January 2017 Answer Key

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

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 In attempting to solve the system of equations $y = 3x - 2$ and $6x - 2y = 4$, John graphed the two equations on his graphing calculator. Because he saw only one line, John wrote that the answer to the system is the empty set. Is he correct? Explain your answer.

He is incorrect.
Since both lines are the same the answers to the system are infinite. The equations are equivalent.

26 A typical marathon is 26.2 miles. Allan averages 12 kilometers per hour when running in marathons.

Determine how long it would take Allan to complete a marathon, to the *nearest tenth of an hour.* Justify your answer.

On Reference Sheet

$$\frac{26.2 \text{ miles}}{1} \cdot \frac{1 \text{ km}}{0.62 \text{ miles}} = \frac{26.2 \text{ km}}{.62}$$

$$\frac{26.2 \text{ km}}{.62} \cdot \frac{1 \text{ hr}}{12 \text{ km}} = \frac{26.2 \text{ h}}{.62(12)} = 3.5 \text{ hours}$$

27 Solve the inequality below:

$$1.8 - 0.4y \geq 2.2 - 2y$$

$+2y \quad +2y$

$1.8 + 1.6y \geq 2.2$

$-1.8 \quad -1.8$

$\frac{1.6y}{1.6} \geq \frac{.4}{1.6}$

$y \geq .25$

28 Jakob is working on his math homework. He decides that the sum of the expression $\frac{1}{3} + \frac{6\sqrt{5}}{7}$ must be rational because it is a fraction. Is Jakob correct? Explain your reasoning.

Acording to Calculator

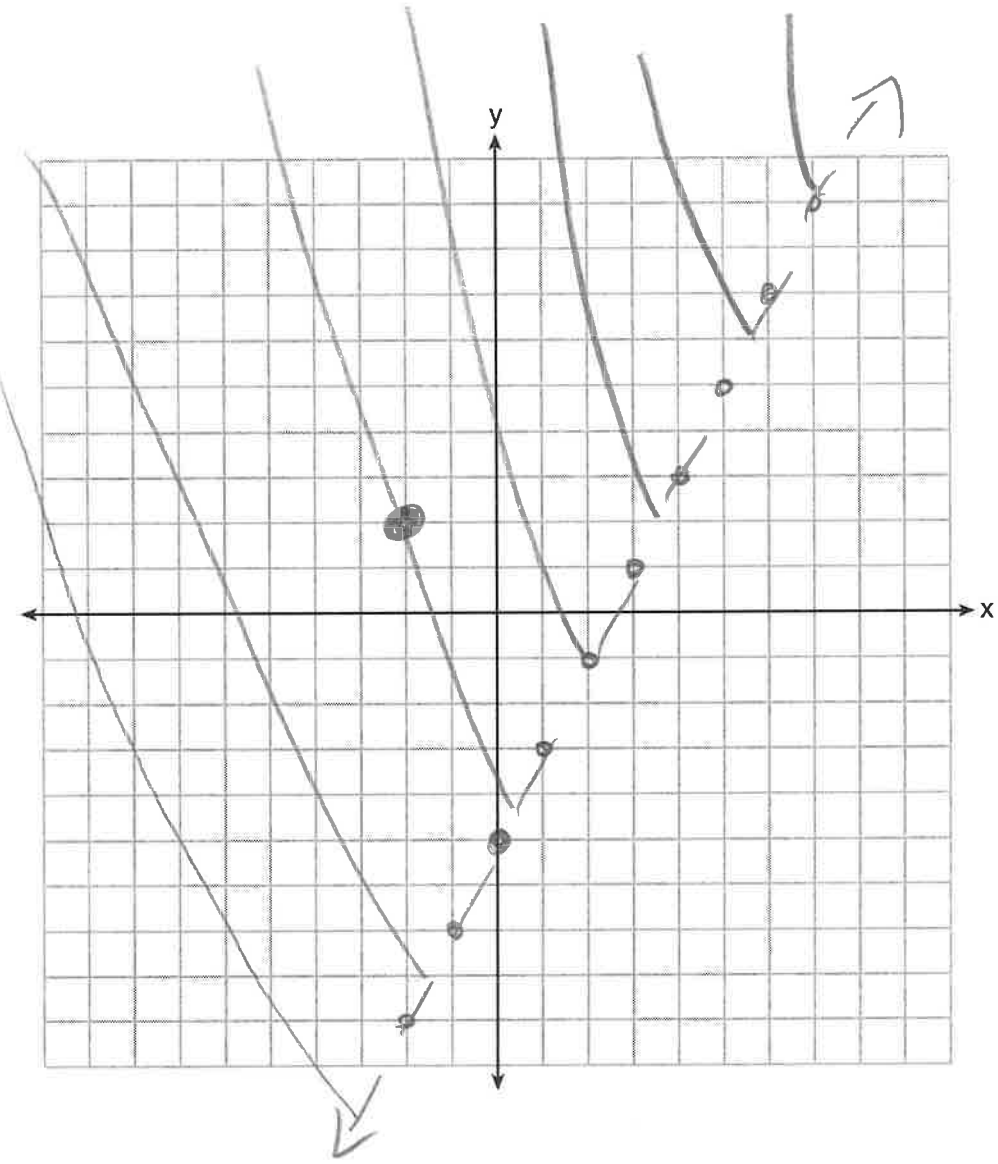
$\frac{1}{3} + \frac{6\sqrt{5}}{7} = 2.2499\,63028...$

Jakob is NOT correct

2.249963028... is a never ending and never repeating decimal which makes it irrational.

Dashed line
shade up

29 Graph the inequality $y > 2x - 5$ on the set of axes below.
State the coordinates of a point in its solution.



(-2, 2) is a point in the solution.

30 Sandy programmed a website's checkout process with an equation to calculate the amount customers will be charged when they download songs.

The website offers a discount. If one song is bought at the full price of \$1.29, then each additional song is \$.99.

State an equation that represents the cost, C, when s songs are downloaded.

$C = 1.29 + .99(s-1)$

or

$C = .99s + 30$

Sandy figured she would be charged \$52.77 for 52 songs. Is this the correct amount? Justify your answer.

$52.77 = 1.29 + .99(52-1)$

$52.77 \neq 51.78$

Not the correct amount

31 A family is traveling from their home to a vacation resort hotel. The table below shows their distance from home as a function of time.

Time (hrs)	0	2	5	7
Distance (mi)	0	140	375	480

Determine the average rate of change between hour 2 and hour 7, including units.

(2, 140)
(7, 480)

$\frac{\Delta y}{\Delta x}$

$\frac{480-140}{7-2} = \frac{340}{5} = 68$ miles per hour

32 Nora says that the graph of a circle is a function because she can trace the whole graph without picking up her pencil.

Mia says that a circle graph is *not* a function because multiple values of x map to the same y-value.

Determine if either one is correct, and justify your answer completely.

Neither is correct.

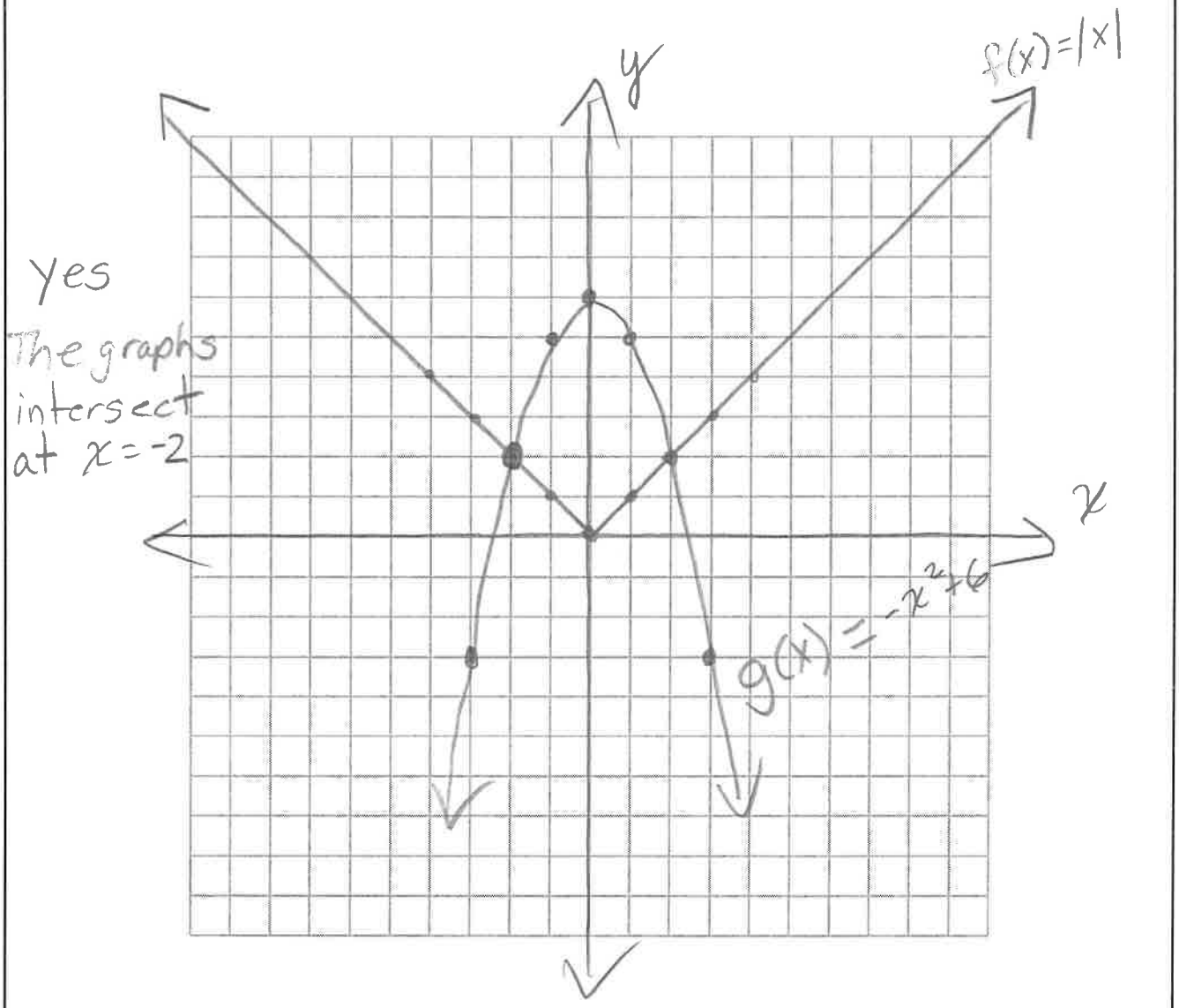
Nora is incorrect becaue a circle will fail the vertical line test.

Mia is incorrect because multiple x values can have the same y. ex. (1, 2) (2, 2) (3, 2) She should have reversed her x and y stating that multiple values of y map to the same x-value.

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 Graph $f(x) = |x|$ and $g(x) = -x^2 + 6$ on the grid below.
Does $f(-2) = g(-2)$? Use your graph to explain why or why not.



Yes
The graphs intersect at $x = -2$

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.]

$p + 2s = 15.95$
$3p + 5s = 45.90$

$-3(p + 2s) = 15.95$
$-3p - 6s = -47.85$
$3p + 5s = 45.90$
$-s = -1.95$
$s = 1.95$

$p + 2s = 15.95$
$p + 2(1.95) = 15.95$
$p + 3.9 = 15.95$
$p = 12.05$

Soda = 1.95
pizza = 12.05

35 Tanya is making homemade greeting cards. The data table below represents the amount she spends in dollars, $f(x)$, in terms of the number of cards she makes, x.

x	f(x)
4	7.50
6	9
9	11.25
10	12

Write a linear function, $f(x)$, that represents the data.

step 1 $m = \frac{9 - 7.5}{6 - 4} = \frac{1.5}{2} = .75$

$y = .75x + 4.5$

step 2
$y = mx + b$
$9 = .75(6) + b$
$9 = 4.5 + b$
$4.5 = b$

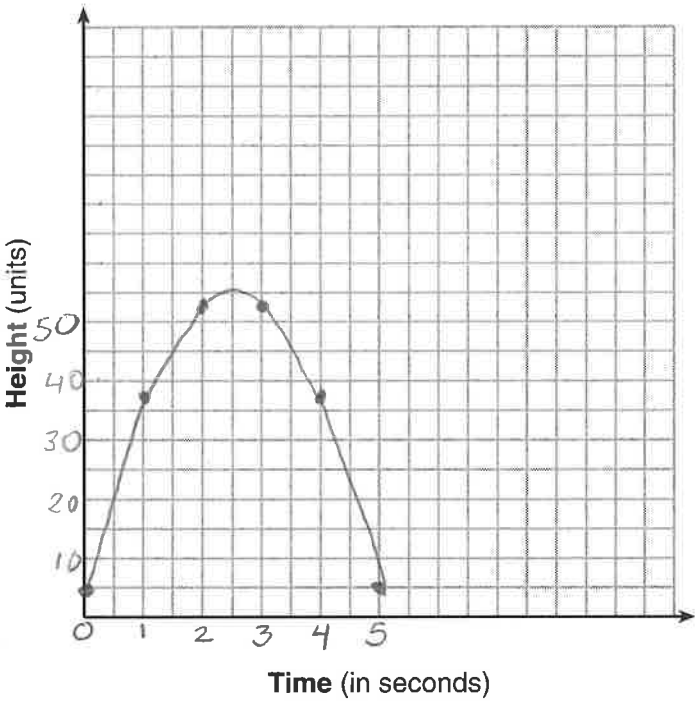
Explain what the slope and y-intercept of $f(x)$ mean in the given context.

slope = .75 = cost per card

y-intercept = 4.5 = starting costs

36 Alex launched a ball into the air. The height of the ball can be represented by the equation $h = -8t^2 + 40t + 5$, where h is the height, in units, and t is the time, in seconds, after the ball was launched. Graph the equation from $t = 0$ to $t = 5$ seconds.

t	h
0	5
1	37
2	53
3	53
4	37
5	5



State the coordinates of the vertex and explain its meaning in the context of the problem.

To find vertex:
t value of vertex will be in the middle of 2 and 3, so $t = 2.5$. Plug $t = 2.5$ into equation to find value of h.

$h = -8(2.5)^2 + 40(2.5) + 5$

$h = 55$ (2.5, 55)

Another option would be to complete the square.

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 Ian is borrowing \$1000 from his parents to buy a notebook computer. He plans to pay them back at the rate of \$60 per month. Ken is borrowing \$600 from his parents to purchase a snowboard. He plans to pay his parents back at the rate of \$20 per month.

Write an equation that can be used to determine after how many months the boys will owe the same amount.

Let m = # of months

$1000 - 60m = 600 - 20m$

Determine algebraically and state in how many months the two boys will owe the same amount. State the amount they will owe at this time.

$1000 - 60m = 600 - 20m$
$+60m \qquad +60m$

$1000 = 600 + 40m$
$-600 \qquad -600$

$\frac{400}{40} = \frac{40m}{40}$

$10 = m$

10 months

$600 - 20(10) = 400$

\$400

Ian claims that he will have his loan paid off 6 months after he and Ken owe the same amount. Determine and state if Ian is correct. Explain your reasoning.

$400 - 60m \leq 0$

$\frac{400}{60} \leq \frac{60m}{60}$

$6.\overline{6} \leq m$

Ian is not correct. It will take him $6.\overline{6}$ months which is 1 more month than he thought.