FSA Algebra I

End-of-Course

Review Packet

Functions

and

Modeling

FSA Algebra 1 EOC Review

Table of Contents

FSA Algebra 1 EOC Review

MAFS.912.F-BF.2.3 EOC Practice

Level 2	Level 3	Level 4	Level 5
identifies the graph, the equation, or ordered pairs of a linear, quadratic, or exponential function with a vertical or horizontal shift	identifies the graph of a linear or quadratic function with a vertical or horizontal stretch or shrink; determines the value of k given a graph and its transformation; completes a table of values for a function that has a vertical or horizontal shift; graphs a function with a vertical or horizontal shift	identifies the graph of an exponential function with a vertical or horizontal stretch or shrink; completes a table of values for a function with a horizontal or vertical stretch or shrink	determines the value of k when given a set of ordered pairs for two functions or a table of values for two functions; identifies differences and similarities between a function and its transformation

1. Write an equation that could represent the graph below. Justify why your equation is appropriate for this graph.
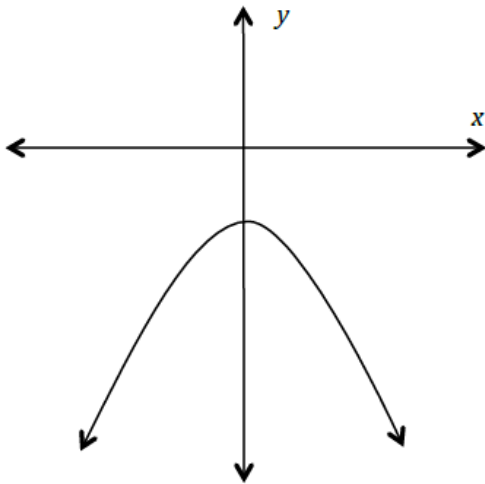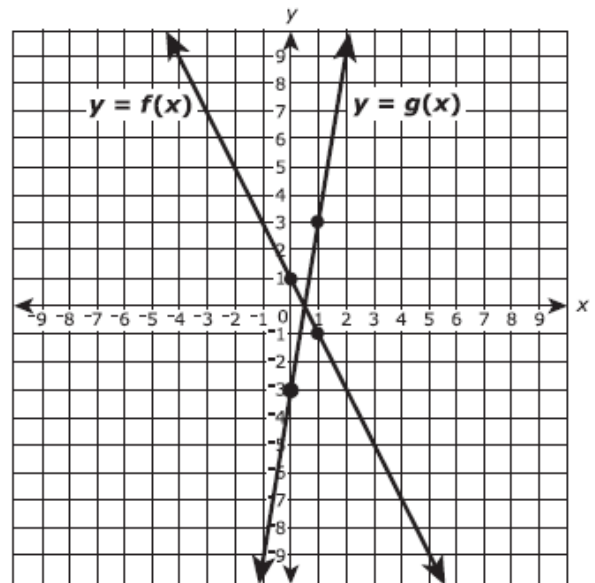

Equation:

2. The figure shows the graphs of the functions $y = f(x)$ and $y = g(x)$. The four indicated points all have integer coordinates.
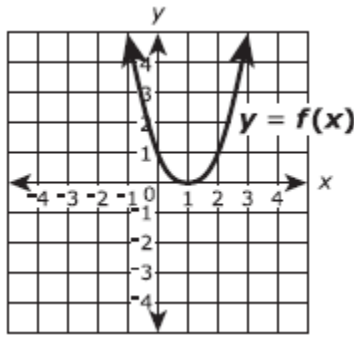
   If $g(x) = k \cdot f(x)$, what is the value of k?

   Enter your answer in the box.

3. Consider the function $f(x)$, shown in the xy −coordinate plane, as the parent function.

Part A

The graph of a transformation of the function $f(x)$ is shown.

Which expression defines the transformation shown?

A. $f(x + 0) - 1$
B. $f(x + 0) + 1$
C. $f(x - 1) + 0$
D. $f(x + 1) + 0$

Part B

The graph of a transformation of the function $f(x)$ is shown.

Which expression defines the transformation shown?

A. $\frac{1}{2}f(x + 0) + 0$
B. $2f(x + 0) + 0$
C. $\frac{1}{2}f(x - 1) - 1$
D. $2f(x + 1) - 0$
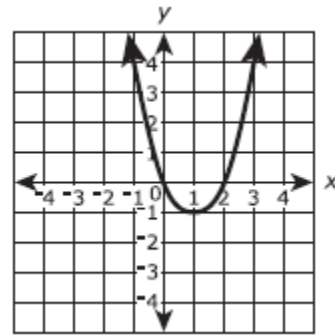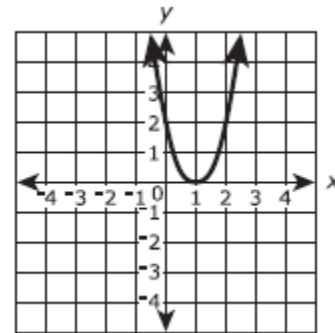
Part C

The graph of a transformation of the function $f(x)$ is shown.

Which expression defines the transformation shown?

A. $f(x) - 2$
B. $f(x - 2) + 0$
C. $f(x) + 2$
D. $f(x + 2) + 0$
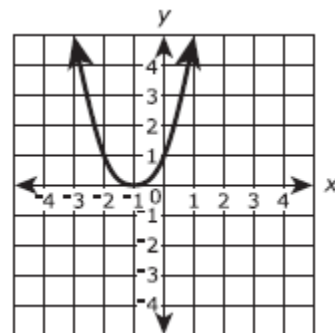
4. When the function $f(x) = x^2$ is multiplied by the value a, where $a > 1$, the graph of the new function, $g(x) = ax^2$.

    A. opens upward and is wider
    B. opens upward and is narrower
    C. opens downward and is wider
    D. opens downward and is narrower

5. Use the graph to answer the question.
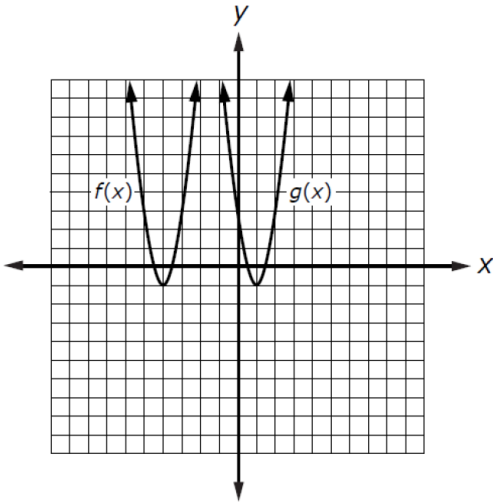
Which equation relates $f(x)$ with $g(x)$?

    A. $g(x) = f(x) + 5$
    B. $g(x) = f(x) - 5$
    C. $g(x) = f(x + 5)$
    D. $g(x) = f(x - 5)$

MAFS.912.F-IF.1.2 EOC Practice

Level 2	Level 3	Level 4	Level 5
evaluates simple functions in their domains; evaluates functions for a simple quadratic, simple square root, and simple exponential	evaluates quadratic, polynomial of degree 3, absolute value, square root, and exponential functions for inputs in their domain; interprets statements that use function notation in terms of a real-world context for simple quadratic, simple square root, and simple exponential	uses function notation to evaluate functions for inputs in their domain and interprets statements that use function notation in terms of context	writes and evaluates functions when the function is described in a real-world context

1. What is the value of $f(16) - f(0)$ when $f(x) = 4x - 8$?

   A. 16
   B. 48
   C. 56
   D. 64

2. The height, h, in feet, of an object thrown upward from a height of 144 feet is a function of time, t, in seconds. The height can be determined by the function $h(t) = -16t^2 + 128t + 144$. What is the height of the object at 3 seconds?

   A. 144 feet
   B. 384 feet
   C. 432 feet
   D. 672 feet

3. In 1997 there were 31 laptop computers at Grove High School. Starting in 1998 the school bought 20 more laptop computers at the end of each year. The equation $T = 20x + 31$ can be used to determine T, the total number of laptop computers at the school x years after 1997. What was the total number of laptop computers at Grove High School at the end of 2005?

   A. 160
   B. 171
   C. 191
   D. 268

4. The number of miles a car can be driven depends on the number of gallons of gas in its tank. The function m = 25g models a situation in which a car gets 25 miles per gallon. If the gas tank holds 20 gallons of gas, which inequality represents its range?

   A. $0 \le g \le 20$
   B. $0 \le m \le 500$
   C. $m \le 500$
   D. $g \le 20$

5. Which equation could best be used to determine the value of $f(3)$ for the function $f(x) = 2x + 4$?

    A. $f(3) = 23 + 4$
    B. $f(3) = 2(3) + 4$
    C. $f(3) = 3(2x) + 4$
    D. $f(3) = 3(3x + 4)$

6. Vincent goes to the gym for 30 minutes every day. He starts a new exercise routine on a Monday and uses a function to model the amount of calories he has used, $f(d)$, as a function of the number of days, d, he has exercised with the new routine.
    Which statement represents a correct interpretation of $f(d)$?

    A. $f(5) = 150$ means Vincent has exercised for a total of 150 minutes after the fifth day of exercising with his new routine
    B. $f(10) = 3,500$ means Vincent will use 3,500 calories on day 10 of exercising with his new routine.
    C. $f(15) = 5,250$ means after 15 days of exercising with his new routine, Vincent has used 5,250 calories.
    D. $f(30) = 10,500$ means the number of calories Vincent has used times 30 is equal to 10,500.

FSA Algebra 1 EOC Review

MAFS.912.F-IF.1.1 EOC Practice

Level 2	Level 3	Level 4	Level 5
uses the definition of a function to identify whether a relation represented by a graph, a table, mapping, diagrams, or sets of ordered pairs is a function	demonstrates understanding that a function's domain is assigned to exactly one element of the range in function notation	applies and extends knowledge of domain and range to real world situations and contexts; justifies that a relation is a function using the definition of a function	[intentionally left blank]

1. Collin noticed that various combinations of nickels and dimes could add up to $0.65.

   ▪ Let x equal the number of nickels.
   ▪ Let y equal the number of dimes.

   What is the domain where y is a function of x and the total value is $0.65?

   A. {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13}
   B. {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13}
   C. {0, 1, 3, 5, 7, 9, 11, 13}
   D. {1, 3, 5, 7, 9, 11, 13}

2. Let f be a function such that $f(x) = 2x - 4$ is defined on the domain $2 \le x \le 6$. The range of this function is

   A. $-\infty \le y \le \infty$
   B. $0 \le y \le 8$
   C. $0 \le y \le \infty$
   D. $2 \le y \le 6$

3. Given that y is a function of x, which of the following tables best represents a function?

A.

x	y
−7	12
−3	8.5
0	−1
−3	−8.5
7	−12

B.

x	y
−5	−17
−2	−11
1	−5
2	−3
5	3

C.

x	y
−2	−14
−2	−8
−2	−5
−2	−1
−2	7

D.

x	y
−8	−7
−5	−2
0	1
−5	4
−8	12

4. Which of the following could be a function?

    A. The height of a student in your school related to the shoe size of that student.
    B. The hair length of a student in your school related to the height of that student.
    C. The color of hair of a student in your school related to the age of that student.
    D. The student ID number of a student in your school related to the full name of that student.

5. Which statement below is correct for the following set of ordered pairs?

$$\{\,(\,0, 1.2),\,(\,3, 2),\,(-1.2, 3),\,(\,4, -2),\,(\,1, -1.2),\,(\,1.2, 4)\,\}$$

    A. The set is a function since each element in the domain has a different element in the range.
    B. The set is a function since each element in the range has a different element in the domain.
    C. The set is a not a function since each element in the domain has a different element in the range.
    D. The set is a not function since each element in the range has a different element in the domain.

6. The domain of the function $f(x) = -3x$ is restricted to the negative integers. Which values are elements of the range?

    ☐ -12
    ☐ -3
    ☐ 0
    ☐ 7
    ☐ 9
    ☐ 12
    ☐ 21

7. A function, f, has domain $-10 \leq x \leq 20$ and range $-40 \leq f(x) \leq -10$. Select each statement that **must be false** about $f(x)$.

$$f(1) = -13$$

$$f(-10) = -40$$

    ☐ $f(1) = 13$
    ☐ $f(-9) = 88$
    ☐ $f(5) = -40$
    ☐ $f(0) = 0$
    ☐ $f(-15) = -20$

MAFS.912.F-IF.2.5 EOC Practice

Level 2	Level 3	Level 4	Level 5
interprets and identifies domains of linear functions when presented with a graph in a real-world context	interprets and identifies domains of quadratic or exponential functions (with no translation) when presented with a graph; interprets and identifies the domain of a linear function from a context	relates the domains of linear, quadratic, or exponential functions to a graph when the function is described within the context	interprets and identifies domains of linear, quadratic, or exponential functions when presented a function described within the context

1. A local theater sells admission tickets for $9.00 on Thursday nights. At capacity, the theater holds 100 customers. The function $M(n) = 9n$ represents the amount of money the theater takes in on Thursday nights, where n is the number of customers. What is the domain of $M(n)$ in this context? Select the correct answer.

   A. all whole numbers
   B. all non-negative rational numbers
   C. all non-negative integers that are multiples of 9
   D. all non-negative integers less than or equal to 100

2. If the function $f(x)$ represents the number of hours that it takes a person to catch x fish in a lake. What domain makes sense for the function?

   A. $-\infty \leq x \leq \infty$
   B. $0 < x < \infty$
   C. $x \leq 0$
   D. $x \geq +\infty$

3. Officials in a town use a function, C, to analyze traffic patterns. $C(n)$ represents the rate of traffic through an intersection where n is the number of observed vehicles in a specified time interval. What would be the most appropriate domain for the function?

   A. $\{\ldots -2, -1, 0, 1, 2, 3, \ldots\}$
   B. $\{-2, -1, 0, 1, 2, 3\}$
   C. $\{0, \frac{1}{2}, \ 1, 1\frac{1}{2}, 2, 2\frac{1}{2}\}$
   D. $\{0, 1, 2, 3, \ldots\}$

4. The function $h(t) = -16t^2 + 144$ represents the height, $h(t)$, in feet, of an object from the ground at t seconds after it is dropped. A realistic domain for this function is

   A. $-3 \leq t \leq 3$
   B. $0 \leq h(t) \leq 144$
   C. $0 \leq t \leq 3$
   D. *all real numbners*

5. Sue hits a ball from a height of 4 feet. The height of the ball above the ground is a function of the horizontal distance the ball travels until it comes to rest on the ground. Consider this complete graph of the function.

Trajectory of Ball
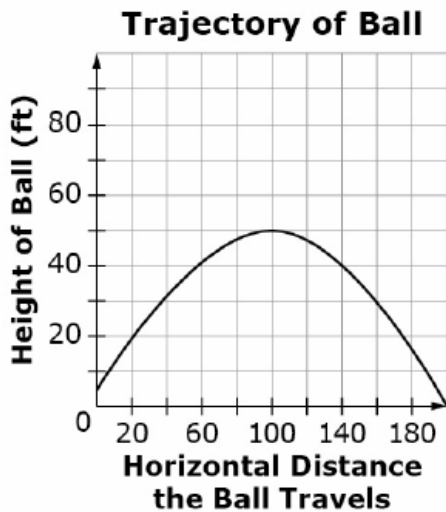
Select all values that are in the domain of the function as shown in the graph.

☐   –5 feet
☐   0 feet
☐   60 feet
☐   200 feet
☐   220 feet

6. The daily cost of production in a factory is calculated using $c(x) = 200 + 16x$, where x is the number of complete products manufactured. Which set of numbers best defines the domain of $c(x)$?

A.   Integers
B.   positive real numbers
C.   positive rational numbers
D.   whole numbers

MAFS.912.F-IF.2.4 EOC Practice

Level 2	Level 3	Level 4	Level 5
identifies the key features (as listed in the standard, excluding periodicity) when given a linear, quadratic, or exponential graph in a real- world context	interprets the key features (as listed in the standard, excluding periodicity) when given a table of a linear, quadratic, or exponential; interprets key features of a linear function given as a verbal description	interprets key features of a quadratic function given as a verbal description	interprets key features of an exponential function given as a verbal description

1. Corinne has a cell phone plan that includes 200 minutes for phone calls and unlimited texting. An additional fee is charged for using more than 200 minutes for phone calls. The figure below is the graph of $C = f(m)$, where C is the monthly cost after m minutes used.
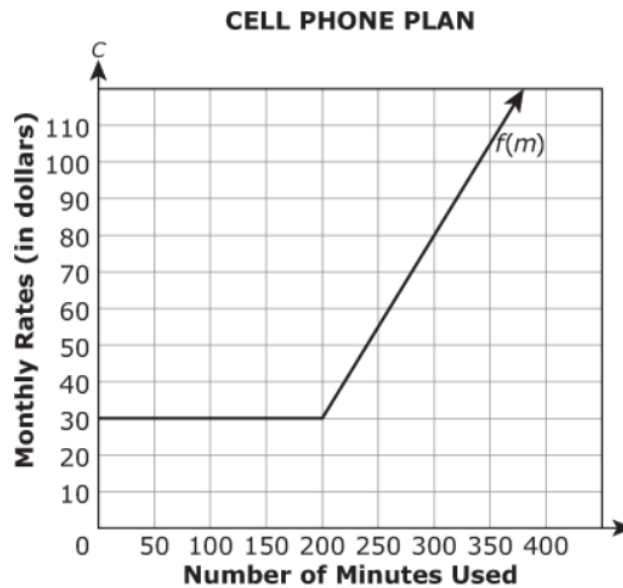
Part A
What is the minimum monthly cost for Corinne's cell phone plan? Show or explain your work.

Part B
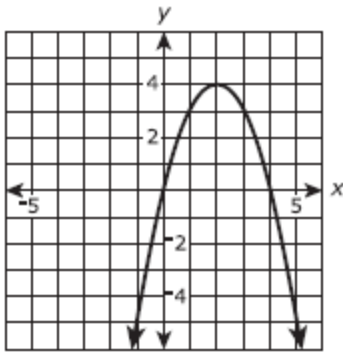What is the value of $f(150)$. Explain its meaning in terms of the cell phone plan.

Part C
For what m is $f(m) = 55$? Explain its meaning in terms of the cell phone plan.

Part D
What is the cost per minute after Corinne uses her monthly allowance of 200 minutes? Show or explain your work.

2. The function $f(x) = 4x - x^2$ is graphed in the xy-coordinate plane as shown.

Part A
Based on the graph of the function, which statements are true? Select **ALL** that apply.

☐ f is increasing on the interval $x < 0$.

☐ f is decreasing on the interval $x < 0$.

☐ f is increasing on the interval $0 < x < 2$.

☐ f is decreasing on the interval $0 < x < 2$.

☐ f is increasing on the interval $2 < x < 4$.

☐ f is decreasing on the interval $2 < x < 4$.

☐ f is increasing on the interval $x > 4$.

☐ f is decreasing on the interval $x > 4$.

Part B
Based on the graph of the function, which statements are true? Select all that apply.

☐ $f(x) < 0$ on the interval $x < 0$.

☐ $f(x) > 0$ on the interval $x < 0$.

☐ $f(x) < 0$ on the interval $0 < x < 2$.

☐ $f(x) > 0$ on the interval $0 < x < 2$.

☐ $f(x) < 0$ on the interval $2 < x < 4$.

☐ $f(x) > 0$ on the interval $2 < x < 4$.

☐ $f(x) < 0$ on the interval $x > 4$.

☐ $f(x) > 0$ on the interval $x > 4$.

3. A computer technician charges a one-time fee of $50 plus an additional $20 per hour of labor. If an equation is created to determine the technician's total charge, what does the $50 represent?

   A. slope
   B. coefficient
   C. x-intercept
   D. y-intercept

4. Given two equations of lines:

$$y = -\frac{1}{4}x + 2 \quad \text{and} \quad -2y = \frac{1}{2}x - 4$$

   How do the lines compare?

   A. They are different lines with the same slope.
   B. They are different lines with the same y-intercept.
   C. They are the same line, both with a slope of 1/2 and a y- intercept of -4
   D. They are the same line, both with a slope of - 1/4 and a y- intercept of 2.

5. This graph shows the population of mice in a study, modeled as a function of time. The study begins on day 0 and ends on day 200.
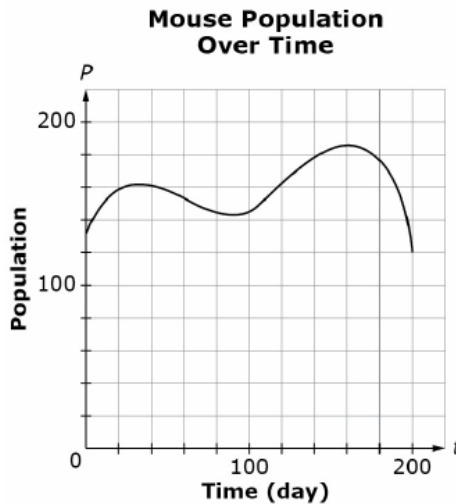
Mouse Population Over Time

Determine whether each statement is true according to the graph. Select True or False for each statement.

Statement	TRUE	FALSE
The mouse population was decreasing between day 40 and day 80.		
The least number of mice during the study was 130.		
The mouse population was at its greatest around day 160.		
There are two intervals of time where the mouse population is decreasing.		

6. Use the graph to answer the questions.

Fire Hose Water Path
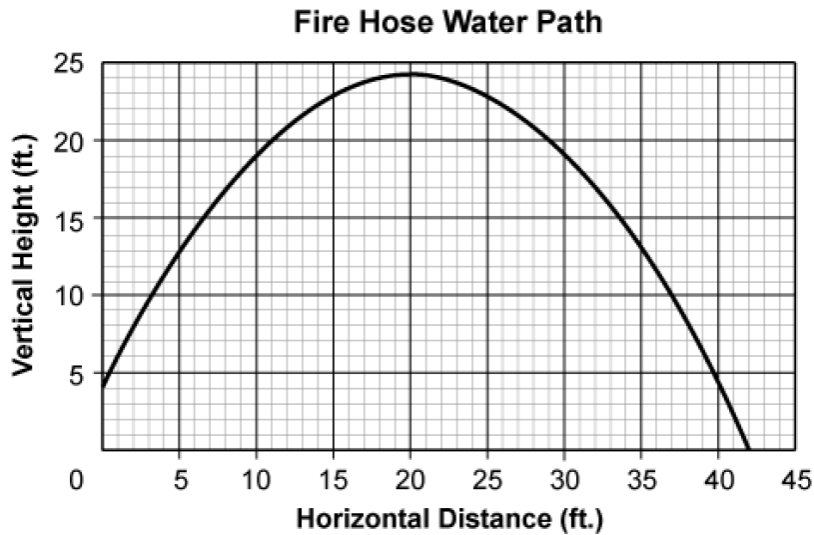
Part A

Explain what the maximum value of this represents in this situation. Make sure to identify the maximum and include information about the x-value and y-value in your explanation.

Part B

What does the x-intercept of the graph represent in terms of the water spray? Use specific information about the coordinates of the x-intercept in your answer.

Part C

Describe characteristics of the rate of change of the function over the interval $0 \le x \le 20$.

7. A grasshopper jumps off of a tree stump. The height, in feet, of the grasshopper above the ground after t seconds is modeled by the function shown.

$$h(t) = -t^2 + \frac{4}{3}t + \frac{1}{4}$$

After how many seconds will the grasshopper land on the ground?

MAFS.912.F-IF.3.9 EOC Practice

Level 2	Level 3	Level 4	Level 5
compares properties of two linear functions, each represented a different way in a real-world or mathematical context	compares the properties of two functions of the same type with different representations (such as a quadratic to a quadratic but using a table and an equation); differentiates between linear and quadratic functions that are represented using different representations (table, graph, or algebraic)	compares properties of two functions (linear, quadratic, or exponential), each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions); differentiates between exponential and quadratic functions that are represented using different representations (table, graph, or algebraic)	compares properties of two functions (linear, quadratic, or exponential) when at least one function is described verbally; differentiates between two functions (linear, quadratic, or exponential) when at least one is described verbally

1. The figure shows a graph of the function of $f(x)$ in the xy-coordinate plane, with the vertex at $(1, 9)$ and the zeros at -2 and 4.
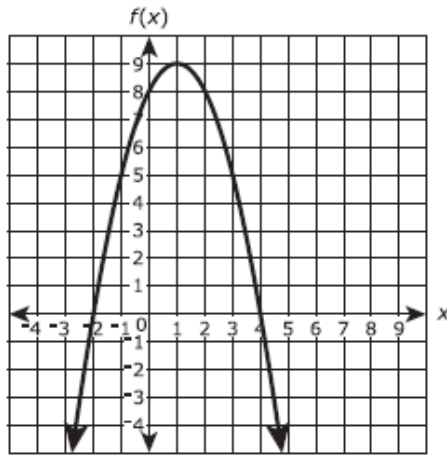
The function g is defined by $g(x) = -3x + 2$. Which statements are true? Select **ALL** that apply.

☐ $f\{-2)$ is greater than $g(-2)$.

☐ $f\{-1)$ is less than $g(-1)$.

☐ $f\{0)$ is greater than $g(0)$.

☐ $f(1)$ is less than $g(1)$.

☐ $f(2)$ is greater than $g(2)$.

2. Which table shows the same rate of change of y with respect to x as $y = 4 - \frac{5}{8}x$?

A.

x	y
−3	−12
−1	−4
2	8
5	20

B.

x	y
−4	6.5
2	2.75
4	1.5
8	−1

C.

x	y
−4	10.4
2	0.8
4	−2.4
8	−8.8

D.

x	y
−3	12
−1	4
2	−8
5	−20

3. Two linear functions are represented by the set of ordered pairs and the graph below.

$$\{(-4, -6), (-2, -2), (2, 6), (4, 10)\}$$
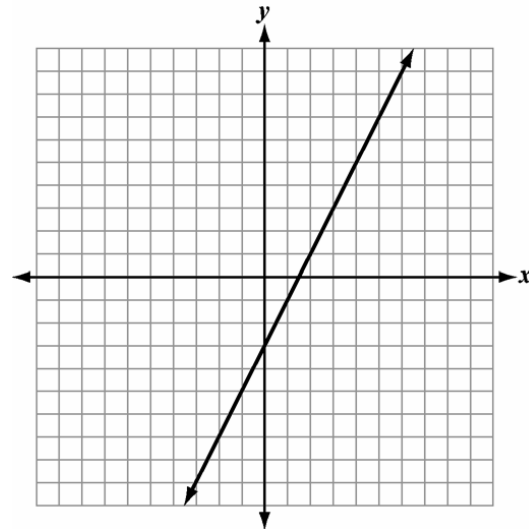
Which statement is true about the functions?

A. The two functions are the same.
B. The two functions have the same y-intercept
C. The two functions have the same x-intercept
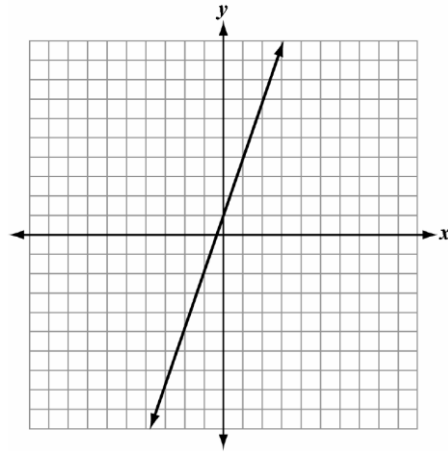D. The two functions have the same rate of change

4. Which function is different from the others?

A.

$$f(x) = 3x + 1$$

B.

C.

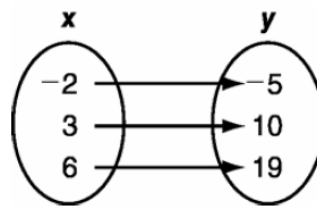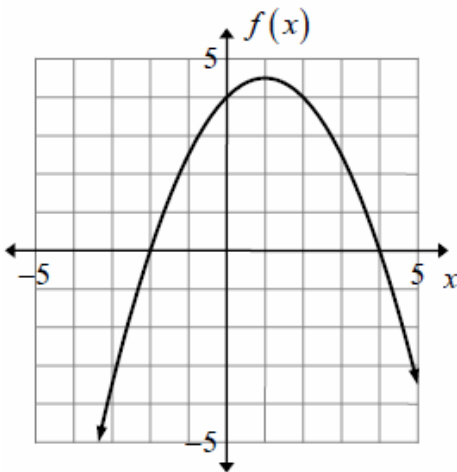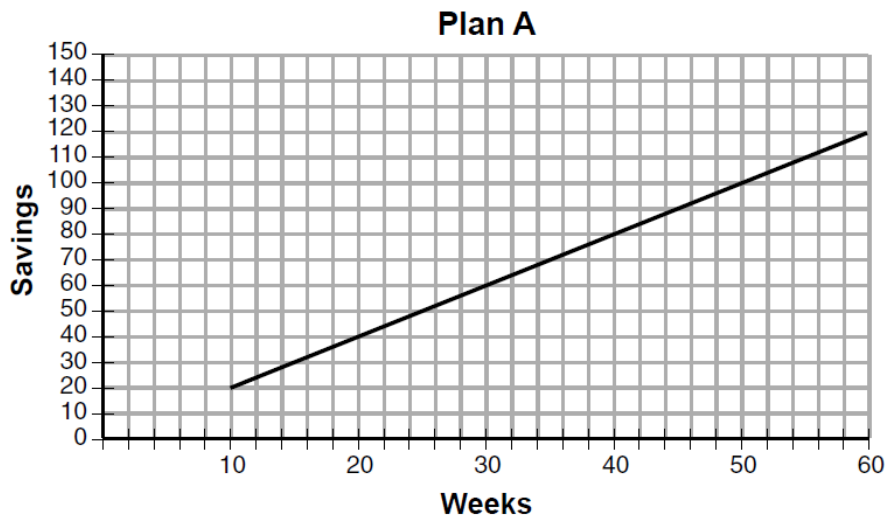| x	y
−5	−14
4	12
12	36

D.

5. Look at the graph of the quadratic $f(x)$ below.

The graph of $g(x) = 3x^2 + bx - 24$ has the same x −intercepts. What is the value of b?

A. -6
B. -2
C. 1
D. 14

8. Nancy works for a company that offers two types of savings plans.
   Plan A is represented on the graph below.

Plan B is represented by the function $f(x) = 0.01 + 0.05x^2$, where x is the number of weeks. Nancy wants to have the highest savings possible after a year. Nancy picks Plan B.

Her decision is

A. correct, because Plan B is an exponential function and will increase at a faster rate
B. correct, because Plan B is a quadratic function and will increase at a faster rate
C. incorrect, because Plan A will have a higher value after 1 year
D. incorrect, because Plan B is a quadratic function and will increase at a slower rate

FSA Algebra 1 EOC Review

MAFS.912.F-IF.2.6 EOC Practice

Level 2	Level 3	Level 4	Level 5
calculates the average rate of change of a function represented by a graph, table of values, or set of data in a real-world context (which may or may not be linear)	interprets the average rate of change of a function represented by a graph, table of values, or set of data or a linear regression equation; calculates the average rate of change when given a quadratic or exponential function presented algebraically; interprets the y-intercept of a linear regression equation	determines the units of a rate of change for a function presented algebraically; uses an interpretation to identify the graph	explains the interpretation, using units, of the rate of change and/or the y-intercept within the context

1. The function $r(x)$ represents the radius of a circle for a given area x. A graph of the function is shown in the figure.

   According to the graph what is the approximate average rate of change in the radius of the circle as the area increases from 3 square feet to 7 square feet?

   A. 0.125 foot per square foot
   B. 0.25 foot per square foot
   C. 0.5 foot per square foot
   D. 8 feet per square foot
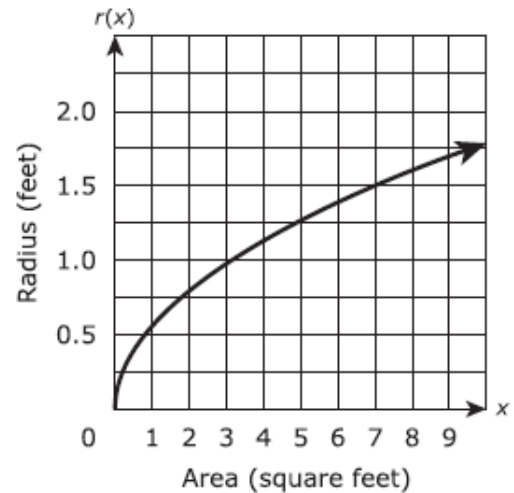
2. Which of the following best describes the relationship between the math class grade and number of days absent represented by the table?

Days Absent	0	3	6	9	12	15
Math Grade	95%	88%	81%	74%	67%	60%

   A. The math class grade is not affected by the number of days absent.
   B. The math class grade decreases steadily as the number of days absent decreases.
   C. The math class grade increases steadily as the number of days absent increases.
   D. The math class grade decreases steadily as the number of days absent increases.

3. Use the table to answer the question.

Gulf Water Temperature, Gulfport
(data collected on the fifteenth of the month)

Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.
Water Temperature (°F)	63.9	64.4	66.8	73.1	78.1	82.4	85.2	86.7	84.5

A scientist measures the water temperature in the Gulf at Gulfport on the fifteenth of each month. Her data is shown in the table.

What is the average rate of change between March 15 and June 15?

A. 2.6°F per month
B. 3.9°F per month
C. 5.2°F per month
D. 7.8°F per month

4. During the first years of growth the height of a tree can be modeled with the function

$$h = -t^2 + 12t + 10$$

where t is the time in years since being planted and h is the height in inches.

Enter the average rate of change, in inches per year, from year 1 to year 5.

5. The table below is of a quadratic function, $g(x)$, where x is measured in seconds and $g(x)$ is measured in meters.
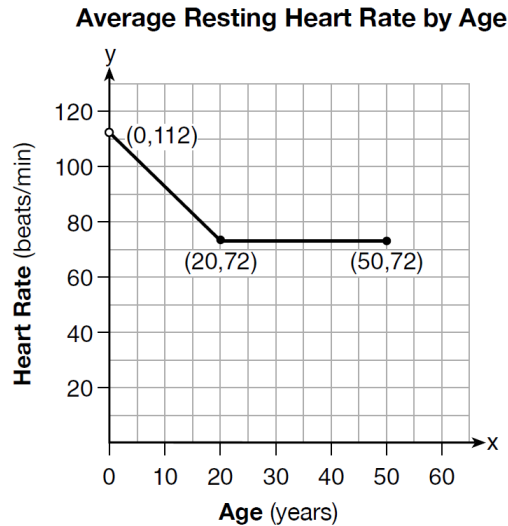
x	0	1	2	3	4
$g(x)$	2.3	-1.0	1.7	10.4	25.1

What is the approximate rate of change over the interval $0 \leq x \leq 4$?

A. 22.8 m/s
B. 8.7 m/s
C. 6.3m/s
D. 5.7 m/s

6. A graph of average resting heart rates is shown below. The average resting heart rate for adults is 72 beats per minute, but doctors consider resting rates from 60-100 beats per minute within normal range.

Average Resting Heart Rate by Age

Which statement about average resting heart rates is not supported by the graph?

A. A 10-year-old has the same average resting heart rate as a 20-year-old.
B. A 20-year-old has the same average resting heart rate as a 30-year-old.
C. A 40-year-old may have the same average resting heart rate for ten years.
D. The average resting heart rate for teenagers steadily decreases.

7. An equation of a function $y(t)$ is shown.

$$y(t) = -t^2 + 14t - 40$$

Select All of the statements that are true about the graph of $y(t)$ for $6 \leq t \leq 8$.

☐ The value of $y(t)$ increases over the interval $6 \leq t \leq 8$

☐ The value of $y(t)$ increases over the interval $7 \leq t \leq 8$

☐ The average rate of change over the interval $6 \leq t \leq 8$ is 0

☐ The value of $y(t)$ is constant over the interval $6 \leq t \leq 8$

☐ The average rate of change over the interval $6 \leq t \leq 7$ is the same as the average rate of change over the interval $7 \leq t \leq 8$

MAFS.912.S-ID.3.7 EOC Practice

Level 2	Level 3	Level 4	Level 5
calculates the average rate of change of a function represented by a graph, table of values, or set of data in a real-world context (which may or may not be linear)	interprets the average rate of change of a function represented by a graph, table of values, or set of data or a linear regression equation; calculates the average rate of change when given a quadratic or exponential function presented algebraically; interprets the y-intercept of a linear regression equation	determines the units of a rate of change for a function presented algebraically; uses an interpretation to identify the graph	explains the interpretation, using units, of the rate of change and/or the y-intercept within the context

1. The distance in miles, y, a bicyclist is from home after riding x hours is represented by the equation $y = 8x + 7$. What does the slope represent in this situation?

   A. the number of hours it takes the bicyclist to ride 15 miles
   B. the distance the bicyclist is from home when $x = 0$
   C. the steepness of the hill the bicyclist is climbing
   D. the speed of the bicyclist

2. One type of redwood tree has an average height of 65 feet when it is 20 years old. If the tree is more than 20 years old, the average height, h, can be modeled by the function $h = 1.95(a - 20) + 65$, where a is the age of the tree in years. Which statement about this situation is true?

   A. Every additional 1.95 ft of length over 20 ft adds 45 years to the age of this type of redwood tree.
   B. For this type of redwood tree, the average height increases by 1.95 ft per year throughout its lifetime.
   C. Each additional year of age over 20 years adds 1.95 ft to the average height of this type of redwood tree.
   D. For this type of redwood tree, the average height increases by 65 ft for every 20 years of growth.

3. The table shows the playing time in minutes of high-definition videos and the file size of these videos in megabytes (MB).

   Videos

 | Playing Time, x (min) | File Size, y (MB) |
   |---|---|
   | 0.5 | 60 |
   | 1.5 | 180 |
   | 2 | 240 |
   | 4.5 | 540 |
   | 5 | 600 |

   What does the slope of the graph of this situation represent?

   A. The increase in the file size of the video per minute of playing time
   B. The file size of each video
   C. The playing time of each video
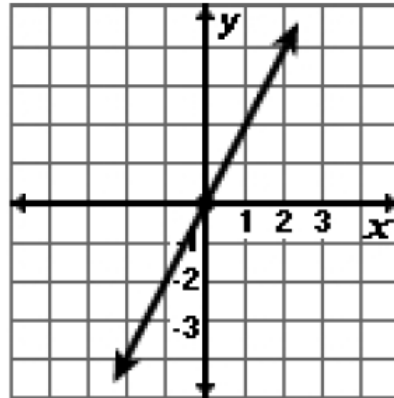   D. The increase in the playing time per MB of video

4. Which is the graph of a linear function with a slope of 2 and a y-intercept at (0, 1)?
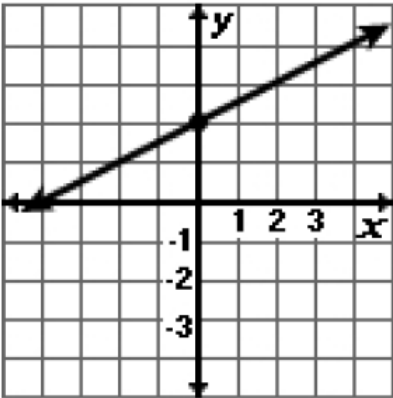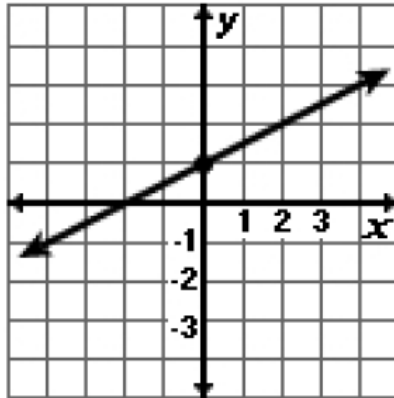
A.
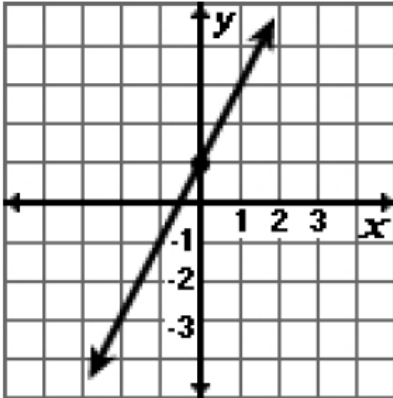
B.

C.

D.

5. A scatterplot is made of a city's population over time. The equation of the line of best fit is $p = 629t + 150{,}000$ where p is the city's predicted population size and t is the number of years since 2000. What is the meaning of the slope of this line?

   A. In 2000, the city's population was about 629 people.
   B. In 2000, the city's population was about 150,000 people.
   C. The city's population increases by about 629 people each year.
   D. The city's population increases by about 150,000 people each year.

6. Juan wants to rent a house. He gathers data on many similar houses. The distance from the center of the city, x, and the monthly rent for each house, y, are shown in the scatter plot. Juan models the data with a linear equation.

Distance and Rent
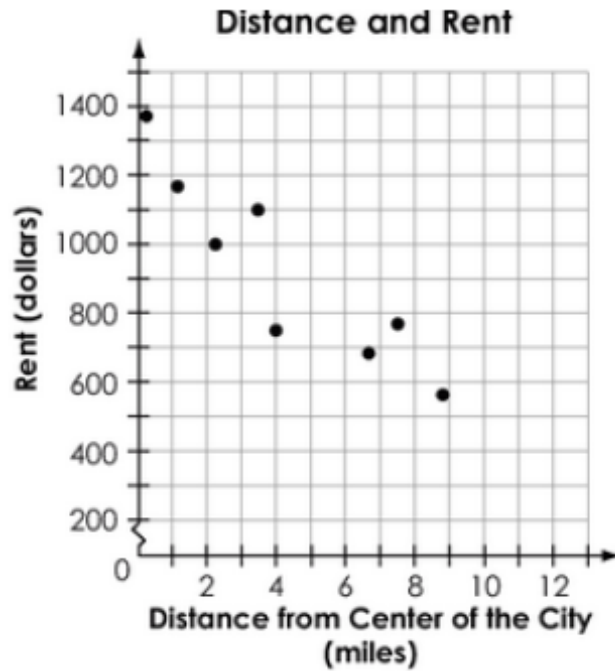
What could the number 1275 represent in this situation?

A. The estimated rent for a house in the center of the city.
B. The estimated minimum rent for a house far from the center of the city.
C. The estimated change in rent for each additional mile from the center of the city.
D. The estimated change in distance from the center of the city for each dollar change in rent.

FSA Algebra 1 EOC Review

MAFS.912.F-IF.3.8 EOC Practice

Level 2	Level 3	Level 4	Level 5
finds zeros of quadratics of the form $ax_2 + b = c$, where a, b, and c are integers; interprets the zero contextually; real-world or mathematical contexts	factors the difference of two squares with a degree of 2, and trinomials with a degree of 2 whose leading coefficient has up to 4 factors and interprets the zeros; completes the square when the leading coefficient is 1; interprets the extreme values	factors quadratics with a common integral factor and a leading coefficient with more than four factors and interprets the zeros; completes the square when the leading coefficient is greater than 1 and $b/(2a)$ is an integer; interprets the extreme values	interprets the axis of symmetry
uses properties of exponents (one operation) and identifies the new base of an exponential function; interprets the a in $y = ab^x$	uses the properties of exponents and interprets the new base, in terms of a rate	transforms exponential functions that have more than one operation and explains the properties of the expressions within a real-world context	compares and contrasts different forms of exponential functions using a real-world context

1. Write the function $y - 3 = \frac{2}{3}(x - 4)$ in the equivalent form most appropriate for identifying the slope and y-intercept of the function.

2. The area, A, in square feet, of a rectangular storage bin in a warehouse is given by the function $A(x) = -2x^2 + 36x$, where x is the width, in feet, of the storage bin.

   Part A
   If the function is graphed in a coordinate plane, which statement would be true?

   A. The x-intercepts of the function are 0 and 8, which are a lower bound and an upper bound for the possible values of the length of the storage bin.
   B. The x-intercepts of the function are 0 and 8, which are a lower bound and an upper bound for the possible values of the width of the storage bin.
   C. The x-intercepts of the function are 0 and 18, which are a lower bound and an upper bound for the possible values of the length of the storage bin.
   D. The x-intercepts of the function are 0 and 18, which are a lower bound and an upper bound for the possible values of the width of the storage bin.

   Part B
   The process of completing the square can be used to calculate the width, in feet, of the storage bin that gives a maximum area. What is the missing value?

   $$A = -2x^2 + 36x$$

   $$A = -2(x - 9)^2 + ?$$

   Enter your answer in the box.

3. A cliff diver's height above the water, in meters, is modeled by the function $h(d) = -d^2 + 2d + 24$, where d represents how far the diver is from the cliff.
    How far from the cliff will the diver be when she reaches the water?

    A. 0 meters
    B. 4 meters
    C. 6 meters
    D. 24 meters

4. Given the function $f(x) = -x^2 + 8x + 9$,

    Part A
    State whether the vertex represents a maximum or minimum point for the function. Explain your answer.

    Part B
    Rewrite $f(x)$ in vertex form by completing the square.

5. A cannonball is shot from the top of an ocean cliff as shown. The height (in meters) of the cannonball above the water is given by $h(t) = -5t^2 + 15t + 8$, where t is the number of seconds after the shot.
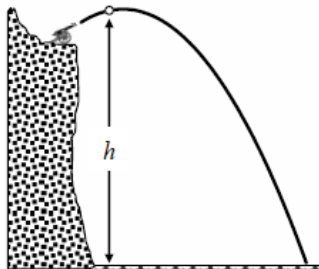
    Determine whether each statement is true according to the graph. Select True or False for each statement.

Statement	TRUE	FALSE
The cannon is 8 meters above the water.		
The cannonball reaches its maximum height at 1.5 seconds after it is shot.		
The cannonball hits the water 8 seconds after it is shot.		

6. The graph of a quadratic function $f(x)$ intersects the $x-$axis at -3 and 5. What is a possible equation for $f(x)$?

MAFS.912.A-APR.2.3 EOC Practice

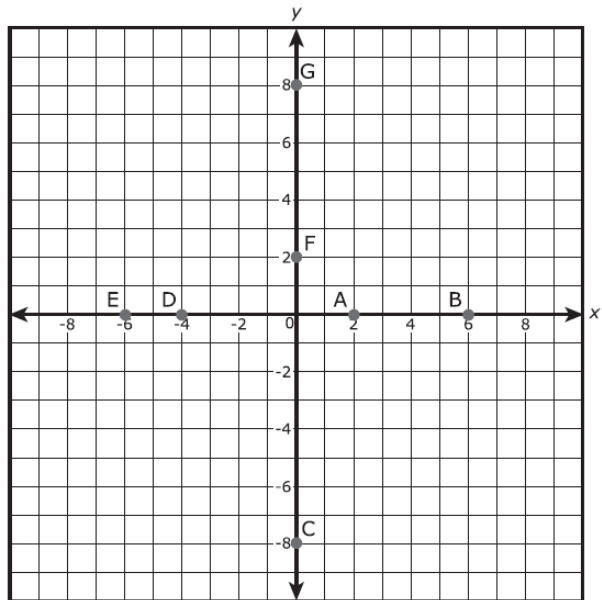| Level 2	Level 3	Level 4	Level 5
identifies the zeros of a function from a graph	identifies the graph of a function given in factored form for a polynomial whose leading coefficient is a positive integer	creates a rough graph given a polynomial function in factored form whose leading coefficient is an integer in a real-world or mathematical context	uses the x-intercepts of a polynomial function and end behavior to graph the function in a real-world or mathematical context

1. Several points are plotted on the graph.
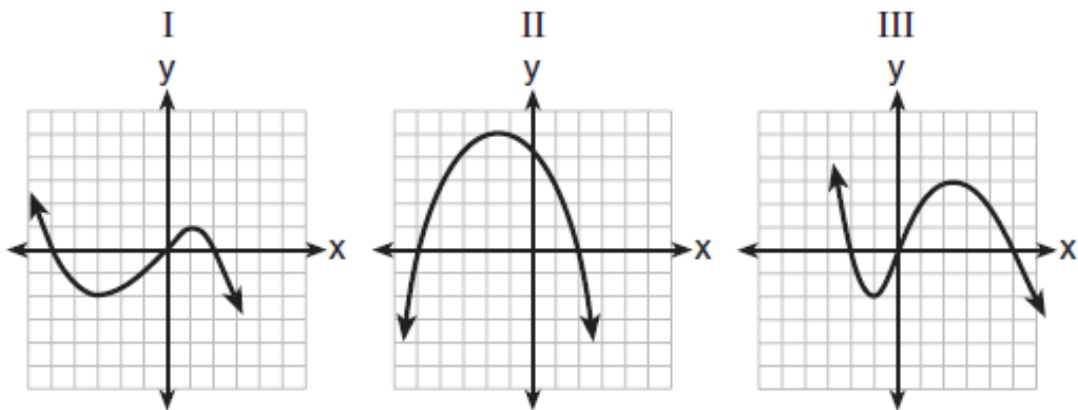   Select the plotted points on the graph that represent the zeros of the function:

   $$f(x) = (x^2 + 2x - 8)(x - 6)?$$

   Select **ALL** that apply.

   ☐ $(2, 0)$

   ☐ $(6, 0)$

   ☐ $(0, -8)$

   ☐ $(-4, 0)$

   ☐ $(-6, 0)$

   ☐ $(0, 2)$

   ☐ $(0, 8)$

2. A polynomial function contains the factors x, $x - 2$, and $x + 5$. Which graph(s) below could represent the graph of this function?

   I

   II

   III

   A. I only
   B. II only
   C. I and III
   D. I, II, and III

MAFS.912.F-IF.3.7 EOC Practice

Level 2	Level 3	Level 4	Level 5
identifies the graph of a linear, simple quadratic, or simple exponential function given its equation	constructs the graph of a linear function, quadratic, or exponential given its equation; constructs a linear function using x- and y-intercepts	constructs the graph of a quadratic function given the x- and y-intercepts or vertex and end behavior; key features can be presented in both a mathematical and a real-world context	constructs the graph of an exponential function given the x- and y-intercepts and end behavior

1. What are the $x-$intercepts of the parabola?
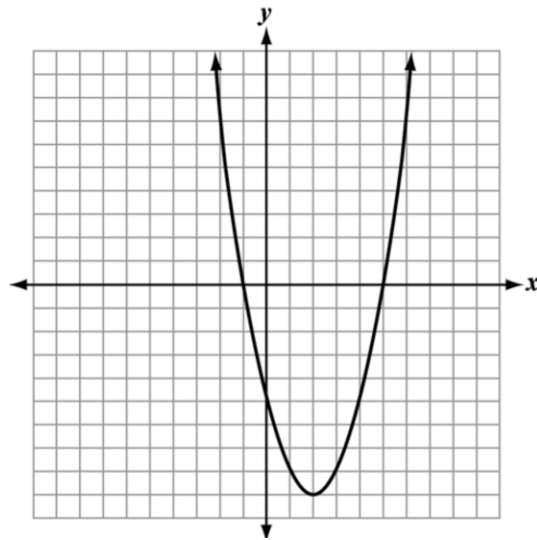
   A. $(0, -1)$ and $(0, 5)$
   B. $(2, 0)$ and $(-9, 0)$
   C. $(-1, 0)$ and $(5, 0)$
   D. $(0, -5)$ and $(-5, 0)$

2. In the xy-coordinate plane, the graph of the equation $y = 3x^2 - 12x - 36$ has zeros at $x = $ a and $x = b$, where $a < b$. The graph has a minimum at $(c, -48)$. What are the values of a, b, and c?
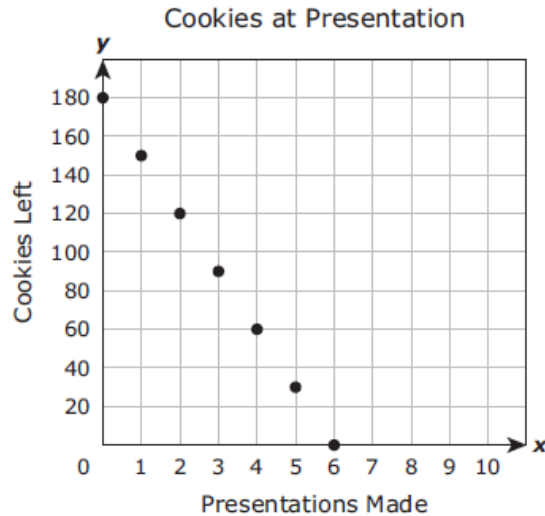
   A. $a = 2, b = 4, c = 2$
   B. $a = -2, b = 6, c = 2$
   C. $a = -31 \ b = 31 \ C = 0$
   D. $a = 3, b = 6, c = 2$

3. What are the intercepts of the line with equation $2x - 3y = 30$?

   A. $(-10, 0)$ and $(0, 15)$
   B. $(6, 0)$ and $(0, -6)$
   C. $(15, 0)$ and $(0, -10)$
   D. $(30, 0)$ and $(0, -30)$

4. The graph shows the relationship between the number of cookies a presenter at a convention had left to give away and the number of presentations she had made.

Cookies at Presentation

What does the $x-$intercept of the graph represent?

A. The number of cookies the presenter had before making any presentations
B. The maximum number of cookies the presenter gave away during every presentation
C. The number of presentations the presenter made per hour
D. The maximum number of presentations the presenter made before running out of cookies

5. An architecture student is drawing a graph of an arch. As shown below, the arch has the shape of a parabola that begins at the origin and has a vertex at (4.6, 12.2).

Arch Drawing
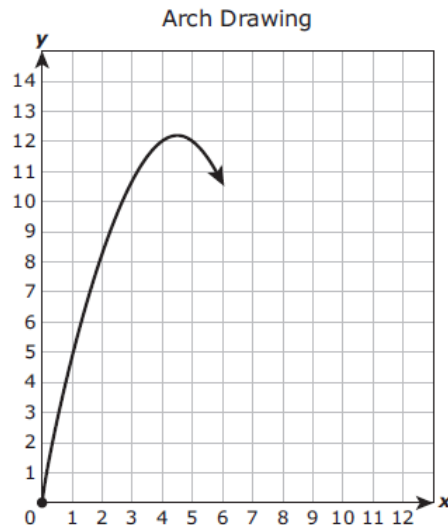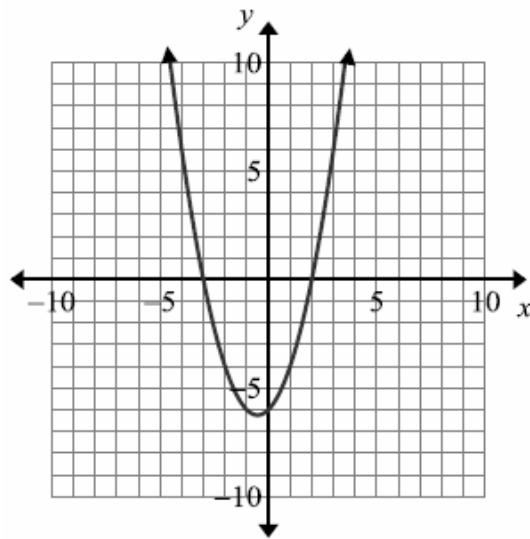

Other than the origin, at which point will the graph intersect the x-axis?

A. $(12.2, 0)$
B. $(9.2, 0)$
C. $(4.6, 0)$
D. $(10.6, 0)$
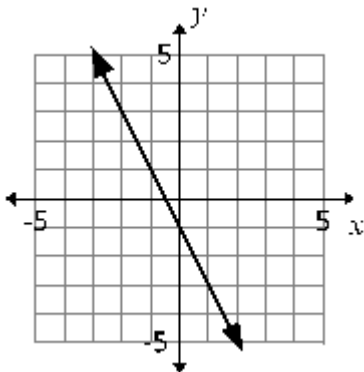
6. Which equation is represented in the graph below?
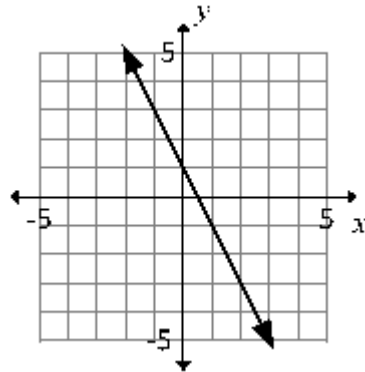

A. $y = x^2 - x - 6$
B. $y = x^2 - x + 6$
C. $y = x^2 - x - 6$
D. $y = x^2 + x + 6$

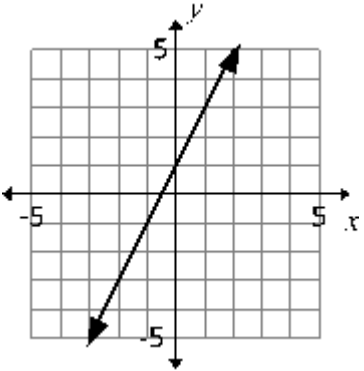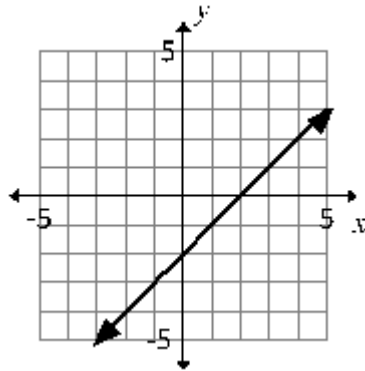7. Which is the graph of the line with x-intercept $\frac{1}{2}$ and y-intercept 1?

A.

B.

C.

D.

MAFS.912.F-LE.1.1 EOC Practice

Level 2	Level 3	Level 4	Level 5
identifies relationships in tables and graphs that can be modeled with linear functions (constant rate of change) and with exponential functions (exponential rate of change)	proves that linear functions grow by equal differences over equal intervals; proves that exponential functions grow by equal factors over equal intervals; identifies the constant rate or rate of growth or decay; chooses an explanation as to why a context may be modeled by a linear or exponential function	identifies situations given as a written description in a real-world context in which one quantity changes at a constant rate per unit interval relative to another or grows by equal factors over equal intervals	[intentionally left blank]

1. Christy and Derron set goals for improving their recorded times for the mile. Which statement best describes these goals?

   ▪ Christy: Complete each new run in 5 fewer seconds than the previously recorded run.
   ▪ Derron: Complete each new run in 5% less time than the previously recorded run.

   A. Christy's goal can be modeled with an exponential function, while Derron's goal can be modeled with a linear function.
   B. Christy's goal can be modeled with a linear function, while Derron's goal can be modeled with an exponential function.
   C. Both goals can be modeled with exponential functions.
   D. Both goals can be modeled with linear functions.

2. Given that $y = ax + b$, $x_0 = -2$, and $x_1 = 3$, what is the difference between the value of y corresponding to x_1 and the value of y corresponding to x_0?

   A. -5a
   B. -a
   C. a
   D. 5a

3. Which situation best describes the graph?
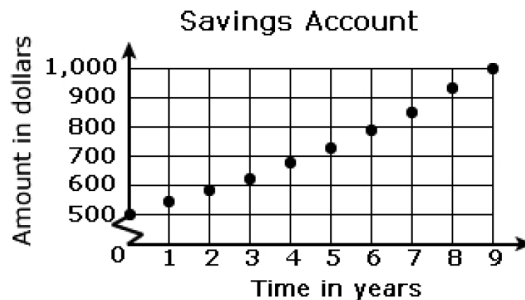
   Savings Account

   A. 8% per year increase in value of a $1,000 deposit over 9 years.
   B. 8% per year increase in value of a $500 deposit over 9 years.
   C. 8% per year decrease in value of a $1,000 deposit over 9 years.
   D. 8% per year decrease in value of a $500 deposit over 9 years.

4. Which equation represents a linear function?

   A. $y = x + 1$

   B. $xy = 1$

   C. $y = x^2$

   D. $x = \dfrac{1}{y}$

5. Rachel and Marc were given the information shown below about the bacteria growing in a Petri dish in their biology class.

Number of Hours, x	1	2	3	4	5	6	7	8	9	10
Number of Bacteria, B(x)	220	280	350	440	550	690	860	1070	1340	1680

   Rachel wants to model this information with a linear function. Marc wants to use an exponential function. Which model is the better choice? Explain why you chose this model.

6. Which scenario represents exponential growth?

   A. A water tank is filled at a rate of 2 gallons/minute.
   B. A vine grows 6 inches every week.
   C. A species of fly doubles its population every month during the summer.
   D. A car increases its distance from a garage as it travels at a constant speed of 25 miles per hour.

MAFS.912.F-LE.2.5 EOC Practice

Level 2	Level 3	Level 4	Level 5
identifies which values are constant from a given context	interprets the slope and x- and y-intercepts in a linear function; interprets the base value and vertical shifts in an exponential function of the form $f(x) = b^x + k$, where b is an integer and k can equal zero; in a real-world context	interprets the base value and initial value in an exponential function of the form $f(x) = ab^x$, where b is an integer and can be any positive integer	[intentionally left blank]

1. Point A on the graph represents the distance and time that Cat traveled on her trip. Which of the following represents her average speed?

   A. x-coordinate of point A
   B. y-coordinate of point A
   C. slope of line through A and (0, 0)
   D. distance from the origin to point A

2. The development budget (C) for a computer game company is described by the equation $C = \$50,000t + \$10,000$, where t is the number of years since the company's creation. Which statement is true?

   A. Each year development expenses increase by $50,000.
   B. Each year development expenses increase by $60,000.
   C. Each year development expenses are $50,000.
   D. Each year development expenses are $60,000.

3. Roy opened a savings account and made a deposit. Assuming he makes no deductions or additional deposits, his balance can be calculated using the function $f(t) = 850(1.065)^t$ where t represents the number of years since the initial deposit.
   What does the number 850 represent?

   A. the amount of Roy's initial deposit
   B. the amount of interest Roy will earn each year
   C. the number of years it will take for Roy's money to double
   D. the maximum amount of interest Roy can earn with the account

4. Population growth of a country is modeled by the function below, where t is time in years. Based on the model, which is true about the country?

$$P = 10^7(1.04)^t$$

   A. Since reaching 10 million people, the population was growing by 0.04% each year.
   B. Since reaching 10 million people, the population was growing by 4% each year.
   C. Since reaching 100 million people, the population was growing by 0.04% each year.
   D. Since reaching 100 million people, the population was growing by 4% each year.

5. Laniqua trains for the long jump each week. She writes this function to model the relationship between the number of weeks, w, she trains and the distance, $f(w)$, in inches, she can jump.

$$f(w) = 2w + 180$$

What does the slope of this function represent?

A. the number of inches Laniqua can jump when she begins training
B. the number of weeks it takes Laniqua to improve her jumping
C. the number of weeks it takes Laniqua to increase her jump distance by 1 inch
D. the number of inches Laniqua's jump distance increases per week of training

6. The 2014 winner of the Boston Marathon runs as many as 120 miles per week. During the last few weeks of his training for an event, his mileage can be modeled by $M(w) = 120(.90)^{w-1}$, where w represents the number of weeks since training began. Which statement is true about the model $M(w)$?

A. The number of miles he runs will increase by 90% each week.
B. The number of miles he runs will be 10% of the previous week.
C. $M(w)$ represents the total mileage run in a given week.
D. w represents the number of weeks left until his marathon.

MAFS.912.F-LE.1.2 EOC Practice

Level 2	Level 3	Level 4	Level 5
constructs linear functions of arithmetic sequences when given a graph in a real-world context	constructs linear functions, including arithmetic sequences, given a graph or input-output pairs; constructs exponential functions, including geometric sequences given a graph	constructs linear functions and exponential functions, including arithmetic sequences and geometric sequences, given input- output pairs, including those in a table	constructs linear and exponential functions, including arithmetic and geometric sequences, given the description of a relationship

1. What is the equation of the function represented by this table of values?

x	−2	−1	0	1	2
y	$\frac{3}{25}$	$\frac{3}{5}$	3	15	75

A. $y = 5x + 3$
B. $y = 12x + 3$
C. $y = 3 \cdot 5^x$
D. $y = 5 \cdot 3^x$

2. Which expression represents the output of the nth term?

Input	1	2	3	4	5	n
Output	1	3	5	7	9	

A. $n + 2$
B. $n + 11$
C. $2n + 1$
D. $2n - 1$

3. If x and y are defined as indicated by the accompanying table, which equation correctly represents the relationship between x and y?

x	y
2	1
3	3
5	7
7	11

A. $y = x + 2$
B. $y = 2x + 2$
C. $y = 2x + 3$
D. $y = 2x - 3$

4. A certain type of lily plant is growing in a pond in such a way that the number of plants is growing exponentially. The number of plants N in the pond at time t is modeled by the function $N(t) = ab^t$, where a and b are constants and t is measured in months. The table shows two values of the function.

t	$N(t)$
0	150
1	450

Which equation can be used to find the number of plants in the pond at time t?

   A. $N(t) = 150(1)^t$
   B. $N(t) = 450(1)^t$
   C. $N(t) = 150(3)^t$
   D. $N(t) = 450(3)^t$

5. In a basketball game, Marlene made 16 field goals. Each of the field goals were worth either 2 points or 3 points, and Marlene scored a total of 39 points from field goals.

Part A
Let x represent the number of two-point field goals and y represent the number of three-point field goals. Which equations can be used as a system to model the situation?

Select **ALL** that apply.

☐ $x + y = 16$
☐ $x + y = 39$
☐ $2x + 3y = 16$
☐ $2x + 3y = 39$
☐ $3x + 2y = 16$
☐ $3x + 2y = 39$

Part B
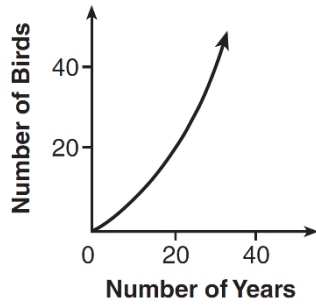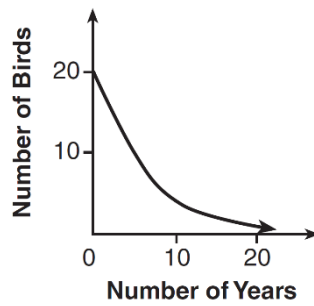How many three-point field goals did Marlene make in the game? Enter your answer in the box.

☐

6. A population that initially has 20 birds approximately doubles every 10 years. Which graph represents this population growth?

A.

B.

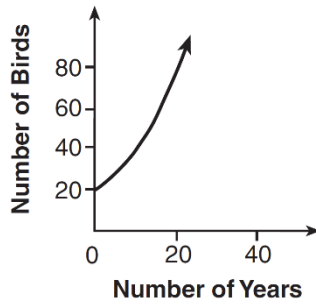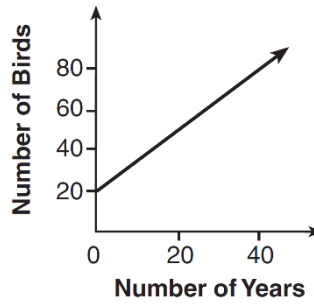

C.

D.

FSA Algebra 1 EOC Review

MAFS.912.F-BF.1.1 EOC Practice

Level 2	Level 3	Level 4	Level 5
recognizes an explicit expression that is linear for arithmetic sequences whose common difference is an integer in a real-world context	writes an explicit function for arithmetic sequences and geometric sequences; writes a recursive formula for an arithmetic sequence; completes a table of calculations	writes a recursive formula for a geometric sequence	writes a recursive formula for a sequence that is not arithmetic or geometric
combines standard function types using addition and subtraction when the functions are given within a real-world context	combines standard function types using addition, subtraction, and multiplication when the functions are given within the context; writes a composition of functions that involve two linear functions in a real-world context	writes a composition of functions that involve linear and quadratic functions	writes a new function that uses both a composition of functions and operations

1. Every day commuting to and from work, Jay drives his car a total of 45 miles. His car already has 2,700 miles on it. Which function shows the total number of miles Jay's car will have been driven after n more days?

   A. $d(n) = 60$
   B. $d(n) = 60n$
   C. $d(n) = 45 + 2{,}700n$
   D. $d(n) = 2{,}700 + 45n$

2. If the first $Now = 5$, what formula can be used to find the terms of this pattern?

   $$5, -10, 20, -40, 80 \ldots$$

   A. $Next = Now - 15$
   B. $Next = (-2) \cdot Now$
   C. $Next = 2 \cdot Now$
   D. $Next = (-4) \cdot Now + 10$

3. The first five terms in a pattern are shown below.

   $$-0.5, -0.25, 0, 0.25, 0.5 \ldots$$

   If the pattern continues, which expression can be used to find the nth term?

   A. $0.75n - 1.25$
   B. $-0.25n - 0.25$
   C. $0.25n - 0.75$
   D. $-0.50n + 0.25$

4. Jalea has a camera that automatically takes pictures of hummingbirds visiting her hummingbird feeder. The camera takes 4 pictures on the first day and 10 pictures every day after that. Which function models the total number of hummingbird pictures, $f(d)$, the camera has taken after d days?

    A. $f(d) = 4d + 10$
    B. $f(d) = 4(d + 1) + 10$
    C. $f(d) = 10d + 4$
    D. $f(d) = 10(d - 1) + 4$

5. Andy has $310 in his account. Each week, w, he withdraws $30 for his expenses. Which expression could be used if he wanted to find out how much money he had left after 8 weeks?

    A. 310 - 8w
    B. 280 + 30(w - 1)
    C. 310w – 30
    D. 280 - 30(w - 1)

MAFS.912.F-IF.1.3 EOC Practice

Level 2	Level 3	Level 4	Level 5
identifies an arithmetic sequence as a linear function when the sequence is presented as a sequence	identifies an arithmetic sequence as a linear function when the sequence is presented as a graph or table; identifies that a geometric sequence is a function when the sequence is presented as a sequence, graph, or table; recognizes the domain of a sequence as a set of integers or a subset of integers	identifies non-arithmetic and non-geometric sequences as a function when given as a sequence	identifies non-arithmetic and non-geometric sequences as a function when given as a graph or table; explains why the domain of sequences are a set or a subset of integers

1. For the function below, which set produces the sequence -11, 0, 5?

$$k(n) = 8n - 3n^2$$

   A. $k(-1), k(0), k(1)$
   B. $k(1), k(2), k(3)$
   C. $k(-3), k(-2), k(-1)$
   D. $k(-11), k(0), k(5)$

2. If a sequence is defined recursively $by\ f(0) = 2$ and $f(n + 1) = -2f(n) + 3$ for $n \geq 0$, then $f(2)$ is equal to

   A. -11
   B. 1
   C. 5
   D. 17

3. The third term in an arithmetic sequence is 10 and the fifth term is 26. If the first term is a_1, which is an equation for the nth term of this sequence?

   A. $a_n = 8n + 10$
   B. $a_n = 8n - 14$
   C. $a_n = 16n + 10$
   D. $a_n = 16n - 38$

4. If $f(1) = 3$ and $f(n) = -2f(n-1) + 1$, then $f(5) =$

   A. -5
   B. 11
   C. 21
   D. 43

5. A sequence is created from the function $k(n) = 3n + 1$, where n represents the position of the term in the sequence. The sequence does not begin at 0. Which list represents the first five terms of the sequence?

   A. $5, 6, 7, 8, 9$
   B. $4, 7, 10, 13, 16$
   C. $4, 7, 11, 18, 29$
   D. 6,9,12,15,18

6. Use the number sequences to answer the question.

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Sequence I	2	4	8	16	32	64
Sequence II	10	20	30	40	50	60
Sequence III	1	5	1	5	1	5

The table shows the first 6 terms for three different number sequences.

Which statement describes all number sequences?

   A. Sequences are functions, with the previous term as the domain and the following terms as the range.
   B. Sequences are not functions because the same number can appear more than once in a sequence.
   C. Sequences are functions, with the term number as the domain and the terms of the sequence as the range.
   D. Sequences are not functions because functions relate two sets of numbers, the inputs and the outputs, and sequences have only one set of numbers

7. In 2014, the cost to mail a letter was 49¢ for up to one ounce. Every additional ounce cost 21¢. Which recursive function could be used to determine the cost of a 3-ounce letter, in cents?

   A. $a_1 = 49; a_n = a_{n-1} + 21$
   B. $a_1 = 0; a_n = 49a_{n-1} + 21$
   C. $a_1 = 21; a_n = a_{n-1} + 49$
   D. $a_1 = 0; a_n = 21a_{n-1} + 49$

MAFS.912.F-LE.1.3 EOC Practice

Level 2	Level 3	Level 4	Level 5
given graphs or a linear and exponential function on the same coordinate plane, describes how the graphs compare; identifies which function is a linear function, an exponential function, or a quadratic function given in a real-world context by interpreting the functions' graphs or tables	identifies that an exponential growth function will eventually increase faster than a linear function or a quadratic function given in a real-world context by interpreting the functions' tables	identifies that a quantity increasing exponentially eventually exceeds a quantity increasing linearly using graphs and tables; explains that an exponential growth function will eventually increase faster than a linear function or a quadratic function given in a real-world context by interpreting the functions' graphs or tables	describes and compares the changes of behavior between a linear and an exponential function including the approximate point(s) of intersection; justifies that an exponential function will eventually increase faster than a linear function or a quadratic function given in a real-world context by interpreting the functions' graphs or tables using rates

1. Graph $f(x) = x^2$ and $g(x) = 2^x$ for $x \geq 0$ on the set of axes below.
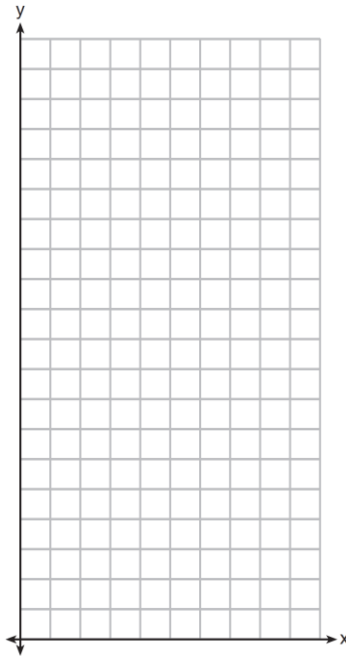
State which function, $f(x)$ or $g(x)$, has a greater value when $x = 20$. Justify your reasoning.

2. During the 1st day of a canned-goods drive, Jasmine's homeroom teacher collected 2 cans. During the 3rd day, the teacher collected 8 cans. Let D represent each collection day, and let N represent the number of canned goods collected on that day.

Part A

Based on the situation, Jasmine claims that the number of canned goods collected can be modeled by an exponential function. What is the number of canned goods collected on the 6th day based on an exponential model? Enter your answer in the box.

Part B

Ramon disagrees with Jasmine and claims that the number of canned goods collected can be modeled by a linear function.
Which statement is true about the number of cans predicted to be collected on the 6th day based on the two models?

A.   The number of cans predicted to be collected on the 6th day using a linear model is greater than that predicted using an exponential model.
B.   The number of cans predicted to be collected on the 6th day using a linear model is less than that predicted using an exponential model.
C.   The number of cans predicted to be collected on the 6th day using a linear model is equal to that predicted using an exponential model.
D.   There is not enough information to determine the relationship between the number of cans predicted to be collected on the 6th day using a linear model and that predicted using an exponential model.

3.   Alicia has invented a new app for smart phones that two companies are interested in purchasing for a 2-year contract.

- Company A is offering her $10,000 for the first month and will increase the amount each month by $5000.
- Company B is offering $500 for the first month and will double their payment each month from the previous month.

Monthly payments are made at the end of each month. For which monthly payment will company B's payment first exceed company A's payment?

A.   6
B.   7
C.   8
D.   9