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

ALGEBRA I

Thursday, June 16, 2022 — 9:15 a.m. to 12:15 p.m., only

Student Name _____

School Name _____

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.

Part I

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 Which correlation shows a causal relationship?

(1) The more minutes an athlete is on the playing field, the more goals he scores.

(2) The more gasoline that you purchase at the pump, the more you pay.

(3) The longer a shopper stays at the mall, the more purchases she makes.

(4) As the price of a gift increases, the size of the gift box increases.

2 Given $f(x) = 3x - 5$, which statement is true?

(1) $f(0) = 0$

(2) $f(3) = 4$

(3) $f(4) = 3$

(4) $f(5) = 0$

3 At Benny's Café, a mixed-greens salad costs \$5.75. Additional toppings can be added for \$0.75 each. Which function could be used to determine the cost, $c(s)$, in dollars, of a salad with s additional toppings?

(1) $c(s) = 5.75s + 0.75$

(2) $c(s) = 0.75s + 5.75$

(3) $c(s) = 5.00s + 0.75$

(4) $c(s) = 0.75s + 5.00$

4 Which expression is equivalent to $x^2 + 5x - 6$?

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

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

(3) $(x - 6)(x + 1)$

(4) $(x + 6)(x - 1)$

5 Peter has \$100 to spend on drinks for his party. Bottles of lemonade cost \$2 each, and juice boxes cost \$0.50 each.

If x is the number of bottles of lemonade and y is the number of juice boxes, which inequality models this situation?

(1) $0.50x + 2y \leq 100$

(2) $0.50x + 2y \geq 100$

(3) $2x + 0.50y \leq 100$

(4) $2x + 0.50y \geq 100$

Use this space for computations.

6 Which domain is most appropriate for a function that represents the number of items, $f(x)$, placed into a laundry basket each day, x, for the month of January?

(1) integers
(2) whole numbers
(3) rational numbers
(4) irrational numbers

7 What is the solution to $\frac{3}{2}b + 5 < 17$?

(1) $b < 8$
(2) $b > 8$
(3) $b < 18$
(4) $b > 18$

8 Which table of values represents an exponential relationship?

x	f(x)
1	6
2	9
3	12
4	15
5	18

(1)

x	k(x)
1	4
2	16
3	64
4	256
5	1024

(3)

x	h(x)
1	2
2	7
3	12
4	17
5	22

(2)

x	p(x)
1	–9.5
2	–12
3	–14.5
4	–17
5	–19.5

(4)

9 Which expression is *not* equivalent to $(5^{2x})^3$?

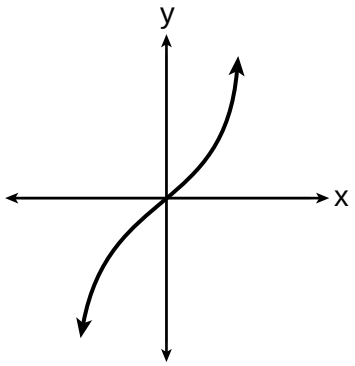
(1) $(5^x)^6$
(2) $(5^{3x})^2$
(3) $(5^5)^x$
(4) $(5^2)^{3x}$

Use this space for computations.

10 Which relation is a function?

x	y
−1	1
0	0
1	1
1	2
2	4
3	9

(1)



(3)

$$y = \begin{cases} x, & -1 < x \leq 2 \\ x^2, & 2 \leq x < 4 \end{cases}$$

(2)

$\{(0,1), (2,3), (3,2), (3,4)\}$

(4)

11 The formula $Ax + By = C$ represents the equation of a line in standard form. Which expression represents y in terms of A, B, C, and x?

(1) $\frac{C - Ax}{B}$

(2) $\frac{C - A}{Bx}$

(3) $\frac{C - A}{x + B}$

(4) $\frac{C - B}{Ax}$

12 What are the zeros of $f(x) = (2x - 4)(3x + 4)$?

(1) $\left\{-\frac{4}{3}, 2\right\}$

(2) $\{-4, 4\}$

(3) $\left\{-2, \frac{4}{3}\right\}$

(4) $\{-4, 2\}$

13 Joe has dimes and nickels in his piggy bank totaling \$1.45. The number of nickels he has is 5 more than twice the number of dimes, d. Which equation could be used to find the number of dimes he has?

(1) $0.10d + 0.05(2d + 5) = 1.45$

(2) $0.10(2d + 5) + 0.05d = 1.45$

(3) $d + (2d + 5) = 1.45$

(4) $(d - 5) + 2d = 1.45$

Use this space for computations.

14 Donna and Andrew compared their math final exam scores from grade 8 through grade 12. Their scores are shown below.

Donna	
8th	90
9th	92
10th	87
11th	94
12th	95

Andrew	
8th	78
9th	96
10th	87
11th	94
12th	93

Which statement about their final exam scores is correct?

(1) Andrew has a higher mean than Donna.

(2) Donna and Andrew have the same median.

(3) Andrew has a larger interquartile range than Donna.

(4) The 3rd quartile for Donna is greater than the 3rd quartile for Andrew.

15 The first term in a sequence is 5 and the fifth term is 17. What is the common difference?

(1) 2.4

(2) 12

(3) 3

(4) 4

16 A quadratic function and a linear function are graphed on the same set of axes. Which situation is *not* possible?

(1) The graphs do not intersect.

(2) The graphs intersect in one point.

(3) The graphs intersect in two points.

(4) The graphs intersect in three points.

17 The expression $(m - 3)^2$ is equivalent to

(1) $m^2 + 9$

(2) $m^2 - 9$

(3) $m^2 - 6m + 9$

(4) $m^2 - 6m - 9$

Use this space for computations.

18 Mrs. Rossano asked her students to explain why $(3,-4)$ is a solution to $2y + 3x = 1$. Three student responses are given below.

Andrea:
"When the equation is graphed on a calculator, the point can be found within its table."

Bill:
"Substituting $x = 3$ and $y = -4$ into the equation makes it true."

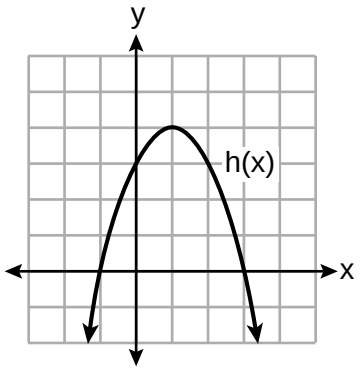
Christine:
"The graph of the line passes through the point $(3,-4)$."

Which students are correct?

(1) Andrea and Bill, only
(2) Bill and Christine, only
(3) Andrea and Christine, only
(4) Andrea, Bill, and Christine

19 Four quadratic functions are shown below.

x	f(x)
−4	−4
−2	4
−1	5
0	4
2	−4



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

$j(x) = -\frac{1}{2}x^2 + x + 4$

Which statement is true?

(1) The maximum of $f(x)$ is less than the maximum of $j(x)$.
(2) The maximum of $g(x)$ is less than the maximum of $h(x)$.
(3) The maximum of $f(x)$ equals the maximum of $g(x)$.
(4) The maximum of $h(x)$ equals the maximum of $j(x)$.

Use this space for computations.

20 An example of a sixth-degree polynomial with a leading coefficient of seven and a constant term of four is

(1) $6x^7 - x^5 + 2x + 4$

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

(3) $7x^4 + 6 + x^2$

(4) $5x + 4x^6 + 7$

21 In the equation $A = P(1 \pm r)^t$, A is the total amount, P is the principal amount, r is the annual interest rate, and t is the time in years. Which statement correctly relates information regarding the annual interest rate for each given equation?

(1) For $A = P(1.025)^t$, the principal amount of money is increasing at a 25% interest rate.

(2) For $A = P(1.0052)^t$, the principal amount of money is increasing at a 52% interest rate.

(3) For $A = P(0.86)^t$, the principal amount of money is decreasing at a 14% interest rate.

(4) For $A = P(0.68)^t$, the principal amount of money is decreasing at a 68% interest rate.

22 It takes Tim 4.5 hours to run 50 kilometers. Which expression will allow him to change this rate to minutes per mile?

(1) $\frac{4.5\text{ hr}}{50\text{ km}} \bullet \frac{1.609\text{ km}}{1\text{ mi}} \bullet \frac{60\text{ min}}{1\text{ hr}}$

(2) $\frac{50\text{ km}}{4.5\text{ hr}} \bullet \frac{1\text{ mi}}{1.609\text{ km}} \bullet \frac{60\text{ min}}{1\text{ hr}}$

(3) $\frac{50\text{ km}}{4.5\text{ hr}} \bullet \frac{1\text{ mi}}{1.609\text{ km}} \bullet \frac{1\text{ hr}}{60\text{ min}}$

(4) $\frac{4.5\text{ hr}}{50\text{ km}} \bullet \frac{1\text{ mi}}{1.609\text{ km}} \bullet \frac{60\text{ min}}{1\text{ hr}}$

23 When the equation $\frac{x-1}{2} - \frac{a}{4} = \frac{3a}{4}$ is solved for x in terms of a, the solution is

(1) $\frac{3a}{2} + 1$

(2) $a + 1$

(3) $\frac{4a+1}{2}$

(4) $2a + 1$

24 If a sequence is defined recursively as $a_1 = -3$ and $a_n = -3a_{n-1} - 2$, then a_4 is

(1) -107

(2) -95

(3) 55

(4) 67

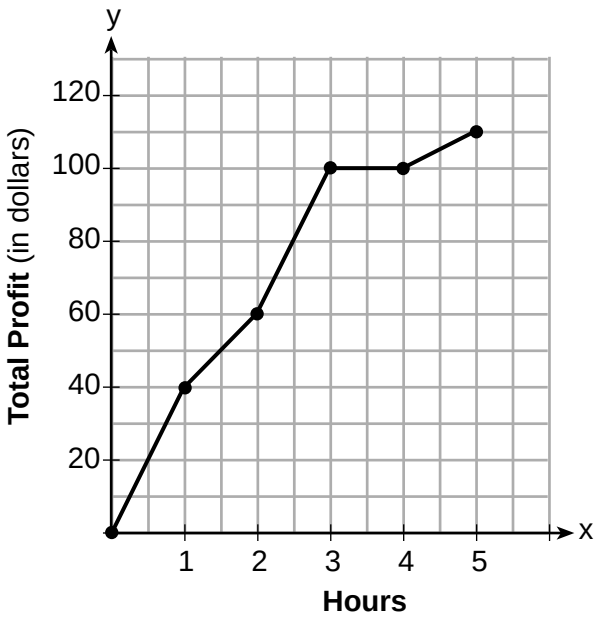
Part II

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 Is the product of $\sqrt{1024}$ and -3.4 rational or irrational? Explain your answer.

26 Describe the transformations performed on the graph of $f(x) = x^2$ to obtain the graph of $g(x)$ when $g(x) = (x - 3)^2 - 4$.

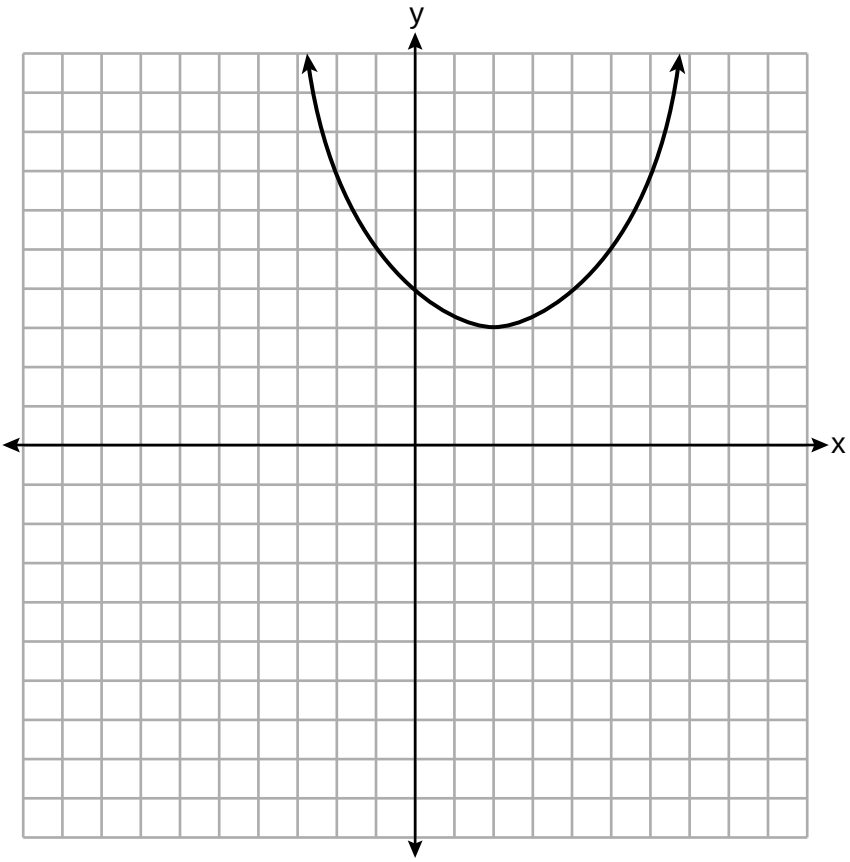
27 The total profit earned at a garage sale during the first five hours is modeled by the graph shown below.



Determine the average rate of change, in dollars per hour, over the interval $1 \leq x \leq 4$.

28 Subtract $3x(x - 2y)$ from $6(x^2 - xy)$ and express your answer as a monomial.

29 A function is graphed on the set of axes below.



State the domain of this function.

State the range of this function.

30 Solve $6x^2 + 5x - 6 = 0$ algebraically for the exact values of x.

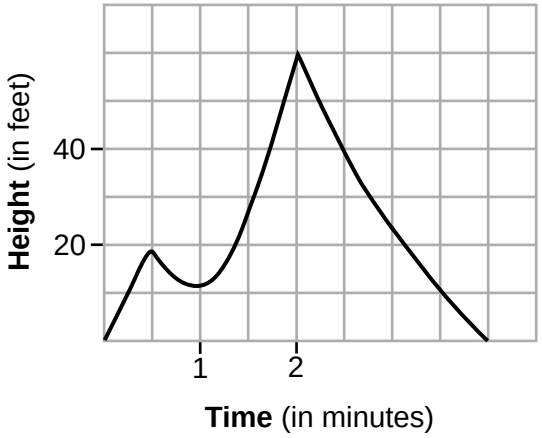
31 Factor the expression $x^4 - 36x^2$ completely.

32 Determine the exact values of x for $x^2 - 8x - 5 = 0$ by completing the square.

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 graph below models the height of Sam's kite over a period of time.

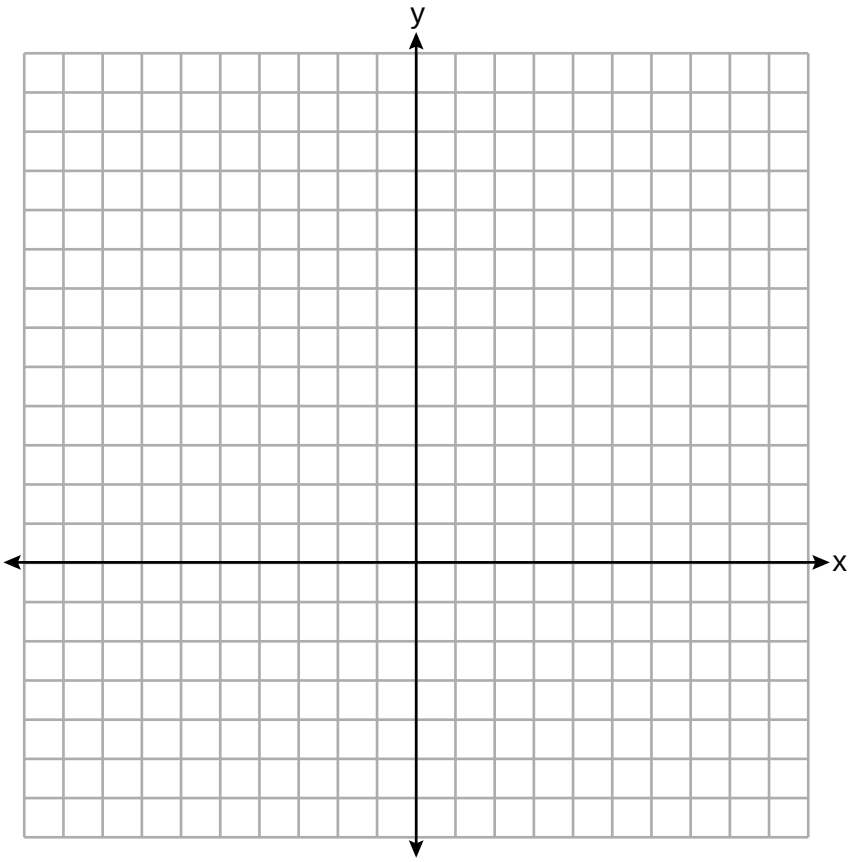


Explain what the zeros of the graph represent in the context of the situation.

State the time intervals over which the height of the kite is increasing.

State the maximum height, in feet, that the kite reaches.

34 On the set of axes below, graph $f(x) = x^2 - 1$ and $g(x) = 3^x$.



Based on your graph, for how many values of x does $f(x) = g(x)$? Explain your reasoning.

35 An insurance agent is looking at records to determine if there is a relationship between a driver's age and percentage of accidents caused by speeding. The table below shows his data.

Age (x)	17	18	21	25	30	35	40	45	50	55	60	65
Percentage of Accidents Caused by Speeding (y)	49	49	48	38	31	33	24	25	16	10	5	6

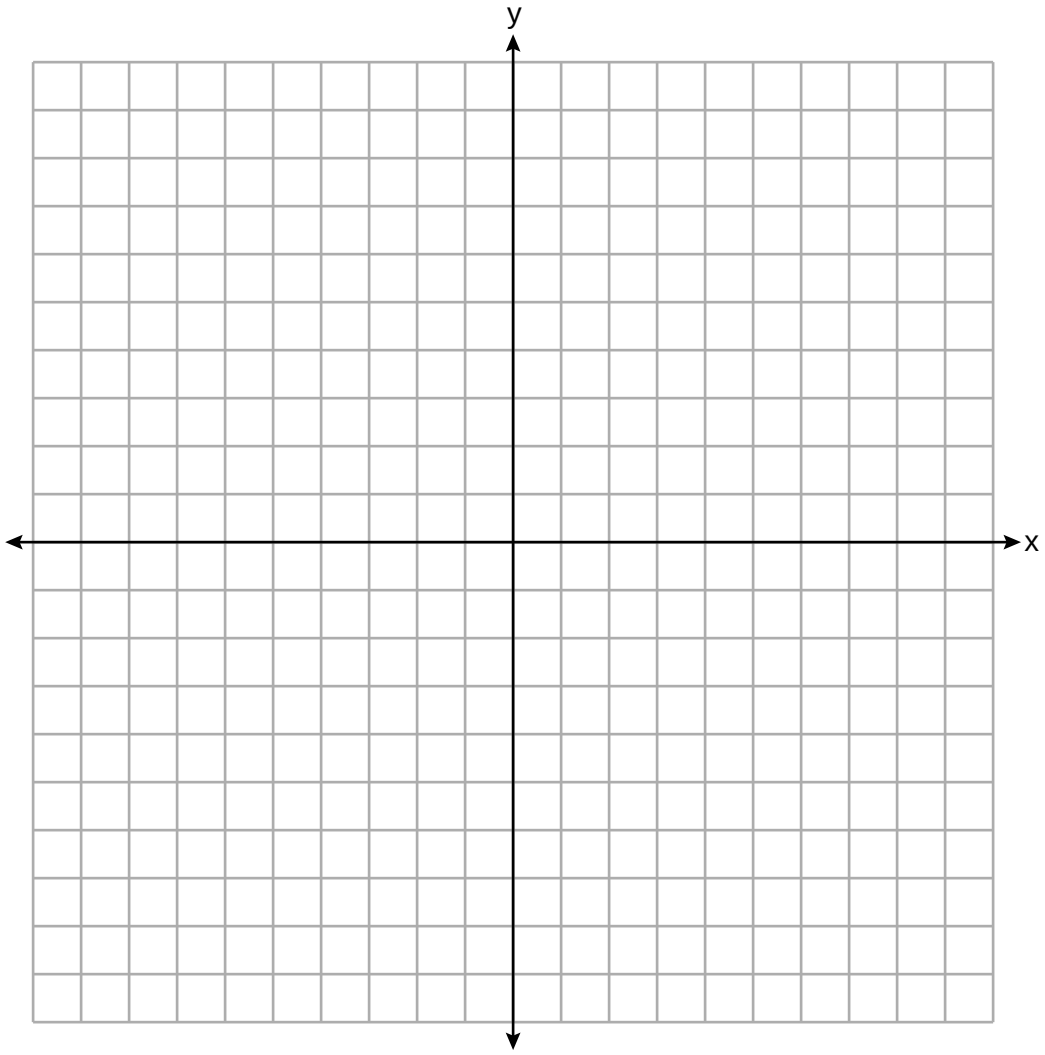
State the linear regression equation that models the relationship between the driver's age, x, and the percentage of accidents caused by speeding, y. Round all values to the *nearest hundredth*.

State the value of the correlation coefficient to the *nearest hundredth*. Explain what this means in the context of the problem.

36 Solve the system of inequalities graphically on the set of axes below.
Label the solution set *S*.

$$2x + 3y < 9$$

$$2y \geq 4x + 6$$



Determine if the point (0,3) is a solution to this system of inequalities. Justify your answer.

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 At an amusement park, the cost for an adult admission is a, and for a child the cost is c. For a group of six that included two children, the cost was \$325.94. For a group of five that included three children, the cost was \$256.95. All ticket prices include tax.

Write a system of equations, in terms of a and c, that models this situation.

Use your system of equations to determine the exact cost of each type of ticket algebraically.

Determine the cost for a group of four that includes three children.

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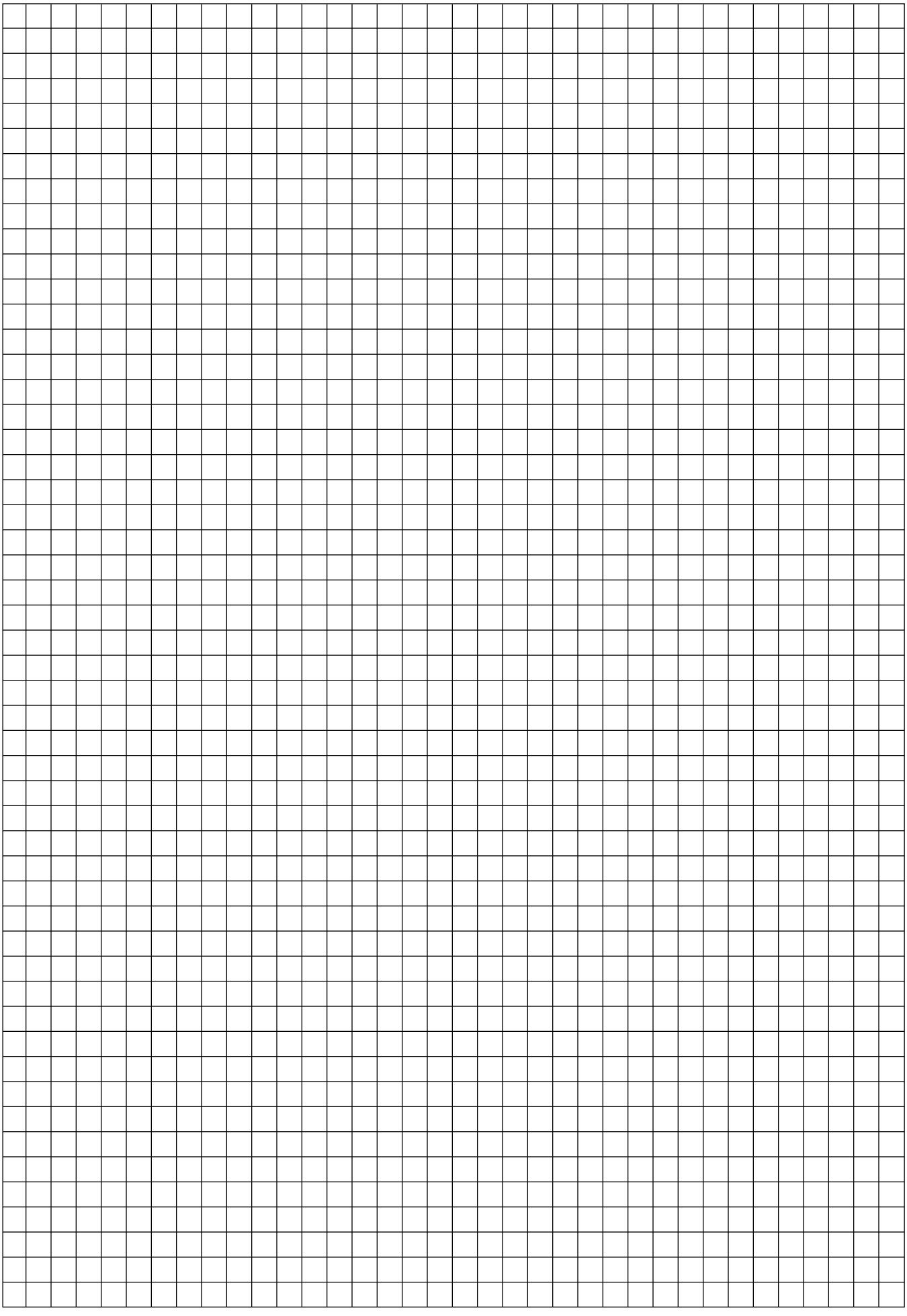

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High School Math Reference Sheet

1 inch = 2.54 centimeters
1 meter = 39.37 inches
1 mile = 5280 feet
1 mile = 1760 yards
1 mile = 1.609 kilometers

1 kilometer = 0.62 mile
1 pound = 16 ounces
1 pound = 0.454 kilogram
1 kilogram = 2.2 pounds
1 ton = 2000 pounds

1 cup = 8 fluid ounces
1 pint = 2 cups
1 quart = 2 pints
1 gallon = 4 quarts
1 gallon = 3.785 liters
1 liter = 0.264 gallon
1 liter = 1000 cubic centimeters

Triangle	$A = \frac{1}{2}bh$
Parallelogram	$A = bh$
Circle	$A = \pi r^2$
Circle	$C = \pi d$ or $C = 2\pi r$
General Prisms	$V = Bh$
Cylinder	$V = \pi r^2 h$
Sphere	$V = \frac{4}{3}\pi r^3$
Cone	$V = \frac{1}{3}\pi r^2 h$
Pyramid	$V = \frac{1}{3}Bh$

Pythagorean Theorem	$a^2 + b^2 = c^2$
Quadratic Formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Arithmetic Sequence	$a_n = a_1 + (n - 1)d$
Geometric Sequence	$a_n = a_1 r^{n-1}$
Geometric Series	$S_n = \frac{a_1 - a_1 r^n}{1 - r}$ where $r \neq 1$
Radians	1 radian $= \frac{180}{\pi}$ degrees
Degrees	1 degree $= \frac{\pi}{180}$ radians
Exponential Growth/Decay	$A = A_0 e^{k(t - t_0)} + B_0$

ALGEBRA I

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ALGEBRA I

The State Education Department / The University of the State of New York

Regents Examination in Algebra I – June 2022

Scoring Key: Part I (Multiple-Choice Questions)

Examination	Date	Question Number	Scoring Key	Question Type	Credit	Weight
Algebra I	June '22	**1**	2	MC	2	1
Algebra I	June '22	**2**	2	MC	2	1
Algebra I	June '22	**3**	2	MC	2	1
Algebra I	June '22	**4**	4	MC	2	1
Algebra I	June '22	**5**	3	MC	2	1
Algebra I	June '22	**6**	2	MC	2	1
Algebra I	June '22	**7**	1	MC	2	1
Algebra I	June '22	**8**	3	MC	2	1
Algebra I	June '22	**9**	3	MC	2	1
Algebra I	June '22	**10**	3	MC	2	1
Algebra I	June '22	**11**	1	MC	2	1
Algebra I	June '22	**12**	1	MC	2	1
Algebra I	June '22	**13**	1	MC	2	1
Algebra I	June '22	**14**	3	MC	2	1
Algebra I	June '22	**15**	3	MC	2	1
Algebra I	June '22	**16**	4	MC	2	1
Algebra I	June '22	**17**	3	MC	2	1
Algebra I	June '22	**18**	4	MC	2	1
Algebra I	June '22	**19**	3	MC	2	1
Algebra I	June '22	**20**	2	MC	2	1
Algebra I	June '22	**21**	3	MC	2	1
Algebra I	June '22	**22**	1	MC	2	1
Algebra I	June '22	**23**	4	MC	2	1
Algebra I	June '22	**24**	4	MC	2	1

Regents Examination in Algebra I – June 2022

Scoring Key: Parts II, III, and IV (Constructed-Response Questions)

Examination	Date	Question Number	Scoring Key	Question Type	Credit	Weight
Algebra I	June '22	**25**	-	CR	2	1
Algebra I	June '22	**26**	-	CR	2	1
Algebra I	June '22	**27**	-	CR	2	1
Algebra I	June '22	**28**	-	CR	2	1
Algebra I	June '22	**29**	-	CR	2	1
Algebra I	June '22	**30**	-	CR	2	1
Algebra I	June '22	**31**	-	CR	2	1
Algebra I	June '22	**32**	-	CR	2	1
Algebra I	June '22	**33**	-	CR	4	1
Algebra I	June '22	**34**	-	CR	4	1
Algebra I	June '22	**35**	-	CR	4	1
Algebra I	June '22	**36**	-	CR	4	1
Algebra I	June '22	**37**	-	CR	6	1

Key
MC = Multiple-choice question
CR = Constructed-response question

The chart for determining students' final examination scores for the **June 2022 Regents Examination in Algebra I** will be posted on the Department's web site at: https://www.nysedregents.org/algebraone/ on the day of the examination. Conversion charts provided for the previous administrations of the Regents Examination in Algebra I must NOT be used to determine students' final scores for this administration.

FOR TEACHERS ONLY

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

ALGEBRA I

Thursday, June 16, 2022 — 9:15 a.m. to 12:15 p.m., only

RATING GUIDE

Updated information regarding the rating of this examination may be posted on the New York State Education Department's web site during the rating period. Check this web site at: http://www.nysed.gov/state-assessment/high-school-regents-examinations and select the link "Scoring Information" for any recently posted information regarding this examination. This site should be checked before the rating process for this examination begins and several times throughout the Regents Examination period.

The Department is providing supplemental scoring guidance, the "Model Response Set," for the Regents Examination in Algebra I. This guidance is intended to be part of the scorer training. Schools are encouraged to incorporate the Model Response Sets into the scorer training or to use them as additional information during scoring. While not reflective of all scenarios, the model responses selected for the Model Response Set illustrate how less common student responses to constructed-response questions may be scored. The Model Response Set will be available on the Department's web site at http://www.nysedregents.org/algebraone/.

Mechanics of Rating

The following procedures are to be followed for scoring student answer papers for the Regents Examination in Algebra I. More detailed information about scoring is provided in the publication *Information Booklet for Scoring the Regents Examination in Algebra I.*

Do *not* attempt to correct the student's work by making insertions or changes of any kind. In scoring the constructed-response questions, use check marks to indicate student errors. Unless otherwise specified, mathematically correct variations in the answers will be allowed. Units need not be given when the wording of the questions allows such omissions.

Each student's answer paper is to be scored by a minimum of three mathematics teachers. No one teacher is to score more than approximately one-third of the constructed-response questions on a student's paper. Teachers may not score their own students' answer papers. On the student's separate answer sheet, for each question, record the number of credits earned and the teacher's assigned rater/scorer letter.

Schools are not permitted to rescore any of the constructed-response questions on this exam after each question has been rated once, regardless of the final exam score. Schools are required to ensure that the raw scores have been added correctly and that the resulting scale score has been determined accurately.

Raters should record the student's scores for all questions and the total raw score on the student's separate answer sheet. Then the student's total raw score should be converted to a scale score by using the conversion chart that will be posted on the Department's web site at: http://www.nysed.gov/state-assessment/high-school-regents-examinations on Thursday, June 16, 2022. Because scale scores corresponding to raw scores in the conversion chart may change from one administration to another, it is crucial that, for each administration, the conversion chart provided for that administration be used to determine the student's final score. The student's scale score should be entered in the box provided on the student's separate answer sheet. The scale score is the student's final examination score.

General Rules for Applying Mathematics Rubrics

I. General Principles for Rating

The rubrics for the constructed-response questions on the Regents Examination in Algebra I are designed to provide a systematic, consistent method for awarding credit. The rubrics are not to be considered all-inclusive; it is impossible to anticipate all the different methods that students might use to solve a given problem. Each response must be rated carefully using the teacher's professional judgment and knowledge of mathematics; all calculations must be checked. The specific rubrics for each question must be applied consistently to all responses. In cases that are not specifically addressed in the rubrics, raters must follow the general rating guidelines in the publication *Information Booklet for Scoring the Regents Examination in Algebra I*, use their own professional judgment, confer with other mathematics teachers, and/or contact the State Education Department for guidance. During each Regents Examination administration period, rating questions may be referred directly to the Education Department. The contact numbers are sent to all schools before each administration period.

II. Full-Credit Responses

A full-credit response provides a complete and correct answer to all parts of the question. Sufficient work is shown to enable the rater to determine how the student arrived at the correct answer.

When the rubric for the full-credit response includes one or more examples of an acceptable method for solving the question (usually introduced by the phrase "such as"), it does not mean that there are no additional acceptable methods of arriving at the correct answer. Unless otherwise specified, mathematically correct alternative solutions should be awarded credit. The only exceptions are those questions that specify the type of solution that must be used; e.g., an algebraic solution or a graphic solution. A correct solution using a method other than the one specified is awarded half the credit of a correct solution using the specified method.

III. Appropriate Work

Full-Credit Responses: The directions in the examination booklet for all the constructed-response questions state: "Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc." The student has the responsibility of providing the correct answer ***and*** showing how that answer was obtained. The student must "construct" the response; the teacher should not have to search through a group of seemingly random calculations scribbled on the student paper to ascertain what method the student may have used.

Responses With Errors: Rubrics that state "Appropriate work is shown, but…" are intended to be used with solutions that show an essentially complete response to the question but contain certain types of errors, whether computational, rounding, graphing, or conceptual. If the response is incomplete; i.e., an equation is written but not solved or an equation is solved but not all of the parts of the question are answered, appropriate work has ***not*** been shown. Other rubrics address incomplete responses.

IV. Multiple Errors

Computational Errors, Graphing Errors, and Rounding Errors: Each of these types of errors results in a 1-credit deduction. Any combination of two of these types of errors results in a 2-credit deduction. No more than 2 credits should be deducted for such mechanical errors in a 4-credit question and no more than 3 credits should be deducted in a 6-credit question. The teacher must carefully review the student's work to determine what errors were made and what type of errors they were.

Conceptual Errors: A conceptual error involves a more serious lack of knowledge or procedure. Examples of conceptual errors include using the incorrect formula for the area of a figure, choosing the incorrect trigonometric function, or multiplying the exponents instead of adding them when multiplying terms with exponents.

If a response shows repeated occurrences of the same conceptual error, the student should not be penalized twice. If the same conceptual error is repeated in responses to other questions, credit should be deducted in each response.

For 4- and 6-credit questions, if a response shows one conceptual error and one computational, graphing, or rounding error, the teacher must award credit that takes into account both errors. Refer to the rubric for specific scoring guidelines.

Part II

For each question, use the specific criteria to award a maximum of 2 credits. Unless otherwise specified, mathematically correct alternative solutions should be awarded appropriate credit.

(25) **[2]** Rational, and a correct explanation is written.

[1] Appropriate work is shown, but one computational error is made.

or

[1] Appropriate work is shown, but one conceptual error is made.

or

[1] Rational, but the explanation is incomplete.

[0] Rational, but the explanation is missing or incorrect.

or

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

(26) **[2]** It shifts to the right 3 and down 4.

[1] One conceptual error is made.

or

[1] Only one transformation is described correctly.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

(27) **[2]** 20, and correct work is shown.

[1] Appropriate work is shown, but one computational error is made.

or

[1] Appropriate work is shown, but one conceptual error is made.

or

[1] 20, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

(28) **[2]** $3x^2$, and correct work is shown.

[1] Appropriate work is shown, but one computational or simplification error is made.

or

[1] Appropriate work is shown, but one conceptual error is made.

or

[1] Appropriate work is shown, but the answer is not written as a monomial.

or

[1] $3x^2$, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

(29) **[2]** The domain is all real numbers, range $y \geq 3$, or equivalent answers are stated.

[1] Either the correct domain or the correct range is stated.

or

[1] One conceptual error is made.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

(30) **[2]** $-\frac{18}{12}$ and $\frac{8}{12}$ or equivalent, and correct algebraic work is shown.

[1] Appropriate work is shown, but one computational error is made.

or

[1] Appropriate work is shown, but one conceptual error is made.

or

[1] $-\frac{18}{12}$ and $\frac{8}{12}$, but a method other than algebraic is used.

or

[1] $-\frac{18}{12}$ and $\frac{8}{12}$, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

(31) **[2]** $x^2(x + 6)(x - 6)$, and correct work is shown.

[1] Appropriate work is shown, but one computational or factoring error is made.

or

[1] Appropriate work is shown, but one conceptual error is made.

or

[1] $x^2(x^2 - 36)$ or $(x^2 - 6x)\,(x^2 + 6x)$ is written, but no further correct work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

(32) **[2]** $4 \pm \sqrt{21}$, and correct work is shown.

[1] Appropriate work is shown, but one computational error is made.

or

[1] Appropriate work is shown, but one conceptual error is made.

or

[1] $4 \pm \sqrt{21}$, but a method other than completing the square is used.

or

[1] $4 \pm \sqrt{21}$, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

Part III

For each question, use the specific criteria to award a maximum of 4 credits. Unless otherwise specified, mathematically correct alternative solutions should be awarded appropriate credit.

(33) **[4]** A correct explanation is written, 0 to $\frac{1}{2}$ and 1 to 2, and 60.

[3] Appropriate work is shown, but the explanation is missing, incomplete, or incorrect.

or

[3] Appropriate work is shown, but only one correct interval is stated.

[2] Both intervals are stated correctly, but no further correct work is shown.

[1] A correct explanation is written, but no further correct work is shown.

or

[1] Only one correct interval is stated, but no further correct work is shown.

or

[1] 60, but no further correct work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

(34) **[4]** Correct graphs are drawn, 1, and a correct explanation based on the graph is written.

[3] Correct graphs are drawn, 1, but the explanation is missing, incomplete, or incorrect.

or

[3] Appropriate work is shown, but one graphing error is made.

[2] Appropriate work is shown, but two or more graphing errors are made.

or

[2] Correct graphs are drawn, but no further correct work is shown.

or

[2] 1 and a correct explanation based on the graph are written, but no further correct work is shown.

[1] One correct graph is drawn, but no further correct work is shown.

or

[1] 1, but no graphs are drawn.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

(35) **[4]** $y = -0.96x + 64.74$, -0.98, and a correct explanation in context is written.

[3] Appropriate work is shown, but one computational or rounding error is made.

or

[3] The full display of the student's calculator showing incorrect values for a, b, and r is written, but used appropriately.

or

[3] Appropriate work is shown, but the explanation is missing or not written in context.

or

[3] Appropriate work is shown, but a correct expression is written.

[2] $y = -0.96x + 64.74$, but no further correct work is shown.

[1] The expression $-0.96x + 64.74$ is written, but no further correct work is shown.

or

[1] -0.98 is stated, but no further correct work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

(36) **[4]** Both inequalities are graphed correctly, and at least one is labeled, the solution set is labeled *S*, and a correct justification indicating a negative response is given.

[3] Appropriate work is shown, but one computational, graphing, or labeling error is made.

or

[3] Appropriate work is shown, but the solution set is not labeled *S*.

or

[3] Appropriate work is shown, but the justification is missing or incorrect.

or

[3] One inequality is graphed incorrectly, but the system is used appropriately.

[2] Both inequalities are graphed correctly, and at least one is labeled, but no further correct work is shown.

[1] A correct justification is given, but no further correct work is shown.

or

[1] One inequality is graphed and labeled correctly, but no further correct work is shown.

or

[1] $2x + 3y = 9$ and $2y = 4x + 6$ are graphed correctly, and at least one is labeled, but no further correct work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

Part IV

For this question, use the specific criteria to award a maximum of 6 credits. Unless otherwise specified, mathematically correct alternative solutions should be awarded appropriate credit.

(37) **[6]** $4a + 2c = 325.94$ and $2a + 3c = 256.95$ are stated, correct algebraic work is shown to find $c = 46.99$ and $a = 57.99$, and 198.96.

[5] Appropriate work is shown, but one computational error is made.

or

[5] Appropriate work is shown to find either $c = 46.99$ or $a = 57.99$, and an appropriate cost is found for the group of four.

or

[5] Appropriate work is shown, but 198.96 is not stated.

or

[5] Only one equation is written correctly, but the system of equations is solved appropriately, and an appropriate cost is stated.

[4] Appropriate work is shown to find either $c = 46.99$ or $a = 57.99$, but no further correct work is shown.

[3] Both equations are written incorrectly but solved appropriately for both a and c, but no further correct work is shown.

[2] A correct system of equations is stated, but no further correct work is shown.

[1] One equation is written correctly, but no further correct work is shown.

or

[1] $c = 46.99$ and $a = 57.99$, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

Map to the Learning Standards
Algebra I
June 2022

Question	Type	Credits	Cluster
1	Multiple Choice	2	S-ID.C
2	Multiple Choice	2	F-IF.A
3	Multiple Choice	2	F-BF.A
4	Multiple Choice	2	A-SSE.B
5	Multiple Choice	2	A-CED.A
6	Multiple Choice	2	F-IF.B
7	Multiple Choice	2	F-LE.A
8	Multiple Choice	2	A-REI.B
9	Multiple Choice	2	A-SSE.B
10	Multiple Choice	2	F-IF.A
11	Multiple Choice	2	A-CED.A
12	Multiple Choice	2	A-APR.B
13	Multiple Choice	2	A-CED.A
14	Multiple Choice	2	S-ID.A
15	Multiple Choice	2	F-IF.A
16	Multiple Choice	2	F-IF.C
17	Multiple Choice	2	A-APR.A
18	Multiple Choice	2	A-REI.D
19	Multiple Choice	2	F-IF.C
20	Multiple Choice	2	A-SSE.A

21	Multiple Choice	2	F-LE.A
22	Multiple Choice	2	N-Q.A
23	Multiple Choice	2	A-REI.B
24	Multiple Choice	2	F-IF.A
25	Constructed Response	2	N-RN.B
26	Constructed Response	2	F-BF.B
27	Constructed Response	2	F-IF.B
28	Constructed Response	2	A-APR.A
29	Constructed Response	2	F-IF.A
30	Constructed Response	2	A-REI.B
31	Constructed Response	2	A-SSE.A
32	Constructed Response	2	A-REI.B
33	Constructed Response	4	F-IF.B
34	Constructed Response	4	A-REI.D
35	Constructed Response	4	S-ID.C
36	Constructed Response	4	A-REI.D
37	Constructed Response	6	A-CED.A

Regents Examination in Algebra I

June 2022

Chart for Converting Total Test Raw Scores to Final Examination Scores (Scale Scores)

The *Chart for Determining the Final Examination Score for the June 2022 Regents Examination in Algebra I* will be posted on the Department's web site at: http://www.nysed.gov/state-assessment/high-school-regents-examinations by Thursday, June 16, 2022. Conversion charts provided for previous administrations of the Regents Examination in Algebra I must NOT be used to determine students' final scores for this administration.

Online Submission of Teacher Evaluations of the Test to the Department

Suggestions and feedback from teachers provide an important contribution to the test development process. The Department provides an online evaluation form for State assessments. It contains spaces for teachers to respond to several specific questions and to make suggestions. Instructions for completing the evaluation form are as follows:

1. Go to http://www.nysed.gov/state-assessment/teacher-feedback-state-assessments.

2. Select the test title.

3. Complete the required demographic fields.

4. Complete each evaluation question and provide comments in the space provided.

5. Click the SUBMIT button at the bottom of the page to submit the completed form.

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

ALGEBRA I

Thursday, June 16, 2022 — 9:15 a.m. to 12:15 p.m.

MODEL RESPONSE SET

Table of Contents

Question 25

25 Is the product of $\sqrt{1024}$ and -3.4 rational or irrational? Explain your answer.

$\sqrt{1024} = 32$

$32 \cdot -3.4 = -108.8$

The answer is rational because when you multiply $\sqrt{1024}$ and -3.4 you get -108.8 which can be represented as a fraction

Score 2: The student gave a complete and correct response.

Question 25

25 Is the product of $\sqrt{1024}$ and -3.4 rational or irrational? Explain your answer.

$\sqrt{1024} = 32$ $\quad 32 \times -3.4 = -108.8$

The product of $\sqrt{1024}$ and -3.4 is rational because -108.8 is a terminating non-repeating decimal.

Score 2: The student gave a complete and correct response.

Question 25

25 Is the product of $\sqrt{1024}$ and -3.4 rational or irrational? Explain your answer.

$\sqrt{1024} \times -3.4 = -108.8$

Rational

Score 1: The student wrote a justification, but not an explanation.

Question 25

25 Is the product of $\sqrt{1024}$ and -3.4 rational or irrational? Explain your answer.

$32 \times -3.4 = -108.8$

Score 0: The student did not state rational and did not write an explanation.

Question 25

25 Is the product of $\sqrt{1024}$ and -3.4 rational or irrational? Explain your answer.

I think this would be rational.

Score 0: The student did not write an explanation.

Question 26

26 Describe the transformations performed on the graph of $f(x) = x^2$ to obtain the graph of $g(x)$ when $g(x) = (x - 3)^2 - 4$.

Shift down 4

Shift Right 3

Score 2: The student gave a complete and correct response.

Question 26

26 Describe the transformations performed on the graph of $f(x) = x^2$ to obtain the graph of $g(x)$ when $g(x) = (x - 3)^2 - 4$.

Down 3
Right 4

Score 1: The student only wrote the directions of the shifts correctly.

Question 26

26 Describe the transformations performed on the graph of $f(x) = x^2$ to obtain the graph of $g(x)$ when $g(x) = (x - 3)^2 - 4$.

Graph

	$f(x) = x^2$	$g(x) = (x-3)^2 - 4$
0	0	5
1	1	0
2	4	-3
3	9	-4
4	16	-3

$Y_1 = f(x)$ $Y_2 = g(x)$

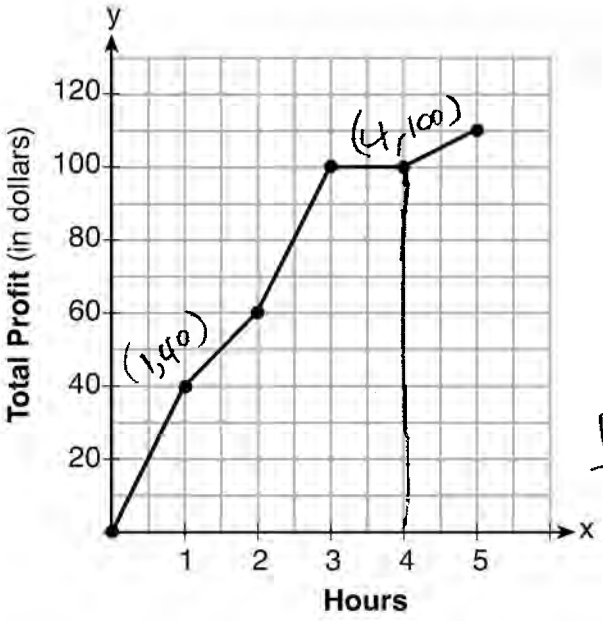
Y_1 vertex is (0,0)

Y_2 vertex is (2, -3)

Score 0: The student did not describe the transformations.

Question 27

27 The total profit earned at a garage sale during the first five hours is modeled by the graph shown below.



$\frac{100-40}{4-1} = \frac{60}{3} = \frac{20}{1}$

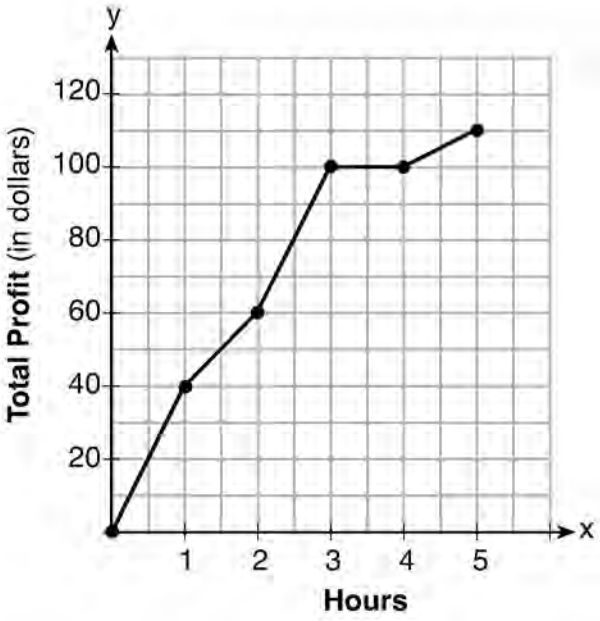
Determine the average rate of change, in dollars per hour, over the interval $1 \leq x \leq 4$.

The average rate of change is $\frac{20}{1}$.

Score 2: The student gave a complete and correct response.

Question 27

27 The total profit earned at a garage sale during the first five hours is modeled by the graph shown below.



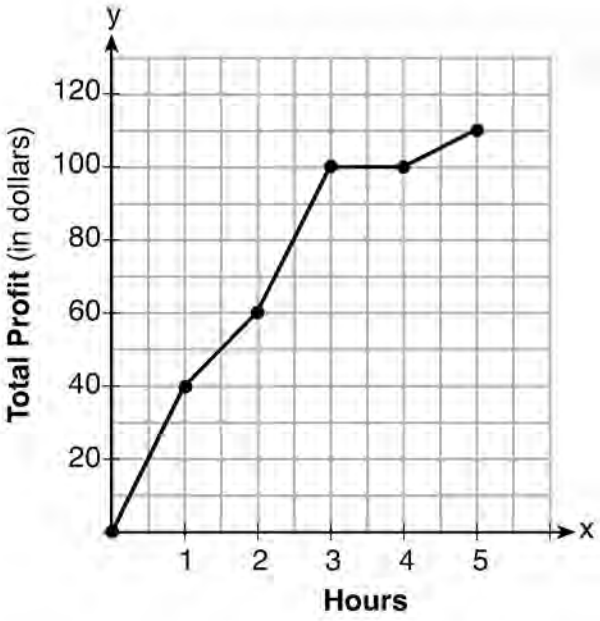
Determine the average rate of change, in dollars per hour, over the interval $1 \leq x \leq 4$.

$$\frac{60 - 40}{2 - 1} = \frac{20}{1} = 20$$

Score 1: The student correctly found the rate of change over the interval $1 \leq x \leq 2$.

Question 27

27 The total profit earned at a garage sale during the first five hours is modeled by the graph shown below.



Determine the average rate of change, in dollars per hour, over the interval $1 \leq x \leq 4$.

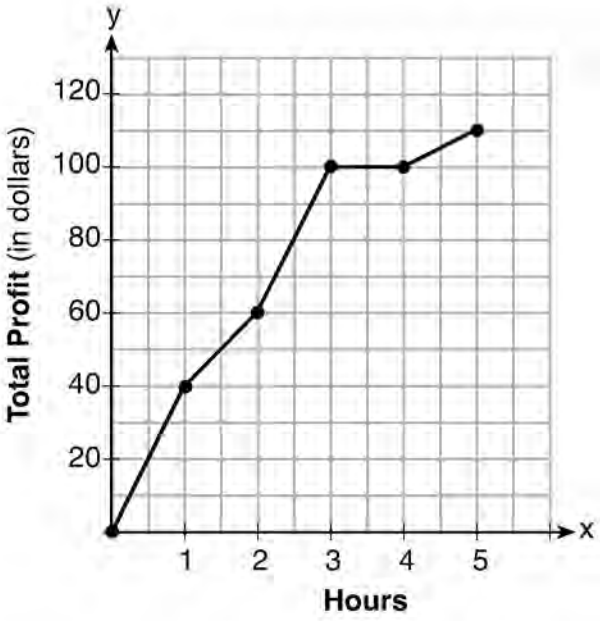
(x y
1, 40) (x y
4, 100)

$\frac{4-1}{100-40} = \frac{1}{20}$

Score 1: The student wrote the rate of change as $\frac{\text{change in } x}{\text{change in } y}$.

Question 27

27 The total profit earned at a garage sale during the first five hours is modeled by the graph shown below.



Determine the average rate of change, in dollars per hour, over the interval $1 \leq x \leq 4$.

(1, 40) (2, 60)

$\frac{2-1}{60-40} = \frac{1}{20}$

Score 0: The student did not show enough correct work to receive any credit.

Question 28

28 Subtract $3x(x - 2y)$ from $6(x^2 - xy)$ and express your answer as a monomial.

$3x^2 - 6xy \quad 6x^2 - 6xy$

$(6x^2 - 6xy) - (3x^2 - 6xy)$

$-3x^2 + 6xy$

$3x^2$

Score 2: The student gave a complete and correct response.

Question 28

28 Subtract $3x(x - 2y)$ from $6(x^2 - xy)$ and express your answer as a monomial.

$3x(x-2y)-6(x^2-xy)$

$3x^2-6xy-6x^2+6xy$

$-3x^2$

$-6xy-3x^2+6xy$

Score 1: The student subtracted the expressions in the wrong order.

Question 28

28 Subtract $3x(x - 2y)$ from $6(x^2 - xy)$ and express your answer as a monomial.

$3x^2 - 6yx$ $6x^2 - 6xy$

$3x^2 - 12xy$

Score 1: The student made an error when subtracting the xy terms.

Question 28

28 Subtract $3x(x - 2y)$ from $6(x^2 - xy)$ and express your answer as a monomial.

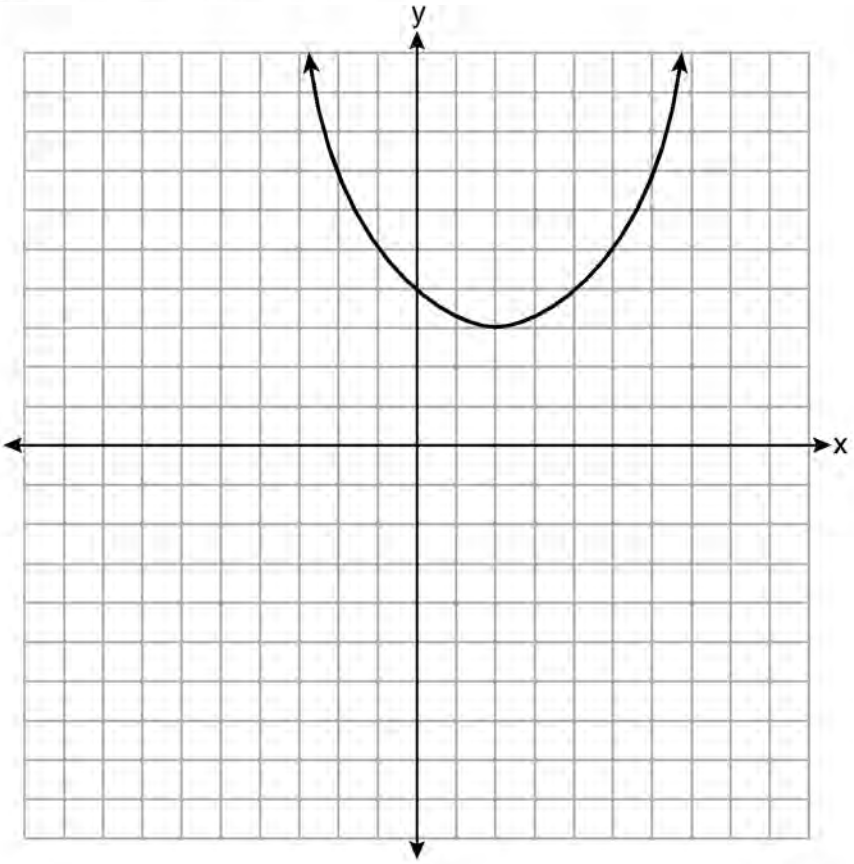
$3x^2 + 6xy - 6x^2 + 6xy$

$3x^2$

Score 0: The student made multiple errors in their work.

Question 29

29 A function is graphed on the set of axes below.



State the domain of this function.

$-\infty < x < \infty$

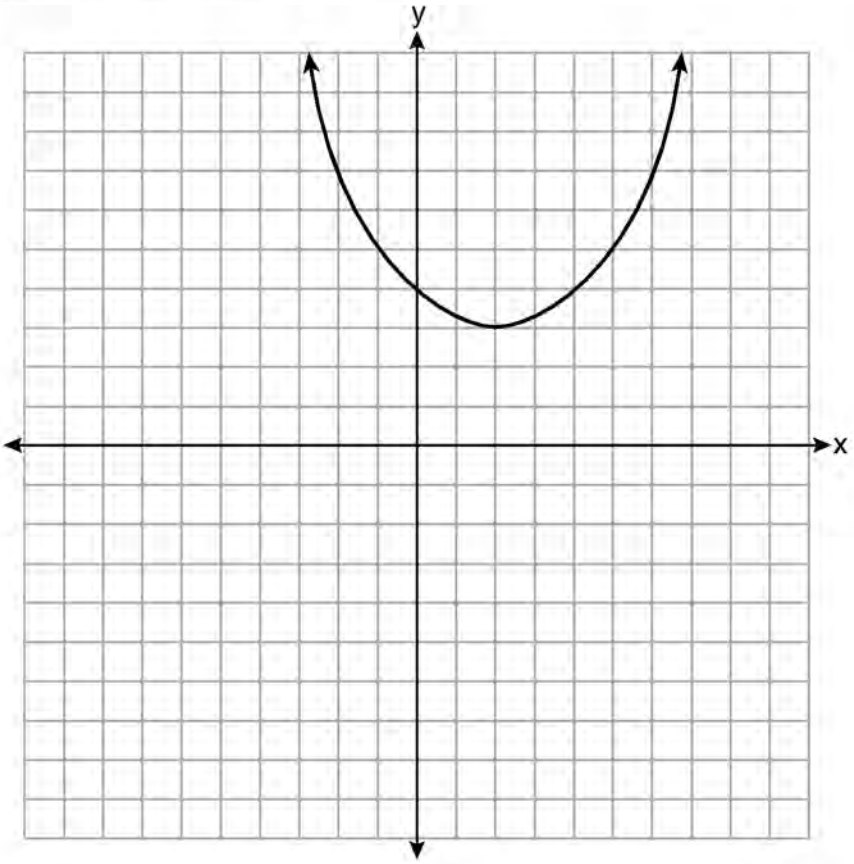
State the range of this function.

$y \geq 3$

Score 2: The student gave a complete and correct response.

Question 29

29 A function is graphed on the set of axes below.



State the domain of this function.

$X = \mathbb{R}$

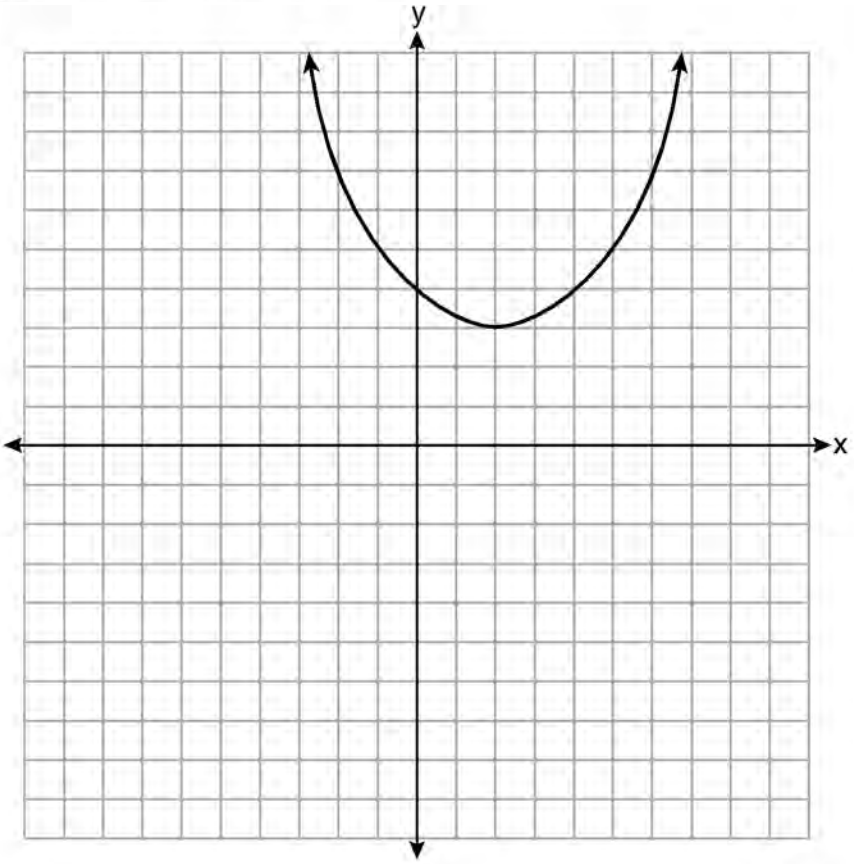
State the range of this function.

$y \geq 3$

Score 2: The student gave a complete and correct response.

Question 29

29 A function is graphed on the set of axes below.



State the domain of this function.

$(-\infty, \infty)$

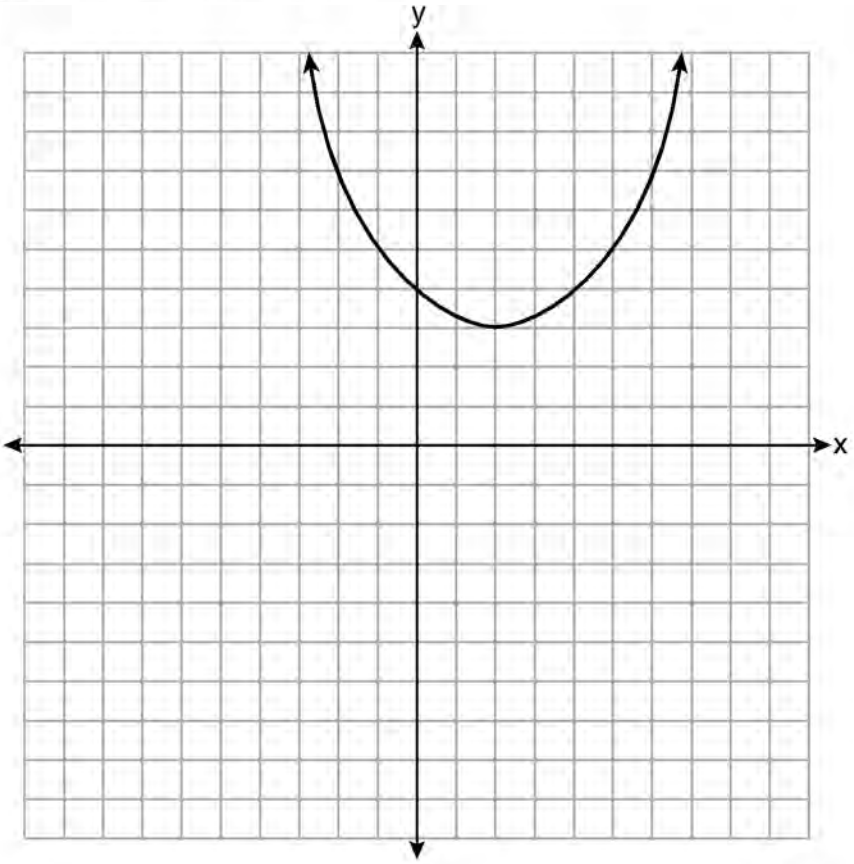
State the range of this function.

$[3, \infty)$

Score 2: The student gave a complete and correct response.

Question 29

29 A function is graphed on the set of axes below.



State the domain of this function.

$[-\infty, \infty]$

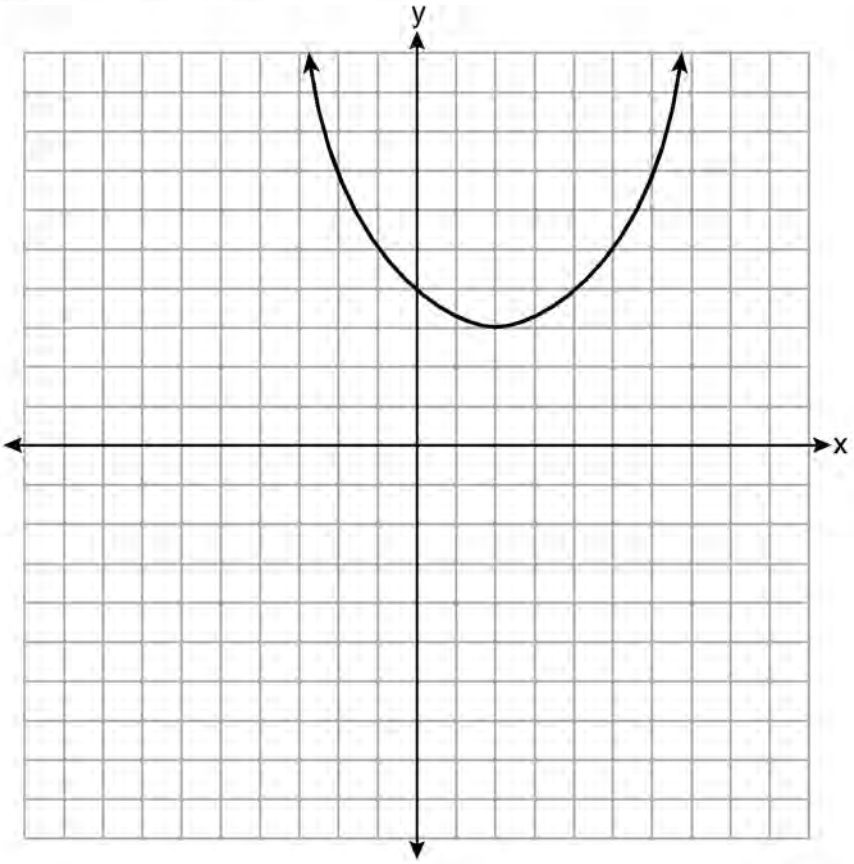
State the range of this function.

$[3, \infty]$

Score 1: The student used brackets with the infinity signs instead of parentheses.

Question 29

29 A function is graphed on the set of axes below.



State the domain of this function.

$y \geq 3$

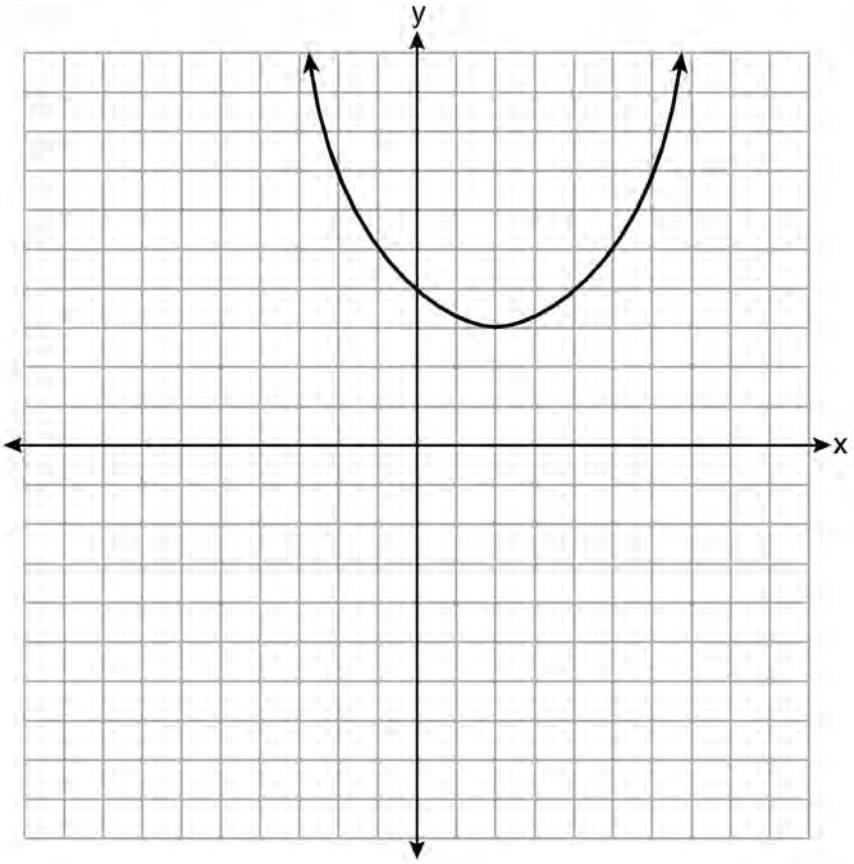
State the range of this function.

$-\infty < x < \infty$

Score 1: The student reversed the domain and range.

Question 29

29 A function is graphed on the set of axes below.



State the domain of this function.

Domain is $x>2$.

State the range of this function.

Range is $y>3$.

Score 0: The student wrote an incorrect domain and an incorrect inequality symbol for the range.

Question 30

30 Solve $6x^2 + 5x - 6 = 0$ algebraically for the exact values of x.

$6x^2+5x-6=0$

$\frac{-b \pm \sqrt{b^2-4(a)(c)}}{2(a)}$

$a=6$
$b=5$
$c=-6$

$\frac{-5 \pm \sqrt{5^2-4(6)(-6)}}{2(6)}$

$\frac{-5 \pm \sqrt{169}}{12}$

$\frac{-5 \pm 13}{12}$

Score 2: The student gave a complete and correct response.

Question 30

30 Solve $6x^2 + 5x - 6 = 0$ algebraically for the exact values of x.

$6x^2+5x-6=0$

$(3x-2)(2x+3)=0$

$3x-2=0$ | $2x+3=0$

$+2\ +2$ | $-3\ -3$

$\frac{3x}{3}=\frac{2}{3}$ | $\frac{2x}{2}=\frac{-3}{2}$

$x=\frac{2}{3}$ | $x=-\frac{3}{2}$

$x=\left\{\frac{2}{3}, -\frac{3}{2}\right\}$

-36, -4, 9, 5

	$2x$	3
$3x$	$6x^2$	$9x$
-2	$-4x$	-6

Score 2: The student gave a complete and correct response.

Question 30

30 Solve $6x^2 + 5x - 6 = 0$ algebraically for the exact values of x.

$\frac{-b \pm \sqrt{b^2-4ac}}{2a}$ $\quad \frac{-5 \pm \sqrt{5^2-4(6)(-6)}}{2(6)}$

$\frac{-5 \pm 13}{12}$

$\frac{-5+13}{12} = .6$

$\frac{-5-13}{12} = 1.5$

Score 1: The student did not include the negative sign in front of 1.5.

Question 30

30 Solve $6x^2 + 5x - 6 = 0$ algebraically for the exact values of x.

$6(6x^2+5x-6=0$

$x^2+5x-6=0$

$(x-1)(x+5)$

$x=-5 \quad x=1$

Score 0: The student did not show enough correct work to receive any credit.

Question 31

31 Factor the expression $x^4 - 36x^2$ completely.

x^4-36x^2

$x^2(x^2-36)$

$x^2(x-6)(x+6)$

Score 2: The student gave a complete and correct response.

Question 31

31 Factor the expression $x^4 - 36x^2$ completely.

$x^4 - 36x^2$

$(x^2 - 6x)(x^2 + 6x)$

$x(x-6)x(x+6)$

Score 2: The student gave a complete and correct response.

Question 31

31 Factor the expression $x^4 - 36x^2$ completely.

$x^4 - 36x^2$

$x^2(x^2 - 36)$

$x^2(x + 6)(x - 6)$

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

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

Score 1: The student factored correctly, but attempted to solve the factored expression as an equation.

Question 31

31 Factor the expression $x^4 - 36x^2$ completely.

$x(x^3-36x)$

Score 0: The student did not show enough correct work to receive any credit.

Question 32

32 Determine the exact values of x for $x^2 - 8x - 5 = 0$ by completing the square.

$(\frac{b}{2})^2 = (\frac{-8}{2})^2 = (-4)^2 = 16$

$x^2 - 8x - 5 = 0$

$+5 \quad +5$

$x^2 - 8x = 5$

$+16 \quad +16$

$x^2 - 8x + 16 = 21$

$\sqrt{(x-4)^2} = \sqrt{21}$

$x - 4 = \pm\sqrt{21}$

$+4 \quad +4$

$x = 4 \pm \sqrt{21}$

Score 2: The student gave a complete and correct response.

Question 32

32 Determine the exact values of x for $x^2 - 8x - 5 = 0$ by completing the square.

$x^2 - 8x - 5 = 0$

$b = -8$
$a = 1$
$c = -5$

$$\frac{8 \pm \sqrt{(-8)^2 - 4(1)(-5)}}{2(1)}$$

$$\frac{8 \pm \sqrt{64 - (-20)}}{2}$$

$$\frac{8 \pm \sqrt{84}}{2}$$

84
42 2
21 2

$$\frac{4 \pm \sqrt{84}}{2}$$

$$4 \pm \frac{2\sqrt{21}}{2}$$

$4 \pm \sqrt{21}$

Score 1: The student did not use the method of completing the square.

Question 32

32 Determine the exact values of x for $x^2 - 8x - 5 = 0$ by completing the square.

$x^2 - 8x - 5 = 0$
$+5 \quad +5$
$x^2 - 8x = 5$
$x^2 - 8x + 16 = 5 + 16$
$x^2 - 8x + 16 = 21$
$(x-4)^2 = 21$
$x - 4 = 21$
$+4 \quad +4$
$x = 25$

$b = -8$
$\frac{1}{2}(-8) = -4$
$(-4)^2 = 16$

Score 1: The student did not take the square root of 21.

Question 32

32 Determine the exact values of x for $x^2 - 8x - 5 = 0$ by completing the square.

$x^2 - 8x - 5 = 0$

$(x^2 - 8x + 16) - 16 - 5 = 0$

$(x-4)(x-4) - 21 = 0$

$\sqrt{(x-4)^2} = \sqrt{21}$

$x - 4 = \pm\sqrt{21}$

$+4 \quad +4$

$x = 4 \pm \sqrt{21}$

$4 + \sqrt{21} = 8.58$

$4 - \sqrt{21} = -.58$

$\frac{1}{2}(-8)$

$(-4)^2$

16

$\{-.58, 8.58\}$

Score 1: The student rounded off the solution.

Question 32

32 Determine the exact values of x for $x^2 - 8x - 5 = 0$ by completing the square.

$x^2 - 8x - 5 = 0$
$+5 \quad +5$

$x^2 - 8x + 16 = 5 + 16$

$x^2 - 8x + 16 = 21$

$(x+4)(x-4) = 21$

$x+4 = 21$	$x-4 = 21$
$-4 \quad -4$	$+4 \quad +4$
$x = 17$	$x = 25$

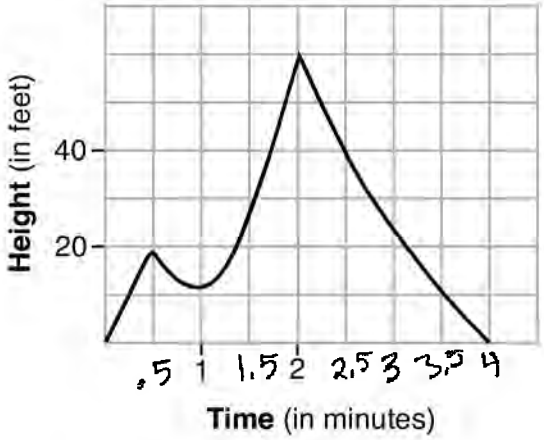
$\frac{8}{2} = 4 \rightarrow (4)^2 = 16$

$x = 17$
and
$x = 25$

Score 0: The student did not show enough correct work to receive any credit.

Question 33

33 The graph below models the height of Sam's kite over a period of time.



Explain what the zeros of the graph represent in the context of the situation.

When the kite is on the ground.

State the time intervals over which the height of the kite is increasing.

$0 < x < .5$

$1 < x < 2$

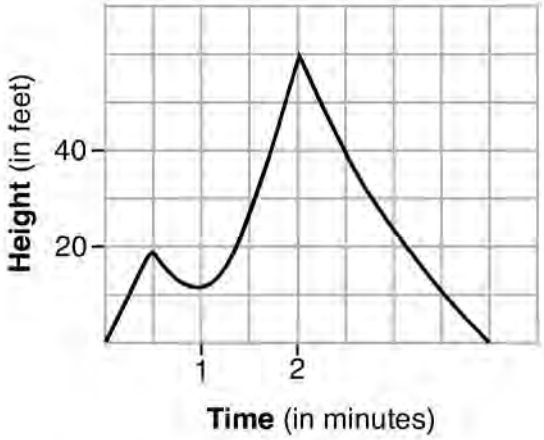
State the maximum height, in feet, that the kite reaches.

60 ft

Score 4: The student gave a complete and correct response.

Question 33

33 The graph below models the height of Sam's kite over a period of time.



Explain what the zeros of the graph represent in the context of the situation.

The 0's represent when Sams kite hit the ground

State the time intervals over which the height of the kite is increasing.

0-.5min 1-2 min

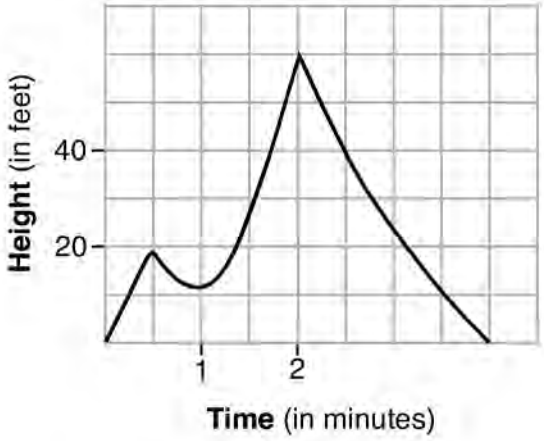
State the maximum height, in feet, that the kite reaches.

60

Score 4: The student gave a complete and correct response.

Question 33

33 The graph below models the height of Sam's kite over a period of time.



Explain what the zeros of the graph represent in the context of the situation.

The kite is on the ground at 0 and 4 minutes.

State the time intervals over which the height of the kite is increasing.

[0, 0.5]

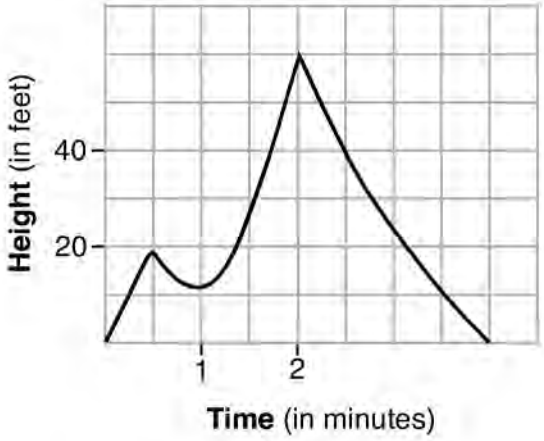
[1, 2]

State the maximum height, in feet, that the kite reaches.

Score 3: The student did not answer the maximum height.

Question 33

33 The graph below models the height of Sam's kite over a period of time.



Explain what the zeros of the graph represent in the context of the situation.

Start and Finish

State the time intervals over which the height of the kite is increasing.

$0 \leq x \leq 0.5$

$1 \leq x \leq 2$

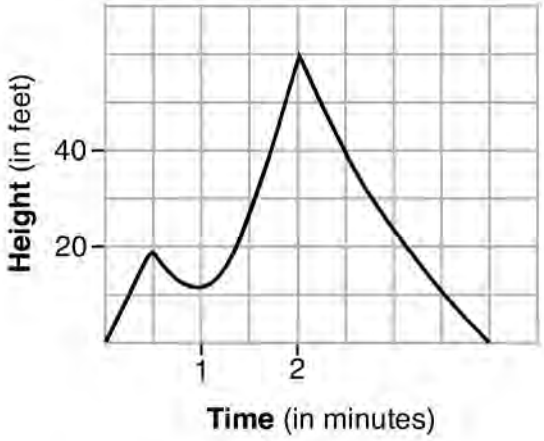
State the maximum height, in feet, that the kite reaches.

60

Score 3: The student wrote an incorrect explanation.

Question 33

33 The graph below models the height of Sam's kite over a period of time.



Explain what the zeros of the graph represent in the context of the situation.

The zeros of the graph represents when the kite started and when the kite landed

State the time intervals over which the height of the kite is increasing.

The time is 2 minutes [redacted]

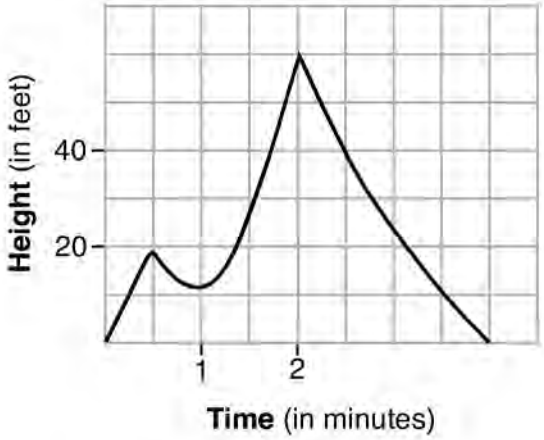
State the maximum height, in feet, that the kite reaches.

The height is 60 feet.

Score 2: The student did not state the intervals.

Question 33

33 The graph below models the height of Sam's kite over a period of time.



Explain what the zeros of the graph represent in the context of the situation.

State the time intervals over which the height of the kite is increasing.

every minute, it goes up 10 ft

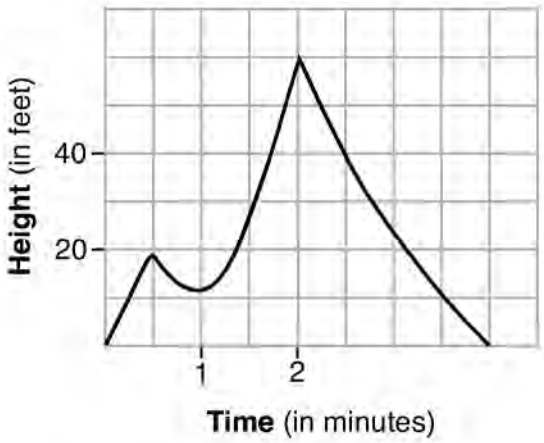
State the maximum height, in feet, that the kite reaches.

60 ft

Score 1: The student only stated the height correctly.

Question 33

33 The graph below models the height of Sam's kite over a period of time.



Explain what the zeros of the graph represent in the context of the situation.

The zeros are the kite starting and ending points.

State the time intervals over which the height of the kite is increasing.

(1.5, 30)

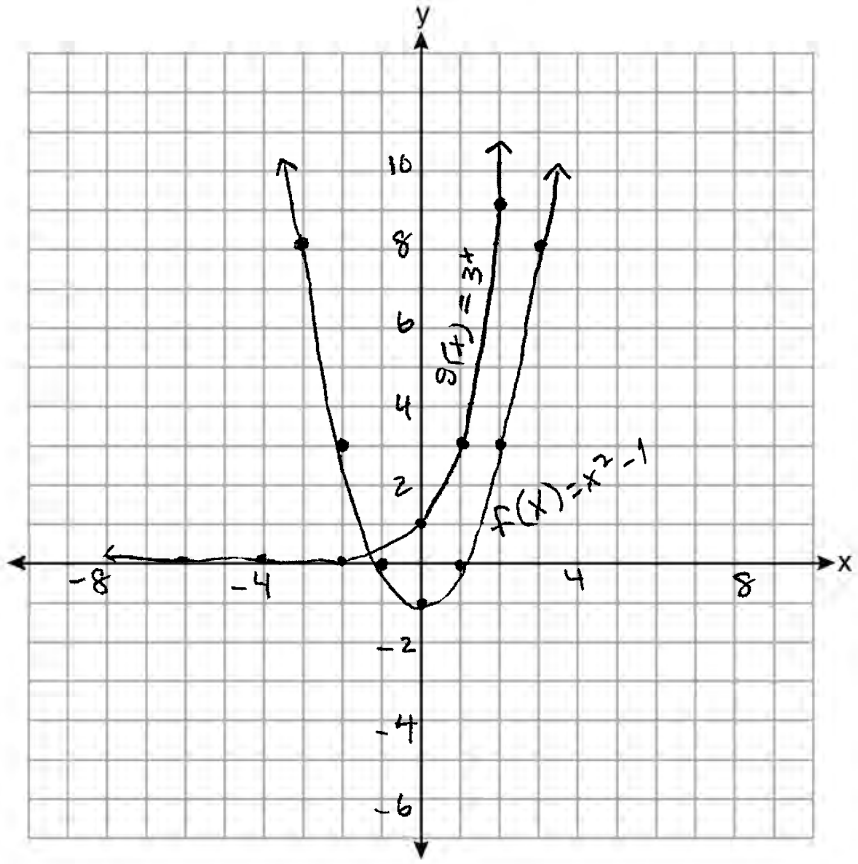
State the maximum height, in feet, that the kite reaches.

(2, 60)

Score 0: The student's explanation did not indicate time, and no further correct work was shown.

Question 34

34 On the set of axes below, graph $f(x) = x^2 - 1$ and $g(x) = 3^x$.



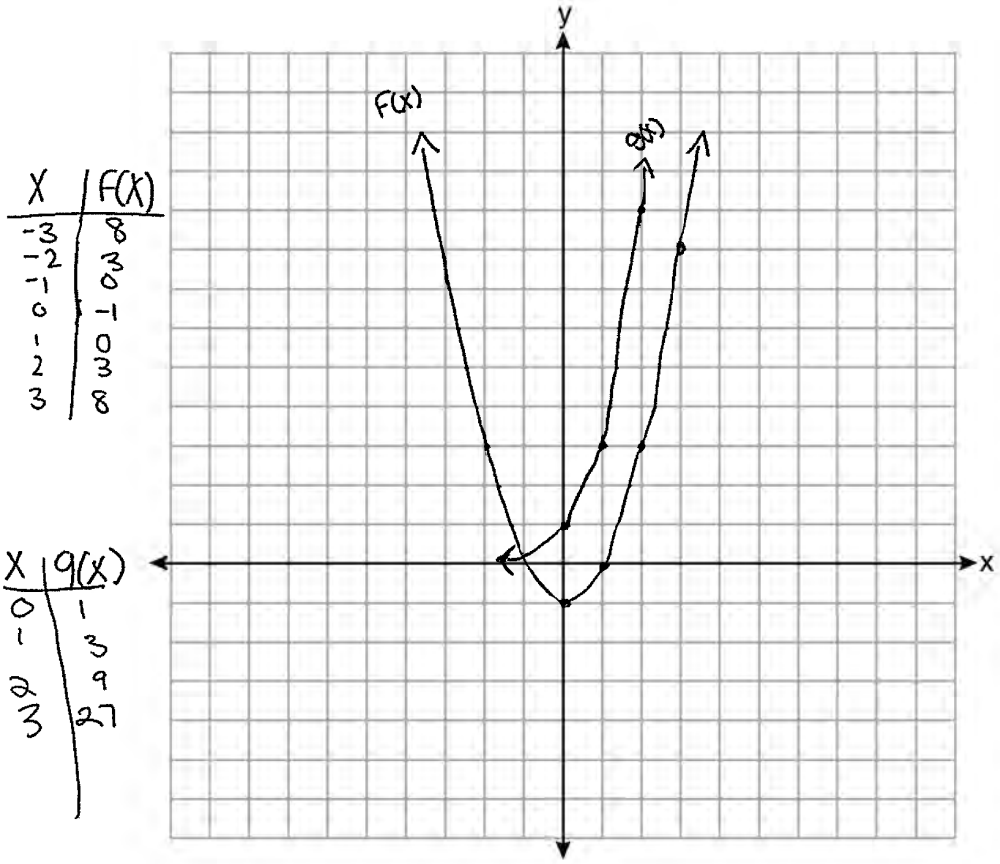
Based on your graph, for how many values of x does $f(x) = g(x)$? Explain your reasoning.

1, because the f(x) and g(x) only intersect at one point.

Score 4: The student gave a complete and correct response.

Question 34

34 On the set of axes below, graph $f(x) = x^2 - 1$ and $g(x) = 3^x$.



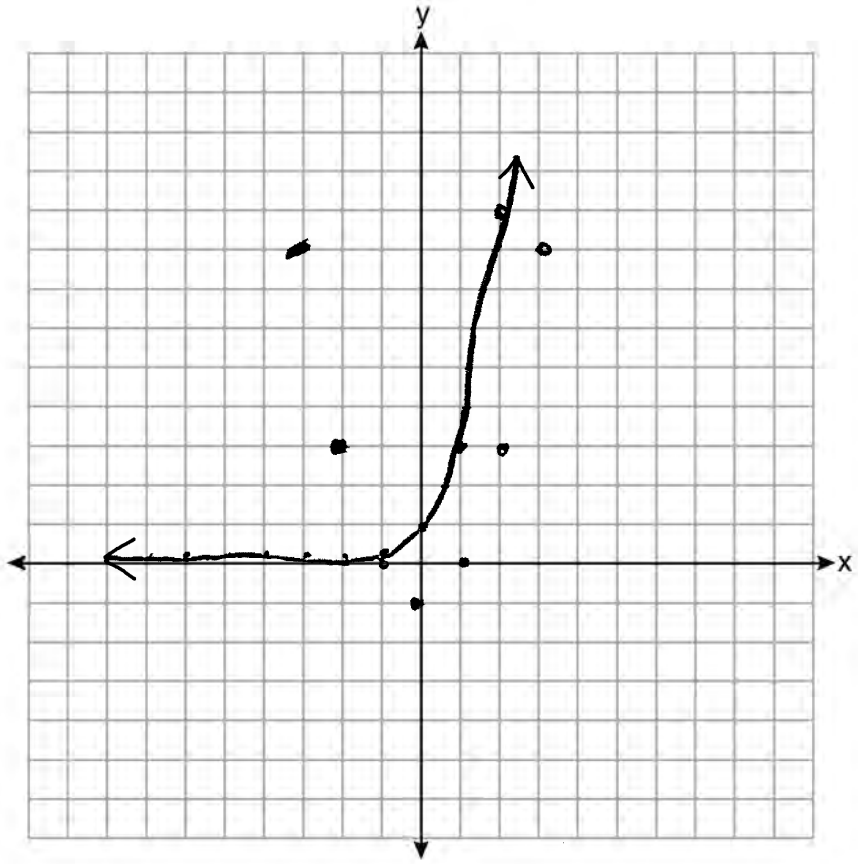
Based on your graph, for how many values of x does $f(x) = g(x)$? Explain your reasoning.

one

Score 3: The student did not write an explanation.

Question 34

34 On the set of axes below, graph $f(x) = x^2 - 1$ and $g(x) = 3^x$.



Based on your graph, for how many values of x does $f(x) = g(x)$? Explain your reasoning.

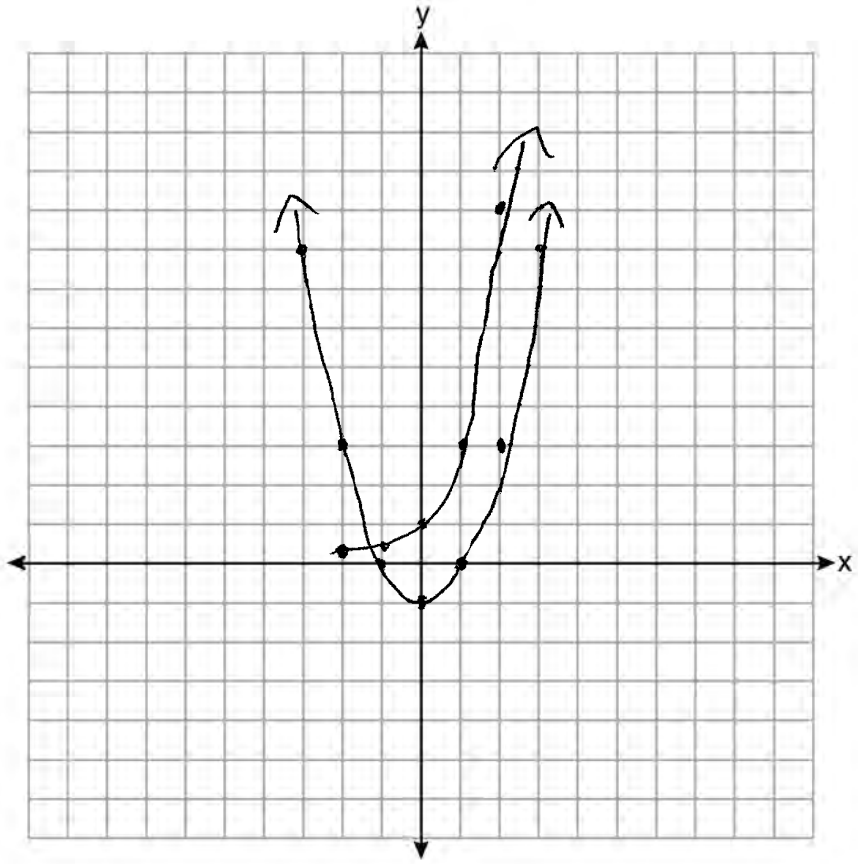
1 value

-1.13476

Score 2: The student did not complete the graph of $f(x)$ and did not write an explanation.

Question 34

34 On the set of axes below, graph $f(x) = x^2 - 1$ and $g(x) = 3^x$.



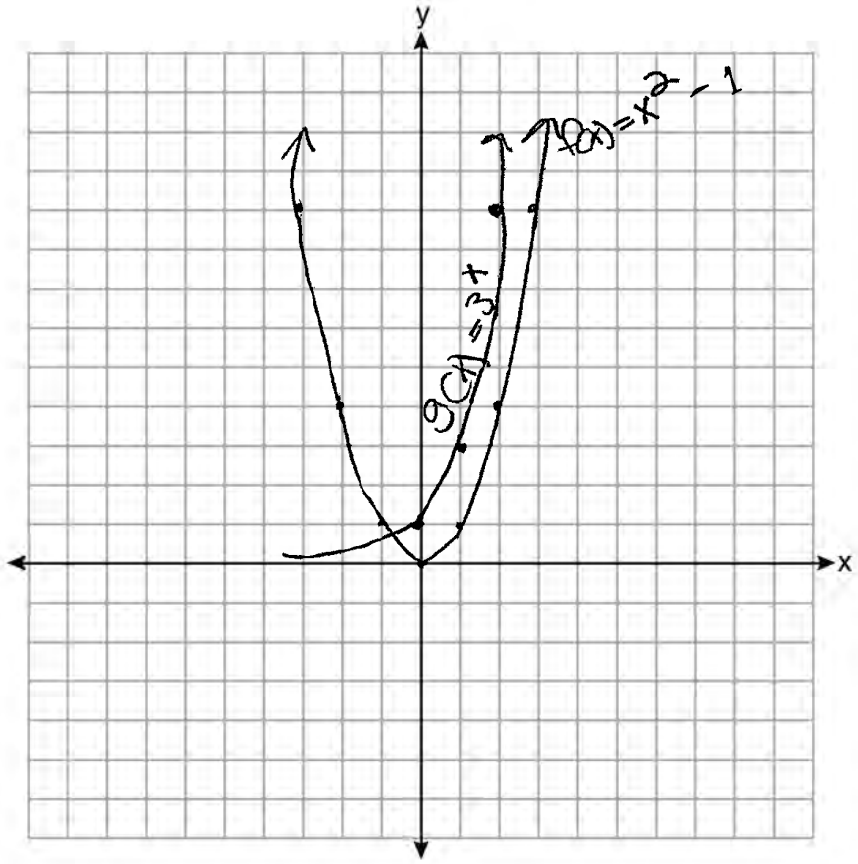
Based on your graph, for how many values of x does $f(x) = g(x)$? Explain your reasoning.

(1, 2, 3)

Score 1: The student only graphed $f(x)$ correctly.

Question 34

34 On the set of axes below, graph $f(x) = x^2 - 1$ and $g(x) = 3^x$.



Based on your graph, for how many values of x does $f(x) = g(x)$? Explain your reasoning.

none, they cross but they Dont have a Pacific Point

Score 0: The student did not show enough correct work to receive any credit.

Question 35

35 An insurance agent is looking at records to determine if there is a relationship between a driver's age and percentage of accidents caused by speeding. The table below shows his data.

Age (x)	17	18	21	25	30	35	40	45	50	55	60	65
Percentage of Accidents Caused by Speeding (y)	49	49	48	38	31	33	24	25	16	10	5	6

State the linear regression equation that models the relationship between the driver's age, x, and the percentage of accidents caused by speeding, y. Round all values to the *nearest hundredth*.

$y = ax + b$

$y = -0.96x + 64.74$

State the value of the correlation coefficient to the *nearest hundredth*. Explain what this means in the context of the problem.

$r = -0.98$ The correlation coefficients means there is a strong negative correlation. In the context of this problem it means that there is a strong relationship between the drivers age and accidents in that the younger you are the more likely you will experience an accident

Score 4: The student gave a complete and correct response.

Question 35

35 An insurance agent is looking at records to determine if there is a relationship between a driver's age and percentage of accidents caused by speeding. The table below shows his data.

Age (x)	17	18	21	25	30	35	40	45	50	55	60	65
Percentage of Accidents Caused by Speeding (y)	49	49	48	38	31	33	24	25	16	10	5	6

State the linear regression equation that models the relationship between the driver's age, x, and the percentage of accidents caused by speeding, y. Round all values to the *nearest hundredth*.

$-0.96x + 64.74 = y$

State the value of the correlation coefficient to the *nearest hundredth*. Explain what this means in the context of the problem.

-0.98

This # signifies how well the data follows the same pattern. The highest that the correlation coefficient can go is 1 or -1. And from this number we can conclude that because it is so close to -1 the data points closely follow the trend pattern

Score 3: The student's explanation was not written in context.

Question 35

35 An insurance agent is looking at records to determine if there is a relationship between a driver's age and percentage of accidents caused by speeding. The table below shows his data.

Age (x)	17	18	21	25	30	35	40	45	50	55	60	65
Percentage of Accidents Caused by Speeding (y)	49	49	48	38	31	33	24	25	16	10	5	6

State the linear regression equation that models the relationship between the driver's age, x, and the percentage of accidents caused by speeding, y. Round all values to the *nearest hundredth*.

$y = ax + b$

$a = -.762886597$ $\quad a = -0.76$

$b = 55.67869416$ $\quad b = -55.68$

$r = -.9115169471$

State the value of the correlation coefficient to the *nearest hundredth*. Explain what this means in the context of the problem.

-0.91

The younger you are the better chance of you being in an accident

Score 3: The student made a data entry error, showed full calculator display, and gave an appropriate response based on the display.

Question 35

35 An insurance agent is looking at records to determine if there is a relationship between a driver's age and percentage of accidents caused by speeding. The table below shows his data.

Age (x)	17	18	21	25	30	35	40	45	50	55	60	65
Percentage of Accidents Caused by Speeding (y)	49	49	48	38	31	33	24	25	16	10	5	6

State the linear regression equation that models the relationship between the driver's age, x, and the percentage of accidents caused by speeding, y. Round all values to the *nearest hundredth*.

$y = -0.96x + 64.74$

$y = -0.96(17) + 64.74$

$y = 48.42$

48.42% of accidents are caused by speeding.

State the value of the correlation coefficient to the *nearest hundredth*. Explain what this means in the context of the problem.

correlation coefficient = 0.96

This means that the accidents were most likely related to speeding

Score 2: The student only wrote the regression equation correctly.

Question 35

35 An insurance agent is looking at records to determine if there is a relationship between a driver's age and percentage of accidents caused by speeding. The table below shows his data.

Age (x)	17	18	21	25	30	35	40	45	50	55	60	65
Percentage of Accidents Caused by Speeding (y)	49	49	48	38	31	33	24	25	16	10	5	6

State the linear regression equation that models the relationship between the driver's age, x, and the percentage of accidents caused by speeding, y. Round all values to the *nearest hundredth*.

$y = ax + b$
$a = -.960653868l$
$b = 64.73845277$
$r = -98456447567$

State the value of the correlation coefficient to the *nearest hundredth*. Explain what this means in the context of the problem.

$r = -985$

Score 1: The student wrote an appropriate regression equation, but did not round correctly.

Question 35

35 An insurance agent is looking at records to determine if there is a relationship between a driver's age and percentage of accidents caused by speeding. The table below shows his data.

Age (x)	17	18	21	25	30	35	40	45	50	55	60	65
Percentage of Accidents Caused by Speeding (y)	49	49	48	38	31	33	24	25	16	10	5	6

State the linear regression equation that models the relationship between the driver's age, x, and the percentage of accidents caused by speeding, y. Round all values to the *nearest hundredth*.

$y = ax + b$

$y = 0.96x - 9.18$

State the value of the correlation coefficient to the *nearest hundredth*. Explain what this means in the context of the problem.

$r = 0.99$ this means it will have a high correlation. It will be close to a straight line

Score 0: The student did not show enough correct work to receive any credit.

Question 36

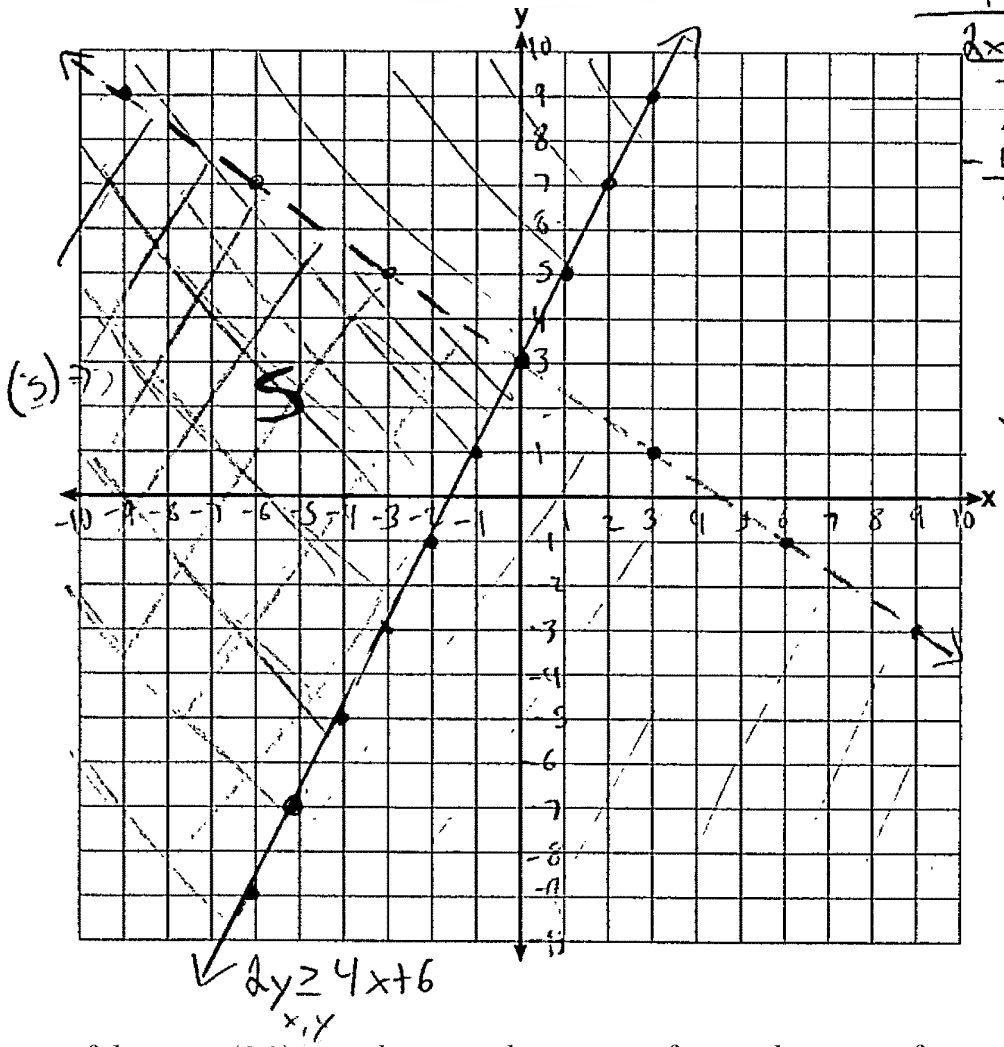
36 Solve the system of inequalities graphically on the set of axes below. Label the solution set S.

$$2x + 3y < 9$$

$$2y \geq 4x + 6$$

$2x+3y<9$
$-3y \quad -3y$
$2x < 9-3y$
$-9 \quad -9$
$\frac{2x-9}{-3} < \frac{-3y}{-3}$
$-\frac{2}{3}x + 3 > y$

$2y \geq 4x+6$
$\Downarrow$
$\frac{2}{2}y \geq \frac{4x}{2} + \frac{6}{2}$
$y \geq 2x+3$



Determine if the point (0,3) is a solution to this system of inequalities. Justify your answer.

$2(0)+3(3) < 9$
$0+9 < 9$
$9 < 9$ ✗

$2(3) \geq 4(0)+6$
$6 \geq 0+6$
$6 \geq 6$ ✓

∴ The point is not a solution to this system because 9 is not less than 9.

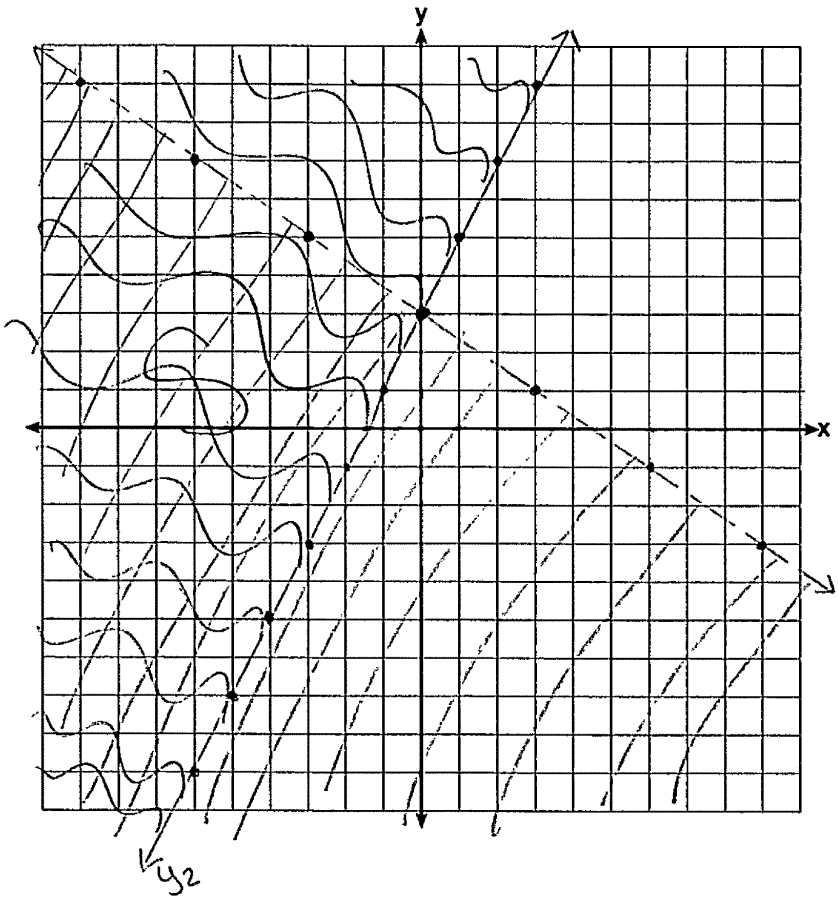
Score 4: The student gave a complete and correct response.

Question 36

36 Solve the system of inequalities graphically on the set of axes below. Label the solution set S.

$2x + 3y < 9$

$2y \geq 4x + 6$



Determine if the point (0,3) is a solution to this system of inequalities. Justify your answer.

No, because at (0,3) one line is solid and the other is dashed.

Score 4: The student gave a complete and correct response.

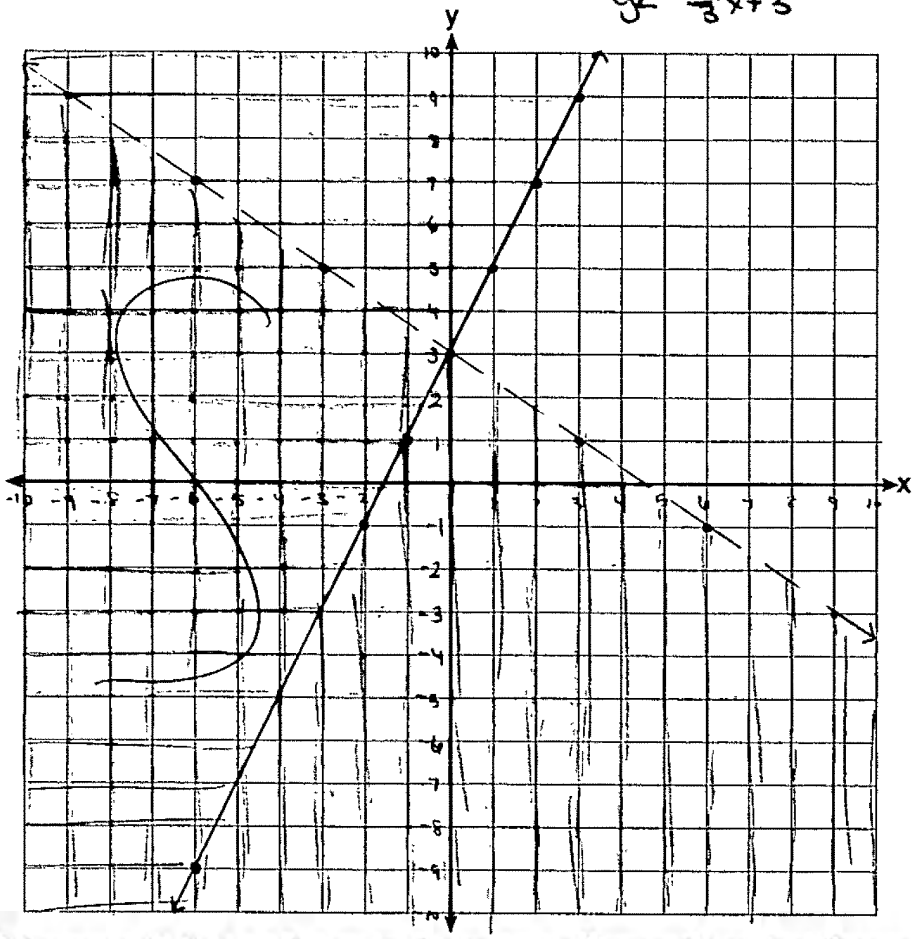
Question 36

36 Solve the system of inequalities graphically on the set of axes below. Label the solution set S.

$$2x + 3y < 9$$
$$2y \geq 4x + 6$$

$2x+3y<9$
$-2x \quad -2x$
$\frac{3y}{3} < \frac{-2x+9}{3}$
$y < -\frac{2}{3}x+3$

$\frac{2y}{2} \geq \frac{4x+6}{2}$
$y \geq 2x+3$



Determine if the point (0,3) is a solution to this system of inequalities. Justify your answer.

(0,3) is not a solution to this system of inequalities because it is on a line that is exclusive. This means that any point on this line is not considered a solution to the system of inequalities.

$2x+3y<9$
$2(0)+3(3)<9$
$9<9$ ✗ not a part of the solution set

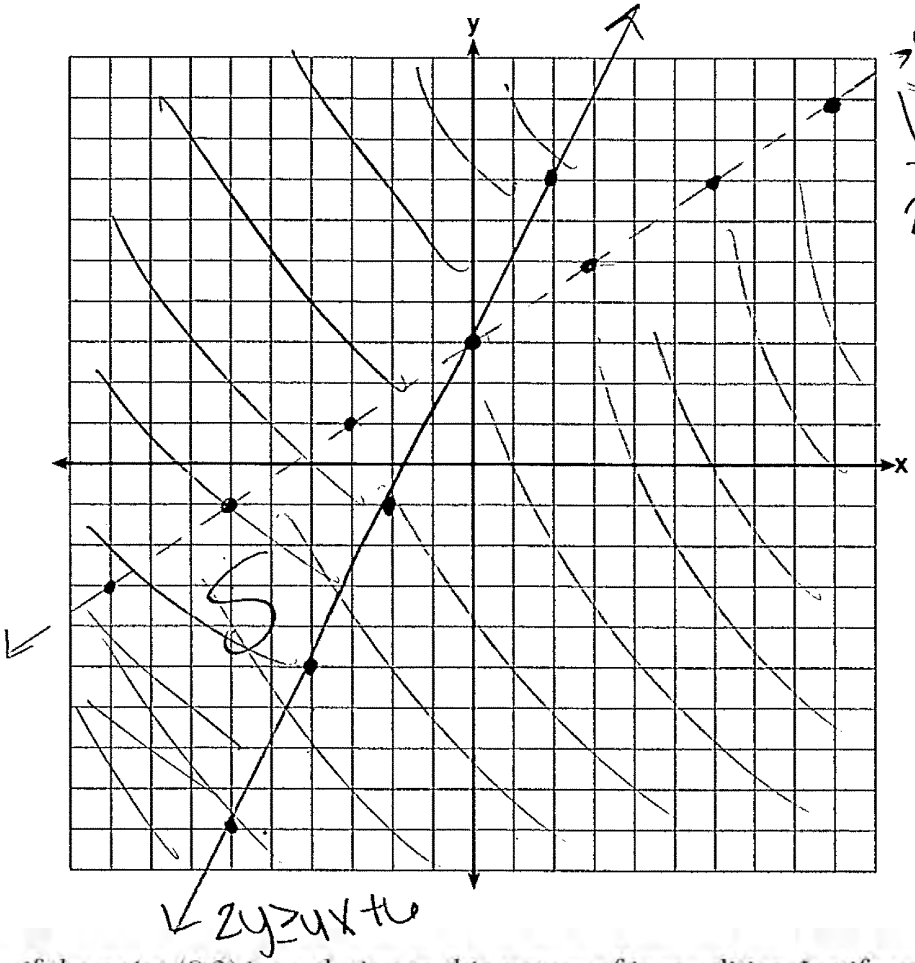
Score 3: The student did not label at least one of the lines.

Question 36

36 Solve the system of inequalities graphically on the set of axes below. Label the solution set *S*.

$2x + 3y < 9$

$2y \geq 4x + 6$



Determine if the point (0,3) is a solution to this system of inequalities. Justify your answer.

Yes it is in the solution area because it is on a solid line

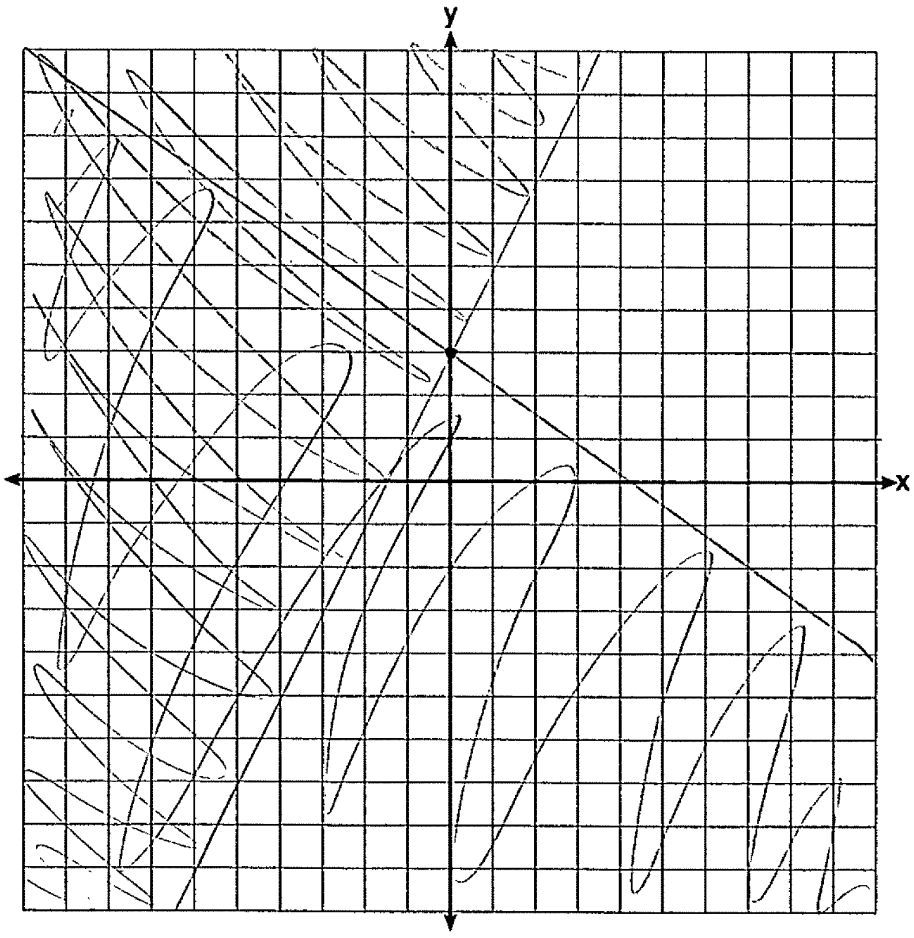
Score 2: The student graphed $2y > 4x + 6$ correctly and labeled their solution set with an *S*.

Question 36

36 Solve the system of inequalities graphically on the set of axes below. Label the solution set S.

$2x + 3y < 9$ $3y < -2x + 9$ $y = -\frac{2}{3}x + 3$

$\frac{2y}{2} \geq \frac{4x + 6}{2}$ $y \geq 2x + 3$



Determine if the point (0,3) is a solution to this system of inequalities. Justify your answer.

yes because if graphed its the intersection

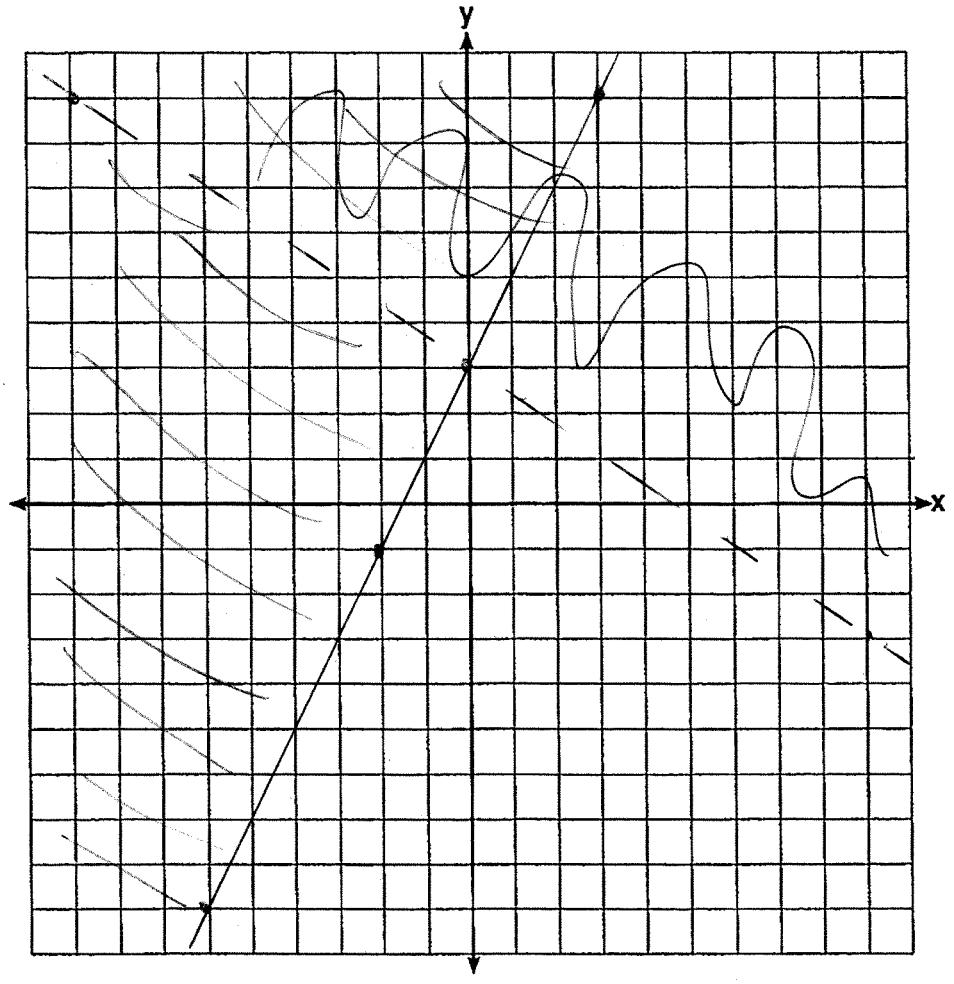
Score 1: The student wrote an appropriate justification based on their graph.

Question 36

36 Solve the system of inequalities graphically on the set of axes below. Label the solution set S.

$$2x + 3y < 9$$

$$2y \geq 4x + 6$$



Determine if the point (0,3) is a solution to this system of inequalities. Justify your answer.

Yes, it's on both lines

Score 0: The student did not label either graph or the solution set and wrote an incorrect explanation.

Question 37

37 At an amusement park, the cost for an adult admission is a, and for a child the cost is c. For a group of six that included two children, the cost was \$325.94. For a group of five that included three children, the cost was \$256.95. All ticket prices include tax.

Write a system of equations, in terms of a and c, that models this situation.

$2c + 4a = 325.94$

$3c + 2a = 256.95$

Use your system of equations to determine the exact cost of each type of ticket algebraically.

$2c + 4a = 325.94$

$-2(3c + 2a = 256.95)$

$-6c - 4a = -513.90$

$+ 2c + 4a = 325.94$

$-4c = -197.96$

$\frac{-4c}{-4} = \frac{-197.96}{-4}$

$c = 46.99$

Children = 46.99

$2(46.99) + 4a = 325.94$

$93.98 + 4a = 325.94$

-93.98

$4a = 231.96$

$\frac{4a}{4} = \frac{231.96}{4}$

$a = 57.99$

adults = 57.99

Determine the cost for a group of four that includes three children.

x

$3c + a = x$

$3(46.99) + 57.99 = x$

$140.97 + 57.99 = x$

$x = 198.96$

Score 6: The student gave a complete and correct response.

Question 37

37 At an amusement park, the cost for an adult admission is a, and for a child the cost is c. For a group of six that included two children, the cost was \$325.94. For a group of five that included three children, the cost was \$256.95. All ticket prices include tax.

Write a system of equations, in terms of a and c, that models this situation.

$4a + 2c = 325.94$
$2a + 3c = 256.95$

Use your system of equations to determine the exact cost of each type of ticket algebraically.

$4a + 2c = 325.94$
$-4a - 5c = -513.90$

$-3c = -187.96$

$\frac{-3c}{-3} = \frac{-187.96}{-3}$

$c = \$62.65$

$4a + 2(62.65) = 325.94$

$4a + 125.30 = 325.94$
$-125.30 \quad -125.30$

$\frac{4a}{4} = \frac{200.64}{4}$

$a = 50.16$

Determine the cost for a group of four that includes three children.

50.16
62.65
62.65
62.65

\$238.11

Score 5: The student made an error when multiplying the second equation by 2. The value found for c was used appropriately in the rest of the problem.

Question 37

37 At an amusement park, the cost for an adult admission is a, and for a child the cost is c. For a group of six that included two children, the cost was \$325.94. For a group of five that included three children, the cost was \$256.95. All ticket prices include tax.

Write a system of equations, in terms of a and c, that models this situation.

$4a + 2c = 325.94$

$2a + 3c = 256.95$

$a = 4$ $\quad$ $a = 2$

$c = 2$ $\quad$ $c = 3$

325.94 $\quad$ $256.9($

Use your system of equations to determine the exact cost of each type of ticket algebraically.

$4a + 2c = 325.94$

$-4a + -6c = -513.9$

$\frac{-4c}{-4} = \frac{-197.96}{-4}$

$c = 46.99$

$4a + 2(46.99) = 325.94$

$4a + 93.98 = 325.94$

$-93.98 \quad -93.98$

$4a = 230.96$

$A = 57.74$

Determine the cost for a group of four that includes three children.

$1a + 3c = ?$

$57.74 + 3(46.99) = 198.71$

Score 5: The student determined $c = 46.99$ correctly and found an appropriate cost for a group of four based on an incorrect value for a.

Question 37

37 At an amusement park, the cost for an adult admission is a, and for a child the cost is c. For a group of six that included two children, the cost was \$325.94. For a group of five that included three children, the cost was \$256.95. All ticket prices include tax.

Write a system of equations, in terms of a and c, that models this situation.

$4a + 2c = 325.94$

$2a + 3c = 256.95$

Use your system of equations to determine the exact cost of each type of ticket algebraically.

$4a + 2c = 325.94$

$-4a \quad -4a$

$\frac{2c = 325.94 - 4a}{2}$

$C = 162.97 - 2a$

$C = 162.97 - 2(57.99)$

$162.97 - 115.98$

$C = \$47.01$

$2a + 3(162.97 - 2a) = 256.95$

$2a + 488.91 - 6a = 256.95$

$-4a + 488.91 = 256.95$

$-488.91 \quad -488.91$

$\frac{-4a = -231.96}{-4} \quad -4$

$a = \$57.99$

Determine the cost for a group of four that includes three children.

$1a + 3c$

$57.99 + 3(47.01)$

\$199.02

Score 5: The student made an error in finding the cost of a child's ticket.

Question 37

37 At an amusement park, the cost for an adult admission is a, and for a child the cost is c. For a group of six that included two children, the cost was \$325.94. For a group of five that included three children, the cost was \$256.95. All ticket prices include tax.

Write a system of equations, in terms of a and c, that models this situation.

$4a + 2c = 325.94$

$2a + 3c = 256.95$

Use your system of equations to determine the exact cost of each type of ticket algebraically.

$4a + 2c = 325.94$

$-2(2a + 3c) = 256.95)$

$4a + 2c = 325.94$

$-4a - 6c = -513.90$

$-4c = -187.96$

$\frac{-4c}{-4} = \frac{-187.96}{-4}$

$c = 46.99$

Determine the cost for a group of four that includes three children.

Score 4: The student found $c = 46.99$ correctly.

Question 37

37 At an amusement park, the cost for an adult admission is a, and for a child the cost is c. For a group of six that included two children, the cost was \$325.94. For a group of five that included three children, the cost was \$256.95. All ticket prices include tax.

Write a system of equations, in terms of a and c, that models this situation.

$4a + 2c = 325.94$
$2a + 3c = 256.95$

Use your system of equations to determine the exact cost of each type of ticket algebraically.

$4a + 2c = 325.94$
$2(2a + 3c = 256.95)$

$4a + 2c = 325.94$
$-\ 4a + 6c = 513.90$

$8c = -187.96$
$c = 23.50$

$2a + 3(23.50) = 256.95$
$2a + 70.50 = 256.95$
$2a = 185.50$
$a = 92.75$

Determine the cost for a group of four that includes three children.

$3c + 1a$

$3(23.50) + 92.75$
$70.50 + 92.75$
163.25

Score 3: The student wrote a correct system of equations and found an appropriate cost for a group of four based on incorrect values for a and c.

Question 37

37 At an amusement park, the cost for an adult admission is a, and for a child the cost is c. For a group of six that included two children, the cost was \$325.94. For a group of five that included three children, the cost was \$256.95. All ticket prices include tax.

Write a system of equations, in terms of a and c, that models this situation.

6 $\begin{cases} 2A+3C=256.95 \\ 4A+2C=325.94 \end{cases}$

Use your system of equations to determine the exact cost of each type of ticket algebraically.

30 30 8.99 48.99

2 3

4 2

$A=30$

$C=8.99$

Determine the cost for a group of four that includes three children.

$4 \times 30 = 120$

$8.99 \times 3 = 26.97$

146.97

Score 2: The student wrote a correct system of equations.

Question 37

37 At an amusement park, the cost for an adult admission is a, and for a child the cost is c. For a group of six that included two children, the cost was \$325.94. For a group of five that included three children, the cost was \$256.95. All ticket prices include tax.

Write a system of equations, in terms of a and c, that models this situation.

Use your system of equations to determine the exact cost of each type of ticket algebraically.

a = 55,50 c = 43,75

Determine the cost for a group of four that includes three children.

a + 3c
55,50 + 3(43,75)
55,50 + 131,25
186,75

Score 1: The student found an appropriate cost for the group of four based on values they wrote for both a and c.

Question 37

37 At an amusement park, the cost for an adult admission is a, and for a child the cost is c. For a group of six that included two children, the cost was \$325.94. For a group of five that included three children, the cost was \$256.95. All ticket prices include tax.

Write a system of equations, in terms of a and c, that models this situation.

$6a + 2c \leq 325.94$

$5a + 3c \leq 256.95$

Use your system of equations to determine the exact cost of each type of ticket algebraically.

$5(6a + 2c \leq 325.94)$

$-6(5a + 3c \leq 256.95)$

$30a + 10c \leq 1629.7$

$-30a - 18c \leq -1541.7$

$\frac{-8c}{-8} \leq \frac{-3171.4}{-8}$

$c \leq 396.425$

$5a + 3(396.425) \leq 256.9$

$5a + 1189.275 \leq 256.9$

$-1189.275 \quad -1189.2$

$\frac{5a}{5} \leq \frac{-1189.275}{5}$

$a \leq 27.735$

Determine the cost for a group of four that includes three children.

$4a + 3c$

Score 0: The student did not show enough correct work to receive any credit.

The State Education Department / The University of the State of New York

Regents Examination in Algebra I – June 2022

Chart for Converting Total Test Raw Scores to Final Exam Scores (Scale Scores)

(Use for the June 2022 exam only.)

Raw Score	Scale Score	Performance Level
86	**100**	5
85	**99**	5
84	**97**	5
83	**96**	5
82	**95**	5
81	**94**	5
80	**93**	5
79	**92**	5
78	**91**	5
77	**90**	5
76	**89**	5
75	**88**	5
74	**88**	5
73	**87**	5
72	**86**	5
71	**86**	5
70	**86**	5
69	**85**	5
68	**84**	4
67	**84**	4
66	**84**	4
65	**83**	4
64	**83**	4
63	**83**	4
62	**82**	4
61	**82**	4
60	**82**	4
59	**81**	4
58	**81**	4

Raw Score	Scale Score	Performance Level
57	**81**	4
56	**81**	4
55	**80**	4
54	**80**	4
53	**80**	4
52	**80**	4
51	**79**	3
50	**79**	3
49	**79**	3
48	**78**	3
47	**78**	3
46	**78**	3
45	**77**	3
44	**77**	3
43	**77**	3
42	**76**	3
41	**76**	3
40	**75**	3
39	**75**	3
38	**74**	3
37	**74**	3
36	**73**	3
35	**72**	3
34	**72**	3
33	**71**	3
32	**70**	3
31	**69**	3
30	**68**	3
29	**67**	3

Raw Score	Scale Score	Performance Level
28	**66**	3
27	**65**	3
26	**64**	2
25	**63**	2
24	**61**	2
23	**60**	2
22	**59**	2
21	**57**	2
20	**56**	2
19	**55**	2
18	**52**	1
17	**50**	1
16	**48**	1
15	**46**	1
14	**44**	1
13	**42**	1
12	**40**	1
11	**37**	1
10	**34**	1
9	**32**	1
8	**29**	1
7	**26**	1
6	**23**	1
5	**19**	1
4	**16**	1
3	**12**	1
2	**8**	1
1	**4**	1
0	**0**	1

To determine the student's final examination score (scale score), find the student's total test raw score in the column labeled "Raw Score" and then locate the scale score that corresponds to that raw score. The scale score is the student's final examination score. Enter this score in the space labeled "Scale Score" on the student's answer sheet.

Schools are not permitted to rescore any of the open-ended questions on this exam after each question has been rated once, regardless of the final exam score. Schools are required to ensure that the raw scores have been added correctly and that the resulting scale score has been determined accurately.

Because scale scores corresponding to raw scores in the conversion chart change from one administration to another, it is crucial that for each administration the conversion chart provided for that administration be used to determine the student's final score. The chart above is usable only for this administration of the Regents Examination in Algebra I.