below.

25

GO ON ▶

Section 3

1 A person deposited $10,000.00 into a bank account and made no other withdrawals or deposits. Each year, interest was added to the account. The table shows the account balance, $f(x)$, in dollars, x years after the person deposited the money for selected values of x.

Bank Account Balance

Years after Deposit, x	Account Balance, $f(x)$
0	$10,000.00
1	$10,130.00
2	$10,261.69

Which function **best** represents this situation?

A $f(x) = 10,000 - 130x$

B $f(x) = 10,000 + 130x$

C $f(x) = 10,000(0.987)^x$

D $f(x) = 10,000(1.013)^x$

2 The system of equations shown is graphed in the xy–plane.

$$\begin{cases} x + y = 1 \\ 2x - 3y = 17 \end{cases}$$

Determine the coordinates of the solution of the system algebraically. Then show that your solution is valid. Show your work or explain how you found your answer.

Enter your answer and your work or explanation in the space provided.

GO ON ▶

3 An office manager is ordering this year's supply of pencils and pens for the office. Each pencil costs $0.10, each pen costs $0.75, and the manager will spend a total of $235 on pencils and pens.

Which additional piece of information is sufficient to determine the number of pencils and the number of pens that the manager will order?

A The number of pencils purchased last year will be equal to the number of pens purchased this year.

B The number of pens purchased this year will be three times the number of pencils purchased this year.

C The total cost of the pens purchased this year will be greater than the total cost of the pencils purchased this year.

D The total cost of the pencils and pens purchased last year will be three times the total cost of the pencils and pens purchased this year.

GO ON ▶

4 The *xy*-plane shows a graph of the solutions to a system of inequalities.
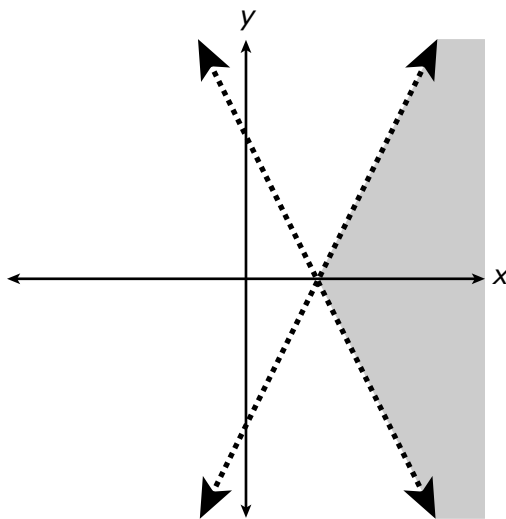
If *a* and *b* are positive integers, the system consists of which inequalities?

Select **all** that apply.

A $y < -ax - b$

B $y > -ax - b$

C $y < -ax + b$

D $y > -ax + b$

E $y < ax - b$

F $y > ax - b$

G $y < ax + b$

H $y > ax + b$

GO ON ▶

5 The table shows the weight, in tons, and the fuel economy, in miles per gallon, of eight sport-utility vehicles.

Weight and Fuel Economy of Eight Sport-Utility Vehicles

| Weight (tons)	Fuel Economy (miles per gallon)
1.875	36.8
2	28.4
2.125	26.7
2.25	24.8
2.5	23.3
2.75	19.7
3	20.4
3.25	19.6

The function $f(w) = -10.139w + 49.993$ models the relationship between the fuel economy, $f(w)$, in miles per gallon, of a sport-utility vehicle and its weight, w, in tons.

- For the sport-utility vehicles with weights of 1.875 tons and 3.25 tons, compare the fuel economy modeled by the function to the actual fuel economy for each sport-utility vehicle. Show your work or explain how you found your answers.
- Determine a regression function that better models the relationship between the fuel economy, $f(w)$, in miles per gallon, and the weight, w, in tons, for the eight sport-utility vehicles. Explain how you found your function.

Enter your answers and your work or explanations in the space provided.

29

GO ON ▶

6 The graph shown represents a student's distance from home, in miles, with respect to time, in minutes, during a bike ride home from school.

Bike Ride Home
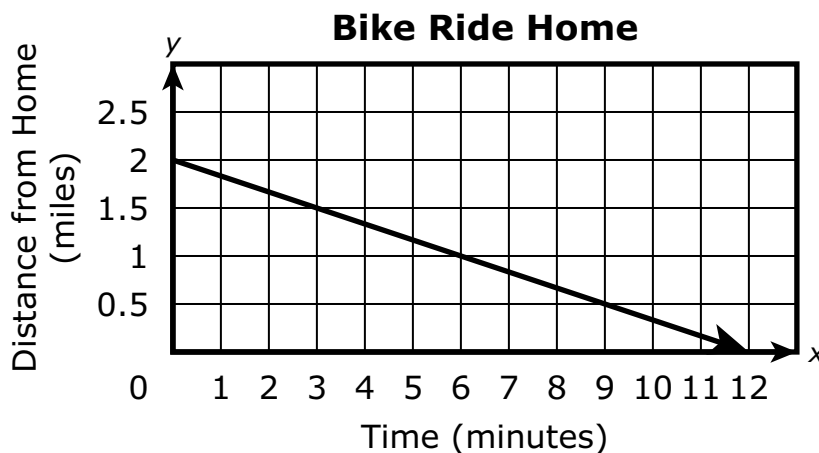
What is the rate of change indicated on the graph for the 12-minute bike ride?

A $-\frac{1}{6}$ mile per minute

B $-\frac{1}{3}$ mile per minute

C -3 miles per minute

D -6 miles per minute

STOP

You have come to the end of Section 3 of the test. Review your answers from Section 3 only.

STOP

Section 4
(Calculator)

Directions:

Today, you will take Section 4 of the Algebra I Practice Test. You will be allowed to use a calculator.

Read each question. Then, follow the directions to answer each question. Mark your answers by completely filling in the circles in your answer document. Do not make any pencil marks outside of the circles. If you need to change an answer, be sure to erase your first answer completely. If a question asks you to show or explain your work, you must do so to receive full credit. Only responses written within the space provided will be scored.

If you do not know the answer to a question, you may go on to the next question. If you finish early, you may review your answers and any questions you did not answer in this Section ONLY. Do not go past the stop sign.

GO ON ▶

Directions for Completing the Answer Grids

1. Work the problem and find an answer.

2. Write your answer in the boxes at the top of the grid.

3. Print only one number or symbol in each box. Do not leave a blank box in the middle of an answer.

4. Under each box, fill in the circle that matches the number or symbol you wrote above. Make a solid mark that completely fills the circle.

5. Do not fill in a circle under an unused box.

6. Fractions cannot be entered into an answer grid and will not be scored. Enter fractions as decimals.

7. See below for examples on how to correctly complete an answer grid.

EXAMPLES

To answer −3 in a question, fill in the answer grid as shown below.

To answer .75 in a question, fill in the answer grid as shown below.

GO ON ▶

1 An expression is given.

$$9(3)^{(2x+1)}$$

Which expression is equivalent to the given expression?

A $(3)^{(4x+2)}$

B $(3)^{(4x+1)}$

C $(3)^{(2x+3)}$

D $(3)^{(2x+2)}$

2 An object is dropped off the roof of a building. The function $h(x) = -16x^2 + 64$ models the height, $h(x)$, in feet, of the object above the ground x seconds after it is dropped.

What is the **best** description of the meaning of $h(2) = 0$ in terms of the context?

A The object is dropped from an initial height of 2 feet.

B The object hits the ground 2 seconds after it is dropped.

C The object travels at a speed of 2 feet per second after it is dropped.

D The speed of the object increases at a rate of 2 feet per second each second after it is dropped.
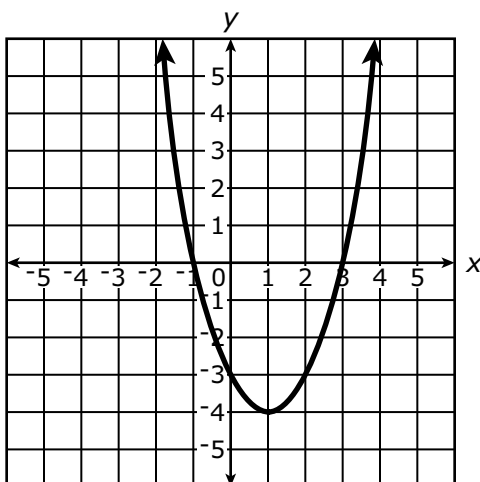
3 A sequence is defined by $a_n = -5 + (n-1)14$, where n is a positive integer.

What is the value of a_{10}?

Enter your answer in the space provided.

34

GO ON ▶

4 The quadratic function *f* is graphed in the *xy*–plane shown.

The function will be transformed to form a second function, *g*.

For which transformation of *f* will the equation $f(x) = g(x)$ have **two** solutions?

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

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

C $g(x) = f(x + k)$, where $k \neq 0$

D $g(x) = f(x) + k$, where $k \neq 0$

5 A nursing student works at a doctor's office for $15 per hour and tutors other students for $25 per hour.

The student cannot work more than 20 hours each week.

The student wants to earn at least $375 each week.

- Define two variables and write a system of inequalities that represents the given constraints.
- Determine the greatest whole number of hours the student can work at the doctor's office. Show your work or explain how you found your answer.

Enter your answers and your work or explanation in the space provided.

GO ON ▶

6 A grain silo is in the shape of a cylinder with a top shaped like a hemisphere. The formula shown represents *V*, the volume, in cubic units, of a silo with a base radius of *r* units and a total height of *h* units.

$$V = \pi r^2\left(h - \frac{1}{3}r\right)$$

Which formula can be used to determine *h* in terms of *r* and *V*?

A $h = \dfrac{V}{\pi r^2} + \dfrac{1}{3}r$

B $h = \dfrac{V}{\pi r^2} - \dfrac{1}{3}r$

C $h = \pi r^2 V + \dfrac{1}{3}r$

D $h = \pi r^2 V - \dfrac{1}{3}r$

7 Consider the equation $(x - a)^2 - b = 0$, where *a* and *b* are both positive real numbers.

Which statement about the solution or solutions to the equation must be true?

A The equation has no real solutions.

B The equation has exactly one real solution and the solution is positive.

C The equation has exactly two real solutions and both of the solutions are positive.

D The equation has exactly two real solutions and at least one of the solutions is positive.

36

GO ON ▶

8 The librarian at a local school collected data on the number of students using the library after school each week during the first 22 weeks of school. The librarian counted the number of students in the library each day and then calculated the total for each week. The weekly totals were plotted in a graph and then a trend line was fit to the data.

Students in the Library
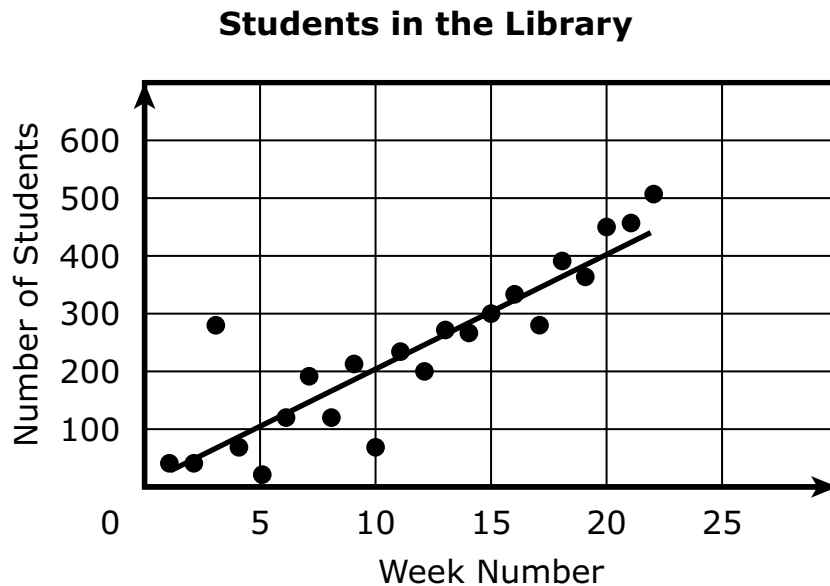
For which week does the trend line **underpredict** the number of students using the library by the **greatest** amount?

A week 3

B week 5

C week 10

D week 22

STOP

STOP

You have come to the end of Section 4 of the test. Review your answers from Section 4 only.

STOP

38

P

ALG-I