Bluebonnet Learning
Secondary Mathematics
EDITION 1

Algebra I

Assessments

STUDENT EDITION

Acknowledgment

Thank you to all the Texas educators and stakeholders who supported the review process and provided feedback. These materials are the result of the work of numerous individuals, and we are deeply grateful for their contributions.

Notice

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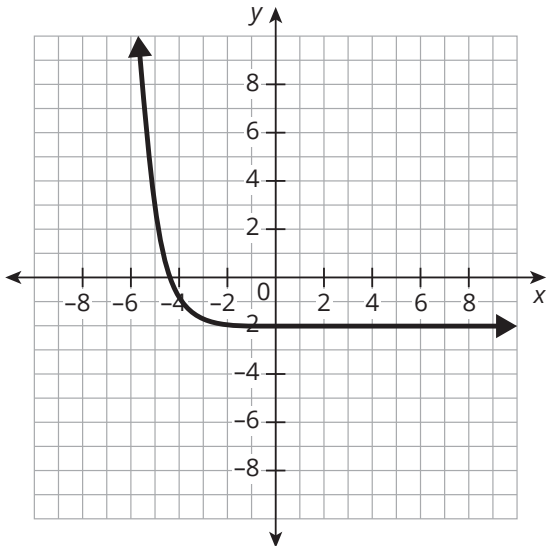
MODULE 1

Searching for Patterns

Name _____ Date _____

1. Which characteristics best describe the graph? Select **TWO** correct answers.



A. The graph shows an exponential function.

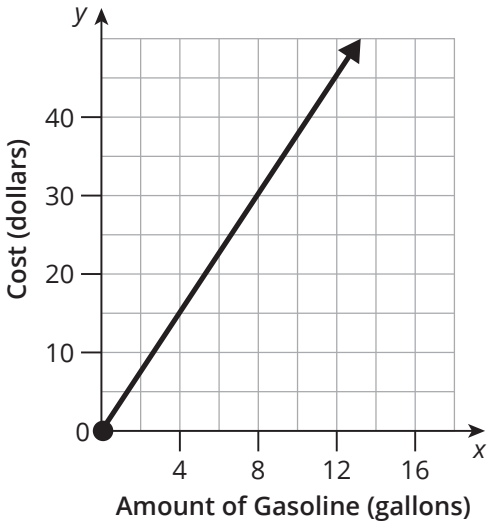
B. The graph shows a linear function.

C. The graph is increasing.

D. The coordinates of the *x*-intercept are (2, 0).

E. The coordinates of the *y*-intercept are (0, −2).

2. A gas station owner calculates the cost of the gasoline he needs to purchase for the year and records it on the graph below.



What are the domain and range of the function in the situation?

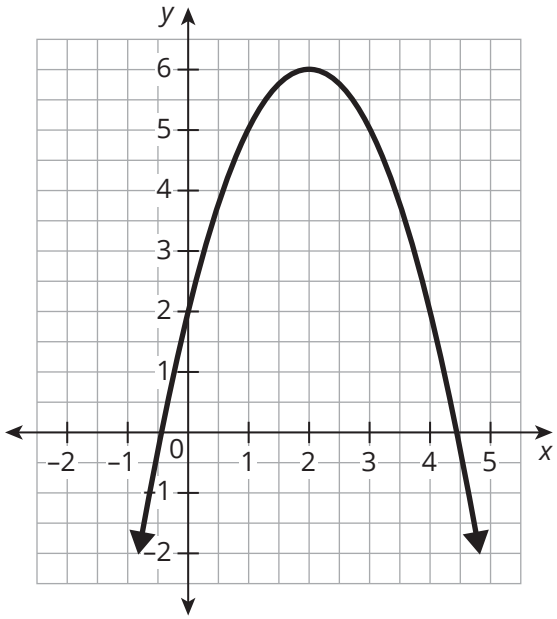
F. Domain: All real numbers greater than or equal to 0
Range: All real numbers greater than or equal to 0

G. Domain: All real numbers greater than or equal to 0 and less than or equal to 13
Range: All real numbers greater than or equal to 0 and less than or equal to 50

H. Domain: All real numbers
Range: All real numbers

J. Domain: All real numbers greater than or equal to 0 and less than or equal to 50
Range: All real numbers greater than or equal to 0 and less than or equal to 13

3. The graph of quadratic function r is shown on the grid.



Which answer choice best represents the range of r?

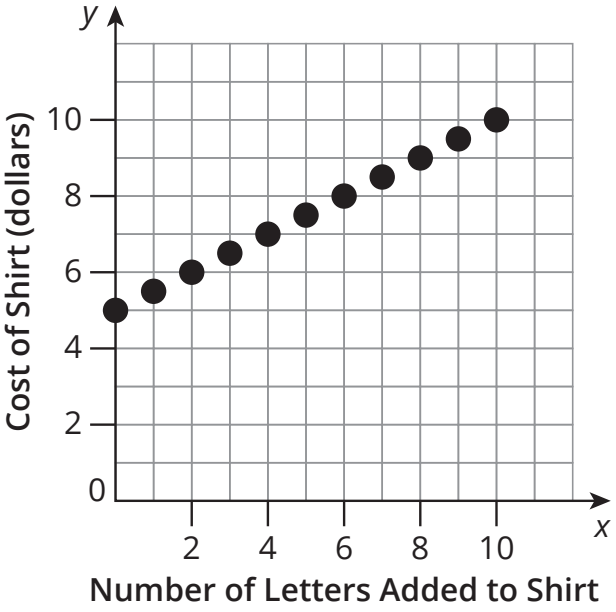
A. $-0.5 \leq x \leq 4.5$

B. $y \geq 6$

C. $y \leq 6$

D. All real numbers

4. A store owner sells T-shirts for $5. Customers can personalize the T-shirts with a name for an additional $0.50 per letter. The graph represents the cost of a T-shirt based on the number of letters added to the shirt.



Which statements are true for the graph? Select **TWO** correct answers.

F. Domain: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

G. Range: 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5, 9, 9.5, 10

H. The domain and range include all real numbers.

J. The graph is continuous.

K. Domain: $0 \leq x \leq 10$

5. Which table shows y as a function of x?

A.

x	4	4	4	4
y	−3	8	10	14

B.

x	2	4	6	8
y	4	8	8	16

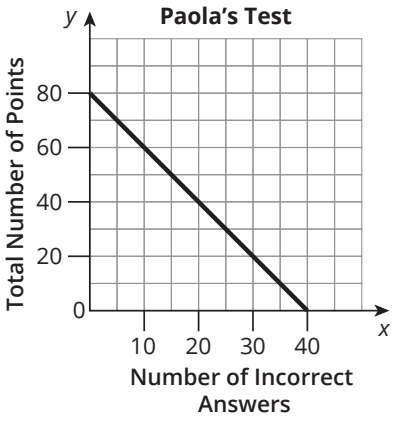
C.

x	3	−3	−3	−9
y	2	4	8	16

D.

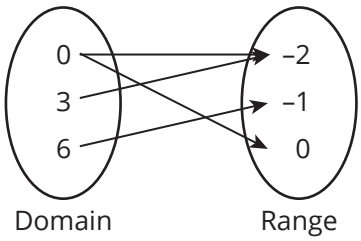
x	0	0	1	2
y	1	2	3	4

6. Paola begins a test with a possible total of 80 points. She loses 2 points for every question she answers incorrectly. The graph represents this situation.

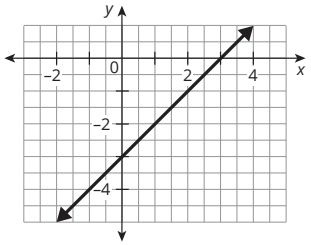
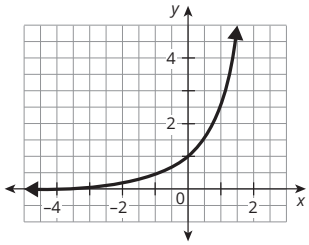
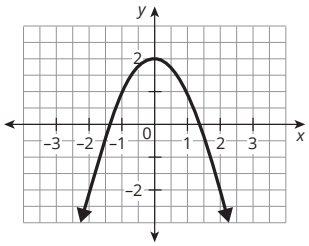


Identify the y-intercept and explain what it means in the problem situation.

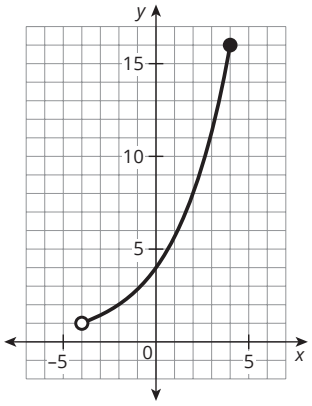
7. Determine whether the relationship represents a function. Explain why or why not.



8. Determine whether each graph represents a linear, quadratic, or exponential function. Select the correct answer in each row.

Function	Linear	Quadratic	Exponential
Graph A 			
Graph B 			
Graph C 			

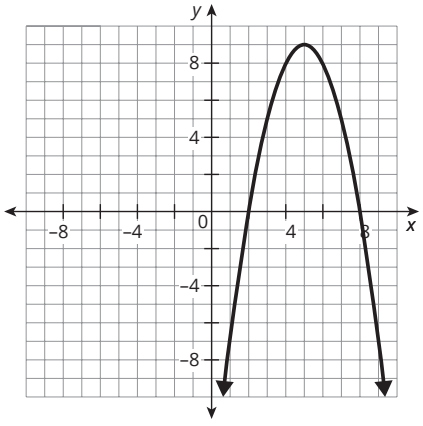
9. Part of an exponential function is graphed on the grid. Write the domain and range of the part shown using inequalities.



Domain:

Range:

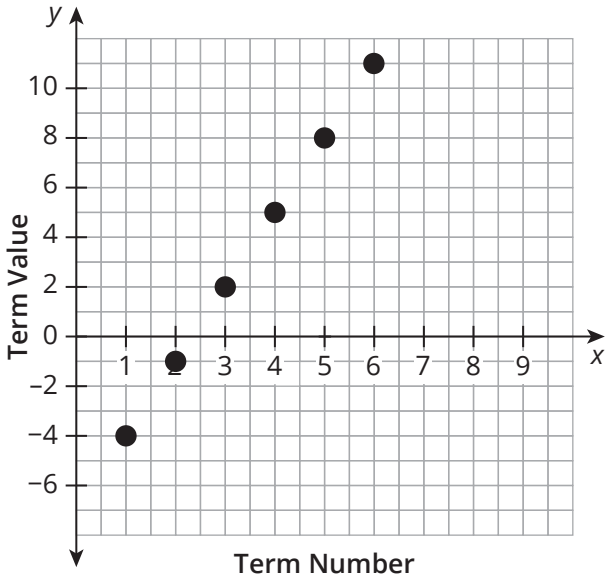
10. The graph of the quadratic function f is shown on the grid. The coordinates of the x-intercepts, y-intercept, and vertex are integers.



Determine the maximum value of f.

Name _____ Date _____

1. Which explicit formula is represented by the graph?



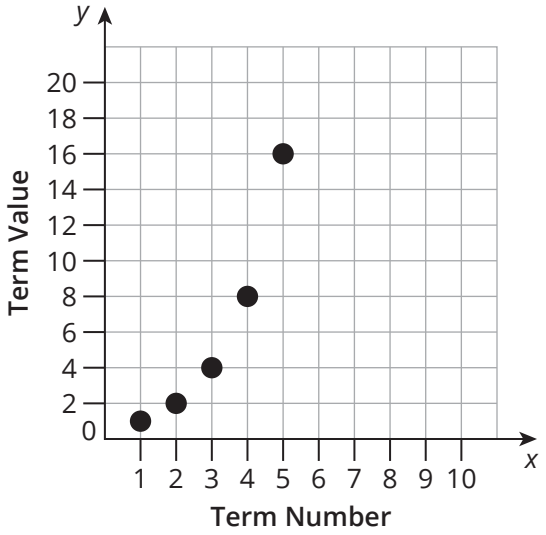
A. $a_n = 3n - 7$

B. $a_n = -4n + 7$

C. $a_n = 3n - 9$

D. $a_n = 2n - 6$

2. Which explicit formula is represented by the graph?



F. $g_n = 1^{n-1}$

G. $g_n = (-1)^{n-1}$

H. $g_n = 2^{n-1}$

J. $g_n = (-2)^{n-1}$

3. Which representations show the first five terms of a sequence given by the recursive formula $f_n = f_{n-1} + 5$, where $f_1 = 15$? Select **TWO** correct answers.

A. 15, 20, 25, 30, 35

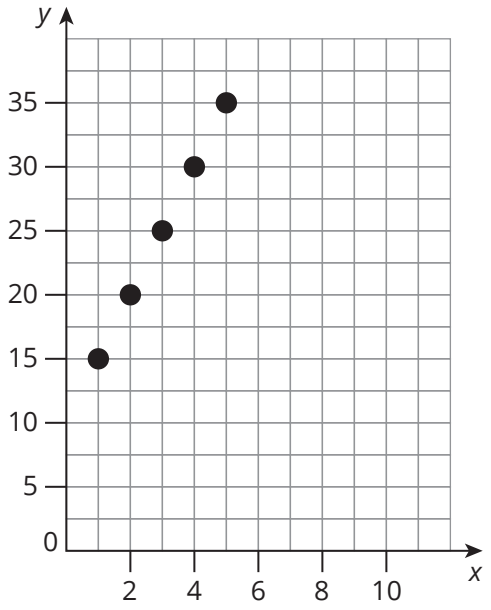
B.

n	f_n
1	20
2	25
3	30
4	35
5	40

C.

n	f_n
1	15
2	25
3	35
4	45
5	55

D.



E. 15, 10, 5, 0, −5

4. A sequence can be generated by using $m_n = r \cdot m_{n-1}$, where $m_1 = 6$, $r = 4$ and n is a whole number greater than 1. What are the first four terms in the sequence?

   F. 6, 24, 96, 384

   G. 6, 10, 14, 18

   H. 6, 20, 100, 500

   J. 6, 20, 76, 300

5. In the sequence of numbers, $p_3 = -48$, $p_4 = -96$, $p_5 = -192$, $p_6 = -384$, and $p_7 = -768$. Based on this information, which equation can be used to find the nth term in the sequence, p_n?

   A. $p_n = -48 \cdot 2^{n+1}$

   B. $p_n = -48 \cdot 2^{n-1}$

   C. $p_n = -12 \cdot 2^{n+1}$

   D. $p_n = -12 \cdot 2^{n-1}$

6. A sequence can be generated using $a_{n+1} = -0.25 + a_n$, where $a_1 = 5$ and n is a whole number greater than 1. Determine the first 5 terms in the sequence.

7. A sequence can be generated by using $r_n = 2(r_{n-1})$, where $r_1 = \frac{1}{3}$ and n is a whole number greater than 1. Determine the first 5 terms of the sequence.

8. For the sequence, write a recursive formula and a simplified explicit formula.

   $a_1 = 12.6, a_2 = 5.6, a_3 = -1.4,$
   $a_4 = -8.4, a_5 = -15.4, \ldots$

9. A Petri dish is filled with 250 bacterial cultures. The number of bacteria in the dish triples every hour. Predict the number of bacterial cultures in the dish after 5 hours. Explain your reasoning.

10. Determine the 28th term of the sequence $a_n = a_{n-1} + 5.2$, when the 26th term is 42.3.

11. Determine the 7th term of the sequence $g_n = g_{n-1} \cdot (-2)$, when $g_3 = 20$.

12. Does the sequence 2, 4, 6, 8, ... represent a function? Explain your reasoning.

MODULE 2

Exploring Constant Change

End of Topic Assessment

Name _____ Date _____

1. The table shows Lucia's salary for different years.

Year	2000	2001	2002	2003
Salary ($)	40,000	42,000	46,000	44,500

Which linear function best models the data if x represents the number of years since 2000?

A. $y = 39{,}625x + 4375$

B. $y = 4375x + 39{,}625$

C. $y = 1750x + 40{,}500$

D. $y = 40{,}500x + 1750$

2. Which situation best represents causation?

F. When you are at the beach, you get wet.

G. When you study for a test, your classmate studies too.

H. When you carry an umbrella to school, it rains.

J. When you don't brush your teeth, you get cavities.

3. Nia is selling cookies at a constant price to raise money for charity. The table shows her profit.

Number of Cookies Sold	Profit (dollars)
4	–1.50
5	1.25
6	4.00
7	6.75

Determine the rate of change for the problem situation. Be sure to include units of measure.

4. The table shows the monthly high temperature for Austin, Texas, in degrees Fahrenheit over a 12-month period.

Month	Temperature (°F)
1	90
2	99
3	98
4	99
5	104
6	108
7	109
8	110
9	112
10	100
11	91
12	90

What does the correlation coefficient for the data indicate about the strength of the linear association between the month and the temperature in Austin?

A. Weak negative correlation

B. Strong negative correlation

C. Weak positive correlation

D. Strong positive correlation

5. The table shows the decrease in the amount of chicken feed in a farmer's barn over a seven-month period.

Month	March	April	May	June	July	August	September
Pounds	950	873	796	719	642	565	488

Determine a linear function that represents y, the number of pounds of chicken feed in terms of x, the number of months since March.

6. The table shows the amount Omar earns at his job based on the number of hours he works.

Times (hours)	0	1	2	3	4	5	6	7
Money (dollars)	0	16	35	47	60	69	90	103

Based on the table, what is the best prediction of the amount Omar earns for 9 hours of work?

F. $34.61

G. $128.00

H. $131.46

J. $189

7. What is the slope of the line represented by the equation $15x + 3y = 45$?

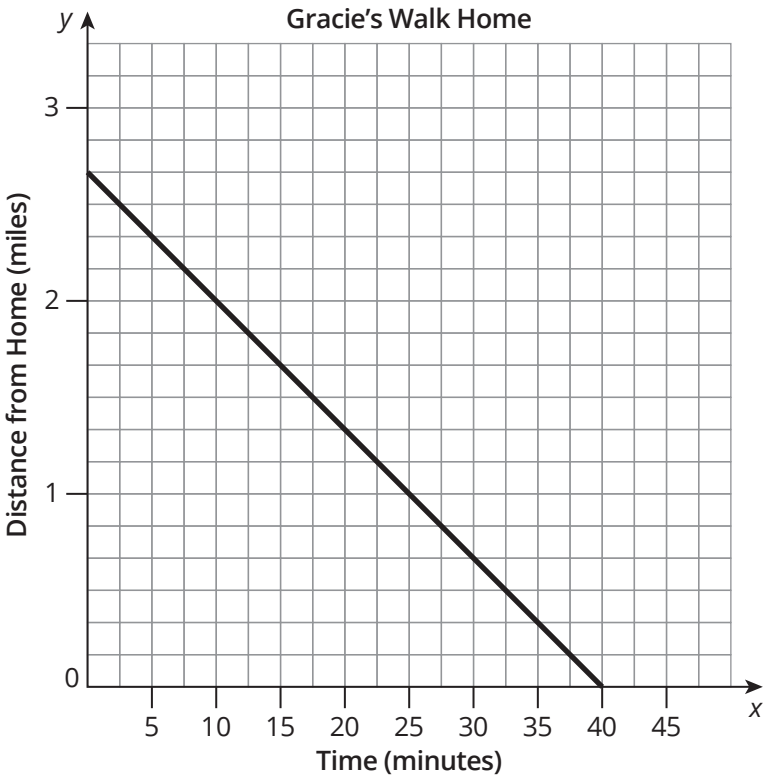
8. What is the equation in slope-intercept form of a line with a slope of $\frac{1}{3}$ that passes through the point $(-1, -2)$?

9. The water level in a tub is changing at a constant rate. The table shows the relationship between the time in minutes, x, and the height of the water in liters, y.

Time (minutes)	Amount of Water Left in the Tub (liters)
0	360
2	240
3.5	150
5	60

Determine the the rate of change of the water level with respect to time. Then, interpret the rate of change in terms of the problem situation.

The graph represents Gracie's walk home from school.



Use the graph to answer questions 10 through 12.

10. Identify the *x*-intercept and explain its meaning in terms of the problem situation.

11. Identify the *y*-intercept and explain its meaning in terms of the problem situation.

12. Calculate the slope of the linear function and explain its meaning in terms of the problem situation.

13. What is the value of $f(x) = 23.2x + 2.5$ at $x = -4.2$?

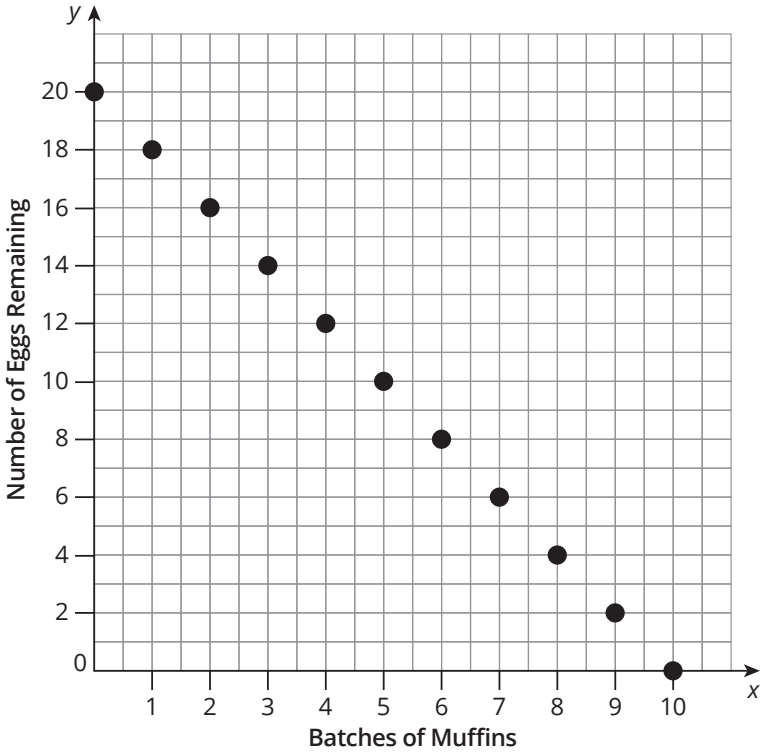
A. -99.94

B. -94.94

C. -29.9

D. 21.5

14. Miguel likes to bake. He has 20 eggs. His muffin recipe uses two eggs per batch. The graph shows the linear relationship between y, the number of eggs remaining, and x, the number of batches of muffins Miguel bakes.



What is the domain of the function for this situation?

F. $0 \leq x \leq 10$

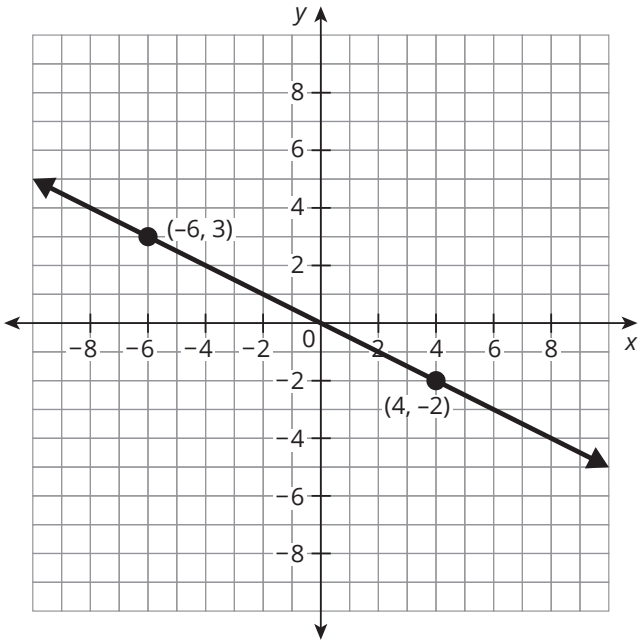
G. {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}

H. $0 \leq y \leq 20$

J. {0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20}

Name _____ Date _____

1. The graph of linear function m is shown on the grid.



Given $f(x) = x$ and $m(x) = af(x)$, what is the value of a?

2. The daily cost of hiring a lawn service, y, to work x hours mowing the grounds on a golf course can be modeled using a linear function. The lawn service charges a fixed cost of $100, plus an additional cost of $25 per hour. The lawn service works a maximum of 6 hours per day. For one day of work, what is the range of the function for this situation?

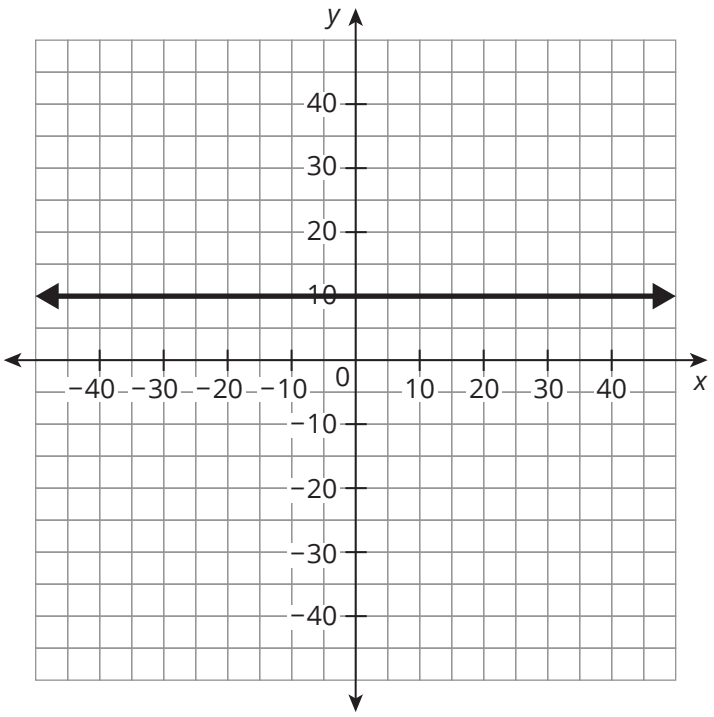
A. $25 \leq y \leq 400$

B. $100 \leq y \leq 250$

C. $0 \leq x \leq 6$

D. $0 \leq x \leq 8$

3. What are the equation and slope of the line shown on the grid?



F. $x = 10$; slope is 10

G. $y = 10$; slope is zero

H. $x = 10$; slope is zero

J. $y = 10$; slope is undefined

4. Catalina graphed $f(x)$ and $g(x) = f(x + 1)$ on the same coordinate grid. Which statement describes how the graphs of f and g are related?

A. The graph of the function $f(x)$ is translated up 1 unit to produce $g(x)$.

B. The graph of the function $f(x)$ is translated down 1 unit to produce $g(x)$.

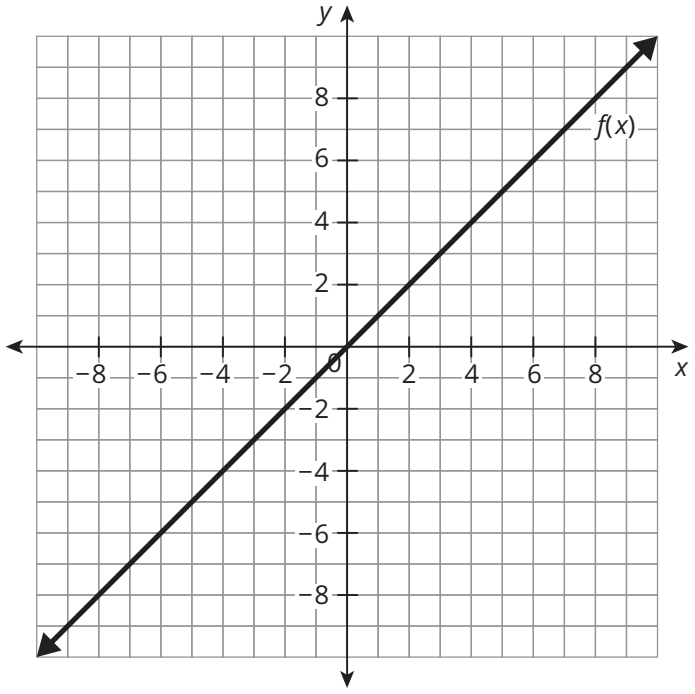
C. The graph of the function $f(x)$ is translated right 1 unit to produce $g(x)$.

D. The graph of the function $f(x)$ is translated left 1 unit to produce $g(x)$.

5. What is the y-intercept of the linear function created by translating $f(x)$, represented in the table, 1 unit right?

x	$f(x)$
−2	7
−1	5
0	3
1	1
2	−1
3	−3

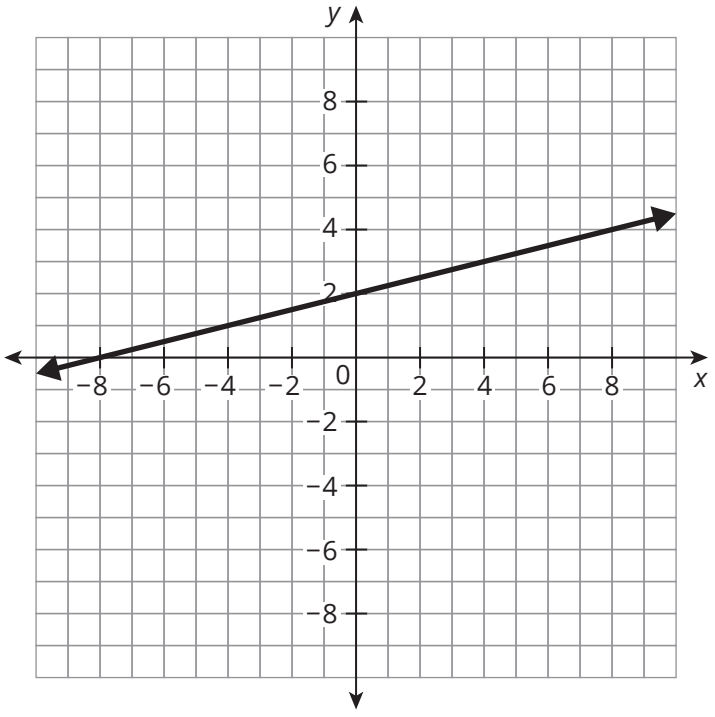
6. Graph $g(x)$ based on the given transformation of $f(x)$.
   $f(x) = x$
   $g(x) = f(3x)$



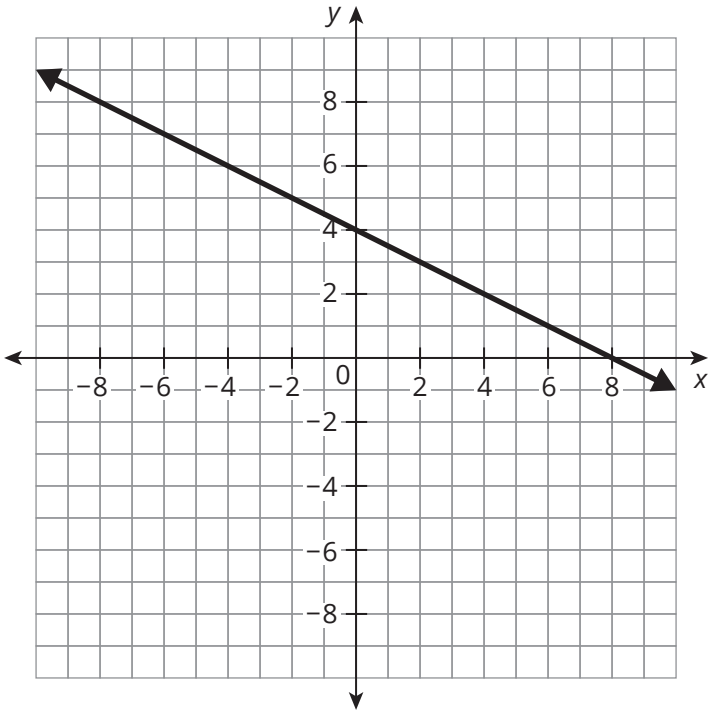
7. What is the equation in slope-intercept form of the line that crosses the x-axis at 4 and is perpendicular to the line represented by $y = -\frac{2}{3}x + 4$?

8. What is the equation in slope-intercept form of the line that passes through the point $(-3, 0)$ and is parallel to the line represented by $y = 3.2x + 7.3$?

9. Write an equation in point-slope form that represents the graph.



10. The graph of a linear function is shown on the coordinate plane.



Which statements describe the graph of the linear function?
Select **TWO** correct answers.

F. The graph is increasing.

G. The slope of the line is $\frac{1}{2}$.

H. The y-intercept is (0, 4).

J. The zero of the function is 4.

K. The zero of the function is 8.

MODULE
3

Modeling Linear Equations and Inequalities

Name _____ Date _____

1. Sofia is saving money in her bank account to purchase a new skateboard. Her aunt gave her $50 for her birthday, and she is saving $20 per week for the purchase.

   Which equation can be used to determine the amount that Sofia has saved, y, after x weeks?

   A. $y = 20 + 50x$

   B. $y = 20x + 50$

   C. $y = -20x + 50$

   D. $y = -50x + 20$

2. What value of p makes the equation $8 - 6(p + 4) = 12 - 2(3p + 10)$ true?

   F. 3

   G. 5

   H. 7

   J. No solution

3. What is the solution set for $4(2 - s) > -3s + 9$?

   A. $s > 1$

   B. $s \leq -2$

   C. $s \geq -2$

   D. $s < -1$

4. Solve the equation shown.

   $0.4(5x - 2) = -2.4x + 3.6$

5. Does the equation shown below have one solution, no solution, or an infinite number of solutions? Explain your reasoning.

   $\frac{1}{3}(9x + 45) = 3(x + 3) + 6$

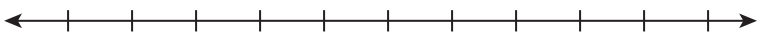
6. Chloe goes to a bakery. She buys 3 eclairs that cost $2.25 each and some doughnuts for $2.80 each.
   Write an equation for the total cost, y, when Chloe purchases x donuts.

7. Rewrite the equation in slope-intercept form.

   $5x + 3y = 9$

8. The formula for the circumference of a circle is $C = 2\pi r$.
   Solve the equation for r.

9. Solve the inequality, and graph the solution on the number line.
   $1.5m - 2 < -2(m + 8)$



10. Rewrite the equation $y - 5 = 2(x + 3)$ in slope-intercept form.

11. A triangle has a height of $(2n - 4)$ inches and a base of 8 inches. A rectangle has a length of 6 inches and a width of $(3 + n)$ inches. The area in square inches of the triangle is equal to the area in square inches of the rectangle. What is the value of n?

Name _____ Date _____

1. Noah wants to sign up for a streaming service. Company A charges a one-time fee of $10 and costs $6 per month. Company B charges a one-time fee of $20 and costs $3 per month. If x represents the number of months using the service and y represents the total cost of the service, which system of equations represents this situation?

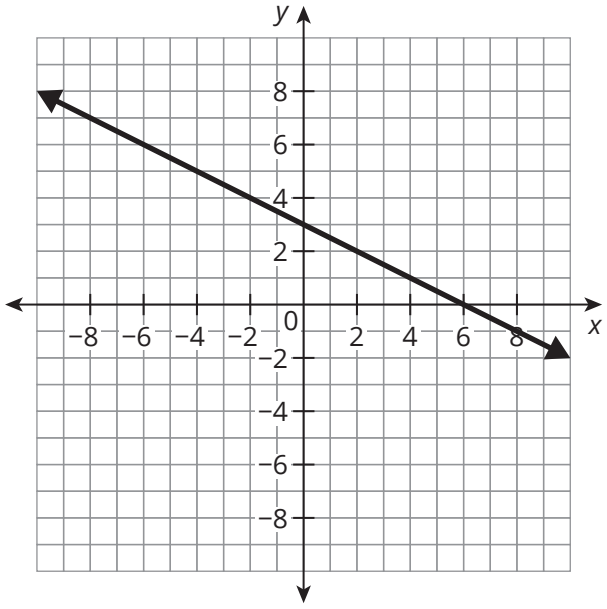
A. $\begin{cases} y = 10x + 6 \\ y = 20x + 3 \end{cases}$

B. $\begin{cases} y = 3x + 10 \\ y = 6x + 20 \end{cases}$

C. $\begin{cases} y = 20 + 6x \\ y = 10 + 3x \end{cases}$

D. $\begin{cases} y = 20 + 3x \\ y = 10 + 6x \end{cases}$

2. The graph of $12 = 2x + 4y$ is shown on the grid.



Which ordered pair is in the solution set of $12 \geq 2x + 4y$?

F. (6, 0)

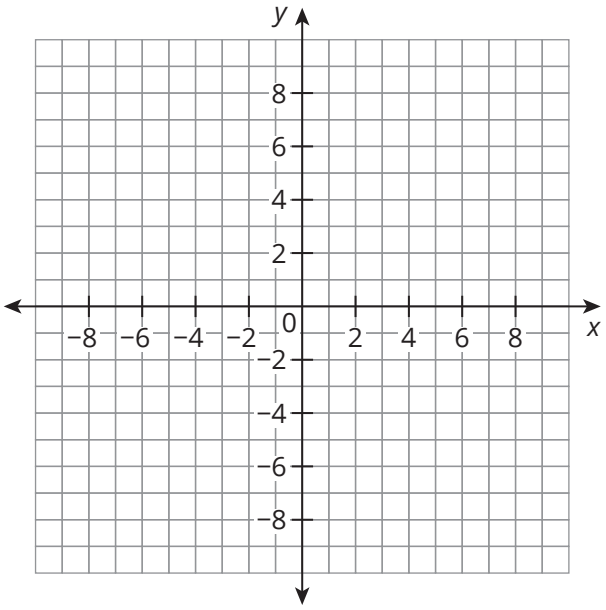
G. (0, 6)

H. (3, 6)

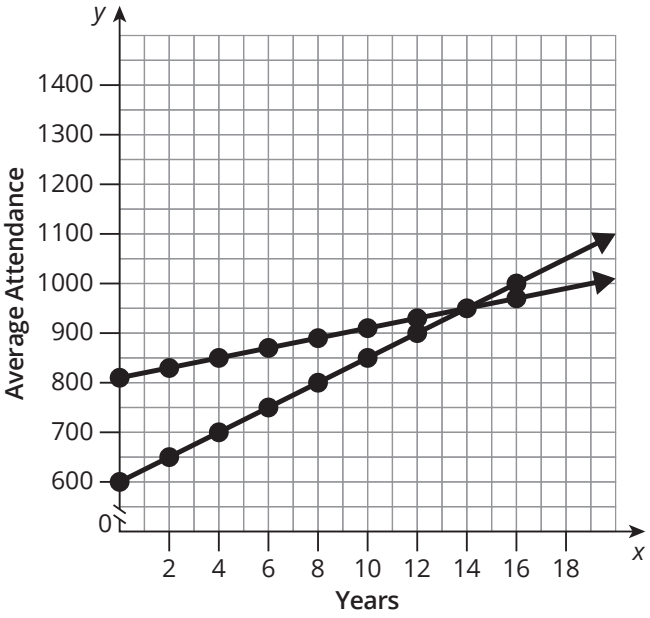
J. (−2, 8)

3. Graph the system of equations. Determine the solution.

$$\begin{cases} 8x = -16 - 8y \\ 12x - 4y = 8 \end{cases}$$



4. The graphed system of linear equations shows the average attendance for two schools. Estimate the solution to the system, and explain what it represents.



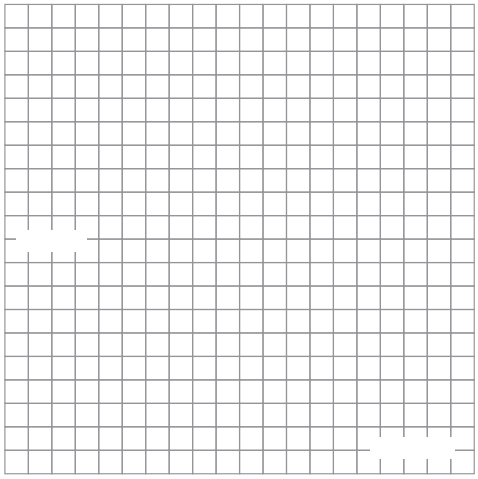
5. Admission to a zoo costs $10 for adults and $6 for children. A group of 29 people attending the zoo paid a total of $222 in admission fees. How many adults and children went to the zoo?

Use the information given to answer Questions 6 and 7.

A company manufactures 15-inch laptops and 17-inch laptops. It takes 3 hours to manufacture a 15-inch laptop and 5 hours to manufacture a 17-inch laptop. The company has 480 hours of manufacturing time available.

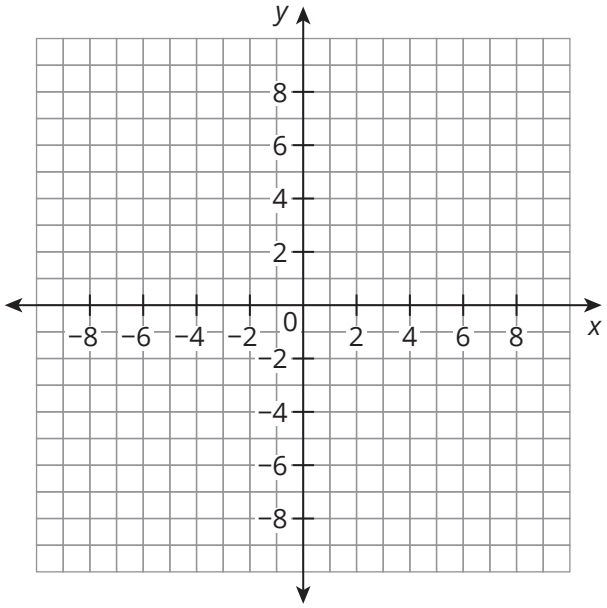
6. Write a linear inequality to model this scenario. Be sure to define your variables.

7. Graph the inequality that represents this scenario.



8. Graph the solution set to this system of linear inequalities.

$$\begin{cases} 2x + y \geq 11 \\ x - 2y > 12 \end{cases}$$



9. Write a system of equations in slope-intercept form that represents lines f and g.

Line f

x	y
-4	-7.5
-1	0.75
2	9
5	17.25

Line g

x	y
-3	7
0	-2
4	-14
7	-23

10. As a fundraiser, a high school debate club plans to sell T-shirts that feature the school logo. The company producing the T-shirts will charge the club $250 for the design and set-up costs, plus $10 per T-shirt. The club members have decided to sell the T-shirts for $15 each. How many shirts does the debate club need to sell to break even?

11. What is the value of y in the solution to the system of equations shown?

$$\begin{cases} y = 3x - 1 \\ y = -x - 5 \end{cases}$$

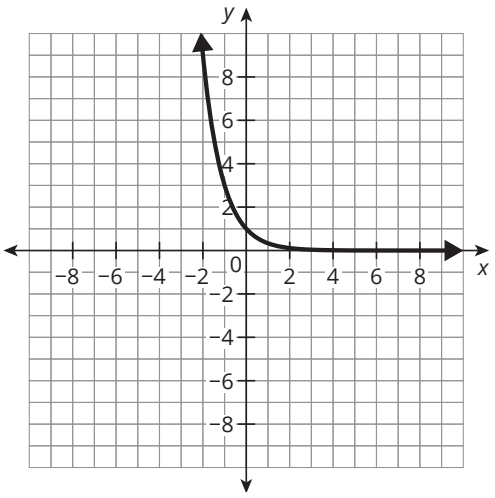
MODULE
4

Investigating Growth and Decay

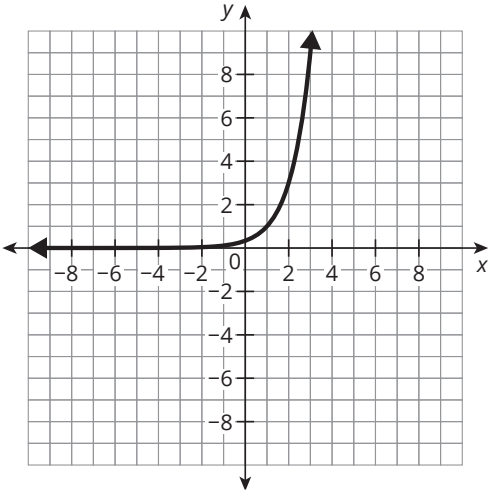
Name _____ Date _____

1. Which graph best represents $f(x) = -3^x$?

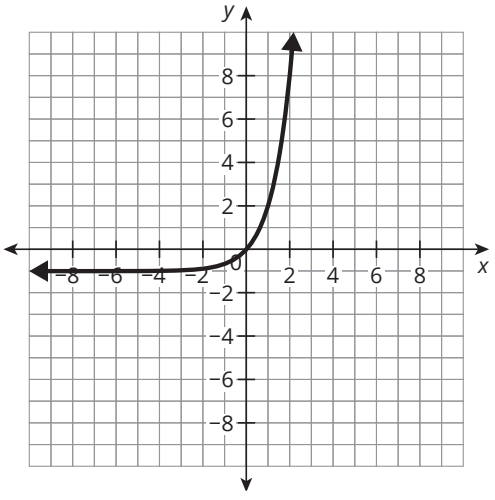
A.



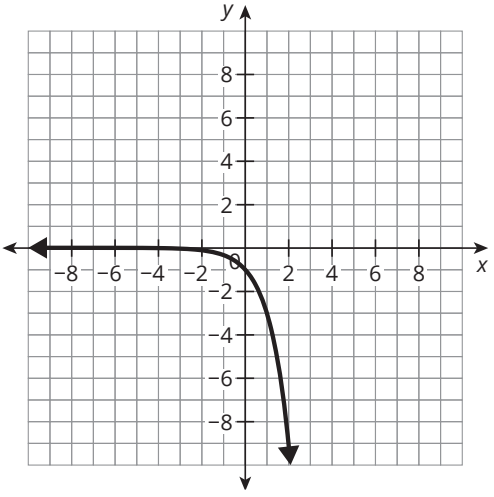
B.



C.



D.



2. Rewrite $\sqrt[3]{5^2}$ with a rational exponent.

F. $5^{\frac{3}{2}}$

G. $3^{\frac{2}{5}}$

H. $5^{\frac{2}{3}}$

J. $2^{\frac{5}{3}}$

3. Gabriel buys 512 bottles of water to hand to runners in a marathon. He estimates that each hour, half of the remaining bottles will be used. Which function can be used to determine the number of bottles remaining at the end of x hours?

A. $f(x) = 512(0.05)^x$

B. $f(x) = 512(0.50)^x$

C. $f(x) = 512(1.05)^x$

D. $f(x) = 512(1.50)^x$

4. Write an equivalent expression in simplest form.

$$\frac{90r^{-6}y^7z^{12}}{15r^{-9}y^{10}z^{-5}}$$

Use the explicit formula to answer Questions 5 and 6.

$g(n) = -2\left(\frac{1}{5}\right)^{n-1}$

5. Rewrite the explicit formula in exponential function form, $f(x) = a \cdot b^x$.

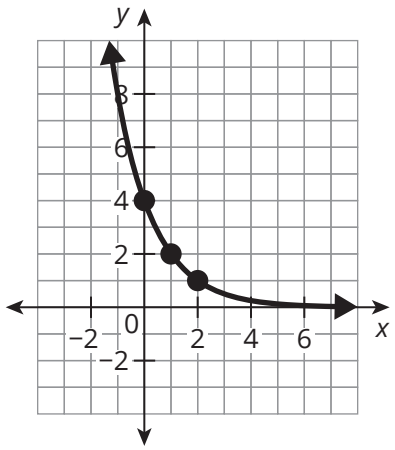
6. Identify the y-intercept, the equation for the asymptote, and whether the function increases or decreases from left to right.

Write the expression in simplest radical form to answer Questions 7 and 8.

7. $\sqrt{32}$

8. $5\sqrt{117}$

Use the graph of the exponential function to answer Questions 9 and 10.



9. Determine the domain and range of the function.

   Domain:

   Range:

10. Write an exponential function of the form $f(x) = ab^x$ for the graph.

Use the table to answer Questions 11 and 12.

The table shows the number of bacteria in a Petri dish over a three-hour period.

Bacteria	
Time (hours)	Number of Bacteria
0	460
1	1380
2	4140
3	12,420

11. Write an exponential function to represent the number of bacteria in the Petri dish as a function of time, t.

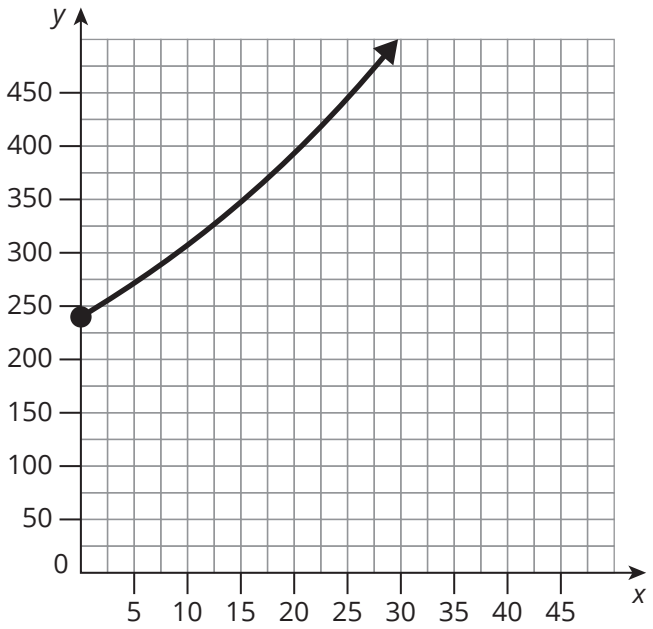
12. Identify the y-intercept and the constant ratio of the exponential function and interpret them in terms of the scenario.

13. Rewrite the expression in simplest radical form.
$\left(3r^{\frac{1}{3}}s^{\frac{1}{2}}\right)\left(3rs^{\frac{1}{2}}\right)$

14. A sequence is defined by $f(n) = \frac{1}{2}f(n-1)$ for each whole number n, where $n > 1$. What are the first four terms of the sequence when $f(1) = 36$?

Name _____ Date _____

1. Which scenario and equation is represented by the graph?



A. Carlos deposits $200 in a savings account with an interest rate of 2% simple interest.

$I = 200(0.02)t$

B. Carlos deposits $240 in a savings account with an interest rate of 2.5% simple interest.

$I = 240(0.25)t$

C. Carlos deposits $200 in a savings account with an interest rate of 2% compounded annually.

$P(t) = 200 \cdot (1.02)^t$

D. Carlos deposits $240 in a savings account with an interest rate of 2.5% compounded annually.

$P(t) = 240 \cdot (1.025)^t$

2. The function $f(x) = 125{,}000(1.028)^x$ models the change in population of a city, where x represents the number of years since 2010. Which statement is **NOT** true?

   F. The domain of the function includes all real values of x.

   G. The point (1, 128,500) represents the population of the city in 2011.

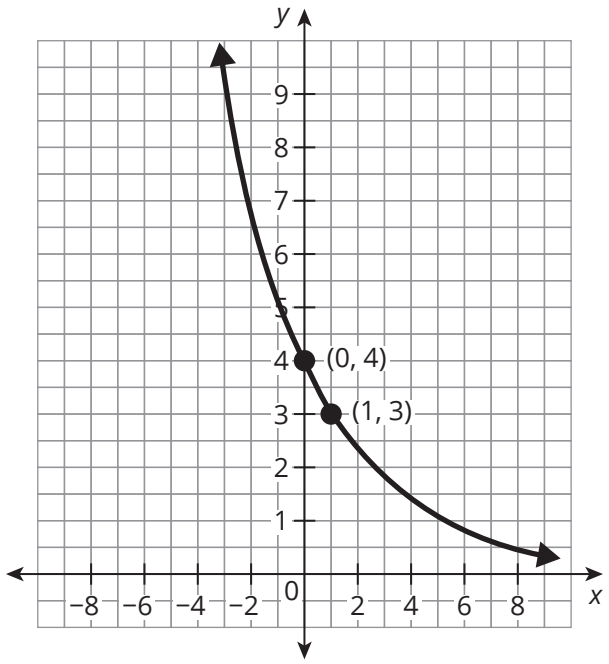
   H. The population of the city in 2010 is 125,000.

   J. The function has an asymptote at $y = 125{,}000$.

3. Write an exponential function that models the values in the table.

x	y
0	−1
1	−3
2	−9
3	−27

4. Write an exponential function that models the graph.



5. A scientist puts a sample of 4000 bacteria in a Petri dish. The number of bacteria decrease at a rate of 2% per hour. Write an exponential function to represent the number of bacteria, b, as a function of time measured in hours, t.

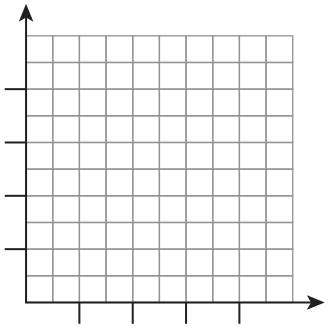
Use the information and the table to answer Questions 6 through 9.

A concert venue opened in 2012. The table shows the total number of people at the concert venue the first few years it was open.

Year	2012	2013	2014	2015	2016
Number of People	103	224	516	1118	2487

6. Let x represent the number of years since 2012 and $f(x)$ represent the total number of people at the concert venue each year. Write an exponential function to best model the values in the table. Round all values to the hundredths place.

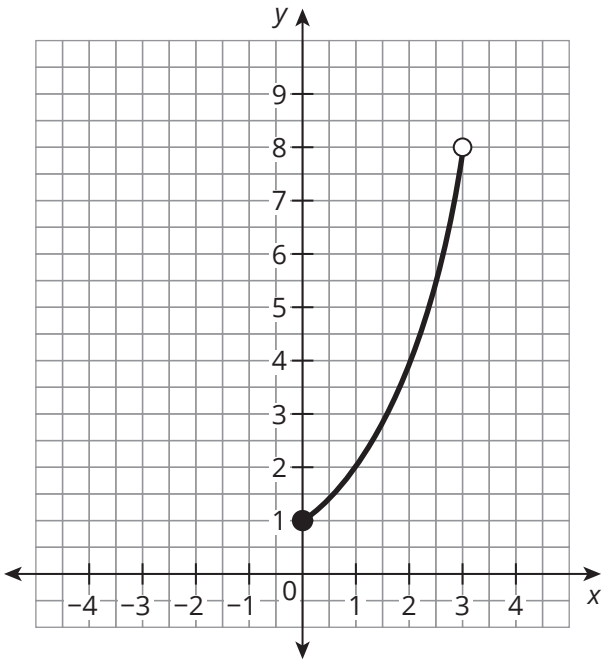
7. Sketch the graph for the function you wrote in Question 6. Include the data points from the table on your graph.



8. In the exponential function form $f(x) = ab^x$, what is the meaning of a and b for this scenario?

9. About how many people are predicted to be at the concert venue in 2017?

10. Write the domain and range of the partial exponential function using inequalities.



11. Robert uses $f(x) = 2200(1.04)^x$ to calculate the interest he earns each year for his savings account. What is the yearly interest rate as a percent?

12. The expression $(x^{23})(x^{\frac{1}{4}})^8$ is equivalent to x^p. What is the value of p?

13. Isaiah deposited $1500 in an account that earns simple interest each year. The table shows the time in years since the money was deposited and the balance in the account.

Time (years)	Simple Interest Balance (dollars)
3	1612.50
5	1687.50
8	1800

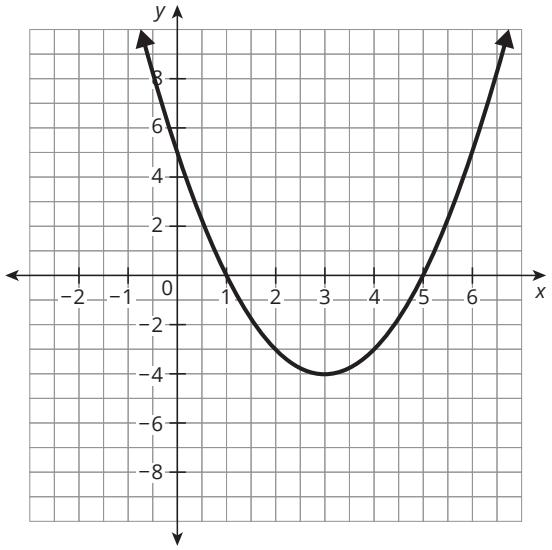
What is the rate of change of the simple interest balance in dollars with respect to the time in years since the money was deposited?

MODULE 5

Maximizing and Minimizing

Name _____ Date _____

1. A quadratic function is graphed on the grid.



Which answer choice best represents the domain and range of the function?

A. Domain: all real numbers
Range: $y \leq -4$

B. Domain: $x > 0$
Range: $y < 0$

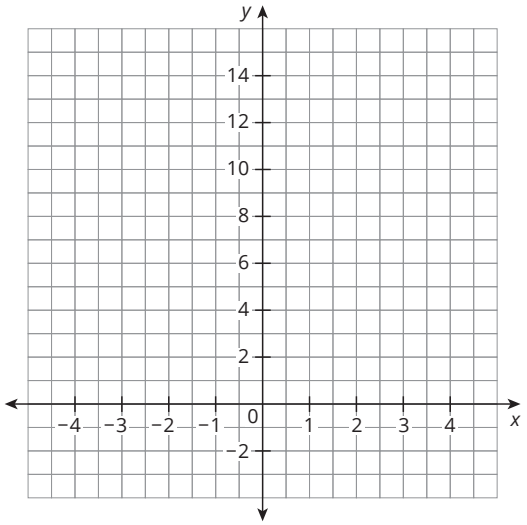
C. Domain: $x > 0$
Range: $y \geq -4$

D. Domain: all real numbers
Range: $y \geq -4$

Use the information to answer Questions 2 through 4.

The function $g(t) = -16t^2 + 30t$ describes the height, in feet, of a ball kicked into the air over time, in seconds.

2. Graph the function and label the axes.



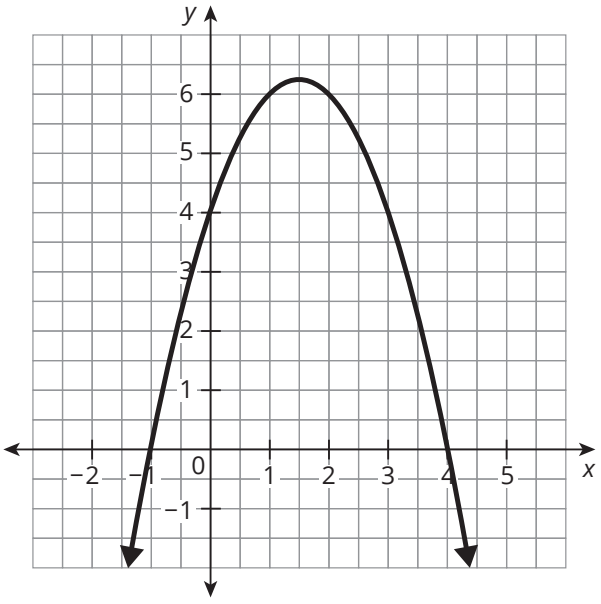
3. What is the maximum height the ball reaches? At what time does the ball reach this height? Round to the nearest tenth.

4. Describe the domain and range of the context and of the function $g(t)$. Explain your reasoning.

Use the function and the graph to answer Questions 5 and 6.

The graph of $f(x)$ is shown.

$f(x) = -x^2 + 3x + 4$



5. What are the domain and range of $f(x)$?

   Domain:

   Range:

6. Identify the given characteristics of $f(x)$.

   y-intercept(s):

   x-intercept(s)/zero(s):

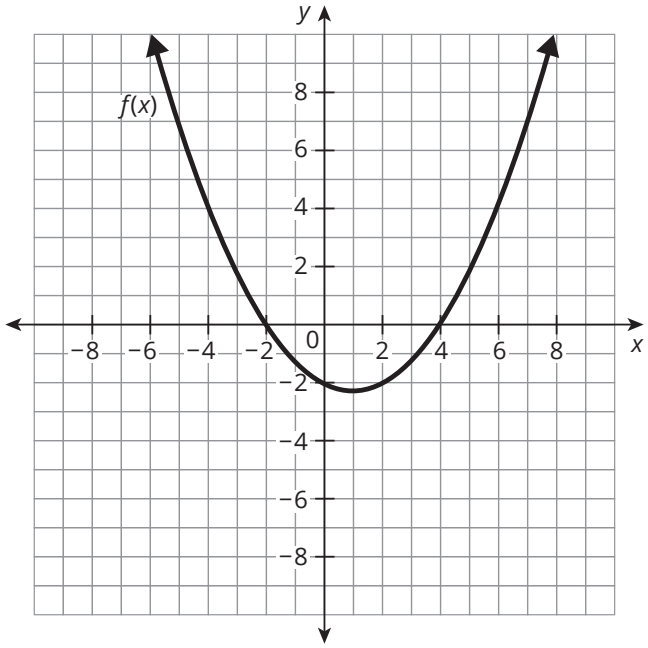
   Axis of symmetry:

   Vertex:

   Interval of increase:

   Interval of decrease:

7. The graph of the function $f(x)$ has zeros at (4, 0) and (−2, 0) and a vertex at (1, −2.25). Write the function $f(x)$ in factored form.

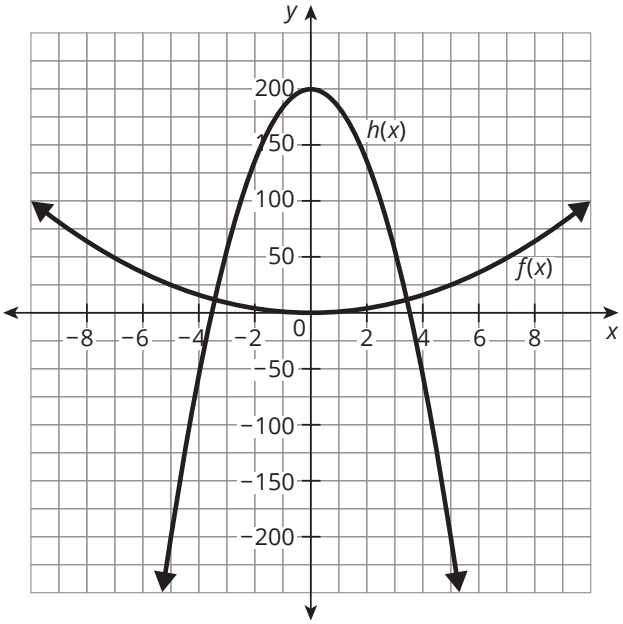


8. Describe how the graph of the function $m(x)$ compares to the graph of $g(x) = x^2$.

   $m(x) = 3(x - 2)^2 + 7$

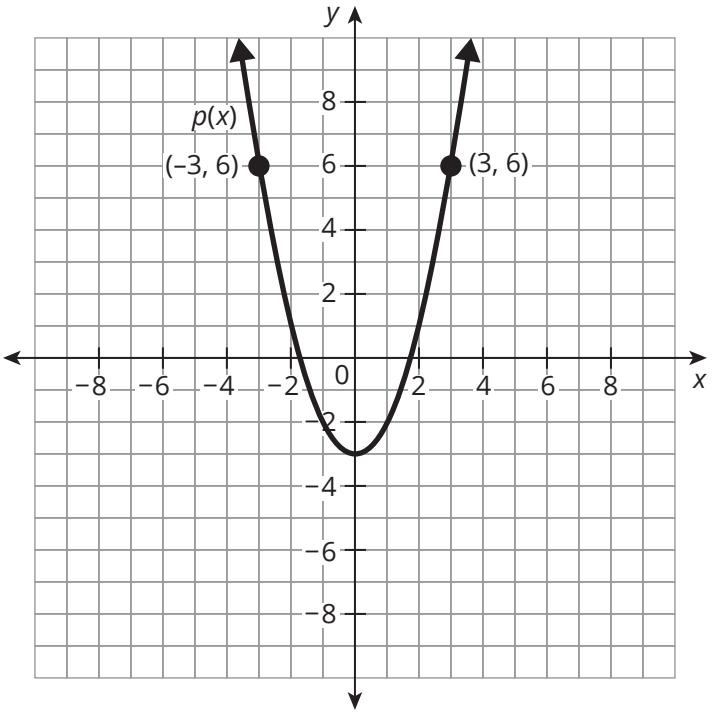
9. A physics class has been assigned the task of creating a container that will protect an egg that their teacher will drop from the roof of their school. The graph shows the parent function $f(x) = x^2$ and also shows the function $h(x)$, which represents the height of the egg with respect to x, the time it is in the air.

   Describe the types of transformations performed on $f(x)$ to result in $h(x)$.



10. Write a quadratic function in vertex form with vertex (3, −1) that passes through the point (−1, 7).

11. The graph of quadratic function $p(x)$ is shown on the grid.



If $k(x) = x^2$ and $p(x) = k(x) + n$, what is the value of n?

Name _____ Date _____

1. Which expression is the difference of $(3x^2 + 6x - 3) - (3x^2 + 3x - 3)$?

   A. $3x$

   B. $3x^2$

   C. $9x - 6$

   D. $6x^2 + 9x - 6$

2. Which expression is the quotient of $(5x^2 + 9x - 2) \div (x + 3)$?

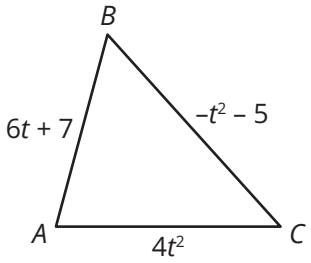
   F. $5x - 6 - \frac{20}{(x + 3)}$

   G. $5x - 6$

   H. $5x + 3 + \frac{16}{(x + 3)}$

   J. $5x - 6 + \frac{16}{(x + 3)}$

3. The perimeter of a triangle is the sum of the lengths of the three sides.



$AB = 6t + 7$

$BC = -t^2 - 5$

$AC = 4t^2$

Write an expression in simplest terms that is equivalent to the perimeter of $\triangle ABC$.

4. Multiply $(-4a)(3a^2 - 4a + 8)$.

5. How could you determine, without using long division, whether $x + 2$ is a factor of the function $f(x) = x^2 - 3x - 10$? Explain your reasoning. Then, determine the quotient.

6. Complete the area model to find the product of $6u + 5$ and $3u - 4$.

·		

Write the product in standard form.

7. Given functions $A(x) = x^2 - 2x$, $B(x) = -2x^2 + 5x + 4$, and $C(x) = 3x + 1$, determine the function $A(x) - B(x) + C(x)$. Write your answer in standard form.

8. Find the product. Write your answer in standard form.

   $(-4y - 9)(-4y - 9)$

9. Simplify the quotient $\frac{(x^2 - 9)}{(x - 3)}$.

10. Divide.

    $(3m^2 + 5m - 2) \div (3m - 1)$

Name _____ Date _____

1. Which word or phrase best completes the sentence?
The zeros of a quadratic function are the same as the _____ of its linear factors.

A. zeros

B. product

C. square roots

D. quadratic formula

2. The table shows the number of attendees at a local festival on May 1 and every third day thereafter.

Days Since May 1	Number of Attendees
0	215
3	520
6	725
9	865
12	955
15	1025
18	970
21	874
24	710
27	490
30	207

Which function best models the data?

F. $f(x) = -0.5212x + 694.73$

G. $f(x) = -3.5035x^2 + 104.58x + 221.76$

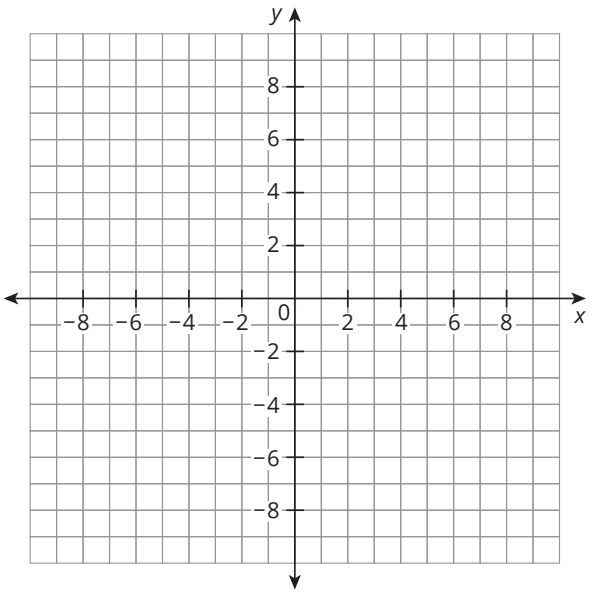
H. $f(x) = 620.58(0.999)^x$

J. The function cannot be determined.

Use the function to answer Questions 3 through 5.

Consider the function $f(x) = -\frac{1}{3}(x - 2)^2 + 1$.

3. Graph $f(x)$ and determine the number of real zeros of the function. Explain your reasoning.



4. Determine the zeros algebraically. Write the answer in simplest radical form.

5. Write the domain and range of $f(x)$ using inequalities.

6. Factor the polynomial completely.
$4x^2 - 16$

7. Factor the polynomial completely.

$6x^2 - x - 15$

8. Determine the solutions to the quadratic equation shown.
$2x^2 + 13x + 15 = 0$

9. Determine the solutions of the equation $x^2 + 18x - 40 = 0$ by completing the square.

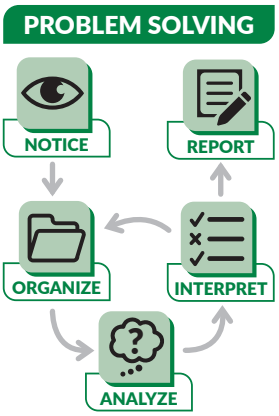
10. Rewrite $\sqrt{243}$ in simplest radical form.

11. What is the positive solution to this equation?
$12x^2 - 10 = 65$

Different health clubs offer different amenities at different monthly rates. A linear equation in the form $y = mx + b$ can be used to graph and compare the rates of each club to determine the best value.

Performance Tasks

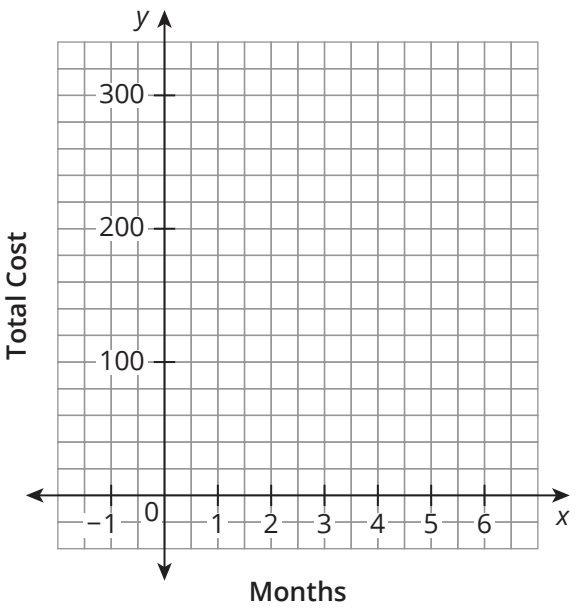
1 Performance Task



Linear Functions

Your friends Catalina, James, and Ricardo are interested in joining a health club. After searching online, they gathered the following information about the cost of three different health clubs.

Fit Club



Energym

Months	Total Cost
1	$195
2	$240
3	$285
4	$330
5	$375

Fitness Zone

Fitness Zone has an initial fee of $250 and charges $35 per month.

Your friends are interested in joining a health club for different lengths of time.

- Catalina wants to join for just 6 months before she leaves for college.
- James wants to join a club for the length of the school year—10 months.
- Ricardo wants to commit to a health club for an entire year.

Which health club should each friend join so that they spend the least amount of money on their health club membership as possible? Explain your reasoning.

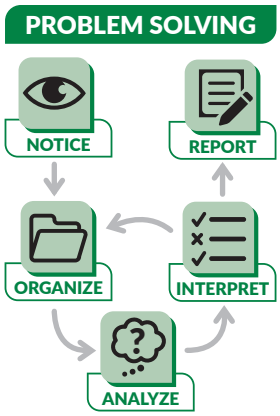
Your work should include:

- Linear equations for each health club. (3 points)
- Explanation of the meaning of the slope and y-intercept for each club. (3 points)
- Written advice for Catalina, James, and Ricardo, including an explanation. (9 points)

Rubric: 15 Total Points

	0 points	1 point	2 points	3 points
Equations	No equations correct.	Only one equation is correct.	Two equations are correct.	All three equations are correct.
Explanations of Slope and *y*-intercept	No explanations are correct.	Explanation for one equation is correct.	Explanation for two equations are correct.	Explanation for all three equations are correct.
Advice for Catalina	No advice given.	Advice is given, but with no mathematical basis in the equations for each club.	Advice is given based on mathematics but includes some incorrect calculations.	Advice is complete and correct.
Advice for James	No advice given.	Advice is given, but with no mathematical basis in the equations for each club.	Advice is given based on mathematics but includes some incorrect calculations.	Advice is complete and correct.
Advice for Ricardo	No advice given.	Advice is given, but with no mathematical basis in the equations for each club.	Advice is given based on mathematics but includes some incorrect calculations.	Advice is complete and correct.

2 Performance Task



Linear Equations and Inequalities

Linh is going to a festival. There are two pricing options at the festival.

General Admission	VIP
$15 admission	$36 admission
$4 per taco	$1.50 per taco

When Linh plans to buy 6 tacos, which option should he choose?

Suppose Linh has a total of $55 to spend and wants to eat as many tacos as he can, which option should he choose?

How many tacos must Linh buy for the General Admission and the VIP Option to cost the same? Explain your solution in terms of the problem situation.

How many tacos must Linh buy for each pricing option to be the cheapest?

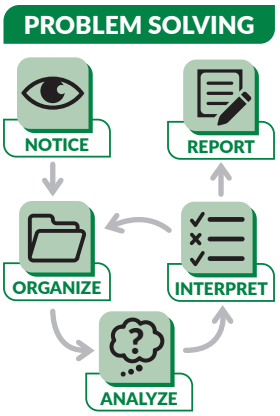
Your work should include:

- Equations with defined variables for each pricing option. (3 points)
- A graph representing both pricing options. (3 points)
- Answer to each question. (4 points)
- Explanations using math terms. (4 points)

Rubric: 14 Total Points

	0 points	1 point	2 points	3 points	4 points
Equations	No equations are given.	An equation is given for one option with variables defined or equations are given for both options without defined variables.	Equations are given for both options but contains errors or the variables aren't defined.	Gives accurate equations to represent each option with defined variables.	N/A
Graph	No graph is given.	The graph is shown for only one equation.	Both equations are graphed, but are graphed on separate coordinate planes or the axes do not make sense for the context of the problem.	One coordinate plane is used to graph both equations, showing only the first quadrant of the coordinate plane with reasonable axes.	N/A
Answers	No answers are given.	A correct answer is given for one of the parts.	A correct answer is given for two of the parts.	Correct answers are given for three of the parts.	Correct answers are given for all parts.
Explanation Using Math Terms	No explanation is given.	An explanation is given for one of the parts.	An explanation is given for two of the parts.	An explanation is given for three of the parts.	An explanation is given for all the parts.

3 Performance Task

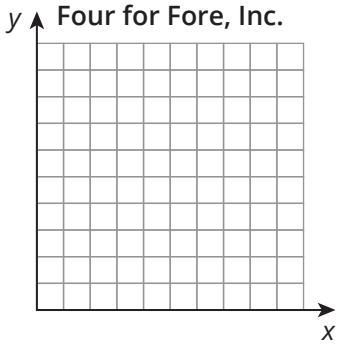


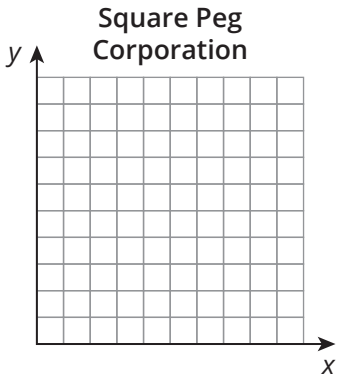
Comparing Linear, Exponential, and Quadratic Functions

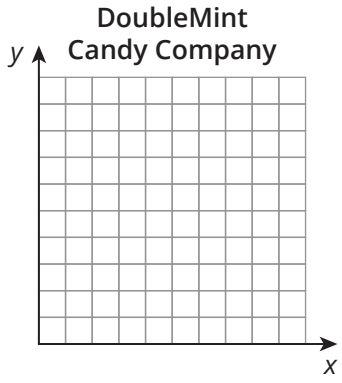
This past year, Lauren graduated from a prestigious university where she was heavily recruited by three large companies. Her goal is to retire early and pursue other careers. Each company proposed very different compensation, or payment, plans. The table below includes the three companies and the compensation plans they will give her when she meets her monthly performance goals.

Company	Four for Fore, Inc.	Square Peg Corp.	DoubleMint Candy Co.
Compensation Plan	Starting salary of $4,000, with a monthly pay raise of $400	Starting salary of $100 the first month, with an increase to $400 in month 2, to $900 in month 3, $1600 in month 4, and so on	Starting salary of $1 the first month, $2 the second month, $4 the third month, $8 the fourth month, and so on

Represent each compensation plan with a table, equation, and graph. Identify the function family used to model each plan and explain your reasoning.







- Which compensation plan would have the greatest monthly pay for Lauren in month 6? Month 12? Month 24?

- When Lauren's goal is early retirement, which compensation plan should she choose? Explain your reasoning.

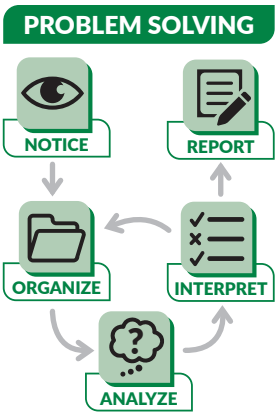
Your work should include:

- A table to model each compensation plan. (3 points)
- An equation to model each compensation plan. (3 points)
- A graph to model each compensation plan. (3 points)
- The function family used to model each compensation plan with supportive reasoning. (3 points)
- Identification of compensation plan with the greatest monthly pay for months 6, 12, and 24. (3 points)
- Recommendation for the offer Lauren should take after comparison of the three offers. (3 points)

Rubric: 18 Total Points

	0 points	1 point	2 points	3 points
A Table to Represent Each Plan	No tables are provided.	Three tables with more than one error are provided.	Three tables with insufficient values to support a decision and/or, at most, one error are provided.	Three correct tables with sufficient values to support a decision are provided.
An Equation to Represent Each Plan	No correct equations are provided.	One equation is correct.	Two equations are correct.	Three equations are correct.
A Graph to Represent Each Plan	No correct graphs are provided.	Provides one correct graph.	Provides two correct graphs.	Provides three correct graphs.
The Function Family Used to Model Each Plan with Reasoining	Provides no correct function families with reasoning or less than three correct function families without reasoning.	Provides correct function family and reasoning for one compensation plan or three correct function families without reasoning.	Provides correct function family and reasoning for two compensation plans.	Provides correct function family and reasoning for all three compensation plans.
Identification of Greatest Monthly Pay	No correct answers are provided.	One correct answer is provided.	Two correct answers are provided.	Three correct answers are provided.
Recommendation for the Best with an Explanation	No recommendation is provided.	Recommendation is incorrect.	Recommendation is correct but without an explanation.	Recommendation is correct with an explanation.

4 Performance Task



Modeling Data Using Functions

The table displays the undergraduate tuition and fees for three universities. The tuitions at both the University of Texas Austin and Texas A&M University represent the in-state resident rates. The tuition at Oklahoma University reflects the out-of-state rates. Use the data to predict which Use the data to predict which university will cost the most when a child born in October, 2017 is ready to start college. Assume the child starts college the fall semester that they turn 18 years old.

	Tuition and Fees		
School Year	University of Texas Austin	Texas A&M University	Oklahoma University
2012–2013	$4899	$4557	$19,530
2013–2014	$4905	$4876	$20,469
2014–2015	$4903	$4911	$21,451
2015–2016	$5046	$5225	$22,953
2016–2017	$5199	$5417	$24,444
2017–2018	$5305	$5663	$26,919
2019–2020	$5412	$5866	$27,144

Let $x = 0$ represent the 2011–2012 school year. Use technology to write a linear, quadratic, or exponential function that provides the best fit to the data for each institution.

Your work should include:

- Scatterplot and graph of the best fit function for the University of Texas Austin. (3 points)
- The best fit function that models the University of Texas Austin tuition and fees over time. (2 points)
- Scatterplot and graph of the best fit function for Texas A&M University. (3 points)
- The best fit function that models the Texas A&M University tuition and fees over time. (2 points)
- Scatterplot and graph of the best fit function for Oklahoma University. (3 points)
- The best fit function that models Oklahoma University tuition and fees over time. (2 points)
- A prediction of the cost at each institution, and an explanation of process and the function family used to model the context. (3 points)

Rubric: 18 Total Points

	0 points	1 point	2 points	3 points
Scatterplot and Graph for the University of Texas Austin	Neither a scatterplot nor a graph are provided.	Both the scatterplot and graph are provided but have errors.	Provides a correct scatterplot or correct graph of the function.	Provides a correct scatterplot and correct graph of the function.
Function of the University of Texas Austin's Tuition and Fees	No function is provided.	Function is provided but is incorrect.	Function is correct.	N/A
Scatterplot and Graph for Texas A&M University	Both a scatterplot and graph are not provided.	Both the scatterplot and graph are provided but have errors.	Provides a correct scatterplot or correct graph of the function.	Provides a correct scatterplot and correct graph of the function.
Function of Texas A&M University's Tuition and Fees	No function is provided.	Function is provided but is incorrect.	Function is correct.	N/A
Scatterplot and Graph for Oklahoma University	Both a scatterplot and graph are not provided.	Both the scatterplot and graph are provided but have errors.	Provides a correct scatterplot or correct graph of the function.	Provides a correct scatterplot and correct graph of the function.
Function of Oklahoma University's Tuition and Fees	No function is provided.	Function is provided but is incorrect.	Function is correct.	N/A
Prediction of the cost with an Explanation of Process and Function Family	None are present: Correct predictions, explanation of process, and reason for function family.	One of three are present: correct predictions, explanation of process, and reason for function family.	Two of three are present: correct predictions, explanation of process, and reason for function family.	All three are present: correct predictions, explanation of process, and reason for function family.

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