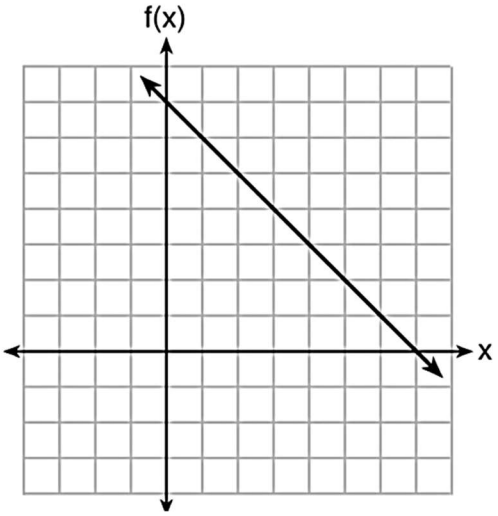
Name: _____ Date: _____

ALGEBRA I LIVE REVIEW PROBLEMS - 2019
eMATHinstruction

GENERAL FUNCTION WORK

January 2019

21 The functions $f(x)$, $q(x)$, and $p(x)$ are shown below.



$$q(x) = (x - 1)^2 - 6$$

x	p(x)
2	5
3	4
4	3
5	4
6	5

When the input is 4, which functions have the same output value?

(1) $f(x)$ and $q(x)$, only
(2) $f(x)$ and $p(x)$, only
(3) $q(x)$ and $p(x)$, only
(4) $f(x)$, $q(x)$, and $p(x)$

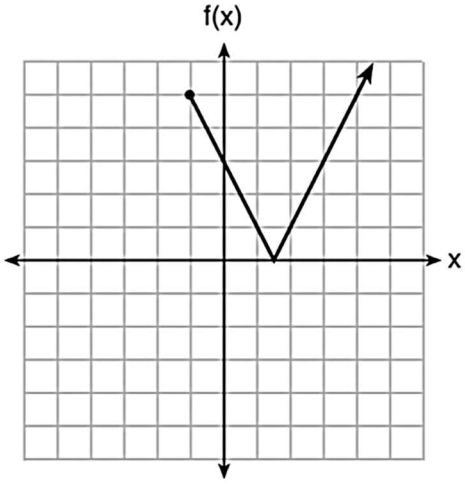
June 2018

11 A function is defined as {(0,1), (2,3), (5,8), (7,2)}. Isaac is asked to create one more ordered pair for the function. Which ordered pair can he add to the set to keep it a function?

(1) (0,2)
(2) (5,3)
(3) (7,0)
(4) (1,3)

January 2019

17 The function $f(x)$ is graphed below.



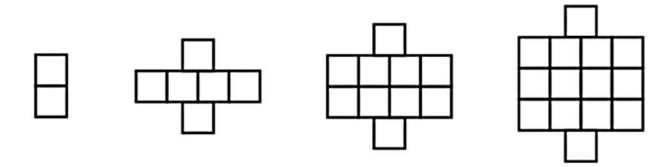
The domain of this function is

(1) all positive real numbers
(2) all positive integers
(3) $x \geq 0$
(4) $x \geq -1$

SEQUENCES

June 2015

22 A pattern of blocks is shown below.



If the pattern of blocks continues, which formula(s) could be used to determine the number of blocks in the nth term?

I	II	III
$a_n = n + 4$	$a_1 = 2$ $a_n = a_{n-1} + 4$	$a_n = 4n - 2$

(1) I and II
(2) I and III
(3) II and III
(4) III, only

June 2018

7 On the main floor of the Kodak Hall at the Eastman Theater, the number of seats per row increases at a constant rate. Steven counts 31 seats in row 3 and 37 seats in row 6. How many seats are there in row 20?

(1) 65

(2) 67

(3) 69

(4) 71

August 2018

32 Write the first five terms of the recursive sequence defined below.

$$a_1 = 0$$
$$a_n = 2(a_{n-1})^2 - 1, \text{ for } n > 1$$

January 2019

19 Which function could be used to represent the sequence 8, 20, 50, 125, 312.5,..., given that $a_1 = 8$?

(1) $a_n = a_{n-1} + a_1$

(2) $a_n = 2.5(a_{n-1})$

(3) $a_n = a_1 + 1.5(a_{n-1})$

(4) $a_n = (a_1)(a_{n-1})$

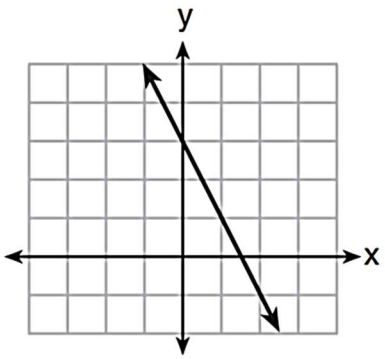
RATE OF CHANGE

August 2016

15 Which function has a constant rate of change equal to -3?

x	y
0	2
1	5
2	8
3	11

(1)



(3)

$\{(1,5), (2,2), (3,-5), (4,4)\}$

(2)

$2y = -6x + 10$

(4)

August 2018

27 The table below represents the height of a bird above the ground during flight, with $P(t)$ representing height in feet and t representing time in seconds.

t	P(t)
0	6.71
3	6.26
4	6
9	3.41

Calculate the average rate of change from 3 to 9 seconds, in feet per second.

June 2016

35 An airplane leaves New York City and heads toward Los Angeles. As it climbs, the plane gradually increases its speed until it reaches cruising altitude, at which time it maintains a constant speed for several hours as long as it stays at cruising altitude. After flying for 32 minutes, the plane reaches cruising altitude and has flown 192 miles. After flying for a total of 92 minutes, the plane has flown a total of 762 miles.

Determine the speed of the plane, at cruising altitude, in miles per minute.

Write an equation to represent the number of miles the plane has flown, y, during x minutes at cruising altitude, only.

Assuming that the plane maintains its speed at cruising altitude, determine the total number of miles the plane has flown 2 hours into the flight.

LINEAR EQUATIONS

June 2018

30 Solve the equation below algebraically for the exact value of x.

$$6 - \frac{2}{3}(x + 5) = 4x$$

January 2019

5 What is the solution to the equation $\frac{3}{5}\left(x + \frac{4}{3}\right) = 1.04$?

(1) $3.0\overline{6}$

(2) 0.4

(3) $-0.4\overline{8}$

(4) $-0.709\overline{3}$

August 2016

32 Solve the equation below for x in terms of a.

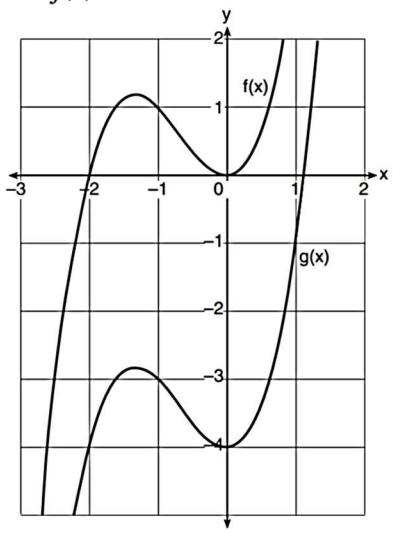
$$4(ax + 3) - 3ax = 25 + 3a$$

TRANSFORMATIONS

General Idea:

June 2016

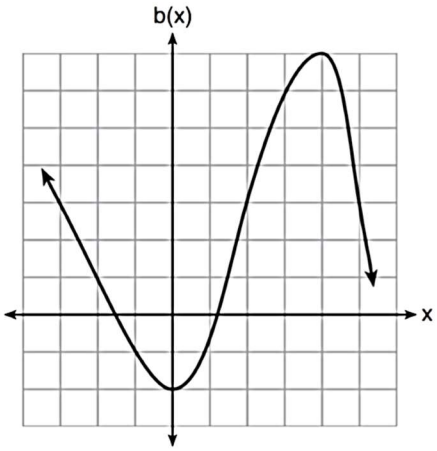
32 In the diagram below, $f(x) = x^3 + 2x^2$ is graphed. Also graphed is $g(x)$, the result of a translation of $f(x)$.



Determine an equation of $g(x)$. Explain your reasoning.

August 2016

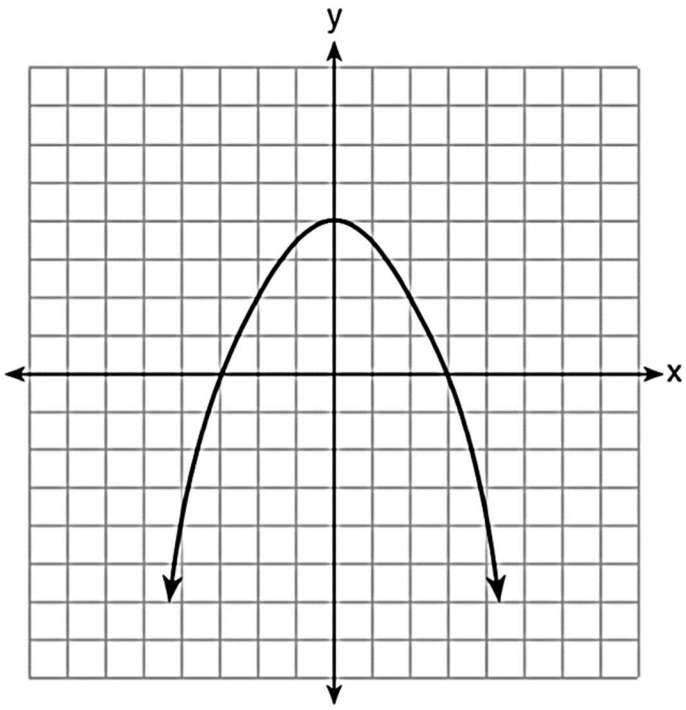
26 Richard is asked to transform the graph of $b(x)$ below.



The graph of $b(x)$ is transformed using the equation $h(x) = b(x - 2) - 3$. Describe how the graph of $b(x)$ changed to form the graph of $h(x)$.

June 2018

28 The graph of the function $p(x)$ is represented below. On the same set of axes, sketch the function $p(x + 2)$.



January 2015

12 How does the graph of $f(x) = 3(x - 2)^2 + 1$ compare to the graph of $g(x) = x^2$?

(1) The graph of $f(x)$ is wider than the graph of $g(x)$, and its vertex is moved to the left 2 units and up 1 unit.

(2) The graph of $f(x)$ is narrower than the graph of $g(x)$, and its vertex is moved to the right 2 units and up 1 unit.

(3) The graph of $f(x)$ is narrower than the graph of $g(x)$, and its vertex is moved to the left 2 units and up 1 unit.

(4) The graph of $f(x)$ is wider than the graph of $g(x)$, and its vertex is moved to the right 2 units and up 1 unit.

COMPLETING THE SQUARE

June 2014

8 Which equation has the same solution as $x^2 - 6x - 12 = 0$?

(1) $(x + 3)^2 = 21$

(2) $(x - 3)^2 = 21$

(3) $(x + 3)^2 = 3$

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

June 2018

12 The quadratic equation $x^2 - 6x = 12$ is rewritten in the form $(x + p)^2 = q$, where q is a constant. What is the value of p?

(1) -12

(2) -9

(3) -3

(4) 9

August 2018

30 Solve the following equation by completing the square:

$$x^2 + 4x = 2$$

June 2016

16 Which equation and ordered pair represent the correct vertex form and vertex for $j(x) = x^2 - 12x + 7$?

(1) $j(x) = (x - 6)^2 + 43$, $(6,43)$

(2) $j(x) = (x - 6)^2 + 43$, $(-6,43)$

(3) $j(x) = (x - 6)^2 - 29$, $(6,-29)$

(4) $j(x) = (x - 6)^2 - 29$, $(-6,-29)$

EXPONENTIAL FUNCTIONS

August 2014

26 Rhonda deposited \$3000 in an account in the Merrick National Bank, earning 4.2% interest, compounded annually. She made no deposits or withdrawals. Write an equation that can be used to find B, her account balance after t years.

June 2017

28 The value, $v(t)$, of a car depreciates according to the function $v(t) = P(.85)^t$, where P is the purchase price of the car and t is the time, in years, since the car was purchased. State the percent that the value of the car *decreases* by each year. Justify your answer.

June 2018

33 A population of rabbits in a lab, $p(x)$, can be modeled by the function $p(x) = 20(1.014)^x$, where x represents the number of days since the population was first counted.

Explain what 20 and 1.014 represent in the context of the problem.

Determine, to the *nearest tenth*, the average rate of change from day 50 to day 100.

FACTORING AND ZEROS

June 2018

4 The zeros of the function $p(x) = x^2 - 2x - 24$ are

(1) -8 and 3

(2) -6 and 4

(3) -4 and 6

(4) -3 and 8

January 2015

22 When factored completely, the expression $p^4 - 81$ is equivalent to

(1) $(p^2 + 9)(p^2 - 9)$

(2) $(p^2 - 9)(p^2 - 9)$

(3) $(p^2 + 9)(p + 3)(p - 3)$

(4) $(p + 3)(p - 3)(p + 3)(p - 3)$

June 2014

31 Factor the expression $x^4 + 6x^2 - 7$ completely.

August 2017

19 The zeros of the function $f(x) = 2x^3 + 12x - 10x^2$ are

(1) $\{2, 3\}$

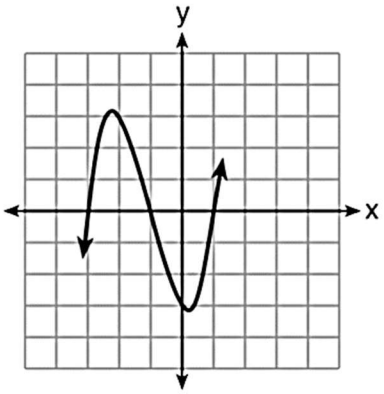
(2) $\{-1, 6\}$

(3) $\{0, 2, 3\}$

(4) $\{0, -1, 6\}$

June 2018

18 A cubic function is graphed on the set of axes below.



Which function could represent this graph?

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

(2) $g(x) = (x + 3)(x + 1)(x - 1)$

(3) $h(x) = (x - 3)(x - 1)(x + 3)$

(4) $k(x) = (x + 3)(x + 1)(x - 3)$

THE QUADRATIC FORMULA

June 2014

10 What are the roots of the equation $x^2 + 4x - 16 = 0$?

(1) $2 \pm 2\sqrt{5}$

(2) $-2 \pm 2\sqrt{5}$

(3) $2 \pm 4\sqrt{5}$

(4) $-2 \pm 4\sqrt{5}$

August 2018

28 Is the solution to the quadratic equation written below rational or irrational? Justify your answer.

$0 = 2x^2 + 3x - 10$

January 2015

29 Solve the equation $4x^2 - 12x = 7$ algebraically for x.

MORE WORK WITH QUADRATIC EQUATIONS

August 2014

9 Sam and Jeremy have ages that are consecutive odd integers. The product of their ages is 783. Which equation could be used to find Jeremy's age, j, if he is the younger man?

(1) $j^2 + 2 = 783$
(2) $j^2 - 2 = 783$
(3) $j^2 + 2j = 783$
(4) $j^2 - 2j = 783$

January 2018

14 What are the solutions to the equation $3(x - 4)^2 = 27$?

(1) 1 and 7
(2) -1 and -7
(3) $4 \pm \sqrt{24}$
(4) $-4 \pm \sqrt{24}$

June 2018

29 When an apple is dropped from a tower 256 feet high, the function $h(t) = -16t^2 + 256$ models the height of the apple, in feet, after t seconds. Determine, algebraically, the number of seconds it takes the apple to hit the ground.

SYSTEMS OF EQUATIONS

August 2018

9 Lizzy has 30 coins that total \$4.80. All of her coins are dimes, D, and quarters, Q. Which system of equations models this situation?

(1) $D + Q = 4.80$
$.10D + .25Q = 30$

(2) $D + Q = 30$
$.10D + .25Q = 4.80$

(3) $D + Q = 30$
$.25D + .10Q = 4.80$

(4) $D + Q = 4.80$
$.25D + .10Q = 30$

August 2016

22 A system of equations is given below.

$$x + 2y = 5$$
$$2x + y = 4$$

Which system of equations does *not* have the same solution?

(1) $3x + 6y = 15$
$2x + y = 4$

(2) $4x + 8y = 20$
$2x + y = 4$

(3) $x + 2y = 5$
$6x + 3y = 12$

(4) $x + 2y = 5$
$4x + 2y = 12$

January 2018

15 A system of equations is shown below.

Equation A: $5x + 9y = 12$
Equation B: $4x - 3y = 8$

Which method eliminates one of the variables?

(1) Multiply equation A by $-\frac{1}{3}$ and add the result to equation B.
(2) Multiply equation B by 3 and add the result to equation A.
(3) Multiply equation A by 2 and equation B by -6 and add the results together.
(4) Multiply equation B by 5 and equation A by 4 and add the results together.

January 2017

34 Two friends went to a restaurant and ordered one plain pizza and two sodas. Their bill totaled \$15.95. Later that day, five friends went to the same restaurant. They ordered three plain pizzas and each person had one soda. Their bill totaled \$45.90.

Write and solve a system of equations to determine the price of one plain pizza. [Only an algebraic solution can receive full credit.]

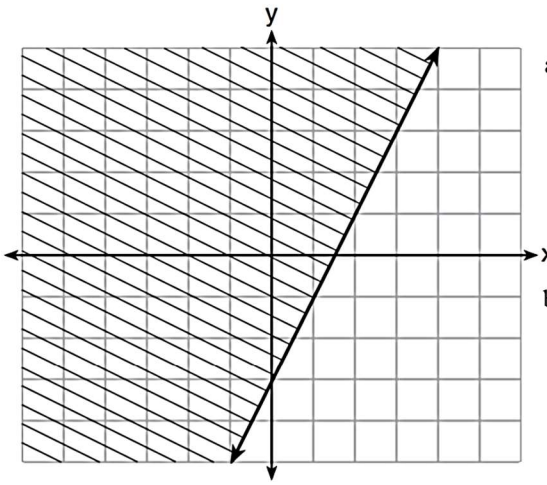
INEQUALITIES

January 2019

25 Solve algebraically for x: $3600 + 1.02x < 2000 + 1.04x$

January 2015

34 The graph of an inequality is shown below.



a) Write the inequality represented by the graph.

b) On the same set of axes, graph the inequality $x+2y<4$.

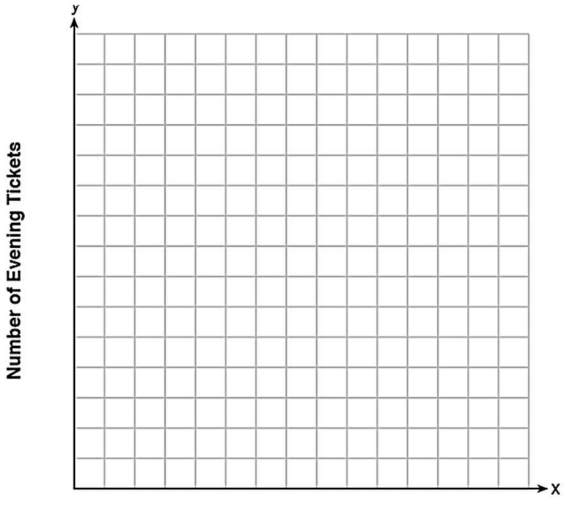
c) The two inequalities graphed on the set of axes form a system. Oscar thinks that the point (2,1) is in the solution set for this system of inequalities. Determine and state whether you agree with Oscar. Explain your reasoning.

January 2019

35 Myranda received a movie gift card for $100 to her local theater. Matinee tickets cost $7.50 each and evening tickets cost $12.50 each.

If x represents the number of matinee tickets she could purchase, and y represents the number of evening tickets she could purchase, write an inequality that represents all the possible ways Myranda could spend her gift card on movies at the theater.

On the set of axes below, graph this inequality.



What is the maximum number of matinee tickets Myranda could purchase with her gift card? Explain your answer.

STATISTICS

34 The data given in the table below show some of the results of a study comparing the height of a certain breed of dog, based upon its mass.

Mass (kg)	4.5	5	4	3.5	5.5	5	5	4	4	6	3.5	5.5
Height (cm)	41	40	35	38	43	44	37	39	42	44	31	30

Write the linear regression equation for these data, where x is the mass and y is the height. Round all values to the *nearest tenth*.

State the value of the correlation coefficient to the *nearest tenth,* and explain what it indicates.

January 2019

31 Santina is considering a vacation and has obtained high-temperature data from the last two weeks for Miami and Los Angeles.

Miami	76	75	83	73	60	66	76
	81	83	85	83	87	80	80

Los Angeles	74	63	65	67	65	65	65
	62	62	72	69	64	64	61

Which location has the least variability in temperatures? Explain how you arrived at your answer.

June 2016

15 A public opinion poll was taken to explore the relationship between age and support for a candidate in an election. The results of the poll are summarized in the table below.

Age	For	Against	No Opinion
21–40	30	12	8
41–60	20	40	15
Over 60	25	35	15

What percent of the 21–40 age group was for the candidate?

(1) 15 (3) 40

(2) 25 (4) 60

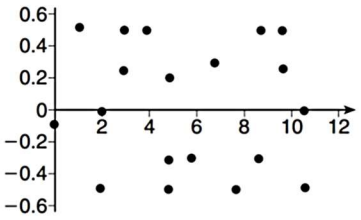
June 2017

29 A survey of 100 students was taken. It was found that 60 students watched sports, and 34 of these students did not like pop music. Of the students who did *not* watch sports, 70% liked pop music. Complete the two-way frequency table.

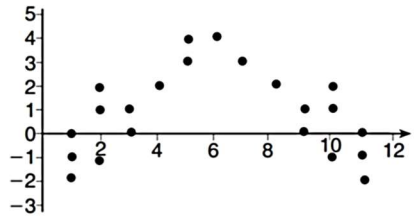
	Watch Sports	Don't Watch Sports	Total
Like Pop			
Don't Like Pop			
Total			

June 2015

31 The residual plots from two different sets of bivariate data are graphed below.



Graph A



Graph B

Explain, using evidence from graph *A* and graph *B*, which graph indicates that the model for the data is a good fit.

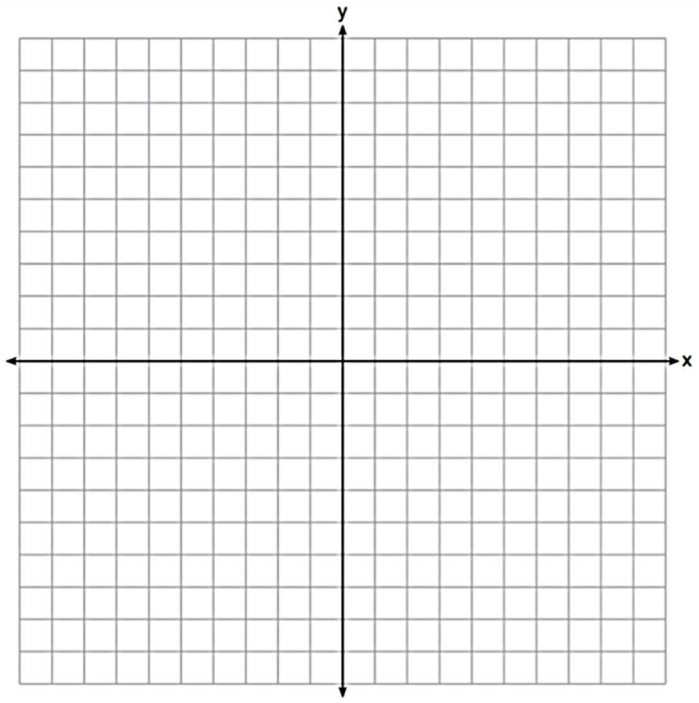
June 2016

36 On the set of axes below, graph

$$g(x) = \frac{1}{2}x + 1$$

and

$$f(x) = \begin{cases} 2x + 1, & x \leq -1 \\ 2 - x^2, & x > -1 \end{cases}$$



How many values of x satisfy the equation $f(x) = g(x)$? Explain your answer, using evidence from your graphs.