Thomas Edison Energysmart Charter School

Summer packet for students who have successfully completed Algebra-1

Student's name:_____

Algebra-1 Teacher: _____

I have checked for the completion of the packet.

Parent/Guardian's signature

The goal of Thomas Edison Energysmart Charter school is to assist your child in becoming a lifelong learner. The summer months provide the perfect opportunity to extend and enrich your child's learning experiences. Summer Reading/Writing and Math packets will help prepare your child for 2017-18 school year.

All students are expected to read through and follow directions for both Reading/Writing and Math packets. Packets will be due by September 1, 2017. The math packet will count as 1st marking period project grades in math and there would not any other math project during the first marking period. Submission can also be done online by emailing/sharing the document with the previous year Algebra-1 teacher.

Ten points will be taken out if the packet is late by a day, twenty points will be taken out if late by two days. The student would get 0 points if it is late by three or more days. Plagiarized work would receive a score of 0.

Apart from the above, the following rubric will be used:

Score of 100	Score of 90	Score of 80	Score of 70	Score of 0
If all 90 to 100% of the responses are correct	If 80-90% of the responses are correct	If 70-80% of the responses are correct	If less than 60-70% of the responses are correct	If less than 60% of the responses are correct

Enjoy the break!

SUMMER PACKET FOR STUDENTS WHO HAVE SUCCESSFULLY COMPLETED ALGEBRA-1 [131118]

Student _____

Class _____

Date _____

1. A 6 foot by 8 foot rectangular garden is surrounded on all four sides by a sidewalk that is *x* feet wide.

Part A

Write a function to represent the total area *T*, in square feet, of the garden and the sidewalk. Show or explain your work.

Part B

Write an equation to represent *w*, the area, in square feet, of the sidewalk. Show or explain your work.

2. Eva and Martin saved money for 8 months. Each used a different savings plan.

- Eva started saving by depositing $20 into a savings account. The next month she deposited 1.5 times that amount into the account. She continued to increase her deposits in this manner. The function that defines Eva's savings plan is $f(x) = 20(1.5)^{(x-1)}$, where *x* represents the month and $f(x)$ represents the amount of the deposit, in dollars.
- Martin also deposited money into a savings account. His approach was to deposit $40 the first month, and then deposit a constant dollar amount every month after that. The first few deposits of his savings plan are shown in the table.

Month	1	2	3	4	5
Deposit	$40	$50	$60	$70	$80

Part A

What is the difference in the amount that Eva and Martin each deposited the third month? Show your work.

Part B

Who deposited more money the fifth month? Justify your answer.

Part C

Do Eva and Martin ever deposit the same dollar amount into their savings accounts in the same month? Justify your answer.

3. Dennis compared two quadratic functions. The first function can be written algebraically as shown.

$$f(x) = (x - 1)(x - 5)$$

Some values from the second function are shown in the table.

x	$g(x)$
-8	16
-5	-5
-4	-8
-1	-5
1	7

Line m passes through the minimum of each function. What is the slope of line m? Justify your answer.

4. The table shows the accumulated number of pages read in a book for 6 days.

Day	Pages
1	27
2	57
3	107
4	161
5	201
6	242

Part A

What is the average rate of change for the 6 days? Show your work.

Part B

Interpret your response from Part A for these data.

5. Quadratic function *f* is given below.

$$f(x) = -\frac{3}{2}x^2 - 3x + \frac{9}{2}$$

Part A

What is the *y*-intercept of the graph of $f(x)$? Use the given function to justify your answer.

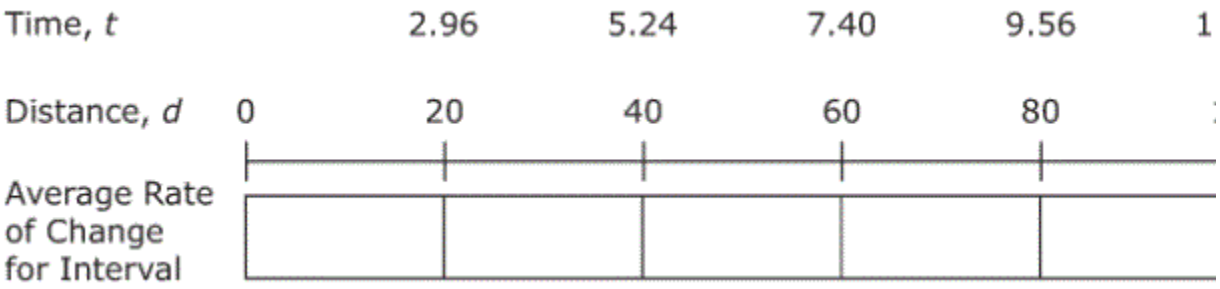
Part B

In what direction does the graph of $f(x)$ open? Use the given function to justify your answer.

Part C

Rewrite the equation of function $f(x)$ in vertex form. What is the vertex of the graph of $f(x)$?

6. The chart shows *t*, the time, in seconds, for a runner every 20 meters in a 100-meter race.



Part A

Complete the chart by calculating the average rate of change, in meters per second, for each interval.

Part B

What is the average rate of change, in meters per second, for the interval between 0 meters and 100 meters?

Part C

Explain whether or not your answer in Part B is the best representation of the greatest rate of change for the race.

7. Brandon compares two functions, *r* and *h*. Function *r* is described by the equation shown.

$$r(t) = -0.2t^2 + 5t + 10$$

Function *h* is a continuous, quadratic function. Some of the values that satisfy function *h* are shown in the table.

t	$h(t)$
−2	8
0	20
2	28
4	32
6	32
8	28
10	20
12	8

Part A

Which function has the greatest maximum? Justify your answer.

Part B

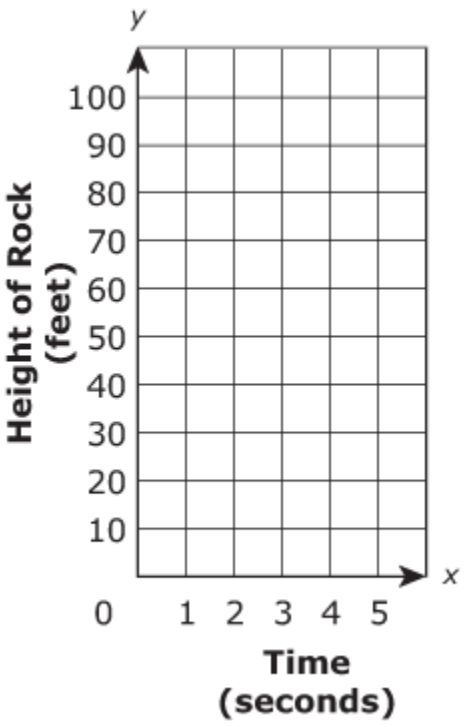
Which function has the greatest average rate of change for the interval $0 \leq t \leq 10$? Justify your answer.

8. A rock falls off a cliff from an initial height of 100 feet. The following function $h(x)$ represents the height of the rock after falling for *x* seconds.

$h(x) = -16x^2 + 100$
given $x \geq 0$ and $0 \leq h(x) \leq 100$

Part A

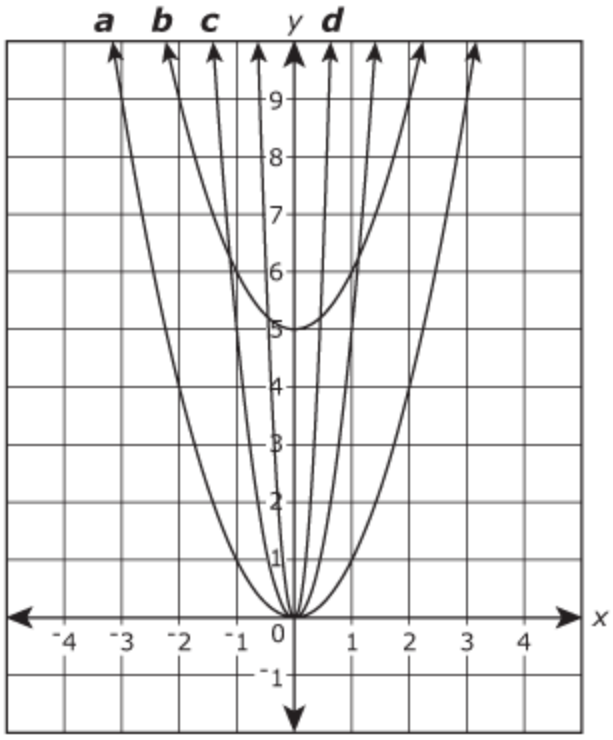
Graph $f(x)$ on the coordinate plane.



Part B

Find the value of the *x*-intercept of $f(x)$. What does the *x*-intercept mean in relation to the context?

9. The coordinate grid shows the graphs of four functions.



Part A

Match the corresponding graph with each of the four functions:

$f(x)$
$f(kx)$
$kf(x)$
$f(x)+k$

Part B

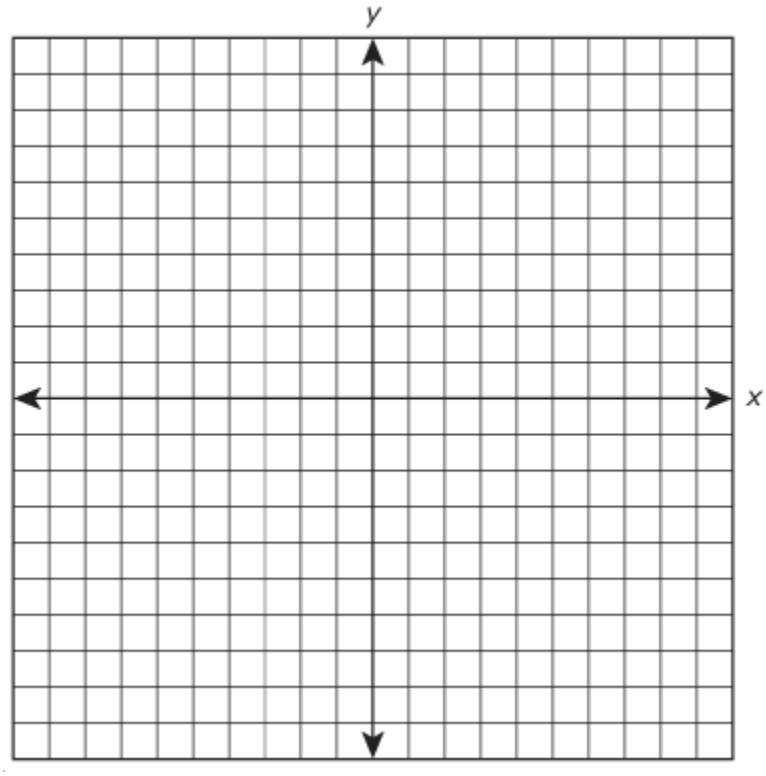
What is the value of *k* for the graphs?

10. The table shows some of the values of a quadratic function.

x	*y*
-5	4
-3	-4
-2	-5
0	-1
1	4

Part A

Sketch the graph of the quadratic function represented in the table on the coordinate grid. Use an appropriate scale for each axis.



Part B

What are the vertex and the *y*-intercept of the quadratic function?

Part C

Write an equation of the quadratic function in the form $y = a(x - h)^2 + k$.

11. In the equation $ax^2 + bx + c = 0$, *a*, *b*, and *c* are integers and $a \neq 0$.

Part A

Explain what values of *a*, *b*, and *c* will yield no real solutions when solving the quadratic equation.

Part B

Write a quadratic equation that will yield no real solutions.

12. A system of equations is shown.

$$\begin{cases} 8x - 2y = -6 \\ y - x^2 = -2 \end{cases}$$

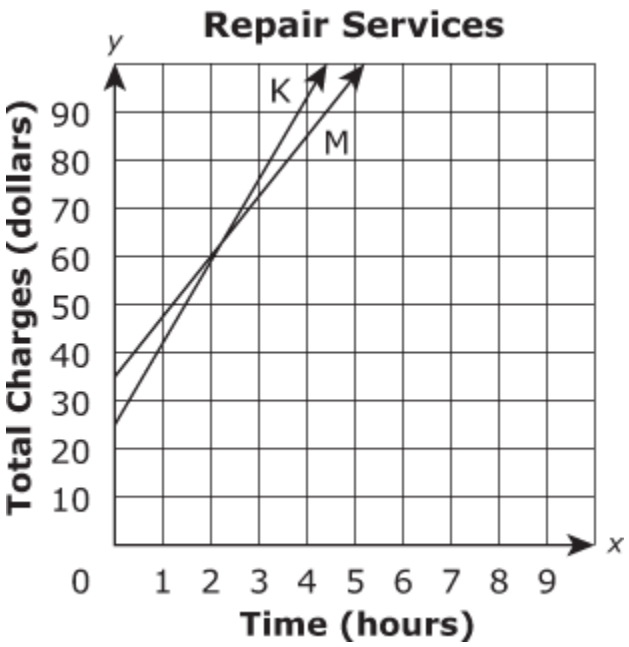
What are the solutions to this system of equations? Show your work.

13. The table represents some values of a quadratic function $f(x)$.

x	$f(x)$
-1	0
0	-3
3	0
4	5

What is the equation of the line of symmetry for the graph of $f(x)$? Show or explain your work.

14. Company K and Company M charge a service fee plus an hourly rate for the same type of repair services. The graphs shown on the coordinate grid represent the total cost a customer is charged by these two companies for the same repair services.



Part A

Between which two consecutive hours will the total amount charged for the same repair service be the same by both companies?

Part B

Explain which company would charge the least amount for a 6-hour repair service.

15. The domain of the function *f* is given as $\{-2,\ 0,\ 1,\ 2,\ 3\}$.

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

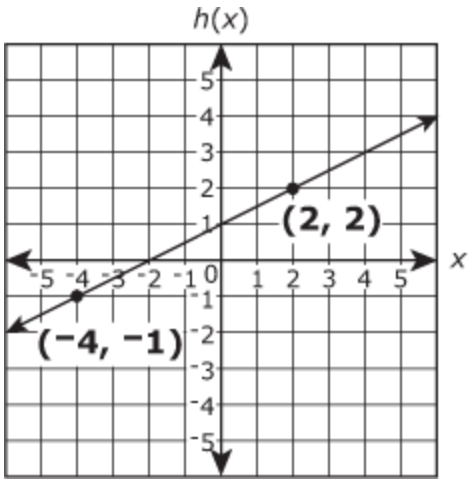
Part A

What is the range of the function for the given domain?

Part B

If the 5 in the function *f* is replaced with a 7, explain whether or not the range of the function will remain the same using the same given domain.

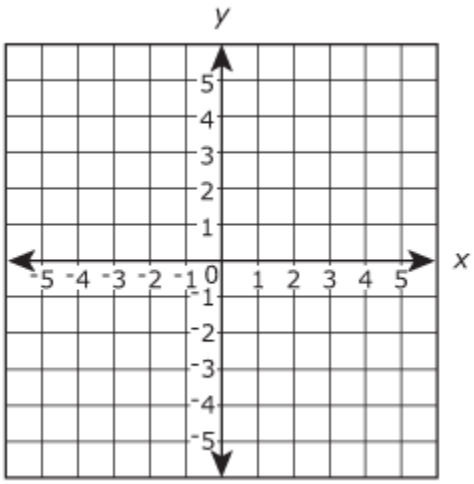
16. Cindy is comparing function *k* and function *h*. The algebraic form of function *k* is $k(x) = -\frac{5}{2}x + 1$. The following graph represents function *h*.



Cindy correctly determines the domain of both functions is the set of real numbers. For what values of *x*, if any, is $k(x) \geq h(x)$? Justify your answer.

17. Graph the solution set on the coordinate grid to the system of inequalities shown.

$$\begin{cases} y < x + 2 \\ x < -2 \end{cases}$$



18. The function f is defined by $f(x) = x^2 - 6x + 21$. What are the solutions of $f(x) = 0$? Show your work.

Answer on a separate sheet.

19. What are the solutions to the equation $x^2 + 9 = 0$?

Answer on a separate sheet.

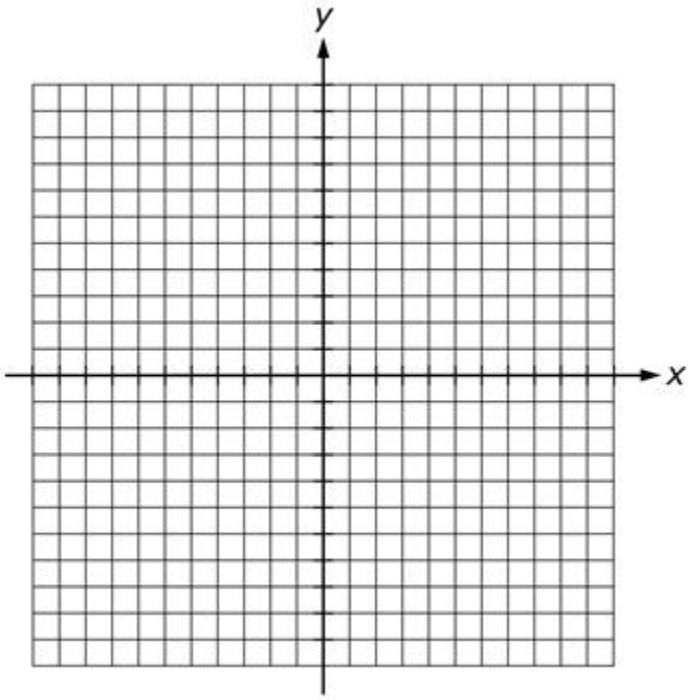
20. Use the function $g(x) = x^2 + 8x + 16$ to answer the following questions.

Part A:

What are the zeros of the function?

Part B:

Using your answer from Part A, sketch a graph of the function on the coordinate plane below. Provide an appropriate scale on the axes.

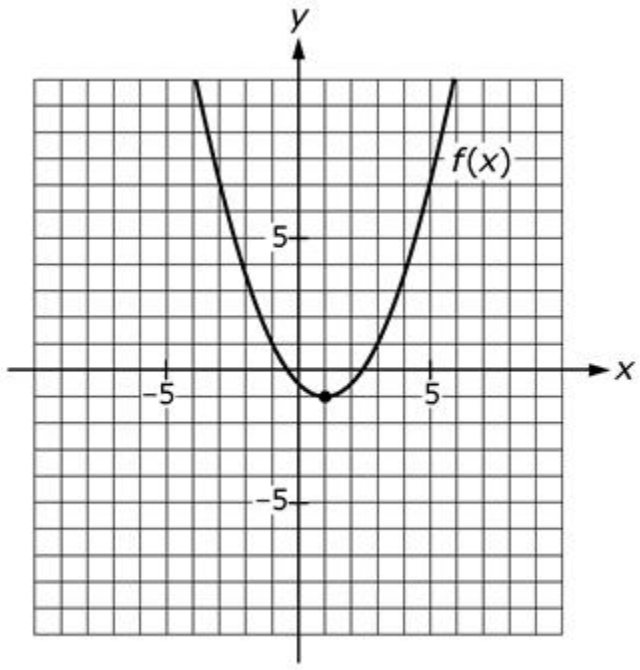


Answer on a separate sheet.

21. Write the function $h(x) = -5(x-1)^2 + 3$ in standard form. Show your work.

Answer on a separate sheet.

22.



The graph of a parabola f is shown above. The function g is defined by $g(x) = (x-1)^2 - 3$.

Part A:

Which function has the smaller minimum? What is its value?

Part B:

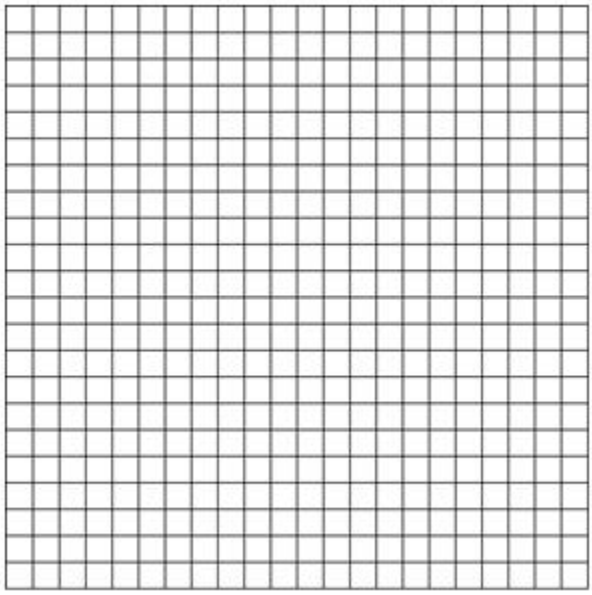
Is the leading coefficient of the function f greater than 1, equal to 1, greater than 0 but less than 1, or less than 0? Explain your answer.

Answer on a separate sheet.

23. On a windy morning, a hot air balloon starts ascending and flying away from the top of a hill. The altitude, h, in feet, of the balloon x hours after starting its ascent from the hill can be modeled by the function $h(x) = -16x^2 + 64x + 80$.

Part A:

Sketch a graph of the function. Provide scales and units on the axes.



Part B:

Identify the *x*- and *y*-intercepts and explain their meaning in context.

Part C:

When does the balloon reach its maximum altitude, and what is the maximum altitude obtained?

Answer on a separate sheet.

24.

x	0	1	2	3	4	5	6	7	8	9
$f(x)$	80	103	122	137	148	155	158	157	152	143

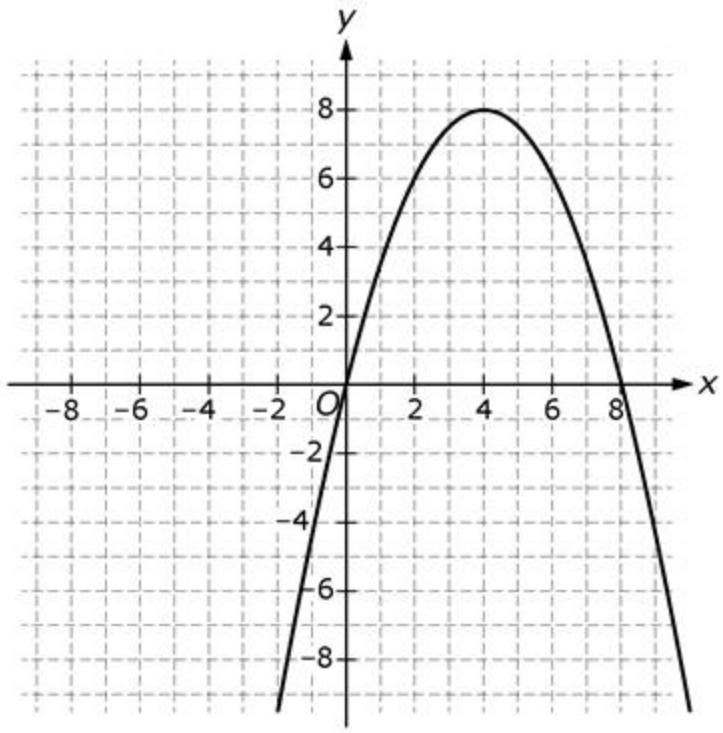
A table of values for the quadratic function f is shown above. The function g is defined by $g(x) = -4x^2 + 48x + 10$. Which function has the greater maximum value? Show your work.

Answer on a separate sheet.

25. Write the function $f(x) = x^2 - 4x - 7$ in vertex form. Show your work.

Answer on a separate sheet.

26.



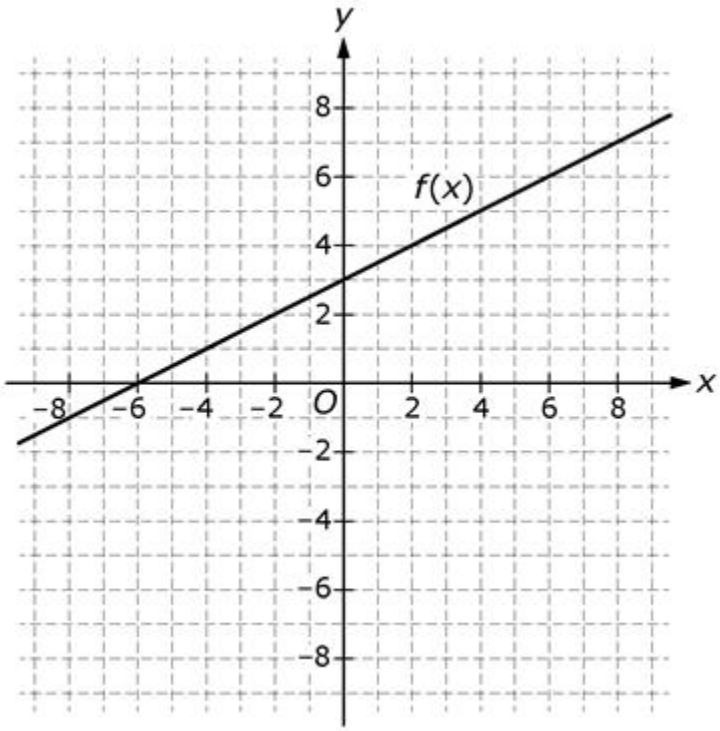
The graph of the quadratic function *f* is shown in the coordinate plane above. Estimate the average rate of change of *f* over each of the following intervals, and then place the intervals in order from greatest average rate of change to least average rate of change.

A	B	C	D	E
$0 \le x \le 2$	$0 \le x \le 4$	$0 \le x \le 7$	$1 \le x \le 7$	$2 \le x \le 4$

Greatest average rate of change				Least average rate of change

Answer on a separate sheet.

27.



The graph of the linear function $f(x)$ is shown in the coordinate plane above. The function g is defined by $g(x) = \frac{2}{5}x + 4$. Indicate the relationship between each pair of quantities in the table below by placing $>$, $<$, or $=$ in the middle column.

First Quantity	>, <, or =	Second Quantity
Slope of $f(x)$		Slope of $g(x)$
y-intercept of $f(x)$		y-intercept of $g(x)$
x-intercept of $f(x)$		x-intercept of $g(x)$
$f(10)$		$g(10)$
$f(20)$		$g(20)$

Answer on a separate sheet.

28. Solve the equation $(t-7)^2 + 18 = 9$ for t. Show your work.

Answer on a separate sheet.

29. Simplify the expression below.

$$\left(12s^4 - 6s^2 + 4s\right) + \left(6s^4 - 4s + 27\right) - \left(4s^4 + s^2 + 12\right)$$

Answer on a separate sheet.

30. An error has been made in subtracting the two polynomials shown in the work below.

$$(6x^2 - 4x - 5) - (3x^2 - 7x + 2) =$$

$$\begin{array}{r} 6x^2 - 4x - 5 \\ \underline{-3x^2 - 7x + 2} \\ 3x^2 - 11x - 3 \end{array}$$

Part A:

Explain the error that has been made.

Part B:

Show how to correctly subtract the two polynomials.

Answer on a separate sheet.

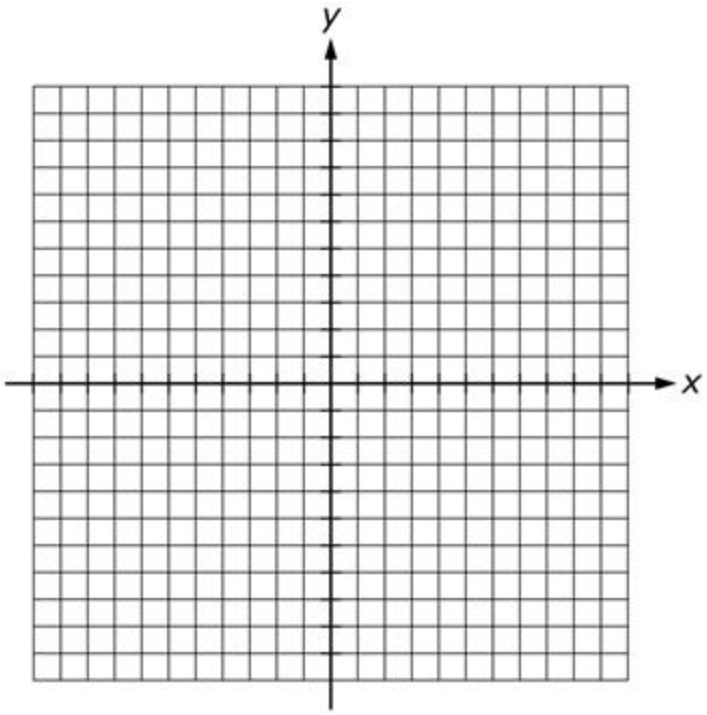
31. A parabola has its vertex at $(2, -3)$ and its y-intercept at 5.

Part A:

Write an equation of the parabola in the form $y = a(x - h)^2 + k$.

Part B:

Graph the parabola on the coordinate grid below. Be sure to provide an appropriate scale on the axes.



Answer on a separate sheet.

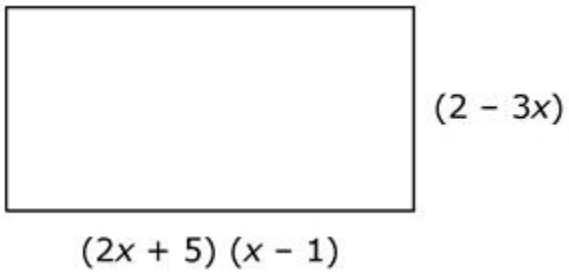
32. What are the solutions of the equation $3x^2 + 13x = 10$? Show your work.

Answer on a separate sheet.

33. How many real solutions, if any, does $2x^2 - 3x + 8 = 0$ have? Explain how you know.

Answer on a separate sheet.

34.



Part A:

Create an expression that represents the perimeter of the rectangle above. Write the expression as a polynomial in standard form. Show your work.

Part B:

Create an expression that represents the area of the rectangle above. Write the expression as a polynomial in standard form. Show your work.

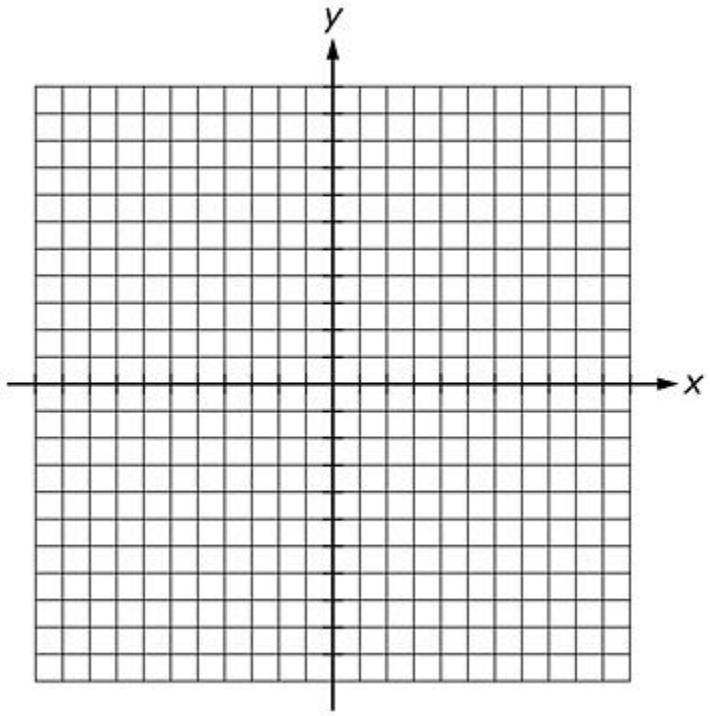
Answer on a separate sheet.

35. If $ax^2 - 6x + 3 = 0$ has no real solutions, and a is an integer, what is the least possible value of a?

Answer on a separate sheet.

36. Solve the system of equations below by graphing on the coordinate plane provided.

$3x + 2y = 8$
$x + 2y = 4$



Solution: _____

Answer on a separate sheet.

37. The Chang family is on their way home from a cross-country road trip. During the trip, the function $D(t) = 2,280 - 60t$ can be used to model their distance, in miles, from home after t hours of driving.

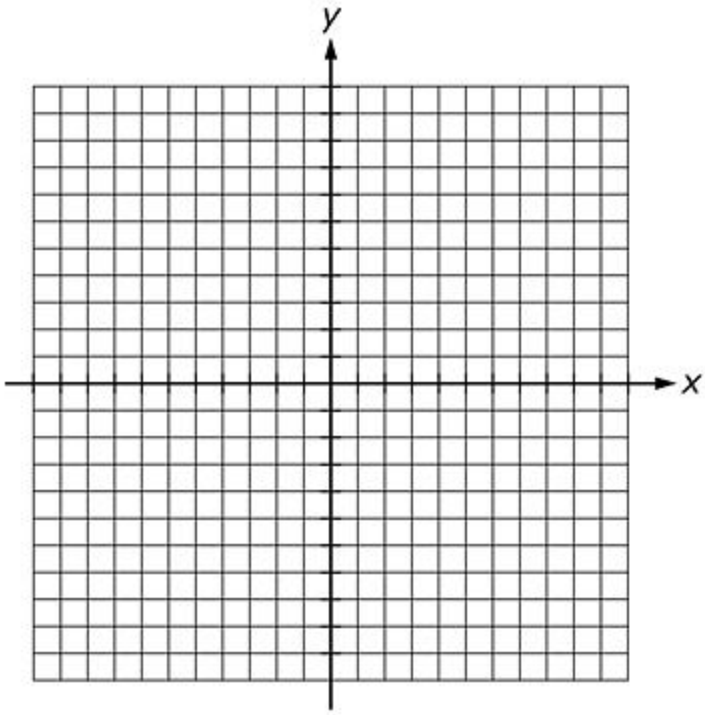
Find $D(15)$ and interpret the meaning in the context of the problem.

If $D(t) = 1,200$, find the value of t and interpret its meaning in the context of the problem.

Answer on a separate sheet.

38. Graph the solution to the system of inequalities in the coordinate plane below.

$3x - 2y > 12$
$2x + y \leq 8$



Answer on a separate sheet.

39. Solve the following equation. Show all work and justify each step in the work with a mathematical reason.

$$\frac{1}{3}(2x-5)-2=\frac{1}{2}(x-2)$$

Answer on a separate sheet.

40. In the polynomial function $p(x)$, k is a real number.

$$p(x) = x^2 - 4x + k$$

Part A

List the solutions to $p(x) = 0$ when $k = 6$. Show your work.

Part B

What are the possible values of k if $p(x) = 0$ has non-real solutions? Justify your answer.

Part C

If one zero of the function is 2 + 3*i*, what is the value of *k*? Justify your answer.

41. During a science experiment, a toy rocket was launched upward. Its height, *h* (in feet), after *x* seconds is given by the function $h(x) = -16x^2 + 28x + 30$.

Part A

Completely factor the function and state the zeros. Show your work.

Part B

What do the zeros of the function represent in the context of this situation?

42. A polynomial function is shown.

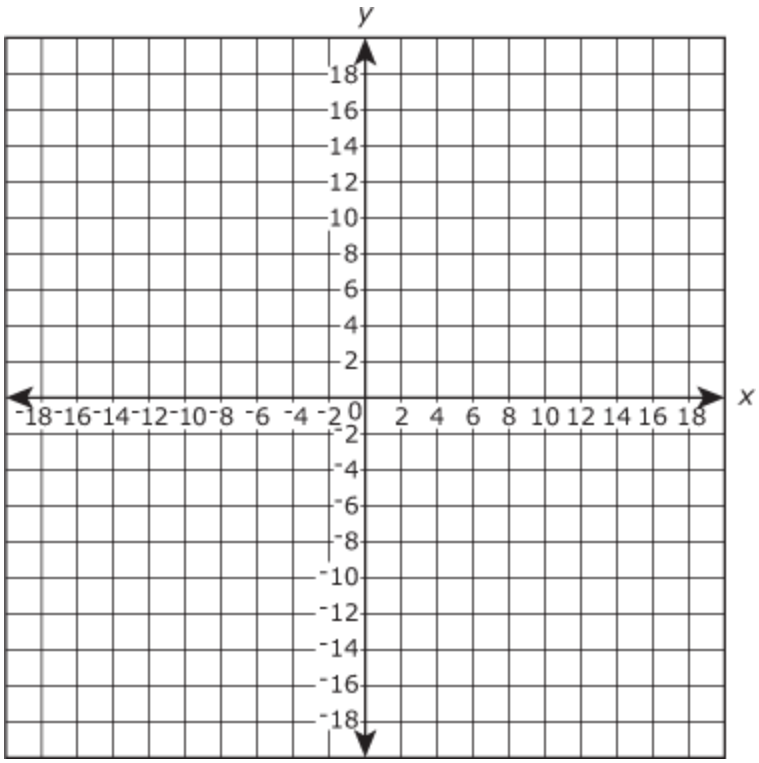
$f(x) = 2x^2 - 13x + 15$

Part A

What are the coordinates of the zero(s) of this function?

Part B

Graph the function. Label the vertex and any *x*- and *y*-intercepts of the function.



43. Use the function $f(x) = 2x^2 - x - 15$ to answer the following.

Part A

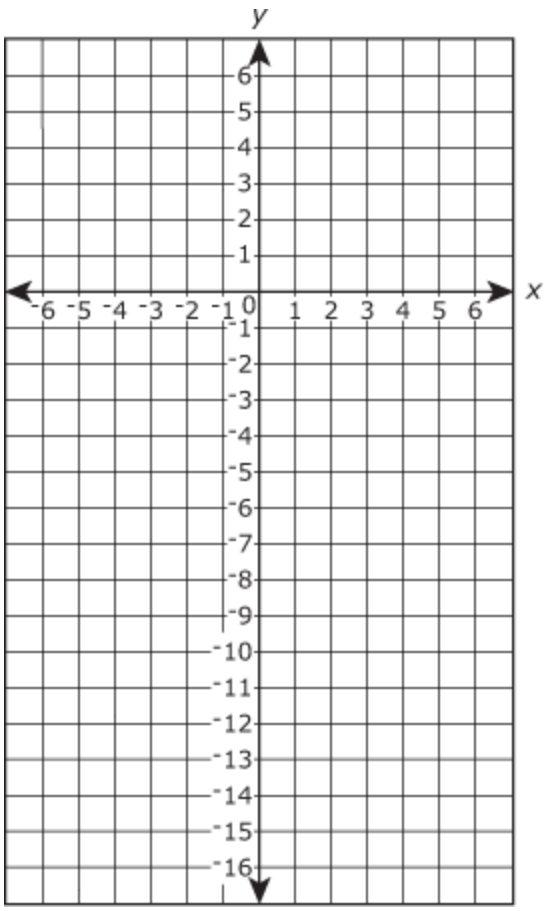
Rewrite the function $f(x)$ in factored form.

Part B

What are the zeros of the function? Use your work from Part A to justify your answer.

Part C

Use your work from Part B to sketch a graph of the function $f(x)$. Label the *x*-intercepts and the vertex of the function.



44. The fifth grade teachers are planning a lunch for their students on field day. They need a total of at least 110 hot dogs and hamburgers and can spend at most $100.00. They will spend $0.55 on each hot dog and $1.40 on each hamburger.

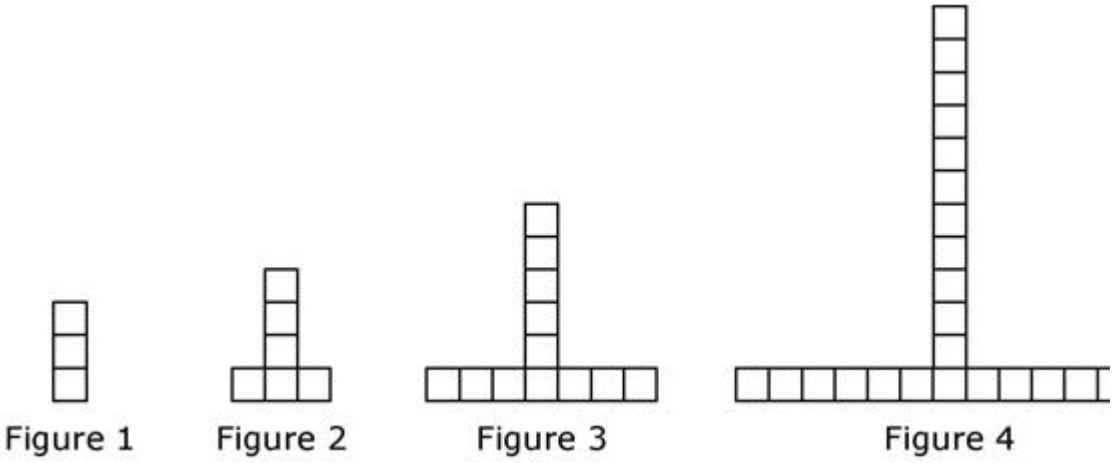
Part A

Write a system of inequalities to model the given situation, where *b* is the number of hamburgers and *d* is the number of hot dogs.

Part B

Can the teachers make more hamburgers than hot dogs for the students? Explain your answer.

45.



For the pattern above, the total number of boxes used in Figure *n* can be described by a geometric sequence. Write a recursive formula to find the number of boxes in Figure *n*.

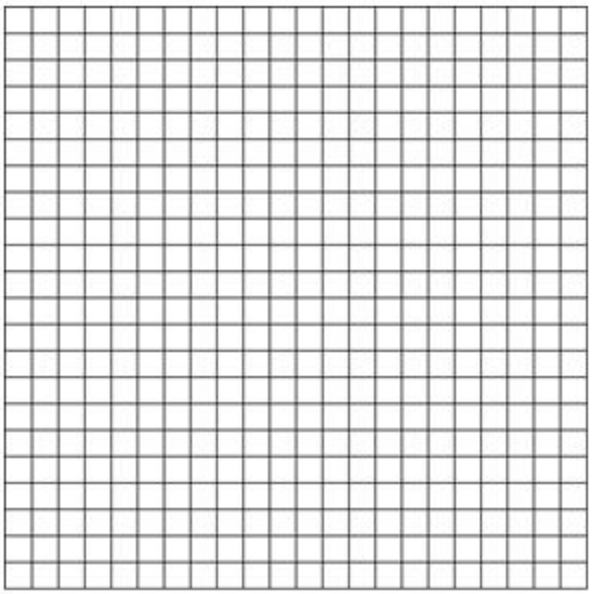
Recursive formula: _____

Answer on a separate sheet.

46. Rewrite the equation of the function $f(x) = 3x^2 - 24x + 46$ in a form that emphasizes the location of the vertex of the graph of the function in the coordinate plane. What are the coordinates of the vertex?

Answer on a separate sheet.

47. The cost for a phone call on a cruise ship is 65 cents per minute (or part of a minute). Create a graph that shows the total cost, in dollars, for calls between 0 and 10 minutes in length.



Answer on a separate sheet.

48. Solve the equation below. Show your work.

$$\sqrt{7x+15} = x+1$$

Answer on a separate sheet.

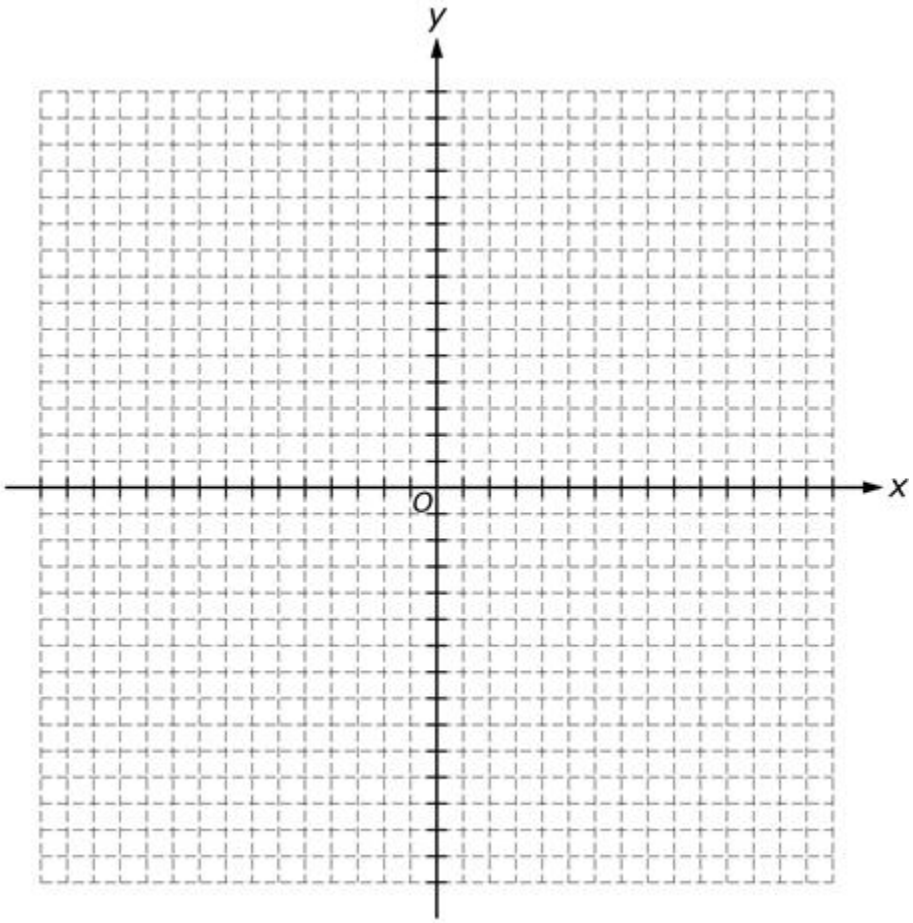
49. $y = 2x + 5$

$y = x^2 + 4x - 10$

Solve the system of equations above algebraically. Show your work.

Solution set: _____

Graph both equations and indicate the solution on the graph.

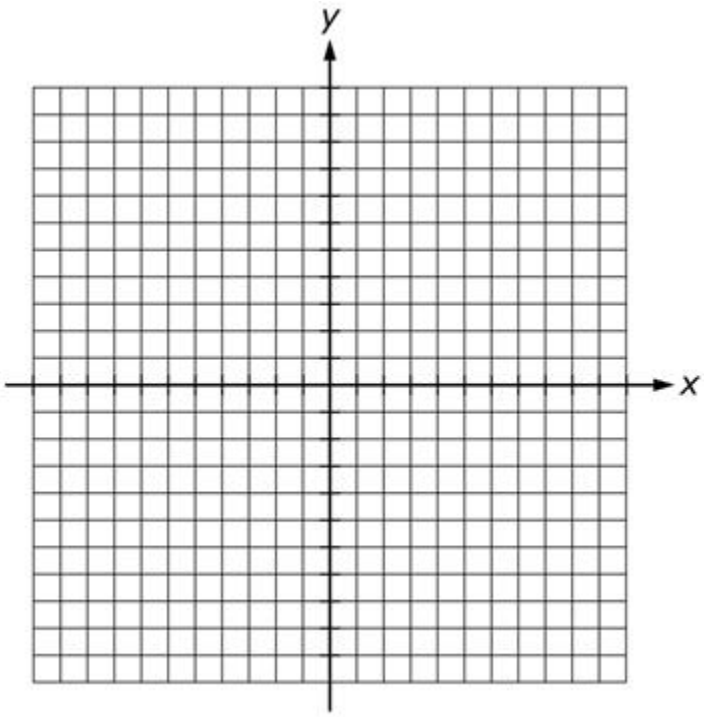


Answer on a separate sheet.

50. Solve the system of equations below by graphing on the coordinate plane provided.

$y = \frac{1}{2}x + 3$

$y = \frac{-1}{6}x + \frac{1}{3}$



Solution:

Answer on a separate sheet.