The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

ALGEBRA I (Common Core)

Thursday, January 28, 2016 — 1:15 to 4:15 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 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 In the function $f(x) = (x - 2)^2 + 4$, the minimum value occurs when x is

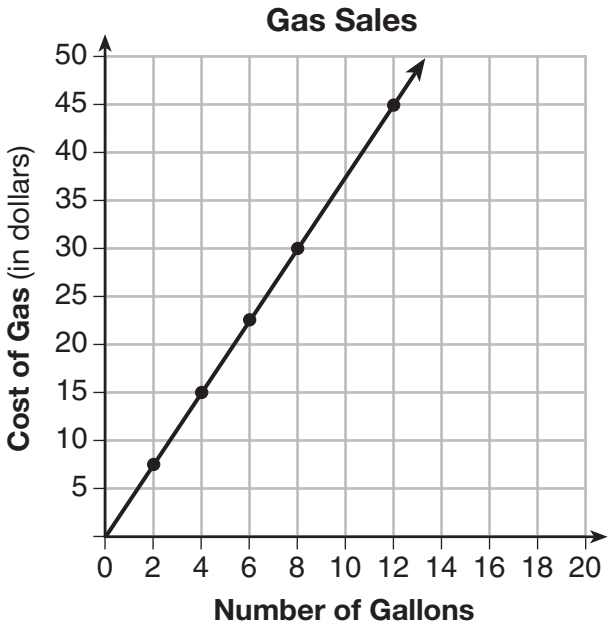
(1) -2

(2) 2

(3) -4

(4) 4

2 The graph below was created by an employee at a gas station.



Which statement can be justified by using the graph?

(1) If 10 gallons of gas was purchased, \$35 was paid.

(2) For every gallon of gas purchased, \$3.75 was paid.

(3) For every 2 gallons of gas purchased, \$5.00 was paid.

(4) If zero gallons of gas were purchased, zero miles were driven.

Use this space for computations.

3 For a recently released movie, the function $y = 119.67(0.61)^x$ models the revenue earned, y, in millions of dollars each week, x, for several weeks after its release.

Based on the equation, how much more money, in millions of dollars, was earned in revenue for week 3 than for week 5?

(1) 37.27
(2) 27.16
(3) 17.06
(4) 10.11

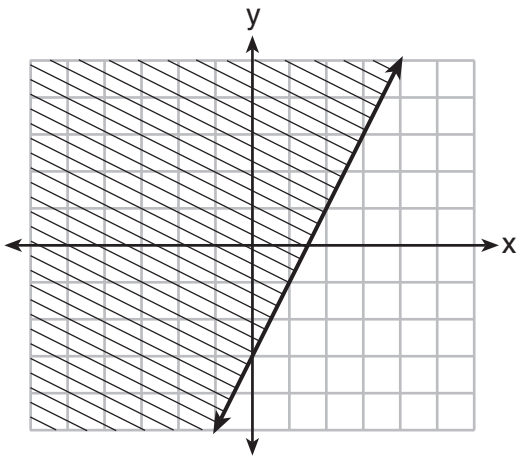
4 Given the following expressions:

I. $-\frac{5}{8} + \frac{3}{5}$
II. $\frac{1}{2} + \sqrt{2}$
III. $\left(\sqrt{5}\right) \cdot \left(\sqrt{5}\right)$
IV. $3 \cdot \left(\sqrt{49}\right)$

Which expression(s) result in an irrational number?

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

5 Which inequality is represented by the graph below?



(1) $y \leq 2x - 3$
(2) $y \geq 2x - 3$
(3) $y \leq -3x + 2$
(4) $y \geq -3x + 2$

Use this space for computations.

6 Michael borrows money from his uncle, who is charging him simple interest using the formula $I = Prt$. To figure out what the interest rate, r, is, Michael rearranges the formula to find r. His new formula is r equals

(1) $\frac{I-P}{t}$

(2) $\frac{P-I}{t}$

(3) $\frac{I}{Pt}$

(4) $\frac{Pt}{I}$

7 Which equation is equivalent to $y - 34 = x(x - 12)$?

(1) $y = (x - 17)(x + 2)$

(2) $y = (x - 17)(x - 2)$

(3) $y = (x - 6)^2 + 2$

(4) $y = (x - 6)^2 - 2$

8 The equation $A = 1300(1.02)^7$ is being used to calculate the amount of money in a savings account. What does 1.02 represent in this equation?

(1) 0.02% decay

(2) 0.02% growth

(3) 2% decay

(4) 2% growth

9 The zeros of the function $f(x) = 2x^2 - 4x - 6$ are

(1) 3 and −1

(2) 3 and 1

(3) −3 and 1

(4) −3 and −1

10 When $(2x - 3)^2$ is subtracted from $5x^2$, the result is

(1) $x^2 - 12x - 9$

(2) $x^2 - 12x + 9$

(3) $x^2 + 12x - 9$

(4) $x^2 + 12x + 9$

Use this space for computations.

11 Joe has a rectangular patio that measures 10 feet by 12 feet. He wants to increase the area by 50% and plans to increase each dimension by equal lengths, x. Which equation could be used to determine x?

(1) $(10 + x)(12 + x) = 120$
(2) $(10 + x)(12 + x) = 180$
(3) $(15 + x)(18 + x) = 180$
(4) $(15)(18) = 120 + x^2$

12 When factored completely, $x^3 - 13x^2 - 30x$ is

(1) $x(x + 3)(x - 10)$
(2) $x(x - 3)(x - 10)$
(3) $x(x + 2)(x - 15)$
(4) $x(x - 2)(x + 15)$

13 The table below shows the cost of mailing a postcard in different years. During which time interval did the cost increase at the greatest average rate?

Year	1898	1971	1985	2006	2012
Cost (¢)	1	6	14	24	35

(1) 1898–1971
(2) 1971–1985
(3) 1985–2006
(4) 2006–2012

14 When solving the equation $x^2 - 8x - 7 = 0$ by completing the square, which equation is a step in the process?

(1) $(x - 4)^2 = 9$
(2) $(x - 4)^2 = 23$
(3) $(x - 8)^2 = 9$
(4) $(x - 8)^2 = 23$

15 A construction company uses the function $f(p)$, where p is the number of people working on a project, to model the amount of money it spends to complete a project. A reasonable domain for this function would be

(1) positive integers
(2) positive real numbers
(3) both positive and negative integers
(4) both positive and negative real numbers

Use this space for computations.

16 Which function is shown in the table below?

x	f(x)
–2	$\frac{1}{9}$
–1	$\frac{1}{3}$
0	1
1	3
2	9
3	27

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

17 Given the functions $h(x) = \frac{1}{2}x + 3$ and $j(x) = |x|$, which value of x makes $h(x) = j(x)$?

(1) -2
(2) 2
(3) 3
(4) -6

18 Which recursively defined function represents the sequence 3, 7, 15, 31, …?

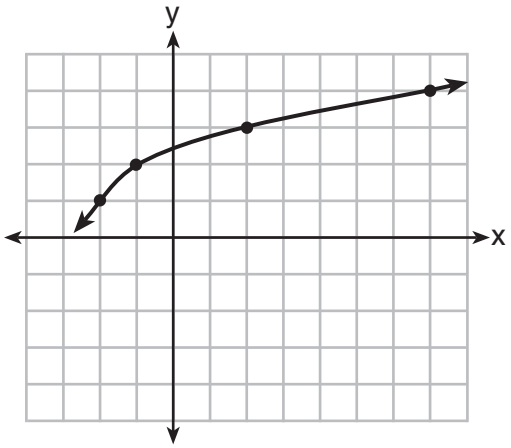
(1) $f(1) = 3,\ f(n + 1) = 2^{f(n)} + 3$
(2) $f(1) = 3,\ f(n + 1) = 2^{f(n)} - 1$
(3) $f(1) = 3,\ f(n + 1) = 2f(n) + 1$
(4) $f(1) = 3,\ f(n + 1) = 3f(n) - 2$

19 The range of the function defined as $y = 5^x$ is

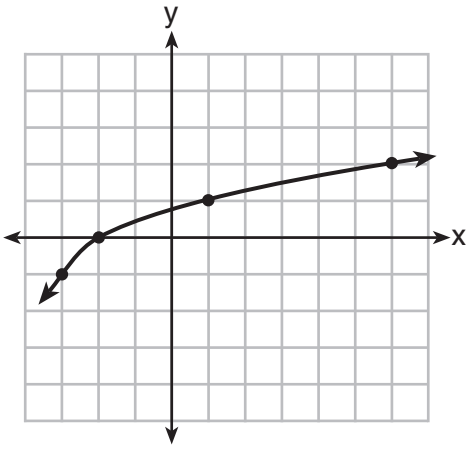
(1) $y < 0$
(2) $y > 0$
(3) $y \leq 0$
(4) $y \geq 0$

Use this space for computations.

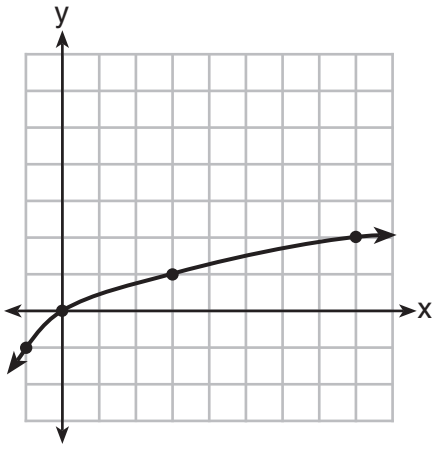
20 The graph of $y = f(x)$ is shown below.



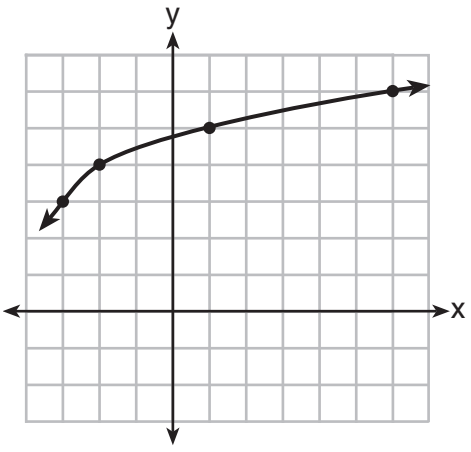
What is the graph of $y = f(x + 1) - 2$?



(1)



(3)



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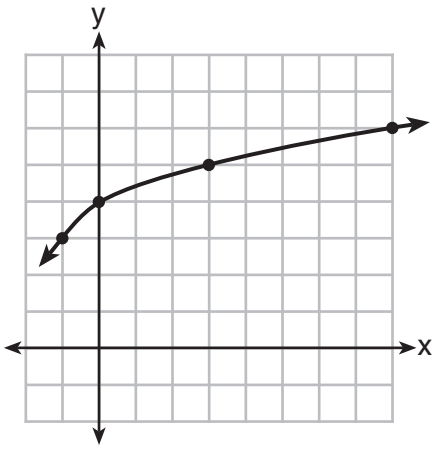


(4)

Use this space for computations.

21 Which pair of equations could *not* be used to solve the following equations for x and y?

$$4x + 2y = 22$$
$$-2x + 2y = -8$$

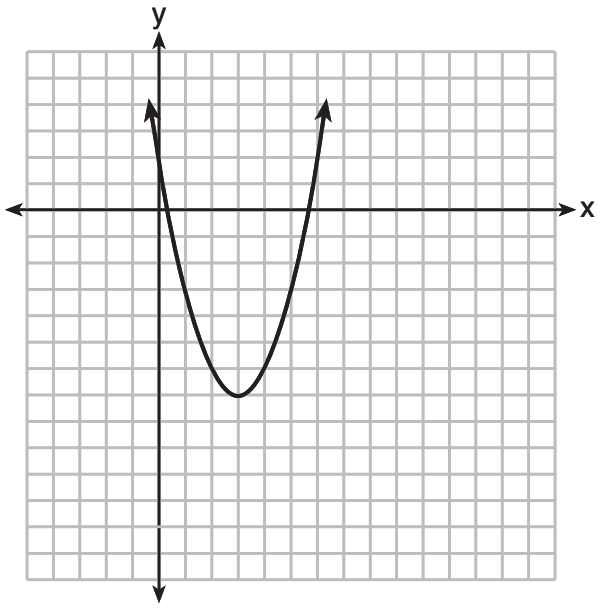
(1) $4x + 2y = 22$
$2x - 2y = 8$

(2) $4x + 2y = 22$
$-4x + 4y = -16$

(3) $12x + 6y = 66$
$6x - 6y = 24$

(4) $8x + 4y = 44$
$-8x + 8y = -8$

22 The graph representing a function is shown below.



Which function has a minimum that is *less* than the one shown in the graph?

(1) $y = x^2 - 6x + 7$

(2) $y = |x + 3| - 6$

(3) $y = x^2 - 2x - 10$

(4) $y = |x - 8| + 2$

Use this space for computations.

23 Grisham is considering the three situations below.

I. For the first 28 days, a sunflower grows at a rate of 3.5 cm per day.

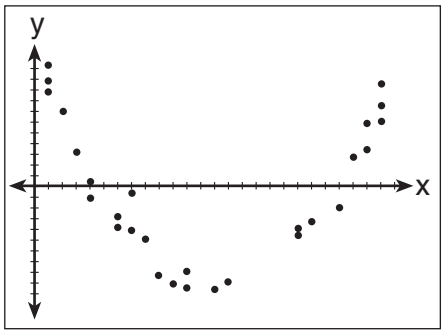
II. The value of a car depreciates at a rate of 15% per year after it is purchased.

III. The amount of bacteria in a culture triples every two days during an experiment.

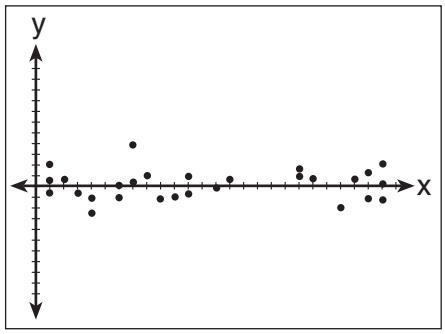
Which of the statements describes a situation with an equal difference over an equal interval?

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

24 After performing analyses on a set of data, Jackie examined the scatter plot of the residual values for each analysis. Which scatter plot indicates the best linear fit for the data?



(1)



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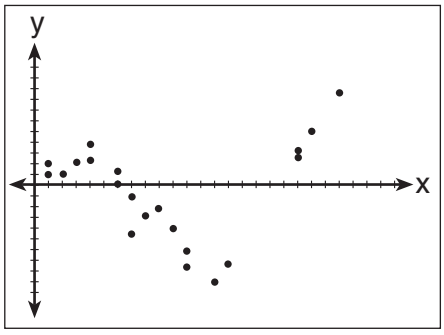
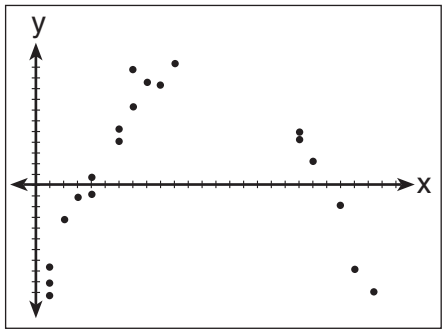


(2)



(4)

Part II

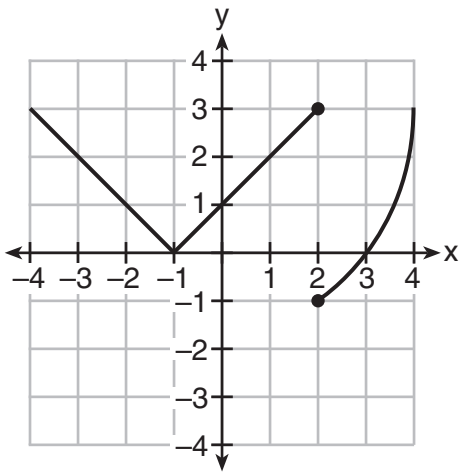
Answer all 8 questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily 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 The function, $t(x)$, is shown in the table below.

x	t(x)
–3	10
–1	7.5
1	5
3	2.5
5	0

Determine whether $t(x)$ is linear or exponential. Explain your answer.

26 Marcel claims that the graph below represents a function.

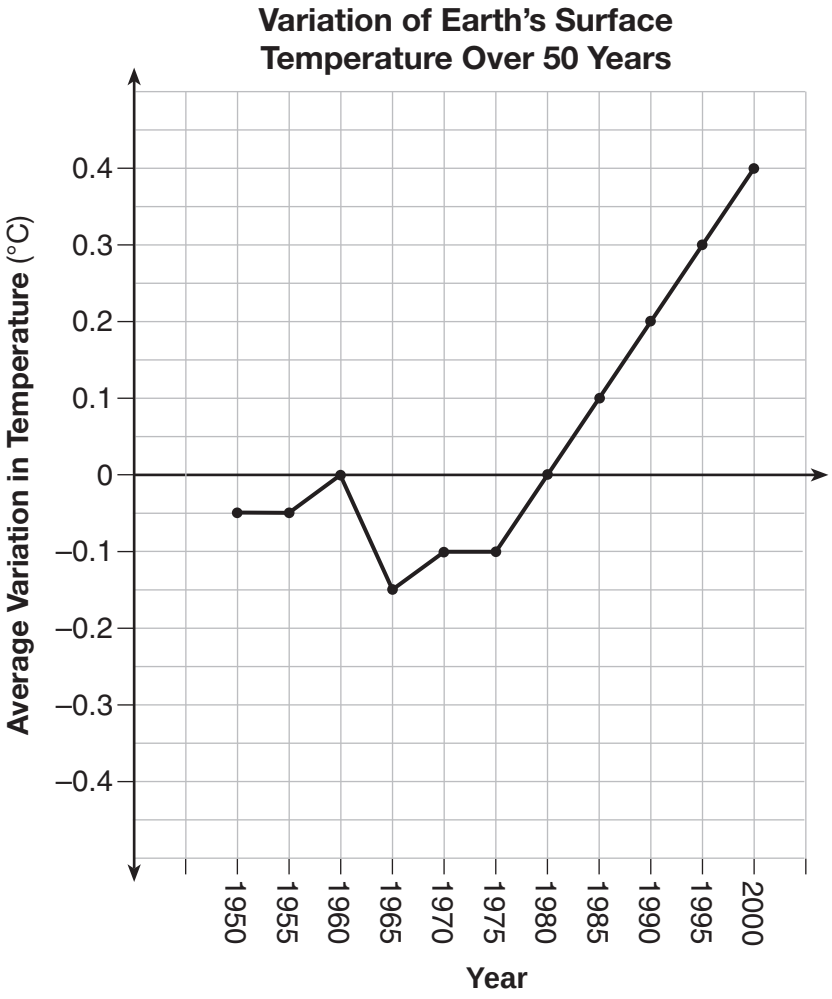


State whether Marcel is correct. Justify your answer.

27 Solve the equation for y.

$$(y - 3)^2 = 4y - 12$$

28 The graph below shows the variation in the average temperature of Earth's surface from 1950–2000, according to one source.



During which years did the temperature variation change the most per unit time? Explain how you determined your answer.

29 The cost of belonging to a gym can be modeled by $C(m) = 50m + 79.50$, where $C(m)$ is the total cost for m months of membership.

State the meaning of the slope and y-intercept of this function with respect to the costs associated with the gym membership.

30 A statistics class surveyed some students during one lunch period to obtain opinions about television programming preferences. The results of the survey are summarized in the table below.

Programming Preferences

	Comedy	Drama
Male	70	35
Female	48	42

Based on the sample, predict how many of the school's 351 males would prefer comedy. Justify your answer.

31 Given that $a > b$, solve for x in terms of a and b:

$$b(x - 3) \geq ax + 7b$$

32 Jacob and Jessica are studying the spread of dandelions. Jacob discovers that the growth over t weeks can be defined by the function $f(t) = (8) \bullet 2^t$. Jessica finds that the growth function over t weeks is $g(t) = 2^{t+3}$.

Calculate the number of dandelions that Jacob and Jessica will each have after 5 weeks.

Based on the growth from both functions, explain the relationship between $f(t)$ and $g(t)$.

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 Let $h(t) = -16t^2 + 64t + 80$ represent the height of an object above the ground after t seconds. Determine the number of seconds it takes to achieve its maximum height. Justify your answer.

State the time interval, in seconds, during which the height of the object *decreases*. Explain your reasoning.

34 Fred's teacher gave the class the quadratic function $f(x) = 4x^2 + 16x + 9$.

a) State two different methods Fred could use to solve the equation $f(x) = 0$.

b) Using one of the methods stated in part *a*, solve $f(x) = 0$ for x, to the *nearest tenth*.

35 Erica, the manager at Stellarbeans, collected data on the daily high temperature and revenue from coffee sales. Data from nine days this past fall are shown in the table below.

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9
High Temperature, t	54	50	62	67	70	58	52	46	48
Coffee Sales, f(t)	$2900	$3080	$2500	$2380	$2200	$2700	$3000	$3620	$3720

State the linear regression function, $f(t)$, that estimates the day's coffee sales with a high temperature of t. Round all values to the *nearest integer*.

State the correlation coefficient, r, of the data to the *nearest hundredth.* Does r indicate a strong linear relationship between the variables? Explain your reasoning.

36 A contractor has 48 meters of fencing that he is going to use as the perimeter of a rectangular garden. The length of one side of the garden is represented by x, and the area of the garden is 108 square meters.

Determine, algebraically, the dimensions of the garden in meters.

Part IV

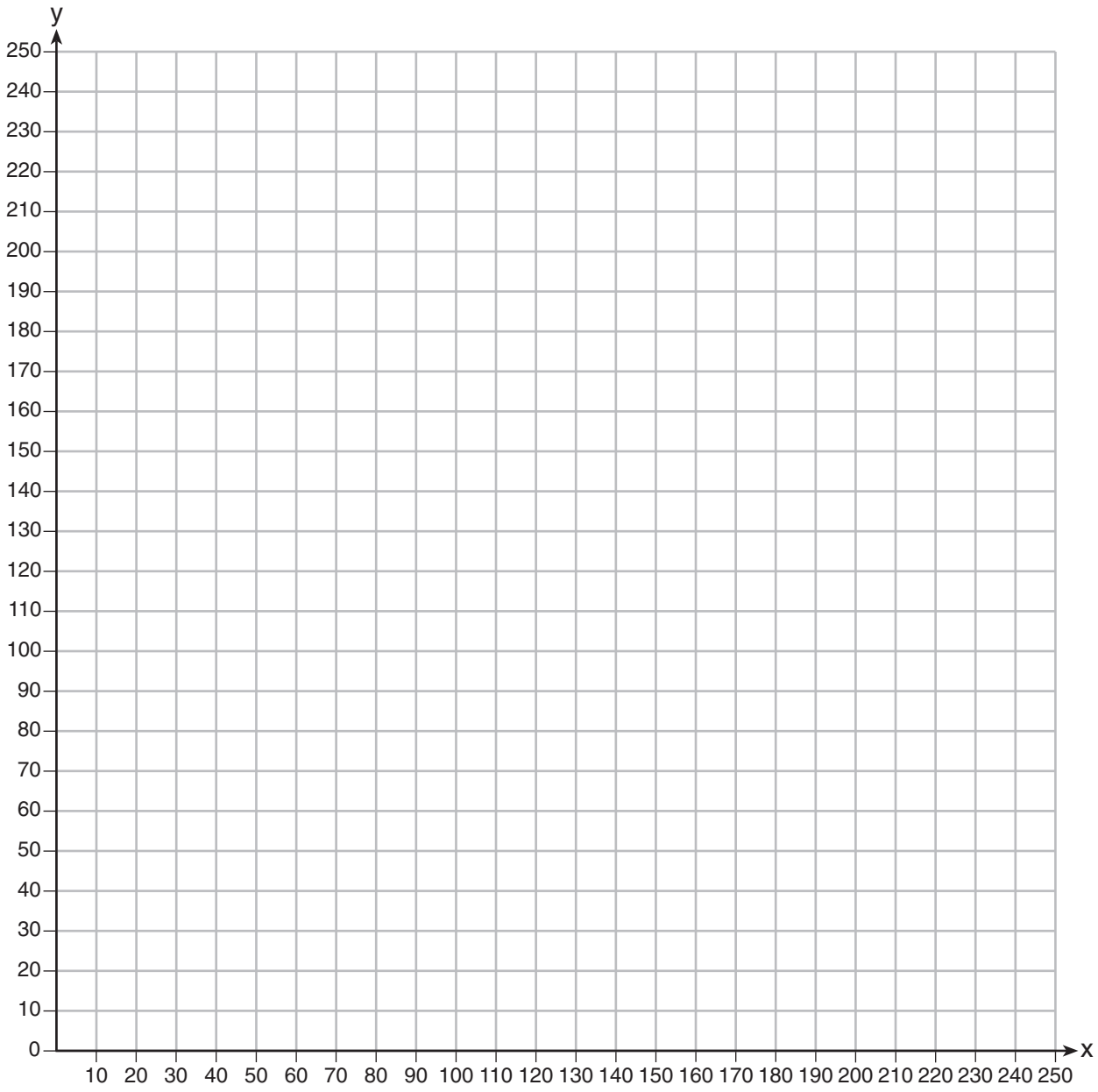
Answer the question in this part. A correct answer will receive 6 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided to determine your answer. Note that diagrams are not necessarily drawn to scale. 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 The Reel Good Cinema is conducting a mathematical study. In its theater, there are 200 seats. Adult tickets cost \$12.50 and child tickets cost \$6.25. The cinema's goal is to sell at least \$1500 worth of tickets for the theater.

Write a system of linear inequalities that can be used to find the possible combinations of adult tickets, x, and child tickets, y, that would satisfy the cinema's goal.

Graph the solution to this system of inequalities on the set of axes on the next page. Label the solution with an S.

Marta claims that selling 30 adult tickets and 80 child tickets will result in meeting the cinema's goal. Explain whether she is correct or incorrect, based on the graph drawn.


y
250
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200
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160
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x
10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250

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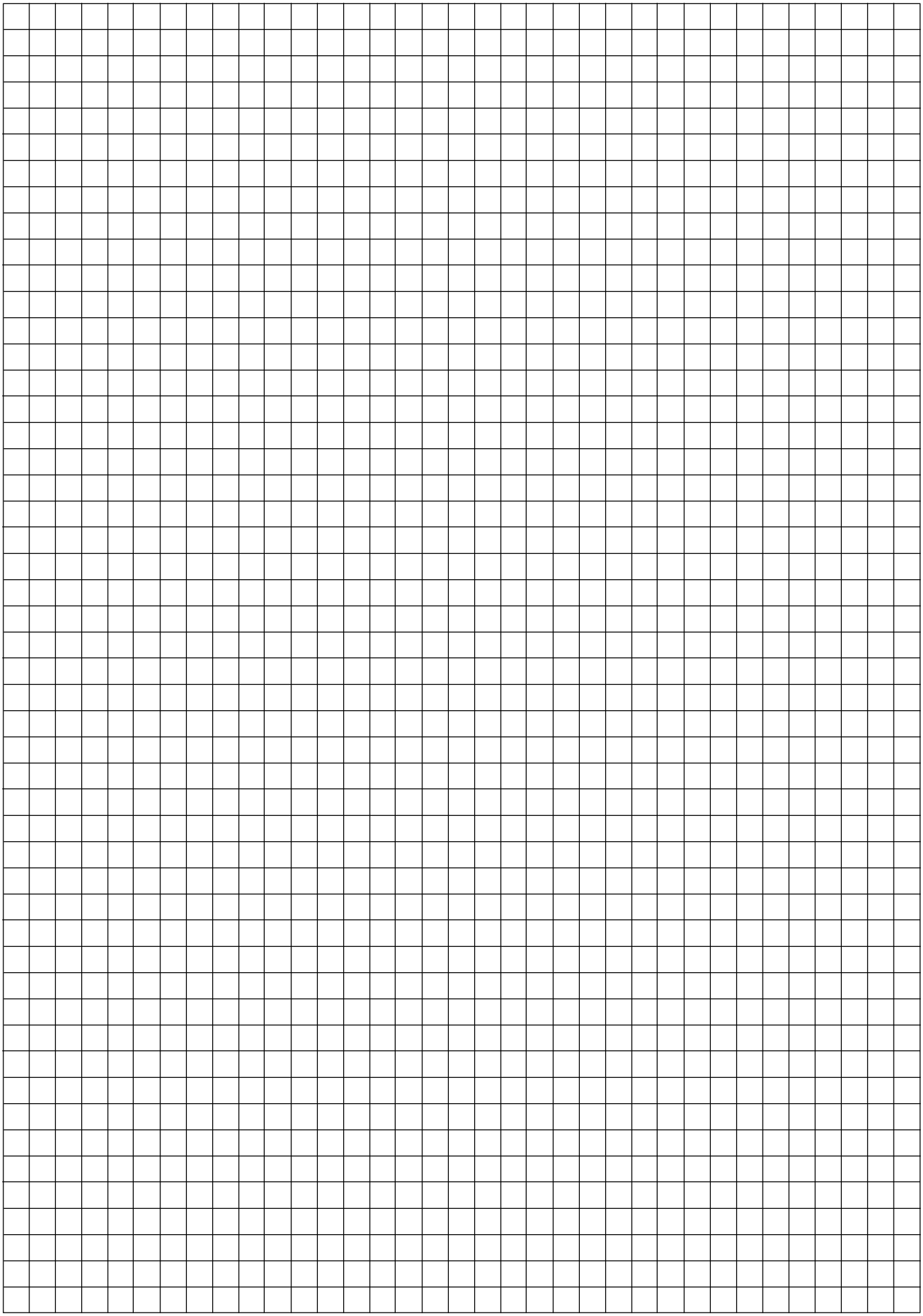

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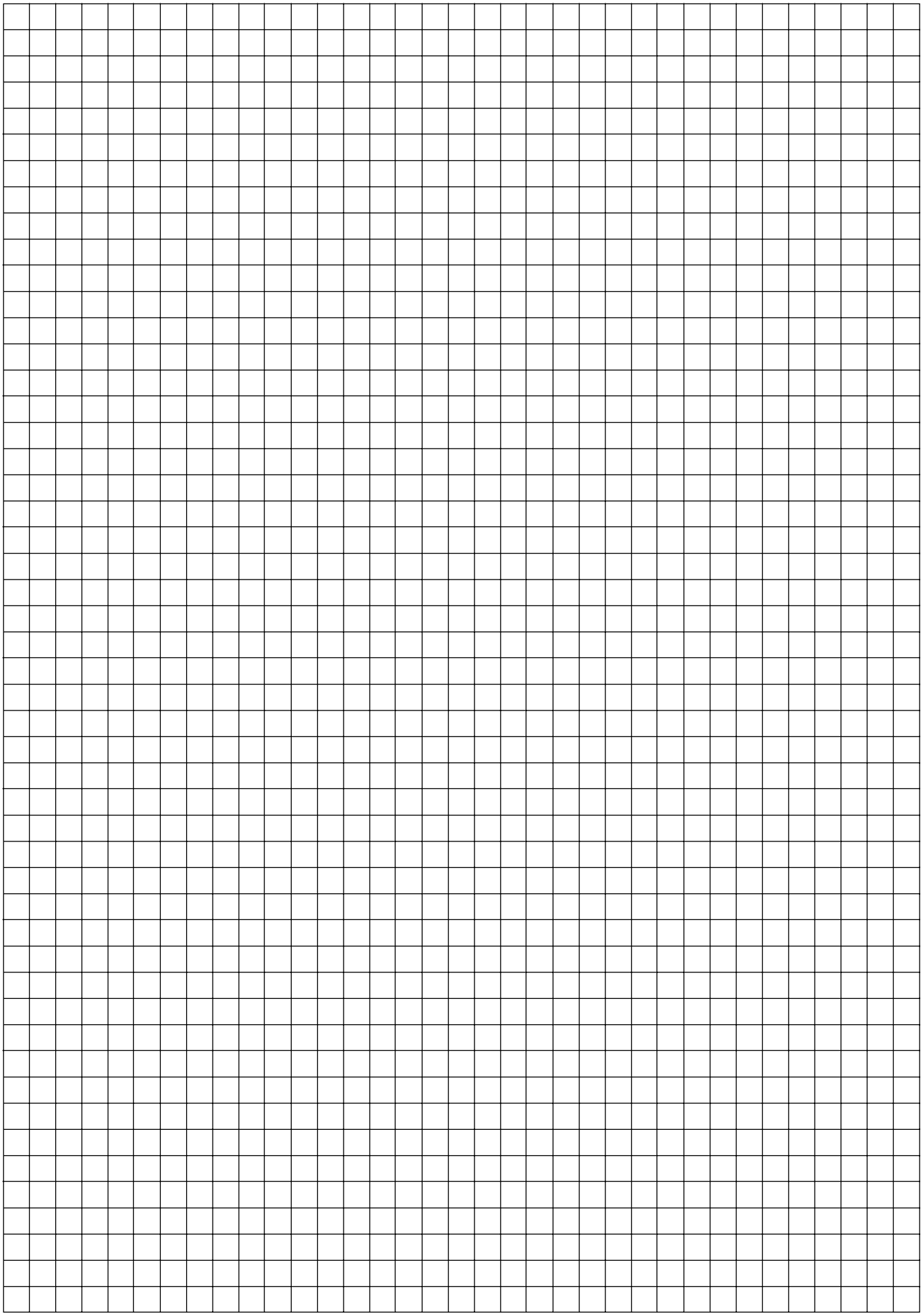

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High School Math Reference Sheet

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	$A = A_0 e^{k(t - t_0)} + B_0$

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ALGEBRA I (COMMON CORE)

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FOR TEACHERS ONLY

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

ALGEBRA I (Common Core)

Thursday, January 28, 2016 — 1:15 to 4:15 p.m., only

SCORING KEY AND RATING GUIDE

Mechanics of Rating

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

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 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.

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.p12.nysed.gov/assessment/ by Thursday, January 28, 2016. 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.

If the student's responses for the multiple-choice questions are being hand scored prior to being scanned, the scorer must be careful not to make any marks on the answer sheet except to record the scores in the designated score boxes. Marks elsewhere on the answer sheet will interfere with the accuracy of the scanning.

Part I

Allow a total of 48 credits, 2 credits for each of the following.

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

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.p12.nysed.gov/assessment/ 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 (Common Core). This guidance is recommended 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/.

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 (Common Core) 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 (Common Core)*, 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]** Linear, and a correct explanation is given.

[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] Linear, but an incomplete explanation is given.

[0] Linear, but no explanation or an incorrect explanation is given.

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]** No, and a correct justification is given.

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

or

[1] No, but an incomplete justification is given.

[0] No, but no justification or an incorrect justification is given.

or

[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]** 7 and 3, and correct work is shown.

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

or

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

or

[1] Appropriate work is shown to find 7 or 3, but no further correct work is shown.

or

[1] 7 and 3, 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]** 1960–1965, 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, such as stating 1975–2000.

or

[1] An incorrect interval is written, but an appropriate explanation is written.

or

[1] 1960–1965, but no explanation or an incorrect explanation is written.

[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 slope is the cost per month and the y-intercept is the initial cost, or similar statements are made.

[1] One conceptual error is made, such as reversing the descriptions.

or

[1] Only one statement is correct.

[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]** 234, and a correct justification is given.

[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] Appropriate work is shown to find $\frac{70}{105}$ or an equivalent fraction, but no further correct work is shown.

or

[1] 234, but no justification is given.

[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]** $x \leq \frac{10b}{b-a}$, or $x \leq \frac{-10b}{a-b}$, or an equivalent inequality is written, 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, such as writing $x \geq \frac{10b}{b-a}$.

or

[1] $x \leq \frac{10b}{b-a}$, 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.

(32) **[2]** Jacob has 256, Jessica has 256, 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] Jacob has 256, Jessica has 256, but no further correct work is shown.

or

[1] A correct explanation 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.

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]** 2, a correct justification is given, a correct interval is stated, and a correct explanation is written.

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

or

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

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

or

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

or

[2] Appropriate work is shown to find 2, but no further correct work is shown.

or

[2] A correct interval is stated and a correct explanation is written, but no further correct work is shown.

or

[2] 2 and a correct interval are stated, but no work is shown and no explanation is written.

[1] Appropriate work is shown, but one conceptual error and one computational or graphing error are made.

or

[1] 2 or a correct interval is stated, but no work is shown, and no explanation is written.

[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]** Two methods are stated, and -0.7 and -3.3 are written, and correct work is shown.

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

or

[3] Appropriate work is shown, but only one method is stated, and -0.7 and -3.3 are written.

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

or

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

or

[2] Two methods are stated, but no further correct work is shown.

or

[2] Appropriate work is shown to find -0.7 and -3.3, but no further correct work is shown.

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

or

[1] One method is stated, but no further correct work is shown.

or

[1] -0.7 and -3.3 are written, 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.

(35) **[4]** $f(t) = -58t + 6182$, -0.94, and a correct explanation is written that indicates it has a strong correlation.

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

or

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

or

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

or

[3] Appropriate work is shown, but the equation is not written in terms of t and $f(t)$.

or

[3] An incorrect linear regression equation is written, but a correlation coefficient is written with an appropriate explanation.

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

or

[2] -0.94, and a correct explanation is written.

or

[2] A correct equation is written, but no further correct work is shown.

[1] -0.94, but no further correct work is shown.

or

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

[0] Yes, but no further correct work is shown.

or

[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]** 6 and 18, and correct algebraic work is shown.

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

or

[3] Appropriate work is shown to find one correct dimension, but no further correct work is shown.

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

or

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

or

[2] A correct quadratic equation in standard form is written, but no further correct work is shown.

or

[2] Appropriate work is shown to find $(x - 12)^2 = 36$, but no further correct work is shown.

or

[2] 6 and 18, but a method other than algebraic is used.

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

or

[1] A correct equation in one variable or a correct system of equations is written, but no further correct work is shown.

or

[1] 6 and 18, 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 IV

For each 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]** A correct system of inequalities is written and graphed correctly, and at least one is labeled, the solution is labeled *S*, and a correct explanation, based on the graph, that the claim is incorrect is given.

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

or

[5] Appropriate work is shown, but the explanation is not based on the graph.

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

or

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

or

[4] A correct system of inequalities is written and graphed and the solution is labeled, but no further correct work is shown.

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

[2] Appropriate work is shown, but two conceptual errors are made.

or

[2] Appropriate work is shown, but one conceptual error and two or more computational, graphing, or labeling errors are made.

or

[2] A correct system of inequalities is written, but no further correct work is shown.

or

[2] Only one inequality is written and graphed, but no further correct work is shown.

[1] Only one inequality is written correctly, but no further correct work is shown.

or

[1] Appropriate work is shown, but two conceptual errors and one computational, graphing, or labeling error are made.

or

[1] Marta is incorrect is written, but a method other than a graph is used as an explanation.

[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 Common Core Learning Standards
Algebra I (Common Core)
January 2016

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

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

Regents Examination in Algebra I (Common Core)

January 2016

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

The *Chart for Determining the Final Examination Score for the January 2016 Regents Examination in Algebra I (Common Core)* will be posted on the Department's web site at: http://www.p12.nysed.gov/assessment/ by Thursday, January 28, 2016. Conversion charts provided for previous administrations of the Regents Examination in Algebra I (Common Core) 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.forms2.nysed.gov/emsc/osa/exameval/reexameval.cfm.

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 (Common Core)

Thursday, January 28, 2016 — 1:15 to 4:15 p.m.

MODEL RESPONSE SET

Table of Contents

Question 25

25 The function, $t(x)$, is shown in the table below.

x	t(x)
–3	10
–1	7.5
1	5
3	2.5
5	0

2(-2.5
2(-2.5
2(-2.5

Determine whether $t(x)$ is linear or exponential. Explain your answer.

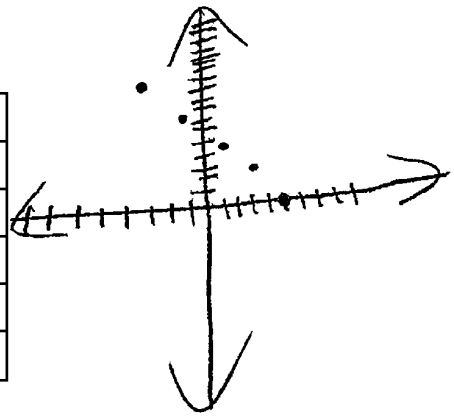
Linear because it has a constant rate of change.

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

Question 25

25 The function, $t(x)$, is shown in the table below.

x	t(x)
–3	10
–1	7.5
1	5
3	2.5
5	0



Determine whether $t(x)$ is linear or exponential. Explain your answer.

Linear because it goes in a straight line

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

Question 25

25 The function, $t(x)$, is shown in the table below.

x	t(x)
–3	10
–1	7.5
1	5
3	2.5
5	0

Determine whether $t(x)$ is linear or exponential. Explain your answer.

t(x) is linear because they have a pattern going on.

Score 1: The student stated linear, but gave an incomplete explanation.

Question 25

25 The function, $t(x)$, is shown in the table below.

x	t(x)
–3	10
–1	7.5
1	5
3	2.5
5	0

Determine whether $t(x)$ is linear or exponential. Explain your answer.

from my calculator I found
$y = -1.25x + 6.25$
and
$r = -1$

Score 1: The student did not state linear.

Question 25

25 The function, $t(x)$, is shown in the table below.

x	t(x)
–3	10
–1	7.5
1	5
3	2.5
5	0

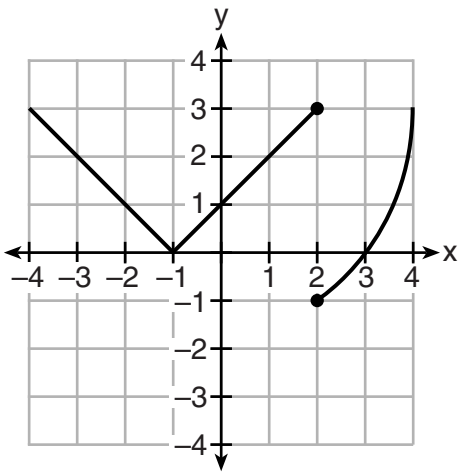
Determine whether $t(x)$ is linear or exponential. Explain your answer.

Exponential. There is no pattern.

Score 0: The student gave a completely incorrect response.

Question 26

26 Marcel claims that the graph below represents a function.



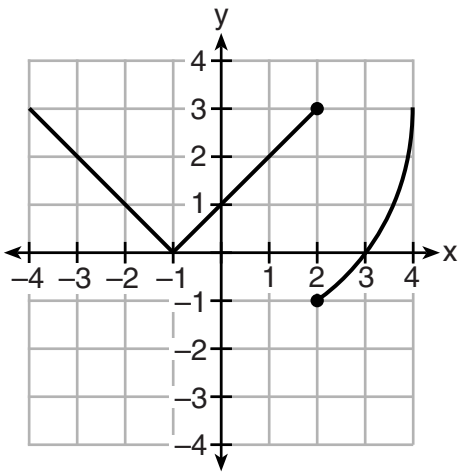
State whether Marcel is correct. Justify your answer.

No, Marcel is not correct because for it to be a function there can only be one y for every x value, but this is not the case.

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

Question 26

26 Marcel claims that the graph below represents a function.



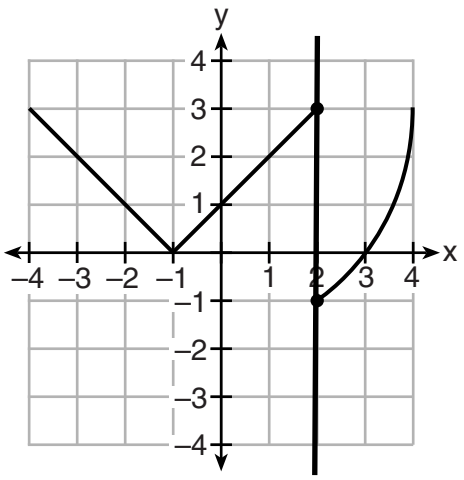
State whether Marcel is correct. Justify your answer.

No, It doesn't pass the vertical line test

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

Question 26

26 Marcel claims that the graph below represents a function.



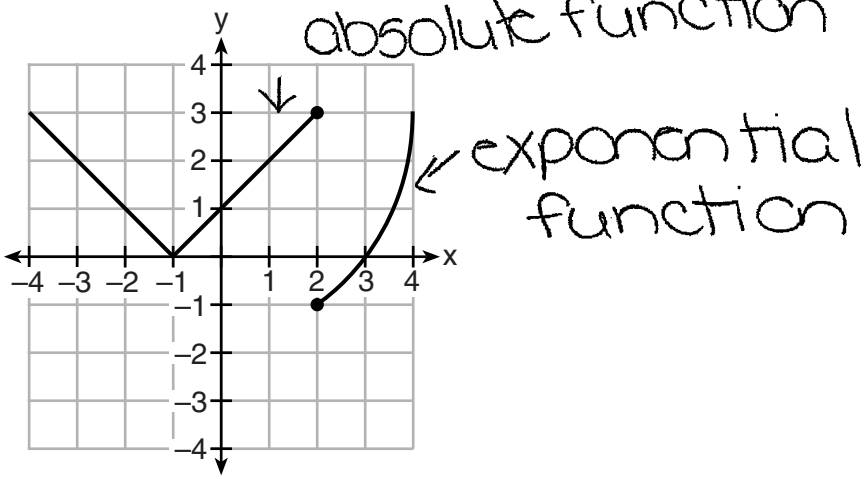
State whether Marcel is correct. Justify your answer.

No

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

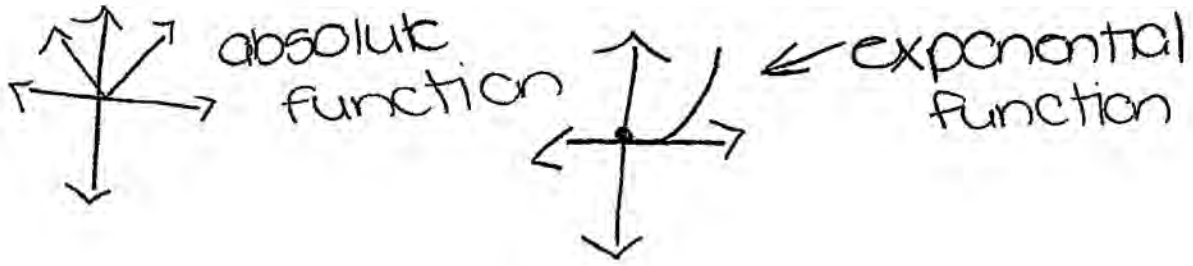
Question 26

26 Marcel claims that the graph below represents a function.



State whether Marcel is correct. Justify your answer.

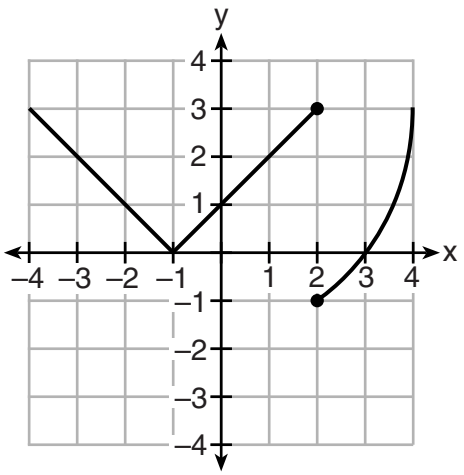
yes this represents a function. X valuc's don't repeat.



Score 1: The student treated the original graph as two separate functions.

Question 26

26 Marcel claims that the graph below represents a function.



State whether Marcel is correct. Justify your answer.

Marcel is not correct, because one of them doesnt have a y-intercept. And the other one starts at (3,2) decends to (-1,0), then goes back up to (-4,3). so neither of these graphs are a function.

Score 0: The student gave an incorrect justification.

Question 27

27 Solve the equation for y.

$$(y - 3)^2 = 4y - 12$$

$y^2-6y+9=4y-12$

$y^2-6y+9=4y-12$

$+12 \quad +12$

$y^2-6y+21=4y$

$-4y \quad -4y$

$y^2-10y+21=0$

$(y-3)(y-7)=0$

$\{7,3\}$

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

Question 27

27 Solve the equation for y.

$$(y - 3)^2 = 4y - 12$$

graphing calc

enter $Y_1 = (X-3)^2$

$Y_2 = 4X - 12$

X	Y_1	Y_2
0	9	-12
1	4	-8
2	1	-4
3	0	0
4	1	4
5	4	8
6	9	12
7	16	16

$Y = 3$

$Y = 7$

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

Question 27

27 Solve the equation for y.

$$(y - 3)^2 = 4y - 12$$

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

$y-3 = 4$

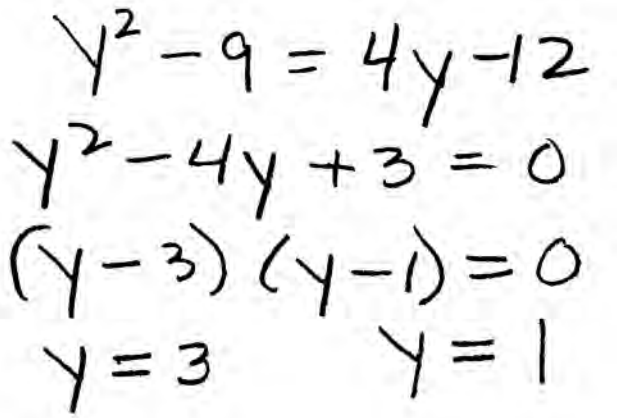
$y = 7$

Score 1: The student divided each side of the equation by $(y - 3)$, which resulted in finding only one solution.

Question 27

27 Solve the equation for y.

$$(y - 3)^2 = 4y - 12$$



Score 1: The student squared the binomial incorrectly.

Question 27

27 Solve the equation for y.

$$(y - 3)^2 = 4y - 12$$

$y^2 - 6y + 9 = 4y - 12$

$-4y + 12 = -4y + 12$

$y^2 - 10y + 21 = 0$

$(y - 3)(y - 7) = 0$

Score 1: The student did not state the solution.

Question 27

27 Solve the equation for y.

$(y - 3)^2 = 4y - 12$

$y^2 - 6y + 9 = 4y - 12$

$-4y \quad -4y$

$y^2 - 10y + 9 = -12$

$y^2 - 10y + 21 = 0$

$(y-3)(y-3)$

$y^2 - 3y - 3y + 9$

$y^2 - 6y + 9$

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

Question 27

27 Solve the equation for y.

$$(y - 3)^2 = 4y - 12$$

$(y-3)(y-3)=4y-12$

$y^2-3y-3y+9=4y-12$

$y^2-6y+9=4y-12$

$+6y \quad +6y$

$y^2+9=10y-12$

$-9 \quad -9$

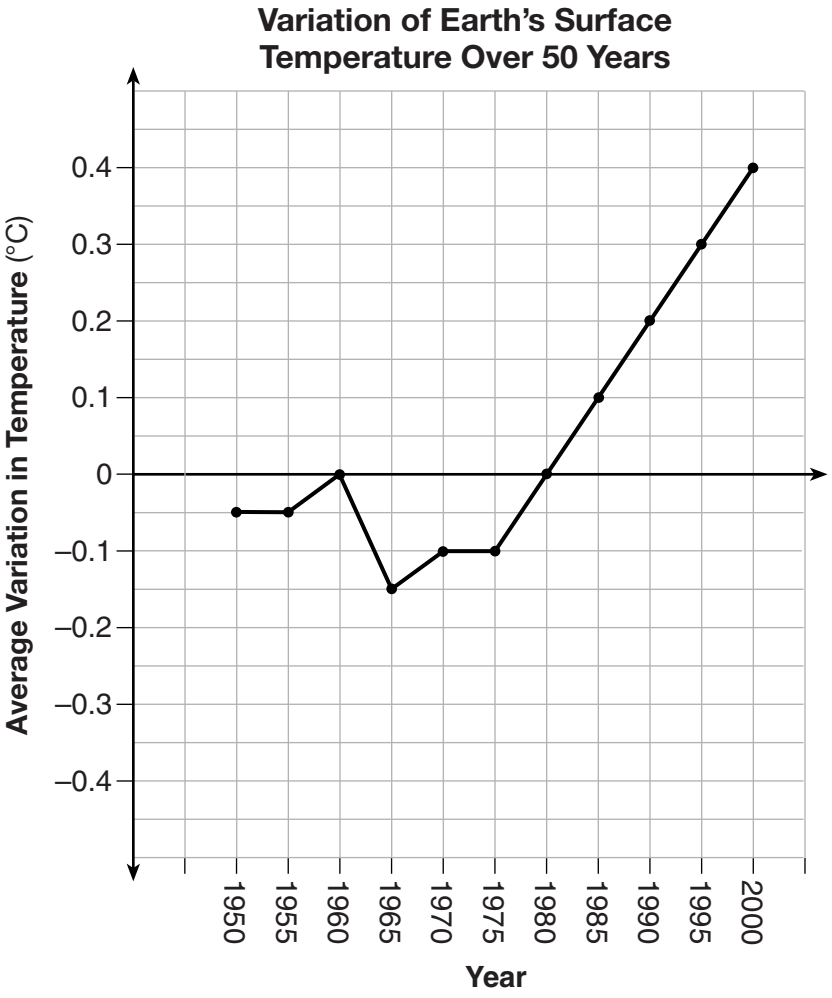
$\sqrt{y^2}=\sqrt{10y-21}$

$\sqrt{y^2}=-21$

Score 0: The student made multiple errors.

Question 28

28 The graph below shows the variation in the average temperature of Earth's surface from 1950–2000, according to one source.



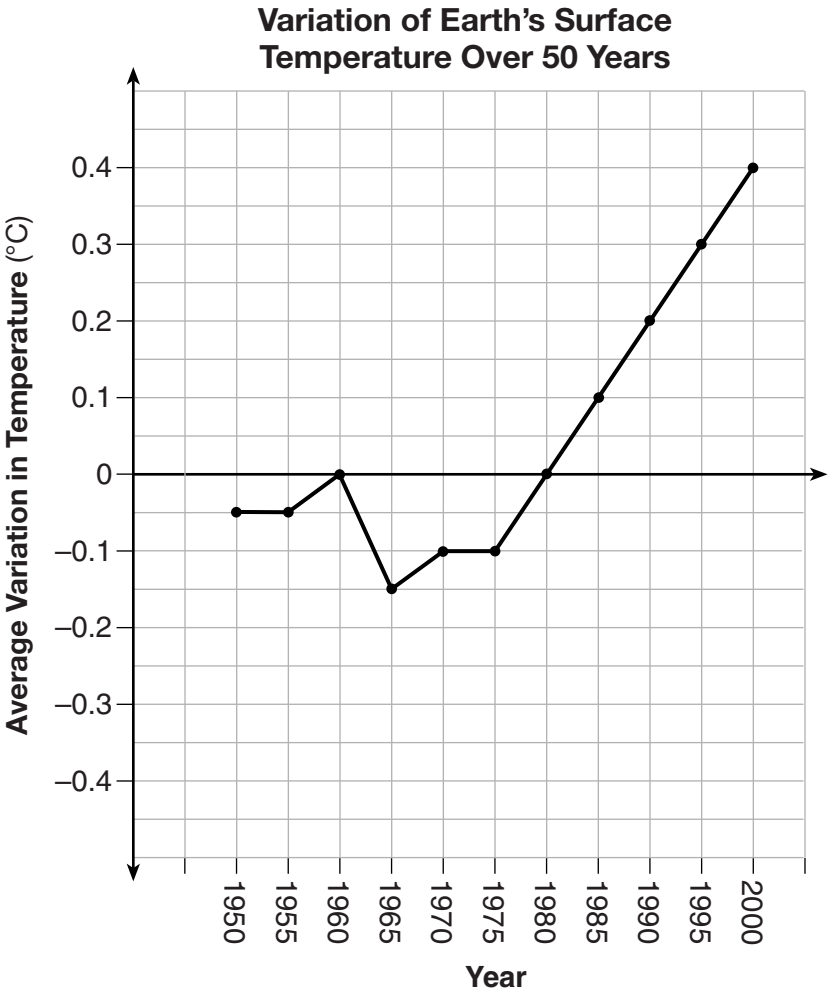
During which years did the temperature variation change the most per unit time? Explain how you determined your answer.

Between 1960 - 1965 because in the 5 year they decrease by 0.15 and the other are increase or decrease by 0.1 or less.

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

Question 28

28 The graph below shows the variation in the average temperature of Earth's surface from 1950–2000, according to one source.



During which years did the temperature variation change the most per unit time? Explain how you determined your answer.

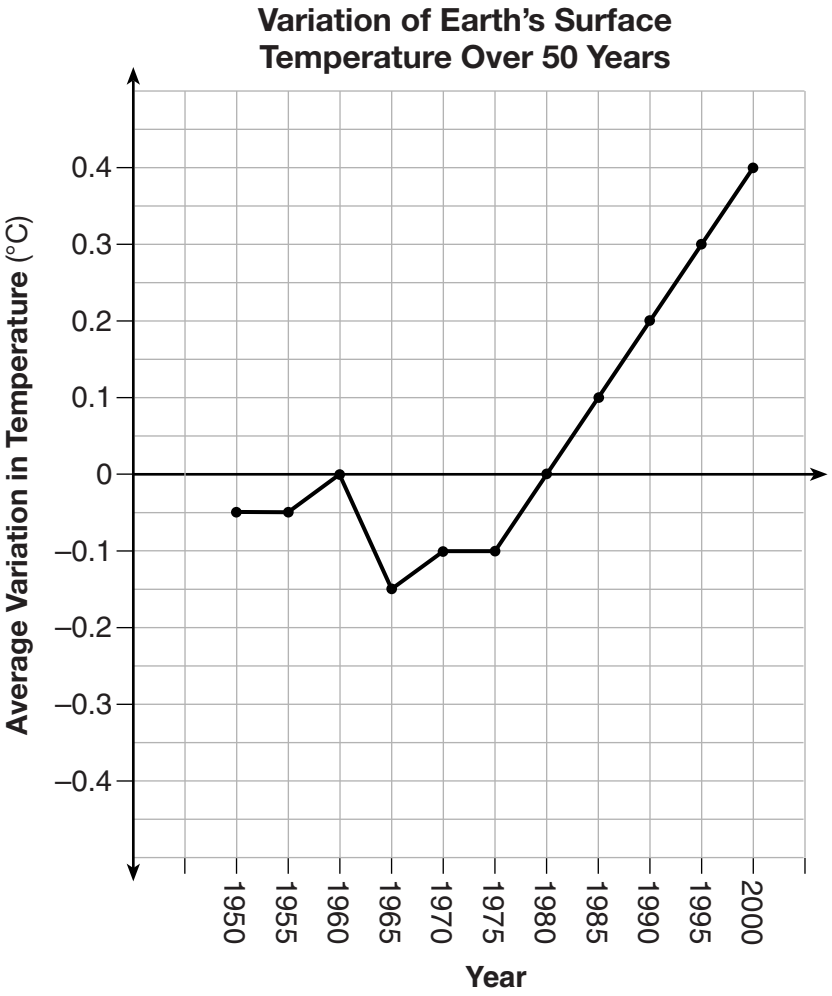
from 1960 to 1965

the graph has the steepest slope

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

Question 28

28 The graph below shows the variation in the average temperature of Earth's surface from 1950–2000, according to one source.



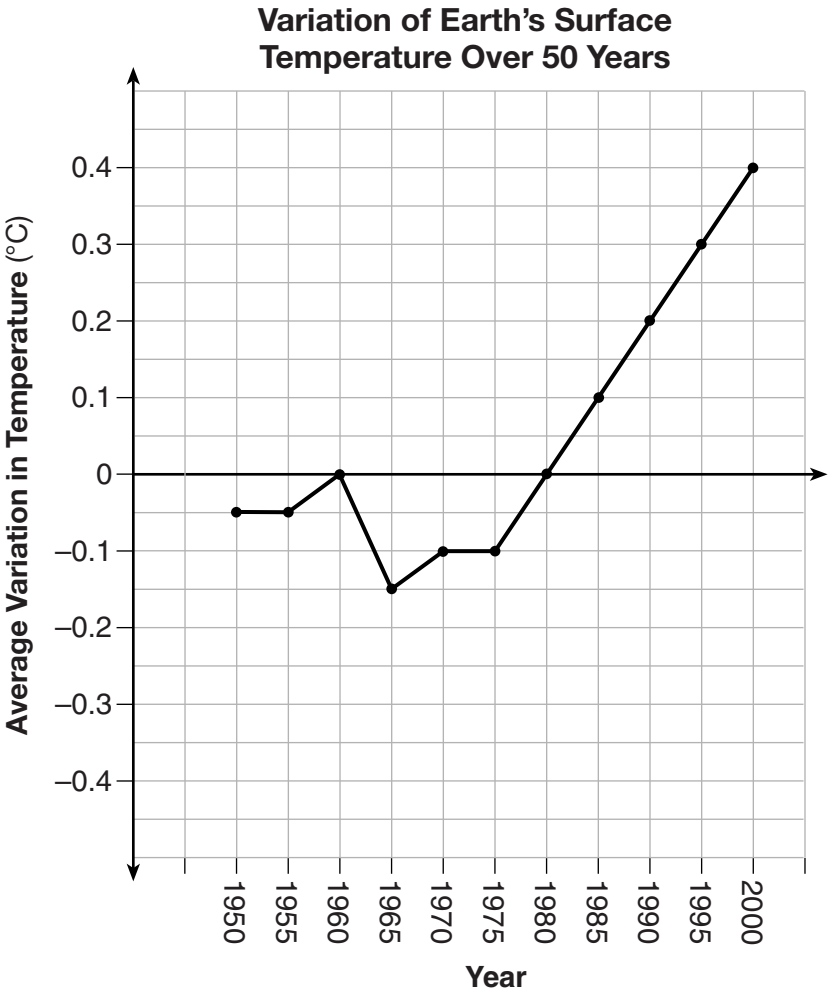
During which years did the temperature variation change the most per unit time? Explain how you determined your answer.

The temperature changed the most from 1960 to 1965. I know this change is the biggest because the temperature goes from 0°C to −.15°C.

Score 1: The student gave an explanation that is not completely correct. The rate of change of the interval was not compared to other intervals' rates of change.

Question 28

28 The graph below shows the variation in the average temperature of Earth's surface from 1950–2000, according to one source.



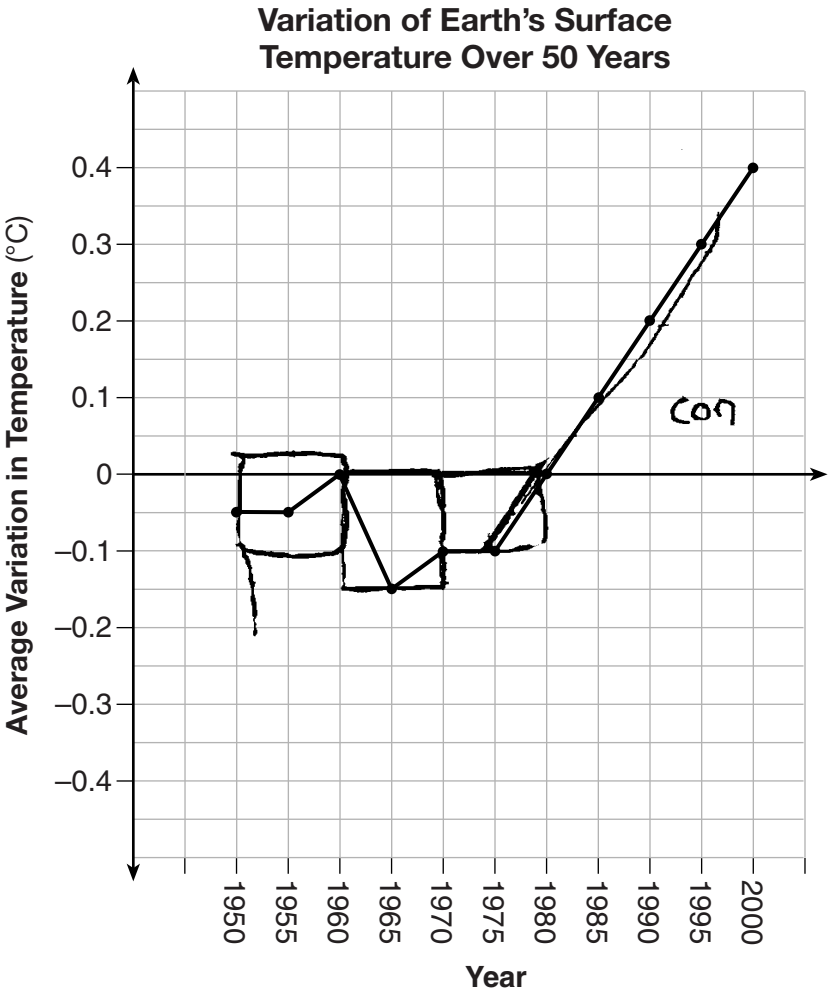
During which years did the temperature variation change the most per unit time? Explain how you determined your answer.

1960-1965, I determined my answer by using the slope of the line.

Score 1: The student did not indicate how the slope was used in comparison with other intervals.

Question 28

28 The graph below shows the variation in the average temperature of Earth's surface from 1950–2000, according to one source.



During which years did the temperature variation change the most per unit time? Explain how you determined your answer.

1960 → 1970

Changes the most in 10 years

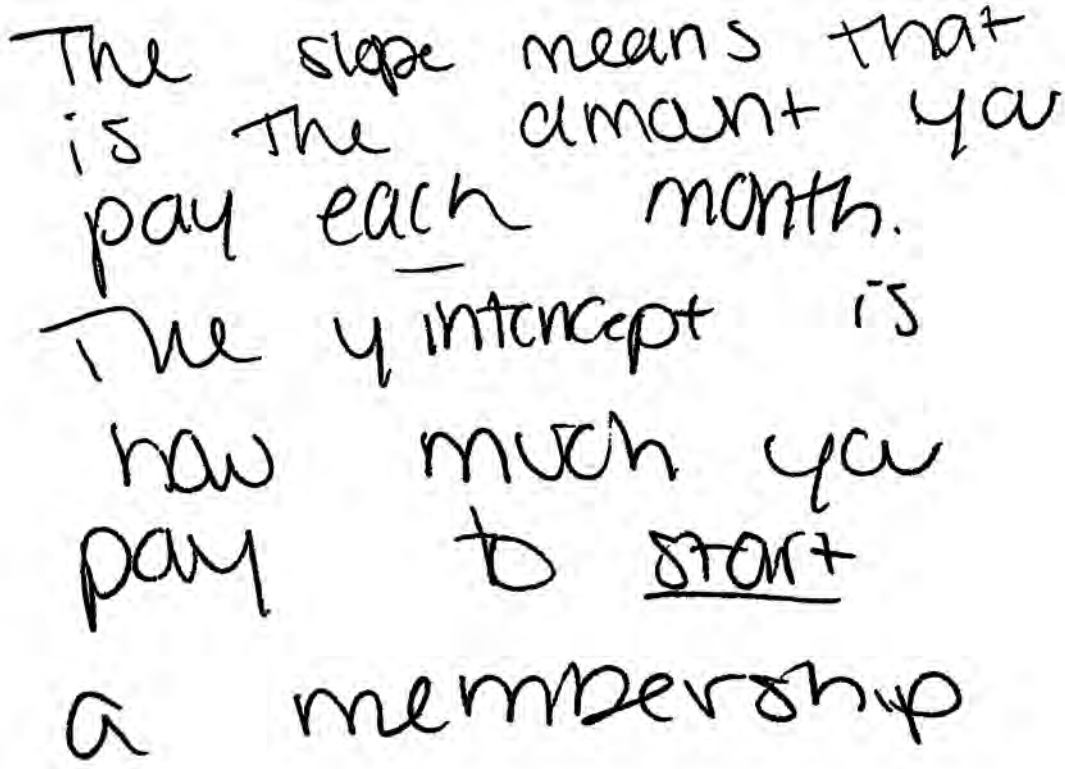
$\frac{\Delta y}{\Delta x}$ $\frac{1965-1960}{-1.5-0}$ $\frac{5}{-1.5}$ $= -3\frac{1}{3}$ $\frac{\Delta y}{\Delta y}$ $\frac{1970-1965}{-1.0+1.5}$ $\frac{5}{.5}$ $= 10$

Score 0: The student gave a completely incorrect response.

Question 29

29 The cost of belonging to a gym can be modeled by $C(m) = 50m + 79.50$, where $C(m)$ is the total cost for m months of membership.

State the meaning of the slope and y-intercept of this function with respect to the costs associated with the gym membership.



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

Question 29

29 The cost of belonging to a gym can be modeled by $C(m) = 50m + 79.50$, where $C(m)$ is the total cost for m months of membership.

State the meaning of the slope and y-intercept of this function with respect to the costs associated with the gym membership.

slope = How much the prices kept on increasing

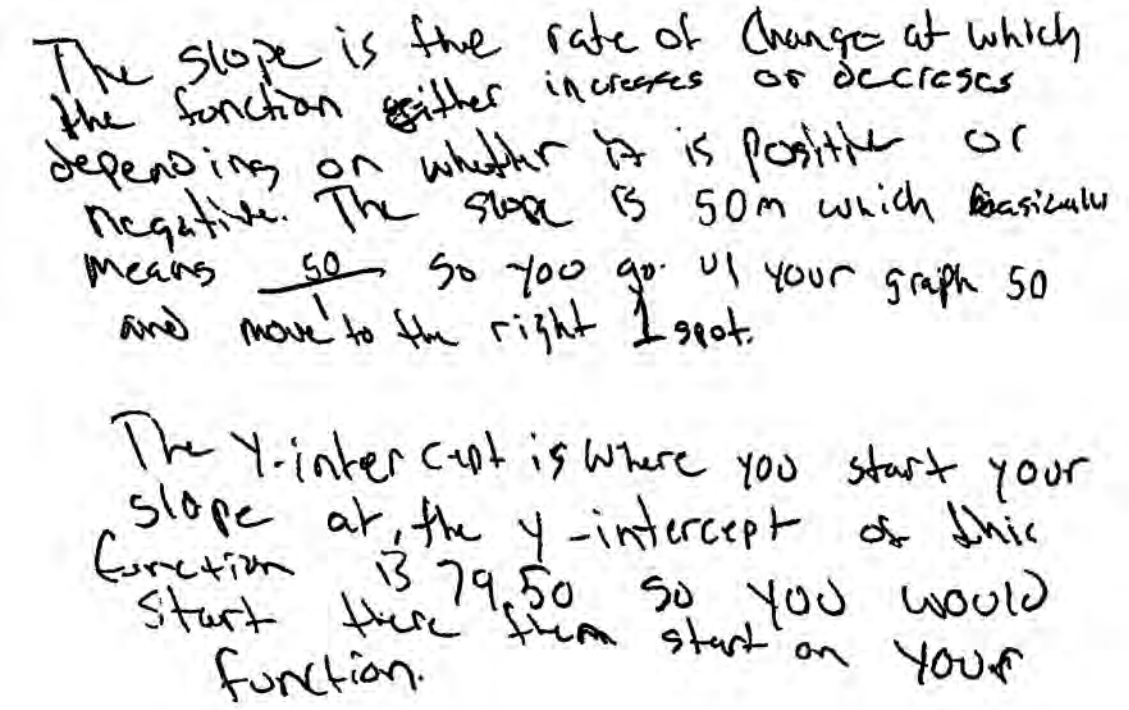
y-int = Is where the starting cost of the health club membership was.

Score 1: The student correctly stated the meaning of the y-intercept.

Question 29

29 The cost of belonging to a gym can be modeled by $C(m) = 50m + 79.50$, where $C(m)$ is the total cost for m months of membership.

State the meaning of the slope and y-intercept of this function with respect to the costs associated with the gym membership.

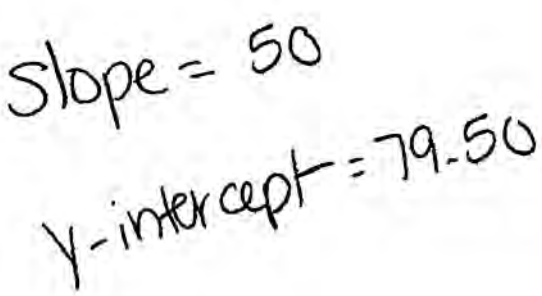


Score 1: The student defined slope and y-intercept correctly, but not with respect to the cost of the gym membership.

Question 29

29 The cost of belonging to a gym can be modeled by $C(m) = 50m + 79.50$, where $C(m)$ is the total cost for m months of membership.

State the meaning of the slope and y-intercept of this function with respect to the costs associated with the gym membership.



Score 0: The student only stated the slope and the y-intercept.

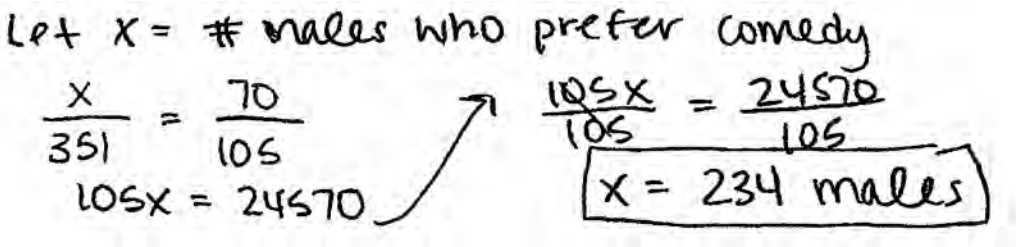
Question 30

30 A statistics class surveyed some students during one lunch period to obtain opinions about television programming preferences. The results of the survey are summarized in the table below.

Programming Preferences

	Comedy	Drama
Male	70	35
Female	48	42

Based on the sample, predict how many of the school's 351 males would prefer comedy. Justify your answer.



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

Question 30

30 A statistics class surveyed some students during one lunch period to obtain opinions about television programming preferences. The results of the survey are summarized in the table below.

Programming Preferences

	Comedy	Drama
Male	70	35
Female	48	42

Based on the sample, predict how many of the school's 351 males would prefer comedy. Justify your answer.

$70 + 35 = 105$

$\frac{70}{105}$

Score 1: The student found the correct ratio.

Question 30

30 A statistics class surveyed some students during one lunch period to obtain opinions about television programming preferences. The results of the survey are summarized in the table below.

Programming Preferences

	Comedy	Drama
Male	70	35
Female	48	42

Based on the sample, predict how many of the school's 351 males would prefer comedy. Justify your answer.

$\frac{70}{195} = \frac{x}{351}$

$x = 126$

Score 1: The student used an incorrect proportion.

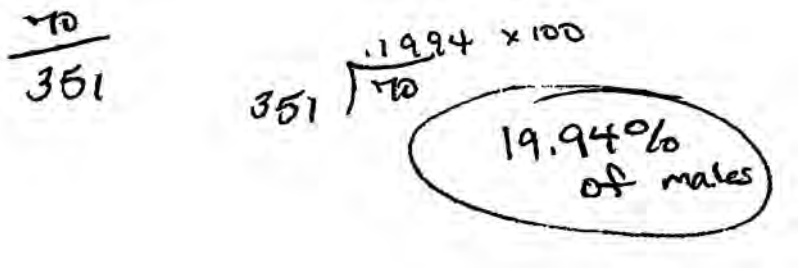
Question 30

30 A statistics class surveyed some students during one lunch period to obtain opinions about television programming preferences. The results of the survey are summarized in the table below.

Programming Preferences

	Comedy	Drama
Male	70	35
Female	48	42

Based on the sample, predict how many of the school's 351 males would prefer comedy. Justify your answer.



Score 0: The student gave a completely incorrect response.

Question 31

31 Given that $a > b$, solve for x in terms of a and b:

$$b(x - 3) \geq ax + 7b$$

Answer

$x \leq \frac{10b}{b-a}$

Work

$b(x-3) \geq ax+7b$

$\downarrow$

$bx - 3b \geq ax + 7b$

$+3b \quad +3b$

$bx \geq ax + 10b$

$-ax \quad -ax$

$\frac{x(b-a)}{(b-a)} \geq \frac{10b}{(b-a)}$

$x \leq \frac{10b}{b-a}$

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

Question 31

31 Given that $a > b$, solve for x in terms of a and b:

$$b(x - 3) \geq ax + 7b$$

$bx - 3b \geq ax + 7b$
$-7b \quad -7b$

$bx - 10b \geq ax$
$-bx \quad -bx$

$-10b \geq ax - bx$
$\frac{-10b}{a-b} \geq \frac{x(a-b)}{a-b}$

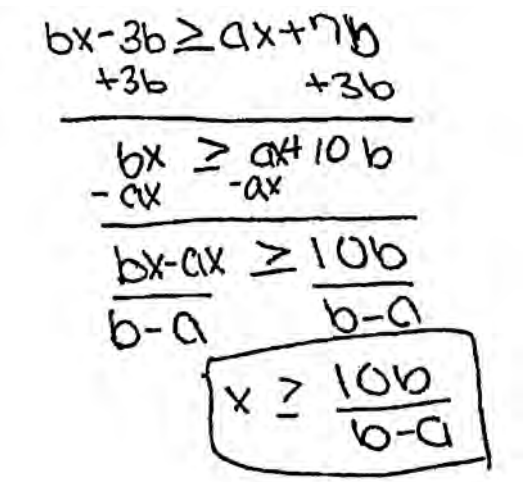
$\frac{-10b}{a-b} \geq x$

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

Question 31

31 Given that $a > b$, solve for x in terms of a and b:

$$b(x - 3) \geq ax + 7b$$



Score 1: The student did not reverse the inequality symbol when dividing each side of the inequality by a negative number.

Question 31

31 Given that $a > b$, solve for x in terms of a and b:

$$b(x - 3) \geq ax + 7b$$

$bx - 3b \geq ax + 7b$

$bx + ax \geq 3b + 7b$

$x(b + a) \geq 10b$

$\frac{x(b+a)}{b+a} \geq \frac{10b}{b+a}$

$x \geq \frac{10b}{b+a}$

Score 1: The student made an error by writing $bx + ax$ instead of $bx - ax$.

Question 31

31 Given that $a > b$, solve for x in terms of a and b:

$$b(x - 3) \geq ax + 7b$$

$\frac{bx-3b}{b} \geq \frac{ax+7b}{b}$

$\frac{x-3}{x} \geq \frac{a}{b}x+7$

$x\left(\frac{-3}{x}\right) \geq \left(\frac{a}{b}+\frac{7}{x}\right)x$

$-3 \geq \frac{a}{b}+7$

$-7 \quad -7$

$-10 \geq \frac{a}{b}$

Score 0: The student gave a completely incorrect response.

Question 32

32 Jacob and Jessica are studying the spread of dandelions. Jacob discovers that the growth over t weeks can be defined by the function $f(t) = (8) \bullet 2^t$. Jessica finds that the growth function over t weeks is $g(t) = 2^{t+3}$.

Calculate the number of dandelions that Jacob and Jessica will each have after 5 weeks.

Jacob

$f(t) = (8) \cdot 2^t$

$f(t) = (8) \cdot 2^5$

$8 \cdot 32$

Jacob: 256 plants

Jessica

$g(t) = 2^{t+3}$

$g(t) = 2^{5+3}$

2^8

Jessica: 256 plants

Based on the growth from both functions, explain the relationship between $f(t)$ and $g(t)$.

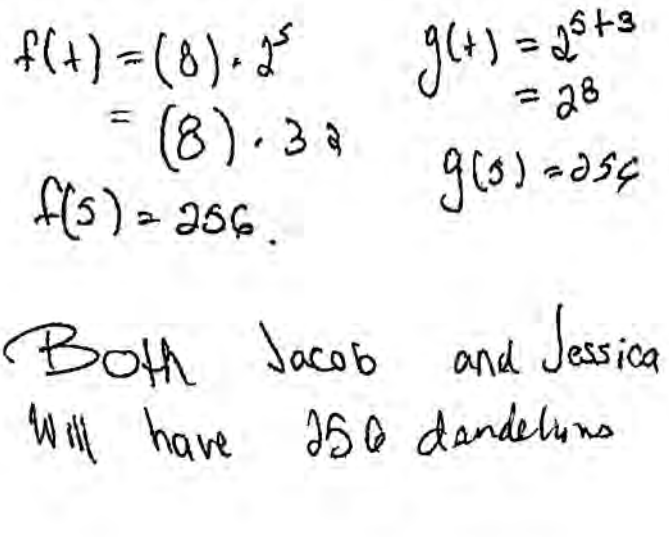
They are both the same thing. No matter how many weeks you plug in for t, f(t) and g(t) are always going to be equal.

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

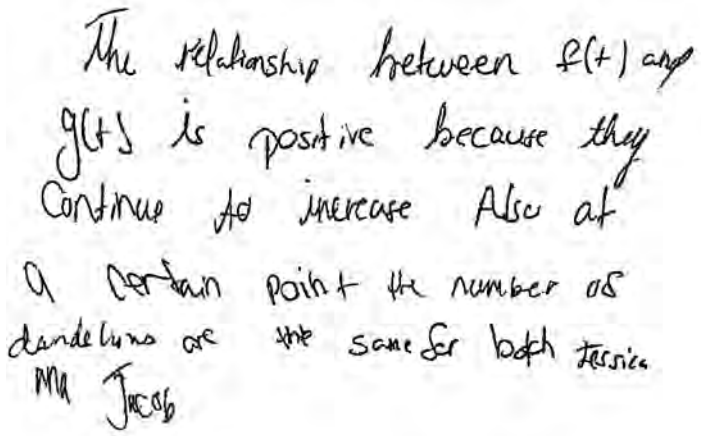
Question 32

32 Jacob and Jessica are studying the spread of dandelions. Jacob discovers that the growth over t weeks can be defined by the function $f(t) = (8) \cdot 2^t$. Jessica finds that the growth function over t weeks is $g(t) = 2^{t+3}$.

Calculate the number of dandelions that Jacob and Jessica will each have after 5 weeks.



Based on the growth from both functions, explain the relationship between $f(t)$ and $g(t)$.



Score 1: The student gave an incomplete explanation.

Question 32

32 Jacob and Jessica are studying the spread of dandelions. Jacob discovers that the growth over t weeks can be defined by the function $f(t) = (8) \bullet 2^t$. Jessica finds that the growth function over t weeks is $g(t) = 2^{t+3}$.

Calculate the number of dandelions that Jacob and Jessica will each have after 5 weeks.

Jacob: There would be 256 dandelions in 5 weeks.

Jessica: There would be also 256 dandelions in 5 weeks.

Based on the growth from both functions, explain the relationship between $f(t)$ and $g(t)$.

The relationship between Jessica and Jacob is there will be 256 dandelions growing in both their field.

Score 1: The student gave an incorrect explanation.

Question 32

32 Jacob and Jessica are studying the spread of dandelions. Jacob discovers that the growth over t weeks can be defined by the function $f(t) = (8) \bullet 2^t$. Jessica finds that the growth function over t weeks is $g(t) = 2^{t+3}$.

Calculate the number of dandelions that Jacob and Jessica will each have after 5 weeks.

$f(t) = 8 \cdot 2^5$
$= 8 \times 32$
$= 256$
Jacob = 256

$g(t) = 2^5 + 2^3$
$= 32 + 8$
$= 40$
Jessica = 40

Based on the growth from both functions, explain the relationship between $f(t)$ and $g(t)$.

Jacob's grows faster

Score 1: The student gave an appropriate explanation based upon the error made in finding $g(t)$.

Question 32

32 Jacob and Jessica are studying the spread of dandelions. Jacob discovers that the growth over t weeks can be defined by the function $f(t) = (8) \bullet 2^t$. Jessica finds that the growth function over t weeks is $g(t) = 2^{t+3}$.

Calculate the number of dandelions that Jacob and Jessica will each have after 5 weeks.

Jacob: $f(t) = (8) \cdot 2^{(t)}$

$f(t) = (8) \cdot 2^{(5)}$

$= (8) \cdot 10$

$= 80$

Jessica: $g(t) = 2^{t+3}$

$g(t) = 2^{5+3}$

$= 2^8$

$= 256$

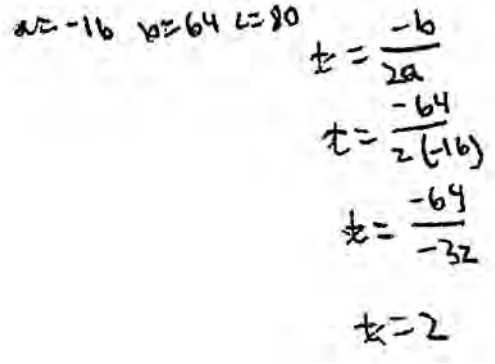
Based on the growth from both functions, explain the relationship between $f(t)$ and $g(t)$.

The relationship between f(t) and g(t) is that they both rise on a graph and f(t) determines the number of dandelions gradually. While g(t) determines the number of dandelions over longer periods.

Score 0: The student made an error in calculating $f(t)$ and gave an incorrect explanation.

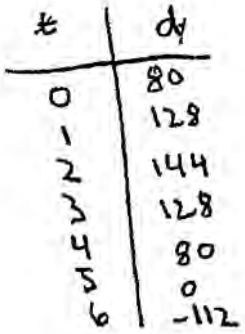
Question 33

33 Let $h(t) = -16t^2 + 64t + 80$ represent the height of an object above the ground after t seconds. Determine the number of seconds it takes to achieve its maximum height. Justify your answer.



It reaches its maximum height at 2 seconds.

State the time interval, in seconds, during which the height of the object *decreases*. Explain your reasoning.



t	dy
0	80
1	128
2	144
3	128
4	80
5	0
6	-112

The height of the object decreases for $2 < t < 5$, because it reaches its maximum height at 2 seconds and decreases in height until it hits the ground at 5 seconds.

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

Question 33

33 Let $h(t) = -16t^2 + 64t + 80$ represent the height of an object above the ground after t seconds. Determine the number of seconds it takes to achieve its maximum height. Justify your answer.

X	Y
0	80
1	128
2	144
3	128
4	80
5	0

At 2 seconds, it reaches it's peak at 144 ft

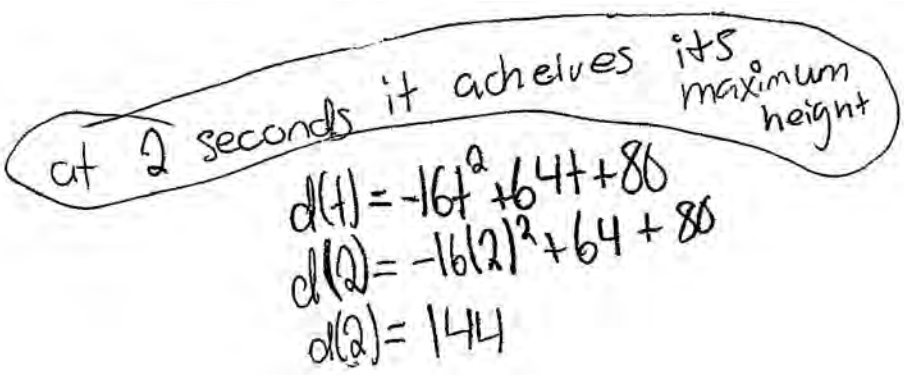
State the time interval, in seconds, during which the height of the object *decreases*. Explain your reasoning.

It decreases when $2 \leq x \leq 5$. It goes from 144 ft to 0 ft.

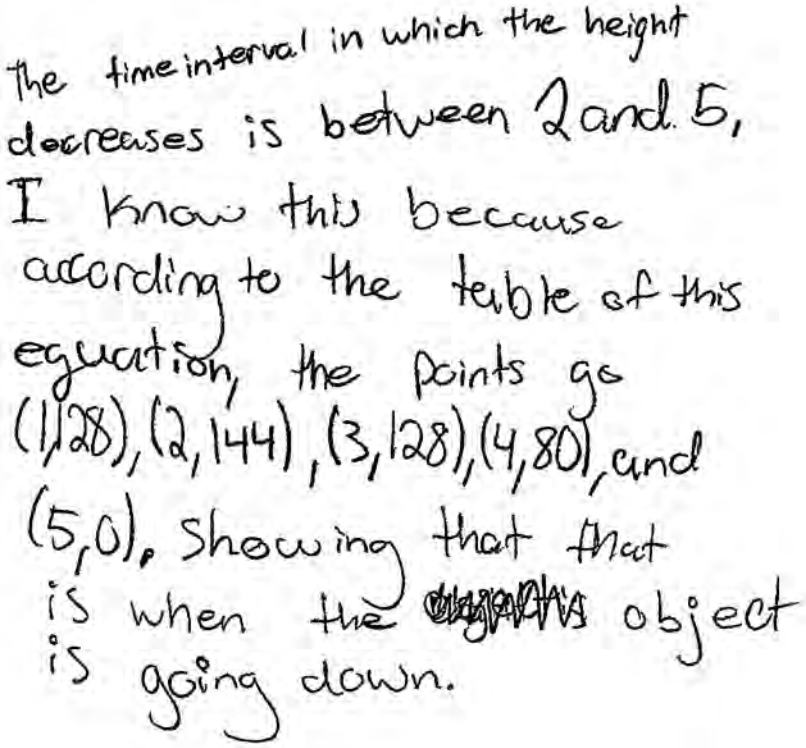
Score 4: The student has a complete and correct response.

Question 33

33 Let $h(t) = -16t^2 + 64t + 80$ represent the height of an object above the ground after t seconds. Determine the number of seconds it takes to achieve its maximum height. Justify your answer.



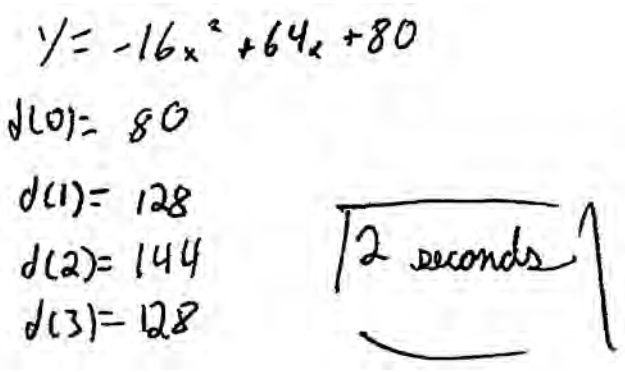
State the time interval, in seconds, during which the height of the object *decreases*. Explain your reasoning.



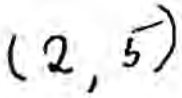
Score 4: The student included a correct set of values for time and distance in their explanation for the second part. These values justify their answer in the first part.

Question 33

33 Let $h(t) = -16t^2 + 64t + 80$ represent the height of an object above the ground after t seconds. Determine the number of seconds it takes to achieve its maximum height. Justify your answer.



State the time interval, in seconds, during which the height of the object *decreases*. Explain your reasoning.

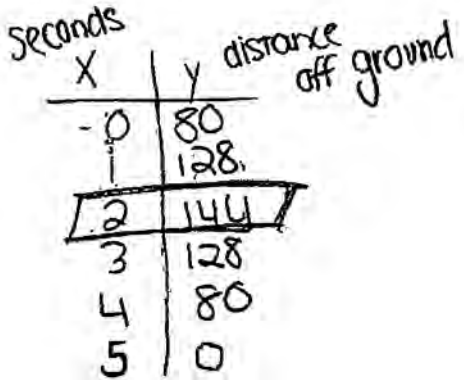


Score 3: The student did not explain how the interval was determined.

Question 33

33 Let $h(t) = -16t^2 + 64t + 80$ represent the height of an object above the ground after t seconds. Determine the number of seconds it takes to achieve its maximum height. Justify your answer.

2 seconds



State the time interval, in seconds, during which the height of the object *decreases*. Explain your reasoning.

after 2 seconds because at 2 seconds the object is as high as it can go, so it's distance above the ground decreases, as the ball starts to fall.

Score 3: The student did not state the complete time interval.

Question 33

33 Let $h(t) = -16t^2 + 64t + 80$ represent the height of an object above the ground after t seconds. Determine the number of seconds it takes to achieve its maximum height. Justify your answer.

$\frac{-b}{2a} \rightarrow \frac{-(64)}{2(-16)} \rightarrow \frac{-64}{-32} = 2$

The maximum height is at 2 seconds

State the time interval, in seconds, during which the height of the object *decreases*. Explain your reasoning.

2 seconds is when it is at maximum height, so anything after that is decreasing,

Score 3: The student did not state the complete time interval.

Question 33

33 Let $h(t) = -16t^2 + 64t + 80$ represent the height of an object above the ground after t seconds. Determine the number of seconds it takes to achieve its maximum height. Justify your answer.

(2, 144)

State the time interval, in seconds, during which the height of the object *decreases*. Explain your reasoning.

To find the time it hits the ground you use $h(t) = 0$ and solve.

$-16t^2 + 64t + 80 = 0$

$-16(t^2 - 4t - 5) = 0$

$-16(t + 1)(t - 5) = 0$

$t + 1 = 0$

$t = -1$

$t - 5 = 0$

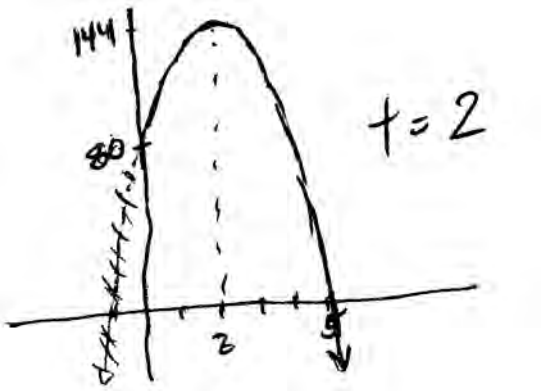
$t = 5$ ← time it hits ground

It's decreasing from from 2 to 5

Score 2: The student showed no work to find (2,144) and did not state a time.

Question 33

33 Let $h(t) = -16t^2 + 64t + 80$ represent the height of an object above the ground after t seconds. Determine the number of seconds it takes to achieve its maximum height. Justify your answer.



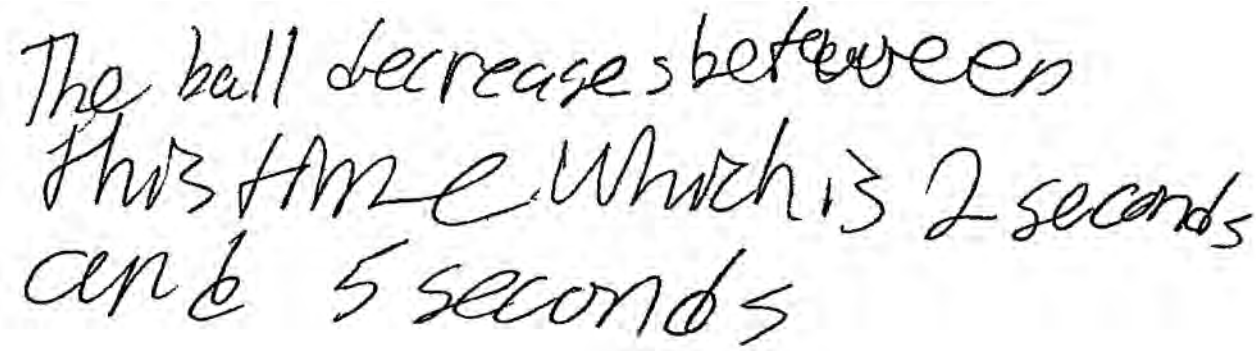
State the time interval, in seconds, during which the height of the object *decreases*. Explain your reasoning.

Score 2: The student determined and justified the time it took to reach the maximum height.

Question 33

33 Let $h(t) = -16t^2 + 64t + 80$ represent the height of an object above the ground after t seconds. Determine the number of seconds it takes to achieve its maximum height. Justify your answer.

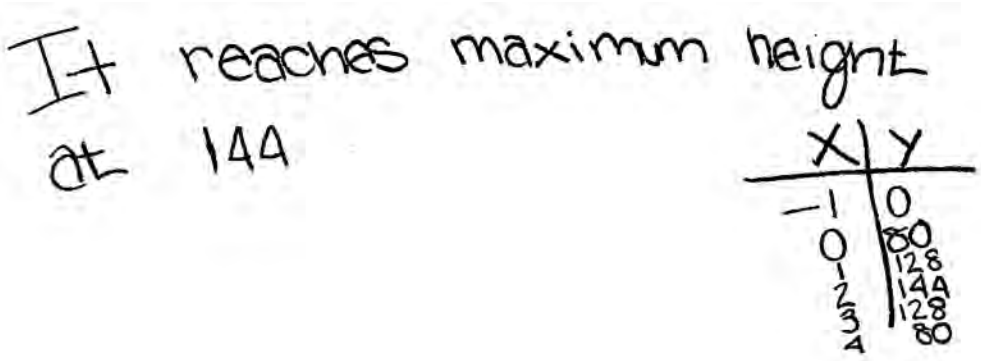
State the time interval, in seconds, during which the height of the object *decreases*. Explain your reasoning.



Score 1: The student wrote the correct interval in words.

Question 33

33 Let $h(t) = -16t^2 + 64t + 80$ represent the height of an object above the ground after t seconds. Determine the number of seconds it takes to achieve its maximum height. Justify your answer.



State the time interval, in seconds, during which the height of the object *decreases*. Explain your reasoning.

Score 1: The student showed appropriate work to determine the time, but stated the maximun height.

Question 33

33 Let $h(t) = -16t^2 + 64t + 80$ represent the height of an object above the ground after t seconds. Determine the number of seconds it takes to achieve its maximum height. Justify your answer.

(2, 144)

144 seconds

State the time interval, in seconds, during which the height of the object *decreases*. Explain your reasoning.

Score 0: The student gave an incorrect response.

Question 34

34 Fred's teacher gave the class the quadratic function $f(x) = 4x^2 + 16x + 9$.

a) State two different methods Fred could use to solve the equation $f(x) = 0$.

He could complete the square or
he could use the quadratic formula.

b) Using one of the methods stated in part *a*, solve $f(x) = 0$ for x, to the *nearest tenth*.

$4x^2 + 16x + 9 = 0$

$4x^2 + 16x + 16 = -9 + 16$

$(2x + 4)^2 = 7$

$2x + 4 = \pm\sqrt{7}$

$2x = -4 \pm \sqrt{7}$

$x = -2 \pm \frac{\sqrt{7}}{2}$

$x = -2 + \frac{\sqrt{7}}{2}$ $\quad$ $x = -2 - \frac{\sqrt{7}}{2}$

$x = -.7$ $\quad$ $x = -3.3$

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

Question 34

34 Fred's teacher gave the class the quadratic function $f(x) = 4x^2 + 16x + 9$.

a) State two different methods Fred could use to solve the equation $f(x) = 0$.

$0 = 4x^2 + 16x + 9$

Fred could use the quadratic formula ($x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$) where you insert a, b, and c from the quadratic function. He could also use completing the square (ax^2+bx+c): First find $(\frac{b}{2})^2$, add it to both sides and solve.

b) Using one of the methods stated in part *a*, solve $f(x) = 0$ for x, to the *nearest tenth*.

$0 = 4x^2 + 16x + 9$

$a = 4$
$b = 16$
$c = 9$

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

$\frac{-16 \pm \sqrt{256-144}}{8}$

$\frac{-16 \pm 10.6}{8}$

$x = \{-3.3, -.7\}$

$\frac{-16+10.6}{8}$

$-.7$

$\frac{-16-10.6}{8}$

-3.3

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

Question 34

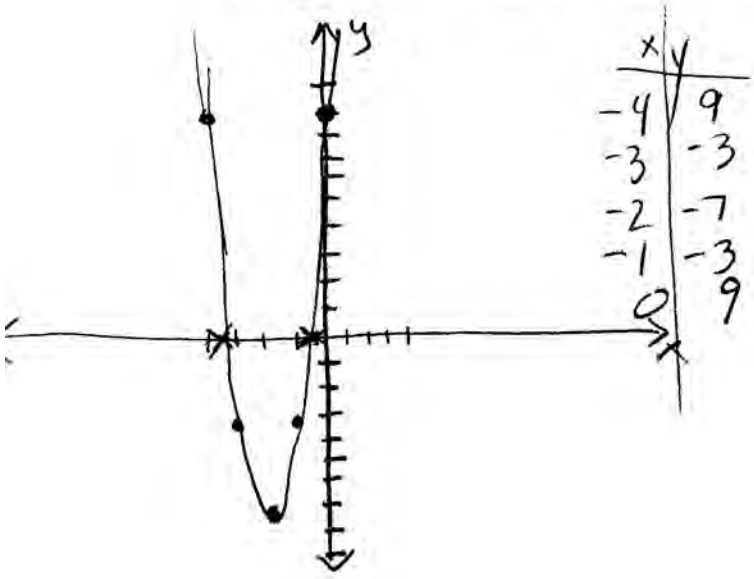
34 Fred's teacher gave the class the quadratic function $f(x) = 4x^2 + 16x + 9$.

a) State two different methods Fred could use to solve the equation $f(x) = 0$.

algebraically or graphically

b) Using one of the methods stated in part *a*, solve $f(x) = 0$ for x, to the *nearest tenth*.

I graphed the parabola and used the 2nd Trace keys to CALC → zero where f(x)=0



x	y
-4	9
-3	-3
-2	-7
-1	-3
0	9

x = -3.3

x = -.7

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

Question 34

34 Fred's teacher gave the class the quadratic function $f(x) = 4x^2 + 16x + 9$.

a) State two different methods Fred could use to solve the equation $f(x) = 0$.

Fred could use the quadratic formula which is $\frac{-b \pm \sqrt{b^2-4ac}}{2a}$ or he could factor by grouping.

b) Using one of the methods stated in part *a*, solve $f(x) = 0$ for x, to the *nearest tenth*.

$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$ $\quad a=4 \quad b=16 \quad c=9$

$x = \frac{-16 \pm \sqrt{16^2-4(4)(9)}}{2(4)}$

$x = \frac{-16 \pm \sqrt{256-144}}{8}$

$x = \frac{-16 \pm \sqrt{112}}{8}$

$x = \frac{-16 \pm \sqrt{16}\sqrt{7}}{8}$

$x = \frac{-16 \pm 4\sqrt{7}}{8}$

$x = \frac{-16+4\sqrt{7}}{8} = -0.7$

$x = \frac{-16-4\sqrt{7}}{8} = -3.3$

$x = -0.7$
$x = -3.3$

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

Question 34

34 Fred's teacher gave the class the quadratic function $f(x) = 4x^2 + 16x + 9$.

a) State two different methods Fred could use to solve the equation $f(x) = 0$.

Using quadratic equation or completing the square.

b) Using one of the methods stated in part *a*, solve $f(x) = 0$ for x, to the *nearest tenth*.

$4x^2+16x+9=0$

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

$\frac{-16\pm\sqrt{16^2-4\cdot4\cdot9}}{2\cdot4}=x$

$\frac{-16\pm\sqrt{256-8\cdot9}}{8}=x$

$\frac{-16\pm\sqrt{256-72}}{8}=x$

$\frac{-16\pm\sqrt{184}}{8}=x$

$\frac{-16\pm13.6}{8}=x$

$\frac{-16+13.6}{8}=x$ | $\frac{-16-13.6}{8}=x$

$\frac{-2.4}{8}=x$ | $\frac{-29.6}{8}=x$

$-\frac{3}{10}=x$ | $-3\frac{7}{10}=x$

Score 3: The student made an error in calculating $4ac$, but found appropriate solutions to the nearest tenth.

Question 34

34 Fred's teacher gave the class the quadratic function $f(x) = 4x^2 + 16x + 9$.

a) State two different methods Fred could use to solve the equation $f(x) = 0$.

quadratic formula

complete the square

b) Using one of the methods stated in part *a*, solve $f(x) = 0$ for x, to the *nearest tenth*.

$\frac{4x^2}{4} + \frac{16x}{4} + \frac{9}{4} = \frac{0}{4}$

$x^2 + 4x + \frac{9}{4} = 0$

$x^2 + 4x + 4 = -\frac{9}{4} + 4$

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

$(x + 2)^2 = 1.75$

$x + 2 = \sqrt{1.75}$

$x = -2 + \sqrt{1.75}$

$x = -.7$

Score 3: The student only used the positive root of $\sqrt{1.75}$ when solving for x.

Question 34

34 Fred's teacher gave the class the quadratic function $f(x) = 4x^2 + 16x + 9$.

a) State two different methods Fred could use to solve the equation $f(x) = 0$.

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

(2) tricky trinomial: a·c then find the factors that equal b when you add them

b) Using one of the methods stated in part *a*, solve $f(x) = 0$ for x, to the *nearest tenth*.

$0 = 4x^2 + 16x + 9$

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

$\frac{-16 \pm \sqrt{16^2-4(4)(9)}}{2(4)}$

$\frac{-16 \pm \sqrt{112}}{8}$

$\frac{-16+\sqrt{112}}{8}$ $x \approx -0.68$

$\frac{-16-\sqrt{112}}{8}$ $x \approx -3.37$

Score 3: The student made a rounding error.

Question 34

34 Fred's teacher gave the class the quadratic function $f(x) = 4x^2 + 16x + 9$.

a) State two different methods Fred could use to solve the equation $f(x) = 0$.

The two different methods Fred could use to solve the equation $f(x)=0$ is by completing the square, and using the quadratic formula.

b) Using one of the methods stated in part *a*, solve $f(x) = 0$ for x, to the *nearest tenth*.

$0 = 4x^2+16x+9$

$-9 \qquad -9$

$64 + -9 = 4x^2+16x+64$

$55 = 4x^2+16x+64$

$55 = (2x+8)(2x+8)$

$55 = (2x+8)^2$

$\sqrt{55} = \sqrt{(2x+8)^2}$

$\sqrt{55} = (2x+8)$

$\sqrt{55} = 2x+8$

$7.4 = 2x+8$

$-8 \qquad -8$

$2x - .6 = 2x \div 2$

$-.3 = x$

Score 2: The student made an error in completing the square and only used the positive root of $\sqrt{55}$.

Question 34

34 Fred's teacher gave the class the quadratic function $f(x) = 4x^2 + 16x + 9$.

a) State two different methods Fred could use to solve the equation $f(x) = 0$.

complete the square,

or use the quadratic formula

b) Using one of the methods stated in part *a*, solve $f(x) = 0$ for x, to the *nearest tenth*.

$4x^2 + 16x + 9 = 0$

$20x^2 + 9 = 0$

$-9 \quad -9$

$\frac{20x^2}{20} = \frac{-9}{20}$

$x^2 = -.45$

$\sqrt{\quad} \quad \sqrt{\quad}$

$x = .45$

Score 2: The student stated two methods.

Question 34

34 Fred's teacher gave the class the quadratic function $f(x) = 4x^2 + 16x + 9$.

a) State two different methods Fred could use to solve the equation $f(x) = 0$.

b) Using one of the methods stated in part *a*, solve $f(x) = 0$ for x, to the *nearest tenth*.

$f(x) = 4x^2 + 16x + 9$ $\quad a = 4,\ b = 16,\ c = 9$

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

$x = \dfrac{-16 \pm \sqrt{(16)^2 - 4(4)(9)}}{2(4)}$

$x = \dfrac{-16 \pm \sqrt{256 - 144}}{8}$

$x = \dfrac{-16 \pm \sqrt{112}}{8}$

$x = \dfrac{-16 \pm \sqrt{16}\sqrt{7}}{8}$

$x = \dfrac{-16 \pm 4\sqrt{7}}{8}$ $\qquad x = -2 \pm \frac{1}{2}\sqrt{7}$

Score 1: The student did not express the solution to the nearest tenth.

Question 34

34 Fred's teacher gave the class the quadratic function $f(x) = 4x^2 + 16x + 9$.

a) State two different methods Fred could use to solve the equation $f(x) = 0$.

Graph it

b) Using one of the methods stated in part *a*, solve $f(x) = 0$ for x, to the *nearest tenth*.

$$\frac{-16 \pm \sqrt{16^2 - 4 \cdot 4 \cdot 9}}{8}$$

$$\frac{-16 \pm \sqrt{400}}{8}$$

$$\frac{-16 \pm 20}{8}$$

$$\frac{-36}{8} \qquad \frac{4}{8}$$

Score 1: The student stated one method.

Question 34

34 Fred's teacher gave the class the quadratic function $f(x) = 4x^2 + 16x + 9$.

a) State two different methods Fred could use to solve the equation $f(x) = 0$.

b) Using one of the methods stated in part *a*, solve $f(x) = 0$ for x, to the *nearest tenth*.

$a = 4$
$b = 16$
$c = 9$

$$\frac{-16 \pm \sqrt{16^2 - 4 \times 4 \times 9}}{2}$$

$$= \frac{-16 \pm \sqrt{112}}{2} = \frac{-16 \pm 10.583}{2}$$

$$\frac{-16 + 10.58}{2} \qquad \frac{-16 - 10.58}{2}$$

$$= -2.71 \qquad = -14.65$$

Score 0: The student made an error in substituting into the quadratic formula and made a rounding error.

Question 35

35 Erica, the manager at Stellarbeans, collected data on the daily high temperature and revenue from coffee sales. Data from nine days this past fall are shown in the table below.

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9
High Temperature, t	54	50	62	67	70	58	52	46	48
Coffee Sales, f(t)	$2900	$3080	$2500	$2380	$2200	$2700	$3000	$3620	$3720

State the linear regression function, $f(t)$, that estimates the day's coffee sales with a high temperature of t. Round all values to the *nearest integer*.

$f(t) = -58t + 6182$

State the correlation coefficient, r, of the data to the *nearest hundredth.* Does r indicate a strong linear relationship between the variables? Explain your reasoning.

$-.94$ This shows a strong linear relationship because the number is very close to -1.

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

Question 35

35 Erica, the manager at Stellarbeans, collected data on the daily high temperature and revenue from coffee sales. Data from nine days this past fall are shown in the table below.

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9
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Coffee Sales, f(t)	$2900	$3080	$2500	$2380	$2200	$2700	$3000	$3620	$3720

State the linear regression function, $f(t)$, that estimates the day's coffee sales with a high temperature of t. Round all values to the *nearest integer*.

$f(t) = -58x + 6182$

State the correlation coefficient, r, of the data to the *nearest hundredth.* Does r indicate a strong linear relationship between the variables? Explain your reasoning.

$r = -.94$ yes it is close to -1

Score 3: The student did not write the regression equation in terms of t.

Question 35

35 Erica, the manager at Stellarbeans, collected data on the daily high temperature and revenue from coffee sales. Data from nine days this past fall are shown in the table below.

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9
High Temperature, t	54	50	62	67	70	58	52	46	48
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State the linear regression function, $f(t)$, that estimates the day's coffee sales with a high temperature of t. Round all values to the *nearest integer*.

$f(t) = -58t + 6182$

State the correlation coefficient, r, of the data to the *nearest hundredth.* Does r indicate a strong linear relationship between the variables? Explain your reasoning.

$r = -0.94$

r indicates a strong negative correlation between the variables.

Score 3: The student gave no explanation.

Question 35

35 Erica, the manager at Stellarbeans, collected data on the daily high temperature and revenue from coffee sales. Data from nine days this past fall are shown in the table below.

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9
High Temperature, t	54	50	62	67	70	58	52	46	48
Coffee Sales, f(t)	$2900	$3080	$2500	$2380	$2200	$2700	$3000	$3620	$3720

State the linear regression function, $f(t)$, that estimates the day's coffee sales with a high temperature of t. Round all values to the *nearest integer*.

y=ax+b f(t)=-58x+6182

y=-58x+6182

State the correlation coefficient, r, of the data to the *nearest hundredth.* Does r indicate a strong linear relationship between the variables? Explain your reasoning.

r=-0.94 r does indicate a weak linear relationship between the variables because r is not close to 1 which means it is not a strong relationship.

Score 2: The student did not write the regression equation in terms of t, but wrote the correct r value.

Question 35

35 Erica, the manager at Stellarbeans, collected data on the daily high temperature and revenue from coffee sales. Data from nine days this past fall are shown in the table below.

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9
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State the linear regression function, $f(t)$, that estimates the day's coffee sales with a high temperature of t. Round all values to the *nearest integer*.

$f(t) = -58x + 6182$

State the correlation coefficient, r, of the data to the *nearest hundredth.* Does r indicate a strong linear relationship between the variables? Explain your reasoning.

.94 the relationship is very strong between the variables because the correlation coefficient is close to one.

Score 2: The student did not write the regression equation in terms of t, and wrote an incorrect correlation coefficient, but wrote an appropriate explanation.

Question 35

35 Erica, the manager at Stellarbeans, collected data on the daily high temperature and revenue from coffee sales. Data from nine days this past fall are shown in the table below.

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9
High Temperature, t	54	50	62	67	70	58	52	46	48
Coffee Sales, f(t)	$2900	$3080	$2500	$2380	$2200	$2700	$3000	$3620	$3720

State the linear regression function, $f(t)$, that estimates the day's coffee sales with a high temperature of t. Round all values to the *nearest integer*.

$f(t) = 6182.2 + (-58.2639)t$

State the correlation coefficient, r, of the data to the *nearest hundredth.* Does r indicate a strong linear relationship between the variables? Explain your reasoning.

-58.26; No, Given it is a negative coefficent

Score 1: The student rounded the regression equation incorrectly, and no further correct work is shown.

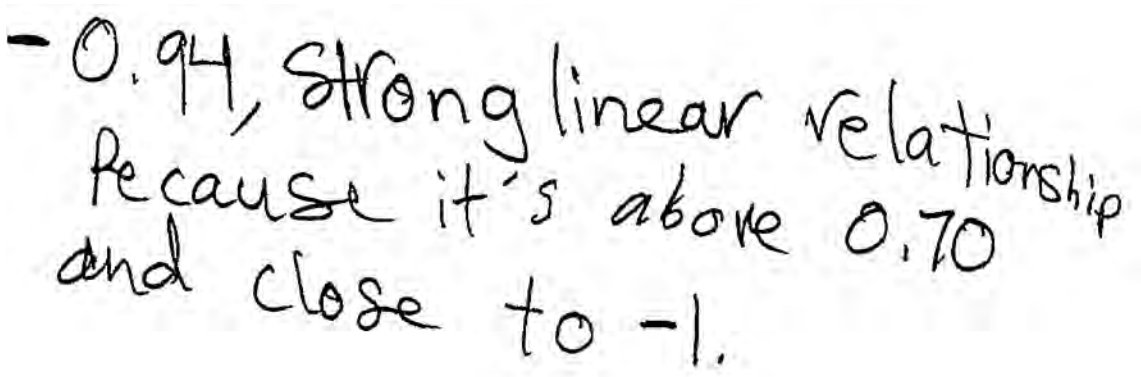
Question 35

35 Erica, the manager at Stellarbeans, collected data on the daily high temperature and revenue from coffee sales. Data from nine days this past fall are shown in the table below.

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9
High Temperature, t	54	50	62	67	70	58	52	46	48
Coffee Sales, f(t)	$2900	$3080	$2500	$2380	$2200	$2700	$3000	$3620	$3720

State the linear regression function, $f(t)$, that estimates the day's coffee sales with a high temperature of t. Round all values to the *nearest integer*.

State the correlation coefficient, r, of the data to the *nearest hundredth.* Does r indicate a strong linear relationship between the variables? Explain your reasoning.



Score 1: The student wrote a correct correlation coefficient, but wrote an incorrect explanation.

Question 35

35 Erica, the manager at Stellarbeans, collected data on the daily high temperature and revenue from coffee sales. Data from nine days this past fall are shown in the table below.

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9
High Temperature, t	54	50	62	67	70	58	52	46	48
Coffee Sales, f(t)	$2900	$3080	$2500	$2380	$2200	$2700	$3000	$3620	$3720

State the linear regression function, $f(t)$, that estimates the day's coffee sales with a high temperature of t. Round all values to the *nearest integer*.

$X = -58\frac{19}{72}X + 6182.199074$

State the correlation coefficient, r, of the data to the *nearest hundredth.* Does r indicate a strong linear relationship between the variables? Explain your reasoning.

no it does not because it dont come out =

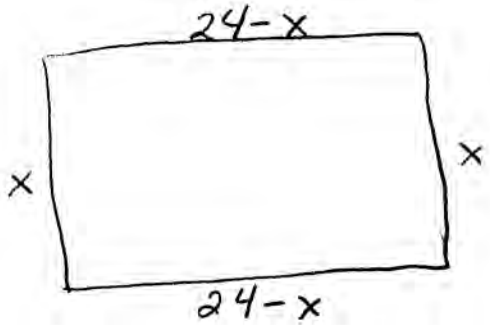
Score 0: The student made multiple errors.

Question 36

36 A contractor has 48 meters of fencing that he is going to use as the perimeter of a rectangular garden. The length of one side of the garden is represented by x, and the area of the garden is 108 square meters.

Determine, algebraically, the dimensions of the garden in meters.

$P = 48$
$A = 108$
$w = x$
$l = \frac{48-2x}{2} = 24-x$



$A = lw$

$108 = x(24-x)$
$108 = 24x - x^2$
$x^2 - 24x + 108 = 0$
$(x-6)(x-18) = 0$
$x = 6$ or $x = 18$

The dimensions are 6 and 18

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

Question 36

36 A contractor has 48 meters of fencing that he is going to use as the perimeter of a rectangular garden. The length of one side of the garden is represented by x, and the area of the garden is 108 square meters.

Determine, algebraically, the dimensions of the garden in meters.

$\frac{48}{2} = 24$

x = length

$24 - x$ = width

$(24-x)x = 108$

$24x - x^2 = 108$

$\cdot -1$

$-24x + x^2 = -108$

$x^2 - 24x + 144 = -108 + 144$

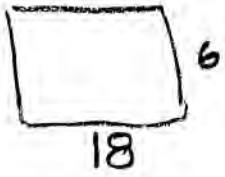
$(x-12)^2 = 36$

$x - 12 = \pm\sqrt{36}$

$x = 12 \pm \sqrt{36}$

$x = 12 + \sqrt{36}$ $\quad$ $x = 12 - \sqrt{36}$

$24 - x = 12 - \sqrt{36}$ $\quad$ $24 - x = 12 + \sqrt{36}$

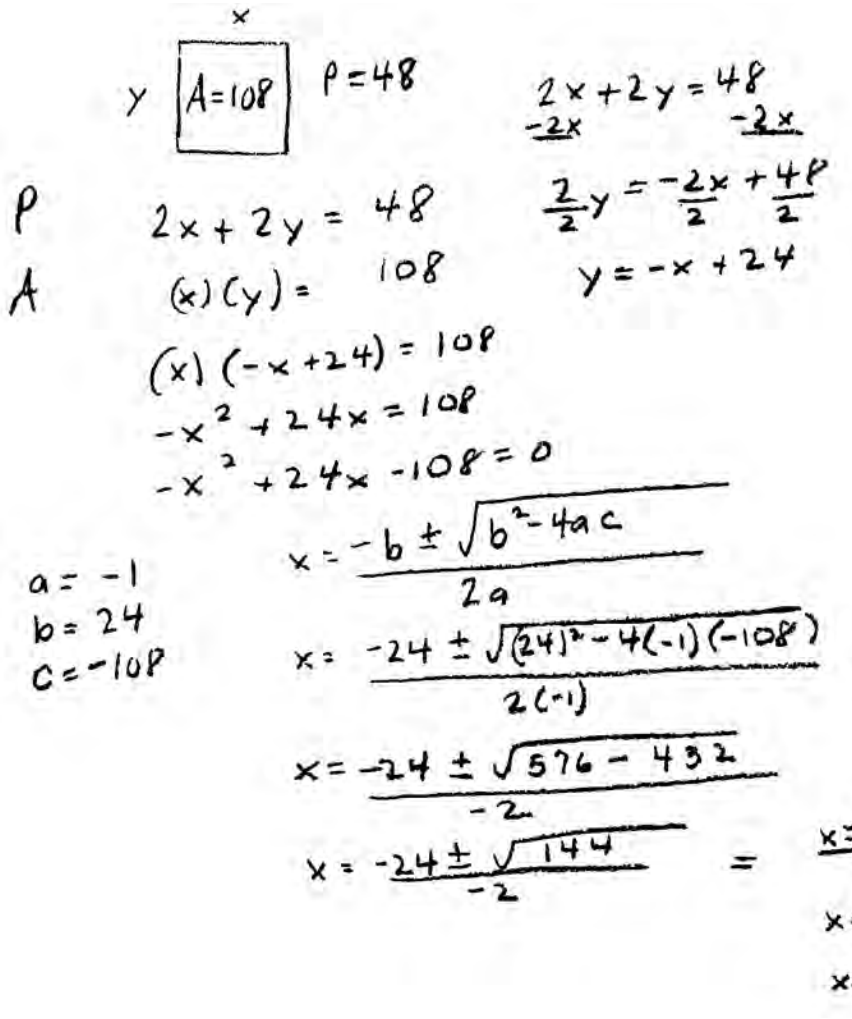


Score 4: The student has a complete and correct response.

Question 36

36 A contractor has 48 meters of fencing that he is going to use as the perimeter of a rectangular garden. The length of one side of the garden is represented by x, and the area of the garden is 108 square meters.

Determine, algebraically, the dimensions of the garden in meters.



Score 3: The student found only one dimension.

Question 36

36 A contractor has 48 meters of fencing that he is going to use as the perimeter of a rectangular garden. The length of one side of the garden is represented by x, and the area of the garden is 108 square meters.

Determine, algebraically, the dimensions of the garden in meters.

$P = 48$

$2x + 2y = 48$

$\frac{xy}{x} = \frac{108}{x}$

$y = \frac{108}{x}$

$2x + 2\left(\frac{108}{x}\right) = 48$

$(x)\ 2x + \frac{216}{x} = 48\ (x)$

$2x^2 + 216 = 48x$

$\frac{2x^2}{2} - \frac{48x}{2} + \frac{216}{2} = 0$

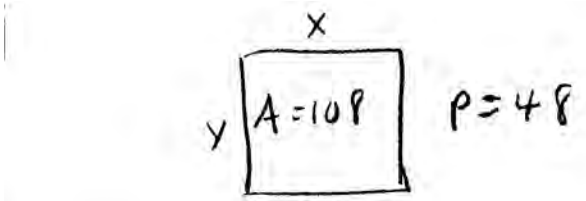
$x^2 - 24x + 108 = 0$

Score 2: The student wrote a correct quadratic equation in standard form.

Question 36

36 A contractor has 48 meters of fencing that he is going to use as the perimeter of a rectangular garden. The length of one side of the garden is represented by x, and the area of the garden is 108 square meters.

Determine, algebraically, the dimensions of the garden in meters.



Perimeter $x + y = 48$

Area: $\frac{xy}{x} = \frac{108}{x}$

$y = \frac{108}{x}$

$(x)\left(x + \frac{108}{x}\right) = 48\,(x)$

$x^2 + 108 = 48x$

$x^2 - 48x + 108 = 0$

$a = 1$

$b = -48$

$c = 108$

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

$x = \frac{-(-48) \pm \sqrt{(-48)^2 - 4(1)(108)}}{2(1)}$

$x = \frac{48 \pm \sqrt{2304 - 432}}{2}$

$x = \frac{48 \pm \sqrt{1872}}{2}$

$x = 45.63330765$

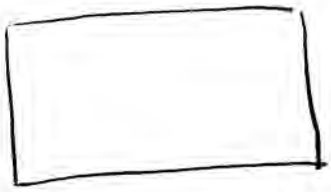
$x = 2.366692347$

Score 2: The student made a conceptual error when expressing the perimeter.

Question 36

36 A contractor has 48 meters of fencing that he is going to use as the perimeter of a rectangular garden. The length of one side of the garden is represented by x, and the area of the garden is 108 square meters.

Determine, algebraically, the dimensions of the garden in meters.



$xy = 108$

$y = \frac{108}{x}$

$2y = \frac{216}{x}$

$2x + 2y = 48$

$2x + \frac{216}{x} = 48$

$2x^2 + 216 = 48x$

$x^2 + 216 = 24x$

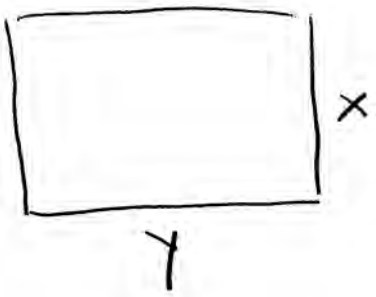
$x^2 - 24x + 216 = 0$

Score 1: The student wrote a correct system of equations, but did not write a correct quadratic equation in standard form.

Question 36

36 A contractor has 48 meters of fencing that he is going to use as the perimeter of a rectangular garden. The length of one side of the garden is represented by x, and the area of the garden is 108 square meters.

Determine, algebraically, the dimensions of the garden in meters.



$xy = 108$

$x + y = 48$

$x + \frac{108}{x} = 48$

$x^2 + 108 = 48x$

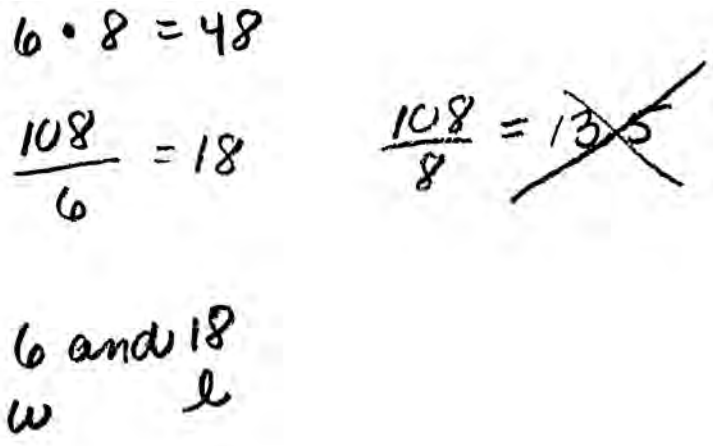
$x^2 - 48x + 108 = 0$

Score 1: The student made a conceptual error when expressing the perimeter, but wrote an appropriate quadratic equation in standard form.

Question 36

36 A contractor has 48 meters of fencing that he is going to use as the perimeter of a rectangular garden. The length of one side of the garden is represented by x, and the area of the garden is 108 square meters.

Determine, algebraically, the dimensions of the garden in meters.



Score 0: The student has a correct response based on an incorrect procedure.

Question 37

37 The Reel Good Cinema is conducting a mathematical study. In its theater, there are 200 seats. Adult tickets cost $12.50 and child tickets cost $6.25. The cinema's goal is to sell at least $1500 worth of tickets for the theater.

Write a system of linear inequalities that can be used to find the possible combinations of adult tickets, x, and child tickets, y, that would satisfy the cinema's goal.

$x + y \leq 200$

$12.5x + 6.25y \geq 1500$

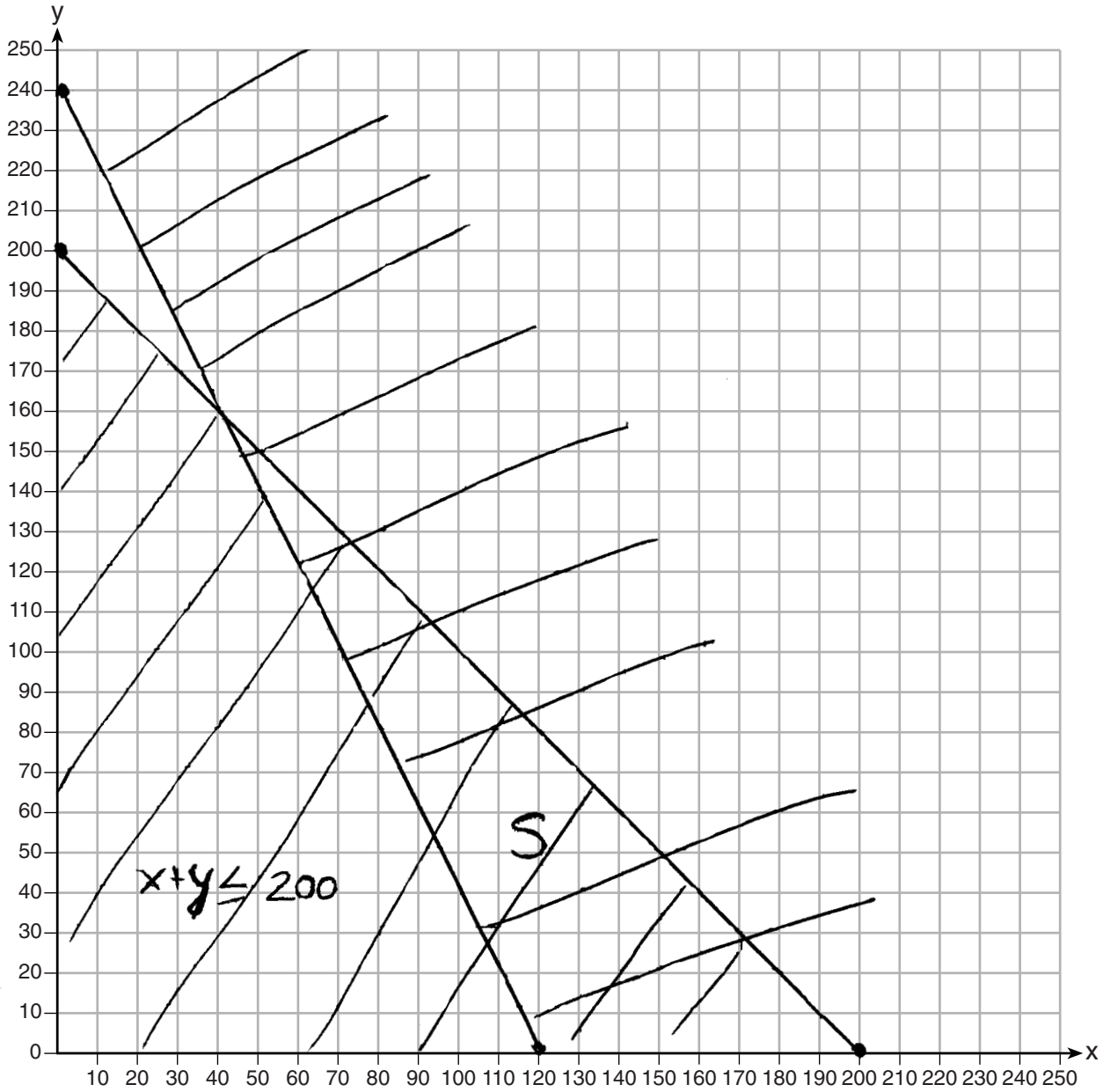
Graph the solution to this system of inequalities on the set of axes on the next page. Label the solution with an *S*.

Marta claims that selling 30 adult tickets and 80 child tickets will result in meeting the cinema's goal. Explain whether she is correct or incorrect, based on the graph drawn.

No, she is incorrect. The reason she isn't right is that, both of the coordinates aren't from the solution area.

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

Question 37



Question 37

37 The Reel Good Cinema is conducting a mathematical study. In its theater, there are 200 seats. Adult tickets cost $12.50 and child tickets cost $6.25. The cinema's goal is to sell at least $1500 worth of tickets for the theater.

Write a system of linear inequalities that can be used to find the possible combinations of adult tickets, x, and child tickets, y, that would satisfy the cinema's goal.

$x+y \leq 200$

$12.5x + 6.25y \geq 1500$

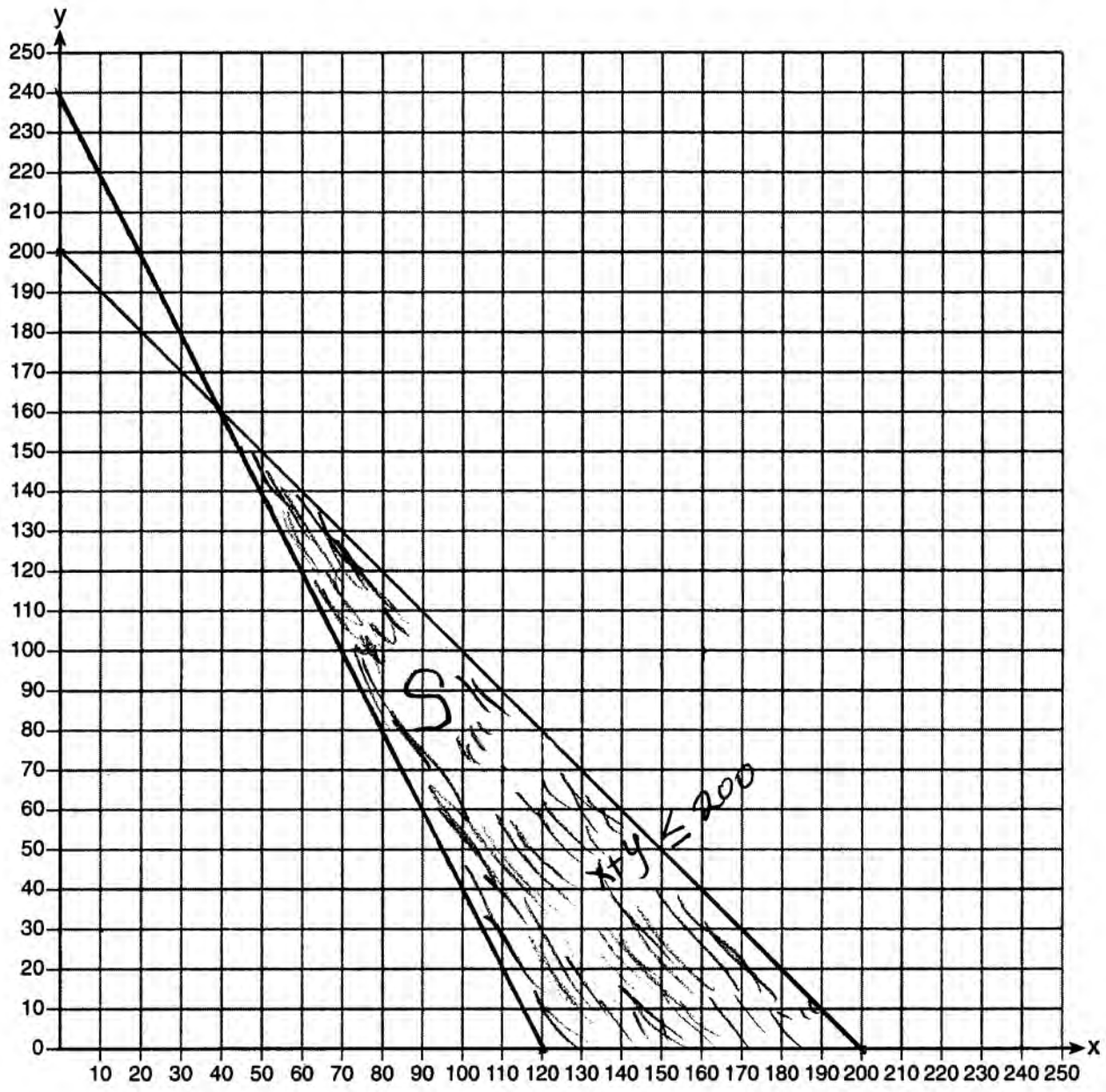
Graph the solution to this system of inequalities on the set of axes on the next page. Label the solution with an *S*.

Marta claims that selling 30 adult tickets and 80 child tickets will result in meeting the cinema's goal. Explain whether she is correct or incorrect, based on the graph drawn.

She's wrong because the point is not in S on the graph.

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

Question 37



Question 37

37 The Reel Good Cinema is conducting a mathematical study. In its theater, there are 200 seats. Adult tickets cost \$12.50 and child tickets cost \$6.25. The cinema's goal is to sell at least \$1500 worth of tickets for the theater.

Write a system of linear inequalities that can be used to find the possible combinations of adult tickets, x, and child tickets, y, that would satisfy the cinema's goal.

x=adult
y=child

$x + y \leq 200$

$12.50x + 6.25y \geq 1500$

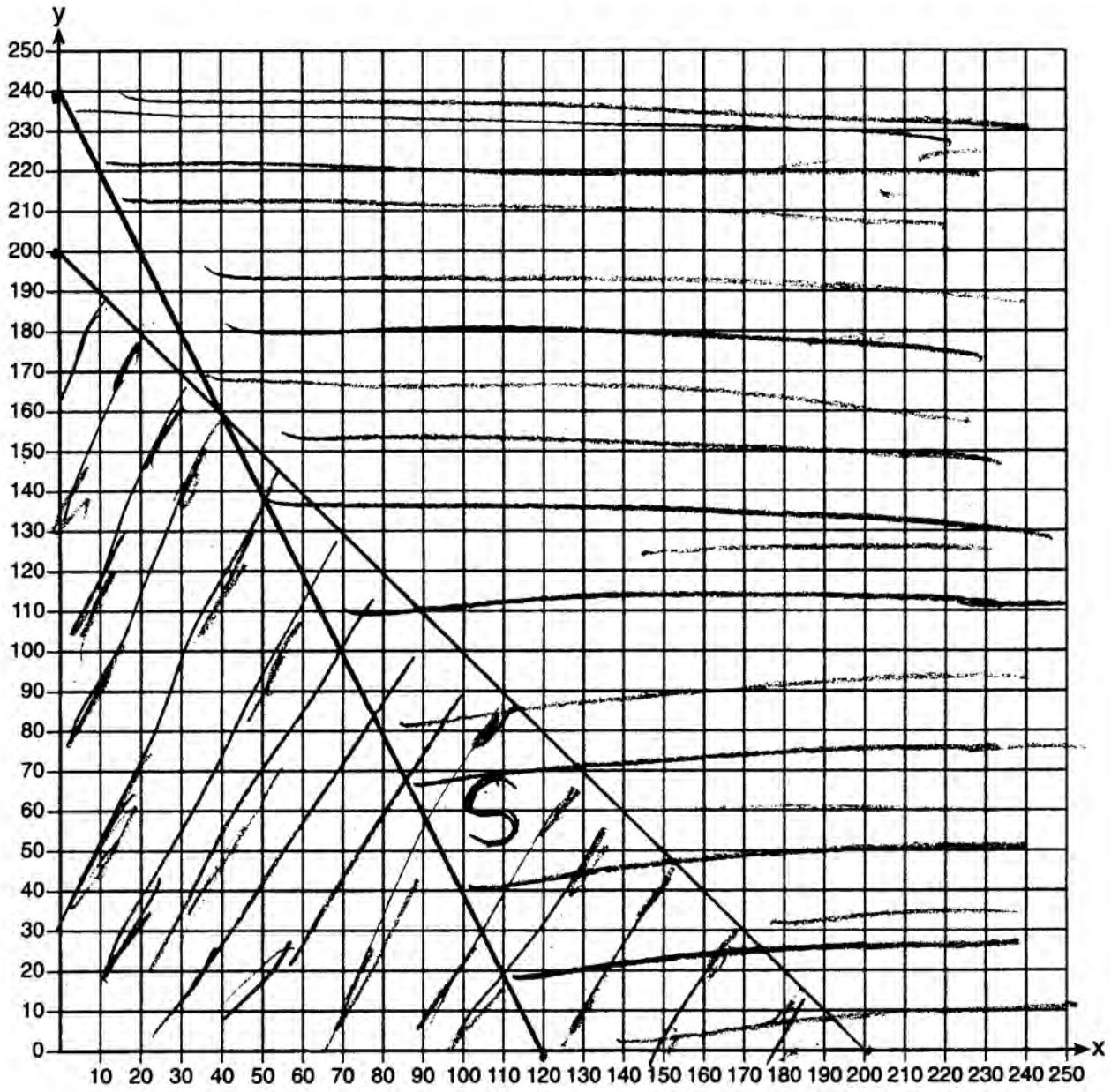
Graph the solution to this system of inequalities on the set of axes on the next page. Label the solution with an *S*.

Marta claims that selling 30 adult tickets and 80 child tickets will result in meeting the cinema's goal. Explain whether she is correct or incorrect, based on the graph drawn.

She is incorrect because according to the graph 80 child and 30 adult does not appear in the solution set

Score 5: The student did not label either inequality on the graph.

Question 37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Question 37

37 The Reel Good Cinema is conducting a mathematical study. In its theater, there are 200 seats. Adult tickets cost $12.50 and child tickets cost $6.25. The cinema's goal is to sell at least $1500 worth of tickets for the theater.

Write a system of linear inequalities that can be used to find the possible combinations of adult tickets, x, and child tickets, y, that would satisfy the cinema's goal.

$x + y \leq 200$

$12.50x + 6.25y \geq 1500$

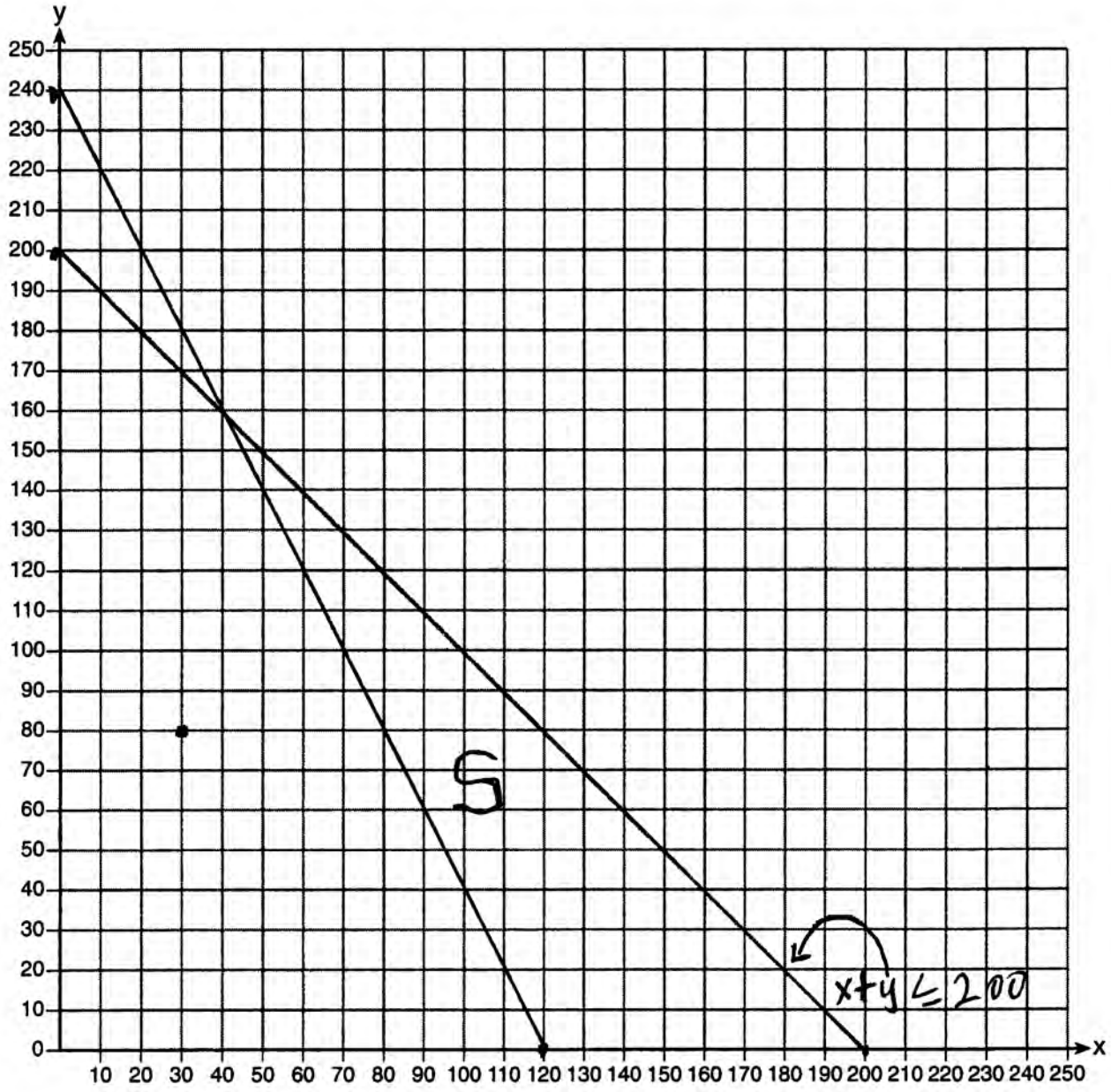
Graph the solution to this system of inequalities on the set of axes on the next page. Label the solution with an *S*.

Marta claims that selling 30 adult tickets and 80 child tickets will result in meeting the cinema's goal. Explain whether she is correct or incorrect, based on the graph drawn.

No, She is incorrect because the point does not lie in S.

Score 5: The student did not shade the solution to the system of inequalities.

Question 37



Question 37

37 The Reel Good Cinema is conducting a mathematical study. In its theater, there are 200 seats. Adult tickets cost \$12.50 and child tickets cost \$6.25. The cinema's goal is to sell at least \$1500 worth of tickets for the theater.

Write a system of linear inequalities that can be used to find the possible combinations of adult tickets, x, and child tickets, y, that would satisfy the cinema's goal.

$x + y = 200$

$12.50x + 6.25y = 1500$

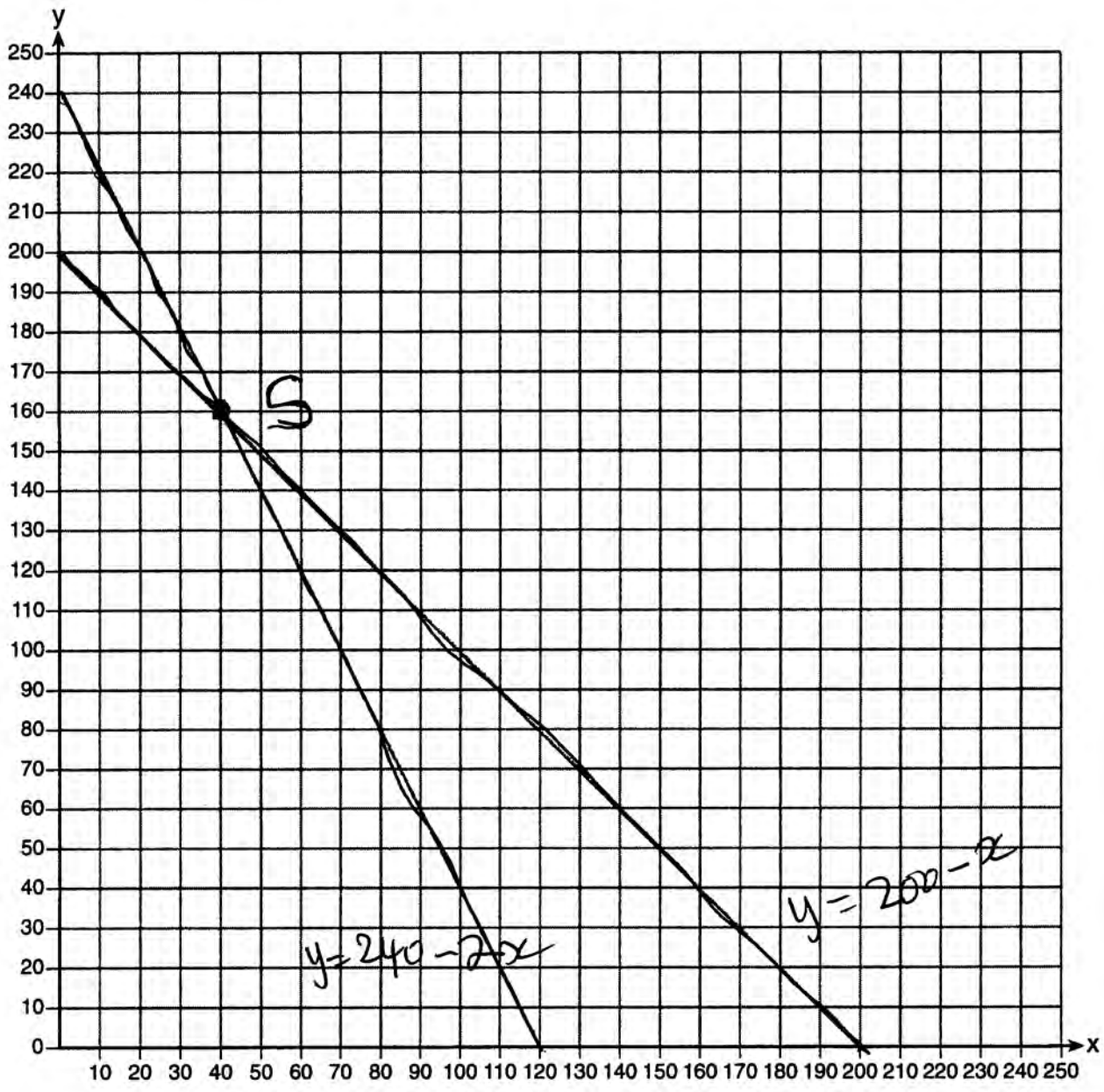
Graph the solution to this system of inequalities on the set of axes on the next page. Label the solution with an S.

Marta claims that selling 30 adult tickets and 80 child tickets will result in meeting the cinema's goal. Explain whether she is correct or incorrect, based on the graph drawn.

No. They have to sell 40 adult and 160 child

Score 4: The student made a conceptual error by writing equations instead of inequalities.

Question 37



Question 37

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Write a system of linear inequalities that can be used to find the possible combinations of adult tickets, x, and child tickets, y, that would satisfy the cinema's goal.

$12.50x + 6.25y \geq 1500$

$x + y \leq 200$

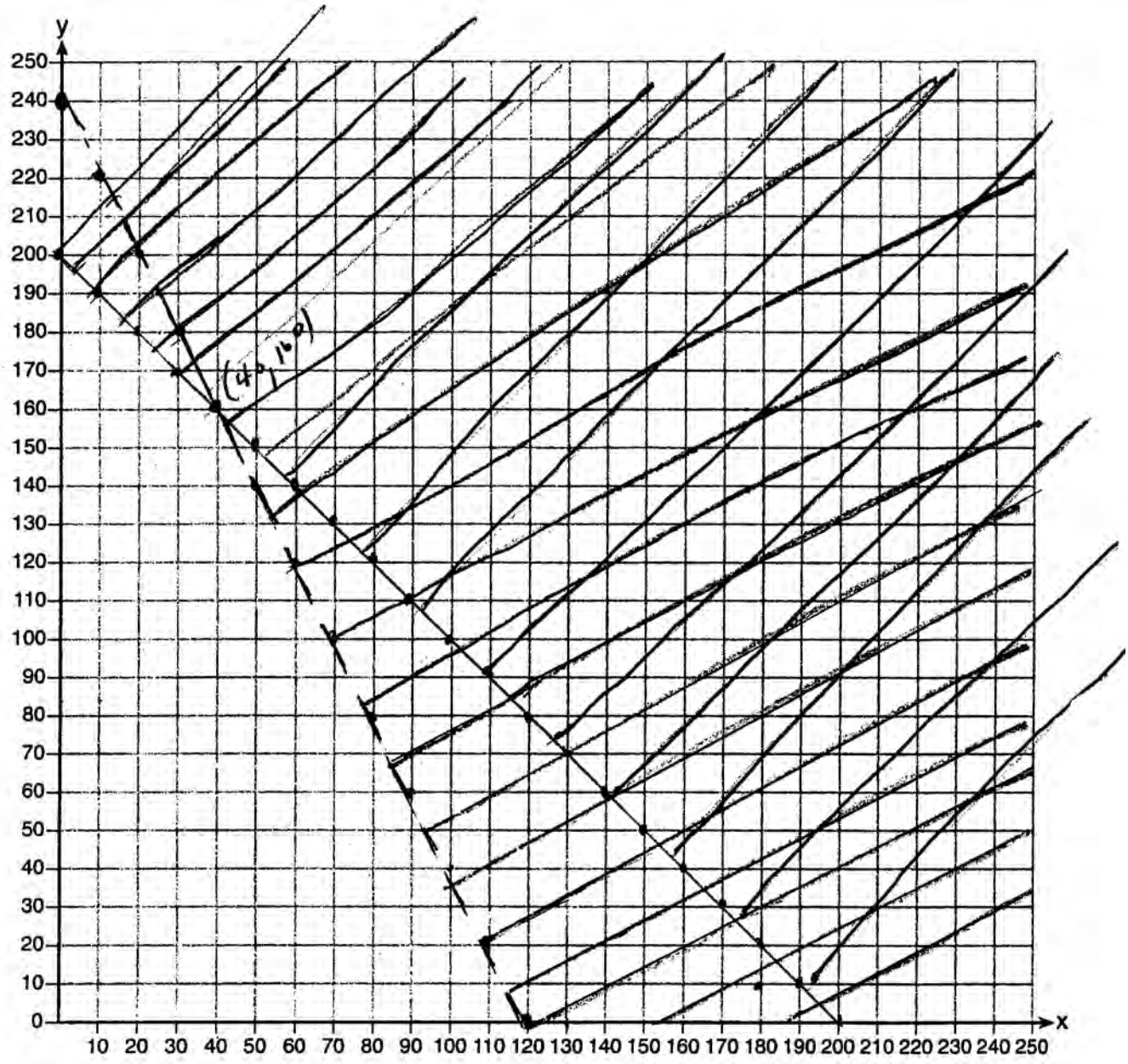
Graph the solution to this system of inequalities on the set of axes on the next page. Label the solution with an *S*.

Marta claims that selling 30 adult tickets and 80 child tickets will result in meeting the cinema's goal. Explain whether she is correct or incorrect, based on the graph drawn.

no, the coordinate (30, 80) is not in the solution set.

Score 4: The student made multiple graphing and labeling errors.

Question 37



Question 37

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Write a system of linear inequalities that can be used to find the possible combinations of adult tickets, x, and child tickets, y, that would satisfy the cinema's goal.

$12.50x + 6.25y \geq 1500$

Graph the solution to this system of inequalities on the set of axes on the next page. Label the solution with an *S*.

Marta claims that selling 30 adult tickets and 80 child tickets will result in meeting the cinema's goal. Explain whether she is correct or incorrect, based on the graph drawn.

$6.25y + 12.50x$ $y = 80$; $x = 30$

$(6.25)80 + (12.50)30$

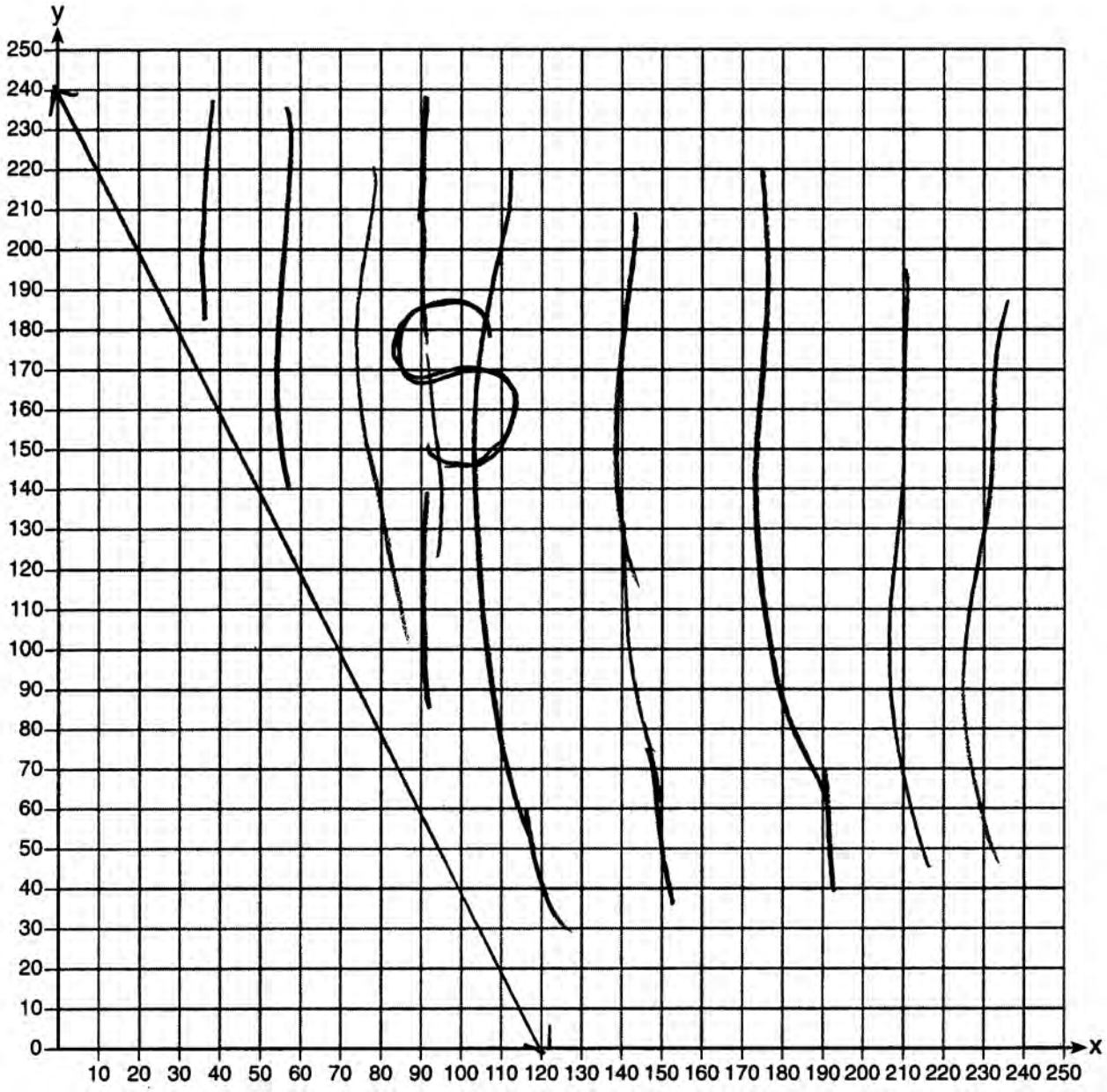
$500 + 375$

$\$875$

No because their goal is $1500 and they're $625 short.

Score 3: The student wrote and graphed one inequality correctly, but the explanation was not based on the graph.

Question 37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x

Question 37

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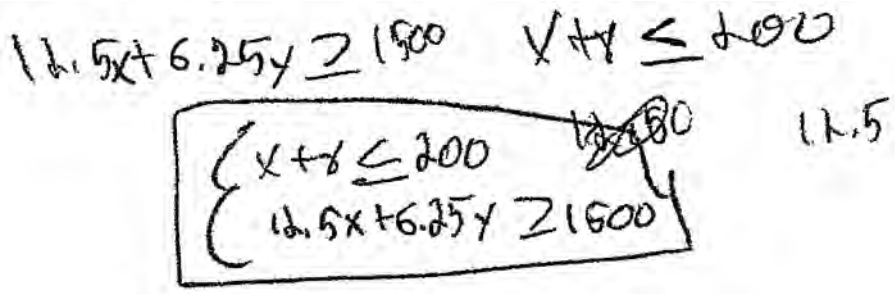
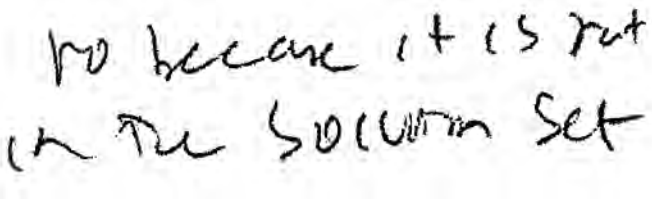
Write a system of linear inequalities that can be used to find the possible combinations of adult tickets, x, and child tickets, y, that would satisfy the cinema's goal.



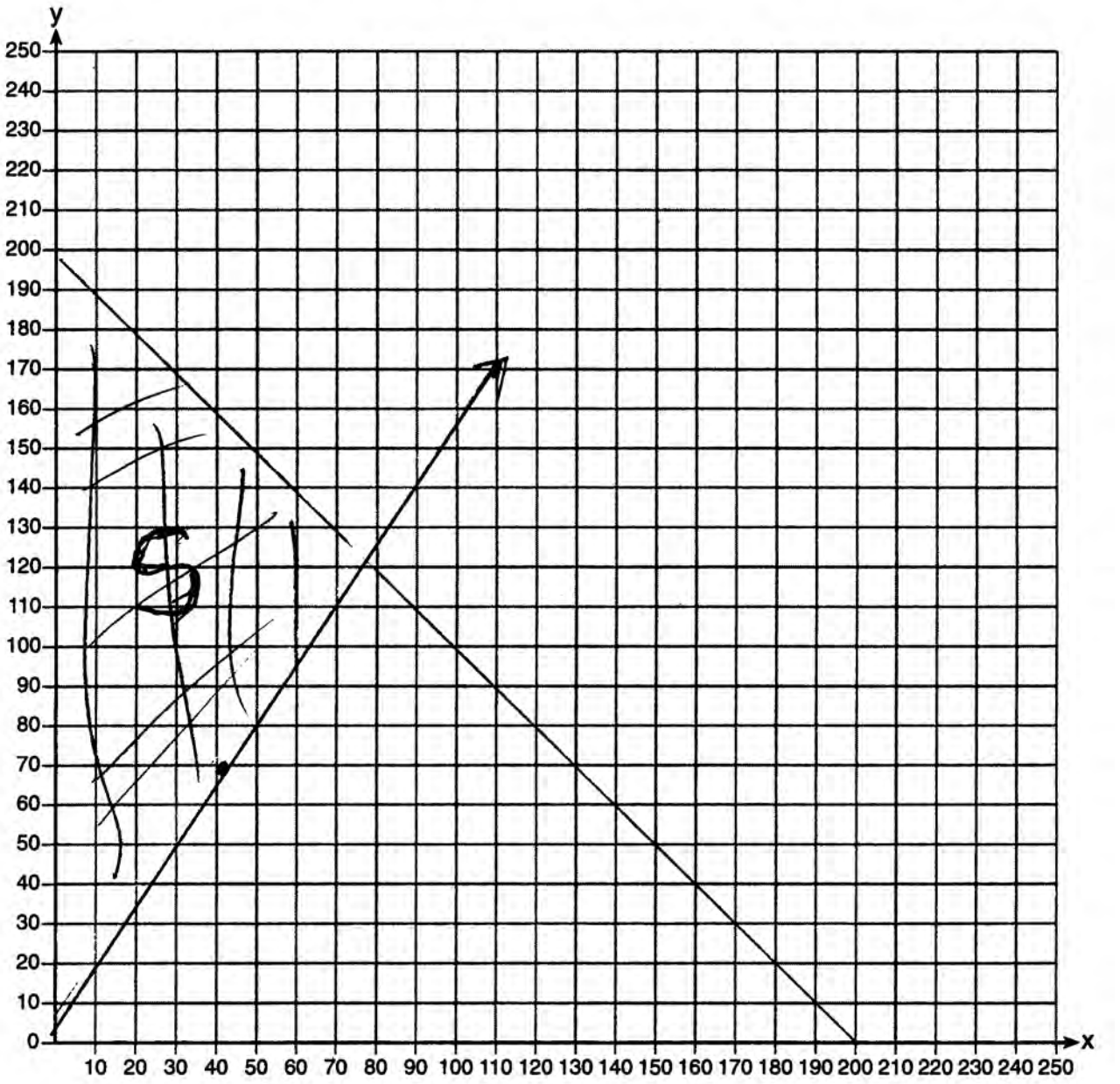
Graph the solution to this system of inequalities on the set of axes on the next page. Label the solution with an S.

Marta claims that selling 30 adult tickets and 80 child tickets will result in meeting the cinema's goal. Explain whether she is correct or incorrect, based on the graph drawn.



Score 2: The student wrote a correct system of inequalities, but made multiple graphing or labeling errors, and wrote an incorrect explanation based on the graph.

Question 37



$y = x + 200$

$12.5x + 6.5y = 1500$

$-6.5y \quad -6.5y$

$12.5x - 100 = 6.25x$

$x + y \leq 200$

$-y \quad -200$

$x - 200$

$\frac{-y}{-1} \geq \frac{x - 200}{-1}$

$y \leq -x + 200$

Question 37

37 The Reel Good Cinema is conducting a mathematical study. In its theater, there are 200 seats. Adult tickets cost $12.50 and child tickets cost $6.25. The cinema's goal is to sell at least $1500 worth of tickets for the theater.

Write a system of linear inequalities that can be used to find the possible combinations of adult tickets, x, and child tickets, y, that would satisfy the cinema's goal.

$12.50x + 6.25y \geq 1500$

Graph the solution to this system of inequalities on the set of axes on the next page. Label the solution with an S.

Marta claims that selling 30 adult tickets and 80 child tickets will result in meeting the cinema's goal. Explain whether she is correct or incorrect, based on the graph drawn.

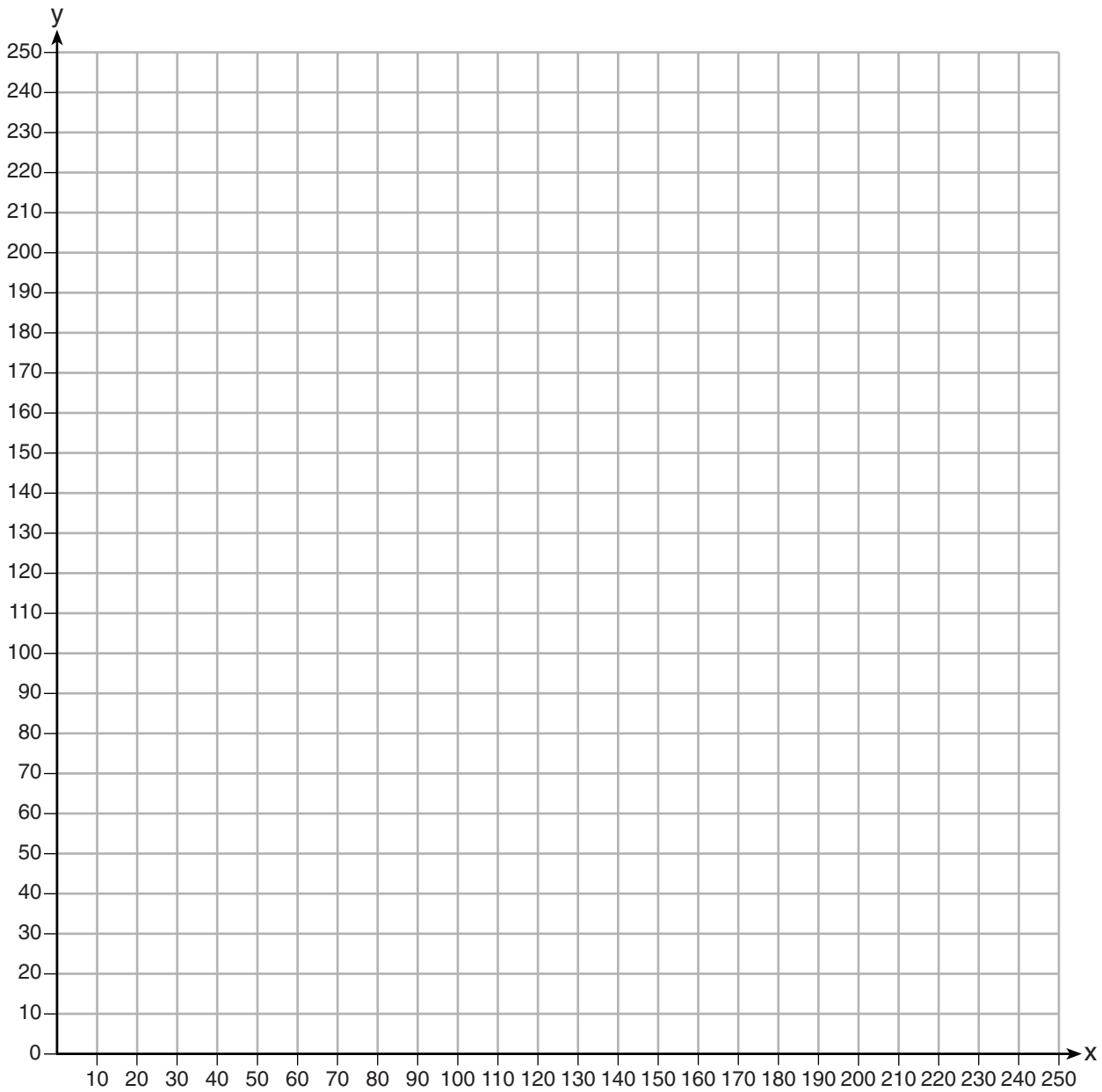
$12.50(30) + 6.25(80)$

875

No She is incorrect

Score 1: The student wrote one inequality correctly, but no explanation was written.

Question 37



$12.50x + 6.25y \geq 200$

$-12.50x \quad -12.50x$

$\frac{6.25y}{6.25} \geq \frac{-12.50x + 200}{6.25}$

$y \geq -2x + 240$

Question 37

37 The Reel Good Cinema is conducting a mathematical study. In its theater, there are 200 seats. Adult tickets cost $12.50 and child tickets cost $6.25. The cinema's goal is to sell at least $1500 worth of tickets for the theater.

Write a system of linear inequalities that can be used to find the possible combinations of adult tickets, x, and child tickets, y, that would satisfy the cinema's goal.

$(12.50 * x) + (6.25 * y) = 1500$

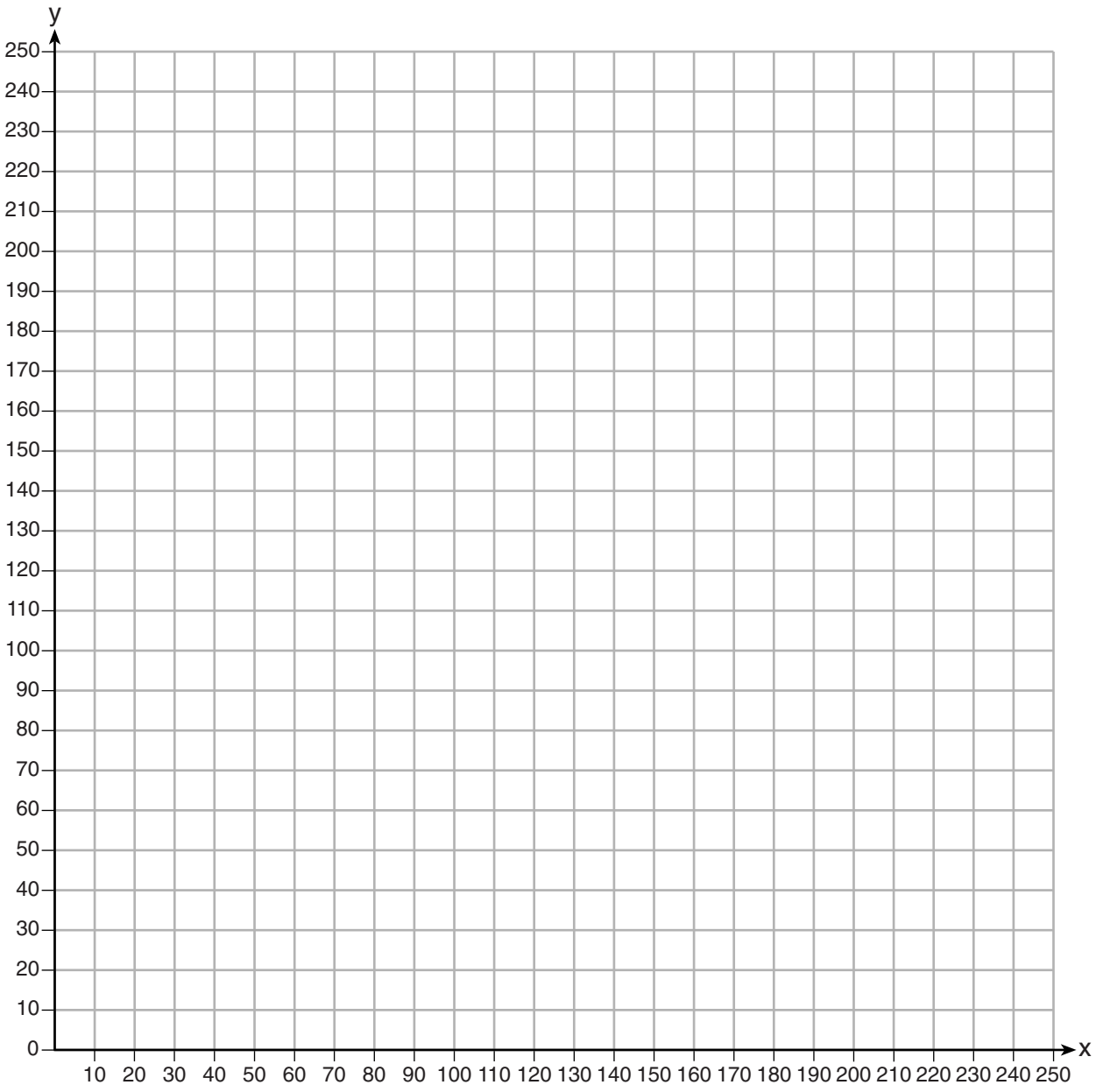
Graph the solution to this system of inequalities on the set of axes on the next page. Label the solution with an S.

Marta claims that selling 30 adult tickets and 80 child tickets will result in meeting the cinema's goal. Explain whether she is correct or incorrect, based on the graph drawn.

no She is incorrect because that would only add up to $875

Score 1: The student gave an explanation not based on the graph.

Question 37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Question 37

37 The Reel Good Cinema is conducting a mathematical study. In its theater, there are 200 seats. Adult tickets cost $12.50 and child tickets cost $6.25. The cinema's goal is to sell at least $1500 worth of tickets for the theater.

Write a system of linear inequalities that can be used to find the possible combinations of adult tickets, x, and child tickets, y, that would satisfy the cinema's goal.

$1500 \geq \$6.25y + 12.50x$

$y > \$12.50x + \$6.25$

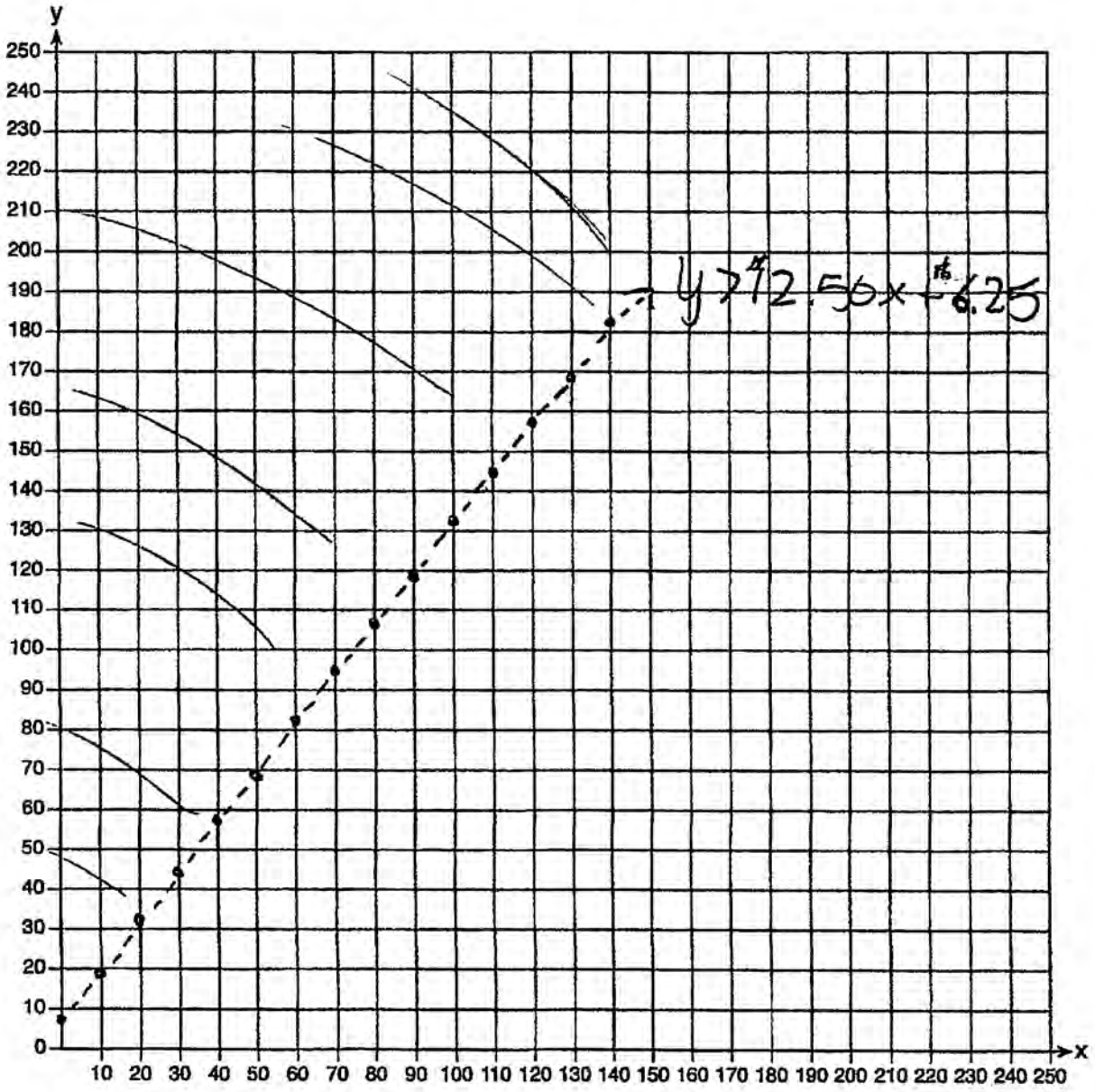
Graph the solution to this system of inequalities on the set of axes on the next page. Label the solution with an *S*.

Marta claims that selling 30 adult tickets and 80 child tickets will result in meeting the cinema's goal. Explain whether she is correct or incorrect, based on the graph drawn.

Marta's claim is correct.

Score 0: The student did not state or graph either inequality correctly and no explanation was given.

Question 37



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

Regents Examination in Algebra I (Common Core) – January 2016

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

(Use for the January 2016 exam only.)

Raw Score	Scale Score	Performance Level
86	**100**	5
85	**98**	5
84	**97**	5
83	**96**	5
82	**95**	5
81	**93**	5
80	**92**	5
79	**90**	5
78	**89**	5
77	**88**	5
76	**87**	5
75	**86**	5
74	**85**	5
73	**84**	4
72	**83**	4
71	**82**	4
70	**81**	4
69	**81**	4
68	**80**	4
67	**79**	4
66	**79**	4
65	**78**	4
64	**78**	4
63	**77**	4
62	**77**	4
61	**76**	4
60	**76**	4
59	**75**	4
58	**75**	4

Raw Score	Scale Score	Performance Level
57	**75**	4
56	**74**	4
55	**74**	4
54	**74**	4
53	**73**	3
52	**73**	3
51	**73**	3
50	**72**	3
49	**72**	3
48	**72**	3
47	**72**	3
46	**71**	3
45	**71**	3
44	**71**	3
43	**71**	3
42	**70**	3
41	**70**	3
40	**70**	3
39	**69**	3
38	**69**	3
37	**69**	3
36	**68**	3
35	**68**	3
34	**67**	3
33	**67**	3
32	**66**	3
31	**66**	3
30	**65**	3
29	**64**	2

Raw Score	Scale Score	Performance Level
28	**64**	2
27	**63**	2
26	**62**	2
25	**61**	2
24	**60**	2
23	**59**	2
22	**58**	2
21	**56**	2
20	**55**	2
19	**54**	1
18	**52**	1
17	**50**	1
16	**49**	1
15	**47**	1
14	**45**	1
13	**43**	1
12	**40**	1
11	**38**	1
10	**35**	1
9	**33**	1
8	**30**	1
7	**27**	1
6	**23**	1
5	**20**	1
4	**16**	1
3	**13**	1
2	**9**	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 (Common Core).