June 2017 Answer Key

(1) 3	(9) 3	(17) . . . . . 3 . . . . .
(2) 2	(10) 3	(18) . . . . . 2 . . . . .
(3) 4	(11) 1	(19) . . . . . 1 . . . . .
(4) 2	(12) 2	(20) . . . . . 4 . . . . .
(5) 1	(13) 4	(21) . . . . . 3 . . . . .
(6) 3	(14) 1	(22) . . . . . 2 . . . . .
(7) 1	(15) 4	(23) . . . . . 3 . . . . .
(8) 1	(16) 4	(24) . . . . . 1 . . . . .

Part II

Answer all 8 questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [16]

25 Express in simplest form: $(3x^2 + 4x - 8) - (-2x^2 + 4x + 2)$

Sharkey! Go Slow!

$(3x^2+4x-8)-(-2x^2+4x+2)$

$3x^2+4x-8+2x^2-4x-2$

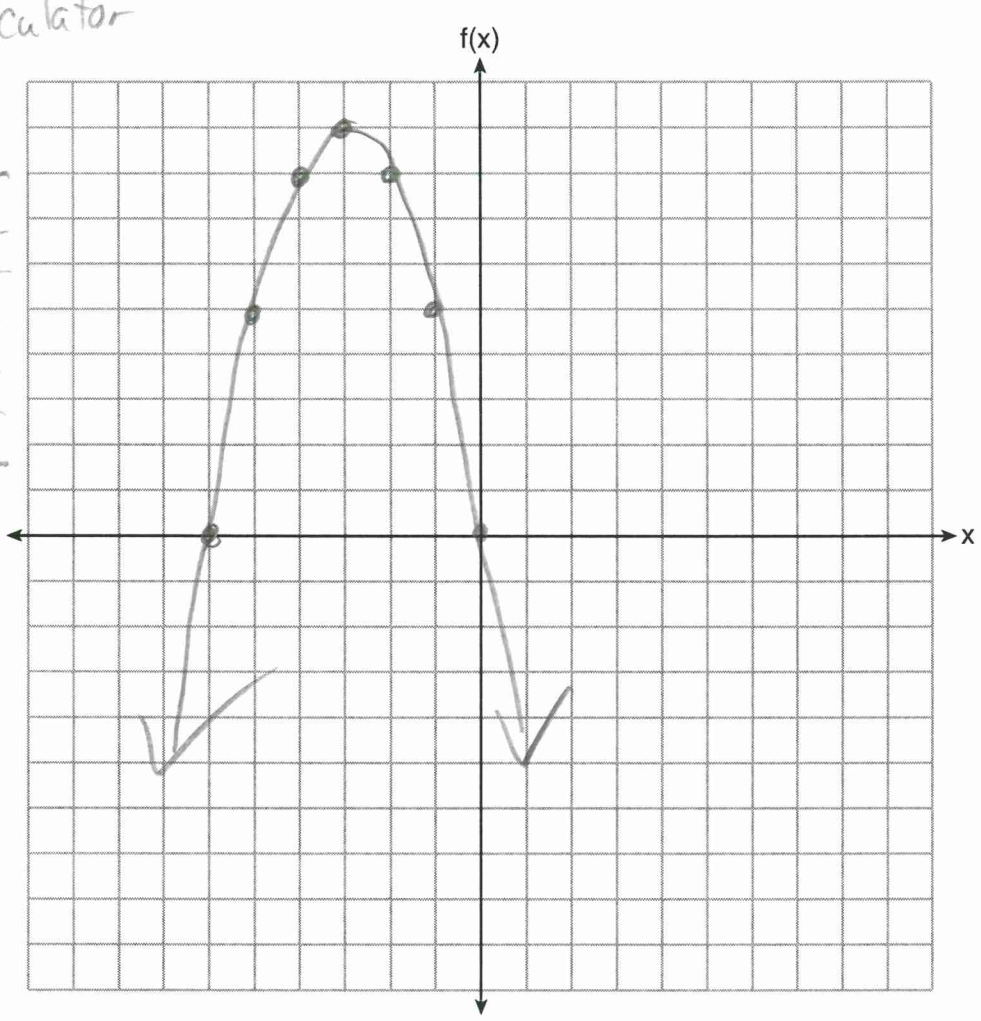
$3x^2+2x^2+4x-4x-8-2$

$5x^2-10$

26 Graph the function $f(x) = -x^2 - 6x$ on the set of axes below.

Use Calculator

x	y
-6	0
-5	5
-4	8
-3	9
-2	8
-1	5
0	0



State the coordinates of the vertex of the graph.

(-3, 9)

27 State whether $7 - \sqrt{2}$ is rational or irrational. Explain your answer.

Irrational

$\sqrt{2}$ is irrational

7 is rational

Rational minus Irrational is always Irrational.

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.

15%

100% − 85% = 15%

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	26	28	54
Don't Like Pop	34	12	46
Total	60	40	100

$60 - 34 = 26$

$40\ (70\%) = 28$

$40 - 28 = 12$

$26 + 28 = 54$

$34 + 12 = 46$

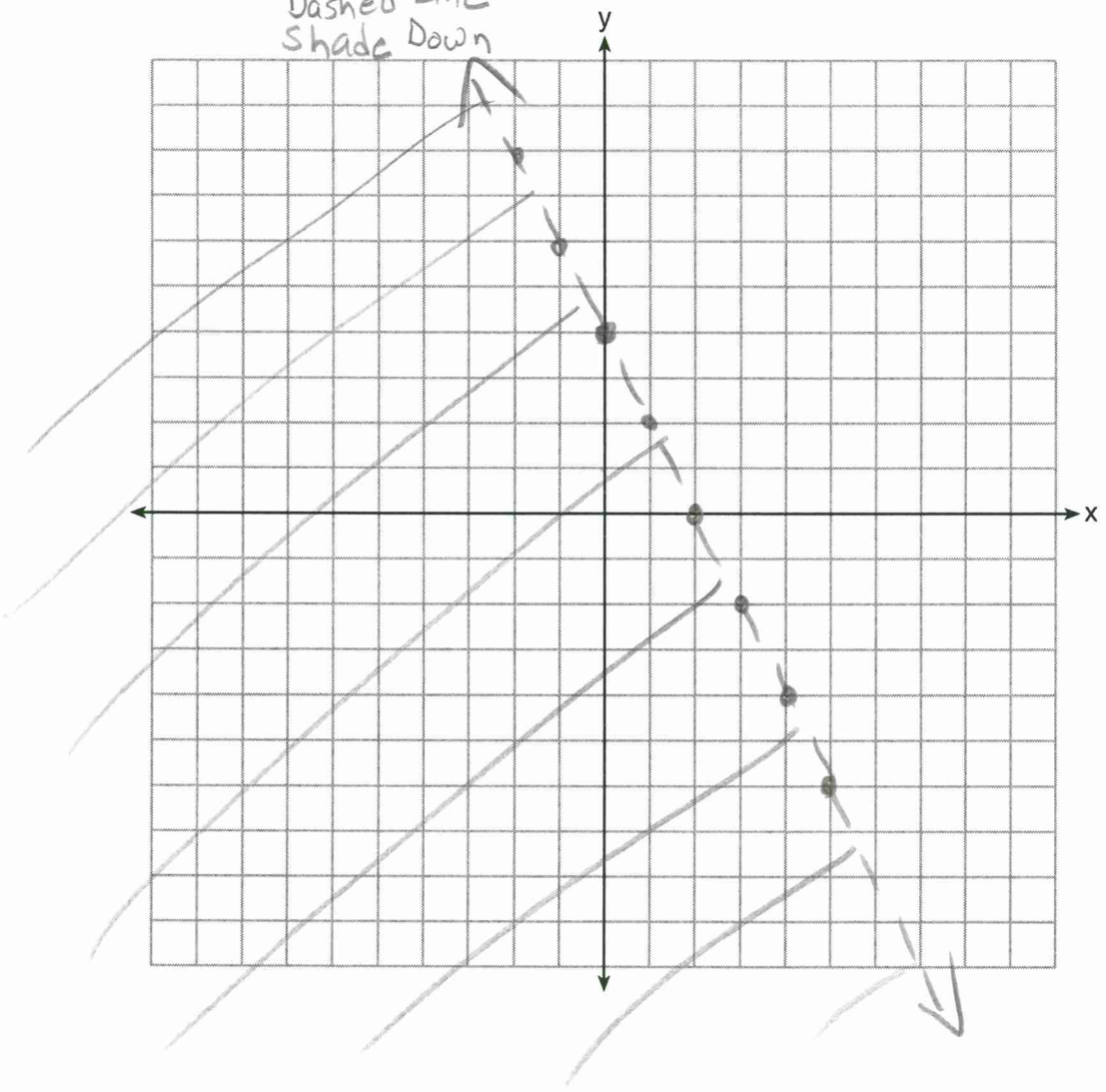
Dashed Line
shade Down

30 Graph the inequality $y + 4 < -2(x - 4)$ on the set of axes below.

$y + 4 < -2x + 8$
$-4 \quad\quad -4$

$y < -2x + 4$

Dashed Line
Shade Down



31 If $f(x) = x^2$ and $g(x) = x$, determine the value(s) of x that satisfy the equation $f(x) = g(x)$.

	f(x)	g(x)
x	y_1	y_2
-2	4	-2
-1	1	-1
0	0	0
1	1	1
2	4	2

$x = 0$
$x = 1$

32 Describe the effect that each transformation below has on the function $f(x) = |x|$, where $a > 0$.

$g(x) = |x - a|$

shift a units right

$h(x) = |x| - a$

shift a units down

Part III

Answer all 4 questions in this part. Each correct answer will receive 4 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [16]

33 The function $r(x)$ is defined by the expression $x^2 + 3x - 18$. Use factoring to determine the zeros of $r(x)$.

$r(x) = x^2 + 3x - 18$

$0 = x^2 + 3x - 18$

$0 = (x-3)(x+6)$

$x - 3 = 0 \quad x + 6 = 0$

$x = 3 \quad x = -6$

$S = 3$

$P = -18$

-1	18
-2	9
-3	6

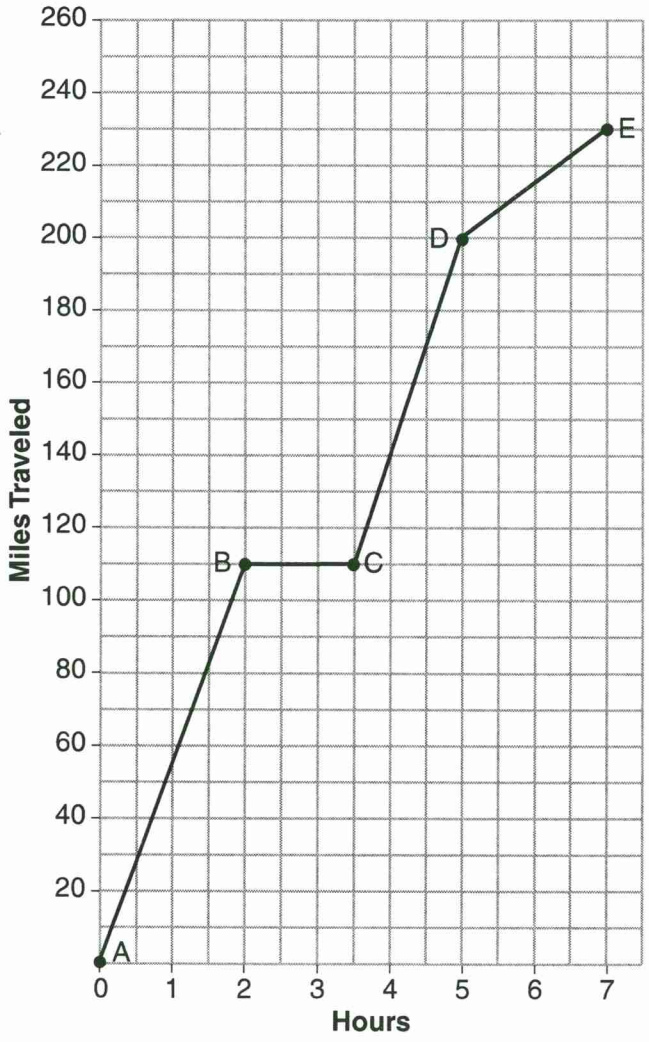
$\{-6, 3\}$

Explain what the zeros represent on the graph of $r(x)$.

The x-intercepts.

Where the graph crosses the x-axis.

34 The graph below models Craig's trip to visit his friend in another state. In the course of his travels, he encountered both highway and city driving.



Based on the graph, during which interval did Craig most likely drive in the city? Explain your reasoning.

D → E

Slower mph

Question 34 is continued on the next page.

Question 34 continued.

Explain what might have happened in the interval between B and C.

Stopped for lunch

Determine Craig's average speed, to the *nearest tenth of a mile per hour*, for his entire trip.

start (0, 0)
End (7, 230)

$\frac{230-0}{7-0} = \frac{230}{7} = 32.9$

35 Given:

$$g(x) = 2x^2 + 3x + 10$$
$$k(x) = 2x + 16$$

Solve the equation $g(x) = 2k(x)$ algebraically for x, to the *nearest tenth*.

$2x^2+3x+10 = 2(2x+16)$

$2x^2+3x+10 = 4x+32$

$-4x \quad -32 \quad -4x \quad -32$

$2x^2 - x - 22 = 0$

$a = 2 \quad b = -1 \quad c = -22$

$$x = \frac{1 \pm \sqrt{1-4(2)(-22)}}{2(2)} = \frac{1 \pm \sqrt{177}}{4}$$

$x = 3.6$

$x = -3.1$

Explain why you chose the method you used to solve this quadratic equation.

Directions said nearest tenth, that led me to believe that factoring would be difficult so I jumped into Quadratic Formula.

36 Michael has \$10 in his savings account. Option 1 will add \$100 to his account each week. Option 2 will double the amount in his account at the end of each week.

Write a function in terms of x to model each option of saving.

$y = 10 + 100x$

$y = 10(2)^x$

Michael wants to have at least \$700 in his account at the end of 7 weeks to buy a mountain bike. Determine which option(s) will enable him to reach his goal. Justify your answer.

$y = 10 + 100(7)$

$y = 710$

$y = 10(2)^7$

$y = 1280$

Both options will let him reach his goal.

Part IV

Answer the question in this part. A correct answer will receive 6 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided to determine your answer. Note that diagrams are not necessarily drawn to scale. A correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [6]

37 Central High School had five members on their swim team in 2010. Over the next several years, the team increased by an average of 10 members per year. The same school had 35 members in their chorus in 2010. The chorus saw an increase of 5 members per year.

Write a system of equations to model this situation, where x represents the number of years since 2010.

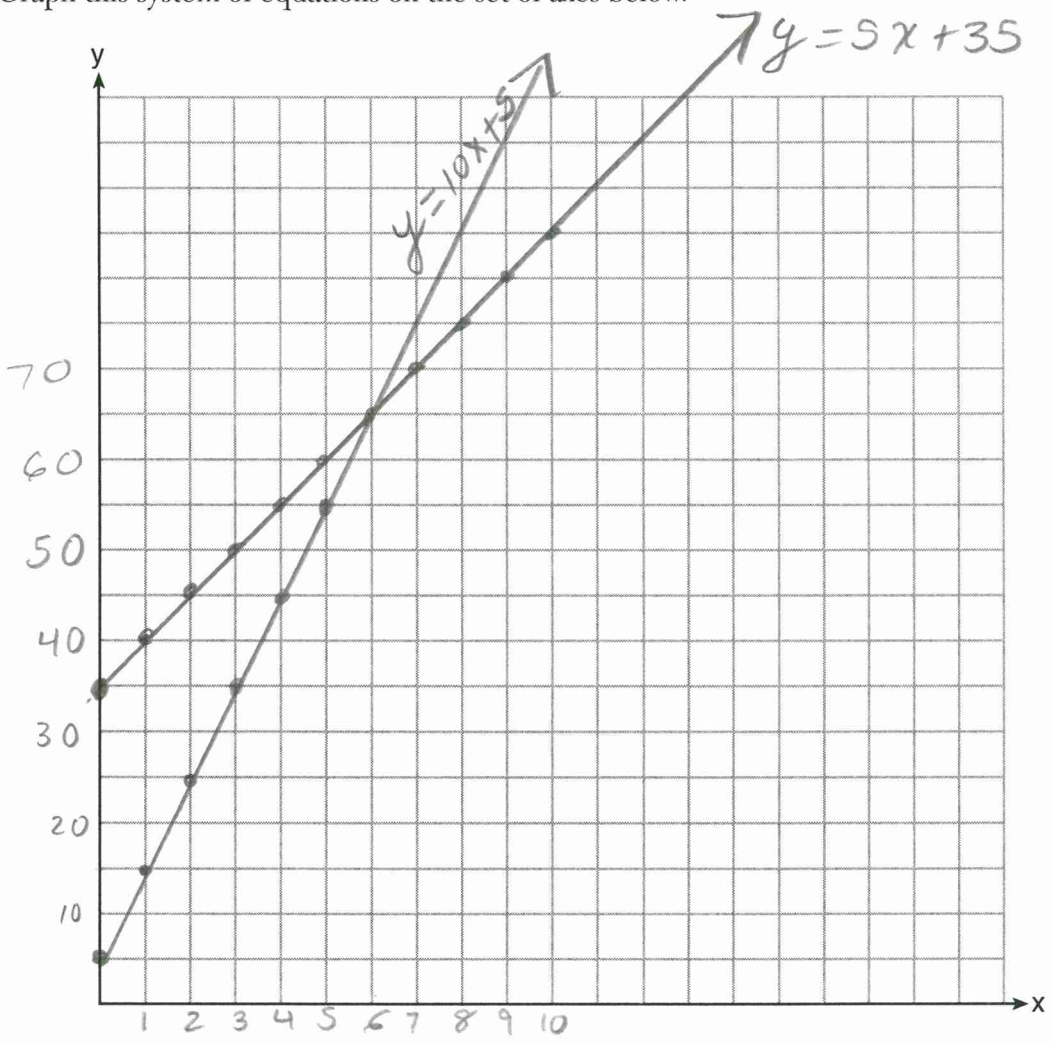
$y = 10x + 5 \rightarrow$ Swim

$y = 5x + 35 \rightarrow$ Choras

Question 37 is continued on the next page.

Question 37 continued.

Graph this system of equations on the set of axes below.



Explain in detail what each coordinate of the point of intersection of these equations means in the context of this problem.

(6, 65)

In 6 years the swim team & the chorus will each have 65 members.