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

ALGEBRA I

Wednesday, August 16, 2023 — 8:30 to 11:30 a.m., only

Student Name _____

School Name _____

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

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

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

This examination has four parts, with a total of 37 questions. You must answer all questions in this examination. Record your answers to the Part I multiple-choice questions on the separate answer sheet. Write your answers to the questions in **Parts II**, **III**, and **IV** directly in this booklet. All work should be written in pen, except for graphs and drawings, which should be done in pencil. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale.

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

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

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

Notice …

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

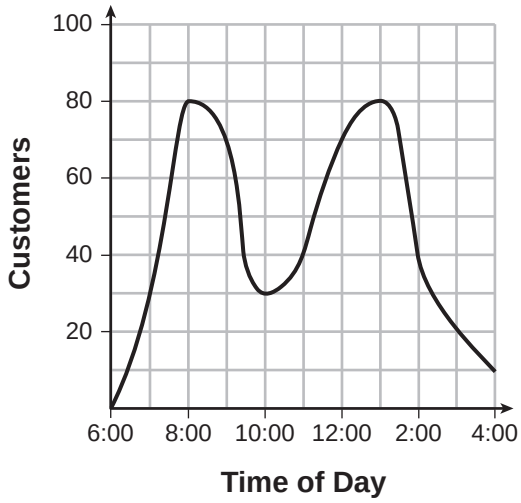
DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN.

Part I

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

Use this space for computations.

1 A café owner tracks the number of customers during business hours. The graph below models the data.



Based on the graph, the café owner saw a continual

(1) increase in customers from 6:00 to 11:00

(2) increase in customers from 12:00 to 3:00

(3) decrease in customers from 1:00 to 4:00

(4) decrease in customers from 11:00 to 2:00

2 The expression $(3x^2 + 4x - 8) + 2(11 - 5x)$ is equivalent to

(1) $3x^2 - x + 5$

(2) $3x^2 - x + 14$

(3) $3x^2 - 6x + 14$

(4) $3x^2 + 14x + 14$

3 Which point is a solution to $y = x^3 - 2x$?

(1) $(-3,-21)$

(2) $(-2,10)$

(3) $(1,1)$

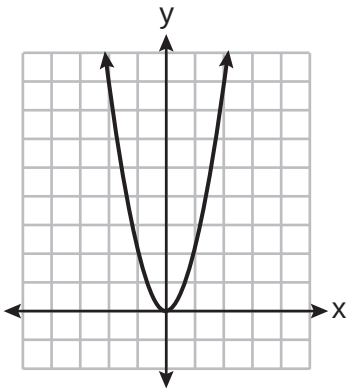
(4) $(4,2)$

Use this space for computations.

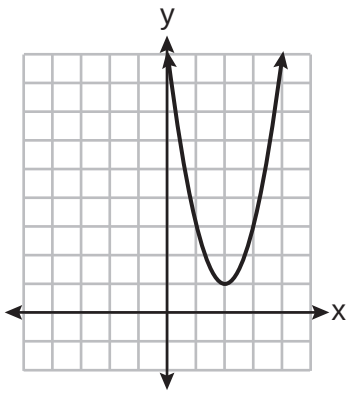
4 What is the value of x in the equation $\frac{5(2x - 4)}{3} + 9 = 14$?

(1) 1.9
(2) 3.5
(3) 5.3
(4) 8.9

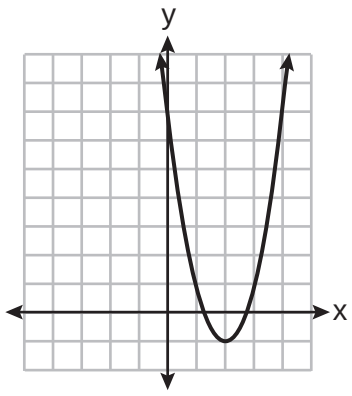
5 The graph of $y = f(x)$ is shown below.



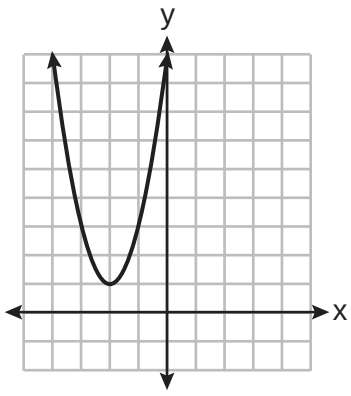
Which graph represents $y = f(x - 2) + 1$?



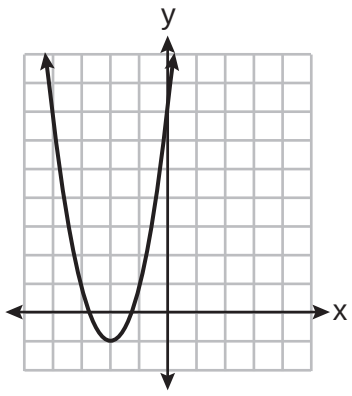
(1)



(3)



(2)



(4)

Use this space for computations.

6 The length of a rectangular flat-screen television is six inches less than twice its width, x. If the area of the television screen is 1100 square inches, which equation can be used to determine the width, in inches?

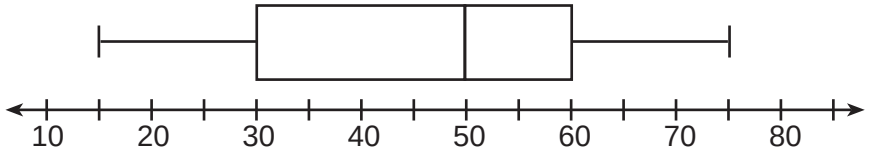
(1) $x(2x - 6) = 1100$

(2) $x(6 - 2x) = 1100$

(3) $2x + 2(2x - 6) = 1100$

(4) $2x + 2(6 - 2x) = 1100$

7 A box plot is shown below.



Which number represents the third quartile?

(1) 30

(2) 50

(3) 60

(4) 75

8 What is the product of $(2x + 7)$ and $(x - 3)$?

(1) $2x^2 - 21$

(2) $2x^2 + x - 21$

(3) $2x^2 + 4x - 21$

(4) $2x^2 + 13x - 21$

9 What is the degree of the polynomial $2x + x^3 + 5x^2$?

(1) 1

(2) 2

(3) 3

(4) 4

10 What is the solution to $-3(x - 6) > 2x - 2$?

(1) $x > 4$

(2) $x < 4$

(3) $x > -16$

(4) $x < -16$

Use this space for computations.

11 Three expressions are shown below.

I. $(x^3)^3$

II. $x^4 \cdot x^5$

III. $x^{10} \cdot x^{-1}$

Which expressions are equivalent for all positive values of x?

(1) I and II, only

(2) I and III, only

(3) II and III, only

(4) I, II, and III

12 Jim uses the equation $A = P(1 + 0.05)^t$ to find the amount of money in an account, A, of an investment, P, after t years. For this equation, which phrase describes the yearly rate of change?

(1) decreasing by 5%

(2) decreasing by 0.05%

(3) increasing by 5%

(4) increasing by 0.05%

13 What are the zeros of $m(x) = x(x^2 - 16)$?

(1) -4 and 4, only

(2) -8 and 8, only

(3) -4, 0, and 4

(4) -8, 0, and 8

14 For which function is the value of the y-intercept the *smallest*?

x	f(x)
−4	5
−2	4
0	3
2	2
4	1

(1)

x	h(x)
−1	3
0	2
1	3
2	6
3	11

(3)

$g(x) = |x| + 4$

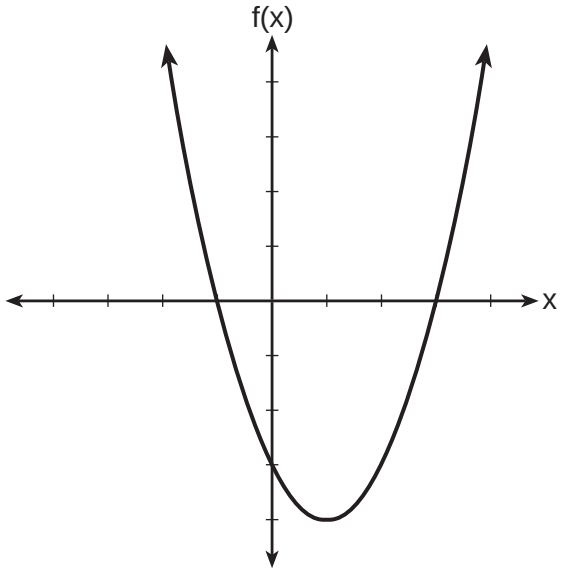
(2)

$k(x) = 5^x$

(4)

Use this space for computations.

15 The function f is graphed on the set of axes below.



What is a possible factorization of this function?

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

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

16 The range of $f(x) = x^2 + 2x - 5$ is the set of all real numbers

(1) less than or equal to -6

(2) greater than or equal to -6

(3) less than or equal to -1

(4) greater than or equal to -1

Use this space for computations.

17 Tables of values for four functions are shown below.

x	f(x)
0	6
1	7
2	10
3	15
4	22

x	h(x)
0	1
1	2
2	4
3	8
4	16

x	g(x)
0	0
1	−2
2	−2
3	0
4	4

x	j(x)
0	2
1	5
2	8
3	11
4	14

Which table best represents an exponential function?

(1) $f(x)$

(2) $g(x)$

(3) $h(x)$

(4) $j(x)$

18 If $f(x) = x^2 + 3x$, then which statement is true?

(1) $f(1) = f(-1)$

(2) $f(2) = f(-2)$

(3) $f(1) = f(2)$

(4) $f(-1) = f(-2)$

19 Jack started a new fitness program. The first day he did 10 push-ups. The program required him to increase the number of push-ups each day by doing 9 less than twice the number from the previous day. Which recursive formula correctly models Jack's new program, where n is the number of days and a_n is the number of push-ups on the nth day?

(1) $a_1 = 10$
$a_n = 2a_{n-1} - 9$

(2) $a_1 = 10$
$a_n = 9 - 2a_{n-1}$

(3) $a_1 = 10$
$a_n = 2(n - 1) - 9$

(4) $a_1 = 10$
$a_n = 9 - 2(n - 1)$

Use this space for computations.

20 Which equation is equivalent to $x^2 - 6x + 4 = 0$?

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

(2) $(x - 3)^2 = 5$

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

(4) $(x - 3)^2 = 9$

21 What is the equation of the line that passes through the point $(6,-3)$ and has a slope of $-\frac{4}{3}$?

(1) $3y = -4x + 15$

(2) $3y = -4x + 6$

(3) $-3y = 4x + 15$

(4) $-3y = 4x + 6$

22 The function $G(m)$ represents the amount of gasoline consumed by a car traveling m miles. An appropriate domain for this function would be

(1) integers

(2) rational numbers

(3) nonnegative integers

(4) nonnegative rational numbers

23 The table below shows the number of reported polio cases in Nigeria from 2006 to 2015.

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Number of Cases	1129	285	798	388	21	62	122	53	60	0

What is the average rate of change, to the *nearest hundredth*, of the number of reported polio cases per year in Nigeria from 2006 to 2013?

(1) -0.01

(2) -125.44

(3) -134.50

(4) -153.71

Use this space for computations.

24 Joe compared gas prices in England and New York State one day. In England, gas sold for 1.35 euros per liter, and one dollar equaled 0.622 euros. A correct way to figure out this cost, in dollars per gallon, is

(1) $\frac{1.35 \text{ euros}}{1 \text{ L}} \cdot \frac{1 \text{ L}}{0.264 \text{ gal}} \cdot \frac{\$1.00}{0.622 \text{ euros}}$

(2) $\frac{1.35 \text{ euros}}{1 \text{ L}} \cdot \frac{\$1.00}{0.622 \text{ euros}} \cdot \frac{0.264 \text{ gal}}{1 \text{ L}}$

(3) $\frac{1.35 \text{ euros}}{1 \text{ L}} \cdot \frac{1 \text{ L}}{0.264 \text{ gal}} \cdot \frac{0.622 \text{ euros}}{\$1.00}$

(4) $\frac{1.35 \text{ euros}}{1 \text{ L}} \cdot \frac{0.622 \text{ euros}}{\$1.00} \cdot \frac{0.264 \text{ gal}}{1 \text{ L}}$

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 Classify the expression $\frac{2}{\sqrt{144}} + \frac{\sqrt{169}}{3}$ as rational or irrational. Explain your reasoning.

26 Julia surveyed 150 of her classmates at City Middle School to determine their favorite animals. Of the 150 students, 46% were male.

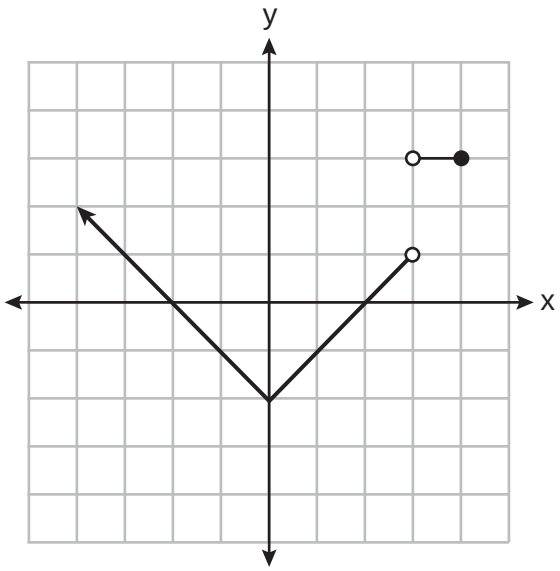
Forty-two students said their favorite animal was a horse, and $\frac{1}{3}$ of those students were female.

Of the 60 students who said dolphins were their favorite animal, 30% were male.

Using this information, complete the two-way frequency table below.

	Horse	Dolphin	Penguin	Total
Male				
Female				
Total				

27 Bryan said that the piecewise function graphed below has a domain of all real numbers.



State *two* reasons why Bryan is *incorrect*.

28 The formula $d = t\left(\frac{v_i + v_f}{2}\right)$ is used to calculate the distance, d, covered by an object in a given period of time, t.

Solve the formula for v_f, the final velocity, in terms of d, t, and v_i, the initial velocity.

29 Solve $x^2 - 9x = 36$ algebraically for all values of x.

30 Determine the common difference of the arithmetic sequence in which $a_1 = 5$ and $a_5 = 17$.

Determine the 21st term of this sequence.

31 Factor $18x^2 - 2$ completely.

32 Solve $x^2 + 3x - 9 = 0$ algebraically for all values of x. Round your answer to the *nearest hundredth*.

Part III

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

33 The senior class at Hills High School is purchasing sports drinks and bottled water to sell at the school field day. At the local discount store, a case of sports drinks costs \$15.79, and a case of bottled water costs \$5.69. The senior class has \$125 to spend on the drinks.

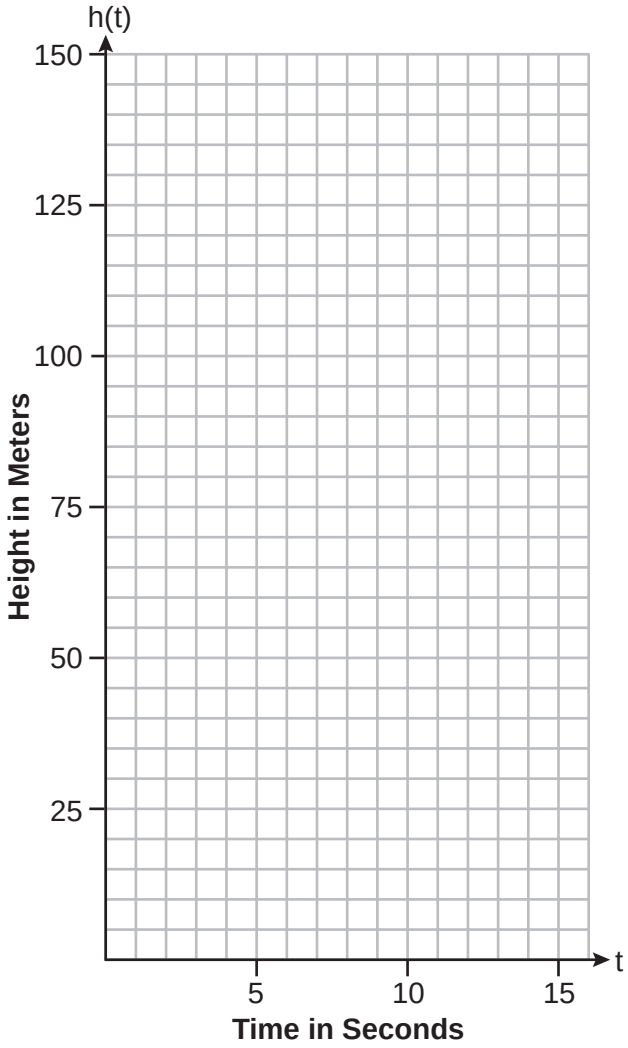
If x represents the number of cases of sports drinks and y represents the number of cases of bottled water purchased, write an inequality that models this situation.

Nine cases of bottled water are purchased for this year's field day. Use your inequality to determine algebraically the maximum number of full cases of sports drinks that can be purchased.

Explain your answer.

34 The path of a rocket is modeled by the function $h(t) = -4.9t^2 + 49t$, where h is the height, in meters, above the ground and t is the time, in seconds, after the rocket is launched.

Sketch the graph on the set of axes below.



State the vertex of this function.

Explain what the vertex means in the context of this situation.

35 A software company kept a record of their annual budget for advertising and their profit for each of the last eight years. These data are shown in the table below.

Annual Advertising Budget (in thousands, $) (x)	**Profit** (in millions, $) (y)
10	2.2
13	2.4
14	3.2
16	4.6
19	5.7
24	6.9
24	7.9
28	9.3

Write the linear regression equation for this set of data.

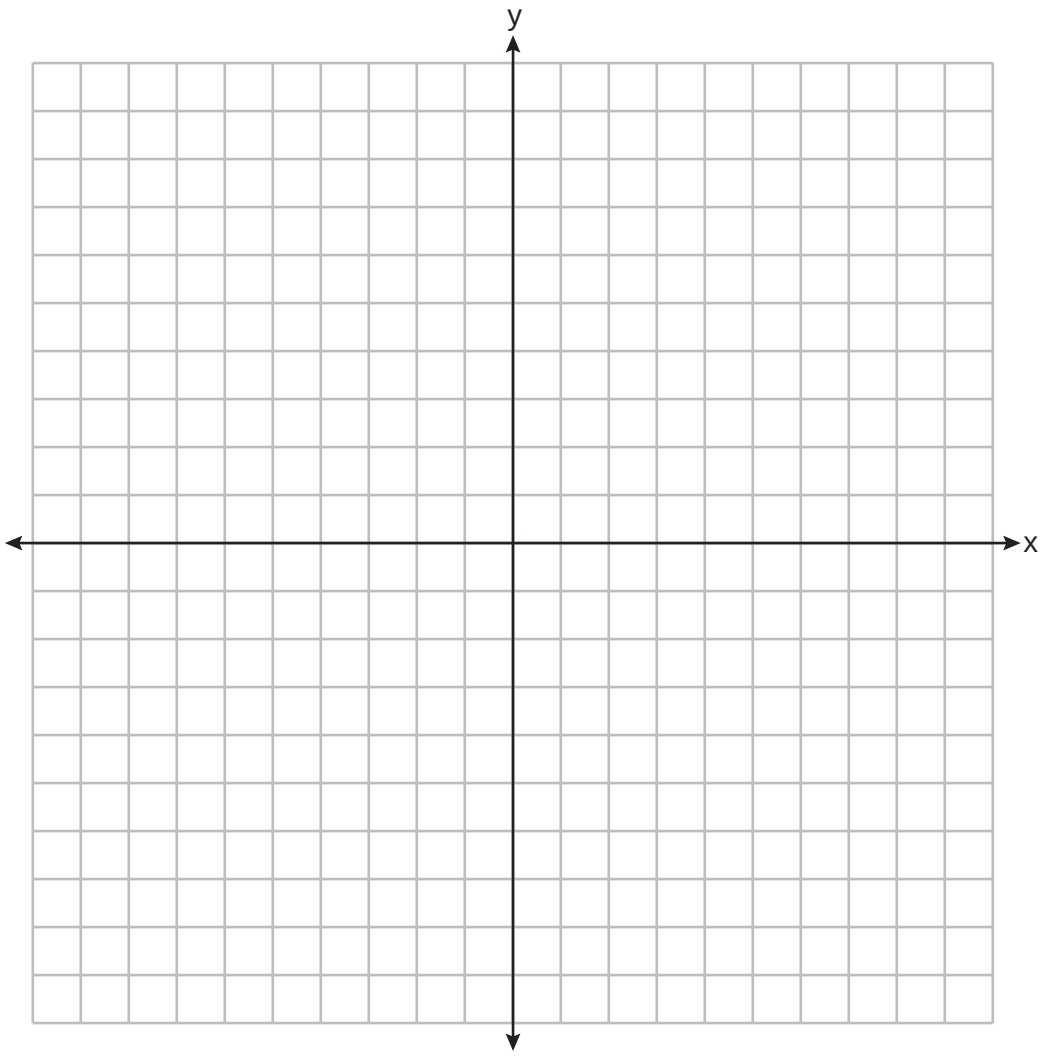
State, to the *nearest hundredth*, the correlation coefficient of these linear data.

State what this correlation coefficient indicates about the linear fit of the data.

36 Graph the following system of inequalities on the set of axes below:

$$-2y < 3x + 12$$
$$x \geq -3$$

Label the solution set *S*.



Allison thinks that (2,−9) is a solution to this system. Determine if Allison is correct.

Justify your answer.

Part IV

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

37 Lydia wants to take art classes. She compares the cost at two art centers. Center *A* charges \$25 per hour and a registration fee of \$25. Center *B* charges \$15 per hour and a registration fee of \$75. Lydia plans to take x hours of classes.

Write an equation that models this situation, where *A* represents the total cost of Center *A*.

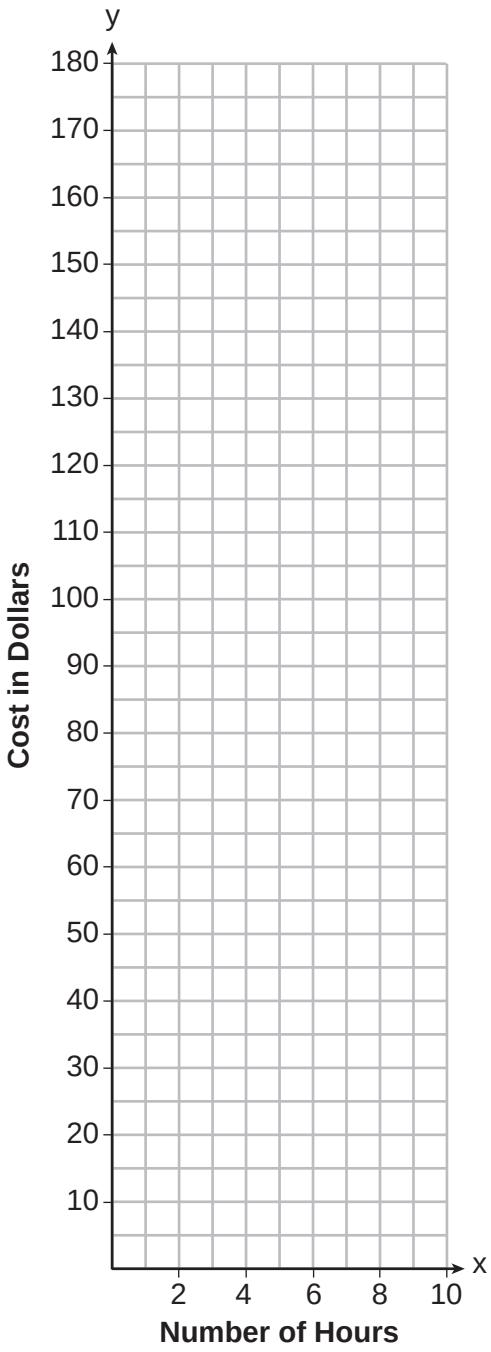
Write an equation that models this situation, where *B* represents the total cost of Center *B*.

If Lydia wants to take 10 hours of classes, use your equations to determine which center will cost *less*.

Question 37 is continued on the next page.

Question 37 continued

Graph your equations for Center *A* and Center *B* on the set of axes below.



State the number of hours of classes when the centers will cost the same.

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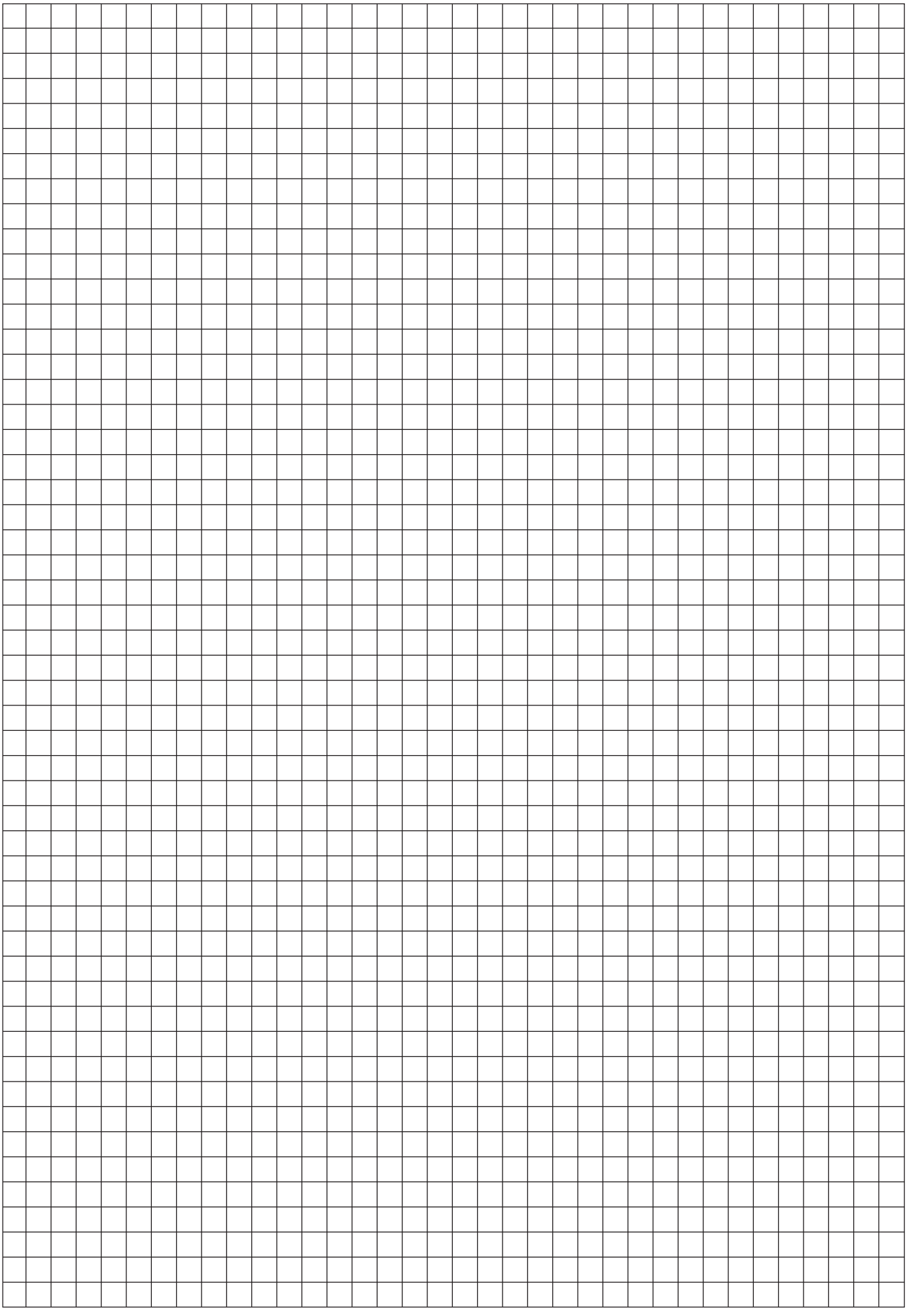

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High School Math Reference Sheet

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	$S_n = \frac{a_1 - a_1 r^n}{1 - \mathrm{r}}$ 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

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ALGEBRA I

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

Regents Examination in Algebra I – August 2023

Scoring Key: Part I (Multiple-Choice Questions)

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

Regents Examination in Algebra I – August 2023

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

Examination	Date	Question Number	Scoring Key	Question Type	Credit	Weight
Algebra I	August '23	**25**	-	CR	2	1
Algebra I	August '23	**26**	-	CR	2	1
Algebra I	August '23	**27**	-	CR	2	1
Algebra I	August '23	**28**	-	CR	2	1
Algebra I	August '23	**29**	-	CR	2	1
Algebra I	August '23	**30**	-	CR	2	1
Algebra I	August '23	**31**	-	CR	2	1
Algebra I	August '23	**32**	-	CR	2	1
Algebra I	August '23	**33**	-	CR	4	1
Algebra I	August '23	**34**	-	CR	4	1
Algebra I	August '23	**35**	-	CR	4	1
Algebra I	August '23	**36**	-	CR	4	1
Algebra I	August '23	**37**	-	CR	6	1

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

The chart for determining students' final examination scores for the **August 2023 Regents Examination in Algebra I** will be posted on the Department's web site at: https://www.nysedregents.org/algebraone/ on the day of the examination. Conversion charts provided for the previous administrations of the Regents Examination in Algebra I must NOT be used to determine students' final scores for this administration.

FOR TEACHERS ONLY

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

ALGEBRA I

Wednesday, August 16, 2023 — 8:30 to 11:30 a.m., only

RATING GUIDE

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

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

Note: The rubric definition for a 0-credit response has been updated based on feedback from New York State mathematics educators.

Mechanics of Rating

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

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

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

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

Raters should record the student's scores for all questions and the total raw score on the student's separate answer sheet. Then the student's total raw score should be converted to a scale score by using the conversion chart that will be posted on the Department's web site at: https://www.nysed.gov/state-assessment/high-school-regents-examinations on Wednesday, August 16, 2023. Because scale scores corresponding to raw scores in the conversion chart may change from one administration to another, it is crucial that, for each administration, the conversion chart provided for that administration be used to determine the student's final score. The student's scale score should be entered in the box provided on the student's separate answer sheet. The scale score is the student's final examination score.

General Rules for Applying Mathematics Rubrics

I. General Principles for Rating

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

II. Full-Credit Responses

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

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

III. Appropriate Work

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

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

IV. Multiple Errors

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

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

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

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

Part II

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

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

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

or

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

or

[1] Rational, but an incomplete explanation is written.

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

or

[0] A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

(26) **[2]** The frequency table is completed correctly.

	Horse	Dolphin	Penguin	Total
Male	28	18	23	69
Female	14	42	25	81
Total	42	60	48	150

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

or

[1] 14, 18, and 69 are placed correctly in the table.

[0] Only the given information of 150, 60, and 42 is written in the table.

or

[0] A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

(27) **[2]** Two correct reasons are stated.

[1] One conceptual error is made.

or

[1] One correct reason is stated.

[0] A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

(28) **[2]** $v_f = \frac{2d}{t} - v_i$, and correct work is shown.

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

or

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

or

[1] Appropriate work is shown, but the expression $\frac{2d}{t} - v_i$ is written.

or

[1] $v_f = \frac{2d}{t} - v_i$, but no work is shown.

[0] A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

(29) **[2]** 12 and -3, and correct algebraic work is shown.

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

or

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

or

[1] Appropriate work is shown, but only 12 or -3 is stated.

or

[1] 12 and -3, but a method other than algebraic is used.

or

[1] 12 and -3, but no work is shown.

[0] A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

(30) **[2]** 3 and 65, and correct work is shown.

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

or

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

or

[1] Appropriate work is shown to find 3 or 65.

or

[1] 3 and 65, but no work is shown.

[0] A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

(31) **[2]** $2(3x + 1)(3x - 1)$ is written, and correct work is shown.

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

or

[1] $2(3x + 1)(3x - 1)$, but no work is shown.

[0] $2(9x^2 - 1)$, but no further correct work is shown.

or

[0] A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

(32) **[2]** 1.85 and −4.85, and correct algebraic work is shown.

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

or

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

or

[1] Appropriate work is shown, but only 1.85 or −4.85 is stated.

or

[1] Appropriate work is shown to find $\frac{-3 \pm \sqrt{45}}{2}$, but no further correct work is shown.

or

[1] 1.85 and −4.85, but a method other algebraic is used.

or

[1] 1.85 and −4.85, but no work is shown.

[0] A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, 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]** $15.79x + 5.69y \leq 125$ and 4, and correct algebraic work is shown, and a correct explanation is written.

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

or

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

or

[3] Appropriate work is shown, but a method other than algebraic is used to find 4.

[2] An incorrect inequality is written but solved appropriately, and no further correct work is shown.

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

or

[1] 4, but no work is shown.

[0] A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

(34) **[4]** A correct graph is sketched, (5,122.5), and a correct explanation in context is written.

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

or

[3] Appropriate work is shown, but the vertex is incorrect.

or

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

[2] A correct graph is sketched, but no further correct work is shown.

or

[2] (5,122.5) is stated, and a correct explanation is written, but no further correct work is shown.

[1] (5,122.5) is stated, but no further correct work is shown.

or

[1] A correct explanation is written.

[0] A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

(35) **[4]** $y = 0.41x - 2.31$, 0.99, and strong is indicated.

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

or

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

or

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

[2] $y = 0.41x - 2.31$, but no further correct work is shown.

[1] 0.99 is stated, but no further correct work is shown.

or

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

[0] A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

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

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

or

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

or

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

or

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

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

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

or

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

or

[1] $-2y = 3x + 12$ and $x = -3$ are graphed correctly, and at least one is labeled, but no further correct work is shown.

[0] A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

Part IV

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

(37) **[6]** $A = 25x + 25$ and $B = 15x + 75$ are written, correct work is shown to find Center B, both equations are graphed correctly and at least one is labeled, and 5 is stated.

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

or

[5] One equation is written incorrectly, but the system is used appropriately.

[4] $A = 25x + 25$ and $B = 15x + 75$ are written, graphed, and labeled correctly, but no further correct work is shown.

or

[4] Appropriate work is shown, but the graphs are missing or incorrect.

[3] Both equations are written correctly and 5 is stated, but no further correct work is shown.

or

[3] Both equations are written correctly and used to determine Center B, but no further correct work is shown.

[2] Both equations are written correctly, but no further correct work is shown.

or

[2] One equation is written, graphed, and labeled correctly, but no further correct work is shown.

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

or

[1] 5 is stated, but no further correct work is shown.

or

[1] Appropriate work is shown to determine Center B, but no further correct work is shown.

[0] Center B is stated, but no work is shown.

or

[0] A zero response does not contain enough relevant course-level work to receive any credit, does not satisfy the criteria for one or more credits, or is a correct response that was obtained by an obviously incorrect procedure.

Map to the Learning Standards
Algebra I
August 2023

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

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

Regents Examination in Algebra I

August 2023

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

The *Chart for Determining the Final Examination Score for the August 2023 Regents Examination in Algebra I* will be posted on the Department's web site at: https://www.nysed.gov/state-assessment/high-school-regents-examinations by Wednesday, August 16, 2023. Conversion charts provided for previous administrations of the Regents Examination in Algebra I must NOT be used to determine students' final scores for this administration.

Online Submission of Teacher Evaluations of the Test to the Department

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

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

2. Select the test title.

3. Complete the required demographic fields.

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

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

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

ALGEBRA I

Wednesday, August 16, 2023 — 8:30 to 11:30 a.m., only

MODEL RESPONSE SET

Table of Contents

Question 25

25 Classify the expression $\frac{2}{\sqrt{144}} + \frac{\sqrt{169}}{3}$ as rational or irrational. Explain your reasoning.

$\frac{2}{\sqrt{144}} + \frac{\sqrt{169}}{3}$

$\frac{2}{12} + \frac{13}{3}$

$\frac{9}{2}$

4.5

$\frac{2}{\sqrt{144}} + \frac{\sqrt{169}}{3}$ is rational because its solution is 4.5 which is a terminating decimal.

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

Question 25

25 Classify the expression $\frac{2}{\sqrt{144}} + \frac{\sqrt{169}}{3}$ as rational or irrational. Explain your reasoning.

rational because $\frac{2}{\sqrt{144}} + \frac{\sqrt{169}}{3} = 1.5$ and it can be changed into a fraction of $9/2$.

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

Question 25

25 Classify the expression $\frac{2}{\sqrt{144}} + \frac{\sqrt{169}}{3}$ as rational or irrational. Explain your reasoning.

13

12

rational + rational = rational

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

Question 25

25 Classify the expression $\frac{2}{\sqrt{144}} + \frac{\sqrt{169}}{3}$ as rational or irrational. Explain your reasoning.

$\frac{2}{12} + \frac{13}{3} = 4.5 \qquad 4\frac{1}{2}$

rational.

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

Question 25

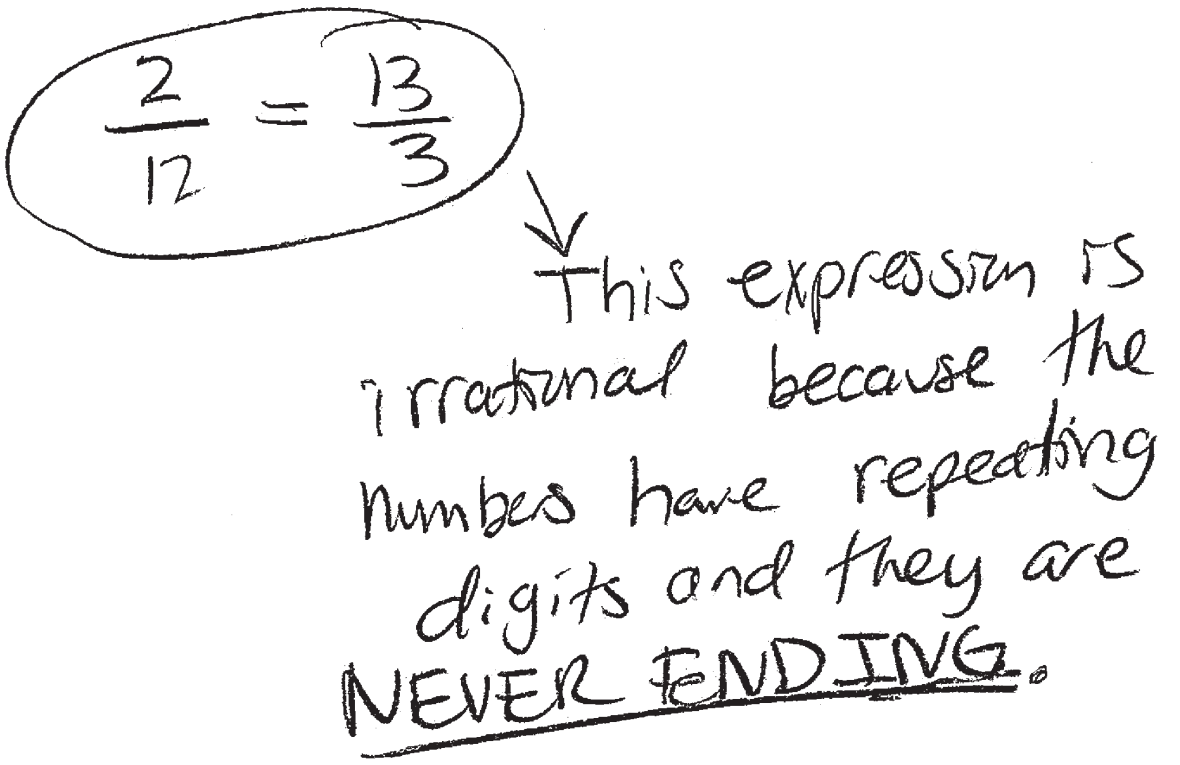
25 Classify the expression $\frac{2}{\sqrt{144}} + \frac{\sqrt{169}}{3}$ as rational or irrational. Explain your reasoning.

Irrational, the resulting answer is a fraction/decimal that terminates

Score 1: The student made a conceptual error.

Question 25

25 Classify the expression $\frac{2}{\sqrt{144}} + \frac{\sqrt{169}}{3}$ as rational or irrational. Explain your reasoning.



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

Question 25

25 Classify the expression $\frac{2}{\sqrt{144}} + \frac{\sqrt{169}}{3}$ as rational or irrational. Explain your reasoning.

$\frac{2}{\sqrt{144}} = \frac{2}{\sqrt{12}\sqrt{12}} = \frac{2}{12} = \frac{1}{6}$

$\frac{\sqrt{169}}{3} = \frac{\sqrt{13}\sqrt{13}}{3} = \frac{13}{3}$

$\frac{1}{6} \rightarrow \frac{1}{6}$

$+ \frac{13}{3} \rightarrow \frac{26}{6}$

$\frac{27}{6}$ $\frac{9}{2}$

IRRATIONAL

$\frac{9}{2}$

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

Question 26

26 Julia surveyed 150 of her classmates at City Middle School to determine their favorite animals. Of the 150 students, 46% were male.

Forty-two students said their favorite animal was a horse, and $\frac{1}{3}$ of those students were female.

Of the 60 students who said dolphins were their favorite animal, 30% were male.

Using this information, complete the two-way frequency table below.

	Horse	Dolphin	Penguin	Total
Male	28	18	23	69
Female	14	42	25	81
Total	42	60	48	150

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

Question 26

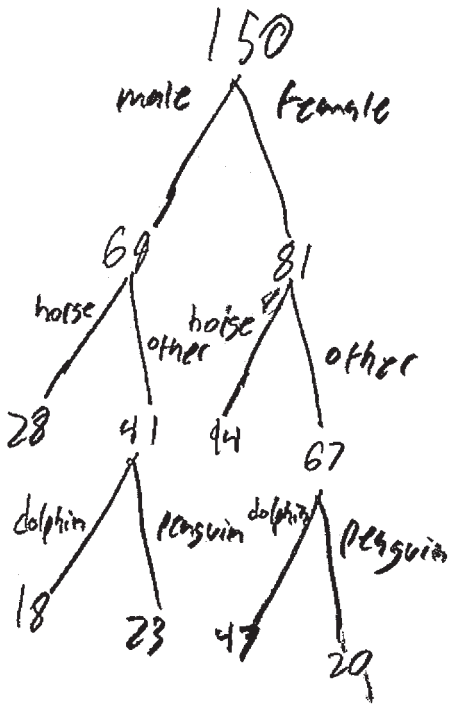
26 Julia surveyed 150 of her classmates at City Middle School to determine their favorite animals. Of the 150 students, 46% were male.

Forty-two students said their favorite animal was a horse, and $\frac{1}{3}$ of those students were female.

Of the 60 students who said dolphins were their favorite animal, 30% were male.

Using this information, complete the two-way frequency table below.

	Horse	Dolphin	Penguin	Total
Male	28	18	23	69
Female	14	47	20	81
Total	42	65	43	150



14 female like horse

Score 1: The student placed 14, 18, and 69 correctly in the table.

Question 26

26 Julia surveyed 150 of her classmates at City Middle School to determine their favorite animals. Of the 150 students, 46% were male.

Forty-two students said their favorite animal was a horse, and $\frac{1}{3}$ of those students were female.

Of the 60 students who said dolphins were their favorite animal, 30% were male.

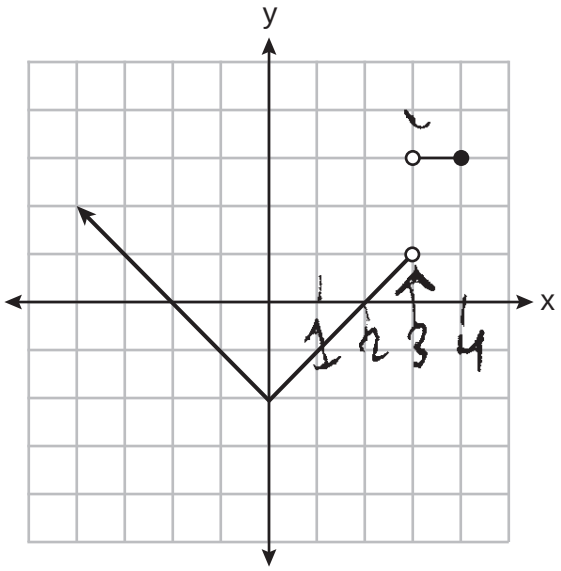
Using this information, complete the two-way frequency table below.

	Horse	Dolphin	Penguin	Total
Male	24	35	6	65
Female	18	25	33	85
Total	42	60	148	150

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

Question 27

27 Bryan said that the piecewise function graphed below has a domain of all real numbers.



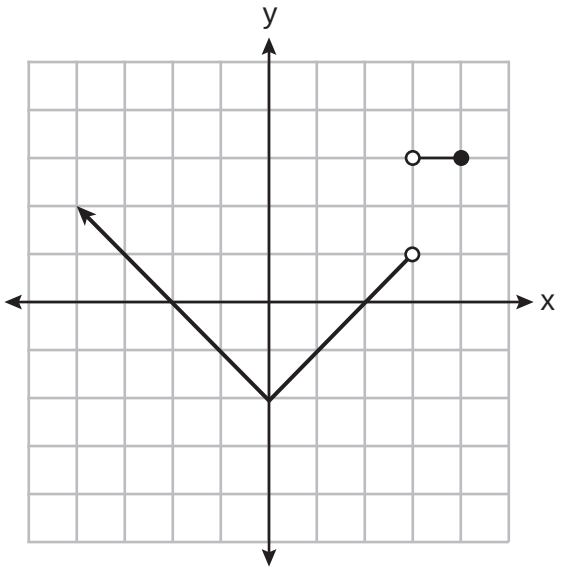
State *two* reasons why Bryan is *incorrect*.

1) The function is not defined at $x=3$.
2) The function is not defined after $x=4$.

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

Question 27

27 Bryan said that the piecewise function graphed below has a domain of all real numbers.



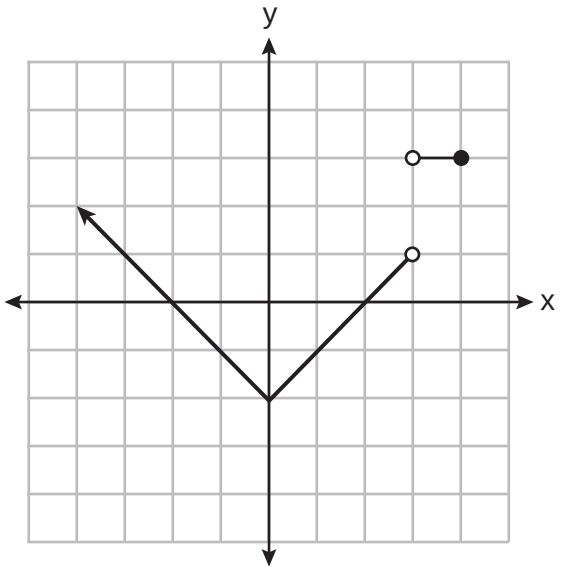
State *two* reasons why Bryan is *incorrect*.

There is no value for 3 because both dots are open and he forgot put an arrow on the function at (4,3).

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

Question 27

27 Bryan said that the piecewise function graphed below has a domain of all real numbers.



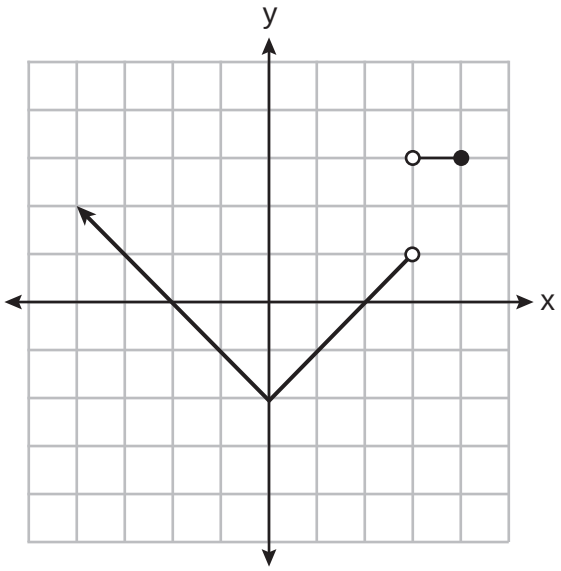
State *two* reasons why Bryan is *incorrect*.

Bryan is incorrect because the domain is not continuous.

Score 1: The student wrote only one correct reason.

Question 27

27 Bryan said that the piecewise function graphed below has a domain of all real numbers.



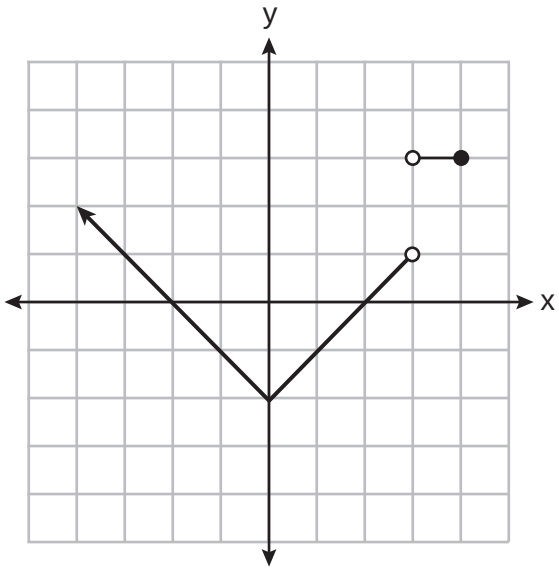
State *two* reasons why Bryan is *incorrect*.

Bryan is incorrect because the dots at x=3 are both open, it has to be one open, one closed. Another reason is the line need to be straight.

Score 1: The student wrote only one correct reason.

Question 27

27 Bryan said that the piecewise function graphed below has a domain of all real numbers.



State *two* reasons why Bryan is *incorrect*.

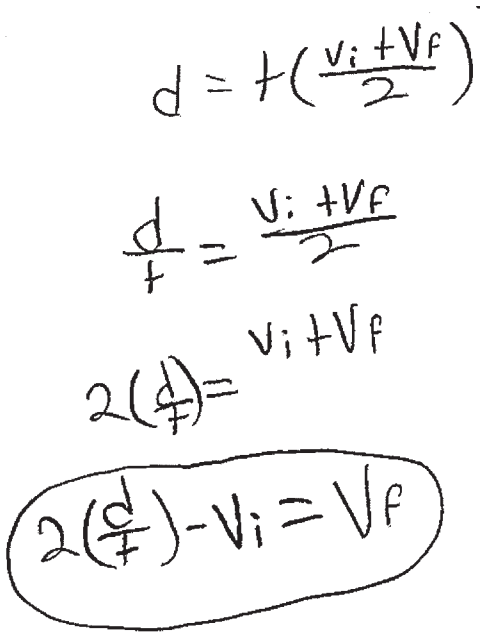
- One reason bryan is wrong because all real numbers should not include negatives
- Another reason he is incorrect would be because the functions are both different + don't show real numbers.

Score 0: The student wrote two incorrect reasons.

Question 28

28 The formula $d = t\left(\frac{v_i + v_f}{2}\right)$ is used to calculate the distance, d, covered by an object in a given period of time, t.

Solve the formula for v_f, the final velocity, in terms of d, t, and v_i, the initial velocity.



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

Question 28

28 The formula $d = t\left(\frac{v_i + v_f}{2}\right)$ is used to calculate the distance, d, covered by an object in a given period of time, t.

Solve the formula for v_f, the final velocity, in terms of d, t, and v_i, the initial velocity.

$$2 \cdot d = t\left(\frac{v_i + v_f}{2}\right) \cdot 2$$

$$2d = t(v_i + v_f)$$

$$-v_i = -v_i$$

$$\frac{2d - v_i}{t} = \frac{t(v_f)}{t}$$

$$v_f = \frac{2d - v_i}{t}$$

Score 1: The student made one error by subtracting v_i before dividing it by t.

Question 28

28 The formula $d = t\left(\frac{v_i + v_f}{2}\right)$ is used to calculate the distance, d, covered by an object in a given period of time, t.

Solve the formula for v_f, the final velocity, in terms of d, t, and v_i, the initial velocity.

$d = t\left(\frac{V_i}{2} + \frac{V_f}{2}\right)$

$d = t\left(\left(\frac{2}{2}\right)\frac{V_i}{2} + \frac{V_f}{2}\left(\frac{2}{2}\right)\right)$

$d = t(V_i + V_f)$

$\frac{d}{t} = \frac{t(V_i + V_f)}{t}$

$\frac{d}{t} = V_i + V_f$

$V_i \quad -V_i$

$\frac{d}{t} - V_i = V_f$

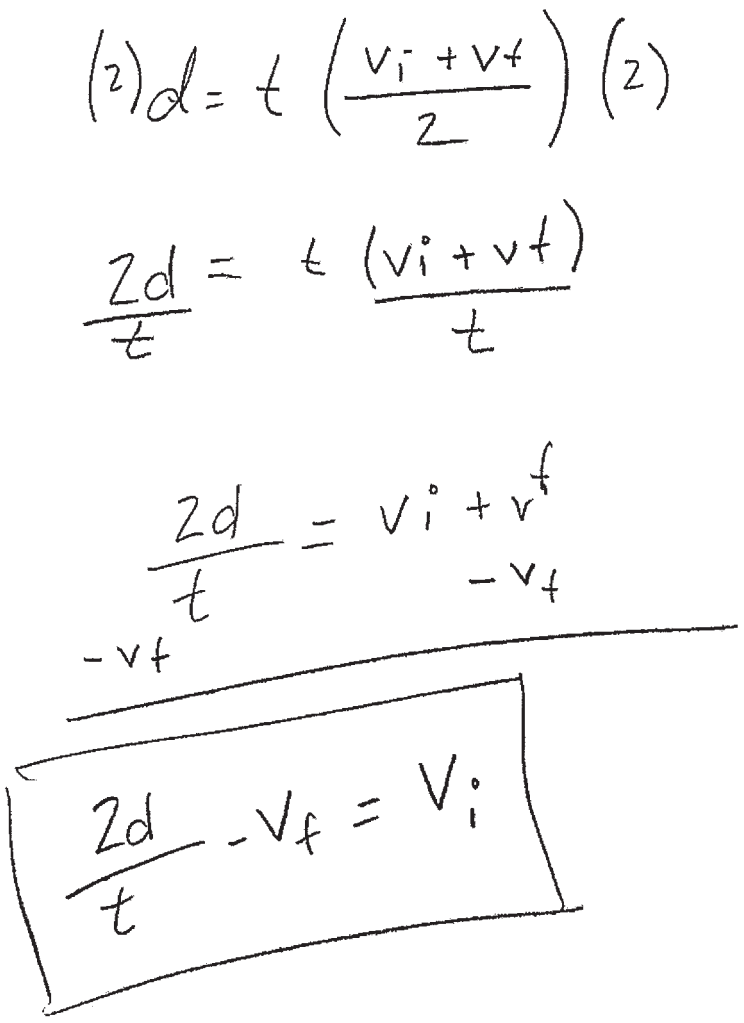
$\boxed{\frac{d}{t} - V_i = V_f}$

Score 1: The student made one error by not multiplying both sides by 2.

Question 28

28 The formula $d = t\left(\frac{v_i + v_f}{2}\right)$ is used to calculate the distance, d, covered by an object in a given period of time, t.

Solve the formula for v_f, the final velocity, in terms of d, t, and v_i, the initial velocity.



Score 1: The student solved for v_i.

Question 28

28 The formula $d = t\left(\frac{v_i + v_f}{2}\right)$ is used to calculate the distance, d, covered by an object in a given period of time, t.

Solve the formula for v_f, the final velocity, in terms of d, t, and v_i, the initial velocity.

$d = t\left(\frac{v_1 + v_f}{2}\right)$

$d = \frac{tv_1 + tv_f}{t_2} \cdot t$

$dt = \frac{v_1 + v_f}{2} \cdot 2$

$\frac{2dt}{v_1} = \frac{v_1 + v_f}{v_1}$

$\frac{2dt}{v_i} = v_f$

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

Question 29

29 Solve $x^2 - 9x = 36$ algebraically for all values of x.

$x^2 - 9x - 36 = 0$

$(x - 12)(x + 3) = 0$

$x - 12 = 0 \quad x + 3 = 0$

$x = 12 \quad x = -3$

$\{12, -3\}$

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

Question 29

29 Solve $x^2 - 9x = 36$ algebraically for all values of x.

$x^2 - 9x - 36 = 0$

a 1
B -9
c -36

$D (-9)^2 - 4(1)(-36) = 225$

$\frac{9 \pm \sqrt{225}}{2}$

$\frac{9 \pm 15}{2}$

$x = 12$
$x = -3$

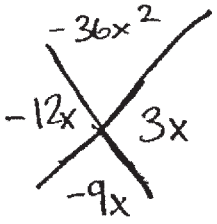
Score 2: The student gave a complete and correct response.

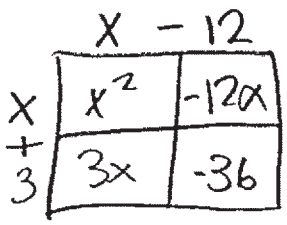
Question 29

29 Solve $x^2 - 9x = 36$ algebraically for all values of x.

$-36 \quad -36$

$x^2 - 9x - 36 = 0$





$(x-12)(x+3)=0$

Score 1: The student factored $x^2 - 9x - 36 = 0$ correctly, but did not solve for the values of x.

Question 29

29 Solve $x^2 - 9x = 36$ algebraically for all values of x.

$x^2 - 9x - 36 = 0$

$(x - 3)(x + 12) = 0$

$x = 3$ | $x = -12$

Score 1: The student made a factoring error.

Question 29

29 Solve $x^2 - 9x = 36$ algebraically for all values of x.

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

$A = 1$
$B = -9$
$C = 0$

$x^2 - 9x = 36$

$x = \frac{-(-9) \pm \sqrt{-9^2 - 4(1)(0)}}{2(1)}$

$x = \frac{9 \pm \sqrt{-81}}{2}$

No Real Solutions.
(value in radical is NEGATIVE)

Score 0: The student used $c = 0$ and did not square -9 correctly.

Question 29

29 Solve $x^2 - 9x = 36$ algebraically for all values of x.

$\sqrt{x^2 - 9x} = \sqrt{36}$

$x - 3x = 6$

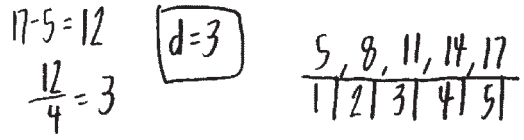
$\frac{-2x}{-2} = \frac{6}{-2}$

$x = -3$

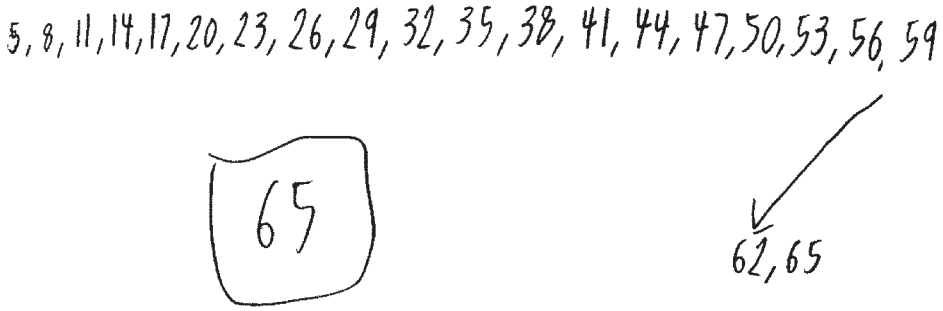
Score 0: The student did not show enough correct work to receive any credit.

Question 30

30 Determine the common difference of the arithmetic sequence in which $a_1 = 5$ and $a_5 = 17$.



Determine the 21st term of this sequence.



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

Question 30

30 Determine the common difference of the arithmetic sequence in which $a_1 = 5$ and $a_5 = 17$.

$d = 3$

$5+3=8$
$8+3=11$
$11+3=14$
$14+3=17$

Determine the 21st term of this sequence.

$a_n = a_1 - (n-1)d$
$a_{21} = 5 + (21-1)3$
$a_{21} = 5 + (20)3$
$a_{21} = 5 + 60$
$a_{21} = 65$

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

Question 30

30 Determine the common difference of the arithmetic sequence in which $a_1 = 5$ and $a_5 = 17$.

Determine the 21st term of this sequence.

5, 8, 11, 14, 17, 20, 23, 26
29, 32, 35, 38, 41, 44, 47,
50, 53, 56, 59, 62, 65

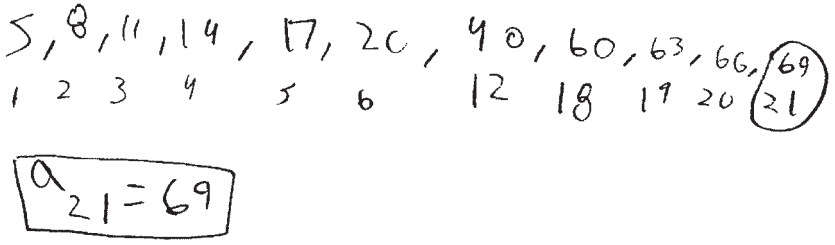
$a_{21} = 65$

Score 1: The student showed correct work to find 65.

Question 30

30 Determine the common difference of the arithmetic sequence in which $a_1 = 5$ and $a_5 = 17$.

Determine the 21st term of this sequence.



Score 0: The student made multiple errors.

Question 31

31 Factor $18x^2 - 2$ completely.

$2(9x^2 - 1)$

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

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

Question 31

31 Factor $18x^2 - 2$ completely.

$\frac{18x^2-2}{2}$

$2(9x^2-1)$ $(3x-1)(3x+1)$

Score 1: The student did not include the common factor in their final answer.

Question 31

31 Factor $18x^2 - 2$ completely.

$$x = \frac{-(0) \pm \sqrt{(0)^2 - 4(18)(-2)}}{2(18)}$$

$$x = \frac{0 \pm \sqrt{144}}{36}$$

$$x = \frac{0 \pm 12}{36}$$

$$x = \frac{0+12}{36} \qquad x = \frac{0-12}{36}$$

$$x = \frac{1}{3} \qquad x = -\frac{1}{3}$$

Score 0: The student solved the expression as an equation.

Question 31

31 Factor $18x^2 - 2$ completely.

$2(9x-1)(9x+1)$

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

Question 31

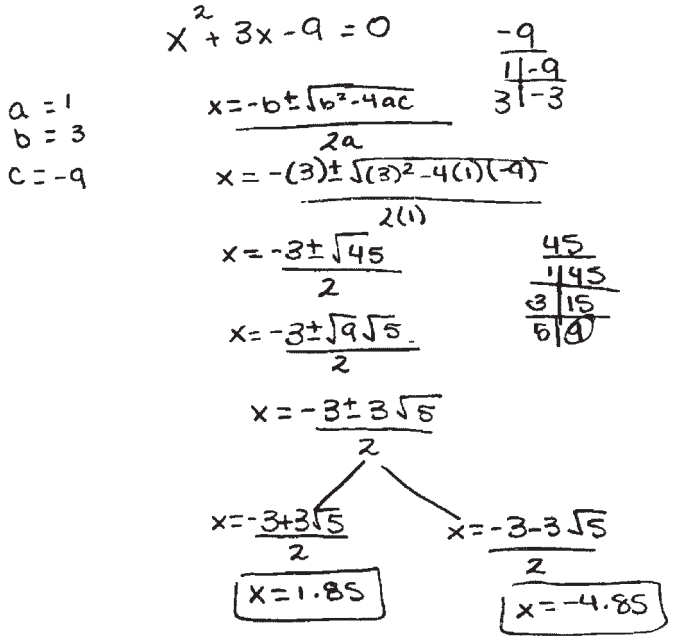
31 Factor $18x^2 - 2$ completely.

$2(9x^2 - 1)$

Score 0: The student did not show enough grade-level work to receive any credit.

Question 32

32 Solve $x^2 + 3x - 9 = 0$ algebraically for all values of x. Round your answer to the *nearest hundredth*.



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

Question 32

32 Solve $x^2 + 3x - 9 = 0$ algebraically for all values of x. Round your answer to the *nearest hundredth*.

a 1
b 3
c -9

$$x = \frac{-(3) \pm \sqrt{(3)^2 - 4(1)(-9)}}{2(1)}$$

$$x = \frac{-3 \pm \sqrt{45}}{2}$$

$$x = \{1.85, -4.85\}$$

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

Question 32

32 Solve $x^2 + 3x - 9 = 0$ algebraically for all values of x. Round your answer to the *nearest hundredth*.

$$x^2 + 3x - 9 = 0$$

$$x^2 + 3x + \frac{9}{4} = 9 + \frac{9}{4}$$

$$\left(x + \frac{3}{2}\right)^2 = \frac{45}{4}$$

$$x + \frac{3}{2} = \pm\sqrt{\frac{45}{4}}$$

$$x + 1.5 = \pm 3.354$$

$$x = -1.5 \pm 3.354$$

$$x \in \{1.85, -4.85\}$$

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

Question 32

32 Solve $x^2 + 3x - 9 = 0$ algebraically for all values of x. Round your answer to the *nearest hundredth*.

$x^2+3x-9=0$

$a=1\ b=3\ c=-9$

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

$x=\frac{-3\pm\sqrt{3^2-4(1)(-9)}}{2(1)}$

$x=\frac{-3\pm\sqrt{9+36}}{2}$

$x=\frac{-3\pm\sqrt{45}}{2}$

$x\approx\frac{-3\pm6.71}{2}$

$x\approx\frac{-3+6.71}{2}$ or $x\approx\frac{-3-6.71}{2}$

$x\approx1.86$ or $x\approx-4.86$

Score 1: The student made one rounding error.

Question 32

32 Solve $x^2 + 3x - 9 = 0$ algebraically for all values of x. Round your answer to the *nearest hundredth*.

$x^2+3x-9=0$
$+9 \quad +9$
$x^2+3x=9$
$\left(\frac{3}{2}\right)^2=(1.5)^2=2.25$
$x^2+3x+2.25=9+2.25$
$\sqrt{(x+1.25)^2}=\pm\sqrt{11.25}$
$x+1.25=3.35 \quad x+1.25=-3.35$
$-1.25 \quad -1.25 \quad -1.25 \quad -1.25$
$x=2.10 \quad x=-4.60$
$\{2.10, -4.60\}$

Score 1: The student made a mistake when factoring $x^2 + 3x + 2.25$.

Question 32

32 Solve $x^2 + 3x - 9 = 0$ algebraically for all values of x. Round your answer to the *nearest hundredth*.

$x^2+3x-9=0$

$a=1$
$b=3$
$c=-9$

$x = \frac{-(3) \pm \sqrt{(3)^2-4(1)(-9)}}{2(1)}$

$x = \frac{-3 \pm \sqrt{9-36}}{2}$

$x = \frac{-3 \pm \sqrt{-27}}{2}$

$x = \frac{-3+\sqrt{-27}}{2}$ | $x = \frac{-3-\sqrt{-27}}{2}$

$x = 1.10$ | $x = -4.10$

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

Question 33

33 The senior class at Hills High School is purchasing sports drinks and bottled water to sell at the school field day. At the local discount store, a case of sports drinks costs $15.79, and a case of bottled water costs $5.69. The senior class has $125 to spend on the drinks.

If x represents the number of cases of sports drinks and y represents the number of cases of bottled water purchased, write an inequality that models this situation.

$15.79x + 5.69y \leq 125$

Nine cases of bottled water are purchased for this year's field day. Use your inequality to determine algebraically the maximum number of full cases of sports drinks that can be purchased.

Explain your answer.

$15.79x + 5.69(9) \leq 125$

$15.79x + 51.21 \leq 125$

$-51.21 \quad -51.21$

$\frac{15.79x}{15.79} \leq \frac{73.79}{15.79}$

$x \leq 4.7$

4 cases of sports drinks, do not have enough money to purchase 5. Can't buy a part of a case.

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

Question 33

33 The senior class at Hills High School is purchasing sports drinks and bottled water to sell at the school field day. At the local discount store, a case of sports drinks costs $15.79, and a case of bottled water costs $5.69. The senior class has $125 to spend on the drinks.

If x represents the number of cases of sports drinks and y represents the number of cases of bottled water purchased, write an inequality that models this situation.

$15.79x + 5.69y \leq 125$

Nine cases of bottled water are purchased for this year's field day. Use your inequality to determine algebraically the maximum number of full cases of sports drinks that can be purchased.

Explain your answer.

$15.79x + 5.69(9) \leq 125$

$15.79x + 51.21 \leq 125$

-51.21

$15.79x \leq 73.79$

$\frac{15.79}{15.79}$

$x \leq 4.673$

only 4 cases of sport drinks can be bought because 9 waters cost $51.21 and with the rest of the money only four cases of sports drinks can be bought.

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

Question 33

33 The senior class at Hills High School is purchasing sports drinks and bottled water to sell at the school field day. At the local discount store, a case of sports drinks costs $15.79, and a case of bottled water costs $5.69. The senior class has $125 to spend on the drinks.

If x represents the number of cases of sports drinks and y represents the number of cases of bottled water purchased, write an inequality that models this situation.

$15.79x + 5.69y \leq 125$

Nine cases of bottled water are purchased for this year's field day. Use your inequality to determine algebraically the maximum number of full cases of sports drinks that can be purchased.

Explain your answer.

$15.79x + 5.69(9) \leq 125$

$\downarrow$

$15.79x + 51.21 \leq 125$

$-51.21 \quad -51.21$

$\frac{15.79x}{15.79} \leq \frac{73.79}{15.79}$

$x \leq 4.67$

4 cases of sports drinks were purchased

Score 3: The student did not explain why only 4 cases can be purchased.

Question 33

33 The senior class at Hills High School is purchasing sports drinks and bottled water to sell at the school field day. At the local discount store, a case of sports drinks costs $15.79, and a case of bottled water costs $5.69. The senior class has $125 to spend on the drinks.

If x represents the number of cases of sports drinks and y represents the number of cases of bottled water purchased, write an inequality that models this situation.

$15.79x + 5.69y \leq 125$

Nine cases of bottled water are purchased for this year's field day. Use your inequality to determine algebraically the maximum number of full cases of sports drinks that can be purchased.

Explain your answer.

$5.69 \times 9 = 51.21$

$4 \times 15.79 = 63.16$

114.37

4 cases of sports drinks can be purchased. If you purchase 5 it will end up being more than 125.

Score 3: The student used a method other than algebraic to find 4.

Question 33

33 The senior class at Hills High School is purchasing sports drinks and bottled water to sell at the school field day. At the local discount store, a case of sports drinks costs \$15.79, and a case of bottled water costs \$5.69. The senior class has \$125 to spend on the drinks.

If x represents the number of cases of sports drinks and y represents the number of cases of bottled water purchased, write an inequality that models this situation.

$15.79x + 5.69y \geq 125$

Nine cases of bottled water are purchased for this year's field day. Use your inequality to determine algebraically the maximum number of full cases of sports drinks that can be purchased.

Explain your answer.

$15.79x + 5.69(9) \geq 125$

$15.79x + 51.21 \geq 125$

$-51.21 \quad -51.21$

$\frac{15.79x}{15.79} \geq \frac{73.79}{15.79}$

$x \geq 4.67$

5 or they will go over there price limit.

Score 2: The student wrote an incorrect inequality but solved it appropriately, and no further correct work is shown.

Question 33

33 The senior class at Hills High School is purchasing sports drinks and bottled water to sell at the school field day. At the local discount store, a case of sports drinks costs $15.79, and a case of bottled water costs $5.69. The senior class has $125 to spend on the drinks.

If x represents the number of cases of sports drinks and y represents the number of cases of bottled water purchased, write an inequality that models this situation.

$5.69x + 15.79x \leq 125$

Nine cases of bottled water are purchased for this year's field day. Use your inequality to determine algebraically the maximum number of full cases of sports drinks that can be purchased.

Explain your answer.

$5.69 \times 9 = \$51.21$

$125.00 - 51.21 = 73.79$

$15.79 \overline{)73.79}$

$15.79 \overline{)73.79}$ → 004

Only 4 cases of sports drinks can be purchased because 73.79 ÷ 15.79 = 4.67 and 15.79 x 5 = 78.95 - which is over the budget.

Score 2: The student wrote an incorrect inequality, found 4 using a method other than algebraic, and wrote a correct explanation.

Question 33

33 The senior class at Hills High School is purchasing sports drinks and bottled water to sell at the school field day. At the local discount store, a case of sports drinks costs $15.79, and a case of bottled water costs $5.69. The senior class has $125 to spend on the drinks.

If x represents the number of cases of sports drinks and y represents the number of cases of bottled water purchased, write an inequality that models this situation.

$15.79x \leq 5.69y$

Nine cases of bottled water are purchased for this year's field day. Use your inequality to determine algebraically the maximum number of full cases of sports drinks that can be purchased.

Explain your answer. $5.69(9) = 51.21$

$125.00
$ 51.21
$73.79
$15.79

4 cases of sport drinks can be bought

Score 1: The student used a method other than algebraic to find 4.

Question 33

33 The senior class at Hills High School is purchasing sports drinks and bottled water to sell at the school field day. At the local discount store, a case of sports drinks costs $15.79, and a case of bottled water costs $5.69. The senior class has $125 to spend on the drinks.

If x represents the number of cases of sports drinks and y represents the number of cases of bottled water purchased, write an inequality that models this situation.

$15.79s + 5.69w \leq 125$

Nine cases of bottled water are purchased for this year's field day. Use your inequality to determine algebraically the maximum number of full cases of sports drinks that can be purchased.

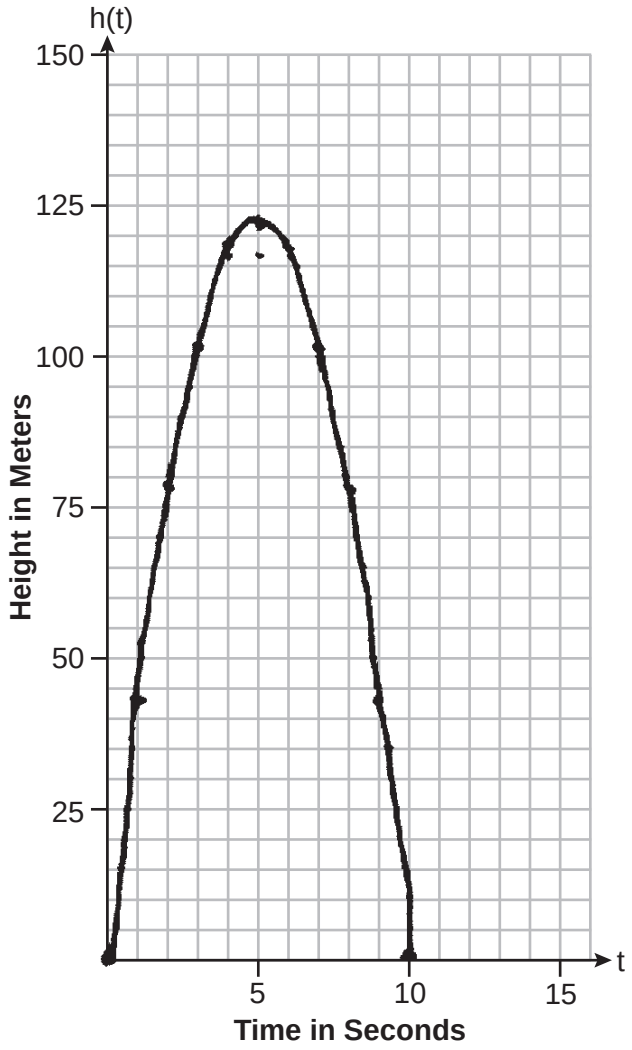
Explain your answer.

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

Question 34

34 The path of a rocket is modeled by the function $h(t) = -4.9t^2 + 49t$, where h is the height, in meters, above the ground and t is the time, in seconds, after the rocket is launched.

Sketch the graph on the set of axes below.



State the vertex of this function.

(5, 122.5)

Explain what the vertex means in the context of this situation.

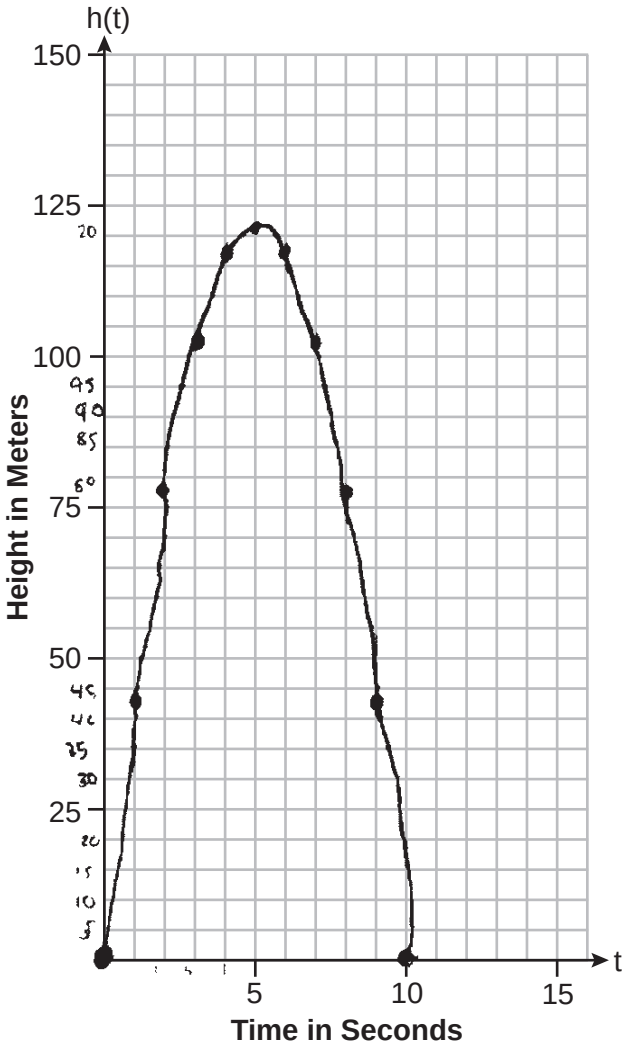
It took 5 seconds for the rocket to reach the highest height of 122.5 meters.

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

Question 34

34 The path of a rocket is modeled by the function $h(t) = -4.9t^2 + 49t$, where h is the height, in meters, above the ground and t is the time, in seconds, after the rocket is launched.

Sketch the graph on the set of axes below.



State the vertex of this function.

(5, 122.5)

Explain what the vertex means in the context of this situation.

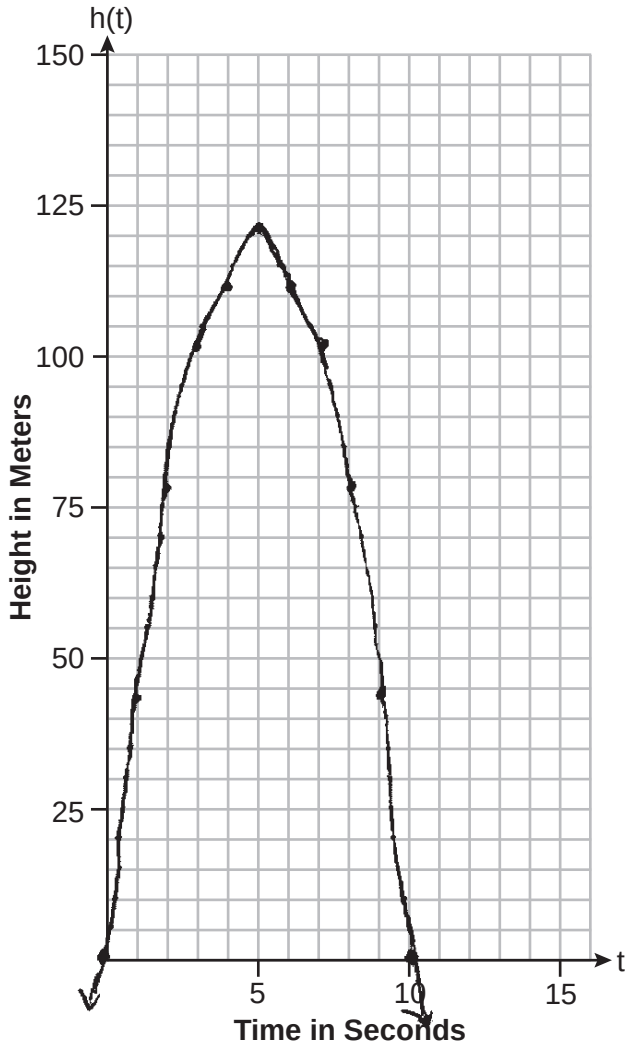
at 5 seconds the rocket was 122.5 ft in the air

Score 3: The student wrote incorrect units in the explanation.

Question 34

34 The path of a rocket is modeled by the function $h(t) = -4.9t^2 + 49t$, where h is the height, in meters, above the ground and t is the time, in seconds, after the rocket is launched.

Sketch the graph on the set of axes below.



State the vertex of this function.

Explain what the vertex means in the context of this situation.

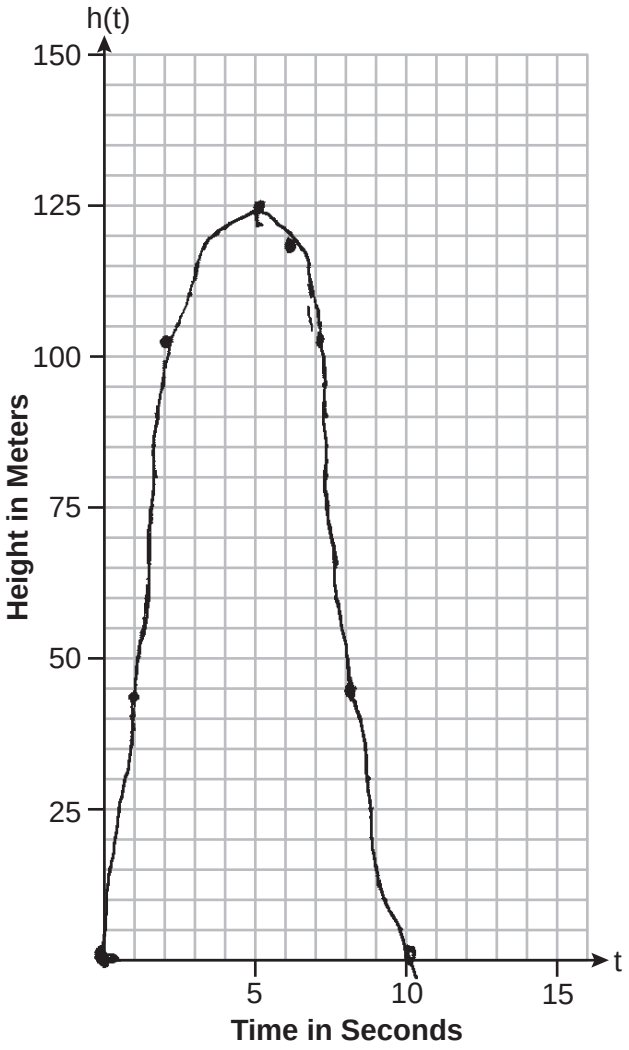
The vertex is at t = 5 seconds. The highest distance the rocket will reach before falling down is 122.5 meters.

Score 2: The student made one graphing error and did not state the vertex.

Question 34

34 The path of a rocket is modeled by the function $h(t) = -4.9t^2 + 49t$, where h is the height, in meters, above the ground and t is the time, in seconds, after the rocket is launched.

Sketch the graph on the set of axes below.



State the vertex of this function.

(5, 122.5)

Explain what the vertex means in the context of this situation.

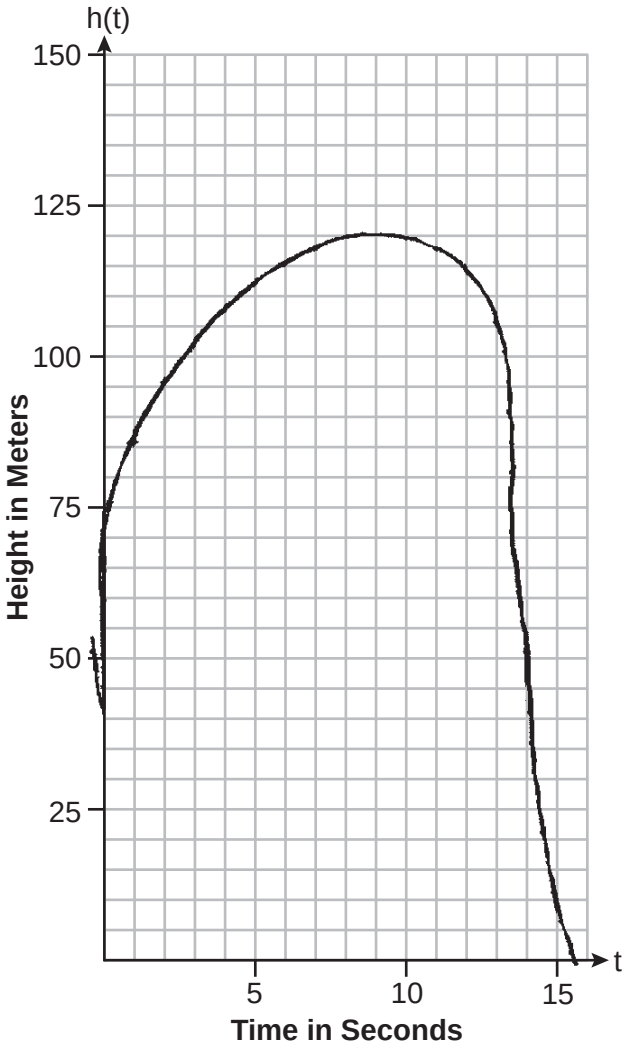
it is the highest the racket got

Score 1: The student stated the vertex correctly.

Question 34

34 The path of a rocket is modeled by the function $h(t) = -4.9t^2 + 49t$, where h is the height, in meters, above the ground and t is the time, in seconds, after the rocket is launched.

Sketch the graph on the set of axes below.



State the vertex of this function.

(6.06, 116.95)

Explain what the vertex means in the context of this situation.

it is the middle point of the graph

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

Question 35

35 A software company kept a record of their annual budget for advertising and their profit for each of the last eight years. These data are shown in the table below.

Annual Advertising Budget (in thousands, $) (x)	**Profit** (in millions, $) (y)
10	2.2
13	2.4
14	3.2
16	4.6
19	5.7
24	6.9
24	7.9
28	9.3

Write the linear regression equation for this set of data.

$y = 0.41x - 2.31$

State, to the *nearest hundredth*, the correlation coefficient of these linear data.

0.99 is the correlation coefficient

State what this correlation coefficient indicates about the linear fit of the data.

It indicates that the linear fit of the data is a good fit and it strong positive correlation.

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

Question 35

35 A software company kept a record of their annual budget for advertising and their profit for each of the last eight years. These data are shown in the table below.

Annual Advertising Budget (in thousands, $) (x)	**Profit** (in millions, $) (y)
10	2.2
13	2.4
14	3.2
16	4.6
19	5.7
24	6.9
24	7.9
28	9.3

Write the linear regression equation for this set of data.

$y = .41x - 2.31$

State, to the *nearest hundredth*, the correlation coefficient of these linear data.

$r = .99$

State what this correlation coefficient indicates about the linear fit of the data.

The correlation coefficient indicates the data has a nearly perfect linear fit.

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

Question 35

35 A software company kept a record of their annual budget for advertising and their profit for each of the last eight years. These data are shown in the table below.

Annual Advertising Budget (in thousands, $) (x)	**Profit** (in millions, $) (y)
10	2.2
13	2.4
14	3.2
16	4.6
19	5.7
24	6.9
24	7.9
28	9.3

Write the linear regression equation for this set of data.

y=ax+b
a=0.382313 9852
b= -1.941176471
r= 0.9844368877

y = 0.38x − 1.94

State, to the *nearest hundredth*, the correlation coefficient of these linear data.

0.98

State what this correlation coefficient indicates about the linear fit of the data.

strong

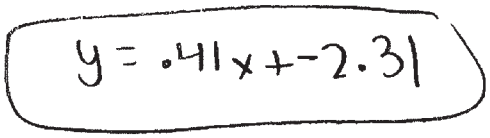
Score 3: The student wrote the full display of their calculator showing incorrect values for a, b, and r.

Question 35

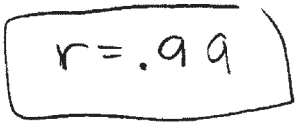
35 A software company kept a record of their annual budget for advertising and their profit for each of the last eight years. These data are shown in the table below.

Annual Advertising Budget (in thousands, $) (x)	**Profit** (in millions, $) (y)
10	2.2
13	2.4
14	3.2
16	4.6
19	5.7
24	6.9
24	7.9
28	9.3

Write the linear regression equation for this set of data.



State, to the *nearest hundredth*, the correlation coefficient of these linear data.



State what this correlation coefficient indicates about the linear fit of the data.

Score 3: The student wrote a correct regression equation and correlation coefficient.

Question 35

35 A software company kept a record of their annual budget for advertising and their profit for each of the last eight years. These data are shown in the table below.

Annual Advertising Budget (in thousands, $) (x)	**Profit** (in millions, $) (y)
10	2.2
13	2.4
14	3.2
16	4.6
19	5.7
24	6.9
24	7.9
28	9.3

Write the linear regression equation for this set of data.

$y = .41x - 2.31$

State, to the *nearest hundredth*, the correlation coefficient of these linear data.

State what this correlation coefficient indicates about the linear fit of the data.

Score 2: The student wrote a correct linear regression equation.

Question 35

35 A software company kept a record of their annual budget for advertising and their profit for each of the last eight years. These data are shown in the table below.

Annual Advertising Budget (in thousands, $) (x)	**Profit** (in millions, $) (y)
10	2.2
13	2.4
14	3.2
16	4.6
19	5.7
24	6.9
24	7.9
28	9.3

Write the linear regression equation for this set of data.

$y = .41x + 2.31$

State, to the *nearest hundredth*, the correlation coefficient of these linear data.

.98

State what this correlation coefficient indicates about the linear fit of the data.

Strong positive

Score 2: The student wrote an incorrect sign in the linear regression equation and wrote an incorrect correlation coefficient.

Question 35

35 A software company kept a record of their annual budget for advertising and their profit for each of the last eight years. These data are shown in the table below.

Annual Advertising Budget (in thousands, $) (x)	**Profit** (in millions, $) (y)
10	2.2
13	2.4
14	3.2
16	4.6
19	5.7
24	6.9
24	7.9
28	9.3

Write the linear regression equation for this set of data.

.41x + -2.31

State, to the *nearest hundredth*, the correlation coefficient of these linear data.

.97

State what this correlation coefficient indicates about the linear fit of the data.

its increas of Profit

Score 1: The student wrote a correct expression.

Question 35

35 A software company kept a record of their annual budget for advertising and their profit for each of the last eight years. These data are shown in the table below.

Annual Advertising Budget (in thousands, $) (x)	**Profit** (in millions, $) (y)
10	2.2
13	2.4
14	3.2
16	4.6
19	5.7
24	6.9
24	7.9
28	9.3

Write the linear regression equation for this set of data.

.2

State, to the *nearest hundredth*, the correlation coefficient of these linear data.

.2

State what this correlation coefficient indicates about the linear fit of the data.

100

Score 0: The student showed no correct work.

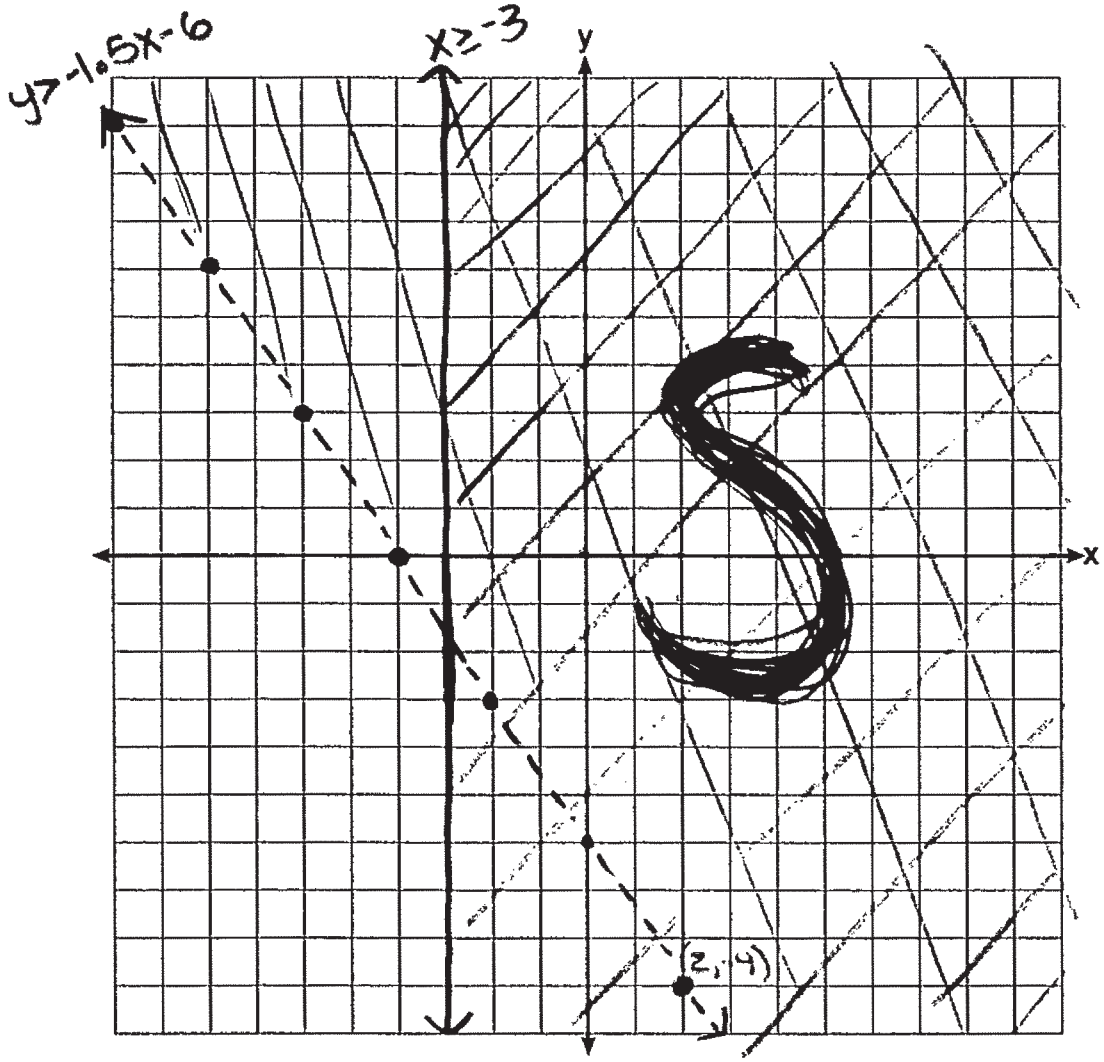
Question 36

36 Graph the following system of inequalities on the set of axes below:

$-2y \leq 3x + 12$ → $-2y < 3x+12$ → $y > -1.5x-6$

$x \geq -3$

Label the solution set *S*.



Allison thinks that (2, −9) is a solution to this system. Determine if Allison is correct. Justify your answer.

Allison is not correct because (2,-9) falls on a dotted line, which is not part of the solution set.

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

Question 36

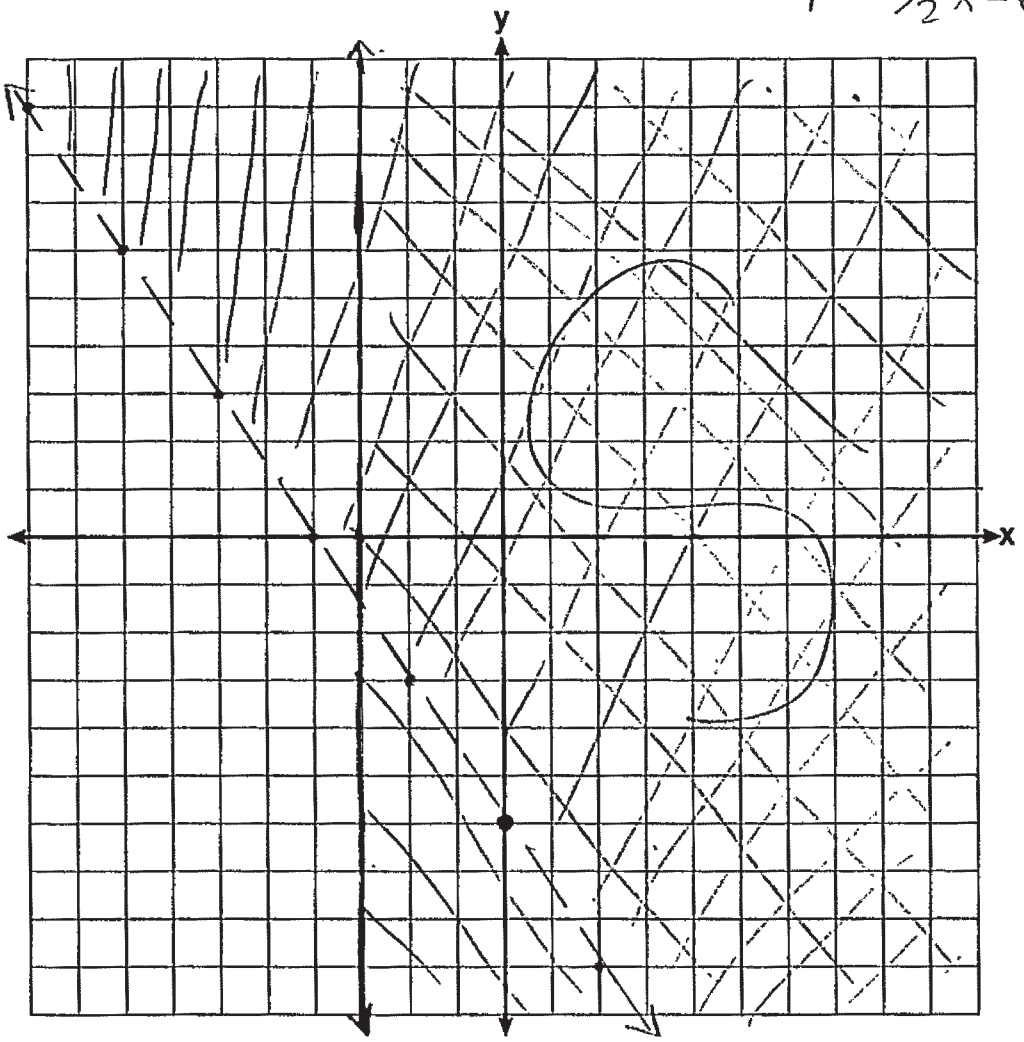
36 Graph the following system of inequalities on the set of axes below:

$$-2y < 3x + 12$$
$$x \geq -3$$

$\frac{-2y}{-2} < \frac{3x+12}{-2}$

$y > -3/2\,x - 6$

Label the solution set *S*.



Allison thinks that (2, −9) is a solution to this system. Determine if Allison is correct. Justify your answer.

(2, -9) is not a solution to the system because it falls on an inequality that cannot contain any solutions since it is not equal to.

Score 3: The student did not label either inequality.

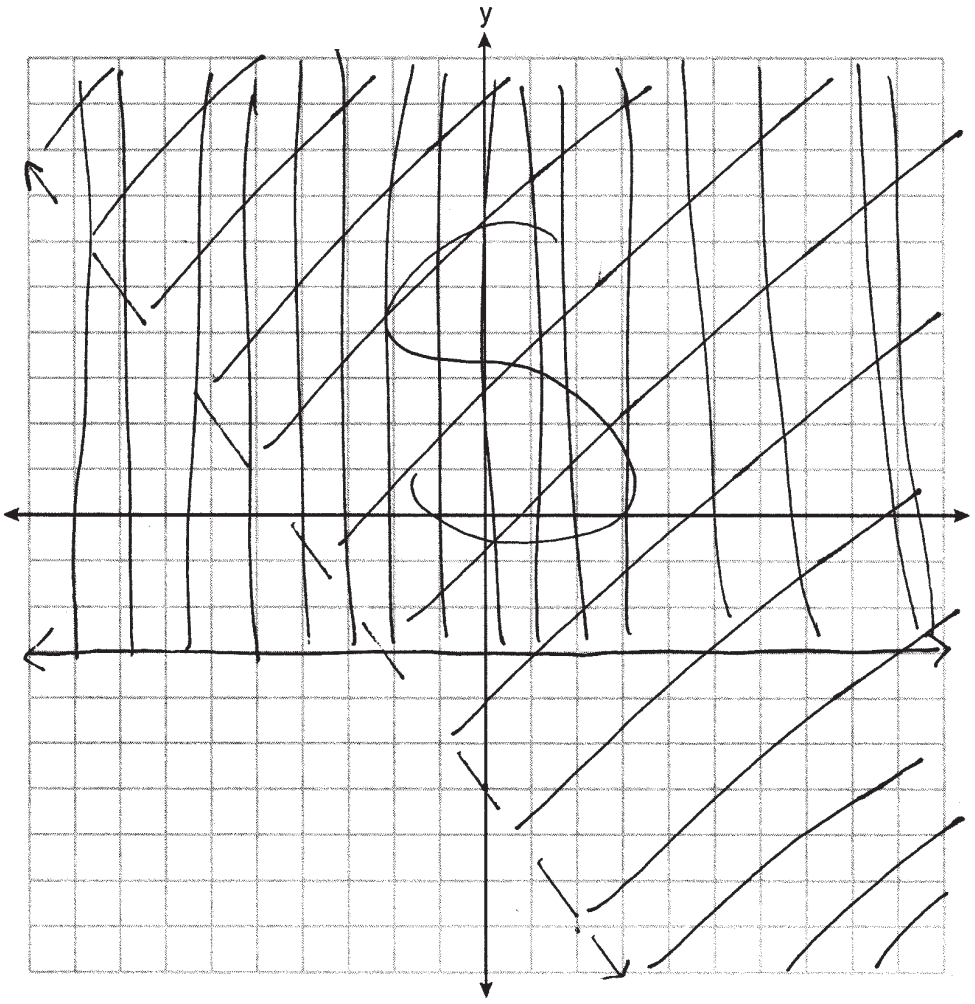
Question 36

36 Graph the following system of inequalities on the set of axes below:

$$\frac{-2y}{-2} \leq \frac{3x}{-2} + \frac{12}{-2}$$
$$x \geq -3$$

$y \geq -\frac{3}{2}x - 6$

Label the solution set *S*.



Allison thinks that $(2,-9)$ is a solution to this system. Determine if Allison is correct. Justify your answer.

No because it is on the dashed line which doesn't include the points on the line.

Score 2: The student labeled *S* correctly based on their graph and wrote an appropriate justification.

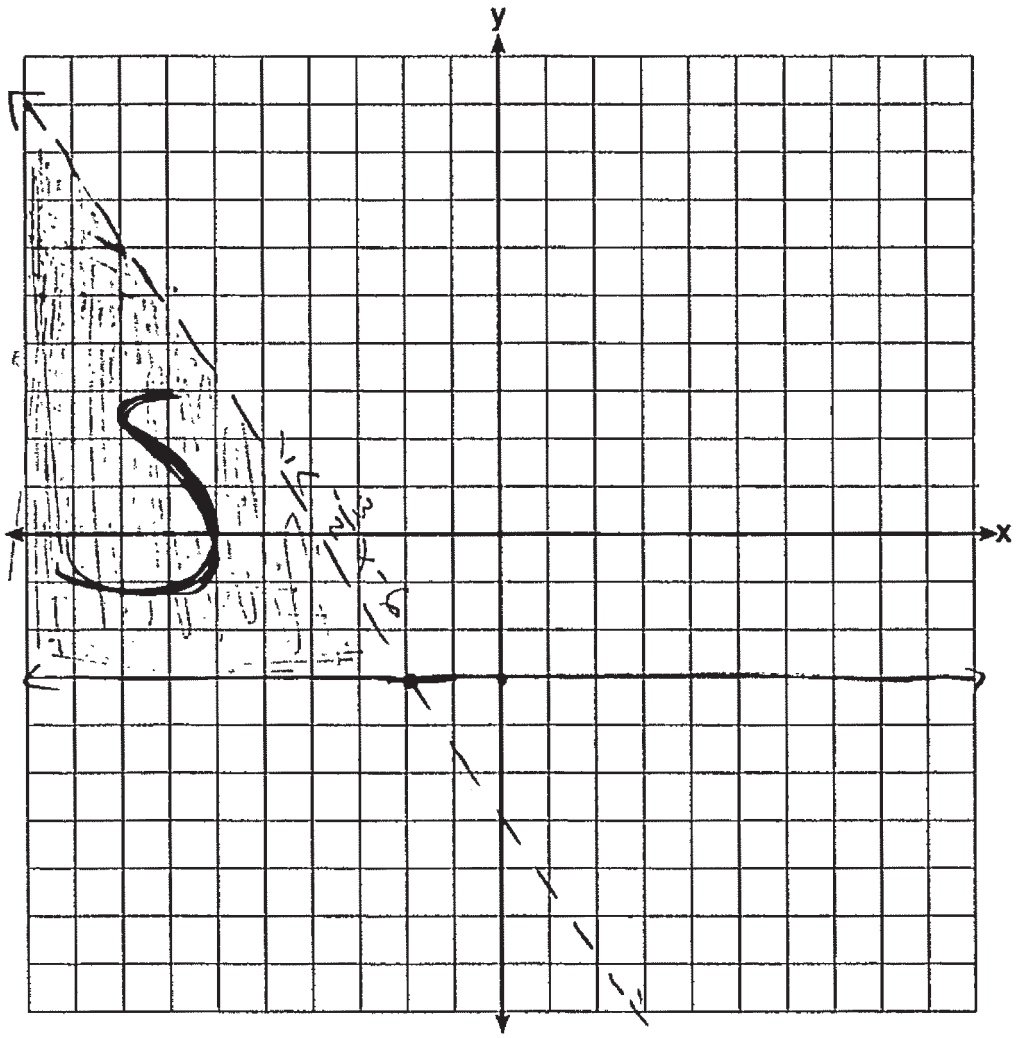
Question 36

36 Graph the following system of inequalities on the set of axes below:

$$\frac{-2y}{-2} \leq \frac{3x + 12}{-2} \rightarrow y \geq -\frac{3}{2}x - 6$$

$$x \geq -3$$

Label the solution set *S*.



Allison thinks that $(2, -9)$ is a solution to this system. Determine if Allison is correct. Justify your answer.

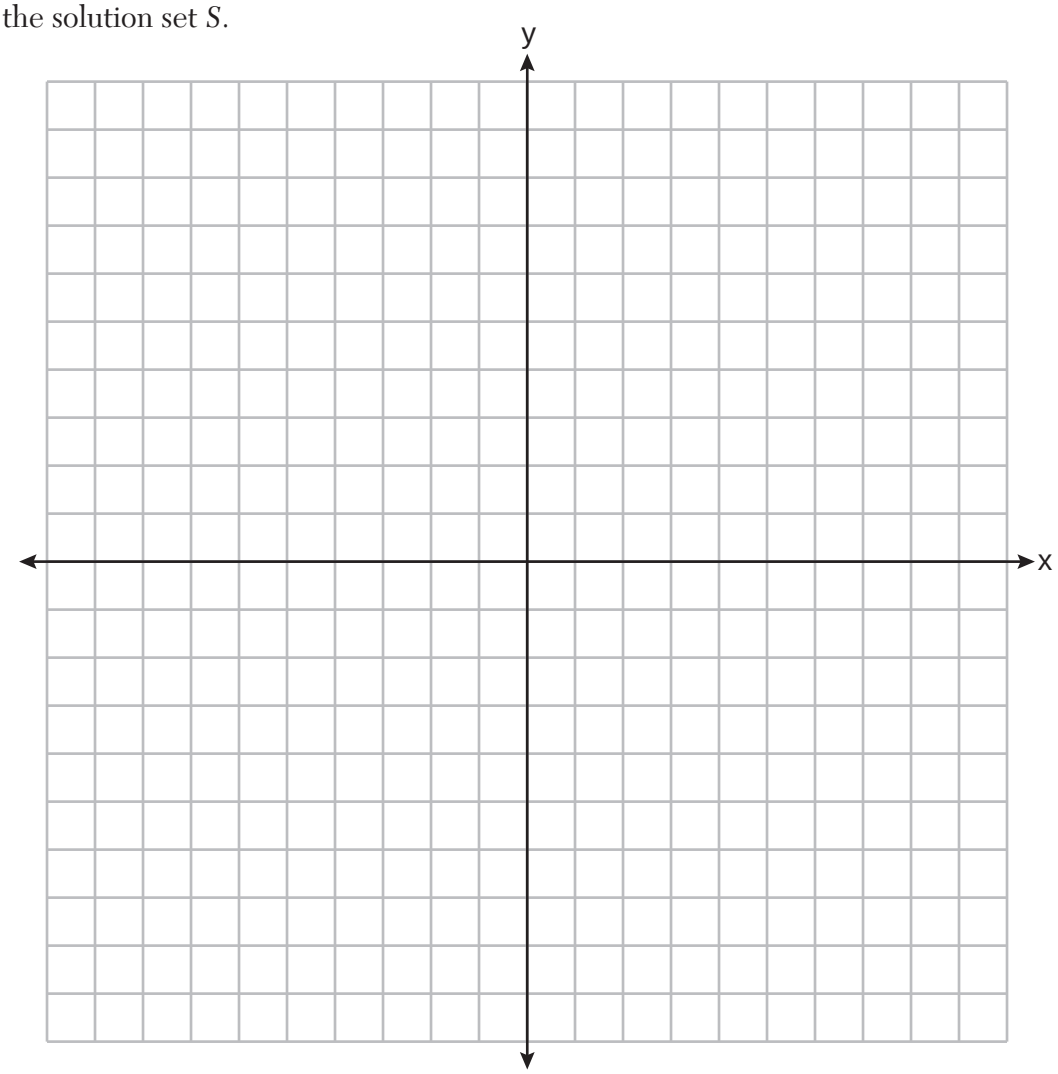
Score 1: The student labeled *S* correctly, based on their graph.

Question 36

36 Graph the following system of inequalities on the set of axes below:

$$-2y < 3x + 12$$
$$x \geq -3$$

Label the solution set *S*.



Allison thinks that $(2,-9)$ is a solution to this system. Determine if Allison is correct. Justify your answer. $2(-9) < 3(2) + 12$ $18 \geq -3$ ✓

$18 < 18$ ✗

No (2,9) does not satisfy both inequalities

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

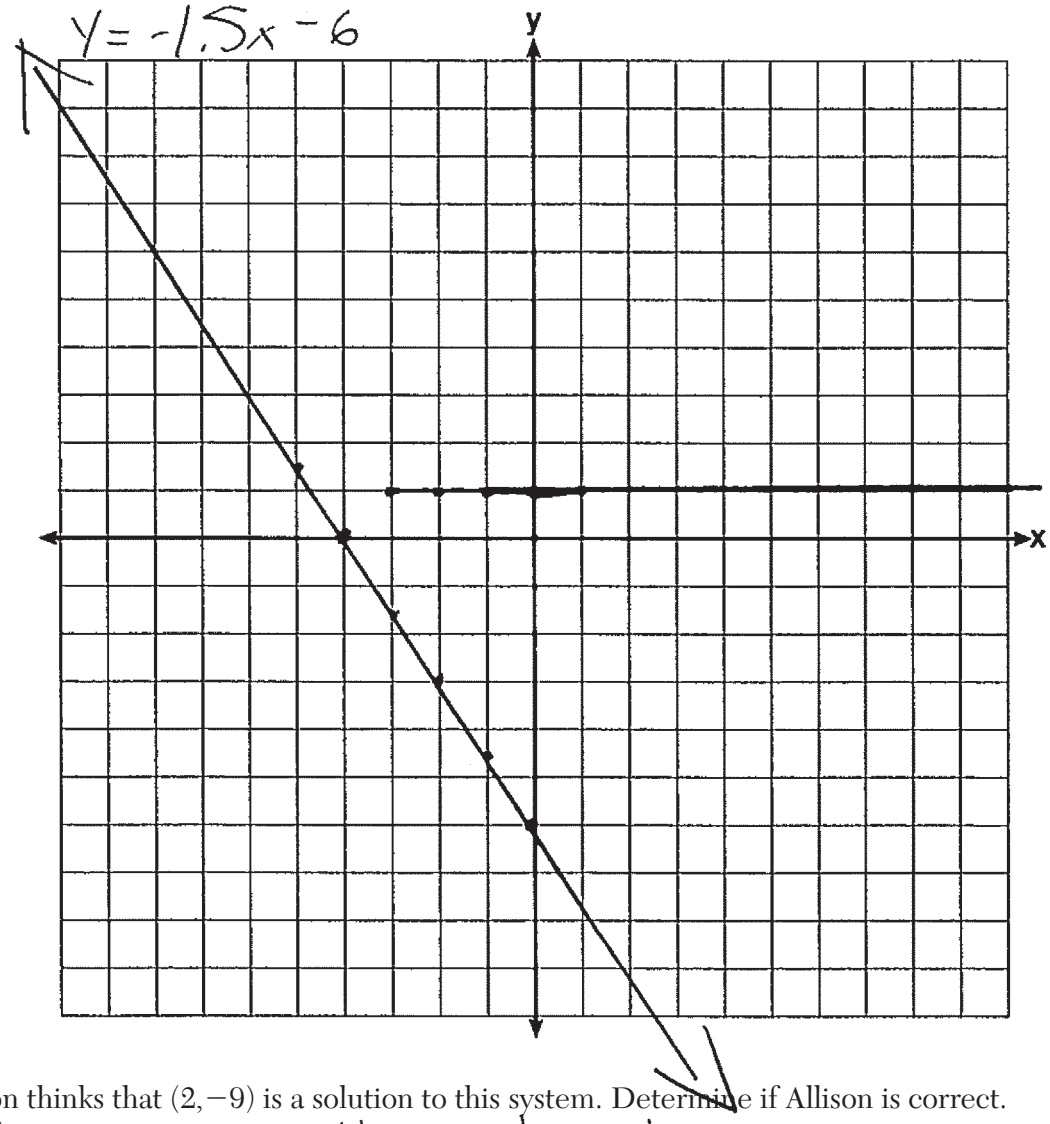
Question 36

36 Graph the following system of inequalities on the set of axes below:

$$-2y < 3x + 12$$
$$x \geq -3$$

$y < -1.5x - 6$

Label the solution set *S*.



Allison thinks that $(2,-9)$ is a solution to this system. Determine if Allison is correct. Justify your answer.

yes it is, the line crosses over it

Score 0: The student only graphed one equation correctly.

Question 37

37 Lydia wants to take art classes. She compares the cost at two art centers. Center *A* charges \$25 per hour and a registration fee of \$25. Center *B* charges \$15 per hour and a registration fee of \$75. Lydia plans to take *x* hours of classes.

Write an equation that models this situation, where *A* represents the total cost of Center *A*.

y = total cost of Center A Center A

$y = 25x + 25$

Write an equation that models this situation, where *B* represents the total cost of Center *B*.

y = total cost of Center B Center B

$y = 15x + 75$

If Lydia wants to take 10 hours of classes, use your equations to determine which center will cost *less*.

Center A

$y = 25x + 25$

$y = 250 + 25$

$y = 275$

Center B

$y = 15x + 75$

$y = 150 + 75$

$y = 225$

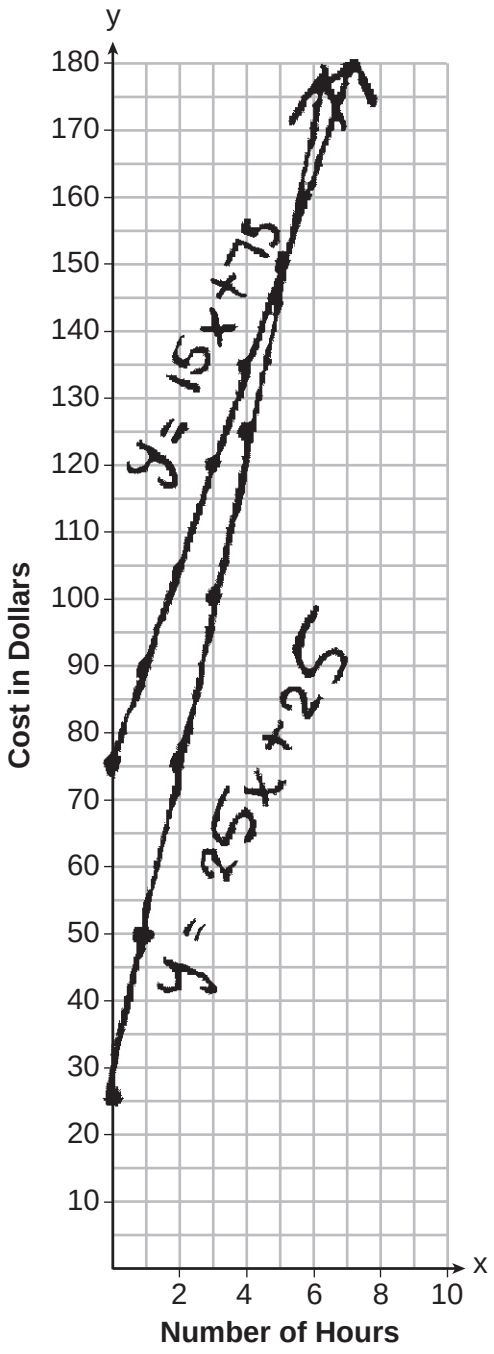
Center B is the better choice as it costs \$225 dollars which is less than center A's \$275 dollars for 10 hours of classes.

Question 37 is continued on the next page.

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

Question 37 continued

Graph your equations for Center *A* and Center *B* on the set of axes below.



State the number of hours of classes when the centers will cost the same.

$25x + 25 = 15x + 75$

$10x = 50$

$x = 5$

5 hours

Question 37

37 Lydia wants to take art classes. She compares the cost at two art centers. Center *A* charges \$25 per hour and a registration fee of \$25. Center *B* charges \$15 per hour and a registration fee of \$75. Lydia plans to take *x* hours of classes.

Write an equation that models this situation, where *A* represents the total cost of Center *A*.

$a = 25x + 25$

Write an equation that models this situation, where *B* represents the total cost of Center *B*.

$b = 15x + 75$

If Lydia wants to take 10 hours of classes, use your equations to determine which center will cost *less*.

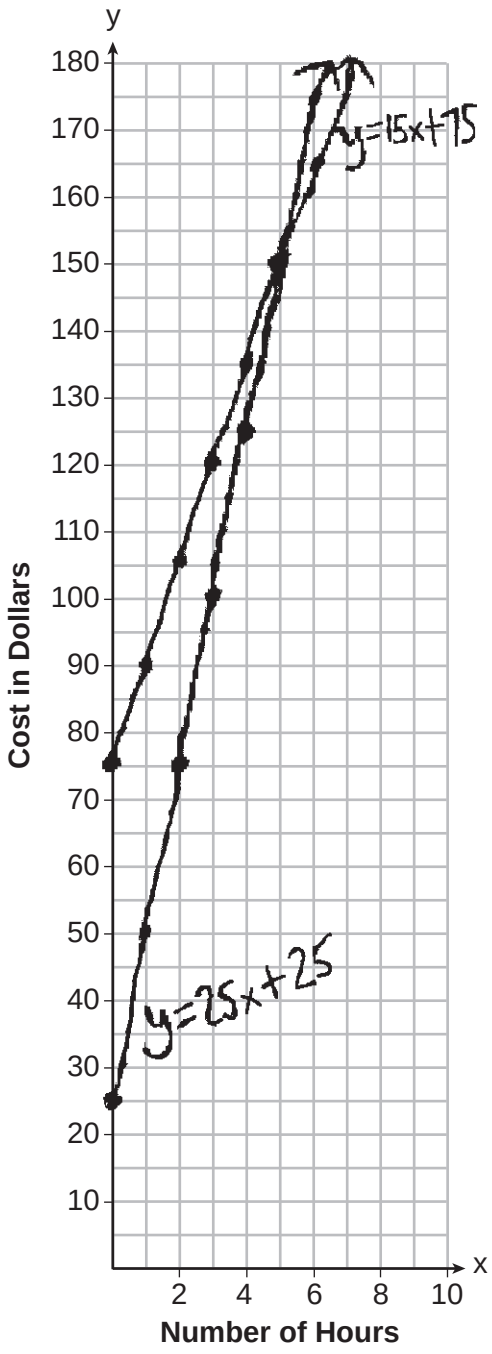
The graph shows that Center B is the better option since it will cost less at 10 hours since Center B is below Center A.

Question 37 is continued on the next page.

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

Question 37 continued

Graph your equations for Center *A* and Center *B* on the set of axes below.



State the number of hours of classes when the centers will cost the same.

5 hours

Question 37

37 Lydia wants to take art classes. She compares the cost at two art centers. Center *A* charges \$25 per hour and a registration fee of \$25. Center *B* charges \$15 per hour and a registration fee of \$75. Lydia plans to take *x* hours of classes.

Write an equation that models this situation, where *A* represents the total cost of Center *A*.

Center A → $25x + 25$

Write an equation that models this situation, where *B* represents the total cost of Center *B*.

Center B → $15x + 75$

If Lydia wants to take 10 hours of classes, use your equations to determine which center will cost *less*.

Center A $25(10) + 25 = 275$

Center B $15(10) + 75 = 225$

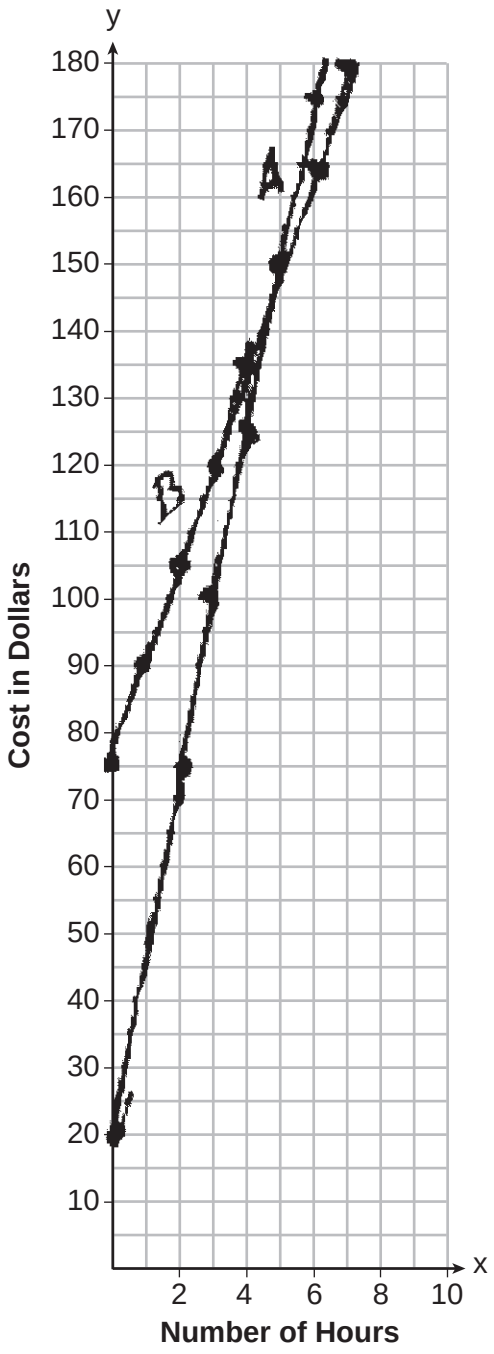
Center B

Question 37 is continued on the next page.

Score 5: The student wrote expressions for Center *A* and Center *B*.

Question 37 continued

Graph your equations for Center *A* and Center *B* on the set of axes below.



State the number of hours of classes when the centers will cost the same.

5 hours

Question 37

37 Lydia wants to take art classes. She compares the cost at two art centers. Center *A* charges $25 per hour and a registration fee of $25. Center *B* charges $15 per hour and a registration fee of $75. Lydia plans to take *x* hours of classes.

Write an equation that models this situation, where *A* represents the total cost of Center *A*.

A = 25x + 25

Write an equation that models this situation, where *B* represents the total cost of Center *B*.

B = 15x + 75

If Lydia wants to take 10 hours of classes, use your equations to determine which center will cost *less*.

A = 25(10) + 25 = 275

B = 15(10) + 75 = 225

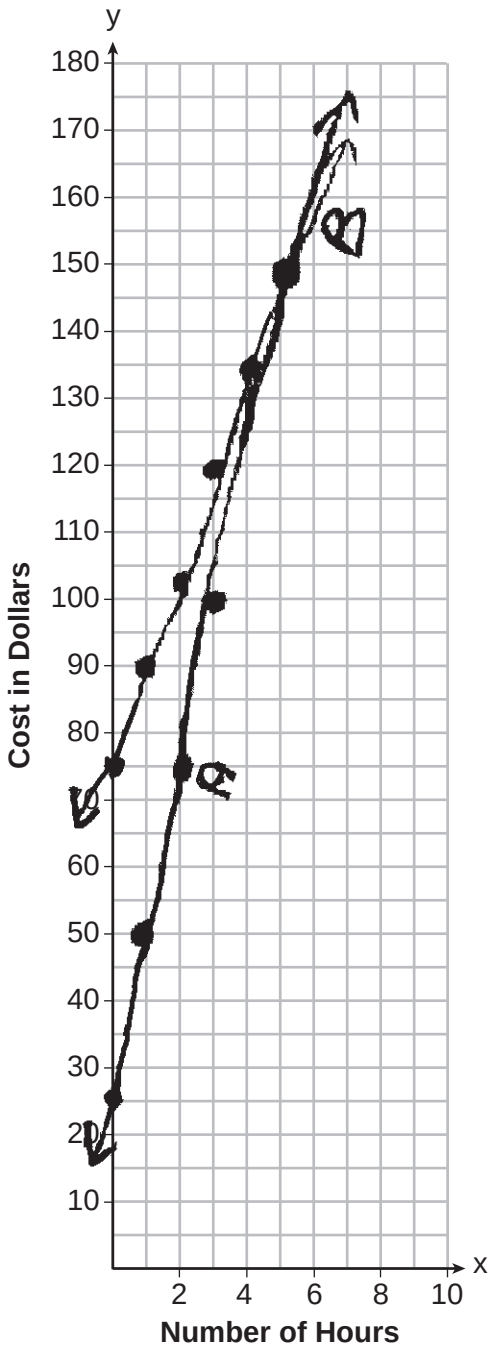
Center B is a better choice.

Question 37 is continued on the next page.

Score 5: The student made one graphing error by extending the lines with arrows on the left.

Question 37 continued

Graph your equations for Center *A* and Center *B* on the set of axes below.



State the number of hours of classes when the centers will cost the same.

at 5 hrs.

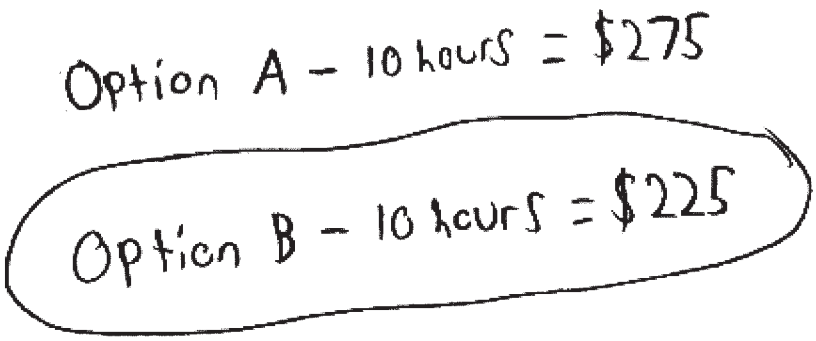
Question 37

37 Lydia wants to take art classes. She compares the cost at two art centers. Center *A* charges \$25 per hour and a registration fee of \$25. Center *B* charges \$15 per hour and a registration fee of \$75. Lydia plans to take *x* hours of classes.

Write an equation that models this situation, where *A* represents the total cost of Center *A*.

Write an equation that models this situation, where *B* represents the total cost of Center *B*.

If Lydia wants to take 10 hours of classes, use your equations to determine which center will cost *less*.



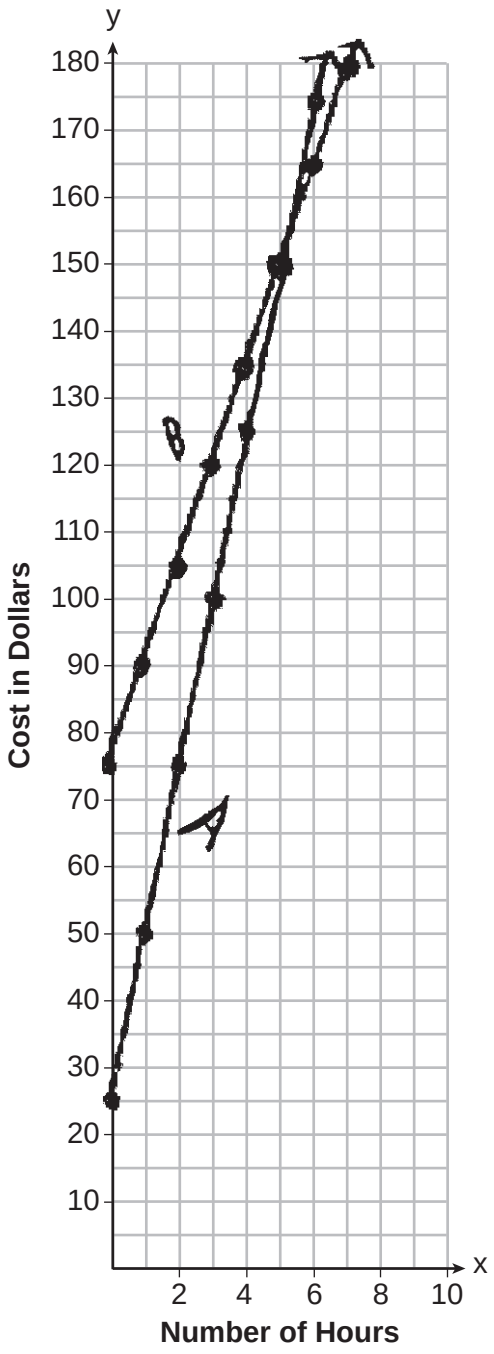
Option B is the cheaper choice.

Question 37 is continued on the next page.

Score 4: The student did not write a system of equations.

Question 37 continued

Graph your equations for Center *A* and Center *B* on the set of axes below.



State the number of hours of classes when the centers will cost the same.

5 hours

Question 37

37 Lydia wants to take art classes. She compares the cost at two art centers. Center *A* charges \$25 per hour and a registration fee of \$25. Center *B* charges \$15 per hour and a registration fee of \$75. Lydia plans to take *x* hours of classes.

Write an equation that models this situation, where *A* represents the total cost of Center *A*.

y=25x+25

Write an equation that models this situation, where *B* represents the total cost of Center *B*.

y=15x+75

If Lydia wants to take 10 hours of classes, use your equations to determine which center will cost *less*.

15(10)+75=y
150+75=y
225=y

25(10)+25=y
250+25=y
275=y

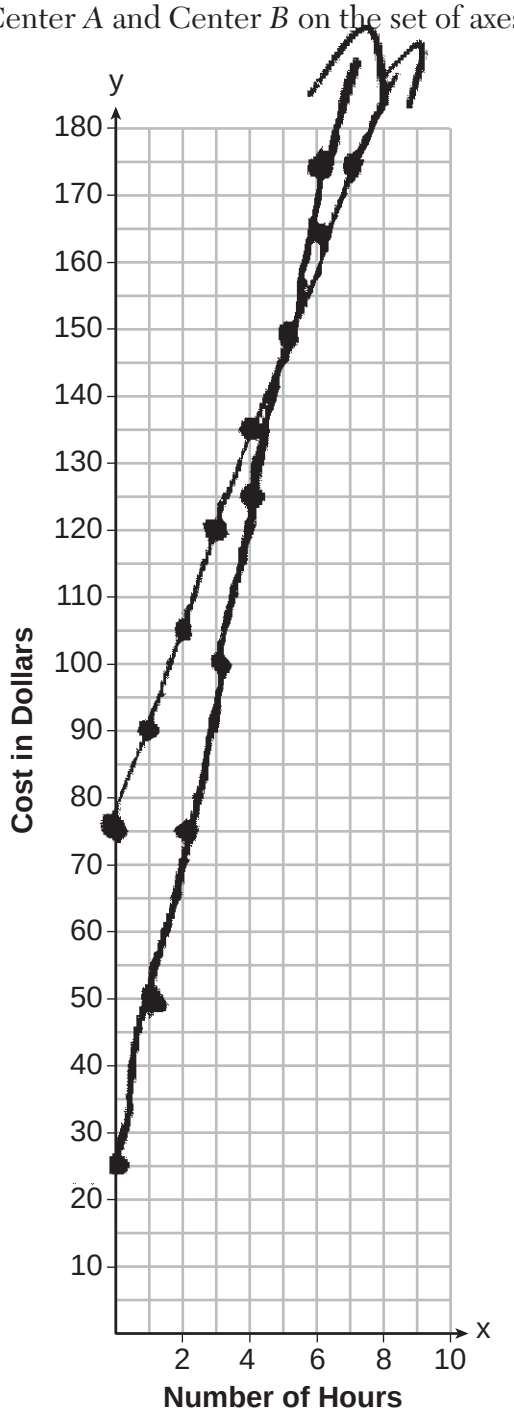
she should use center B because it costs less.

Question 37 is continued on the next page.

Score 4: The student wrote both equations in terms of *y* and did not label either graph.

Question 37 continued

Graph your equations for Center *A* and Center *B* on the set of axes below.



State the number of hours of classes when the centers will cost the same.

5 hour

Question 37

37 Lydia wants to take art classes. She compares the cost at two art centers. Center *A* charges \$25 per hour and a registration fee of \$25. Center *B* charges \$15 per hour and a registration fee of \$75. Lydia plans to take *x* hours of classes.

Write an equation that models this situation, where *A* represents the total cost of Center *A*.

Write an equation that models this situation, where *B* represents the total cost of Center *B*.

If Lydia wants to take 10 hours of classes, use your equations to determine which center will cost *less*.

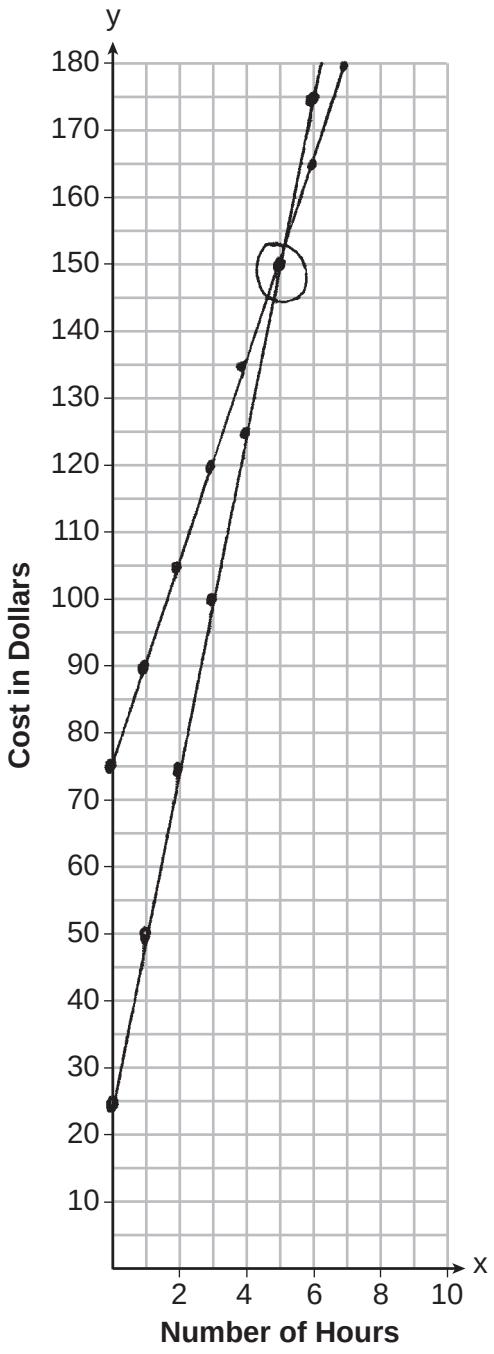
My graphs show that Center B is the better choice because the amount of money paid increases slower. By 10 hours, at Center A you would have spent more money than you would've at Center B.

Question 37 is continued on the next page.

Score 3: The student did not write a system of equations and did not label either equation on their graph.

Question 37 continued

Graph your equations for Center *A* and Center *B* on the set of axes below.



State the number of hours of classes when the centers will cost the same.

5 hours

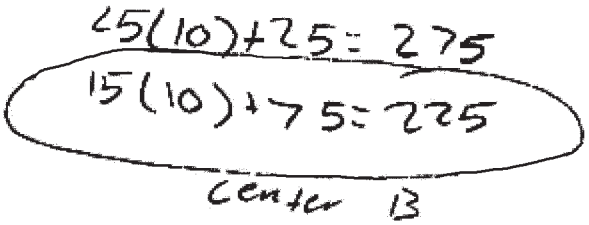
Question 37

37 Lydia wants to take art classes. She compares the cost at two art centers. Center *A* charges \$25 per hour and a registration fee of \$25. Center *B* charges \$15 per hour and a registration fee of \$75. Lydia plans to take *x* hours of classes.

Write an equation that models this situation, where *A* represents the total cost of Center *A*.

Write an equation that models this situation, where *B* represents the total cost of Center *B*.

If Lydia wants to take 10 hours of classes, use your equations to determine which center will cost *less*.

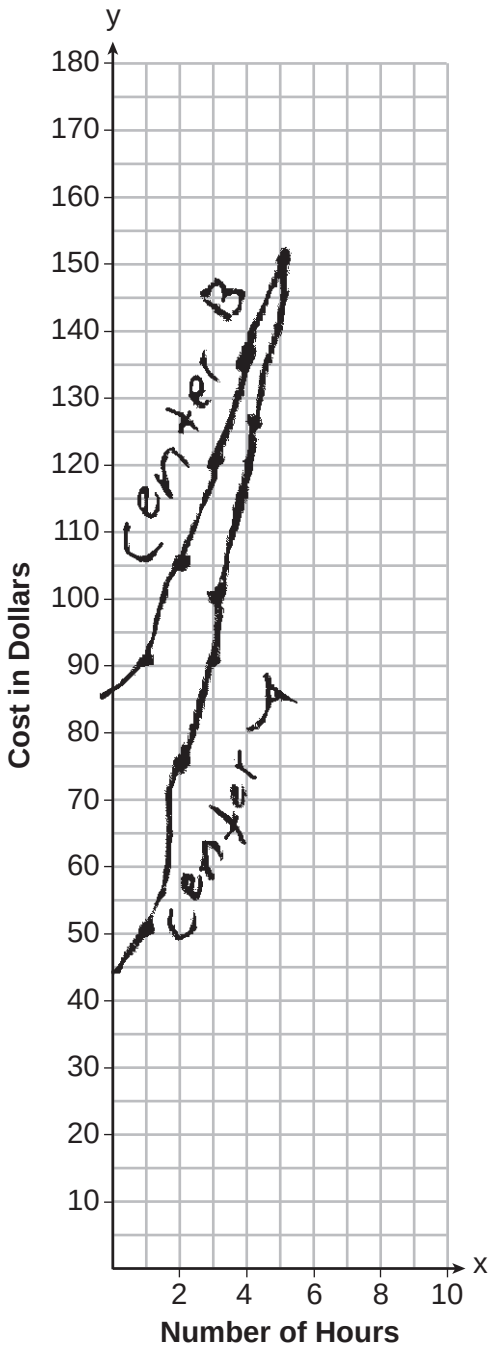


Question 37 is continued on the next page.

Score 2: The student stated 5 and determined that Center *B* was less expensive.

Question 37 continued

Graph your equations for Center *A* and Center *B* on the set of axes below.



State the number of hours of classes when the centers will cost the same.

5

Question 37

37 Lydia wants to take art classes. She compares the cost at two art centers. Center *A* charges \$25 per hour and a registration fee of \$25. Center *B* charges \$15 per hour and a registration fee of \$75. Lydia plans to take *x* hours of classes.

Write an equation that models this situation, where *A* represents the total cost of Center *A*.

$C_1 = 25x + 25$

Write an equation that models this situation, where *B* represents the total cost of Center *B*.

$C_2 = 15x + 75$

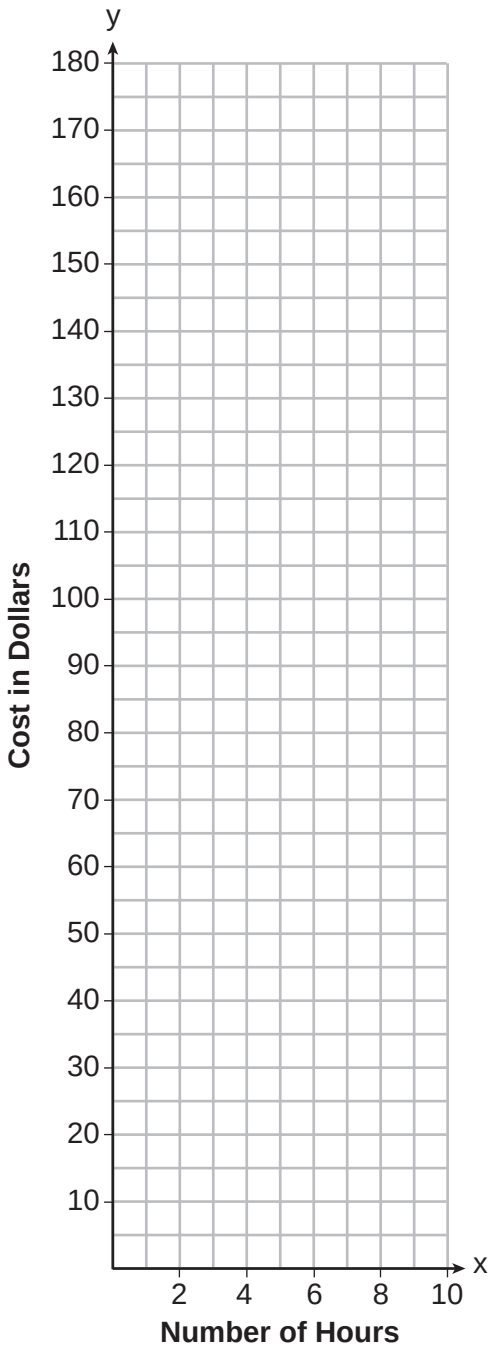
If Lydia wants to take 10 hours of classes, use your equations to determine which center will cost *less*.

Question 37 is continued on the next page.

Score 1: The student wrote C_1 and C_2 in the system of equations.

Question 37 continued

Graph your equations for Center *A* and Center *B* on the set of axes below.



State the number of hours of classes when the centers will cost the same.

Question 37

37 Lydia wants to take art classes. She compares the cost at two art centers. Center *A* charges \$25 per hour and a registration fee of \$25. Center *B* charges \$15 per hour and a registration fee of \$75. Lydia plans to take *x* hours of classes.

Write an equation that models this situation, where *A* represents the total cost of Center *A*.

Write an equation that models this situation, where *B* represents the total cost of Center *B*.

If Lydia wants to take 10 hours of classes, use your equations to determine which center will cost *less*. (10c)

$25(x) + 15 = 75$

$25 - 15 + 75$

10

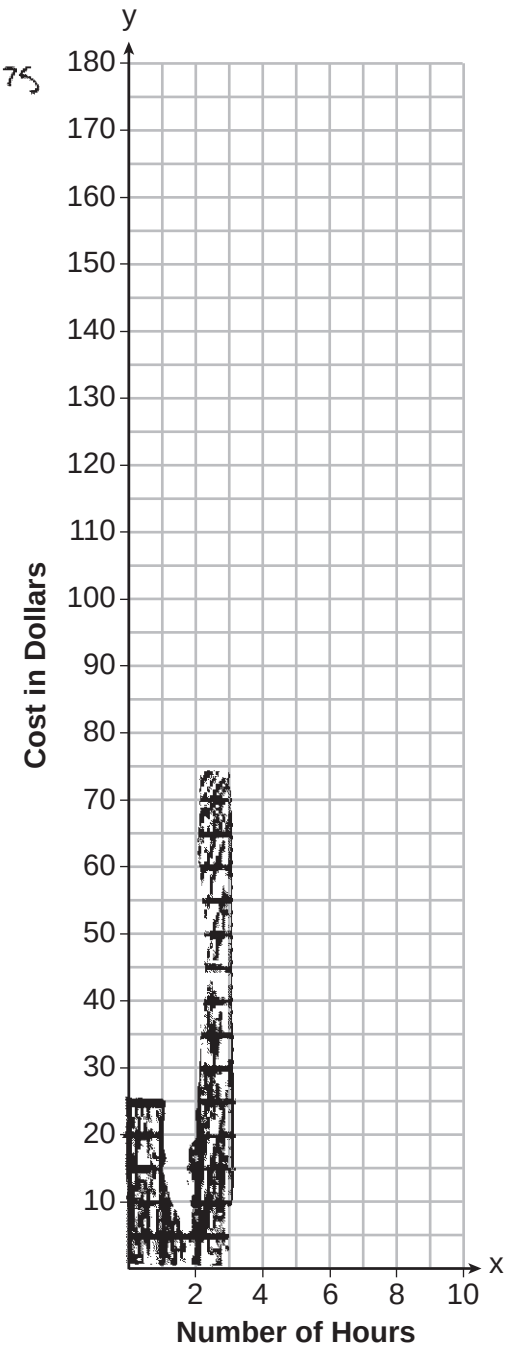
Question 37 is continued on the next page.

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

Question 37 continued

Graph your equations for Center *A* and Center *B* on the set of axes below.

25(x) + 15 + 75



State the number of hours of classes when the centers will cost the same.

3 hours

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

Regents Examination in Algebra I – August 2023

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

(Use for the August 2023 exam only.)

Raw Score	Scale Score	Performance Level
86	**100**	5
85	**99**	5
84	**98**	5
83	**96**	5
82	**95**	5
81	**94**	5
80	**93**	5
79	**92**	5
78	**91**	5
77	**90**	5
76	**89**	5
75	**89**	5
74	**88**	5
73	**87**	5
72	**87**	5
71	**86**	5
70	**86**	5
69	**86**	5
68	**85**	5
67	**84**	4
66	**84**	4
65	**83**	4
64	**83**	4
63	**83**	4
62	**82**	4
61	**82**	4
60	**82**	4
59	**82**	4
58	**81**	4
57	**81**	4
56	**81**	4
55	**80**	4
54	**80**	4
53	**80**	4
52	**80**	4
51	**79**	3
50	**79**	3
49	**79**	3
48	**79**	3
47	**78**	3
46	**78**	3
45	**78**	3
44	**77**	3
43	**77**	3
42	**76**	3
41	**76**	3
40	**75**	3
39	**75**	3
38	**74**	3
37	**74**	3
36	**73**	3
35	**73**	3
34	**72**	3
33	**71**	3
32	**70**	3
31	**70**	3
30	**69**	3
29	**68**	3
28	**67**	3
27	**66**	3
26	**65**	3
25	**63**	2
24	**62**	2
23	**61**	2
22	**59**	2
21	**58**	2
20	**56**	2
19	**55**	2
18	**53**	1
17	**51**	1
16	**49**	1
15	**47**	1
14	**44**	1
13	**42**	1
12	**39**	1
11	**37**	1
10	**34**	1
9	**31**	1
8	**28**	1
7	**25**	1
6	**22**	1
5	**19**	1
4	**15**	1
3	**12**	1
2	**8**	1
1	**4**	1
0	**0**	1

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

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

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