The University of the State of New York
REGENTS HIGH SCHOOL EXAMINATION

ALGEBRA I

Tuesday, January 23, 2018 — 1:15 to 4:15 p.m., only

Student Name _____Steve Watson_____

School Name _____www.jmap.org_____

> **The possession or use of any communications device is strictly prohibited when taking this examination. If you have or use any communications device, no matter how briefly, your examination will be invalidated and no score will be calculated for you.**

Print your name and the name of your school on the lines above.

A separate answer sheet for **Part I** has been provided to you. Follow the instructions from the proctor for completing the student information on your answer sheet.

This examination has four parts, with a total of 37 questions. You must answer all questions in this examination. Record your answers to the Part I multiple-choice questions on the separate answer sheet. Write your answers to the questions in **Parts II**, **III**, and **IV** directly in this booklet. All work should be written in pen, except for graphs and drawings, which should be done in pencil. 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.

The formulas that you may need to answer some questions in this examination are found at the end of the examination. This sheet is perforated so you may remove it from this booklet.

Scrap paper is not permitted for any part of this examination, but you may use the blank spaces in this booklet as scrap paper. A perforated sheet of scrap graph paper is provided at the end of this booklet for any question for which graphing may be helpful but is not required. You may remove this sheet from this booklet. Any work done on this sheet of scrap graph paper will *not* be scored.

When you have completed the examination, you must sign the statement printed at the end of the answer sheet, indicating that you had no unlawful knowledge of the questions or answers prior to the examination and that you have neither given nor received assistance in answering any of the questions during the examination. Your answer sheet cannot be accepted if you fail to sign this declaration.

> **Notice ...**
>
> **A graphing calculator and a straightedge (ruler) must be available for you to use while taking this examination.**

DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN.

Answer all 24 questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. For each statement or question, choose the word or expression that, of those given, best completes the statement or answers the question. Record your answers on your separate answer sheet. [48]

Use this space for computations.

1 When solving the equation $12x^2 - 7x = 6 - 2(x^2 - 1)$, Evan wrote $12x^2 - 7x = 6 - 2x^2 + 2$ as his first step. Which property justifies this step?

(1) subtraction property of equality

(2) multiplication property of equality

(3) associative property of multiplication

(4) distributive property of multiplication over subtraction

This is what changed.

2 Jill invests $400 in a savings bond. The value of the bond, $V(x)$, in hundreds of dollars after x years is illustrated in the table below.

x	V(x)
0	4
1	5.4
2	7.29
3	9.84

V(x) is growing.

Which equation and statement illustrate the approximate value of the bond in hundreds of dollars over time in years?

(1) $V(x) = 4(0.65)^x$, and it grows.

(2) $V(x) = 4(0.65)^x$, and it decays.

(3) $V(x) = 4(1.35)^x$, and it grows.

(4) $V(x) = 4(1.35)^x$, and it decays.

$(0.65) < 1$, so $V(x)$ will get smaller.

check in graphing calculator.

3 Alicia purchased H half-gallons of ice cream for $3.50 each and P packages of ice cream cones for $2.50 each. She purchased 14 items and spent $43. Which system of equations could be used to determine how many of each item Alicia purchased?

(1) $3.50H + 2.50P = 43$
$H + P = 14$

(2) $3.50P + 2.50H = 43$
$P + H = 14$

(3) $3.50H + 2.50P = 14$
$H + P = 43$

(4) $3.50P + 2.50H = 14$
$P + H = 43$

$3.50H + 2.50P = 43$
$H + P = 14$

4 A relation is graphed on the set of axes below.
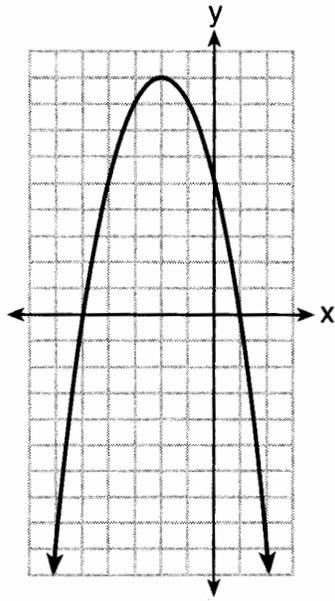
This is a function because there is one and only one value of y for every value of x.

Based on this graph, the relation is

(1) a function because it passes the horizontal line test

(2) a function because it passes the vertical line test

(3) ~~not a function~~ because it fails the horizontal line test

(4) ~~not a function~~ because it fails the vertical line test

5 Ian is saving up to buy a new baseball glove. Every month he puts $10 into a jar. Which type of function best models the total amount of money in the jar after a given number of months?

(1) linear

(2) exponential

(3) quadratic

(4) square root

This is a constant rate of change, so it must be a linear function.

6 Which ordered pair would *not* be a solution to $y = x^3 - x$?

(1) $(-4, -60)$ ✓

(2) $(-3, -24)$ ✓

(3) $(-2, -6)$ ✓

(4) $(-1, -2)$

Put in graphing calculator and inspect table of values

Should be $(-1, 0)$

X	Y
-4	-60
-3	-24
-2	-6
-1	0

7 Last weekend, Emma sold lemonade at a yard sale. The function $P(c) = .50c - 9.96$ represented the profit, $P(c)$, Emma earned selling c cups of lemonade. Sales were strong, so she raised the price for this weekend by 25 cents per cup. Which function represents her profit for this weekend?

(1) $P(c) = .25c - 9.96$ (3) $P(c) = .50c - 10.21$

(2) $P(c) = .50c - 9.71$ (4) $P(c) = .75c - 9.96$

Variable - # of cups sold

$P(c) = .50\overset{\downarrow}{c} - 9.96$

Profit ↑   *↑ price per*   *↑ Fixed Costs*

cup - this increases by 25 cents

8 The product of $\sqrt{576}$ and $\sqrt{684}$ is

(1) irrational because both factors are irrational

(2) rational because both factors are rational

(3) irrational because one factor is irrational

(4) rational because one factor is rational

The product of a rational number and an irrational number is always irrational.

$\sqrt{576} = 24 \rightarrow$ rational $\sqrt{684} = 26.15339366 \rightarrow$ irrational

9 Which expression is equivalent to $y^4 - 100$?

(1) $(y^2 - 10)^2$ (3) $(y^2 + 10)(y^2 - 10)$

(2) $(y^2 - 50)^2$ (4) $(y^2 + 50)(y^2 - 50)$

$y^4 - 100$ is a difference of perfect squares.

$a^2 - b^2 = (a+b)(a-b)$

$y^4 - 100 = (y^2 + 10)(y^2 - 10)$

10 The graphs of $y = x^2 - 3$ and $y = 3x - 4$ intersect at approximately

(1) $(0.38, -2.85)$, only   (3) $(0.38, -2.85)$ and $(2.62, 3.85)$

(2) $(2.62, 3.85)$, only   (4) $(0.38, -2.85)$ and $(3.85, 2.62)$

Strategy #1
Use graphing calculator to calculate intersections

Strategy #2
Solve $x^2 - 3 = 3x - 4$ to get $x = \dfrac{3 \pm \sqrt{5}}{2}$ $x = 2.62$ and $x = .38$

11 The expression $-4.9t^2 + 50t + 2$ represents the height, in meters, of a toy rocket t seconds after launch. The initial height of the rocket, in meters, is

When $t = 0$, the height is 2.

(1) 0   (3) 4.9

(2) 2   (4) 50

12 If the domain of the function $f(x) = 2x^2 - 8$ is $\{-2, 3, 5\}$, then the range is

(1) $\{-16, 4, 92\}$ (3) $\{0, 10, 42\}$

(2) $\{-16, 10, 42\}$ (4) $\{0, 4, 92\}$

Use table view in a graphing calculator.

inputs

Domain	Range
X	Y
-2	0
3	10
5	42

outputs

13 Which polynomial is twice the sum of $4x^2 - x + 1$ and $-6x^2 + x - 4$?

(1) $-2x^2 - 3$ (3) $-4x^2 - 6$

(2) $-4x^2 - 3$ (4) $-2x^2 + x - 5$

Handwritten computation:

$4X^2 - X + 1$
$-6X^2 + X - 4$
Sum $\overline{-2X^2 \qquad -3}$

Twice the sum $2(-2X^2 - 3)$
$\boxed{-4X^2 - 6}$

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

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

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

Handwritten:

$\dfrac{3(x-4)^2}{3} = \dfrac{27}{3}$

$(x-4)^2 = 9$

$\sqrt{(x-4)^2} = \sqrt{9}$

$x - 4 = \pm 3$

$x = 4 \pm 3$

$x = 7 \qquad x = 1$

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.

Handwritten:

$5X + 9y = 12$
$3\left(4X - 3y = 8 \right)$
$12X - 9y = 24$

$5X + 9y = 12$
$12X - 9y = 24$
$\overline{17X \qquad = 36}$

16 The 15 members of the French Club sold candy bars to help fund their trip to Quebec. The table below shows the number of candy bars each member sold.

outlier →

Number of Candy Bars Sold				
0	35	38	41	43
45	50	53	53	55
68	68	68	72	120

← outlier

When referring to the data, which statement is *false*?

(1) The mode is the best measure of central tendency for the data.

True (2) The data have two outliers.

True (3) The median is 53.

True (4) The range is 120.

Handwritten:

Use 1 variable stats in a graphing calculator.

Min   0
Q1   41
Median 53
Q3   68
Max   120

range

Use this space for computations.

Algebra I – Jan. '18

[5]

[OVER]

17 Given the set $\{x| - 2 \leq x \leq 2,$ where x is an integer$\}$, what is the solution of $-2(x - 5) < 10$?

(1) 0, 1, 2   (3) −2, −1, 0

(2) 1, 2   (4) −2, −1

[handwritten: number line marked −2, −1, 0, 1, 2 with x]

[handwritten annotations: Change of direction when inequality dividing by negative]
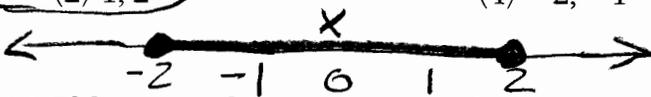
[handwritten computations:]
$-2(x-5) < 10$
$x - 5 > \frac{10}{-2}$
$x - 5 > -5$
$x > 0$
The integers > 0 in the solution set are 1 and 2

18 If the pattern below continues, which equation(s) is a recursive formula that represents the number of squares in this sequence?

[handwritten: 3, 5, 7, 9 above the designs]

Design 1   Design 2   Design 3   Design 4

[handwritten: a_1, a_2, a_3, a_4]

(1) $y = 2x + 1$ *[handwritten: not recursive]*
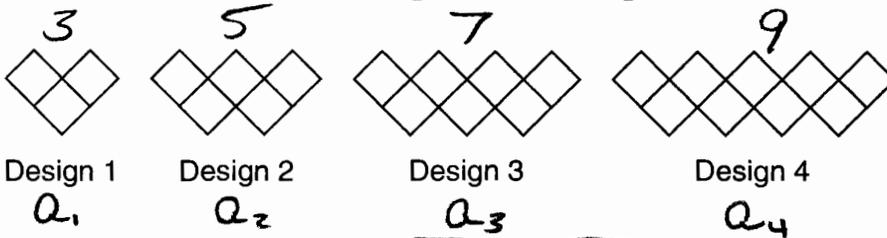
(2) $y = 2x + 3$ *[handwritten: not recursive]*

(3) $a_1 = 3$ ✓
     $a_n = a_{n-1} + 2$ ✓

(4) $a_1 = 1$
     $a_n = a_{n-1} + 2$

19 If the original function $f(x) = 2x^2 - 1$ is shifted to the left 3 units to make the function $g(x)$, which expression would represent $g(x)$?

(1) $2(x - 3)^2 - 1$ (3) $2x^2 + 2$

(2) $2(x + 3)^2 - 1$ (4) $2x^2 - 4$

[handwritten: Put original function and answer choice in graphing calculator to check.]

20 First consider the system of equations $y = -\frac{1}{2}x + 1$ and $y = x - 5$.

Then consider the system of inequalities $y > -\frac{1}{2}x + 1$ and $y < x - 5$.

When comparing the number of solutions in each of these systems, which statement is true?

(1) Both systems have an infinite number of solutions.

(2) The system of equations has more solutions.

(3) The system of inequalities has more solutions.

(4) Both systems have only one solution.

[handwritten: only one solution]

[handwritten: Many Solutions]

[handwritten graph with labels $y < x - 5$ and $y > -\frac{1}{2}x - 4$]
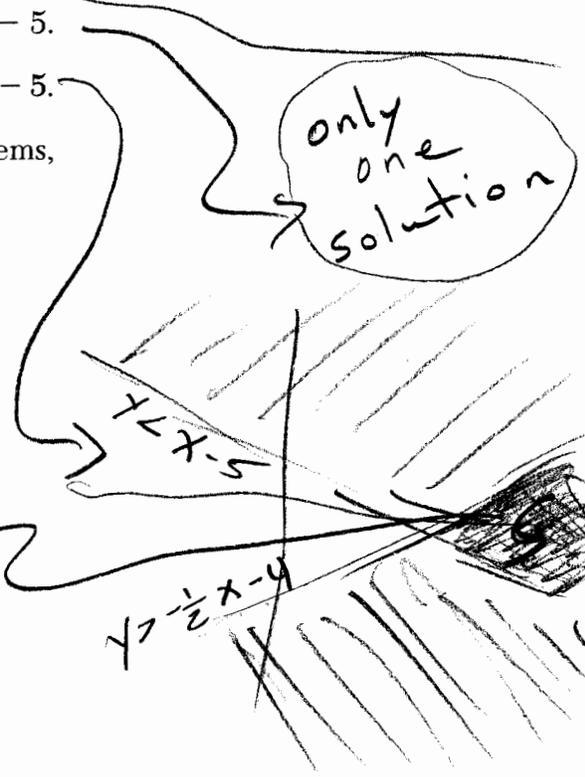
21 Nora inherited a savings account that was started by her grandmother 25 years ago. This scenario is modeled by the function $A(t) = 5000(1.013)^{t + 25}$, where $A(t)$ represents the value of the account, in dollars, t years after the inheritance. Which function below is equivalent to $A(t)$?

(1) $A(t) = 5000[(1.013^t)]^{25}$

(2) $A(t) = 5000[(1.013)^t + (1.013)^{25}]$

(3) $A(t) = (5000)^t (1.013)^{25}$

(4) $A(t) = 5000(1.013)^t (1.013)^{25}$

22 The value of x which makes $\frac{2}{3}\left(\frac{1}{4}x - 2\right) = \frac{1}{5}\left(\frac{4}{3}x - 1\right)$ true is

(1) -10

(2) -2

(3) $-9.0\overline{9}$

(4) $-11.\overline{3}$

23 Which quadratic function has the largest maximum over the set of real numbers?

$f(x) = -x^2 + 2x + 4 \qquad g(x) = -(x - 5)^2 + 5$

(1) $\qquad\qquad\qquad$ (3)

x	k(x)
−1	−1
0	3
1	5
2	5
3	3
4	−1

(2)

x	h(x)
−2	−9
−1	−3
0	1
1	3
2	3
3	1

(4)

Handwritten work:

$Q^m \cdot Q^n = Q^{m+n}$

$(1.013)^t \cdot (1.013)^{25} = (1.013)^{t+25}$

$\frac{2}{3}\left(\frac{1}{4}x - 2\right) = \frac{1}{5}\left(\frac{4}{3}x - 1\right)$

M(3) $2\left(\frac{1}{4}x - 2\right) = \frac{3}{5}\left(\frac{4}{3}x - 1\right)$

M(5) $10\left(\frac{1}{4}x - 2\right) = 3\left(\frac{4}{3}x - 1\right)$

$\frac{10}{4}x - 20 = 4x - 3$

M(4) $10x - 80 = 16x - 12$

$-68 = 6x$

$\frac{-68}{6} = x$

$-11.\overline{33} = x$

max = 5

max = 5

max = 5+

max = 3+

Input $f(x)$ and $g(x)$ into a graphing calculator and inspect their graphs and tables to find their maximums. The maximums of $k(x)$ and $h(x)$ can be estimated from the tables.

24 Voting rates in presidential elections from 1996-2012 are modeled below.

Voting Rates in Presidential Elections, by Age, for the Voting-Age Citizen Population: 1996-2012
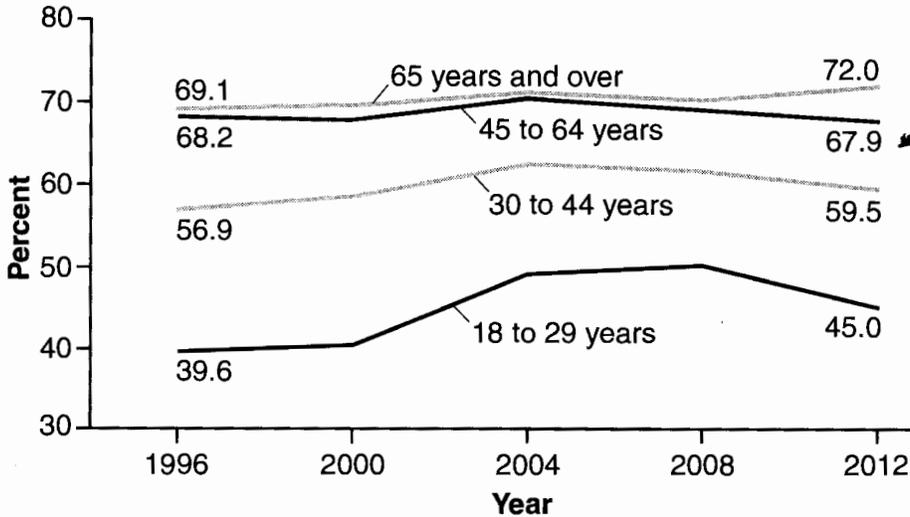
average rate of change is negative

Which statement does *not* correctly interpret voting rates by age based on the given graph?

True (1) For citizens 18-29 years of age, the rate of change in voting rate was greatest between years 2000-2004.

False (2) From 1996-2012, the average rate of change was positive for only two age groups.

True (3) About 70% of people 45 and older voted in the 2004 election.

True (4) The voting rates of eligible age groups lies between 35 and 75 percent during presidential elections every 4 years from 1996-2012.

The average rate of change was positive for three age groups.

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 On the set of axes below, graph $f(x) = |x - 3| + 2$.

X	f(x)
0	5
1	4
2	3
3	2
4	3
5	4
6	5

Use graphing calculator to obtain table of values.

$f(t) = |x+3| + 2$

(0,5)   (6,5)

(3,2)
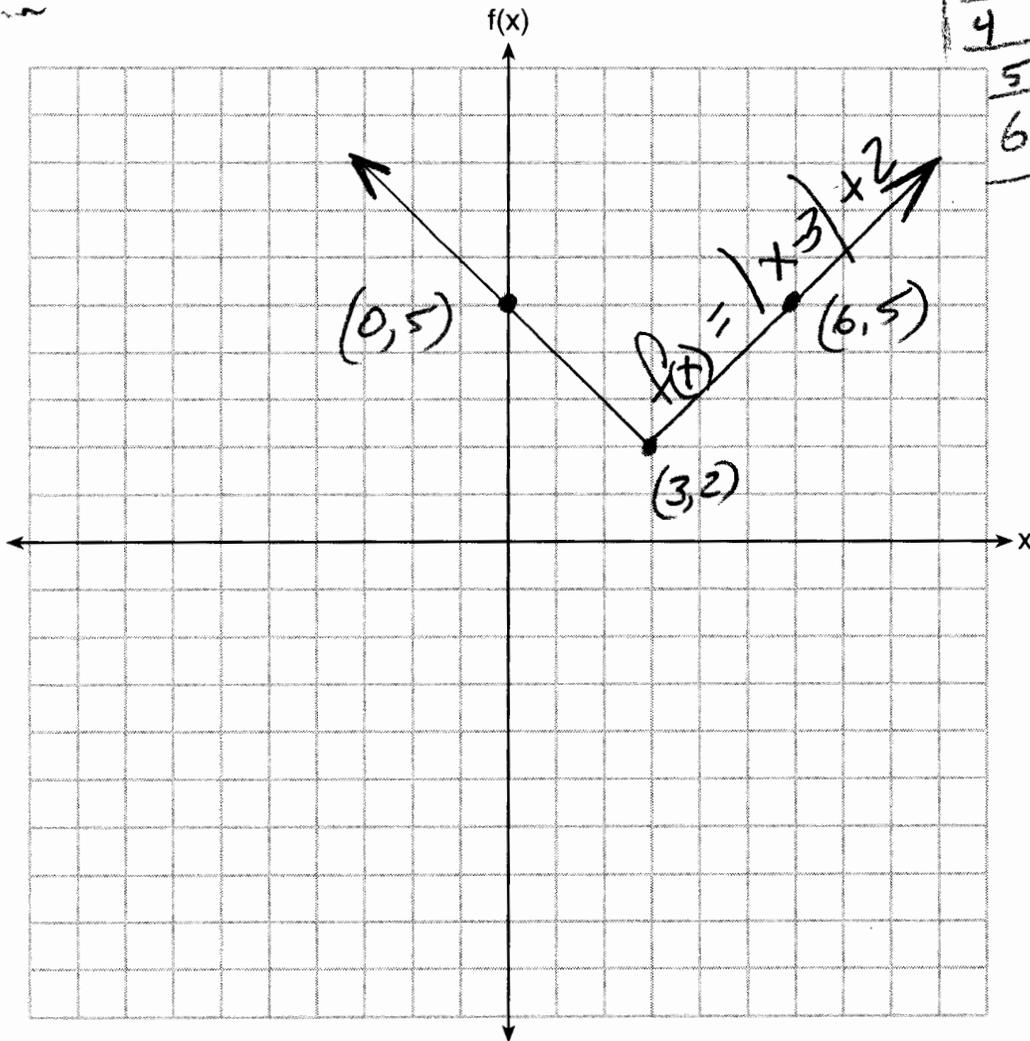
Remember to put arrow tips on graph.

$a=1 \quad b=-4 \quad c=3$

26 Determine all the zeros of $m(x) = x^2 - 4x + 3$, algebraically.

Strategy #1 - Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{4 \pm \sqrt{(-4)^2 - 4(1)(3)}}{2(1)}$$

$$x = \frac{4 \pm \sqrt{16 - 12}}{2}$$

$$x = \frac{4 \pm \sqrt{4}}{2}$$

$$x = \frac{4 \pm 2}{2}$$

$$x = 2 \pm 1$$

$$\boxed{x = 3}$$

and $\boxed{x = 1}$

Strategy #2 Factoring

$$x^2 - 4x + 3 = 0$$

$$(x-3)(x-1) = 0$$

$$\boxed{x = 3 \text{ and } x = 1}$$

Strategy #3 Complete the Square

$$x^2 - 4x + 3 = 0$$

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

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

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

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

$$\sqrt{(x-2)^2} = \sqrt{1}$$

$$x - 2 = \pm 1$$

$$x = 2 \pm 1$$

$$\boxed{x = 3 \text{ and } x = 1}$$

27 The distance traveled is equal to the rate of speed multiplied by the time traveled. If the distance is measured in feet and the time is measured in minutes, then the rate of speed is expressed in which units? Explain how you arrived at your answer.

Explain means write in words.

$$\text{speed} = \frac{\text{distance}}{\text{time}}$$

If distance is measured in feet and time is measured in minutes, then speed is measured as $\frac{feet}{minutes}$ or $\boxed{\text{feet per minute}}$

28 Determine if the point (0,4) is a solution to the system of inequalities graphed below. Justify your answer.

Note the scale used on this graph!
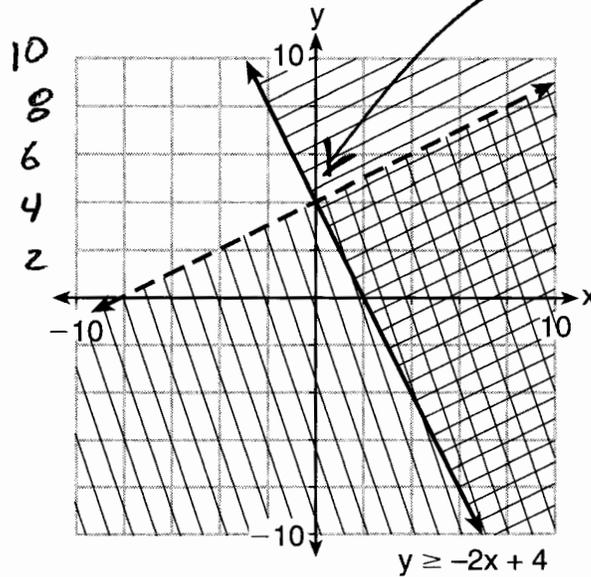
the point (0,4) is at the intersection of the boundary lines

$y \geq -2x + 4$

The point (0,4) is not a solution to this system. A solution to a system of inequalities must solve both inequalities. The point (0,4) solves the inequality with the solid line, but does not solve the inequality with the dashed line.

29 If the zeros of a quadratic function, F, are -3 and 5, what is the equation of the axis of symmetry of F? Justify your answer.

$$\boxed{X = 1}$$

The axis of symmetry is always halfway between the zeros of a quadratic.

$$\frac{-3+5}{2} = \frac{2}{2} = 1$$

30 The formula $F_g = \dfrac{GM_1M_2}{r^2}$ calculates the gravitational force between two objects where G is the gravitational constant, M_1 is the mass of one object, M_2 is the mass of the other object, and r is the distance between them. Solve for the positive value of r in terms of F_g, G, M_1, and M_2.

$$F_g = \frac{GM_1M_2}{r^2}$$

Do not use $\pm$. Use only $+$

$$r^2 F_g = GM_1M_2$$

$$r^2 = \frac{GM_1M_2}{F_g}$$

$$\boxed{r = \sqrt{\frac{GM_1M_2}{F_g}}}$$

31 At Mountain Lakes High School, the mathematics and physics scores of nine students were compared as shown in the table below.

Mathematics	55	93	89	60	90	45	64	76	89
Physics	66	89	94	52	84	56	66	73	92

State the correlation coefficient, to the *nearest hundredth*, for the line of best fit for these data.

$$r = .92$$

Note:
Input table values into stats editor of a graphing calculator, then calculate linear regression with "diagnostics on" to find the correlation coefficient.

Explain what the correlation coefficient means with regard to the context of this situation.

there is a strong positive correlation between mathematics scores and physics scores.

32 The graph of the function $f(x) = ax^2 + bx + c$ is given below.
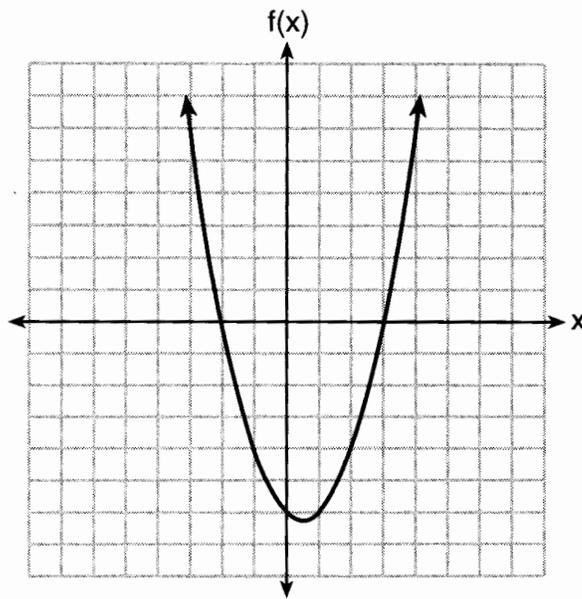
Could the factors of $f(x)$ be $(x + 2)$ and $(x - 3)$? Based on the graph, explain why or why *not*.

⟵ use words

Yes. If the zeros are −2 and 3,
then the factors are X+2 and
X−3.

Zeros

X = −2

X = 3

Factors

$(x + 2) = 0$

$(x - 3) = 0$

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 Jim is a furniture salesman. His weekly pay is $300 plus 3.5% of his total sales for the week. Jim sells x dollars' worth of furniture during the week. Write a function, $p(x)$, which can be used to determine his pay for the week.

$$p(x) = 300 + .035x$$

pay for the week — Fixed pay — .035=3.5% — X represents total sales for the week

Use this function to determine Jim's pay to the *nearest cent* for a week when his sales total is $8250.

$$p(x) = 300 + .035x$$
$$p(8250) = 300 + .035(8250)$$
$$p(8250) = 300 + 288.75$$
$$p(8250) = 588.75$$

$\$588.75$

34 Omar has a piece of rope. He ties a knot in the rope and measures the new length of the rope. He then repeats this process several times. Some of the data collected are listed in the table below.

Number of Knots	4	5	6	7	8
Length of Rope (cm)	64	58	49	39	31

State, to the *nearest tenth*, the <u>linear regression</u> equation that approximates the length, y, of the rope after tying x knots.

Input values from table into stats editor of graphing calculator. Then calculate linear regression.

$$y = ax + b \Big\} \text{ output}$$
$$a = -8.5 \Big\} \text{ from}$$
$$b = 99.2 \Big\} \text{ calculator}$$

$$\boxed{y = -8.5x + 99.2}$$

Explain what the y-intercept means in the context of the problem.

When there are no knots, the rope is 99.2 cm. long.

Explain what the slope means in the context of the problem.

slope = -8.5

There is a negative relationship between the number of knots and the length of the rope. Each knot makes the rope 8.5 cm shorter.

35 The drama club is running a lemonade stand to raise money for its new production. A local grocery store donated cans of lemonade and bottles of water. Cans of lemonade sell for $2 each and bottles of water sell for $1.50 each. The club needs to raise at least $500 to cover the cost of renting costumes. The students can accept a maximum of 360 cans and bottles.

Write a system of inequalities that can be used to represent this situation.

l = lemonade
w = water

$$2l + 1.5w \geq 500$$
$$l + w \leq 360$$

solve for w

The club sells 144 cans of lemonade. What is the *least* number of bottles of water that must be sold to cover the cost of renting costumes? Justify your answer.

$$2l + 1.5w \geq 500$$
$$2(144) + 1.5w \geq 500$$
$$288 + 1.5w \geq 500$$
$$1.5w \geq 500 - 288$$
$$1.5w \geq 212$$
$$w \geq \frac{212}{1.5}$$
$$w \geq 141.\overline{33}$$

cannot sell a fraction of a bottle.

142 bottles

36 A manager wanted to analyze the online shoe sales for his business. He collected data for the number of pairs of shoes sold _each hour_ over a 14-hour time period. He created a graph to model the data, as shown below.
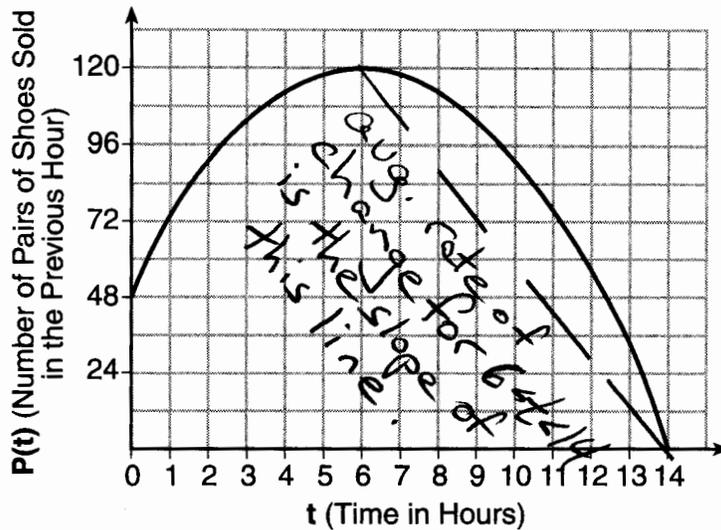
The manager believes the set of integers would be the most appropriate domain for this model. Explain why he is _incorrect_.

> The manager is incorrect because the set of integers includes negative numbers, which are inappropriate.

State the entire interval for which the number of pairs of shoes sold is increasing.

$0 < t < 14$ The <u>total number</u> of shoes sold increases every hour.

_____ or _____

$0 < t < 6$ The <u>hourly rate</u> at which shoes are sold increases from 0 to 6 hours.

Determine the average rate of change between the sixth and fourteenth hours, and explain what it means in the context of the problem.

$$\text{slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{0 - 120}{14 - 6} = \frac{-120}{8} = \boxed{-15}$$

$(6, 120)$
$(14, 0)$

This means 15 fewer shoes were sold each hour, on average.

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]

$$-5 \qquad +2c$$
$$=$$

37 At Bea's Pet Shop, the number of dogs, d, is initially five less than twice the number of cats, c. If she decides to add three more of each, the ratio of cats to dogs will be $\frac{3}{4}$. $\quad\dfrac{cats+3}{dogs+3}$

Write an equation or system of equations that can be used to find the number of cats and dogs Bea has in her pet shop.

$d = dogs$
$c = cats$

$$\begin{cases} d = 2c - 5 \\ \dfrac{c+3}{d+3} = \dfrac{3}{4} \end{cases}$$

Could Bea's Pet Shop initially have 15 cats and 20 dogs? Explain your reasoning.

initially

$$d \overset{?}{=} 2c - 5$$
$$20 \overset{?}{=} 2(15) - 5$$
$$20 \overset{?}{=} 30 - 5$$
$$20 \neq 25$$

No. 15 cats and 20 dogs do not balance the equation $d = 2c - 5$

Determine algebraically the number of cats and the number of dogs Bea initially had in her pet shop.

$$\begin{cases} d = \boxed{2c - 5} \\ \dfrac{c+3}{d+3} = \dfrac{3}{4} \end{cases}$$

Substitute

$$\dfrac{c+3}{2c-5+3} = \dfrac{3}{4}$$

$$\dfrac{c+3}{2c-2} = \dfrac{3}{4}$$

cross multiply

$$4(c+3) = 3(2c-2)$$
$$4c + 12 = 6c - 6$$
$$18 = 2c$$
$$9 = c$$

$$d = 2c - 5$$
$$d = 2(9) - 5$$
$$d = 18 - 5$$
$$d = 13$$

$$\boxed{\begin{array}{c} 9 \text{ cats} \\ 13 \text{ dogs} \end{array}}$$

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