

STUDENT NAME: _____

STUDENT SCORE: _____



MISSISSIPPI
DEPARTMENT OF
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**MISSISSIPPI ASSESSMENT PROGRAM (MAP)
MATHEMATICS
PRACTICE TESTLET
ALGEBRA I
(REVISED MARCH 2016)**

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A Joint Publication

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Introduction

Purpose

The practice testlet is designed to provide students with an authentic opportunity to practice items that are aligned to the Mississippi College-and Career-Readiness Standards (MS CCRS) and that mirror those that may appear on the mathematics MAP assessment. The testlet is also intended to provide teachers with data to drive classroom instruction and provide direct feedback to students. It is **NOT** intended to predict student performance on the operational MAP assessment.

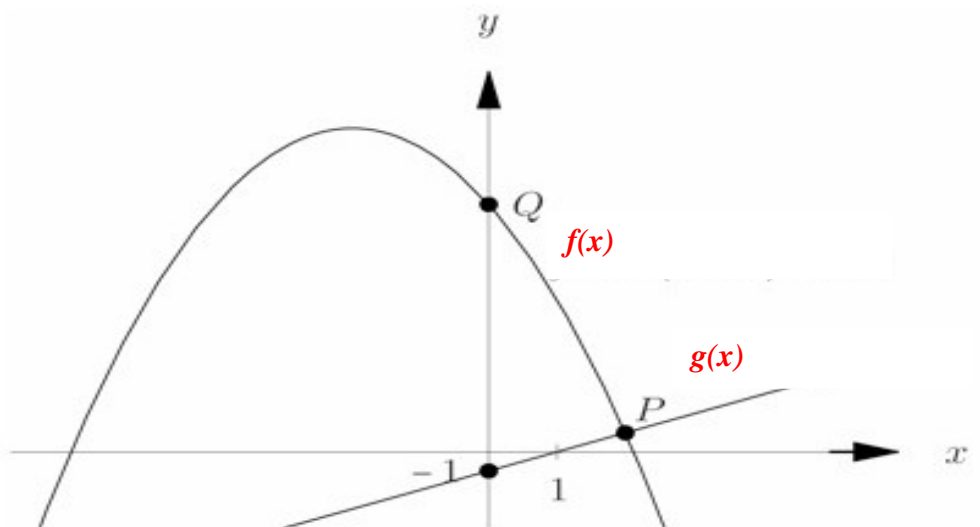
Structure

The mathematics testlet contains various item types that will be administered on the MAP assessment, such as standard multiple choice, matching, multiple select, and fill in the blank. At the end of the testlet are a series of performance task items, which will assess the performance task standards found in the mathematics MAP blueprint.

Directions

1. Allow students to complete each item type and performance task in the testlet.
2. Teachers will review student responses to the items and score the items and the performance task using the scoring key.
3. Teachers should review the results to determine the needed instructional approach.
4. Teachers can utilize the testlets as teaching tools to help students gain a deeper understanding of the MS CCRS.
5. At the bottom left of each page is an item tag, which will contain the item number, grade level, suggested DOK level, and the standard aligned to the item.

1. The figure below shows a **partial** graph of two functions, $f(x)$ and $g(x)$. $f(x)$ is a parabola defined by the quadratic function $f(x) = -(x+2)^2 + 17$ and $g(x)$ is a linear function that passes through the points $(0, -1)$ and $(1, 0)$.



Respond to Part A and Part B based on the given information.

Part A:

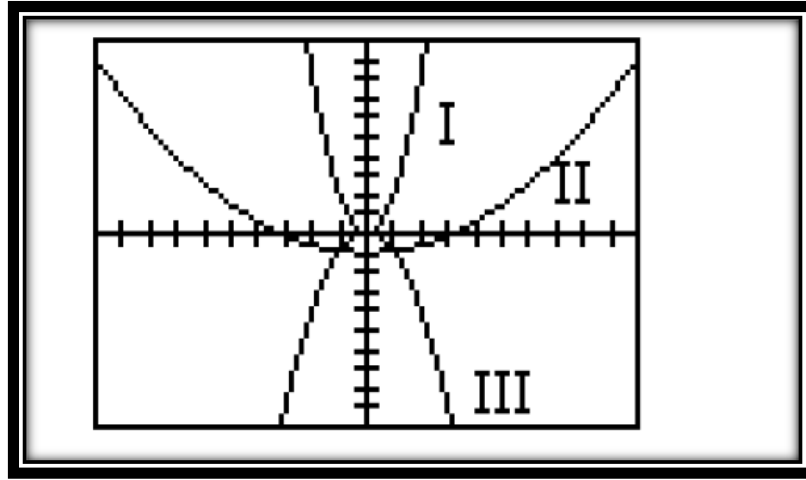
Determine the x -coordinate of the point in Quadrant III where $f(x) = g(x)$.

Part B:

Justify algebraically why the x -coordinate you identified in Part A is a solution to the equation $f(x) = g(x)$.

01-ALG1-LV2-A-REI.11

2. The diagram below displays several graphs of the form $y = ax^2 + c$. Which graph(s) shown below make the statement " $c < 0$ " true?



- A. Graph I and Graph III
- B. Graph I only
- C. Graph I and Graph II
- D. Graph II only

02-ALG1-LV1-F-BF.3

3. Examine the information provided in the table below. Select the item(s) that represent a true statement based on your understanding of each quadratic function.

Function	Vertex is below the x-axis	y-intercept is greater than zero	Has 2 zeros
$y = (x - 1)^2 - 4$	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
$y = -2x^2 + 4x - 1$	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
$y = (x - 4)(3x - 1)$	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

03-ALG1-LV2-F-IF.4

4. The table represents the total number of pediatricians P (in thousands) in the United States in selected years from 1980 through 1998. (Note: $t = 0$ corresponds to the year 1980.)

t	P
0	17.4
5	22.4
10	26.5
12	29.0
13	30.8
14	31.5
15	33.9
16	35.5
17	36.8
18	38.4

Which statements listed below are valid based on this information? Select **all** that apply.

- A. A linear model best fits this data.
- B. A quadratic model best fits this data.
- C. The value of the coefficient of determination, r^2 , that best fits this data is approximately 0.996.
- D. The number of pediatricians in the year 2005 can be estimated at approximately 52 thousand.
- E. Approximately 10 thousand pediatricians were estimated to work in the United States in the year 1984.

04-ALG1-LV3-S-ID.6a

5. Jackson has a camera that automatically takes pictures of hummingbirds visiting the bird feeder in his backyard. His camera takes four pictures on Day 1 and ten pictures every day after that. Which function models the total number of pictures, $p(d)$, the camera has taken after d days?

A. $p(d) = 10(d - 1) + 4$

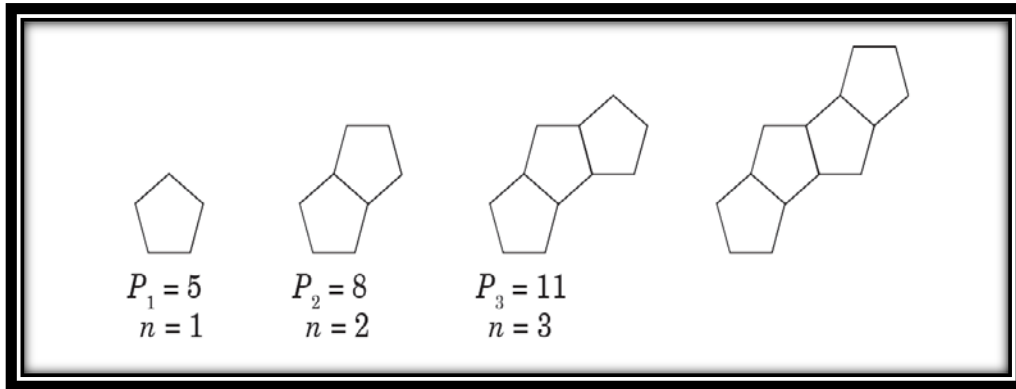
B. $p(d) = 4d + 10d$

C. $p(d) = 4(d + 1) + 10$

D. $p(d) = 4d - 10d$

05-ALG1-LV1-F-BF.1a

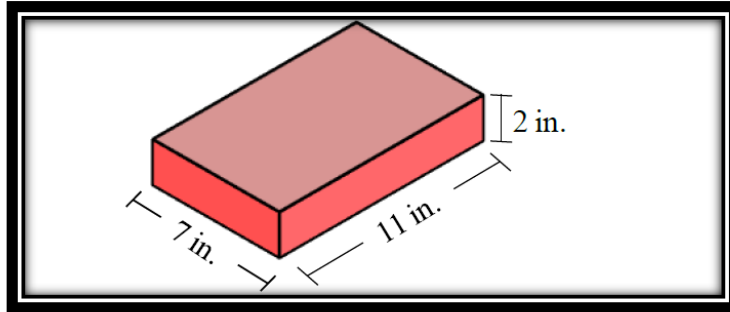
6. The following figures were created with regular pentagons, where each pentagon has a side length of exactly one unit. P_1 represents the perimeter of the first figure and P_2 represents the perimeter of the second figure, and so on. Based on this pattern, what would be the rule for the perimeter of the n^{th} figure, when $n > 1$?



- A. $P_n = 2P_{n-1} - 2$
- B. $P_n = 2P_{n-1} + 4$
- C. $P_n = P_{n-1} + 3$
- D. $P_n = P_{n-1} - 3$

06-ALG1-LV2-F-IF.3

7. A non-profit organization makes chocolate cakes for the annual food drive. The rectangular cake pan shown below is always used for the event. If the head baker makes 6 cups of cake batter, what is the approximate **depth** of the batter once it is completely poured into the pan? (Note: $1 \text{ in}^3 \approx 0.069$ cups)



- A. 1.380 inch
- B. 1.129 inch
- C. 6.376 inch
- D. 6.415 inch

07-ALG1-LV2-N-Q.1

8. Christopher wants to find the x -intercepts of the quadratic function $f(x) = x^2 - 10x + 22$ so he decides to set the function equal to zero and solve by completing the square. His first step is shown below.

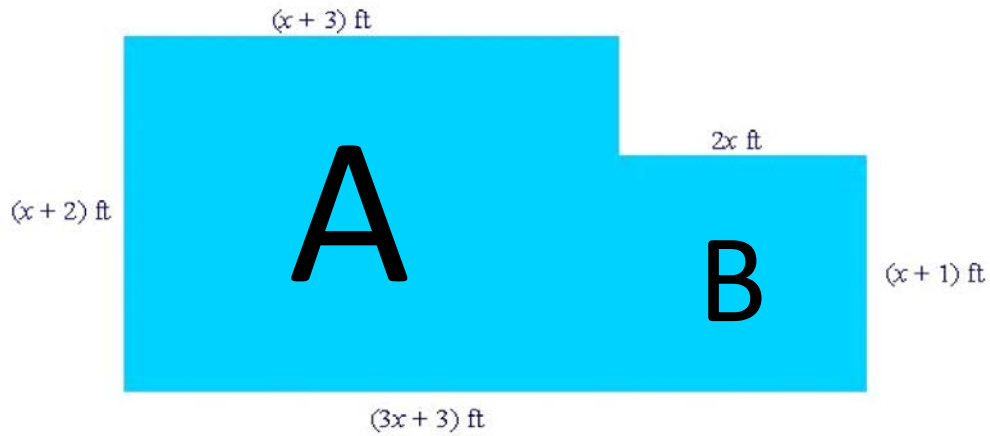
Step 1: $x^2 - 10x + ? = -22 + ?$

Assume that the remainder of his work is correct, determine if the following statements are true or false.

Statement	True	False
The missing value in Step 1 is -5.	<input type="radio"/>	<input type="radio"/>
The lowest point on the graph of $f(x)$ is located at (5,-3).	<input type="radio"/>	<input type="radio"/>
The equation for the axis of symmetry for $f(x)$ is $x = 5$.	<input type="radio"/>	<input type="radio"/>
There is only one root for $f(x)$ located at $x = 5 + \sqrt{3}$.	<input type="radio"/>	<input type="radio"/>
$(x - 5)^2 = 3$ is an equivalent form of the equation $x^2 - 10x = -22$.	<input type="radio"/>	<input type="radio"/>

08-ALG1-LV2-A-REI.4a

9. The irregular figure shown below represents a storage closet. The storage area is made of two sections, *A* and *B*.



Which statements listed below are valid based on the given information? Select **all** that apply.

- A. The total area of the storage closet is $(8x + 10)$ ft².
- B. The area of section A can be represented by the expression $(x + 2)(3x + 3)$ ft².
- C. The expression $(2x^2 + 1)$ ft² represents the area of section B.
- D. If $x = 4$, the total distance around the entire storage closet would be 42 ft.
- E. If additional square footage were added to the top-right hand corner of the storage closet to create a standard rectangle, the additional area would be represented by the expression $2x$ ft².

09-ALG1-LV3-A-APR.1

10. Which statements listed below are valid based on the graph of the linear function $s(x)$ and the graph of the exponential function $r(x)$? Select **all** that apply.

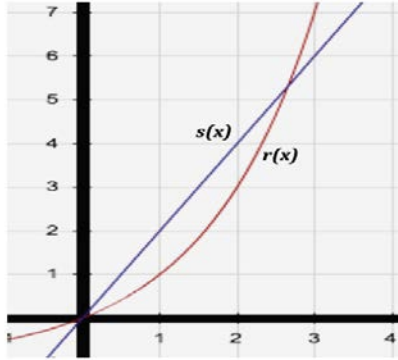


Figure not drawn to scale.

- A. On the interval $4 \leq x \leq 5$, every y -value for $r(x)$ is greater than every y -value for $s(x)$.
- B. The exponential function exceeds the linear function on the interval $1 \leq x \leq 2$.
- C. There is only one point where $s(x) = r(x)$.
- D. $r(12) < s(12)$
- E. $s(7) < r(7)$

10-ALG1-LV2-F-LE.3

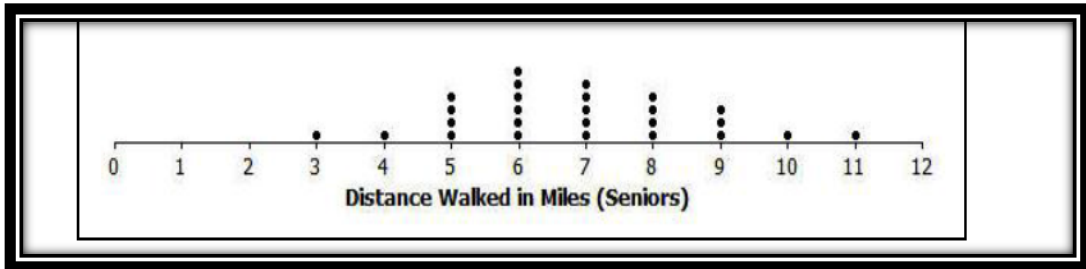
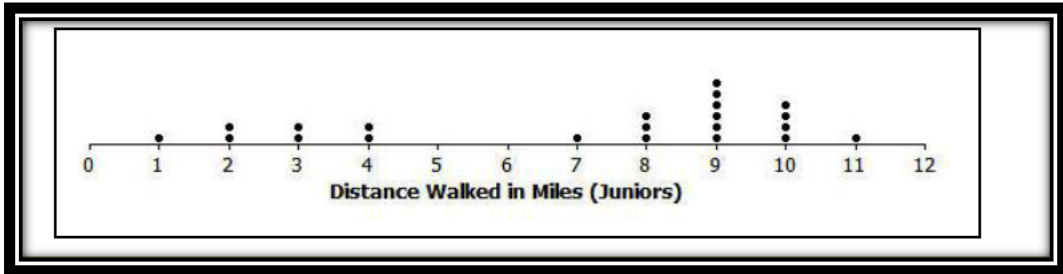
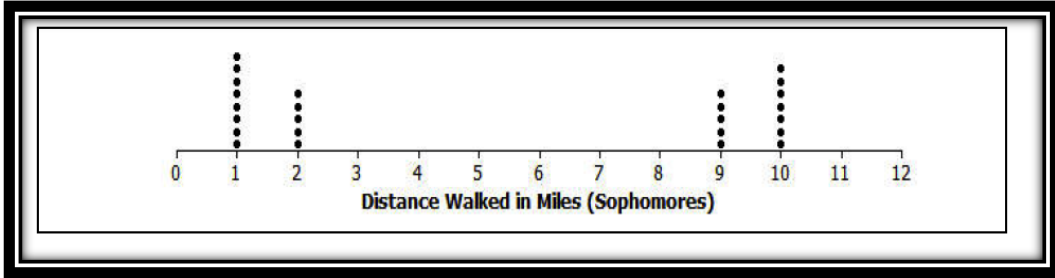
11. While writing a novel, Jared takes a piece of paper and crumples it into a paper ball. Frustrated with his writing, he tosses the paper ball into a trash can. The quadratic function $h(t) = -t^2 + 5t + 6$ can be used to model the toss, where $h(t)$ represents the height of the paper ball, in feet, and t represents the time, in seconds.

Select the equivalent form of the function that provides the needed information. Use each form of the function only one time.

Needed Information	Equivalent Function		
	$h(t) = -t^2 + 5t + 6$	$h(t) = -(t - 6)(t + 1)$	$h(t) = -(t - 2.5)^2 + 12.25$
The initial height at which the paper ball is thrown	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The amount of time it takes the paper ball to reach its maximum height	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The time it will take the paper ball to land in the trash can	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

11-ALG1-LV2-F-IF.8a

12. The dot plots below show the distance walked, in miles, by students at a high school as they participated in a walkathon to raise money for the school's band.



Based on the information presented in the dot plots, which statement listed below is the most accurate? (Note: IQR is interquartile range.)

- A. The median distance walked by the Seniors is greater than the median distance walked by the Juniors.
- B. The IQR for the distance walked by the Sophomores is less than the IQR for the distance walked by the Seniors.
- C. The mean distance walked by the Juniors is greater than the mean distance walked by the Sophomores.
- D. The maximum distance walked by the Sophomores is equal to the maximum distance walked by the Seniors.

12-ALG1-LV2-S-ID.2

13. Examine the two figures below.

Figure A

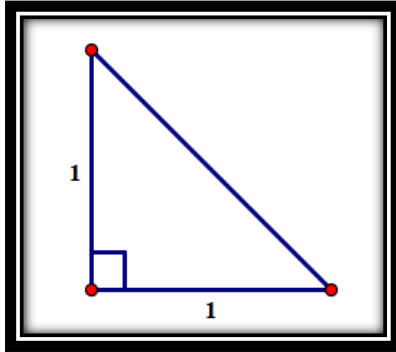
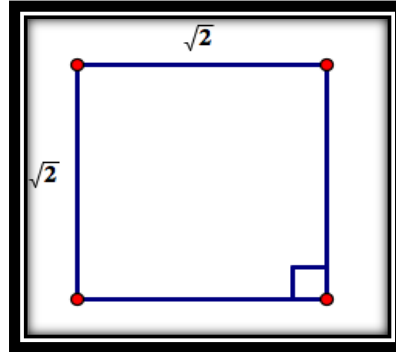


Figure B



Which statements listed below are valid based on your understanding of rational and irrational numbers? Select **all** that apply.

- A. If the value of the perimeter of Figure A were plotted on a number line it would fall between two consecutive whole numbers.
- B. If the value of the area of Figure B were plotted on a number line it would fall on a whole number.
- C. The perimeter of Figure A is larger than the perimeter of Figure B.
- D. The missing side length on Figure A is a rational number.
- E. The total combined area of Figure A and Figure B is an irrational number.

13-ALG1-LV2-N-RN.3

14. Denise attempted to solve the equation $3(x - 4) - 4 = 1$. Her work is shown below.

Step 1:	$3x - 12 - 4 = 1$
Step 2:	$3x - 16 = 1$
Step 3:	$3x = -15$
Step 4:	$x = -5$

Based on the information provided, which statement justifies why her solution is incorrect?

- A. She did not distribute the number 3 to the quantity $(x - 4)$ correctly in Step 1.
- B. She did not add the number -12 to the number -4 correctly in Step 2.
- C. She did not add the number 16 to the number 1 correctly in Step 3.
- D. She did not divide the number -15 by the number 3 correctly in Step 4.

14-ALG1-LV1-A-REI.1

15. The area of a circular garden is approximately 804 ft^2 . Complete each sentence below using one of the following terms: circumference, diameter, or radius.

- The _____ of the garden is approximately 32 feet long.
- The _____ of the garden is approximately 16 feet long.
- The _____ of the garden is approximately 100 feet long.

15-ALG1-LV2-A-CED.4

16. Two linear functions in a coordinate plane have no points of intersection. Which pair of functions listed below could be the equation for these two linear functions?

A. $4x + 2y = 6$ and $10x + 5y = 7$

B. $4x + 2y = 6$ and $10x + 5y = 15$

C. $4x + 2y = 6$ and $y = 0.5x - 0.6$

D. $5x + 10y = 6$ and $y = 0.5x - 0.6$

16-ALG1-LV2-A-REI.6

17. Given the function rule $f(x) = \frac{1}{2}x^2 + 4$, determine if the following statements are true or false.

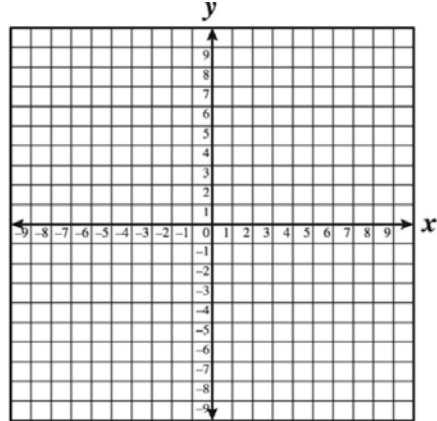
Statement	True	False
$f(-2) = 6$	<input type="radio"/>	<input type="radio"/>
$f(0) = 4$	<input type="radio"/>	<input type="radio"/>
$f(-3) = f(3)$	<input type="radio"/>	<input type="radio"/>
$f(-4) < f(0)$	<input type="radio"/>	<input type="radio"/>
$3 \cdot f(3) > 20$	<input type="radio"/>	<input type="radio"/>

17-ALG1-LV2-F-IF.2

18. Marla will use the coordinate plane below to graph the solution set for the system of linear inequalities shown here.

Inequality 1: $-2x + 3y \geq 6$

Inequality 2: $x + y < 5$



Which statements listed below are **not valid** about the graph of the solution set? Select **all** that apply.

- A. The point (5, 0) is a solution point to the system of linear inequalities.
- B. The boundary line for Inequality 2 is a solid line.
- C. The point where the boundary lines for Inequality 1 and Inequality 2 intersect is located in Quadrant I.
- D. The point (0, 2) is a solution point to the system of linear inequalities.
- E. All points lying on the boundary line for Inequality 2 are a solution to the system of linear inequalities.

18-ALG1-LV2-A-REI.12

19. Four students in Mrs. Gillard's Algebra I class rewrote the expression $x^3 + 4x^2 - 12x$ in four different ways, as shown below.

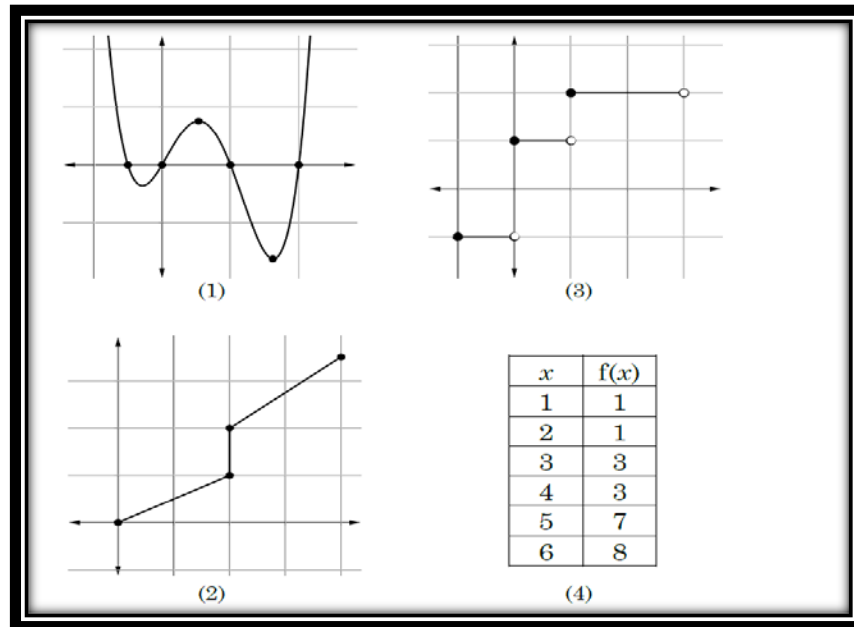
Student	Rewritten Expression
Jose	$x(x^2 + 4x - 12)$
Maria	$(x^2 + 6x)(x - 2)$
Dante	$(x^2 - 2)(x + 6x)$
Alex	$x(x + 6)(x - 2)$

Which student's rewritten expression is **not** equivalent to the original expression?

- A. Jose
- B. Maria
- C. Dante
- D. Alex

19-ALG1-LV2-A-SSE.2

20. Mr. Braxton drew the following diagrams on the board and asked Kyle to circle which diagram(s) represent a function.



Which diagram(s) should Kyle circle?

- A. Diagram 1 only
- B. Diagram 2 and Diagram 4
- C. Diagram 1, Diagram 3, and Diagram 4
- D. Diagram 2 only

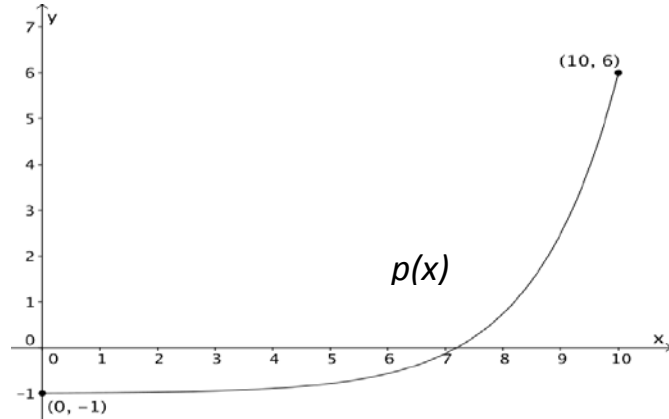
20-ALG1-LV2-F.IF.1

21. Examine each of the diagrams below.

Diagram 1

$$m(x) = \begin{cases} 2x & \text{if } 0 \leq x \leq 6 \\ x-4 & \text{if } 6 < x \leq 10 \end{cases}$$

Diagram 2



Determine if the following statements are true or false.

Statement	True	False
$m(10) = p(10)$	<input type="radio"/>	<input type="radio"/>
The domain of $p(x)$ is $-1 \leq x \leq 6$	<input type="radio"/>	<input type="radio"/>
$m(x)$ can be defined as a piecewise function	<input type="radio"/>	<input type="radio"/>
$p(x)$ and $m(x)$ are both functions	<input type="radio"/>	<input type="radio"/>
$p(0) - m(1) \leq -2$	<input type="radio"/>	<input type="radio"/>

21-ALG1-LV2-F-IF.9

22. Directions: Determine whether the function $f(x) = 4x - x^2$ is increasing or decreasing on each interval listed below.

Interval	Increasing	Decreasing
$x < 0$	o	o
$0 < x < 2$	o	o
$2 < x < 4$	o	o
$x > 4$	o	o

22-ALG1-LV2-F-IF.4

23. Let a and b be rational numbers, and let c be an irrational number. Select the correct phrase that makes each statement true.

- The sum $(a + b)$ is _____.

<input type="radio"/> always rational
<input type="radio"/> never rational
<input type="radio"/> sometimes rational

- The product (ab) is _____.

<input type="radio"/> always rational
<input type="radio"/> never rational
<input type="radio"/> sometimes rational

- The square of c , (c^2) , is _____.

<input type="radio"/> always rational
<input type="radio"/> never rational
<input type="radio"/> sometimes rational

23-ALG1-LV1-N-RN.3

24. A sample of teenagers at the Mississippi State Fair participated in a taste test in which they sampled four new brands of potato chips, labeled “A”, “B”, “C”, and “D”. They were then asked to select their favorite brand. The results of the taste test are shown in the table below.

	<i>Brand A</i>	<i>Brand B</i>	<i>Brand C</i>	<i>Brand D</i>
Boys	45	25	30	20
Girls	25	10	30	15

Based on this information, which statements are valid about the taste test results? Select **all** that apply.

- A. 40% of the teenagers were girls.
- B. 70% of the teenagers preferred brand “A”.
- C. $\frac{20}{120}$ of the boys preferred brand “D”.
- D. $\frac{2}{7}$ of the teenagers that preferred brand “B” were girls.
- E. 60% of the teenagers preferred brand “C”.

24-ALG1-LV2-S-ID.5

25. The functions $f(x) = 1 - x$ and $g(x) = \frac{0.11}{x^2}$ can be graphed on the same coordinate plane for all values where $x > 0$. Determine which statement listed below is valid based on the graphs of these functions.

- A. The graphs of the functions will never intersect because they belong to two different function families.
- B. Because the domain is restricted for all x values greater than zero, the graphs of the functions will never intersect.
- C. The graphs of the functions intersect at the point where $x \approx .555$.
- D. The graphs of the functions intersect at the point where $x \approx 0.445$.

25-ALG1-LV2-A-REI.11

26. A scientist at Massey Chemical Laboratory places 7.35 grams of a radioactive element in a dish. The half-life of the element is two days. After d days, the number of grams of the element remaining in the disk can be modeled by the function $R(d) = 7.35 \left(\frac{1}{2}\right)^{\frac{d}{2}}$.

Identify which statement listed below is true about the equation $R(d)$ when it is rewritten without the fractional exponent.

A. $R(d) = 7.35 (0.250)^d$ is an equation that is equivalent.

B. $R(d) = 7.35 (0.707)^d$ is an equation that is equivalent.

C. Approximately 70% of the element remains from one day to the next day.

D. The element decays by $\frac{1}{4}$ gram per day.

26-ALG1-LV2-A-SSE.3c

27. The expression $x^2(x - y)^3 - y^2(x - y)^3$ can be written in the form $(x - y)^v(x + y)$, where v is a constant. What is the value of v ?

A. 3

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

C. 4

D. 2

27-ALG1-LV2-A-SSE.2

28. Given the functions $h(x) = \frac{x - 4}{x + 1}$ and $k(x) = x^2 + 3$, which intervals contain a value of x for which the functions are equivalent? Select **all** that apply.

A. $-3 < x < -1.5$

B. $-1.5 < x < 1.5$

C. $-4.5 < x < -3$

D. $1.5 < x < 3$

E. $3 < x < 4.5$

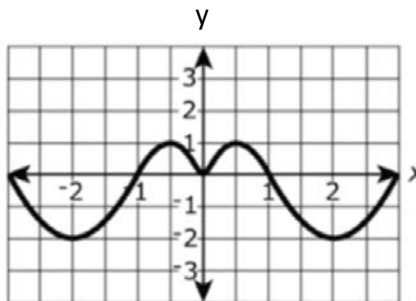
28-ALG1-LV2-A-REI.11

29. Four different functions are given below.

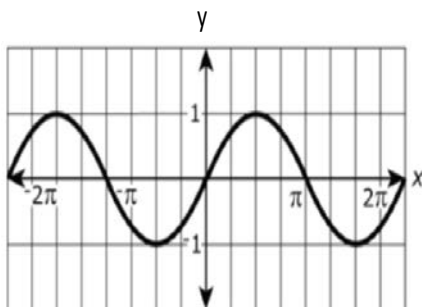
- $f(x) = 3x^2$

- $g(x) = -x^3 + 5$

- $h(x) =$



- $k(x) =$



Determine whether each function is even, odd, or neither even nor odd.

Function	Even	Odd	Neither Even nor Odd
$f(x)$	o	o	o
$g(x)$	o	o	o
$h(x)$	o	o	o
$k(x)$	o	o	o

29-ALG1-LV1-F-BF.3

Algebra I Performance Task:

Directions: Use the following information to respond to items 30-34.

Over the holiday, Nathan will work two jobs to begin saving money for a video game system he wants. He makes \$4 an hour raking leaves and \$6 an hour bagging groceries at the neighborhood grocery store. He needs to make at least \$48 a week in order to purchase the new video system; however, he must work less than 11 hours per week because of basketball practice.

30. Create two linear inequalities that can be used to model this scenario, where r = the number of hours raking leaves and b = the number of hours bagging groceries.

Linear Inequality 1: _____

Linear Inequality 2: _____

30-Alg1-LV2-A-CED.3

31. Are there any restrictions on each inequality you created above? Why or why not?

Restrictions on Linear Inequality 1: _____

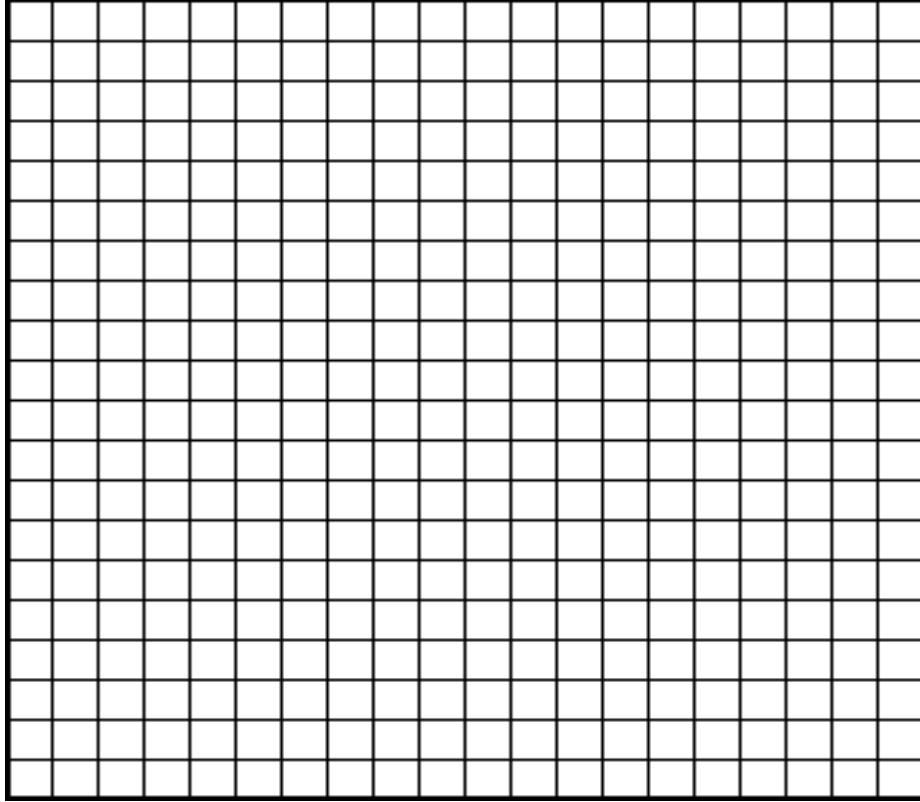
Explanation: _____

Restrictions on Linear Inequality 2: _____

Explanation: _____

31-Alg1-LV3-A-CED.3 and F-IF.5

32. On the coordinate plane below, graph the solution set for the system of linear inequalities you created in Item 30 by graphing the number of hours raking leaves on the horizontal axis and the number of hours bagging groceries on the vertical axis. Be sure to label each linear inequality and the axes accordingly.



32-Alg1-LV2-A-CED.3

33. Identify the x-intercept and y-intercept for each boundary line in your system of linear inequalities.

Boundary line for Linear Inequality 1: x-intercept: (__, __) y-intercept: (__, __)

Boundary line for Linear Inequality 2: x-intercept: (__, __) y-intercept: (__, __)

34. Identify three different ways that Nathan can work less than 11 hours but make at least \$48.00.

33-Alg1-LV1-F-IF.4

34-Alg1-LV2-A-CED.3

Algebra I Answer Key

Item	Standard	Answer	Point Value
1	A-REI.11	Part A: $x = -7$ Part B: Student must show that $g(x) = x - 1$. Student must show that $f(-7) = g(-7)$ $f(-7) = -[(-7) + 2]^2 + 17 = -8$ $g(-7) = -7 - 1 = -8$	2 pts
2	F-BF.3	D	1 pt
3	F-IF.4	A1, A3, B3, C1, C2, C3	2 pts
4	S-ID.6a	B, C, D	2 pts
5	F-BF.1a	A	1 pt
6	F-IF.3	C	1 pt
7	N-Q.1	B	1 pt
8	A-REI.4a	A2, B1, C1, D2, E1	2 pts
9	A-APR.1	D, E	2 pts
10	F-LE.3	A, E	2 pts
11	F-IF.8a	A1, B3, C2	2 pts
12	S-ID.2	C	1 pt
13	N-RN.3	A, B	2 pts
14	A-REI.1	C	1 pt
15	A-CED.4	diameter, radius, circumference	2 pts
16	A-REI.6	A	1 pt
17	F-IF.2	A1, B1, C1, D2, E1	2 pts
18	A-REI.12	A, B, E	2 pts
19	A-SSE.2	C	1 pt
20	F-IF.1	C	1 pt
21	F-IF.9	A1, B2, C1, D1, E1	2 pts
22	F-IF.4	A1, B1, C2, D2	2 pts
23	N-RN.3	A1, B1, C3	2 pts
24	S-ID.5	A, C, D	2 pts
25	A-REI.11	D	1 pt
26	A-SSE.3c	C	1 pt
27	A-SSE.2	C	1 pt
28	A-REI.11	A, B	2 pts
29	F-BF.3	A1, B3, C1, D2	2 pts
30*	A-CED.3	Linear Inequality 1: $4r + 6b \geq 48$ Linear Inequality 2: $r + b < 11$	2 pts
31*	A-CED.3, F-IF.5	Restrictions on Linear Inequality 1: $r \geq 0$; $b \geq 0$ Explanation: Time cannot be a negative value. Restrictions on Linear Inequality 2: $0 < r < 11$; $0 < b < 11$ Explanation: He must work less than 11 hours.	2 pts

Item	Standard	Answer	Point Value
32	A-CED.3	Solutions lie in the area where the systems overlap and on the boundary line for the Linear Inequality $4r + 6b \geq 48$.	2 pts
33*	F-IF.4	Linear Inequality 1: x-intercept: (12, 0) y- intercept (0, 8) Linear Inequality 2: x-intercept (11, 0) y-intercept (0, 11)	2 pts
34	A-CED.3	Answers may vary. Sample Responses: 1. He can rake leaves for 5 hours and bag groceries for 5 hours = (5, 5) 2. He could just bag groceries for 9 hours = (0, 9) 3. He could rake leaves for 4 hours and bag groceries for 6 hours = (4, 6)	3 pts
Total Points			57 pts

* For item #30, students may switch the order of the linear inequalities provided in the Answer Key. If they do so, the order of the answers for item #31 and item #33 must also be switched.

Scoring Rules

Step #1: Use the answer key to view the maximum point value for each item.

Step #2: Add the total number of points the student has earned, and divide by the total number of points possible.

Step #3: Determine if the student has earned at least 80% of the total points.