The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

ALGEBRA I (Common Core)

Wednesday, August 17, 2016 — 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 The graph below shows the distance in miles, m, hiked from a camp in h hours.
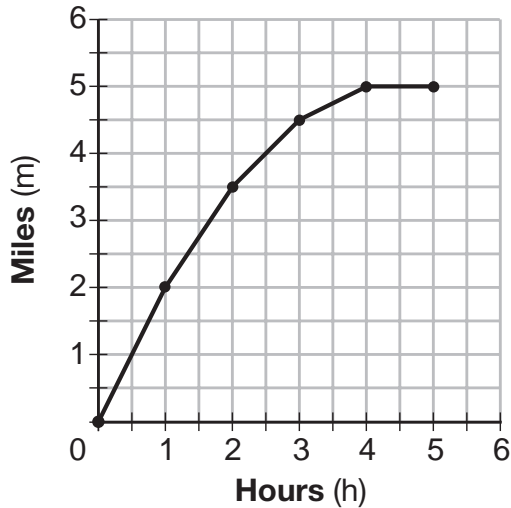
Which hourly interval had the greatest rate of change?

(1) hour 0 to hour 1   (3) hour 2 to hour 3

(2) hour 1 to hour 2   (4) hour 3 to hour 4

2 The solution of an equation with two variables, x and y, is

(1) the set of all x values that make $y = 0$

(2) the set of all y values that make $x = 0$

(3) the set of all ordered pairs, (x,y), that make the equation true

(4) the set of all ordered pairs, (x,y), where the graph of the equation crosses the y-axis

3 Which statistic can *not* be determined from a box plot representing the scores on a math test in Mrs. DeRidder's algebra class?

(1) the lowest score

(2) the median score

(3) the highest score

(4) the score that occurs most frequently

4 Which chart could represent the function $f(x) = -2x + 6$?

x	f(x)
0	6
2	10
4	14
6	18

(1)

x	f(x)
0	8
2	10
4	12
6	14

(3)

x	f(x)
0	4
2	6
4	8
6	10

(2)

x	f(x)
0	6
2	2
4	−2
6	−6

(4)

5 If $f(n) = (n - 1)^2 + 3n$, which statement is true?

(1) $f(3) = -2$ (3) $f(-2) = -15$

(2) $f(-2) = 3$ (4) $f(-15) = -2$

6 The table below shows 6 students' overall averages and their averages in their math class.

Overall Student Average	92	98	84	80	75	82
Math Class Average	91	95	85	85	75	78

If a linear model is applied to these data, which statement best describes the correlation coefficient?

(1) It is close to -1.   (3) It is close to 0.

(2) It is close to 1.   (4) It is close to 0.5.

7 What is the solution to $2h + 8 > 3h - 6$?

   (1) $h < 14$ (3) $h > 14$

   (2) $h < \dfrac{14}{5}$ (4) $h > \dfrac{14}{5}$

8 Which expression is equivalent to $36x^2 - 100$?

   (1) $4(3x - 5)(3x - 5)$ (3) $2(9x - 25)(9x - 25)$

   (2) $4(3x + 5)(3x - 5)$ (4) $2(9x + 25)(9x - 25)$

9 Patricia is trying to compare the average rainfall of New York to that of Arizona. A comparison between these two states for the months of July through September would be best measured in

   (1) feet per hour   (3) inches per month

   (2) inches per hour   (4) feet per month

10 Which function defines the sequence $-6, -10, -14, -18, \ldots$, where $f(6) = -26$?

   (1) $f(x) = -4x - 2$ (3) $f(x) = -x + 32$

   (2) $f(x) = 4x - 2$ (4) $f(x) = x - 26$

11 Which function has the greatest y-intercept?

   (1) $f(x) = 3x$

   (2) $2x + 3y = 12$

   (3) the line that has a slope of 2 and passes through $(1, -4)$

   (4)

12 What is the product of $2x + 3$ and $4x^2 - 5x + 6$?

  (1) $8x^3 - 2x^2 + 3x + 18$ (3) $8x^3 + 2x^2 - 3x + 18$

  (2) $8x^3 - 2x^2 - 3x + 18$ (4) $8x^3 + 2x^2 + 3x + 18$

13 The height of a rocket, at selected times, is shown in the table below.

Time (sec)	0	1	2	3	4	5	6	7
Height (ft)	180	260	308	324	308	260	180	68

Based on these data, which statement is *not* a valid conclusion?

  (1) The rocket was launched from a height of 180 feet.

  (2) The maximum height of the rocket occurred 3 seconds after launch.

  (3) The rocket was in the air approximately 6 seconds before hitting the ground.

  (4) The rocket was above 300 feet for approximately 2 seconds.

14 A parking garage charges a base rate of $3.50 for up to 2 hours, and an hourly rate for each additional hour. The sign below gives the prices for up to 5 hours of parking.

```
Parking Rates
2 hours    $3.50
3 hours    $9.00
4 hours    $14.50
5 hours    $20.00
```

Which linear equation can be used to find x, the additional hourly parking rate?

  (1) $9.00 + 3x = 20.00$ (3) $2x + 3.50 = 14.50$

  (2) $9.00 + 3.50x = 20.00$ (4) $2x + 9.00 = 14.50$

15 Which function has a constant rate of change equal to -3?

x	y
0	2
1	5
2	8
3	11

(1)
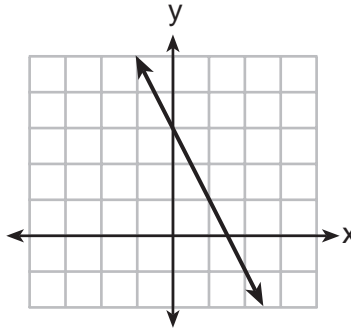
(3)

$\{(1,5), (2,2), (3,-5), (4,4)\}$

(2)

$2y = -6x + 10$

(4)

16 Kendal bought x boxes of cookies to bring to a party. Each box contains 12 cookies. She decides to keep two boxes for herself. She brings 60 cookies to the party. Which equation can be used to find the number of boxes, x, Kendal bought?

(1) $2x - 12 = 60$ (3) $12x - 24 = 60$

(2) $12x - 2 = 60$ (4) $24 - 12x = 60$

17 The table below shows the temperature, $T(m)$, of a cup of hot chocolate that is allowed to chill over several minutes, m.

Time, m (minutes)	0	2	4	6	8
Temperature, T(m) (°F)	150	108	78	56	41

Which expression best fits the data for $T(m)$?

(1) $150(0.85)^m$ (3) $150(0.85)^{m-1}$

(2) $150(1.15)^m$ (4) $150(1.15)^{m-1}$

18 As x increases beyond 25, which function will have the largest value?

(1) $f(x) = 1.5^x$

(3) $h(x) = 1.5x^2$

(2) $g(x) = 1.5x + 3$

(4) $k(x) = 1.5x^3 + 1.5x^2$

19 What are the solutions to the equation $3x^2 + 10x = 8$?

(1) $\frac{2}{3}$ and -4

(3) $\frac{4}{3}$ and -2

(2) $-\frac{2}{3}$ and 4

(4) $-\frac{4}{3}$ and 2

20 An online company lets you download songs for \$0.99 each after you have paid a \$5 membership fee. Which domain would be most appropriate to calculate the cost to download songs?

(1) rational numbers greater than zero

(2) whole numbers greater than or equal to one

(3) integers less than or equal to zero

(4) whole numbers less than or equal to one

21 The function $f(x) = 3x^2 + 12x + 11$ can be written in vertex form as

(1) $f(x) = (3x + 6)^2 - 25$

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

(2) $f(x) = 3(x + 6)^2 - 25$

(4) $f(x) = 3(x + 2)^2 + 7$

22 A system of equations is given below.

$$x + 2y = 5$$
$$2x + y = 4$$

Which system of equations does *not* have the same solution?

(1) $3x + 6y = 15$
  $2x + y = 4$

(3) $x + 2y = 5$
  $6x + 3y = 12$

(2) $4x + 8y = 20$
  $2x + y = 4$

(4) $x + 2y = 5$
  $4x + 2y = 12$

23 Based on the graph below, which expression is a possible factorization of $p(x)$?
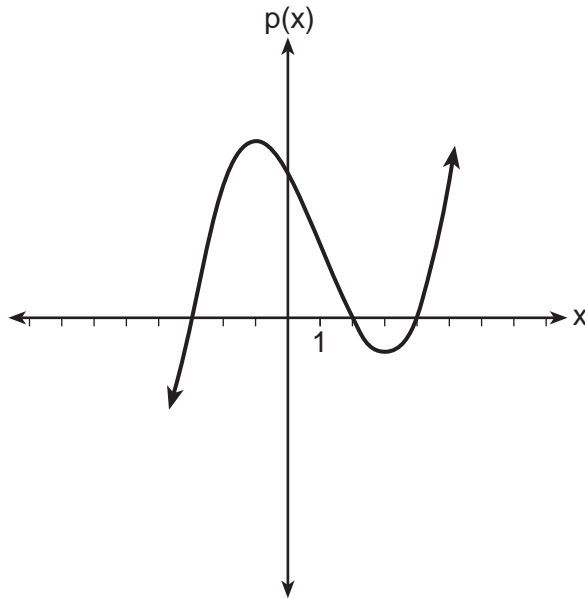
(1) $(x + 3)(x - 2)(x - 4)$ (3) $(x + 3)(x - 5)(x - 2)(x - 4)$

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

24 Milton has his money invested in a stock portfolio. The value, $v(x)$, of his portfolio can be modeled with the function $v(x) = 30{,}000(0.78)^x$, where x is the number of years since he made his investment. Which statement describes the rate of change of the value of his portfolio?

(1) It decreases 78% per year.

(2) It decreases 22% per year.

(3) It increases 78% per year.

(4) It increases 22% per year.

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 Graph the function $y = -\sqrt{x + 3}$ on the set of axes below.
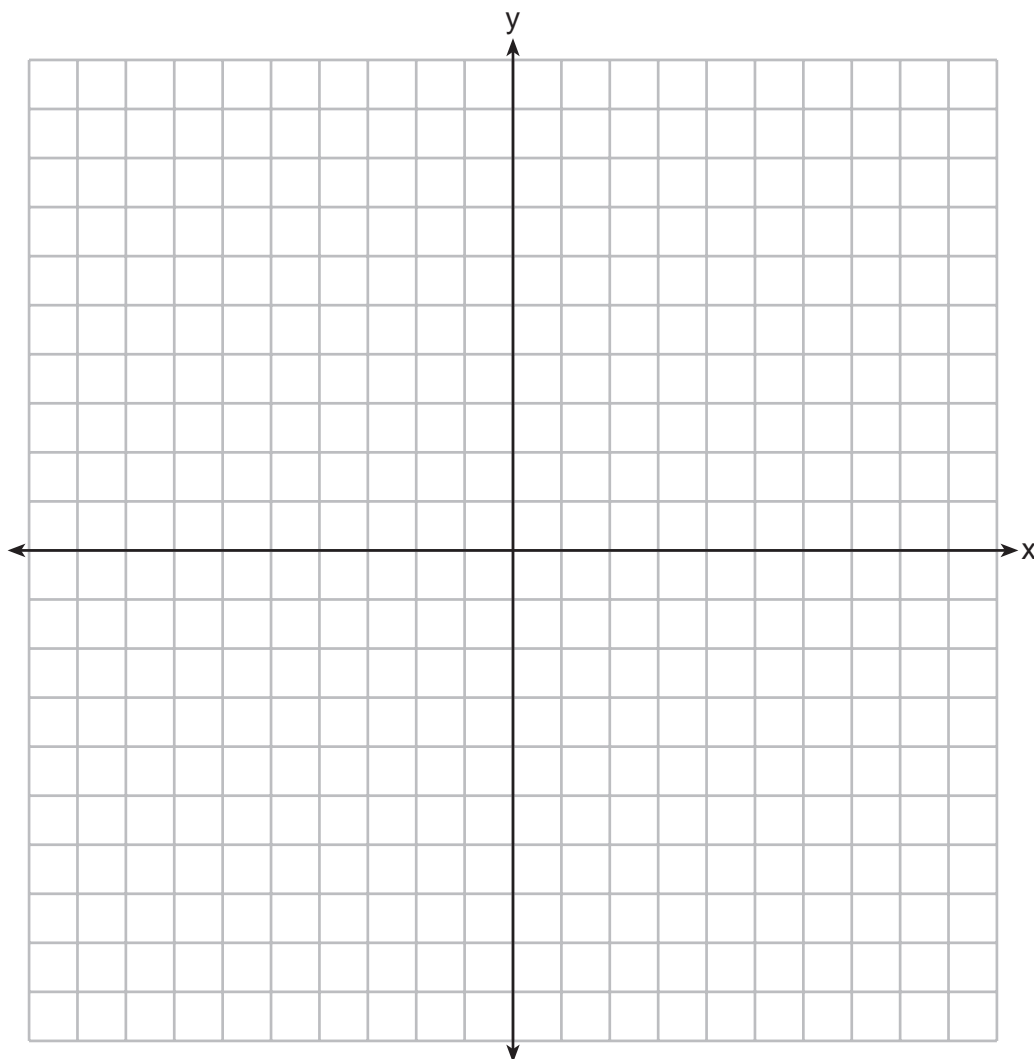
26 Richard is asked to transform the graph of $b(x)$ below.
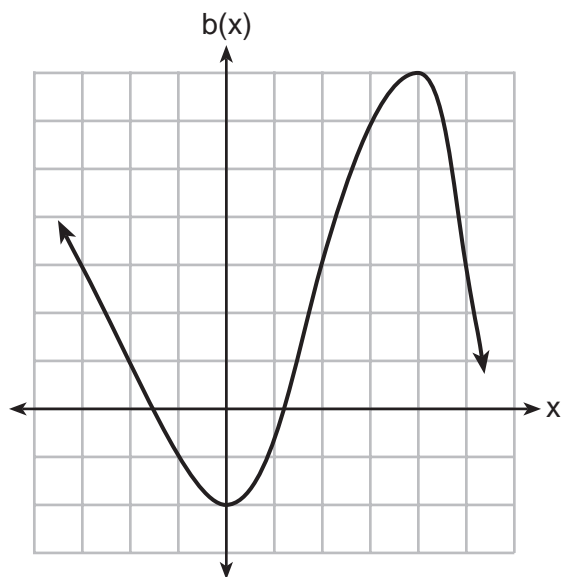
The graph of $b(x)$ is transformed using the equation $h(x) = b(x - 2) - 3$. Describe how the graph of $b(x)$ changed to form the graph of $h(x)$.

27 Consider the pattern of squares shown below:

Which type of model, linear or exponential, should be used to determine how many squares are in the nth pattern? Explain your answer.

28 When multiplying polynomials for a math assignment, Pat found the product to be $-4x + 8x^2 - 2x^3 + 5$. He then had to state the leading coefficient of this polynomial. Pat wrote down -4. Do you agree with Pat's answer? Explain your reasoning.

29 Is the sum of $3\sqrt{2}$ and $4\sqrt{2}$ rational or irrational? Explain your answer.

30 The graph below shows two functions, $f(x)$ and $g(x)$. State all the values of x for which $f(x) = g(x)$.
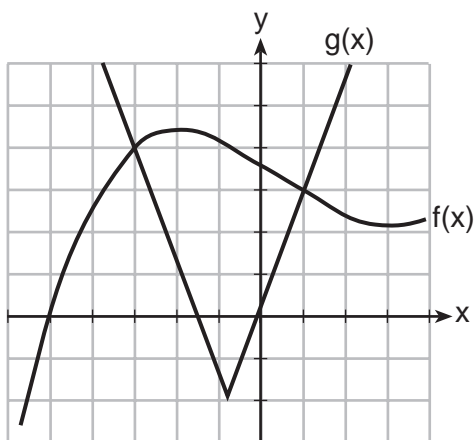
31 Find the zeros of $f(x) = (x - 3)^2 - 49$, algebraically.

32 Solve the equation below for x in terms of a.

$$4(ax + 3) - 3ax = 25 + 3a$$

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 data table below shows the median diameter of grains of sand and the slope of the beach for 9 naturally occurring ocean beaches.

Median Diameter of Grains of Sand, in Millimeters (x)	0.17	0.19	0.22	0.235	0.235	0.3	0.35	0.42	0.85
Slope of Beach, in Degrees (y)	0.63	0.7	0.82	0.88	1.15	1.5	4.4	7.3	11.3

Write the linear regression equation for this set of data, rounding all values to the *nearest thousandth*.
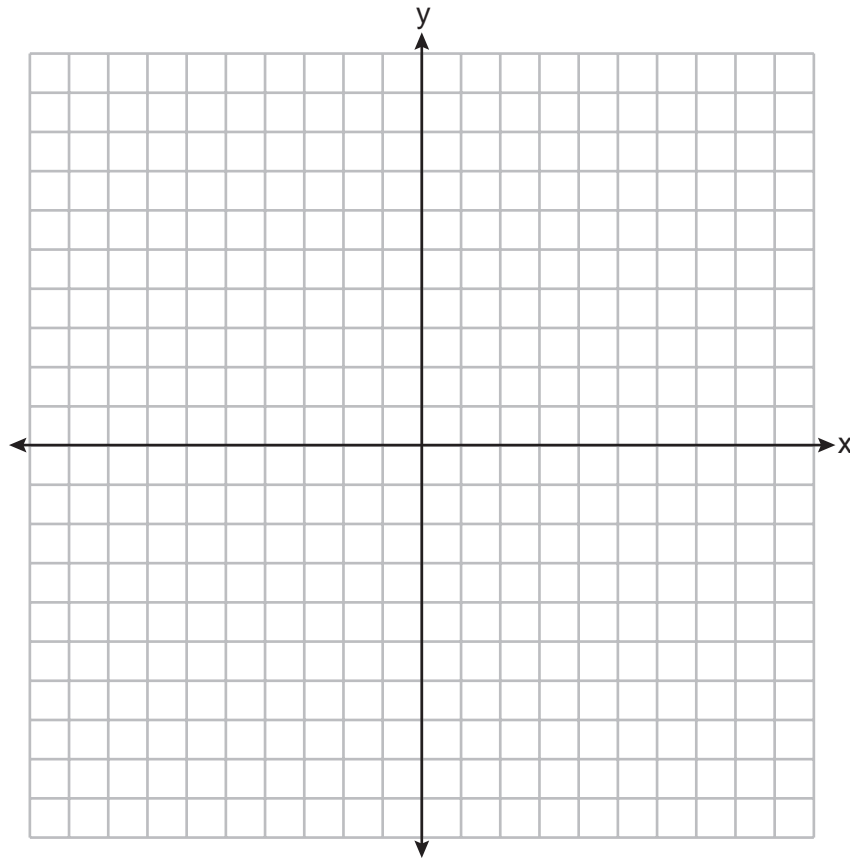
Using this equation, predict the slope of a beach, to the *nearest tenth of a degree,* on a beach with grains of sand having a median diameter of 0.65 mm.

34 Shawn incorrectly graphed the inequality $-x - 2y \geq 8$ as shown below.
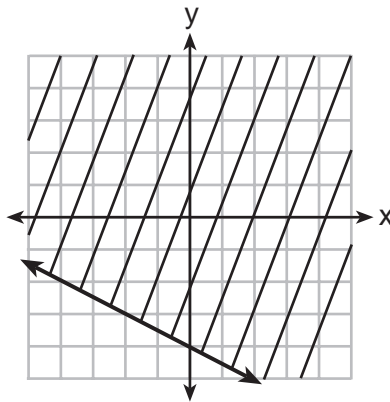
Explain Shawn's mistake.

Graph the inequality correctly on the set of axes below.

35 A drama club is selling tickets to the spring musical. The auditorium holds 200 people. Tickets cost $12 at the door and $8.50 if purchased in advance. The drama club has a goal of selling at least $1000 worth of tickets to Saturday's show.

Write a system of inequalities that can be used to model this scenario.

If 50 tickets are sold in advance, what is the minimum number of tickets that must be sold at the door so that the club meets its goal? Justify your answer.

36 Janice is asked to solve $0 = 64x^2 + 16x - 3$. She begins the problem by writing the following steps:

$$\text{Line 1} \quad 0 = 64x^2 + 16x - 3$$
$$\text{Line 2} \quad 0 = B^2 + 2B - 3$$
$$\text{Line 3} \quad 0 = (B + 3)(B - 1)$$

Use Janice's procedure to solve the equation for x.

Explain the method Janice used to solve the quadratic equation.

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 For a class picnic, two teachers went to the same store to purchase drinks. One teacher purchased 18 juice boxes and 32 bottles of water, and spent \$19.92. The other teacher purchased 14 juice boxes and 26 bottles of water, and spent \$15.76.

Write a system of equations to represent the costs of a juice box, j, and a bottle of water, w.

Kara said that the juice boxes might have cost 52 cents each and that the bottles of water might have cost 33 cents each. Use your system of equations to justify that Kara's prices are *not* possible.

Solve your system of equations to determine the actual cost, in dollars, of each juice box and each bottle of water.

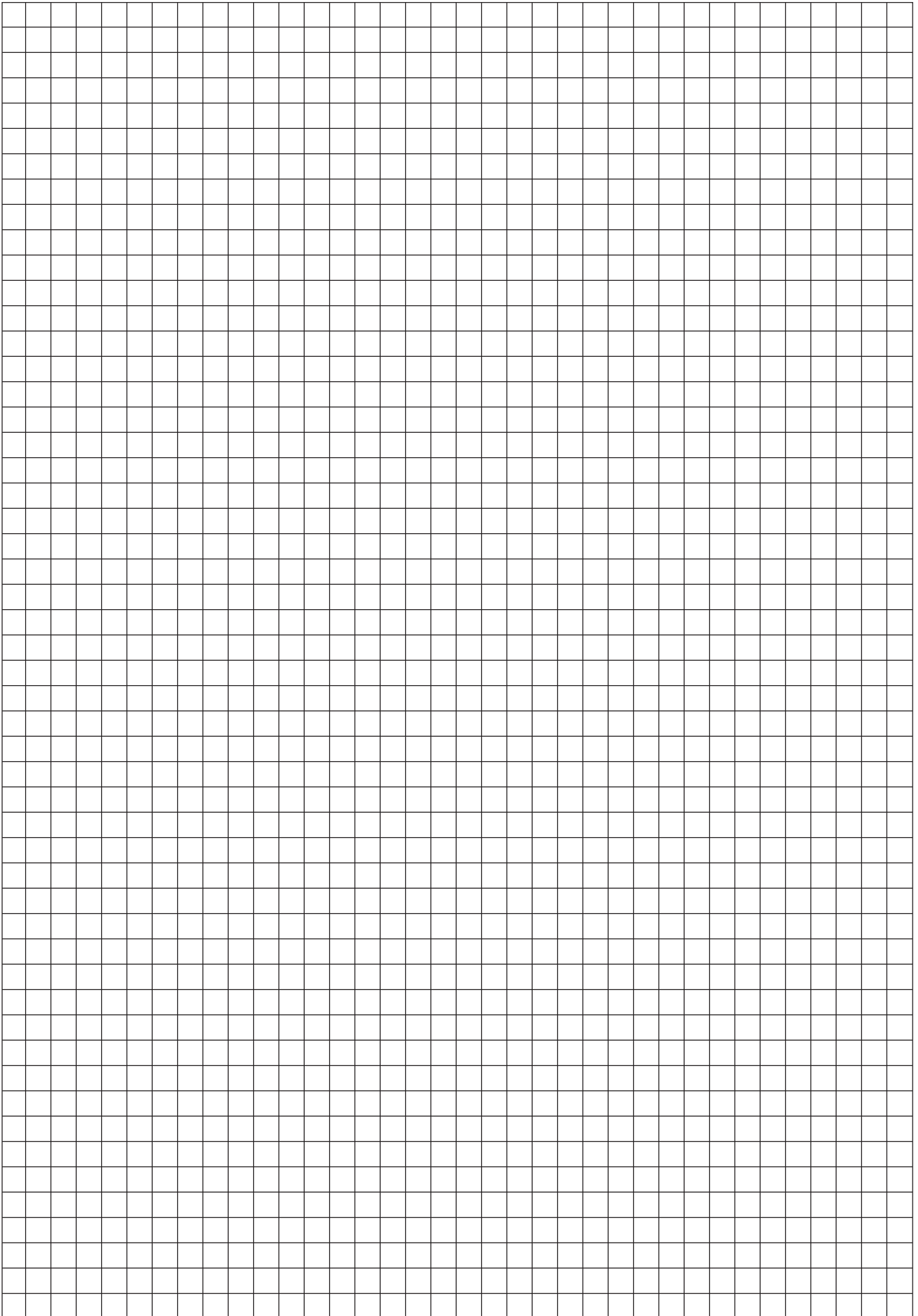# High School Math Reference Sheet

1 inch = 2.54 centimeters	1 kilometer = 0.62 mile	1 cup = 8 fluid ounces
1 meter = 39.37 inches	1 pound = 16 ounces	1 pint = 2 cups
1 mile = 5280 feet	1 pound = 0.454 kilogram	1 quart = 2 pints
1 mile = 1760 yards	1 kilogram = 2.2 pounds	1 gallon = 4 quarts
1 mile = 1.609 kilometers	1 ton = 2000 pounds	1 gallon = 3.785 liters
		1 liter = 0.264 gallon
		1 liter = 1000 cubic centimeters

Triangle	$A = \frac{1}{2}bh$		Pythagorean Theorem	$a^2 + b^2 = c^2$
Parallelogram	$A = bh$		Quadratic Formula	$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Circle	$A = \pi r^2$		Arithmetic Sequence	$a_n = a_1 + (n - 1)d$
Circle	$C = \pi d$ or $C = 2\pi r$		Geometric Sequence	$a_n = a_1 r^{n-1}$
General Prisms	$V = Bh$		Geometric Series	$S_n = \dfrac{a_1 - a_1 r^n}{1 - r}$ where $r \neq 1$
Cylinder	$V = \pi r^2 h$		Radians	1 radian = $\dfrac{180}{\pi}$ degrees
Sphere	$V = \frac{4}{3}\pi r^3$		Degrees	1 degree = $\dfrac{\pi}{180}$ radians
Cone	$V = \frac{1}{3}\pi r^2 h$		Exponential Growth/Decay	$A = A_0 e^{k(t - t_0)} + B_0$
Pyramid	$V = \frac{1}{3}Bh$			

Tear Here

Tear Here

FOR TEACHERS ONLY

ALGEBRA I (Common Core)

Wednesday, August 17, 2016 — 8:30 to 11:30 a.m., only

SCORING KEY AND RATING GUIDE

Mechanics of Rating

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

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

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

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

Raters should record the student's scores for all questions and the total raw score on the student's separate answer sheet. Then the student's total raw score should be converted to a scale score by using the conversion chart that will be posted on the Department's web site at: http://www.p12.nysed.gov/assessment/ by Wednesday, August 17, 2016. Because scale scores corresponding to raw scores in the conversion chart may change from one administration to another, it is crucial that, for each administration, the conversion chart provided for that administration be used to determine the student's final score. The student's scale score should be entered in the box provided on the student's separate answer sheet. The scale score is the student's final examination score.

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

Part I

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

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

Updated information regarding the rating of this examination may be posted on the New York State Education Department's web site during the rating period. Check this web site at: http://www.p12.nysed.gov/assessment/ and select the link "Scoring Information" for any recently posted information regarding this examination. This site should be checked before the rating process for this examination begins and several times throughout the Regents Examination period.

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

General Rules for Applying Mathematics Rubrics

I. General Principles for Rating

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

II. Full-Credit Responses

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

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

III. Appropriate Work

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

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

IV. Multiple Errors

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

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

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

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

Part II

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

(25) **[2]** A correct graph is drawn.

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

<p align="center">*or*</p>

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

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

(26) **[2]** A correct description is written.

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

<p align="center">*or*</p>

    [1] An incomplete description is written.

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

(27) **[2]** Exponential, and a correct explanation is written.

    [1] One conceptual error is made.

<p align="center">*or*</p>

    [1] Exponential, but the explanation is incomplete.

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

<p align="center">*or*</p>

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

(28) **[2]** No, and a correct explanation is written.

[1] One conceptual error is made.

or

[1] No, but the explanation is incomplete.

[0] No, but the explanation is missing or incorrect.

or

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

(29) **[2]** Irrational, 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] Irrational, but the explanation is incomplete.

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

or

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

(30) **[2]** -3 and 1 are stated.

[1] Either -3 or 1 is stated.

or

[1] The coordinates $(-3,4)$ and $(1,3)$ are stated.

[0] Either $(-3,4)$ or $(1,3)$ is stated.

or

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

(31) **[2]** -4 and 10, 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] -4 and 10, but a method other than algebraic is used.

or

[1] Appropriate work is shown to find -4 or 10.

or

[1] -4 and 10, but no work is shown.

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

(32) **[2]** $\dfrac{13 + 3a}{a}$ or $\dfrac{13}{a} + 3$ is written, and correct work is shown.

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

or

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

or

[1] $\dfrac{13 + 3a}{a}$, but no work is shown.

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

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]** $y = 17.159x - 2.476$ and 8.7, and correct work is shown.

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

or

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

or

[3] An incorrect linear regression equation is solved appropriately.

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

or

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

or

[2] $y = 17.159x - 2.476$, but no further correct work is shown.

or

[2] Appropriate work is shown to find 8.7, but no further correct work is shown.

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

or

[1] An incorrect linear regression equation is written, but no further correct work is shown.

or

[1] $17.159x - 2.476$ is written, but no further correct work is shown.

or

[1] 8.7, but no work is shown.

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

(34) **[4]** A correct explanation is written and a correct graph is drawn.

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

or

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

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

or

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

or

[2] The explanation is incomplete and one graphing error is made.

or

[2] A correct explanation is written, but no graph is drawn.

or

[2] A correct graph is drawn, but no explanation is written.

[1] No explanation is written, and one graphing error is made.

or

[1] An incomplete explanation is written, and no graph is drawn.

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

(35) **[4]** A correct system of inequalities is written, 48, and a correct justification is given.

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

or

[3] Appropriate work is shown, but no justification is given.

or

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

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

or

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

or

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

or

[2] Only one inequality is written correctly, 48 is stated, but no justification is given.

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

or

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

or

[1] 48, but no work is shown.

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

(36) **[4]** $-\frac{3}{8}$ and $\frac{1}{8}$ or equivalent, correct work is shown, and a correct explanation is written.

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

or

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

or

[3] $-\frac{3}{8}$ and $\frac{1}{8}$, and a correct explanation is written, but a method other than Janice's is used.

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

or

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

or

[2] $-\frac{3}{8}$ and $\frac{1}{8}$, and a correct explanation is written, but no work is shown.

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

or

[1] $-\frac{3}{8}$ and $\frac{1}{8}$ are written, but no work is shown.

or

[1] A correct explanation is written.

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

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]** $18j + 32w = 19.92$ and $14j + 26w = 15.76$, a correct justification is given, and correct work is shown to find $j = 0.68$ and $w = 0.24$.

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

or

[5] Appropriate work is shown, but only the price of the juice or the price of the water is found correctly.

or

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

[4] Appropriate work is shown, but two computational errors are made.

or

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

[3] Appropriate work is shown, but three or more computational errors are made.

or

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

or

[3] $18j + 32w = 19.92$ and $14j + 26w = 15.76$, and a correct justification is given, but no further correct work is shown.

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

or

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

or

[2] $18j + 32w = 19.92$ and $14j + 26w = 15.76$, but no further correct work is shown.

or

[2] Appropriate work is shown to find $j = 0.68$ and $w = 0.24$, but no further correct work is shown.

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

or

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

<center>*or*</center>

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

<center>*or*</center>

[1] $j = 0.68$ and $w = 0.24$, but no work is shown.

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

Map to the Common Core Learning Standards
Algebra I (Common Core)
August 2016

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

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

Regents Examination in Algebra I (Common Core)

August 2016

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

Online Submission of Teacher Evaluations of the Test to the Department

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

1. Go to http://www.forms2.nysed.gov/emsc/osa/exameval/reexameval.cfm.

2. Select the test title.

3. Complete the required demographic fields.

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

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

ALGEBRA I (Common Core)

Wednesday, August 17, 2016 — 8:30 to 11:30 a.m.

MODEL RESPONSE SET

Table of Contents

25 Graph the function $y = -\sqrt{x+3}$ on the set of axes below.

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

25 Graph the function $y = -\sqrt{x+3}$ on the set of axes below.

$$\begin{array}{c|c} X & -\sqrt{x+3} \\ \hline 6 & -3 \\ 1 & -2 \\ -2 & -1 \\ -3 & 0 \end{array}$$

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

Question 25

25 Graph the function $y = -\sqrt{x+3}$ on the set of axes below.
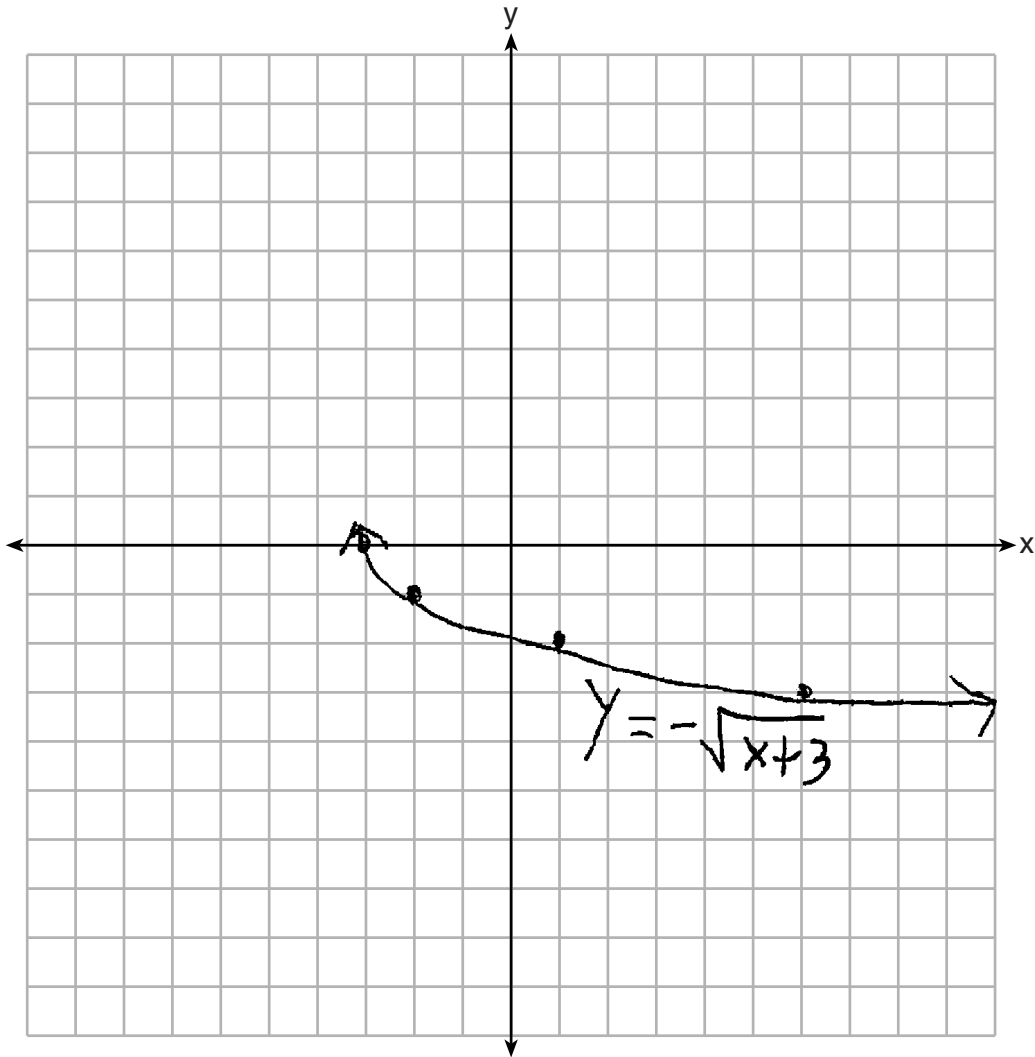
Score 1: The student made an error by putting an arrow at $(-3,0)$.

25 Graph the function $y = -\sqrt{x+3}$ on the set of axes below.
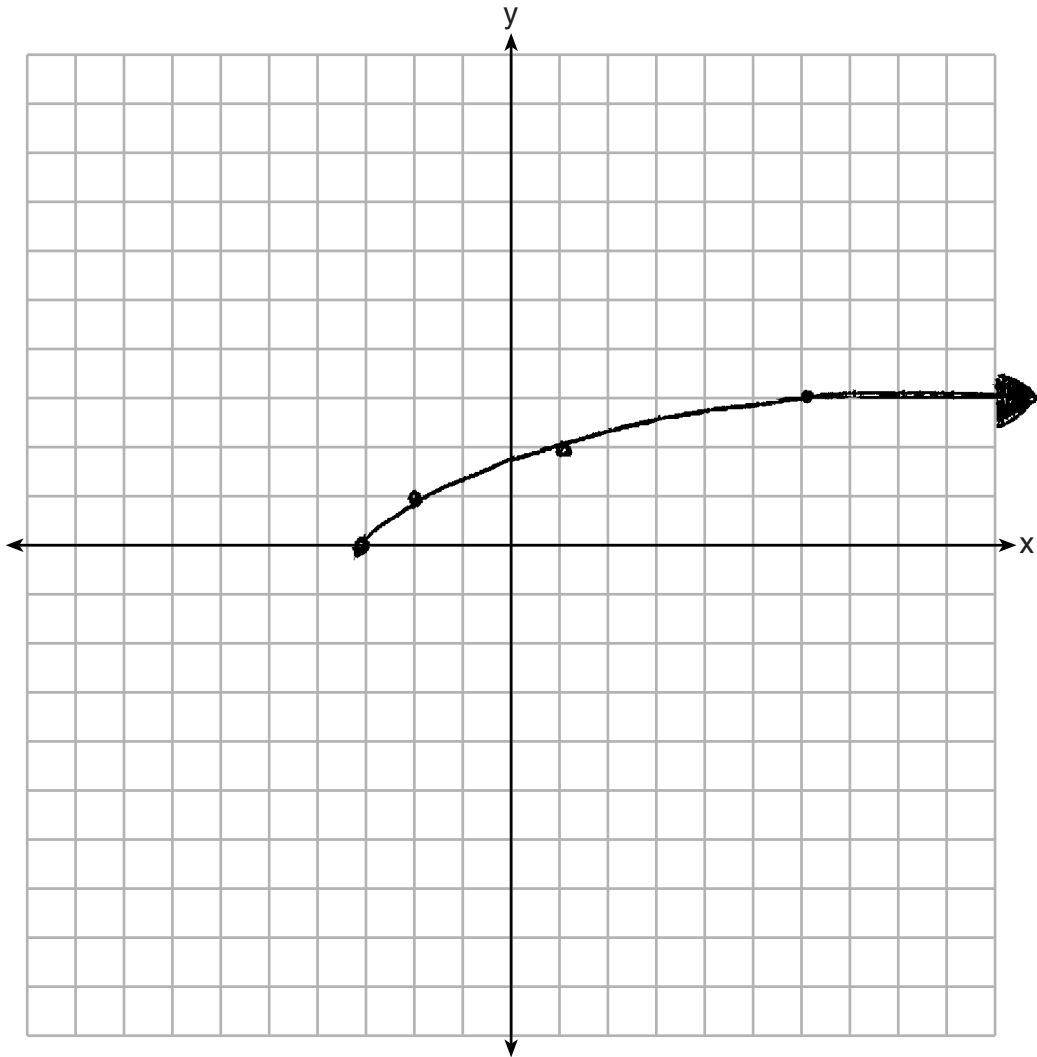
Score 1: The student graphed $y = \sqrt{x+3}$.

25 Graph the function $y = -\sqrt{x + 3}$ on the set of axes below.
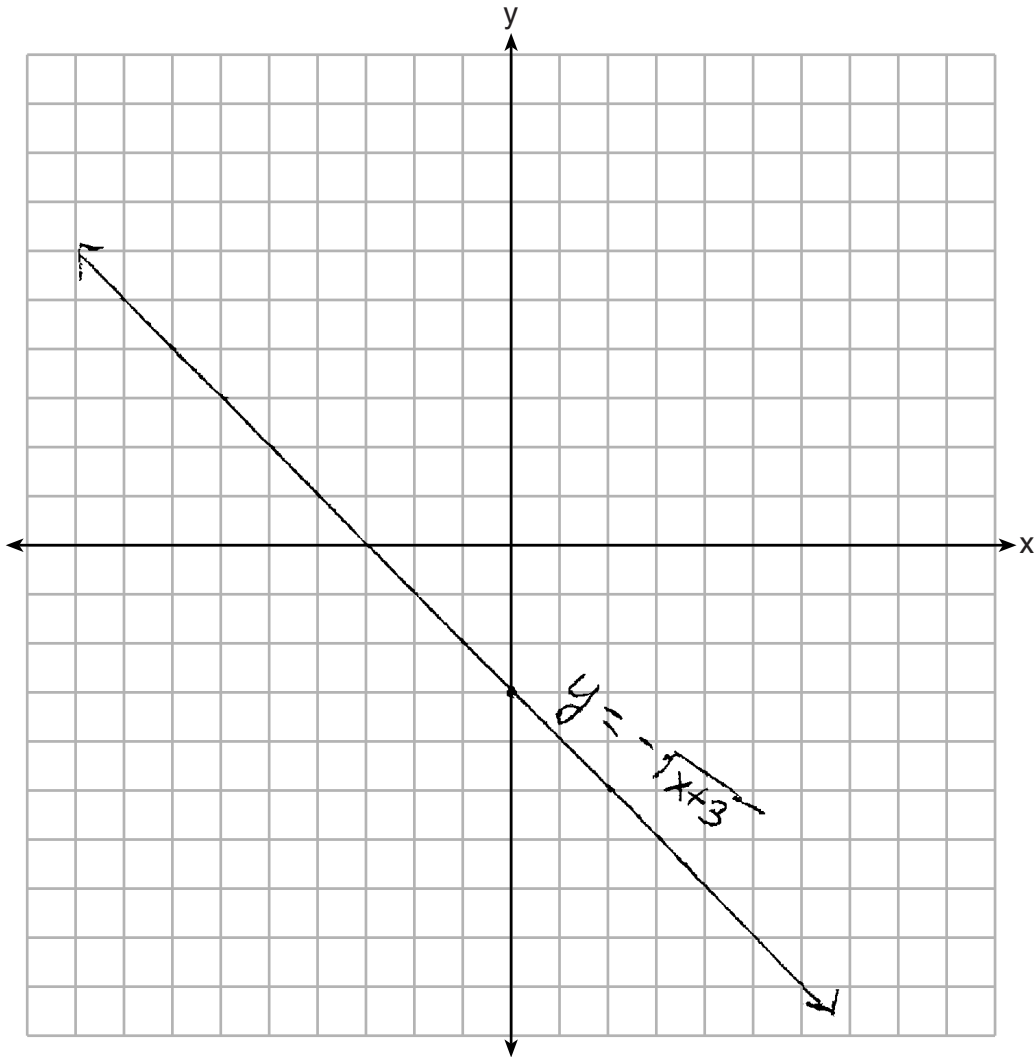
Score 0: The student gave a completely incorrect response.

26 Richard is asked to transform the graph of $b(x)$ below.

The graph of $b(x)$ is transformed using the equation $h(x) = b(x - 2) - 3$. Describe how the graph of $b(x)$ changed to form the graph of $h(x)$.

2 units right

3 units down

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

26 Richard is asked to transform the graph of $b(x)$ below.

The graph of $b(x)$ is transformed using the equation $h(x) = b(x - 2) - 3$. Describe how the graph of $b(x)$ changed to form the graph of $h(x)$.

Right 3
Down 2

Score 1: The student confused the horizontal and vertical shifts.

26 Richard is asked to transform the graph of $b(x)$ below.

b(x)

x
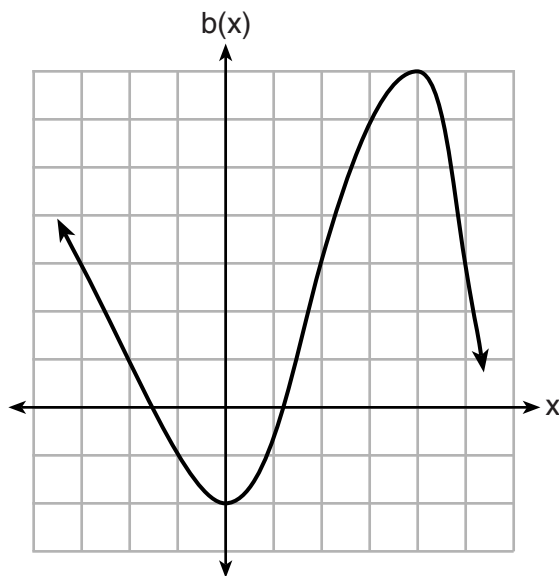
The graph of $b(x)$ is transformed using the equation $h(x) = b(x - 2) - 3$. Describe how the graph of $b(x)$ changed to form the graph of $h(x)$.

The b (x) change 2 units left and 3 units down

Score 1: The student stated an incorrect direction for the horizontal shift.

26 Richard is asked to transform the graph of $b(x)$ below.

$$b(x)$$
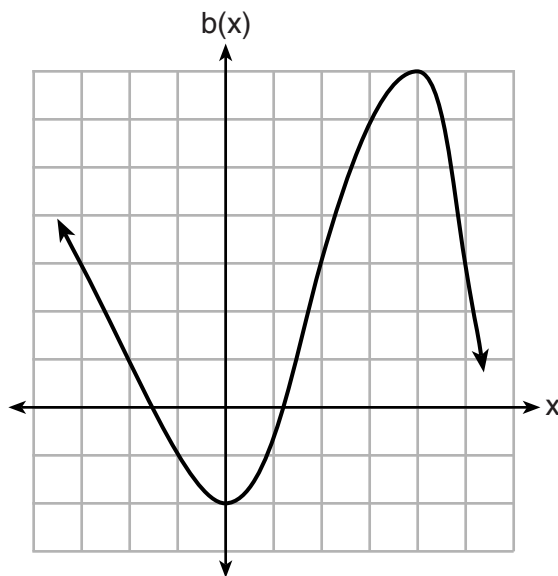
The graph of $b(x)$ is transformed using the equation $h(x) = b(x - 2) - 3$. Describe how the graph of $b(x)$ changed to form the graph of $h(x)$.

It moved down 2 units and to the left 3 units.

Score 0: The student confused the horizontal and vertical shifts and stated an incorrect direction for the horizontal shift.

26 Richard is asked to transform the graph of $b(x)$ below.

b(x)
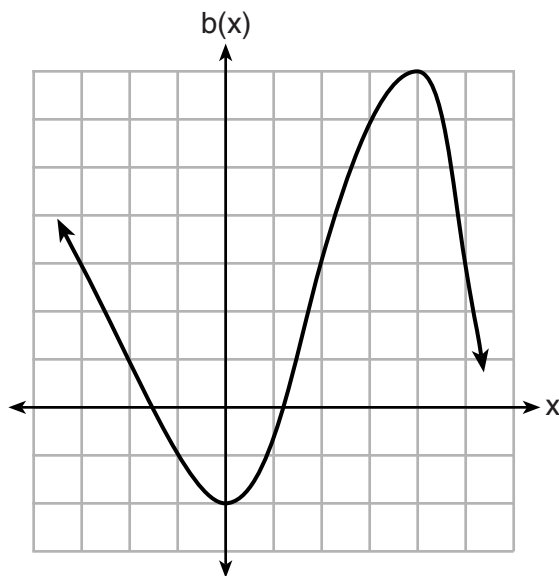
The graph of $b(x)$ is transformed using the equation $h(x) = b(x - 2) - 3$. Describe how the graph of $b(x)$ changed to form the graph of $h(x)$.

The graph will flip to its reflection (left side) and move 3 units. It will als move down 2 units.

Score 0: The student wrote a completely incorrect response.

27 Consider the pattern of squares shown below:

Which type of model, linear or exponential, should be used to determine how many squares are in the *n*th pattern? Explain your answer.
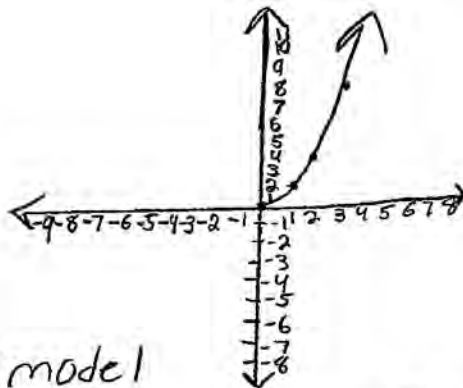
An exponential model should be used to represent the nth pattern because if you look at the pattern of squares above, they are not growing constantly. The squares are growing exponentially. They are growing exponentially because the pattern they are growing at is 2,4,8. A constant pattern would be 2,4,6.

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

27 Consider the pattern of squares shown below:
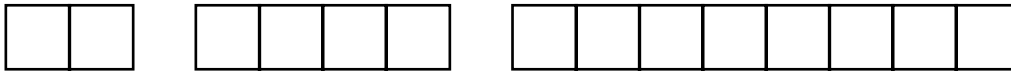
Which type of model, linear or exponential, should be used to determine how many squares are in the *n*th pattern? Explain your answer.

Exponential should be used because the pattern does not increase at a constant rate.

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

27 Consider the pattern of squares shown below:

Which type of model, linear or exponential, should be used to determine how many squares are in the nth pattern? Explain your answer.

ex pone tial

$f(n) = 2^n$ because

2^n fits   the   pattern

example, $f(1)=2^1 \Rightarrow f(1)=2$

$f(2) = 2^2 \Rightarrow f(2) = 4$

$f(3) = 2^3 \Rightarrow f(3) = 8$

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

27 Consider the pattern of squares shown below:

Which type of model, linear or (exponential) should be used to determine how many squares are in the *n*th pattern? Explain your answer.

$$2, 4, 8, \cancel{}16, 32, 64, 128, 256, 512$$

$$9^m \text{ term} = 512 \text{ squares.}$$

Score 1: The student wrote a justification instead of an explanation.
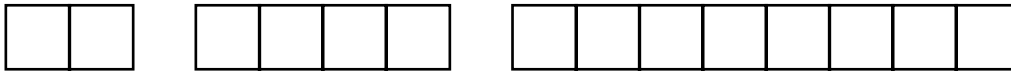
27 Consider the pattern of squares shown below:

Which type of model, linear or exponential, should be used to determine how many squares are in the *n*th pattern? Explain your answer.

Exponential because they are not
is some form of pattern

Score 0: The student wrote an incorrect explanation.

28 When multiplying polynomials for a math assignment, Pat found the product to be $-4x + 8x^2 - 2x^3 + 5$. He then had to state the leading coefficient of this polynomial. Pat wrote down -4. Do you agree with Pat's answer? Explain your reasoning.

No because it is not in the correct order. $-2x^3 + 8x^2 - 4x + 5$ is the correct order, so -2 is the leading coefficient.

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

28 When multiplying polynomials for a math assignment, Pat found the product to be $-4x + 8x^2 - 2x^3 + 5$. He then had to state the leading coefficient of this polynomial. Pat wrote down -4. Do you agree with Pat's answer? Explain your reasoning.

No, because Pat had forgotten to put the polynomial in standard form, with the exponents in decreasing order. The leading coefficient would be the number connected to the exponent of the greatest value. Had pat put the polynomial in standard form he would've gotten $8x^2 - 2x^3 - 4x + 5$.

Score 1: The student made an error in the last sentence of the explanation.

28 When multiplying polynomials for a math assignment, Pat found the product to be $-4x + 8x^2 - 2x^3 + 5$. He then had to state the leading coefficient of this polynomial. Pat wrote down -4. Do you agree with Pat's answer? Explain your reasoning.

because the leading coefficent

is always the first number

I agree with Pat's answer

Score 1: The student did not realize that the polynomial needs to be in standard form for their statement to be true.

28 When multiplying polynomials for a math assignment, Pat found the product to be $-4x + 8x^2 - 2x^3 + 5$. He then had to state the leading coefficient of this polynomial. Pat wrote down -4. Do you agree with Pat's answer? Explain your reasoning.

Yes, because the leading coefficient is always the smallest exponential Power in this case $-4x$.

Score 0: The student wrote a completely incorrect response.

29 Is the sum of $3\sqrt{2}$ and $4\sqrt{2}$ rational or irrational? Explain your answer.

$3\sqrt{2} = 4.24... + 4\sqrt{2}$ Irrational, because the sum cannot be represented as a fraction.

$9.89949...$

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

29 Is the sum of $3\sqrt{2}$ and $4\sqrt{2}$ rational or irrational? Explain your answer.

$$3\sqrt{2} + 4\sqrt{2}$$

$$7\sqrt{4}$$

$$7 \cdot (2)$$

$$7 \cdot 2$$

$$\boxed{14}$$

The sum of $3\sqrt{2}$ and $4\sqrt{2}$ is rational because it equals a whole number.

Score 1: The student made an error when adding $3\sqrt{2}$ and $4\sqrt{2}$.

29 Is the sum of $3\sqrt{2}$ and $4\sqrt{2}$ rational or irrational? Explain your answer.

$7\sqrt{2}$

The answer can't be written as a fraction.

Score 1: The student did not state that the answer was irrational.

29 Is the sum of $3\sqrt{2}$ and $4\sqrt{2}$ rational or irrational? Explain your answer.

$3\sqrt{2}$

4.2426406 87

$4\sqrt{2}$

5.656854249

The sums of $3\sqrt{2}$ and $4\sqrt{2}$ are irrational because the sums have decimals in their answer. To be rational it has to be a whole number, without decimals.

Score 0: The student wrote an incorrect explanation.

30 The graph below shows two functions, $f(x)$ and $g(x)$. State all the values of x for which $f(x) = g(x)$.
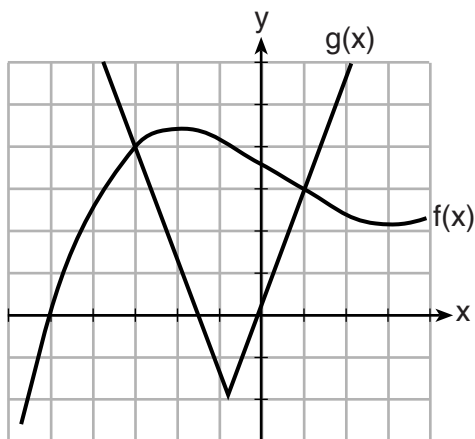
$$f(1) = g(1)$$
$$f(-3) = g(-3)$$

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

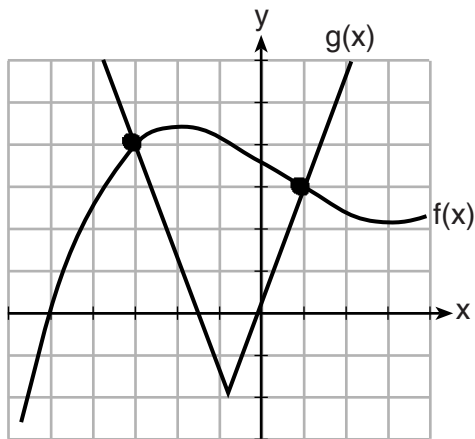**30** The graph below shows two functions, $f(x)$ and $g(x)$. State all the values of x for which $f(x) = g(x)$.
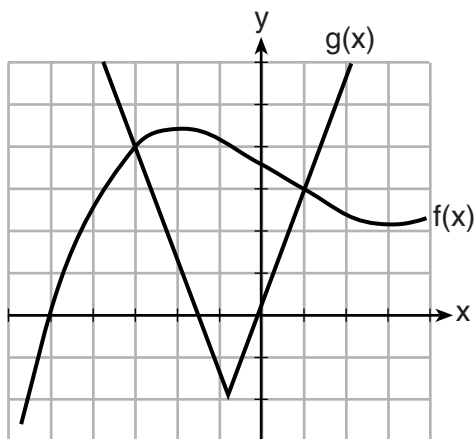
when $f(x) = g(x)$ is 3 and 1.

Score 1: The student wrote one correct value for x.

30 The graph below shows two functions, $f(x)$ and $g(x)$. State all the values of x for which $f(x) = g(x)$.

Score 0: The student did not state the values of x.

31 Find the zeros of $f(x) = (x - 3)^2 - 49$, algebraically.

$$f(x) = (x-3)(x-3) - 49$$
$$f(x) = x^2 - 6x + 9 - 49$$
$$f(x) = x^2 - 6x - 40$$
$$f(x) = (x - 10)(x + 4)$$
$$(x - 10)(x + 4) = 0$$
$$x = 10 \qquad x = -4$$

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

31 Find the zeros of $f(x) = (x - 3)^2 - 49$, algebraically.

$$0 = (x-3)^2 - 49$$
$$\sqrt{49} = \sqrt{(x-3)^2}$$
$$\pm 7 = x - 3$$
$$x = 3 \pm 7$$

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

31 Find the zeros of $f(x) = (x - 3)^2 - 49$, algebraically.

$f(x-3)^2 - 49$

$0 = (x-3)^2 - 49$
$+49 \qquad\qquad +49$

$49 = \sqrt{(x-3)^2}$

$\sqrt{49} = x-3$

$7 = x-3$
$+3 \qquad +3$

$10 = x$

$x = 10$

49

$7 \qquad 7$

Score 1: The student did not write ± 7 when taking the square root of 49.

31 Find the zeros of $f(x) = (x - 3)^2 - 49$, algebraically.

$$+49 \quad y = (x-3)^2 - 49 \quad +49$$

$$49 = (x-3)^2$$

$$49 = (x-3)(x-3)$$

$$x = 3 \quad x = 3$$

Score 0: The student wrote a completely incorrect response.

32 Solve the equation below for *x* in terms of *a*.

$$4(ax + 3) - 3ax = 25 + 3a$$

$4ax + 12 - 3ax = 25 + 3a$

$4ax - 3ax - 3a = 25 - 12$

$x(4a - 3a) - 3a = 25 - 12$

$x = \dfrac{25 - 12 + 3a}{4a - 3a}$

$x = \dfrac{25 - 12 + 3a}{a(4 = 3)}$

$x = \dfrac{25 - 12 + 3a}{a}$

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

32 Solve the equation below for x in terms of a.

$$4(ax + 3) - 3ax = 25 + 3a$$

$$4ax + 12 - 3ax = 25 + 3a$$
$$ax = 13 + 3a$$
$$x = \frac{13}{a} + 3$$

$$x = 13a^{-1} + 3$$

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

32 Solve the equation below for x in terms of a.

$$4(ax + 3) - 3ax = 25 + 3a$$

$$4ax + 12 - 3ax = 25 + 3a$$

$$ax + 12 = 25 + 3a$$
$$\quad\; -12 \quad\;\; -12$$

$$\frac{ax}{a} = \frac{13 + 3a}{a}$$

$$x = \frac{13}{a} + 2$$

Score 1: The student made an error when writing the fraction as a mixed number.

32 Solve the equation below for x in terms of a.

$$4(ax + 3) - 3ax = 25 + 3a$$

$$4ax + 12 - 3ax = 25 + 3a$$
$$ax - 3a = 13$$
$$a(x-3) = 13$$
$$a = \frac{13}{x-3}$$

Score 1: The student solved the equation correctly for a.

32 Solve the equation below for x in terms of a.

$$4(ax + 3) - 3ax = 25 + 3a$$

$$4ax + 12 - 3ax = 25 + 3a$$
$$1ax + 12 = 25 + 3a$$
$$ -12 \quad -12$$
$$\frac{1ax}{a} = \frac{13 + 3a}{a}$$
$$1x = 13 + 3a$$
$$\boxed{x = 13 + 3a}$$

Score 0: The student did not divide both terms on the right side by a and simplified $\frac{3a}{a}$ incorrectly.

33 The data table below shows the median diameter of grains of sand and the slope of the beach for 9 naturally occurring ocean beaches.

Median Diameter of Grains of Sand, in Millimeters (x)	0.17	0.19	0.22	0.235	0.235	0.3	0.35	0.42	0.85
Slope of Beach, in Degrees (y)	0.63	0.7	0.82	0.88	1.15	1.5	4.4	7.3	11.3

Write the linear regression equation for this set of data, rounding all values to the *nearest thousandth*.

$$y = mx + b$$

$$\boxed{y = 17.159x - 2.476}$$

Using this equation, predict the slope of a beach, to the *nearest tenth of a degree,* on a beach with grains of sand having a median diameter of 0.65 mm.

$$y = 17.159(.65) - 2.476$$

$$y = 8.60135$$

$$\boxed{y = 8.7}$$

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

33 The data table below shows the median diameter of grains of sand and the slope of the beach for 9 naturally occurring ocean beaches.

Median Diameter of Grains of Sand, in Millimeters (x)	0.17	0.19	0.22	0.235	0.235	0.3	0.35	0.42	0.85
Slope of Beach, in Degrees (y)	0.63	0.7	0.82	0.88	1.15	1.5	4.4	7.3	11.3

Write the linear regression equation for this set of data, rounding all values to the *nearest thousandth*.

$$Y = ax + b$$
$$a = 17.159$$
$$b = -2.476$$

Using this equation, predict the slope of a beach, to the *nearest tenth of a degree,* on a beach with grains of sand having a median diameter of 0.65 mm.

$$Y = 17.159(.65) - 2.476$$
$$Y = 8.7$$

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

33 The data table below shows the median diameter of grains of sand and the slope of the beach for 9 naturally occurring ocean beaches.

Median Diameter of Grains of Sand, in Millimeters (x)	0.17	0.19	0.22	0.235	0.235	0.3	0.35	0.42	0.85
Slope of Beach, in Degrees (y)	0.63	0.7	0.82	0.88	1.15	1.5	4.4	7.3	11.3

Write the linear regression equation for this set of data, rounding all values to the *nearest thousandth*.

$$y = 17.159x + 2.476$$

I used the graphing calculator to determine it. I went to stat, edit, inputted all the values and went to calc, LinReg (ax+b) and then I plugged in the values given.

Using this equation, predict the slope of a beach, to the *nearest tenth of a degree,* on a beach with grains of sand having a median diameter of 0.65 mm.

$$y = 17.159 (.65) + 2.476$$
$$y = 11.15335 + 2.476$$
$$y = 13.62935$$
$$y = 13.6 \text{ degrees.}$$

Score 3: The student wrote an incorrect regression equation, but solved it appropriately.

33 The data table below shows the median diameter of grains of sand and the slope of the beach for 9 naturally occurring ocean beaches.

Median Diameter of Grains of Sand, in Millimeters (x)	0.17	0.19	0.22	0.235	0.235	0.3	0.35	0.42	0.85
Slope of Beach, in Degrees (y)	0.63	0.7	0.82	0.88	1.15	1.5	4.4	7.3	11.3

Write the linear regression equation for this set of data, rounding all values to the *nearest thousandth*.

$$y = ax + b$$
$$y = 17.244x - 2.615$$

Using this equation, predict the slope of a beach, to the *nearest tenth of a degree,* on a beach with grains of sand having a median diameter of 0.65 mm.

$$Y = 17.244 x - 2.615$$

$$Y = 17.244 (0.65) - 2.615$$

$$Y = 11.2086 - 2.615$$

$$Y = 8.6 \text{ mm}$$

Score 2: The student wrote an incorrect equation and solved it appropriately, but labeled the solution in mm.

33 The data table below shows the median diameter of grains of sand and the slope of the beach for 9 naturally occurring ocean beaches.

Median Diameter of Grains of Sand, in Millimeters (x)	0.17	0.19	0.22	0.235	0.235	0.3	0.35	0.42	0.85
Slope of Beach, in Degrees (y)	0.63	0.7	0.82	0.88	1.15	1.5	4.4	7.3	11.3

Write the linear regression equation for this set of data, rounding all values to the *nearest thousandth*.

$$y = .407(90.949)^x$$

Using this equation, predict the slope of a beach, to the *nearest tenth of a degree,* on a beach with grains of sand having a median diameter of 0.65 mm.

$$y = .407(90.949)^{.65}$$

$$7.6$$

Score 2:   The student wrote an exponential regression equation, but solved it appropriately.

33 The data table below shows the median diameter of grains of sand and the slope of the beach for 9 naturally occurring ocean beaches.

Median Diameter of Grains of Sand, in Millimeters (x)	0.17	0.19	0.22	0.235	0.235	0.3	0.35	0.42	0.85
Slope of Beach, in Degrees (y)	0.63	0.7	0.82	0.88	1.15	1.5	4.4	7.3	11.3

Write the linear regression equation for this set of data, rounding all values to the *nearest thousandth*.

$r = 0.953$

$y = 17.208x - 2.526$

Using this equation, predict the slope of a beach, to the *nearest tenth of a degree,* on a beach with grains of sand having a median diameter of 0.65 mm.

Score 1: The student wrote an incorrect linear regression equation.

33 The data table below shows the median diameter of grains of sand and the slope of the beach for 9 naturally occurring ocean beaches.

Median Diameter of Grains of Sand, in Millimeters (x)	0.17	0.19	0.22	0.235	0.235	0.3	0.35	0.42	0.85
Slope of Beach, in Degrees (y)	0.63	0.7	0.82	0.88	1.15	1.5	4.4	7.3	11.3

Write the linear regression equation for this set of data, rounding all values to the *nearest thousandth*.

$$y = 17x + {}^-2.5$$

Using this equation, predict the slope of a beach, to the *nearest tenth of a degree,* on a beach with grains of sand having a median diameter of 0.65 mm.

Score 0: The student made two different rounding errors when writing the linear regression and did not make a prediction.

34 Shawn incorrectly graphed the inequality $-x - 2y \geq 8$ as shown below.
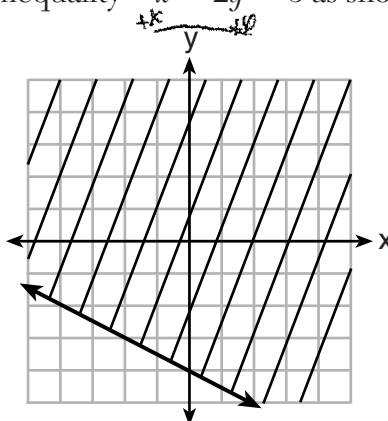
$$-2y \geq 8 + x$$
$$\frac{-2y}{-2} \geq \frac{8}{-2} + \frac{x}{-2}$$
$$y \leq -4 + \frac{1}{2}x$$

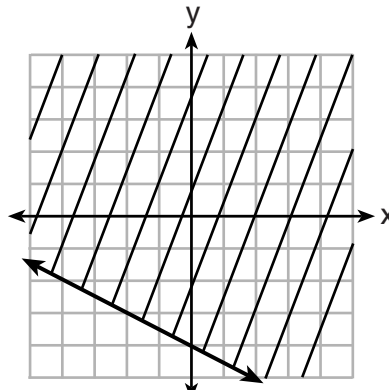Explain Shawn's mistake.

The Solution Should be below the line, not above.

Graph the inequality correctly on the set of axes below.
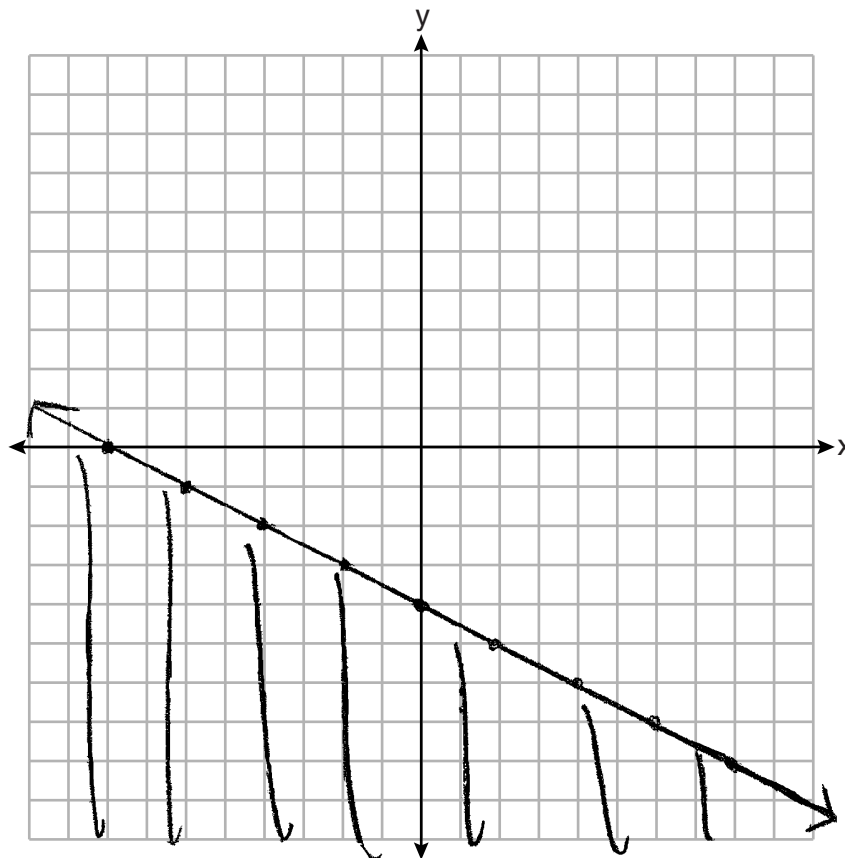
Score 4: The student gave a complete and correct response.

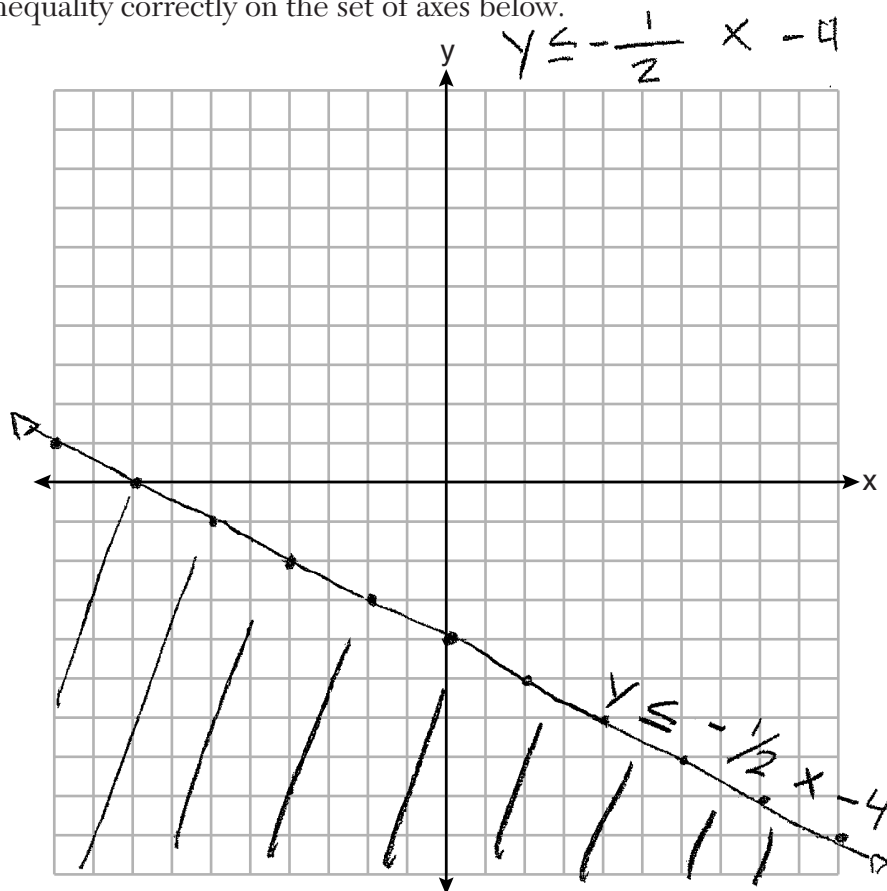**34** Shawn incorrectly graphed the inequality $-x - 2y \geq 8$ as shown below.

$-x - 2y \geq 8 + x$
$+x$

$\dfrac{-2y}{2} \geq \dfrac{x + 8}{-2}$

$y \leq -\dfrac{1}{2}x - 4$

Explain Shawn's mistake.

He got the points right, but the shading is wrong because when you divide by a negative the signs

$\geq, \leq$ or $>, <$ switch to the opposite of what it is and the correct sign for this one is $\leq$ and you shade down.
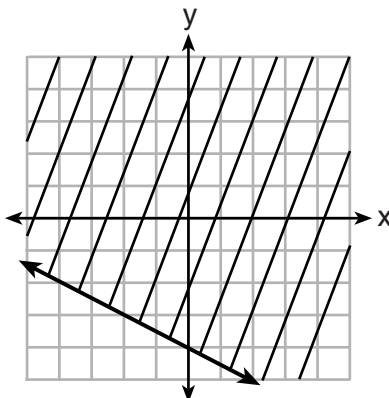
Graph the inequality correctly on the set of axes below.

$y \leq -\dfrac{1}{2}x - 4$

$y \leq -\dfrac{1}{2}x - 4$

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

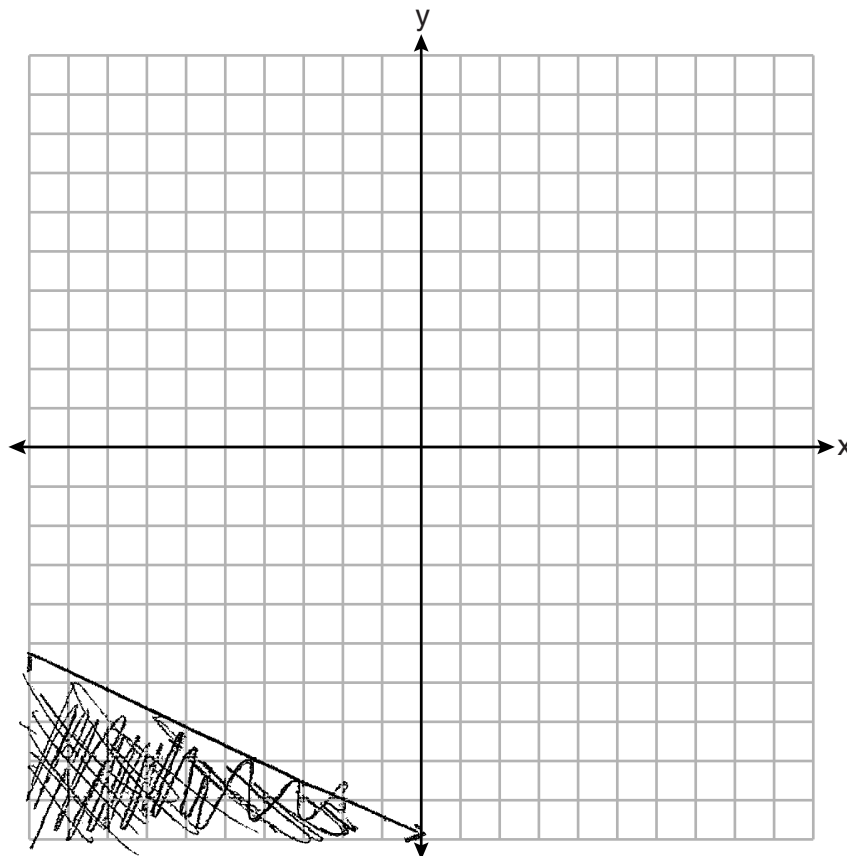**34** Shawn incorrectly graphed the inequality $-x - 2y \geq 8$ as shown below.

Explain Shawn's mistake.

He shaded it wrong
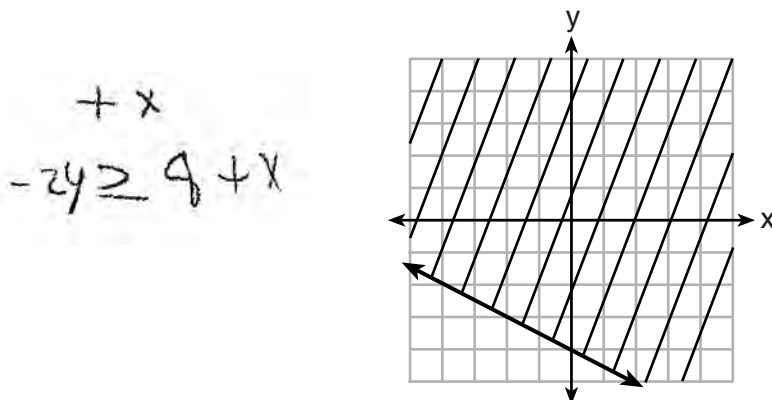
Graph the inequality correctly on the set of axes below.

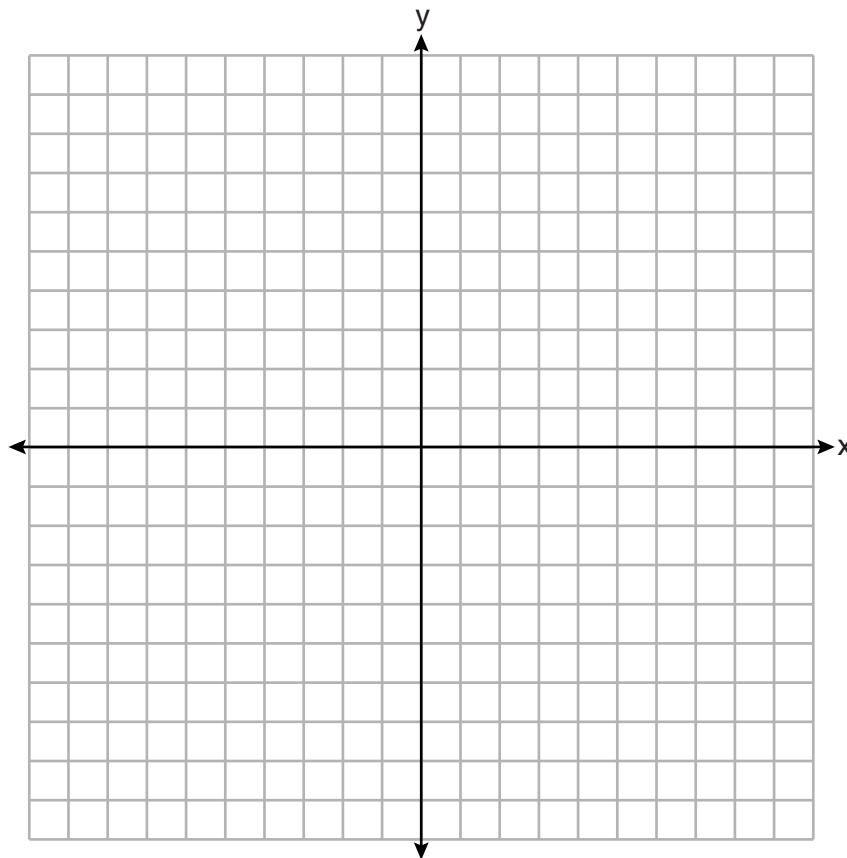**Score 3:** The student graphed the line incorrectly.

34 Shawn incorrectly graphed the inequality $-x - 2y \geq 8$ as shown below.

$+x$

$-2y \geq 8 + x$

Explain Shawn's mistake.

He didn't switu the inequality sign when he divided by a negative.

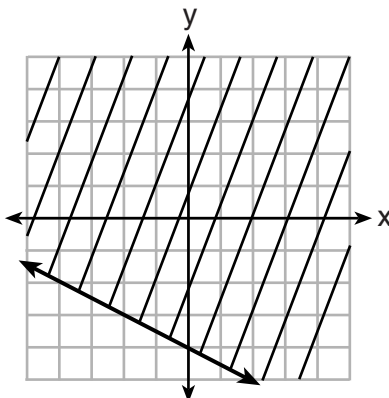Graph the inequality correctly on the set of axes below.

Score 2: The student wrote a correct explanation.

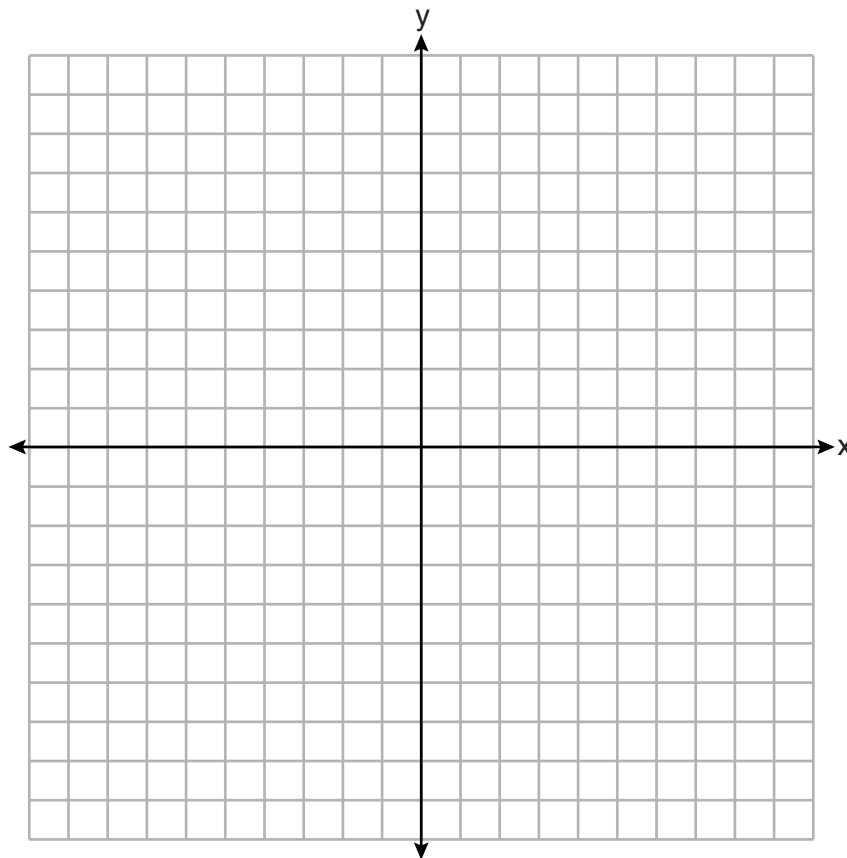**34** Shawn incorrectly graphed the inequality $-x - 2y \geq 8$ as shown below.

Explain Shawn's mistake.

$-x - 2y \geq 8$

$\dfrac{-2y}{-2} \geq \dfrac{x+8}{-2}$

The Sign

$y \leq -\dfrac{1}{2}x - 4$
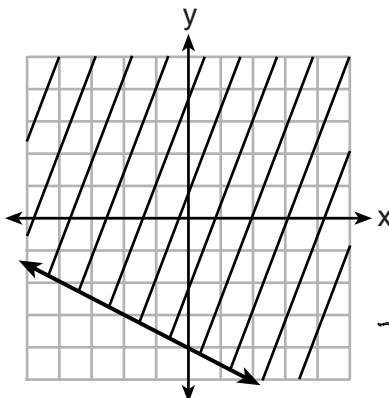
Graph the inequality correctly on the set of axes below.

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

34 Shawn incorrectly graphed the inequality $-x - 2y \geq 8$ as shown below.

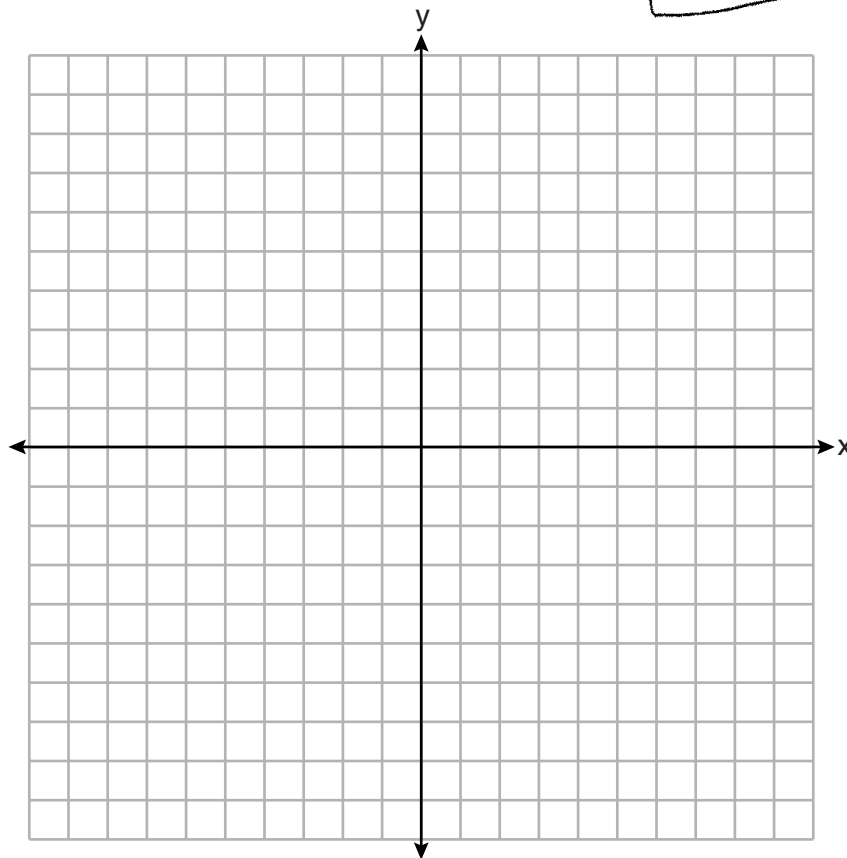Explain Shawn's mistake.

Shawn had to go down two to the right

Graph the inequality correctly on the set of axes below.

$-x - 2y \geq 8$
$+x \qquad +x$

$\dfrac{-2y}{-2} > \dfrac{x + 8}{-2}$

$y \leq -2x - 4$

Score 0: The student wrote a completely incorrect response.

35 A drama club is selling tickets to the spring musical. The auditorium holds 200 people. Tickets cost $12 at the door and $8.50 if purchased in advance. The drama club has a goal of selling at least $1000 worth of tickets to Saturday's show.

Write a system of inequalities that can be used to model this scenario.

$$X + Y \leq 200 \text{ and } 12x + 8.50y \geq 1000$$

If 50 tickets are sold in advance, what is the minimum number of tickets that must be sold at the door so that the club meets its goal? Justify your answer.

$$X + Y \leq 200$$
$$X + \underset{-50}{50} \leq \underset{-50}{200}$$
$$X \leq 150$$

$$12x + \overset{425}{\cancel{8.50}}(50) \geq 1000$$
$$12x + 425 \geq 1000$$
$$\underset{-425}{} \quad \underset{-425}{}$$
$$\frac{12x}{12} \geq \frac{575}{12}$$

$$12(48) + 8.50(50) \geq 1000$$
$$576 + 425 \geq 1000$$
$$1001 \geq 1000$$

$$X \geq 47.92 \;\boxed{48}$$

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

35 A drama club is selling tickets to the spring musical. The auditorium holds 200 people. Tickets cost $12 at the door and $8.50 if purchased in advance. The drama club has a goal of selling at least $1000 worth of tickets to Saturday's show.

Write a system of inequalities that can be used to model this scenario.

$$x + y = 200$$
$$12x + 8.5y \geq 1000$$

If 50 tickets are sold in advance, what is the minimum number of tickets that must be sold at the door so that the club meets its goal? Justify your answer.

$$12x + 8.5y \geq 1000$$
$$12x + (8.5 \times 50) \geq 1000$$
$$12x + 425 \geq 1000$$
$$\underline{-425 \qquad -425}$$
$$12x \geq 575$$
$$x \geq 48$$

The minimum number of tickets that must be sold is 48 tickets at the door.

Score 3: The student wrote $x + y = 200$ instead of an inequality.

35 A drama club is selling tickets to the spring musical. The auditorium holds 200 people. Tickets cost $12 at the door and $8.50 if purchased in advance. The drama club has a goal of selling at least $1000 worth of tickets to Saturday's show.

Write a system of inequalities that can be used to model this scenario.

$$12d + 8.5a = 1000 \qquad d + a = 200$$

If 50 tickets are sold in advance, what is the minimum number of tickets that must be sold at the door so that the club meets its goal? Justify your answer.

$$12d + 8.5(50) = 1000$$
$$12d = 575$$
$$d = 47.91\overline{6}$$

Score 2: The student wrote a system of equations instead of inequalities and did not round up to 48.

35 A drama club is selling tickets to the spring musical. The auditorium holds 200 people. Tickets cost $12 at the door and $8.50 if purchased in advance. The drama club has a goal of selling at least $1000 worth of tickets to Saturday's show.

Write a system of inequalities that can be used to model this scenario.

$$12x + 8.5y = 1000$$

If 50 tickets are sold in advance, what is the minimum number of tickets that must be sold at the door so that the club meets its goal? Justify your answer.

$$1000\$ - 8.5\$(50) = 12x$$

$$575/12\$ =$$

$$47.92$$

Score 1: The student wrote an appropriate justification, but did not state 48.

35 A drama club is selling tickets to the spring musical. The auditorium holds 200 people. Tickets cost $12 at the door and $8.50 if purchased in advance. The drama club has a goal of selling at least $1000 worth of tickets to Saturday's show.

Write a system of inequalities that can be used to model this scenario.

$$12X + 8.50y = 1000$$

If 50 tickets are sold in advance, what is the minimum number of tickets that must be sold at the door so that the club meets its goal? Justify your answer.

$$12X + 8.50y = 1000$$
$$6X + 4.25y = 500$$
$$10.25y = 500$$
$$y = 48.78$$
$$\boxed{48}$$

Score 0:   The student obtained a correct response by an obviously incorrect procedure.

36 Janice is asked to solve $0 = 64x^2 + 16x - 3$. She begins the problem by writing the following steps:

$$\text{Line 1} \quad 0 = 64x^2 + 16x - 3$$
$$\text{Line 2} \quad 0 = B^2 + 2B - 3$$
$$\text{Line 3} \quad 0 = (B + 3)(B - 1)$$

Use Janice's procedure to solve the equation for x.

$$0 = 64x^2 + 16x = 3 \qquad B = 8x$$
$$0 = B^2 + 2B - 3$$
$$0 = (B+3)(B-1)$$
$$0 = (8x+3)(8x-1)$$

$$8x+3 = 0 \qquad 8x-1 = 0$$
$$8x = -3 \qquad 8x = 1$$
$$\frac{8x}{8} = \frac{-3}{8} \qquad \frac{8x}{8} = \frac{1}{8}$$

$$\boxed{x = -\frac{3}{8} \text{ or } \frac{1}{8}}$$

Explain the method Janice used to solve the quadratic equation.

Janice substituted $64x^2$ & $16x$ with B^2 & $2B$, which was helpful b/c we were able to factor the equation & then we replaced B with $8x$ & got X which is $-\frac{3}{8}$ or $\frac{1}{8}$

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

36 Janice is asked to solve $0 = 64x^2 + 16x - 3$. She begins the problem by writing the following steps:

$$\text{Line 1} \quad 0 = 64x^2 + 16x - 3$$
$$\text{Line 2} \quad 0 = B^2 + 2B - 3$$
$$\text{Line 3} \quad 0 = (B + 3)(B - 1)$$

Use Janice's procedure to solve the equation for x.

$$0 = 64x^2 + 16x - 3$$
$$= (8x+3)(8x-1)$$
$$\frac{8x}{8} = \frac{-3}{8} \quad \frac{8x}{8} = \frac{1}{8}$$
$$x = \frac{-3}{8} \quad x = \frac{1}{8}$$

Explain the method Janice used to solve the quadratic equation.

Score 3: The student did not write an explanation.

36 Janice is asked to solve $0 = 64x^2 + 16x - 3$. She begins the problem by writing the following steps:

$$\text{Line 1} \quad 0 = 64x^2 + 16x - 3$$
$$\text{Line 2} \quad 0 = B^2 + 2B - 3$$
$$\text{Line 3} \quad 0 = (B + 3)(B - 1)$$

Use Janice's procedure to solve the equation for x.

$$\frac{1 = 8x}{8 \quad 8}$$

$$\boxed{\frac{1}{8} = x}$$

$$0 = 64x^2 + 16x - 3$$
$$0 = 64x^2 + 24x - 8x - 3$$
$$0 = 8x(8x + 3) - 1(8x + 3)$$
$$0 = (8x - 1)(8x + 3)$$
$$9_1 = 8x - 1$$

$$24 * 8 = -142$$
$$24 + 8 = 16$$

$$8x + 3 = 0$$
$$\underline{-3 \quad -3}$$
$$\frac{8x}{8} = \frac{-3}{8}$$
$$\boxed{x = \frac{-3}{8}}$$

Explain the method Janice used to solve the quadratic equation.

Use the quadratic formula and plug in the numbers

Score 2: The student did not use Janice's procedure and wrote an incorrect explanation.

36 Janice is asked to solve $0 = 64x^2 + 16x - 3$. She begins the problem by writing the following steps:

$$\text{Line 1} \quad 0 = 64x^2 + 16x - 3$$
$$\text{Line 2} \quad 0 = B^2 + 2B - 3$$
$$\text{Line 3} \quad 0 = (B + 3)(B - 1)$$

Use Janice's procedure to solve the equation for x.

$$B + 3 = 0$$
$$\underline{-3 \quad -3}$$
$$B = -3$$

$$B - 1 = 0$$
$$\underline{+1 \quad +1}$$
$$B = 1$$

Explain the method Janice used to solve the quadratic equation.

$$X = \frac{-16 \pm \sqrt{16^2 - 4(-192)}}{128}$$

Score 1: The student completed Janice's work, but did not solve for x.

36 Janice is asked to solve $0 = 64x^2 + 16x - 3$. She begins the problem by writing the following steps:

$$\text{Line 1} \quad 0 = 64x^2 + 16x - 3$$
$$\text{Line 2} \quad 0 = B^2 + 2B - 3$$
$$\text{Line 3} \quad 0 = (B + 3)(B - 1)$$

Use Janice's procedure to solve the equation for x.

$$0 = (B+3)(B-1)$$

$$\boxed{B+3 \quad B+1}$$

Explain the method Janice used to solve the quadratic equation.

Janice used substitution.

Score 0: The student wrote a completely incorrect response.

37 For a class picnic, two teachers went to the same store to purchase drinks. One teacher purchased 18 juice boxes and 32 bottles of water, and spent $19.92. The other teacher purchased 14 juice boxes and 26 bottles of water, and spent $15.76.

Write a system of equations to represent the costs of a juice box, j, and a bottle of water, w.

$$18j + 32w = 19.92$$
$$14j + 26w = 15.76$$

Kara said that the juice boxes might have cost 52 cents each and that the bottles of water might have cost 33 cents each. Use your system of equations to justify that Kara's prices are *not* possible.

$$14(.52) + 26(.33) = 15.76$$
$$7.28 + 8.58$$
$$15.86 \neq 15.76$$

Solve your system of equations to determine the actual cost, in dollars, of each juice box and each bottle of water.

$$-7(18j + 32w = 19.92)$$
$$9(14j + 26w = 15.76)$$

$$18j + 32(.24) = 19.92$$
$$18j + 7.68 = 19.92$$
$$\underline{-7.68 \quad -7.68}$$
$$\frac{18j}{18} = \frac{12.24}{18}$$
$$\boxed{j = .68}$$

$$-126j - 224w = -139.44$$
$$\underline{126j + 234w = 141.84}$$
$$\frac{10w}{10} = \frac{2.4}{10}$$
$$\boxed{w = .24}$$

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

37 For a class picnic, two teachers went to the same store to purchase drinks. One teacher purchased 18 juice boxes and 32 bottles of water, and spent $19.92. The other teacher purchased 14 juice boxes and 26 bottles of water, and spent $15.76.

Write a system of equations to represent the costs of a juice box, j, and a bottle of water, w.

$$18j + 32w = 19.92$$
$$14j + 26w = 15.76$$

Kara said that the juice boxes might have cost 52 cents each and that the bottles of water might have cost 33 cents each. Use your system of equations to justify that Kara's prices are *not* possible.

$$14(.52) + 26(.33) = 15.76$$
$$7.28 + 8.58 = 15.76$$
$$15.86 \neq 15.76$$

Question 37 is continued on the next page.

Solve your system of equations to determine the actual cost, in dollars, of each juice box and each bottle of water.

$$14 \times (18j + 32w = 19.92)$$
$$-18 \times (14j + 26w = 15.76)$$

$$252j + 448w = 278.88$$
$$-252j - 468w = -283.68$$

$$-20w = -4.8$$
$$w = .24$$

Score 5: The student did not find the cost of each juice box.

37 For a class picnic, two teachers went to the same store to purchase drinks. One teacher purchased 18 juice boxes and 32 bottles of water, and spent $19.92. The other teacher purchased 14 juice boxes and 26 bottles of water, and spent $15.76.

Write a system of equations to represent the costs of a juice box, *j*, and a bottle of water, *w*.

$$18x + 32y = 19.92$$
$$14x + 26y = 15.76$$

Kara said that the juice boxes might have cost 52 cents each and that the bottles of water might have cost 33 cents each. Use your system of equations to justify that Kara's prices are *not* possible.

$$14(.52) + 26(.33) = 15.86 \neq 15.76$$

Question 37 is continued on the next page.

Solve your system of equations to determine the actual cost, in dollars, of each juice box and each bottle of water.

$$7 \left(18x + 32y = 19.92 \right)$$
$$-9 \left(14x + 26y = 15.76 \right)$$

$$126x + 224y = 139.44$$
$$-126x - 234y = -141.84$$

$$-10x = -2.40$$
$$x = .24$$

Score 4: The student wrote an appropriate system of equations, but not in terms of j and w. The student only found the cost of one item.

37 For a class picnic, two teachers went to the same store to purchase drinks. One teacher purchased 18 juice boxes and 32 bottles of water, and spent $19.92. The other teacher purchased 14 juice boxes and 26 bottles of water, and spent $15.76.

Write a system of equations to represent the costs of a juice box, j, and a bottle of water, w.

$$18j + 32w = 19.92$$
$$14j + 26w = 15.76$$

Kara said that the juice boxes might have cost 52 cents each and that the bottles of water might have cost 33 cents each. Use your system of equations to justify that Kara's prices are *not* possible.

$$18(52) + 32w = 19.92$$
$$9.36 + 32w = 19.92$$
$$\frac{9.36}{} \qquad \frac{9.36}{}$$
$$\frac{32w}{32} = \frac{10.56}{32} \qquad \boxed{w = .33}$$

$$14j + 26(.33) = 15.76$$
$$14j + 8.58 = 15.76$$
$$8.58 \qquad 8.58$$
$$\frac{14j}{14} = \frac{7.18}{14} \qquad \boxed{j = .51}$$

Solve your system of equations to determine the actual cost, in dollars, of each juice box and each bottle of water.

$18(.65)+32w=19.92$

$11.7+32w=19.92$

$11.7 \qquad 11.7$

$\dfrac{32w}{32}=\dfrac{8.22}{32}$

$18J+32w=19.92$

$14J+26w=15.76$

Score 3: The student wrote a correct system of equations and a correct justification.

37 For a class picnic, two teachers went to the same store to purchase drinks. One teacher purchased 18 juice boxes and 32 bottles of water, and spent $19.92. The other teacher purchased 14 juice boxes and 26 bottles of water, and spent $15.76.

Write a system of equations to represent the costs of a juice box, j, and a bottle of water, w.

$$18j + 32w = 19.92$$
$$14j + 26w = 15.76$$

Kara said that the juice boxes might have cost 52 cents each and that the bottles of water might have cost 33 cents each. Use your system of equations to justify that Kara's prices are *not* possible.

Question 37 is continued on the next page.

Solve your system of equations to determine the actual cost, in dollars, of each juice box and each bottle of water.

$$18j + 32w = 19.92$$
$$14j + 26w = 15.76$$

$$32j + 58w = 35.68 \quad -32j$$
$$-32j$$

$$\frac{58w}{58} = \frac{35.68 - 32j}{58}$$

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

37 For a class picnic, two teachers went to the same store to purchase drinks. One teacher purchased 18 juice boxes and 32 bottles of water, and spent $19.92. The other teacher purchased 14 juice boxes and 26 bottles of water, and spent $15.76.

Write a system of equations to represent the costs of a juice box, j, and a bottle of water, w.

$$x = \$ \text{ for juice boxes}$$
$$y = \$ \text{ for water}$$
$$18x + 32y = 19.92$$
$$14x + 26y = 15.76$$

Kara said that the juice boxes might have cost 52 cents each and that the bottles of water might have cost 33 cents each. Use your system of equations to justify that Kara's prices are *not* possible.

$$18(.52) + 32(.33) = 19.92$$
$$9.36 + 10.56 = 19.92$$
$$19.92 = 19.92$$

Solve your system of equations to determine the actual cost, in dollars, of each juice box and each bottle of water.

Score 2:   The student wrote an appropriate system of equations with redefined variables.

37 For a class picnic, two teachers went to the same store to purchase drinks. One teacher purchased 18 juice boxes and 32 bottles of water, and spent $19.92. The other teacher purchased 14 juice boxes and 26 bottles of water, and spent $15.76.

Write a system of equations to represent the costs of a juice box, j, and a bottle of water, w.

$$18_j + 32 > 14j + 26$$

Kara said that the juice boxes might have cost 52 cents each and that the bottles of water might have cost 33 cents each. Use your system of equations to justify that Kara's prices are *not* possible.

Because
14 x 52 = 728
and 26 x 33 = 858
and add togeth
9t 15.96 less
more then she
spent

$$\begin{array}{r} 26 \\ 33 \\ \hline 858 \end{array}$$

$$\begin{array}{r} 18 \\ \times 52 \\ \hline 9.36 \end{array}$$

$$\begin{array}{r} 32 \\ \times 33 \\ \hline 1056 \end{array}$$

$$\begin{array}{r} 1056 \\ 9.36 \\ \hline 19.92 \end{array}$$

Question 37 is continued on the next page.

Solve your system of equations to determine the actual cost, in dollars, of each juice box and each bottle of water.

$$9:00$$

juice = 44

water = 68

Score 1: The student wrote a correct justification.

37 For a class picnic, two teachers went to the same store to purchase drinks. One teacher purchased 18 juice boxes and 32 bottles of water, and spent $19.92. The other teacher purchased 14 juice boxes and 26 bottles of water, and spent $15.76.

Write a system of equations to represent the costs of a juice box, j, and a bottle of water, w.

$$Y = 18_) + 32 w$$

Kara said that the juice boxes might have cost 52 cents each and that the bottles of water might have cost 33 cents each. Use your system of equations to justify that Kara's prices are *not* possible.

19 Joiceboxes 32 wo spint

3

Solve your system of equations to determine the actual cost, in dollars, of each juice box and each bottle of water.

Score 0: The student wrote a completely incorrect response.

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

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

(Use for the August 2016 exam only.)

Raw Score	Scale Score	Performance Level	Raw Score	Scale Score	Performance Level	Raw Score	Scale Score	Performance Level
86	100	5	57	81	4	28	66	3
85	99	5	56	81	4	27	65	3
84	97	5	55	80	4	26	64	2
83	96	5	54	80	4	25	62	2
82	95	5	53	80	4	24	61	2
81	94	5	52	80	4	23	60	2
80	93	5	51	79	3	22	58	2
79	92	5	50	79	3	21	57	2
78	91	5	49	79	3	20	55	2
77	90	5	48	78	3	19	53	1
76	90	5	47	78	3	18	52	1
75	89	5	46	78	3	17	50	1
74	88	5	45	77	3	16	48	1
73	88	5	44	77	3	15	46	1
72	87	5	43	77	3	14	44	1
71	86	5	42	76	3	13	42	1
70	86	5	41	76	3	12	39	1
69	86	5	40	75	3	11	37	1
68	85	5	39	75	3	10	34	1
67	84	4	38	74	3	9	32	1
66	84	4	37	73	3	8	29	1
65	83	4	36	73	3	7	26	1
64	83	4	35	72	3	6	23	1
63	83	4	34	71	3	5	19	1
62	82	4	33	70	3	4	16	1
61	82	4	32	70	3	3	12	1
60	82	4	31	69	3	2	8	1
59	82	4	30	68	3	1	4	1
58	81	4	29	67	3	0	0	1

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

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

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