

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

ALGEBRA I (Common Core)

Wednesday, August 12, 2015 — 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 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 Given the graph of the line represented by the equation $f(x) = -2x + b$, if b is increased by 4 units, the graph of the new line would be shifted 4 units

- (1) right (3) left
(2) up (4) down

2 Rowan has \$50 in a savings jar and is putting in \$5 every week. Jonah has \$10 in his own jar and is putting in \$15 every week. Each of them plots his progress on a graph with time on the horizontal axis and amount in the jar on the vertical axis. Which statement about their graphs is true?

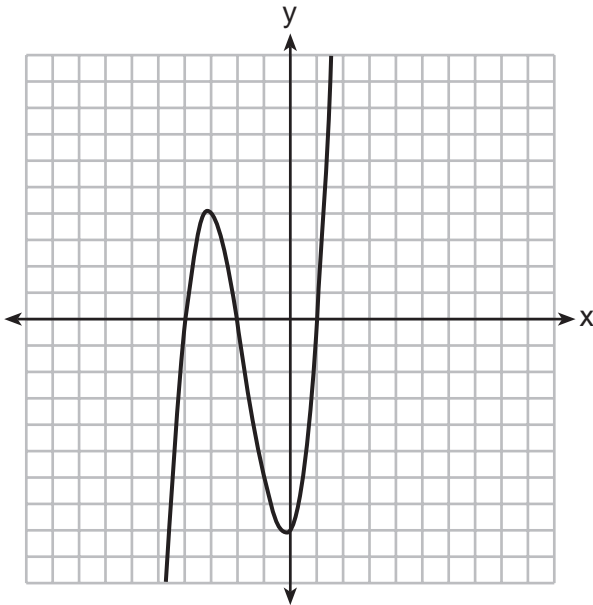
- (1) Rowan's graph has a steeper slope than Jonah's.
(2) Rowan's graph always lies above Jonah's.
(3) Jonah's graph has a steeper slope than Rowan's.
(4) Jonah's graph always lies above Rowan's.

3 To watch a varsity basketball game, spectators must buy a ticket at the door. The cost of an adult ticket is \$3.00 and the cost of a student ticket is \$1.50. If the number of adult tickets sold is represented by a and student tickets sold by s , which expression represents the amount of money collected at the door from the ticket sales?

- (1) $4.50as$ (3) $(3.00a)(1.50s)$
(2) $4.50(a + s)$ (4) $3.00a + 1.50s$

Use this space for
computations.

4 The graph of $f(x)$ is shown below.



Which function could represent the graph of $f(x)$?

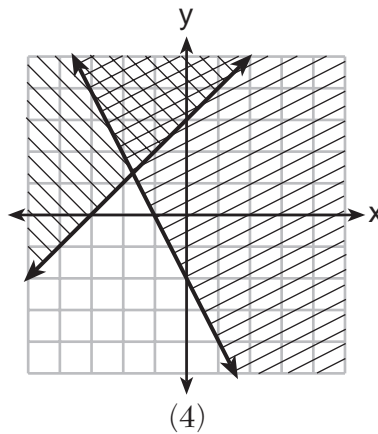
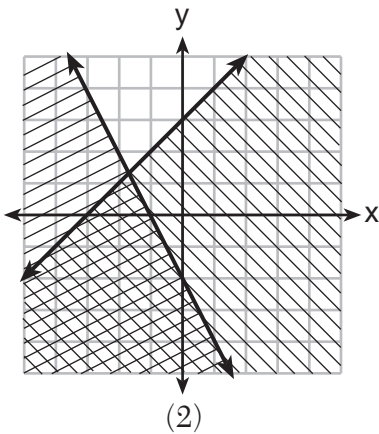
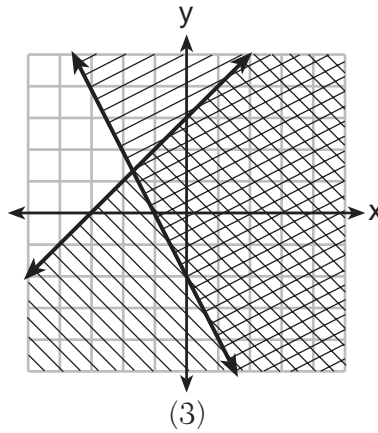
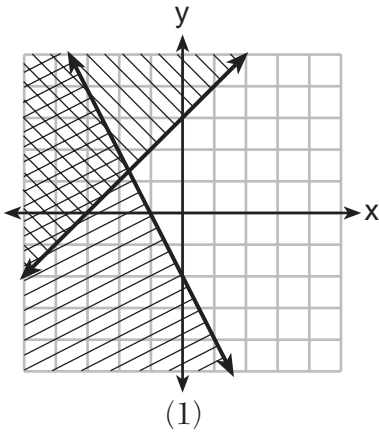
- (1) $f(x) = (x + 2)(x^2 + 3x - 4)$
- (2) $f(x) = (x - 2)(x^2 + 3x - 4)$
- (3) $f(x) = (x + 2)(x^2 + 3x + 4)$
- (4) $f(x) = (x - 2)(x^2 + 3x + 4)$

5 The cost of a pack of chewing gum in a vending machine is \$0.75. The cost of a bottle of juice in the same machine is \$1.25. Julia has \$22.00 to spend on chewing gum and bottles of juice for her team and she must buy seven packs of chewing gum. If b represents the number of bottles of juice, which inequality represents the maximum number of bottles she can buy?

- (1) $0.75b + 1.25(7) \geq 22$
- (2) $0.75b + 1.25(7) \leq 22$
- (3) $0.75(7) + 1.25b \geq 22$
- (4) $0.75(7) + 1.25b \leq 22$

Use this space for computations.

6 Which graph represents the solution of $y \leq x + 3$ and $y \geq -2x - 2$?



7 The country of Benin in West Africa has a population of 9.05 million people. The population is growing at a rate of 3.1% each year. Which function can be used to find the population 7 years from now?

(1) $f(t) = (9.05 \times 10^6)(1 - 0.31)^7$

(2) $f(t) = (9.05 \times 10^6)(1 + 0.31)^7$

(3) $f(t) = (9.05 \times 10^6)(1 + 0.031)^7$

(4) $f(t) = (9.05 \times 10^6)(1 - 0.031)^7$

**Use this space for
computations.**

- 8** A typical cell phone plan has a fixed base fee that includes a certain amount of data and an overage charge for data use beyond the plan. A cell phone plan charges a base fee of \$62 and an overage charge of \$30 per gigabyte of data that exceed 2 gigabytes. If C represents the cost and g represents the total number of gigabytes of data, which equation could represent this plan when more than 2 gigabytes are used?

- (1) $C = 30 + 62(2 - g)$ (3) $C = 62 + 30(2 - g)$
(2) $C = 30 + 62(g - 2)$ (4) $C = 62 + 30(g - 2)$

- 9** Four expressions are shown below.

- I $2(2x^2 - 2x - 60)$
II $4(x^2 - x - 30)$
III $4(x + 6)(x - 5)$
IV $4x(x - 1) - 120$

The expression $4x^2 - 4x - 120$ is equivalent to

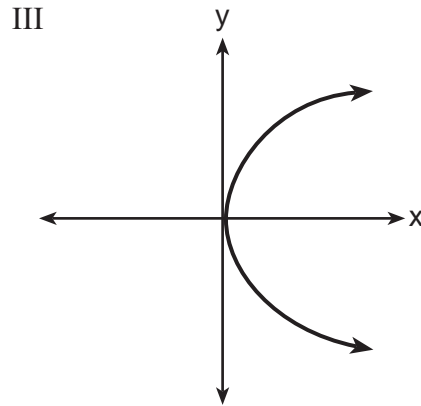
- (1) I and II, only (3) I, II, and IV
(2) II and IV, only (4) II, III, and IV
- 10** Last week, a candle store received \$355.60 for selling 20 candles. Small candles sell for \$10.98 and large candles sell for \$27.98. How many large candles did the store sell?
- (1) 6 (3) 10
(2) 8 (4) 12

Use this space for
computations.

11 Which representations are functions?

I

x	y
2	6
3	-12
4	7
5	5
2	-6



II $\{(1,1), (2,1), (3,2), (4,3), (5,5), (6,8), (7,13)\}$

IV $y = 2x + 1$

(1) I and II

(3) III, only

(2) II and IV

(4) IV, only

12 If $f(x) = \frac{\sqrt{2x+3}}{6x-5}$, then $f\left(\frac{1}{2}\right) =$

(1) 1

(3) -1

(2) -2

(4) $-\frac{13}{3}$

13 The zeros of the function $f(x) = 3x^2 - 3x - 6$ are

(1) -1 and -2

(3) 1 and 2

(2) 1 and -2

(4) -1 and 2

Use this space for computations.

14 Which recursively defined function has a first term equal to 10 and a common difference of 4?

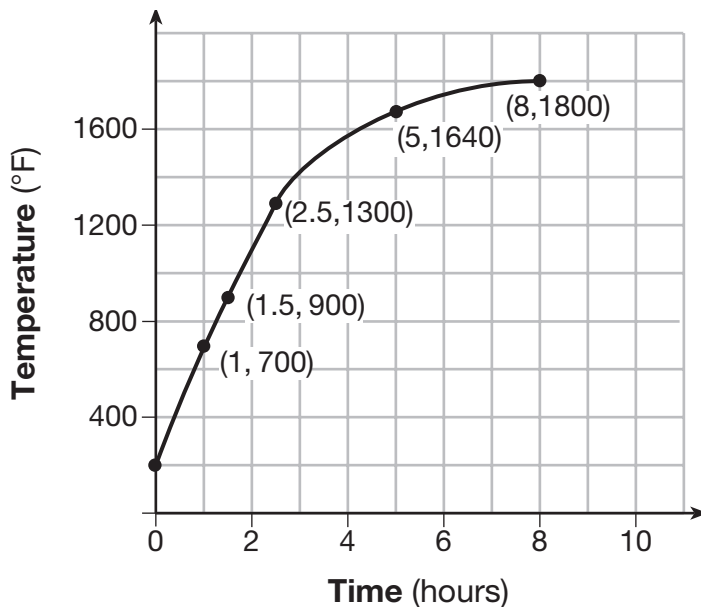
(1) $f(1) = 10$
 $f(x) = f(x - 1) + 4$

(3) $f(1) = 10$
 $f(x) = 4f(x - 1)$

(2) $f(1) = 4$
 $f(x) = f(x - 1) + 10$

(4) $f(1) = 4$
 $f(x) = 10f(x - 1)$

15 Firing a piece of pottery in a kiln takes place at different temperatures for different amounts of time. The graph below shows the temperatures in a kiln while firing a piece of pottery after the kiln is preheated to 200°F.

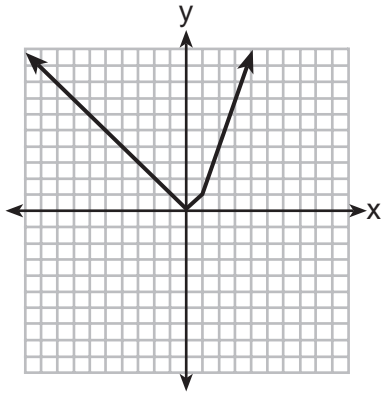


During which time interval did the temperature in the kiln show the greatest average rate of change?

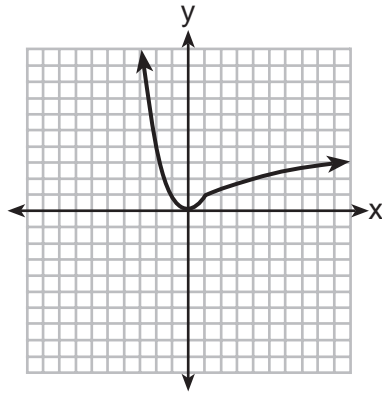
- (1) 0 to 1 hour (3) 2.5 hours to 5 hours
(2) 1 hour to 1.5 hours (4) 5 hours to 8 hours

Use this space for computations.

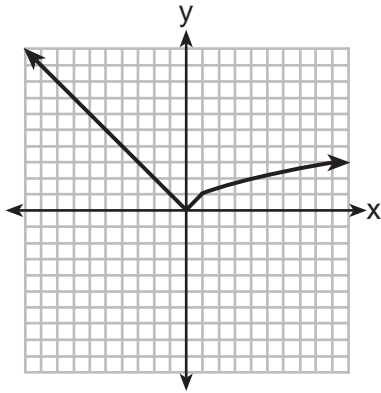
16 Which graph represents $f(x) = \begin{cases} |x| & x < 1 \\ \sqrt{x} & x \geq 1 \end{cases}$?



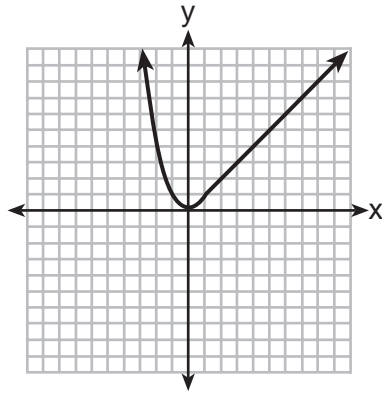
(1)



(3)



(2)



(4)

17 If $f(x) = x^2 - 2x - 8$ and $g(x) = \frac{1}{4}x - 1$, for which values of x is $f(x) = g(x)$?

- (1) -1.75 and -1.438 (3) -1.438 and 0
 (2) -1.75 and 4 (4) 4 and 0

**Use this space for
computations.**

21 Given the following quadratic functions:

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

and

x	-3	-2	-1	0	1	2	3	4	5
n(x)	-7	0	5	8	9	8	5	0	-7

Which statement about these functions is true?

- (1) Over the interval $-1 \leq x \leq 1$, the average rate of change for $n(x)$ is less than that for $g(x)$.
- (2) The y -intercept of $g(x)$ is greater than the y -intercept for $n(x)$.
- (3) The function $g(x)$ has a greater maximum value than $n(x)$.
- (4) The sum of the roots of $n(x) = 0$ is greater than the sum of the roots of $g(x) = 0$.

22 For which value of P and W is $P + W$ a rational number?

- (1) $P = \frac{1}{\sqrt{3}}$ and $W = \frac{1}{\sqrt{6}}$
- (2) $P = \frac{1}{\sqrt{4}}$ and $W = \frac{1}{\sqrt{9}}$
- (3) $P = \frac{1}{\sqrt{6}}$ and $W = \frac{1}{\sqrt{10}}$
- (4) $P = \frac{1}{\sqrt{25}}$ and $W = \frac{1}{\sqrt{2}}$

**Use this space for
computations.**

23 The solution of the equation $(x + 3)^2 = 7$ is

(1) $3 \pm \sqrt{7}$

(3) $-3 \pm \sqrt{7}$

(2) $7 \pm \sqrt{3}$

(4) $-7 \pm \sqrt{3}$

24 Which trinomial is equivalent to $3(x - 2)^2 - 2(x - 1)$?

(1) $3x^2 - 2x - 10$

(3) $3x^2 - 14x + 10$

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

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

Part II

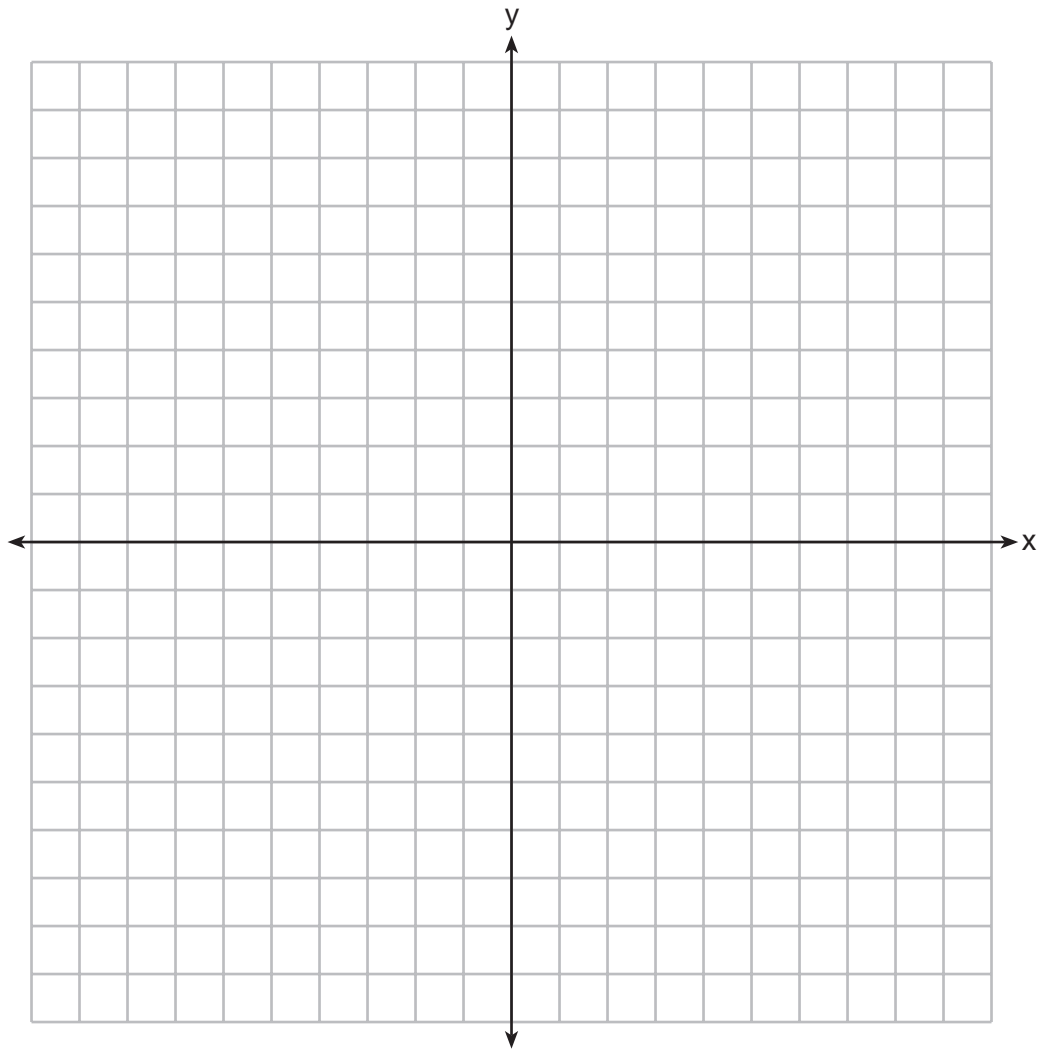
Answer all 8 questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily 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 Each day Toni records the height of a plant for her science lab. Her data are shown in the table below.

Day (n)	1	2	3	4	5
Height (cm)	3.0	4.5	6.0	7.5	9.0

The plant continues to grow at a constant daily rate. Write an equation to represent $h(n)$, the height of the plant on the n th day.

26 On the set of axes below, graph the inequality $2x + y > 1$.



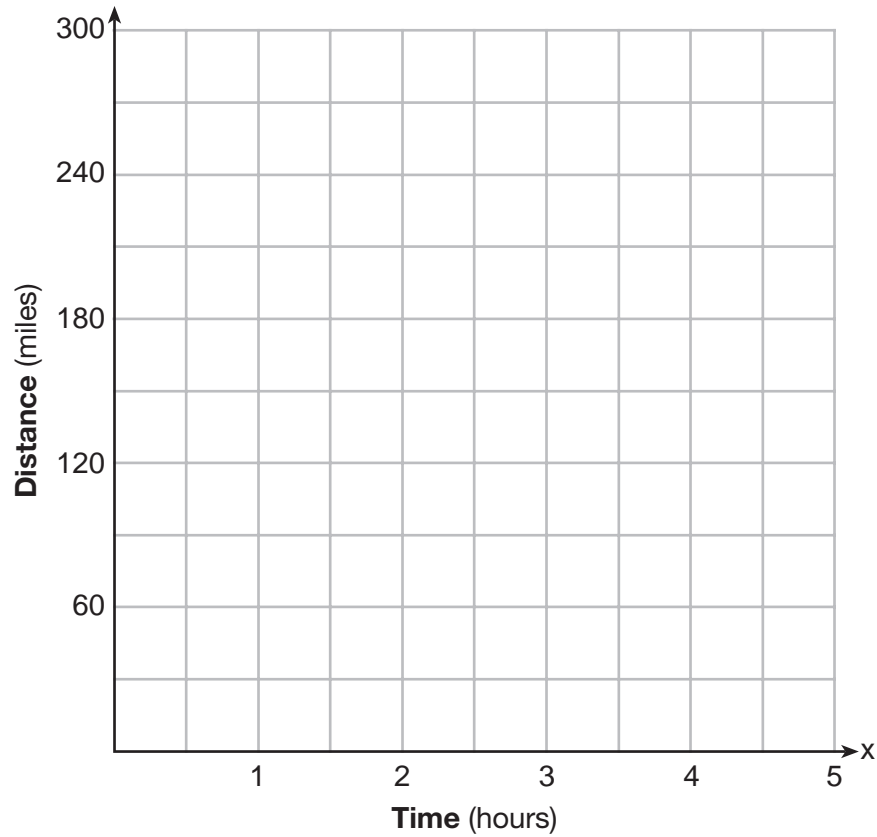
27 Rachel and Marc were given the information shown below about the bacteria growing in a Petri dish in their biology class.

Number of Hours, x	1	2	3	4	5	6	7	8	9	10
Number of Bacteria, $B(x)$	220	280	350	440	550	690	860	1070	1340	1680

Rachel wants to model this information with a linear function. Marc wants to use an exponential function. Which model is the better choice? Explain why you chose this model.

28 A driver leaves home for a business trip and drives at a constant speed of 60 miles per hour for 2 hours. Her car gets a flat tire, and she spends 30 minutes changing the tire. She resumes driving and drives at 30 miles per hour for the remaining one hour until she reaches her destination.

On the set of axes below, draw a graph that models the driver's distance from home.



29 How many real solutions does the equation $x^2 - 2x + 5 = 0$ have? Justify your answer.

30 The number of carbon atoms in a fossil is given by the function $y = 5100(0.95)^x$, where x represents the number of years since being discovered.

What is the percent of change each year? Explain how you arrived at your answer.

31 A toy rocket is launched from the ground straight upward. The height of the rocket above the ground, in feet, is given by the equation $h(t) = -16t^2 + 64t$, where t is the time in seconds. Determine the domain for this function in the given context. Explain your reasoning.

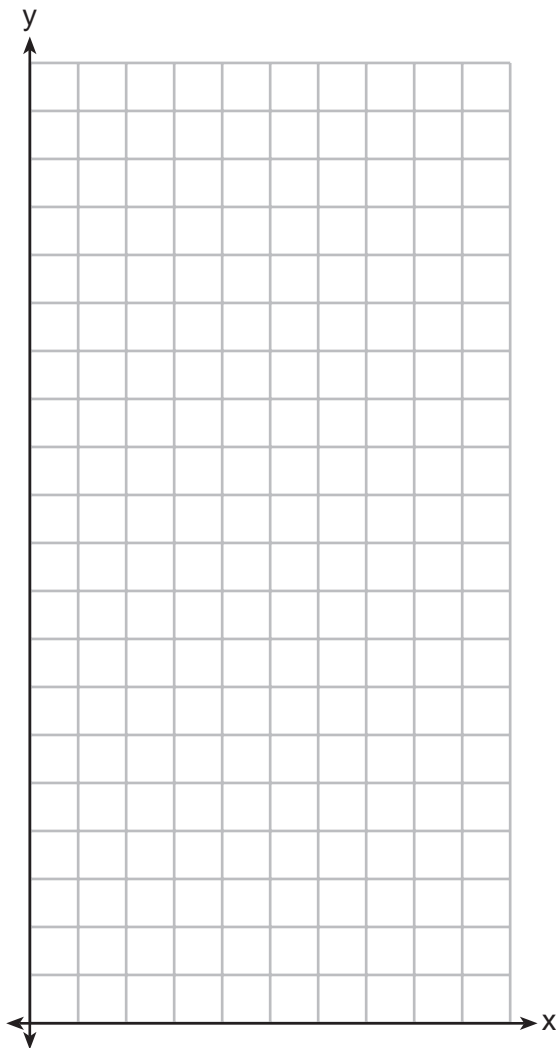
32 Jackson is starting an exercise program. The first day he will spend 30 minutes on a treadmill. He will increase his time on the treadmill by 2 minutes each day. Write an equation for $T(d)$, the time, in minutes, on the treadmill on day d .

Find $T(6)$, the minutes he will spend on the treadmill on day 6.

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 Graph $f(x) = x^2$ and $g(x) = 2^x$ for $x \geq 0$ on the set of axes below.



State which function, $f(x)$ or $g(x)$, has a greater value when $x = 20$. Justify your reasoning.

34 Solve for x algebraically: $7x - 3(4x - 8) \leq 6x + 12 - 9x$

If x is a number in the interval $[4,8]$, state all integers that satisfy the given inequality. Explain how you determined these values.

35 The volume of a large can of tuna fish can be calculated using the formula $V = \pi r^2 h$.
Write an equation to find the radius, r , in terms of V and h .

Determine the diameter, to the *nearest inch*, of a large can of tuna fish that has a volume of 66 cubic inches and a height of 3.3 inches.

36 The table below shows the attendance at a museum in select years from 2007 to 2013.

Attendance at Museum

Year	2007	2008	2009	2011	2013
Attendance (millions)	8.3	8.5	8.5	8.8	9.3

State the linear regression equation represented by the data table when $x = 0$ is used to represent the year 2007 and y is used to represent the attendance. Round all values to the *nearest hundredth*.

State the correlation coefficient to the *nearest hundredth* and determine whether the data suggest a strong or weak association.

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 written in pencil. [6]

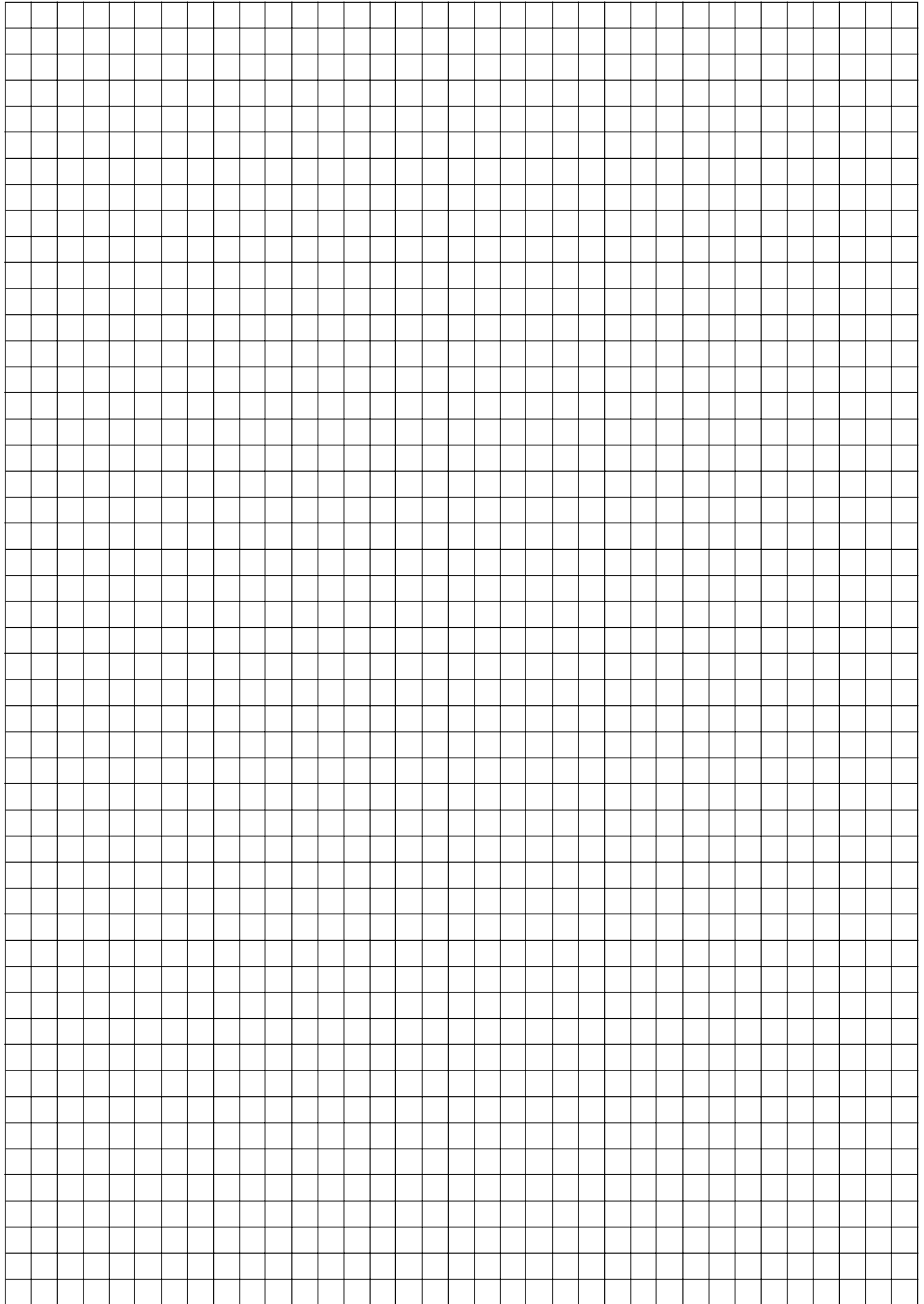
37 A rectangular picture measures 6 inches by 8 inches. Simon wants to build a wooden frame for the picture so that the framed picture takes up a maximum area of 100 square inches on his wall. The pieces of wood that he uses to build the frame all have the same width.

Write an equation or inequality that could be used to determine the maximum width of the pieces of wood for the frame Simon could create.

Explain how your equation or inequality models the situation.

Solve the equation or inequality to determine the maximum width of the pieces of wood used for the frame to the *nearest tenth of an inch*.

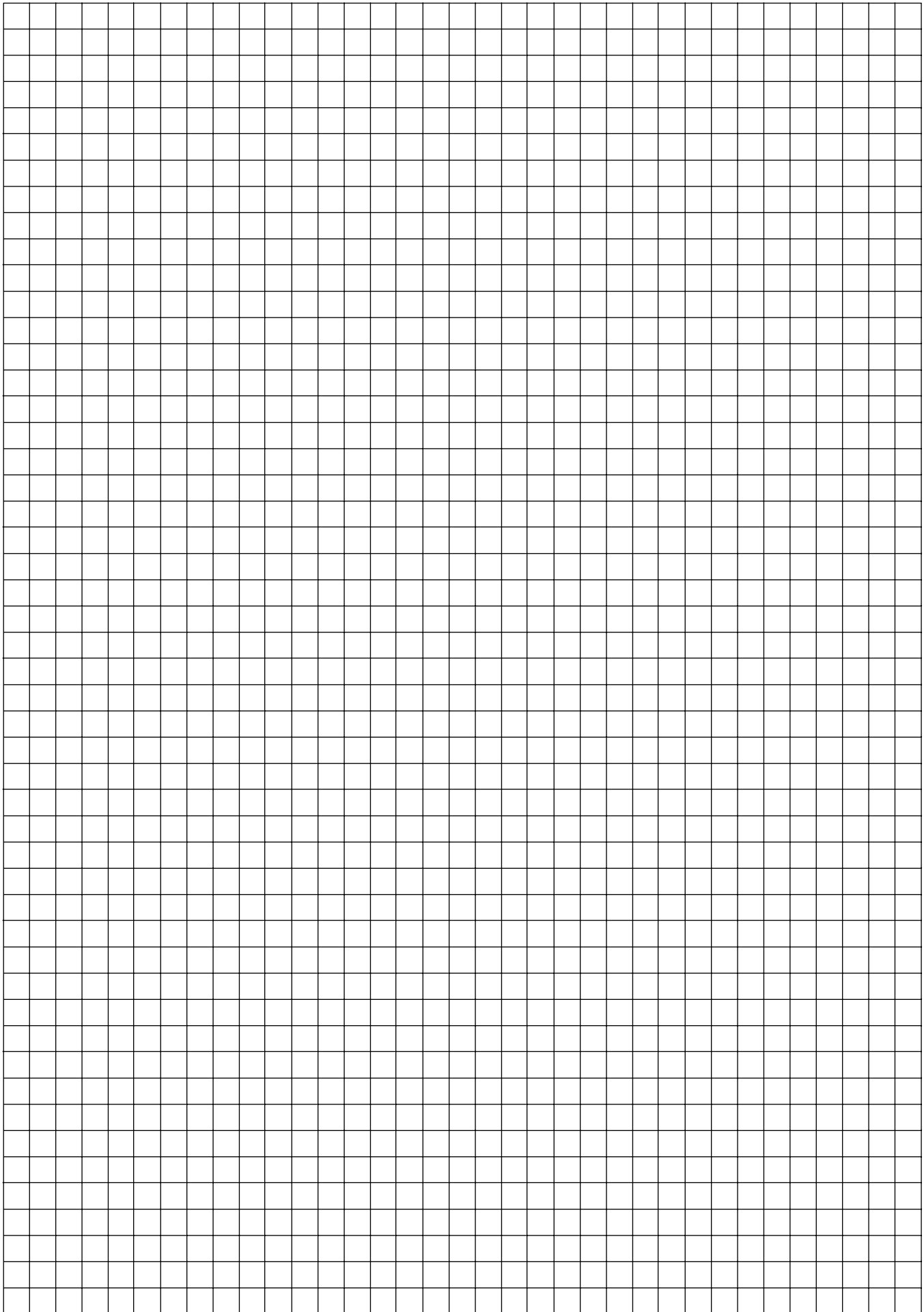
Scrap Graph Paper — This sheet will *not* be scored.



Tear Here

Tear Here

Scrap Graph Paper — This sheet will *not* be scored.



Tear Here

Tear Here

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

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

Tear Here

Tear Here

FOR TEACHERS ONLY

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

ALGEBRA I (Common Core)

Wednesday, August 12, 2015 — 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 12, 2015. Because scale scores corresponding to raw scores in the conversion chart may change from one administration to another, it is crucial that, for each administration, the conversion chart provided for that administration be used to determine the student's final score. The student's scale score should be entered in the box provided on the student's separate answer sheet. The scale score is the student's final examination score.

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

Part I

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

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

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] $h(n) = 1.5(n - 1) + 3$ or an equivalent equation 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] An appropriate equation is written, but not in terms of $h(n)$ and n .

or

[1] $1.5(n - 1) + 3$ or an equivalent expression 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.

(26) [2] The inequality is graphed correctly.

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

or

[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.

(27) [2] Marc or exponential, and a correct explanation is written.

[1] One conceptual error is made, such as stating “exponential because it has a better correlation coefficient.” [You cannot compare correlation coefficients of different types of equations.]

or

[1] Marc or exponential, but the explanation is incomplete.

[0] Marc or exponential, but no explanation is written.

or

[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] A correct graph is drawn.
- [1] Appropriate work is shown, but one graphing error is made.
- or***
- [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.
- (29) [2] None, and a correct justification is given.
- [1] Appropriate work is shown, but one computational error is made.
- or***
- [1] Appropriate work is shown, but one conceptual error is made.
- or***
- [1] Appropriate work is shown, but none is not stated.
- or***
- [1] None, but an incomplete justification is given.
- [0] None, but no justification is given.
- or***
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- (30) [2] 5, 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] 5, but the explanation is incomplete, incorrect, or missing.
- [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] $0 \leq t \leq 4$ or equivalent, 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] $0 \leq t \leq 4$, but the explanation is incomplete, incorrect, or missing.

[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] $T(d) = 30 + 2(d - 1)$ or an equivalent equation and 40 are written.

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

or

[1] $y = 30 + 2(d - 1)$ and 40 are written.

or

[1] An incorrect equation is written, but an appropriate value is stated.

or

[1] The expression $30 + 2(d - 1)$ and 40 are written.

or

[1] 40, but no equation 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 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] Both graphs are drawn correctly, $g(x)$ is stated, and a correct justification is given.

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

or

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

[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] Both graphs are drawn correctly, but no further correct work is shown.

or

[2] $g(x)$ is stated and a correct justification is given, but no graphs are drawn.

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

or

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

[0] $g(x)$, but no work is shown.

or

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

- (34) [4] $x \geq 6$, and correct algebraic work is shown. 6, 7, and 8, 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 incomplete, incorrect, or missing.
- [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] Appropriate work is shown to find $x \geq 6$, but no further correct work is shown.
- or**
- [2] $x \geq 6$ and 6, 7, 8, but a method other than algebraic is used.
- [1] Appropriate work is shown, but one conceptual error and one computational error are made.
- or**
- [1] Appropriate work is shown to find $-5x + 24 \leq 12 - 3x$ or an equivalent inequality, but no further correct work is shown.
- or**
- [1] 6, 7, 8, but no work is shown.
- [0] $7x - 12x + 24 \leq 6x + 12 - 9x$, but no further correct work is shown.
- or**
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

(35) [4] $r = \sqrt{\frac{V}{\pi h}}$ and 5, and correct work is shown.

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

or

[3] Appropriate work is shown to find $r = \sqrt{\frac{V}{\pi h}}$ and the correct radius, but no further correct work is shown.

or

[3] The expression $\sqrt{\frac{V}{\pi h}}$ and 5, and correct work is shown.

or

[3] Appropriate work is shown to find $r = \pm \sqrt{\frac{V}{\pi h}}$ and 5.

[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] Appropriate work is shown to find $r = \sqrt{\frac{V}{\pi h}}$ or 5, but no further correct work is shown.

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

or

[1] Appropriate work is shown to find the length of the radius, but no further correct work is shown.

or

[1] $r = \sqrt{\frac{V}{\pi h}}$ and 5, 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] $y = 0.16x + 8.27$, 0.97, and a strong association are stated.
- [3] Appropriate work is shown, but one rounding error is made.
- or***
- [3] $y = 0.16x + 8.27$ and 0.97, but strong is not stated.
- or***
- [3] The expression $0.16x + 8.27$, 0.97, and a strong association are stated.
- [2] Appropriate work is shown, but one conceptual error is made.
- or***
- [2] $y = 0.16x + 8.27$ is stated, but no further correct work is shown.
- [1] Appropriate work is shown, but one conceptual error and one rounding error are made.
- or***
- [1] The expression $0.16x + 8.27$ is stated, but no further correct work is shown.
- or***
- [1] 0.97, but no further correct work is shown.
- [0] Strong association, but no further correct work is shown.
- or***
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
-

Part IV

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

(37) [6] A correct equation or inequality is written, a correct explanation is written, 1.5, and correct work is shown.

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

or

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

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

or

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

or

[3] A correct equation or inequality and explanation are written, but no further correct work is shown.

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

or

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

or

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

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

or

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

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

**Map to the Common Core Learning Standards
Algebra I (Common Core)
August 2015**

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

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

Regents Examination in Algebra I (Common Core)

August 2015

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

The *Chart for Determining the Final Examination Score for the August 2015 Regents Examination in Algebra I (Common Core)* will be posted on the Department's web site at: <http://www.p12.nysed.gov/assessment/> by Wednesday, August 12, 2015. Conversion charts provided for previous administrations of the Regents Examination in Algebra I (Common Core) must NOT be used to determine students' final scores for this administration.

Online Submission of Teacher Evaluations of the Test to the Department

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

1. Go to <http://www.forms2.nysed.gov/emsc/osa/exameval/reexameval.cfm>.
2. Select the test title.
3. Complete the required demographic fields.
4. Complete each evaluation question and provide comments in the space provided.
5. Click the SUBMIT button at the bottom of the page to submit the completed form.

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

ALGEBRA I (Common Core)

Wednesday, August 12, 2015 — 8:30 to 11:30 a.m.

MODEL RESPONSE SET

Table of Contents

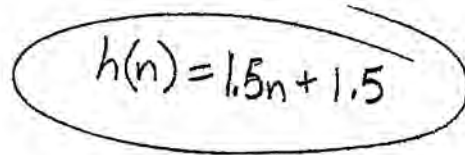
Question 25	2
Question 26	7
Question 27	12
Question 28	18
Question 29	23
Question 30	29
Question 31	33
Question 32	40
Question 33	45
Question 34	54
Question 35	61
Question 36	68
Question 37	73

Question 25

25 Each day Toni records the height of a plant for her science lab. Her data are shown in the table below.

Day (n)	1	2	3	4	5
Height (cm)	3.0	4.5	6.0	7.5	9.0

The plant continues to grow at a constant daily rate. Write an equation to represent $h(n)$, the height of the plant on the n th day.


$$h(n) = 1.5n + 1.5$$

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

Question 25

25 Each day Toni records the height of a plant for her science lab. Her data are shown in the table below.

Day (n)	1	2	3	4	5
Height (cm)	3.0	4.5	6.0	7.5	9.0

The plant continues to grow at a constant daily rate. Write an equation to represent $h(n)$, the height of the plant on the n th day.

$$h(n) = 3.0 \cdot 1.5n$$

The height of the plant grows by 1.5 cm per day, so $h(n) = 3.0 \cdot 1.5n$ would be the equation to represent the height of the plant on the n th day.

Score 1: The student made a conceptual error when writing the equation.

Question 25

25 Each day Toni records the height of a plant for her science lab. Her data are shown in the table below.

Day (n)	1	2	3	4	5
Height (cm)	3.0	4.5	6.0	7.5	9.0

Handwritten annotations above the table show arrows between columns with labels '+1'.
Handwritten annotations below the table show arrows between rows with labels '+1.5'.

The plant continues to grow at a constant daily rate. Write an equation to represent $h(n)$, the height of the plant on the n th day.

Handwritten work:

$$a_n = a_1 + (n-1)d$$

$$f(n) = 3 + (n-1)1.5$$

$$f(1) = 3 + (1-1)1.5$$

$$f(2) = 3 + (2-1)1.5$$

$$f(1) = 3 + \cancel{0 \cdot 1.5}$$

$$f(2) = 3 + 1.5$$

$$f(2) = 4.5$$

Handwritten equation in a box:

$$a_n = 3 + (n-1)1.5, n \geq 1$$

Score 1: The student did not write the equation in terms of $h(n)$.

Question 25

25 Each day Toni records the height of a plant for her science lab. Her data are shown in the table below.

Day (n)	1	2	3	4	5
Height (cm)	3.0	4.5	6.0	7.5	9.0

The plant continues to grow at a constant daily rate. Write an equation to represent $h(n)$, the height of the plant on the n th day.

$$h(n) = 1.5x + 1.5$$

\$

Not work
just testing

$$h(n) = 1.5(6) + 1.5$$

$$= 9 + 1.5$$

$$h(n) = 10$$

Score 1: The student did not write the equation in terms of n .

Question 25

25 Each day Toni records the height of a plant for her science lab. Her data are shown in the table below.

Day (n)	1	2	3	4	5	6
Height (cm)	3.0	4.5	6.0	7.5	9.0	

+1.5

The plant continues to grow at a constant daily rate. Write an equation to represent $h(n)$, the height of the plant on the n th day.

$$\begin{aligned} 6 &= 10.5 \quad +1.5 \\ 7 &= 12.0 \\ 8 &= 13.5 \quad +1.5 \\ 9 &= 15.0 \end{aligned}$$

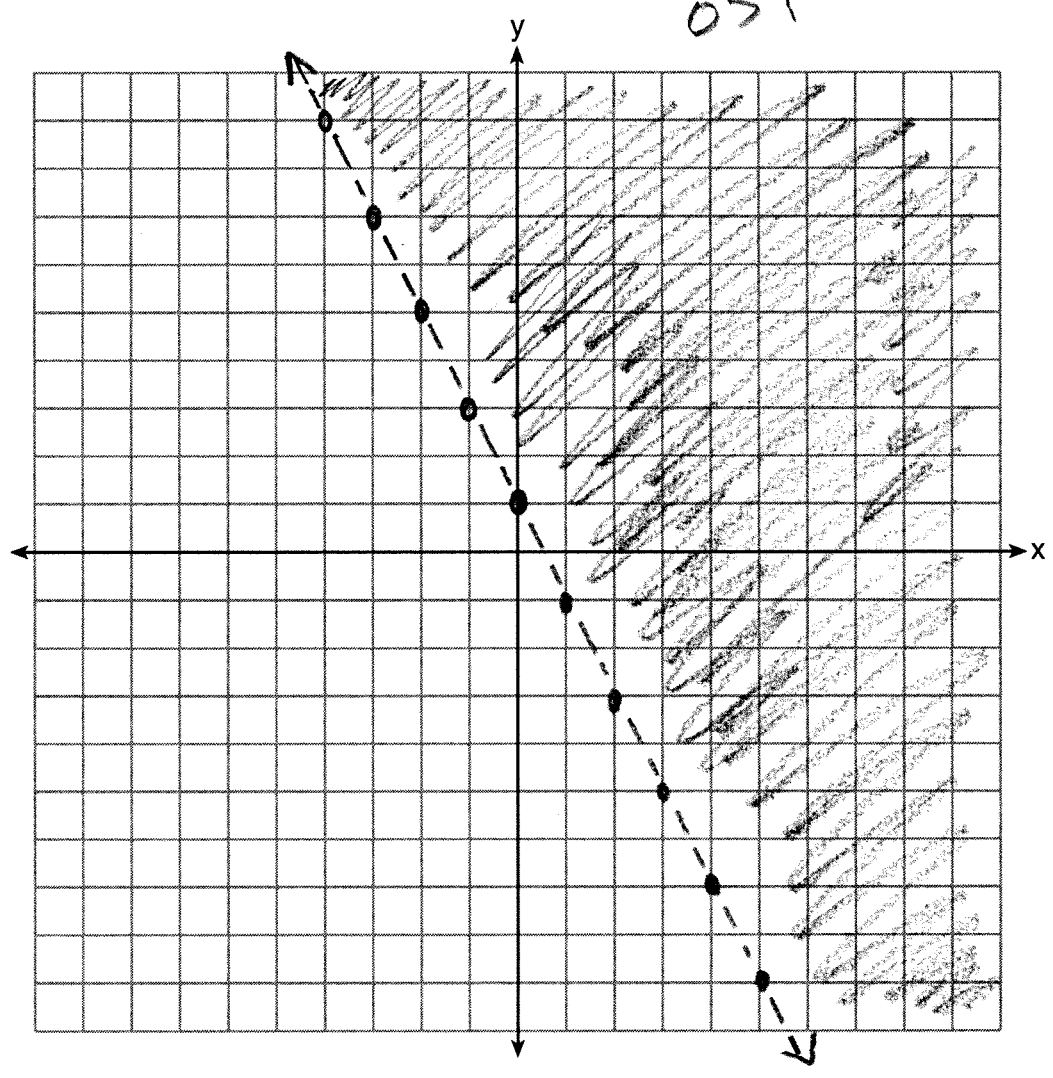
$$H(n) = -15.0n + 9$$

Score 0: The student gave a completely incorrect response.

Question 26

26 On the set of axes below, graph the inequality $2x + y > 1$.

$$\begin{array}{r} -2x \quad -2x \\ \hline y > 1 - 2x \\ 0 > 1 - 2 \cdot 0 \\ 0 > 1 \end{array}$$

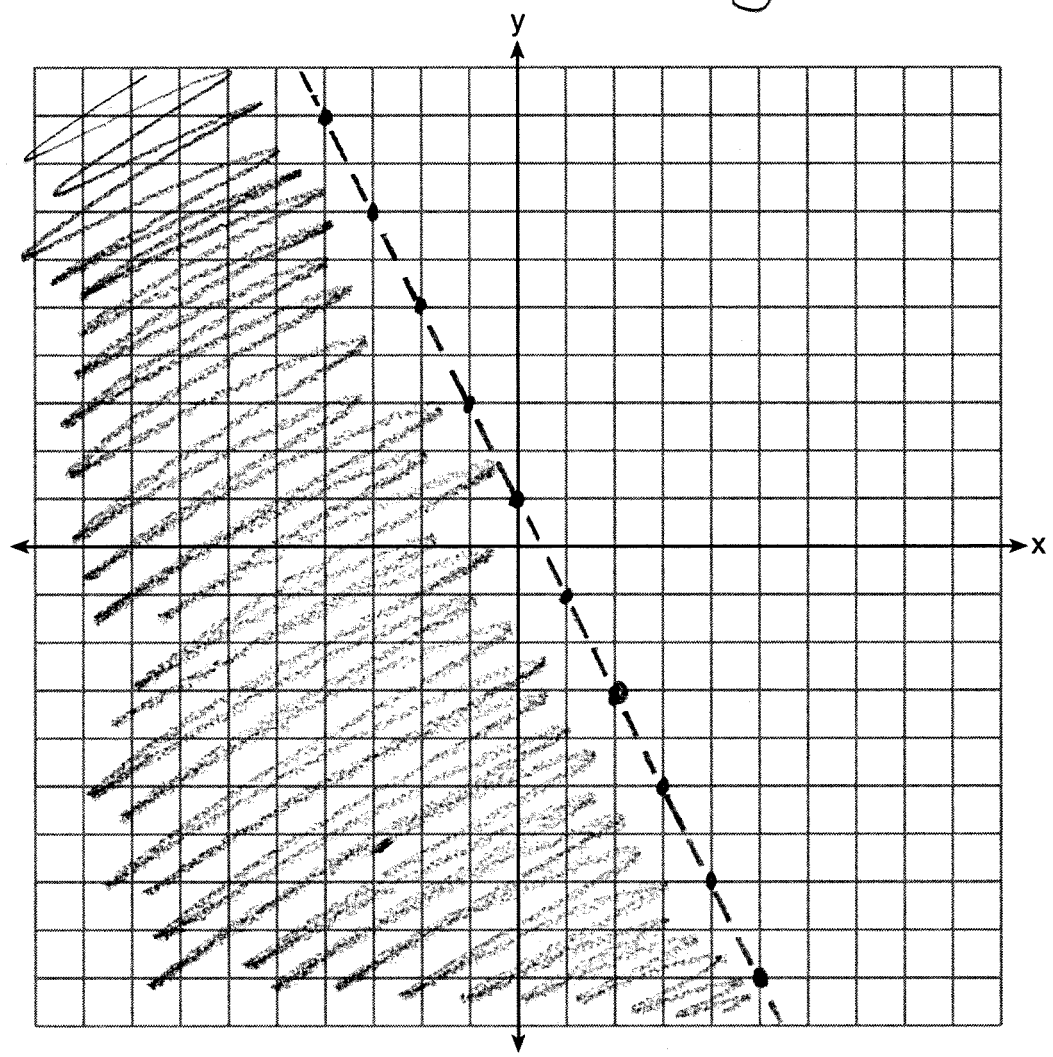


Score 2: The student has a complete and correct response.

Question 26

26 On the set of axes below, graph the inequality $2x + y > 1$.

$$\begin{aligned} 2x + y &> 1 \\ -2x & \quad -2x \\ y &> -2x + 1 \end{aligned}$$



Score 1: The student shaded in the wrong direction.

Question 26

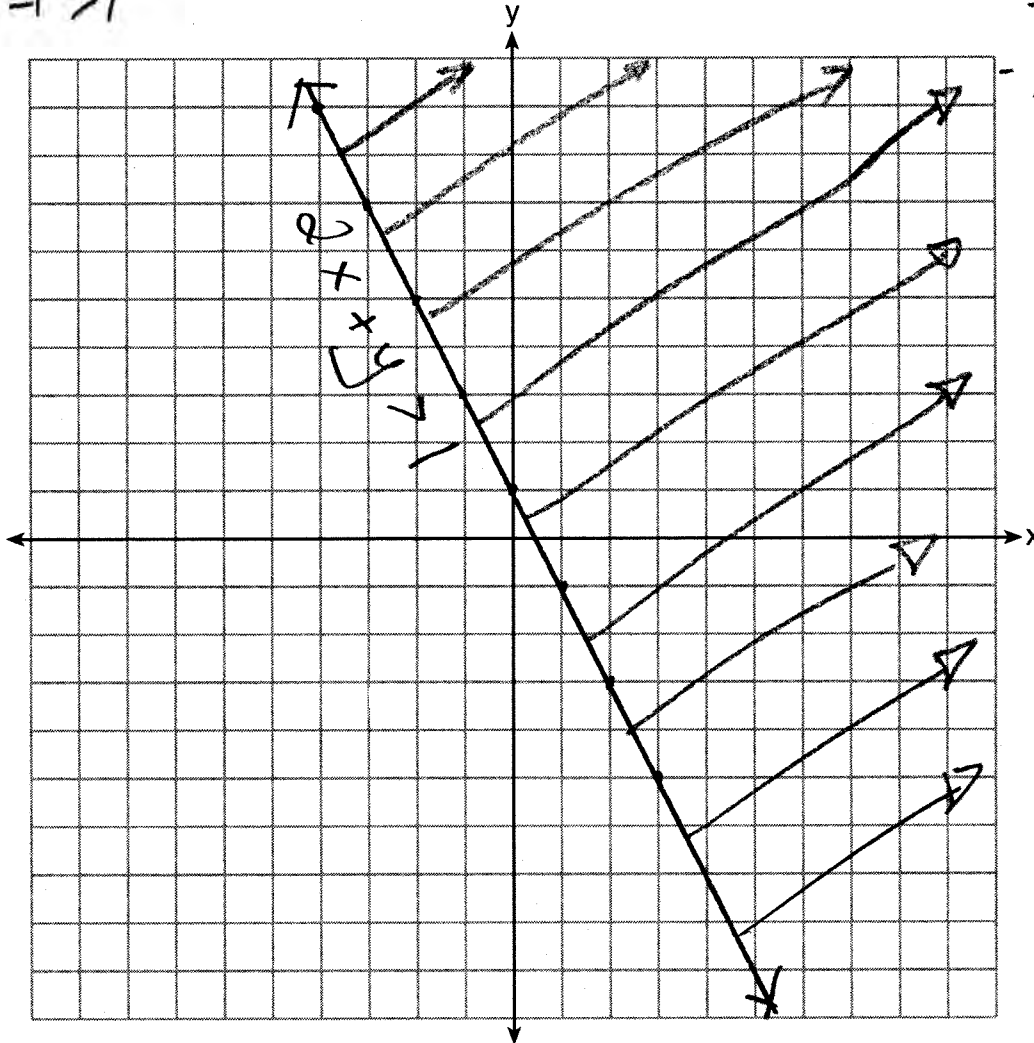
26 On the set of axes below, graph the inequality $2x + y > 1$.

On $(-1, -1)$
 $2x + y > 1$
 $2(-1) + (-1) > 1$
 $2 + -1 > 1$

$-2x \quad -2x$
 $y > -2x + 1$

$2x + y > 1$
 $-y \quad -y$
 $-1 \quad -1$
 $\frac{2x - 1 > -y}{-1 \quad -1}$
 $-2x + 1 > y$

$1 > 1$

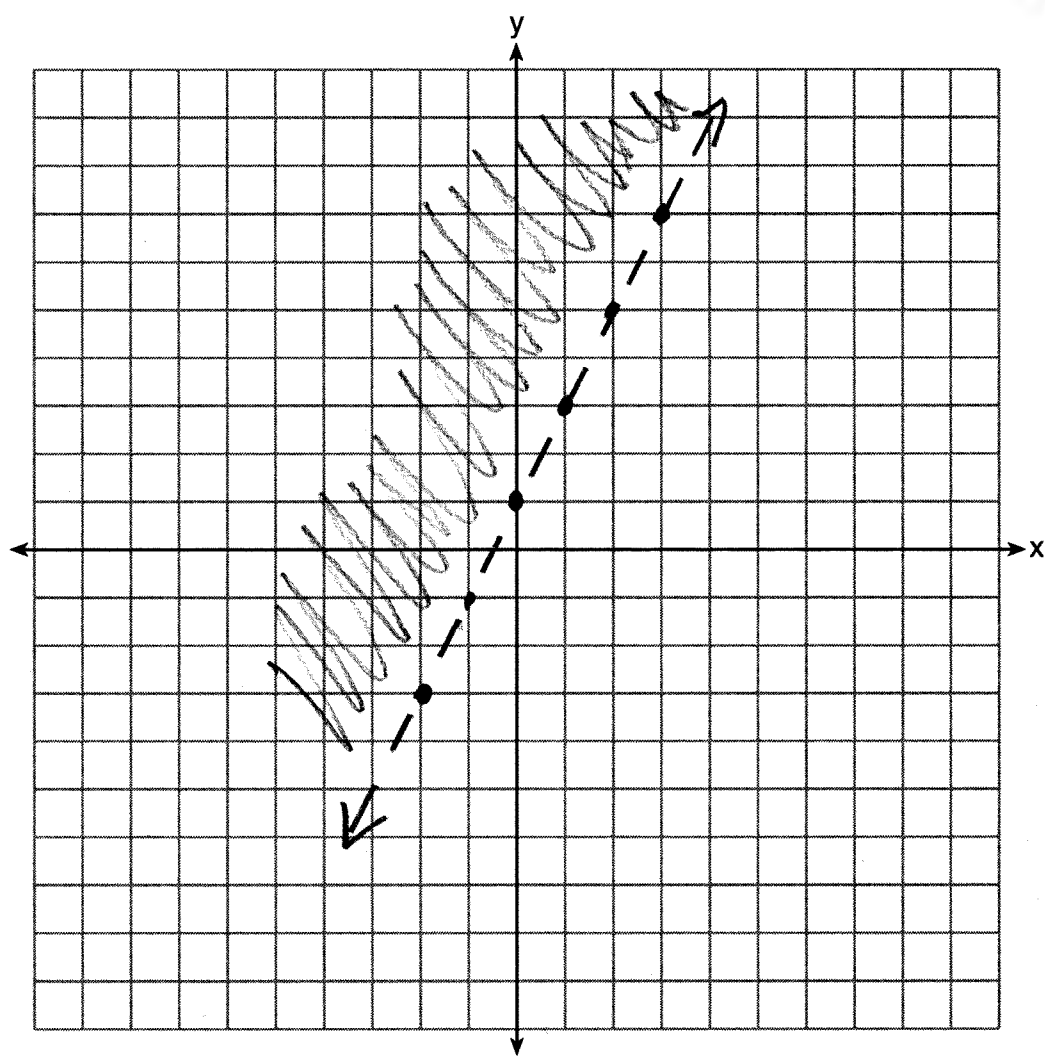


Score 1: The student did not draw a dotted line.

Question 26

26 On the set of axes below, graph the inequality $2x + y > 1$.

$$\begin{array}{llll} -2x & -2x & M=2 & 2(0)+0 > 1 \\ y > -2x+1 & & b=1 & 0+0 > 1 \\ & & & 0 > 1 \end{array}$$



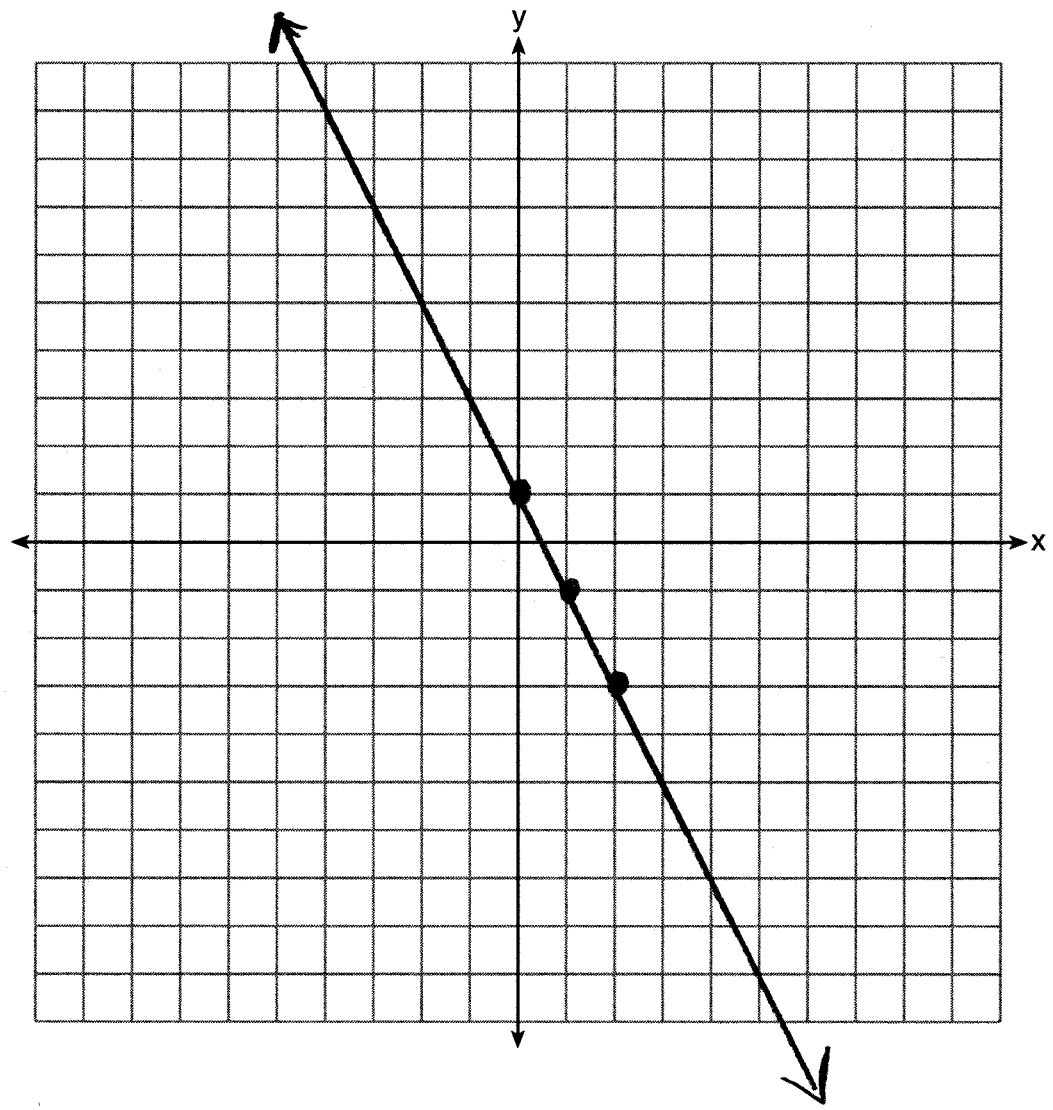
Score 1: The student graphed the slope incorrectly.

Question 26

26 On the set of axes below, graph the inequality $2x + y > 1$.

~~$2x + y > 1$~~
 ~~$-2x$~~
 ~~$-----$~~
 ~~$y > -2x + 1$~~

$2x + y > 1$
 $-2x \quad -2x$
 $-----$
 $y > -2x + 1$



Score 0: The student did not draw a dotted line and did not shade.

Question 27

27 Rachel and Marc were given the information shown below about the bacteria growing in a Petri dish in their biology class.

Number of Hours, x	1	2	3	4	5	6	7	8	9	10
Number of Bacteria, $B(x)$	220	280	350	440	550	690	860	1070	1340	1680

60 70 90 110 140 170 210 270 340

Rachel wants to model this information with a linear function. Marc wants to use an exponential function. Which model is the better choice? Explain why you chose this model.

I think exponential because the graph didn't grow at a constant rate

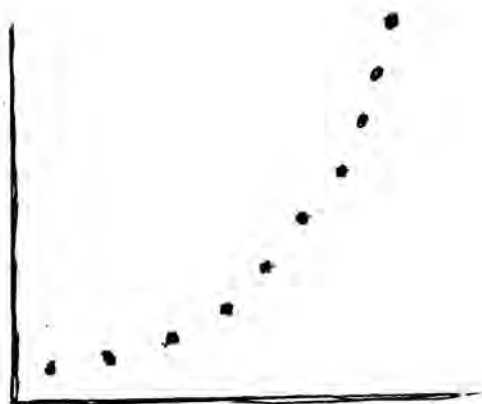
Score 2: The student has a complete and correct response.

Question 27

27 Rachel and Marc were given the information shown below about the bacteria growing in a Petri dish in their biology class.

Number of Hours, x	1	2	3	4	5	6	7	8	9	10
Number of Bacteria, $B(x)$	220	280	350	440	550	690	860	1070	1340	1680

Rachel wants to model this information with a linear function. Marc wants to use an exponential function. Which model is the better choice? Explain why you chose this model.



$$\frac{280}{220} = 1.27 \quad \frac{350}{280} = 1.25$$
$$\frac{440}{350} = 1.25$$

Marc, because the scatterplot shows an exponential graph. The bacteria increase by about 25% each time.

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

Question 27

27 Rachel and Marc were given the information shown below about the bacteria growing in a Petri dish in their biology class.

Number of Hours, x	1	2	3	4	5	6	7	8	9	10
Number of Bacteria, $B(x)$	220	280	350	440	550	690	860	1070	1340	1680

Rachel wants to model this information with a linear function. Marc wants to use an exponential function. Which model is the better choice? Explain why you chose this model.

linear

$$r = .964$$

exponential

$$r = .999$$

I chose exponential because the correlation coefficient was closer to one than the correlation coefficient of the linear model.

Score 1: The student compared correlation coefficients.

Question 27

27 Rachel and Marc were given the information shown below about the bacteria growing in a Petri dish in their biology class.

Number of Hours, x	1	2	3	4	5	6	7	8	9	10
Number of Bacteria, $B(x)$	220	280	350	440	550	690	860	1070	1340	1680

Rachel wants to model this information with a linear function. Marc wants to use an exponential function. Which model is the better choice? Explain why you chose this model.

The linear function is a better choice because the function is not increasing by the same amount every hour. Every hour it is increasing a little more than it did the hour before.

Score 1: The student made a conceptual error by confusing linear and exponential definitions.

Question 27

27 Rachel and Marc were given the information shown below about the bacteria growing in a Petri dish in their biology class.

Number of Hours, x	1	2	3	4	5	6	7	8	9	10
Number of Bacteria, $B(x)$	220	280	350	440	550	690	860	1070	1340	1680

Rachel wants to model this information with a linear function. Marc wants to use an exponential function. Which model is the better choice? Explain why you chose this model.

Exponential because the numbers increase quickly.

Score 1: The student gave an incomplete explanation.

Question 27

27 Rachel and Marc were given the information shown below about the bacteria growing in a Petri dish in their biology class.

Number of Hours, x	1	2	3	4	5	6	7	8	9	10
Number of Bacteria, $B(x)$	220	280	350	440	550	690	860	1070	1340	1680

Rachel wants to model this information with a linear function. Marc wants to use an exponential function. Which model is the better choice? Explain why you chose this model.

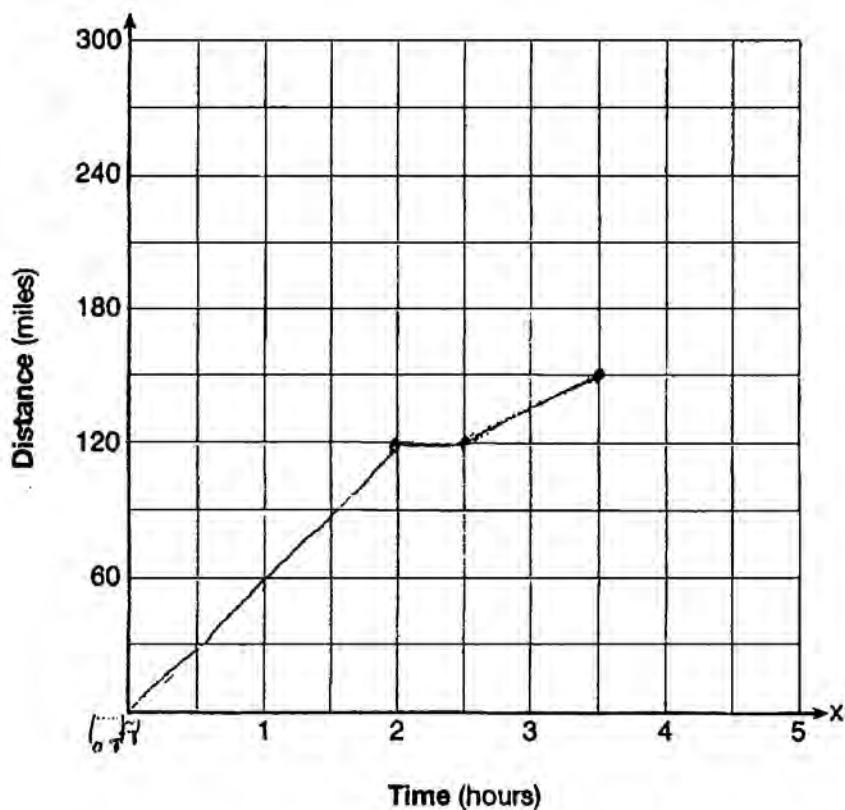
Linear because it is increasing.

Score 0: The student gave a completely incorrect response.

Question 28

28 A driver leaves home for a business trip and drives at a constant speed of 60 miles per hour for 2 hours. Her car gets a flat tire, and she spends 30 minutes changing the tire. She resumes driving and drives at 30 miles per hour for the remaining one hour until she reaches her destination.

On the set of axes below, draw a graph that models the driver's distance from home.

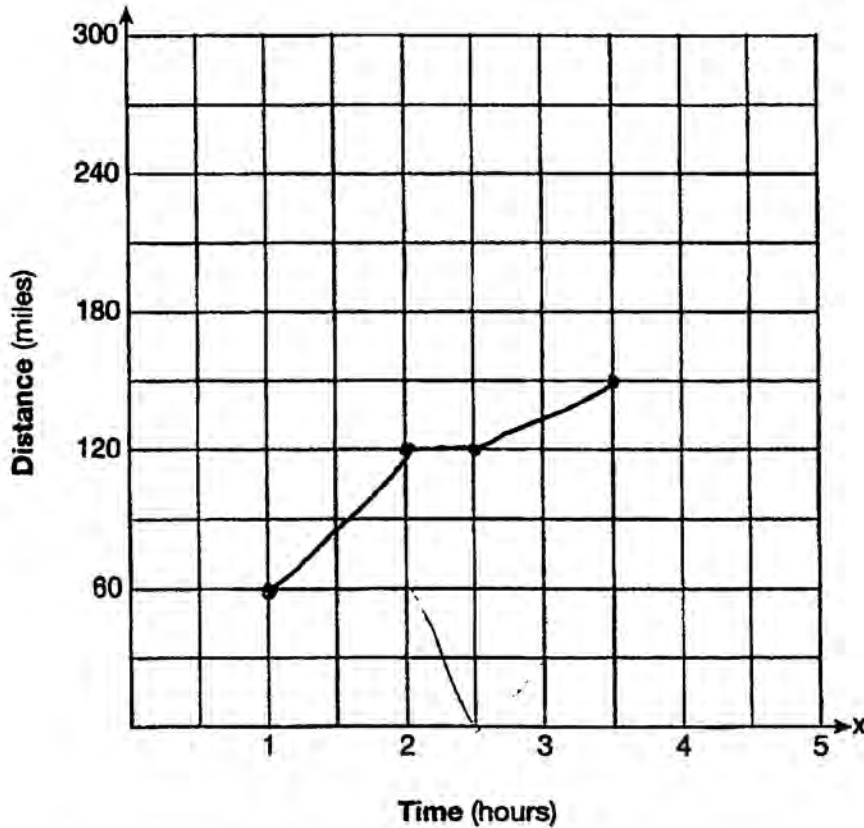


Score 2: The student has a complete and correct response.

Question 28

28 A driver leaves home for a business trip and drives at a constant speed of 60 miles per hour for 2 hours. Her car gets a flat tire, and she spends 30 minutes changing the tire. She resumes driving and drives at 30 miles per hour for the remaining one hour until she reaches her destination.

On the set of axes below, draw a graph that models the driver's distance from home.



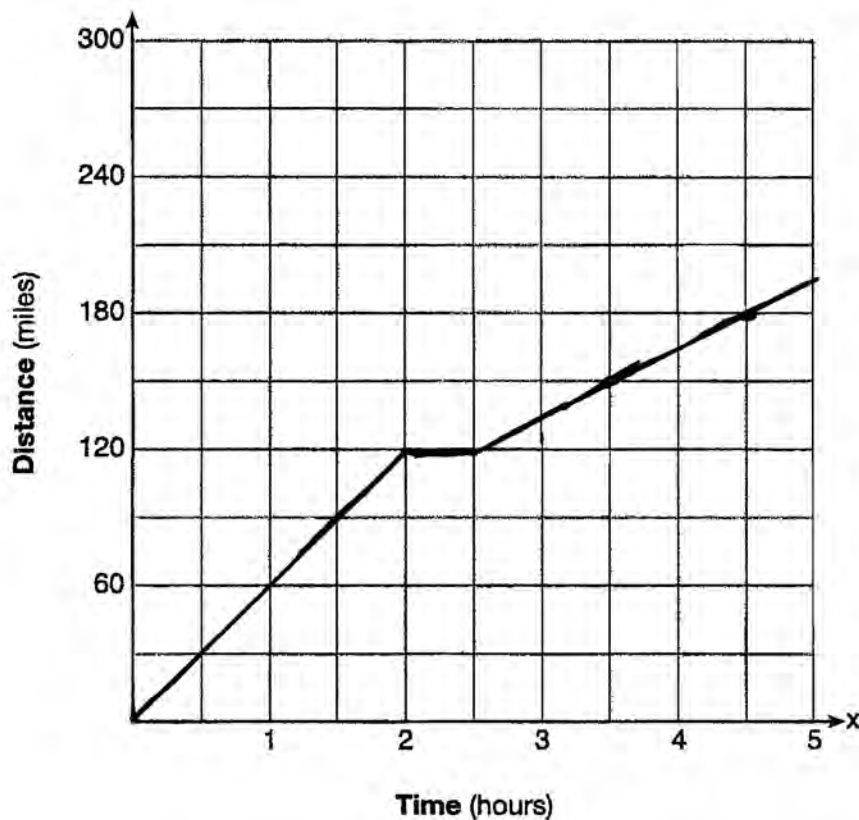
hour	1	2	2.5	3
Distance	60	120	120	150

Score 1: The student did not start at (0,0).

Question 28

28 A driver leaves home for a business trip and drives at a constant speed of 60 miles per hour for 2 hours. Her car gets a flat tire, and she spends 30 minutes changing the tire. She resumes driving and drives at 30 miles per hour for the remaining one hour until she reaches her destination.

On the set of axes below, draw a graph that models the driver's distance from home.

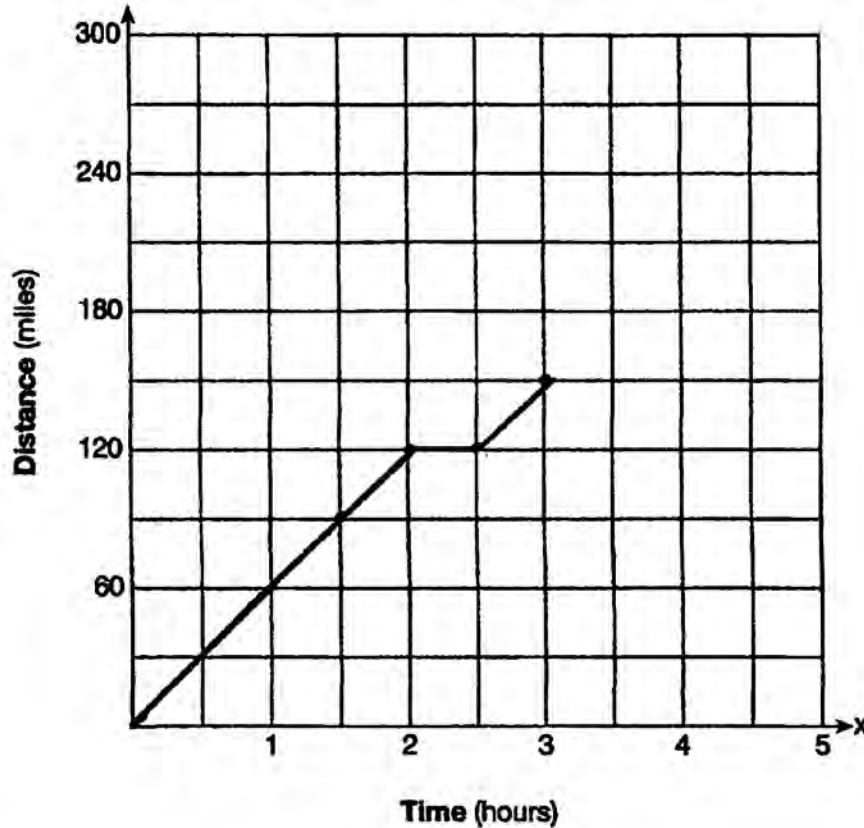


Score 1: The student graphed past the destination, increasing the distance from home.

Question 28

28 A driver leaves home for a business trip and drives at a constant speed of 60 miles per hour for 2 hours. Her car gets a flat tire, and she spends 30 minutes changing the tire. She resumes driving and drives at 30 miles per hour for the remaining one hour until she reaches her destination.

On the set of axes below, draw a graph that models the driver's distance from home.



$$\begin{array}{r} 60 \\ + 60 \\ \hline 120 \end{array}$$

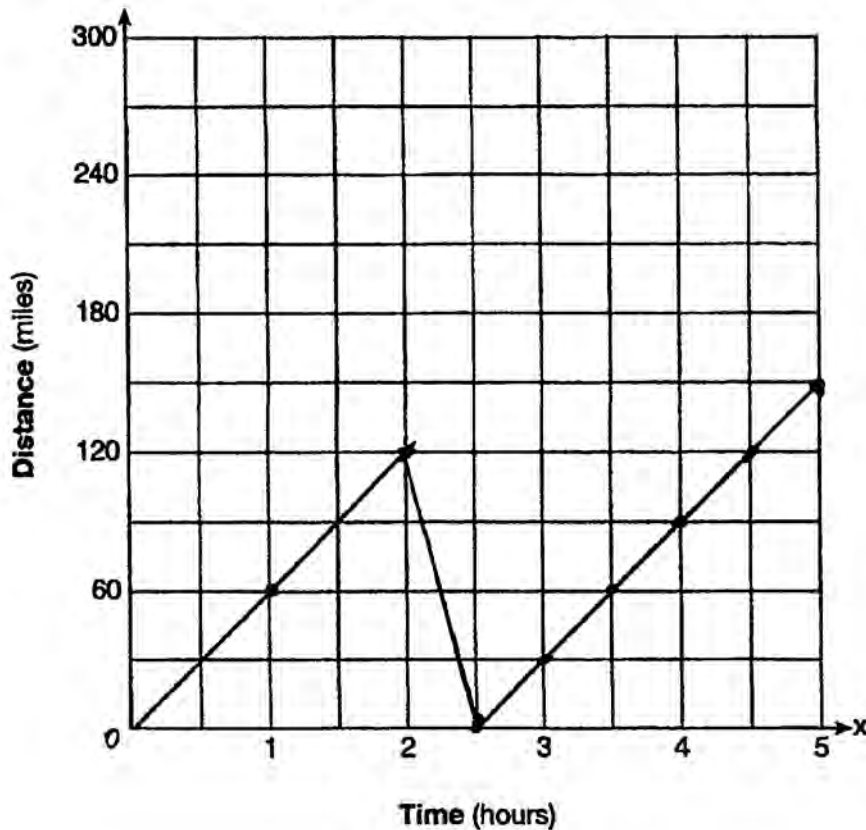
$$\begin{array}{r} 120 \\ 30 \\ \hline 150 \end{array}$$

Score 1: The student graphed the last hour incorrectly.

Question 28

28 A driver leaves home for a business trip and drives at a constant speed of 60 miles per hour for 2 hours. Her car gets a flat tire, and she spends 30 minutes changing the tire. She resumes driving and drives at 30 miles per hour for the remaining one hour until she reaches her destination.

On the set of axes below, draw a graph that models the driver's distance from home.



Score 0: The student did not correctly graph the 30 minutes that the car was stopped, and then continued at 60 mph instead of 30 mph to the end of the grid.

Question 29

29 How many real solutions does the equation $x^2 - 2x + 5 = 0$ have? Justify your answer.

$$a=1 \quad b=-2 \quad c=5$$

$$x = \frac{2 \pm \sqrt{4 - 4(1)(5)}}{2(a)}$$

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

No real solution

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

Question 29

29 How many real solutions does the equation $x^2 - 2x + 5 = 0$ have? Justify your answer.

None, when graphed
it didn't cross the
x-axis.

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

Question 29

29 How many real solutions does the equation $x^2 - 2x + 5 = 0$ have? Justify your answer.

$$\begin{aligned} & -5 \quad -5 \\ x^2 - 2x &= -5 \\ x^2 - 2x + \square &= -5 + \square \\ x^2 - 2x + 1 &= -4 \qquad ac=1 \\ & \qquad \qquad \qquad b=-2 \\ & \qquad \qquad \qquad -1, \underline{1} \\ (x-1)(x-1) &= -4 \\ \sqrt{(x-1)^2} &= \sqrt{-4} \\ x-1 &= \frac{\pm 2}{+1} \\ & \qquad \qquad \qquad +1 \end{aligned}$$

Solutions:

$x = 3$	$\{3, -1\}$
$x = -1$	

Score 1: The student made an error by taking the square root of -4 and found two real solutions.

Question 29

29 How many real solutions does the equation $x^2 - 2x + 5 = 0$ have? Justify your answer.

No solution because no numbers
multiply to 5 and add up to -2

Score 1: The student gave an incomplete justification.

Question 29

29 How many real solutions does the equation $x^2 - 2x + 5 = 0$ have? Justify your answer.

This equation has 2 solutions. I can tell by the x^2 in the beginning of the equation.

Score 1: The student knew that quadratic equations have two solutions, but did not answer the question regarding real solutions.

Question 29

29 How many real solutions does the equation $x^2 - 2x + 5 = 0$ have? Justify your answer.

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

$$\begin{array}{c|c} (x+1) & (x-1) \\ \hline x+1=0 & x-1=0 \\ x=-1 & x=1 \end{array} = 0$$

2 solutions

Score 0: The student gave a completely incorrect response.

Question 30

30 The number of carbon atoms in a fossil is given by the function $y = 5100(0.95)^x$, where x represents the number of years since being discovered.

What is the percent of change each year? Explain how you arrived at your answer.

$$\begin{array}{r} 5100 \\ - 4845 \\ \hline 255 \text{ per year} \end{array}$$

$$y = 5100(.95)^1$$
$$y = 4845$$

$$\frac{255}{5100} = .05$$

The # of atoms decreases by 5% each year I plugged in 1 for x and got 4845 which I subtracted from 5100. It lost 255 in one year. 255 is 5 percent of 5100.

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

Question 30

30 The number of carbon atoms in a fossil is given by the function $y = 5100(0.95)^x$, where x represents the number of years since being discovered.

What is the percent of change each year? Explain how you arrived at your answer.

5%

$$\text{decay} = P(1 - R)^t$$

|
(as a decimal)

Score 1: The student did not give an explanation.

Question 30

30 The number of carbon atoms in a fossil is given by the function $y = 5100(0.95)^x$, where x represents the number of years since being discovered.

What is the percent of change each year? Explain how you arrived at your answer.

$$y = 5100(0.95)^x$$

$$y = 5100(0.95)$$

$$y = 4845$$

$$y = 5100(0.95)^2$$

$$y = 4602.75$$

$$4845 - 4602.75 = 242.25$$

$$\frac{4845}{100} - \frac{4602.75}{100} = \frac{242.25}{100} = \frac{2.4}{1}$$

2.4%

I found out the number of carbon atoms in a fossil for year one and two. I then subtracted them to find the difference and put it in a percent form.

Score 1: The student calculated the percent change incorrectly, but gave an appropriate explanation.

Question 30

30 The number of carbon atoms in a fossil is given by the function $y = 5100(0.95)^x$, where x represents the number of years since being discovered.

What is the percent of change each year? Explain how you arrived at your answer.

$(1) = 5100(0.95)^1$
 $(1) = 4845$ } 1 year

$(2) = 5100(0.95)^2$
 $(2) = 4602.75$ } 2 years

$(3) = 5100(0.95)^3$
 $(3) = 4372.6125$ } 3 years

$\frac{\Delta y}{\Delta x} = \frac{3}{4845 - 4372.6125}$
 $.6\%$

I got that by finding the Δ in y and dividing it by the Δ in x , then moving the decimal place for a percentage.

Score 0: The student gave a completely incorrect response.

Question 31

- 31 A toy rocket is launched from the ground straight upward. The height of the rocket above the ground, in feet, is given by the equation $h(t) = -16t^2 + 64t$, where t is the time in seconds. Determine the domain for this function in the given context. Explain your reasoning.

$$h(t) = -16t^2 + 64t$$

x	y
0	0
1	48
2	64
3	48
4	0

A domain is $0 \leq t \leq 4$
because the rocket takes off at
0 seconds and lands four seconds later.

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

Question 31

- 31** A toy rocket is launched from the ground straight upward. The height of the rocket above the ground, in feet, is given by the equation $h(t) = -16t^2 + 64t$, where t is the time in seconds. Determine the domain for this function in the given context. Explain your reasoning.

The domain for this function is $[0, 4]$, as the maximum amount of time the rocket flew was, 4 seconds before it hit the ground, and in the context of the problem, you can have no negative x -values, as you cannot have negative time.

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

Question 31

31 A toy rocket is launched from the ground straight upward. The height of the rocket above the ground, in feet, is given by the equation $h(t) = -16t^2 + 64t$, where t is the time in seconds. Determine the domain for this function in the given context. Explain your reasoning.

Between 0 and 4 because it starts at 0 seconds on the ground and hits the ground again at 4 seconds.

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

Question 31

- 31** A toy rocket is launched from the ground straight upward. The height of the rocket above the ground, in feet, is given by the equation $h(t) = -16t^2 + 64t$, where t is the time in seconds. Determine the domain for this function in the given context. Explain your reasoning.

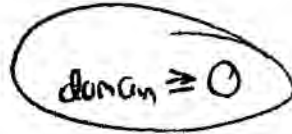
$$h(t) = -16t^2 + 64t$$
$$\frac{-b}{2a} = \frac{-64}{-32} = 2$$
$$y = -16(2)^2 + 64(2)$$

$[0, 64]$ because 0 is ground level and 64 is its maximum height

Score 1: The student gave the range and not the domain.

Question 31

- 31** A toy rocket is launched from the ground straight upward. The height of the rocket above the ground, in feet, is given by the equation $h(t) = -16t^2 + 64t$, where t is the time in seconds. Determine the domain for this function in the given context. Explain your reasoning.



A handwritten note consisting of the text "domain ≥ 0" enclosed in a hand-drawn oval.

seconds can't be negative

Score 1: The student did not realize that the height cannot be negative either.

Question 31

- 31 A toy rocket is launched from the ground straight upward. The height of the rocket above the ground, in feet, is given by the equation $h(t) = -16t^2 + 64t$, where t is the time in seconds. Determine the domain for this function in the given context. Explain your reasoning.

$$\begin{aligned} 0 &= -16t^2 + 64t \\ 16t(-t + 4) &= 0 \\ \hline t=0 & \quad | \quad x=4 \\ & \quad \quad \quad \downarrow \\ & \quad \quad \quad \{0, 4\} \end{aligned}$$

The domain for this function is 0 and 4 because if you substitute these number in equation, it will be equal to 0.

Score 1: The student did not state the interval.

Question 31

- 31 A toy rocket is launched from the ground straight upward. The height of the rocket above the ground, in feet, is given by the equation $h(t) = -16t^2 + 64t$, where t is the time in seconds. Determine the domain for this function in the given context. Explain your reasoning.

X	Y
-1	-80
0	0
1	48
2	64
3	48
4	0
5	-80

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

The domain is 2.

Score 0: The student gave an irrelevant response.

Question 32

- 32 Jackson is starting an exercise program. The first day he will spend 30 minutes on a treadmill. He will increase his time on the treadmill by 2 minutes each day. Write an equation for $T(d)$, the time, in minutes, on the treadmill on day d .

$$T(d) = 30 + 2d - 2$$

Find $T(6)$, the minutes he will spend on the treadmill on day 6.

$$T(6) = 30 + 2(6) - 2$$

$$T(6) = 40$$

40 min.

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

Question 32

32 Jackson is starting an exercise program. The first day he will spend 30 minutes on a treadmill. He will increase his time on the treadmill by 2 minutes each day. Write an equation for $T(d)$, the time, in minutes, on the treadmill on day d .

$$T(d) = 2d + 28$$

Find $T(6)$, the minutes he will spend on the treadmill on day 6.

40

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

Question 32

32 Jackson is starting an exercise program. The first day he will spend 30 minutes on a treadmill. He will increase his time on the treadmill by 2 minutes each day. Write an equation for $T(d)$, the time, in minutes, on the treadmill on day d .

$T = \text{time}$
 $d = \text{day}$

$$30_{\text{min}} + 2_{\text{min}}(d) - 2$$

$$\boxed{30 + 2(d) - 2}$$

Find $T(6)$, the minutes he will spend on the treadmill on day 6.

$$30 + 2(6) - 2$$

$$42 - 2$$

$$\boxed{40 \text{ minutes}}$$

Score 1: The student wrote an expression and not an equation.

Question 32

32 Jackson is starting an exercise program. The first day he will spend 30 minutes on a treadmill. He will increase his time on the treadmill by 2 minutes each day. Write an equation for $T(d)$, the time, in minutes, on the treadmill on day d .

$$30 + 2(d)$$

Find $T(6)$, the minutes he will spend on the treadmill on day 6.

$$30 + 2(6)$$

$$30 + 12$$

42 minutes will spend on the treadmill

Score 1: The student gave a correct $T(6)$ based on the incorrect expression.

Question 32

32 Jackson is starting an exercise program. The first day he will spend 30 minutes on a treadmill. He will increase his time on the treadmill by 2 minutes each day. Write an equation for $T(d)$, the time, in minutes, on the treadmill on day d .

$$T(d) = 30(.02)^d$$

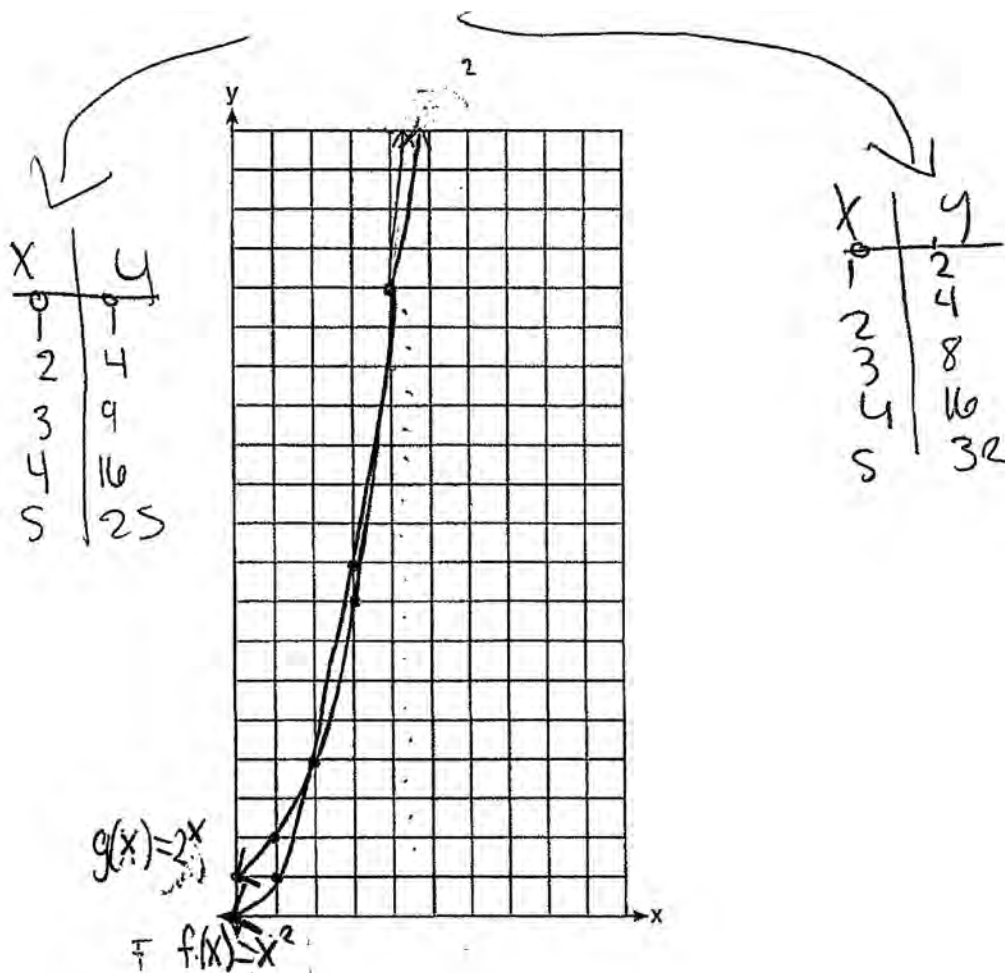
Find $T(6)$, the minutes he will spend on the treadmill on day 6.

$$T(d) = 30(.02)^6 \\ \approx 1.92 \text{ minutes}$$

Score 0: The student gave a completely incorrect response.

Question 33

33 Graph $f(x) = x^2$ and $g(x) = 2^x$ for $x \geq 0$ on the set of axes below.



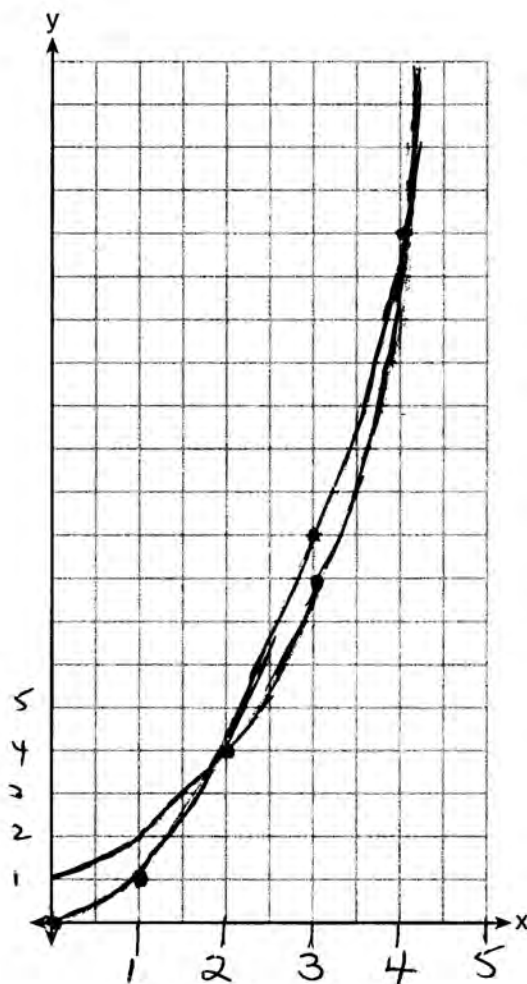
State which function, $f(x)$ or $g(x)$, has a greater value when $x = 20$. Justify your reasoning.

$g(x)$ has a greater value when $x=20$ because 2^{20} is larger than 20^2 .

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

Question 33

33 Graph $f(x) = x^2$ and $g(x) = 2^x$ for $x \geq 0$ on the set of axes below.



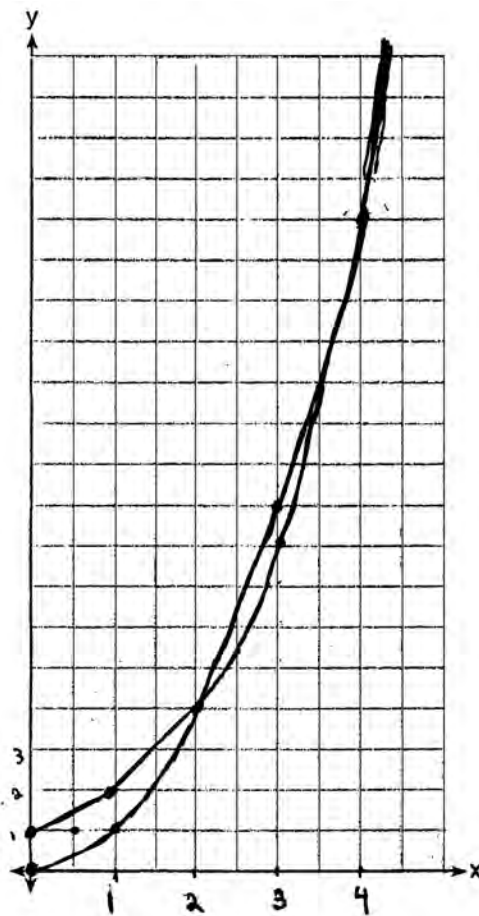
State which function, $f(x)$ or $g(x)$, has a greater value when $x = 20$. Justify your reasoning.

$$\begin{aligned} f(x) &= 400 \\ g(x) &= 1048576 \end{aligned} \quad g(x)$$

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

Question 33

33 Graph $f(x) = x^2$ and $g(x) = 2^x$ for $x \geq 0$ on the set of axes below.



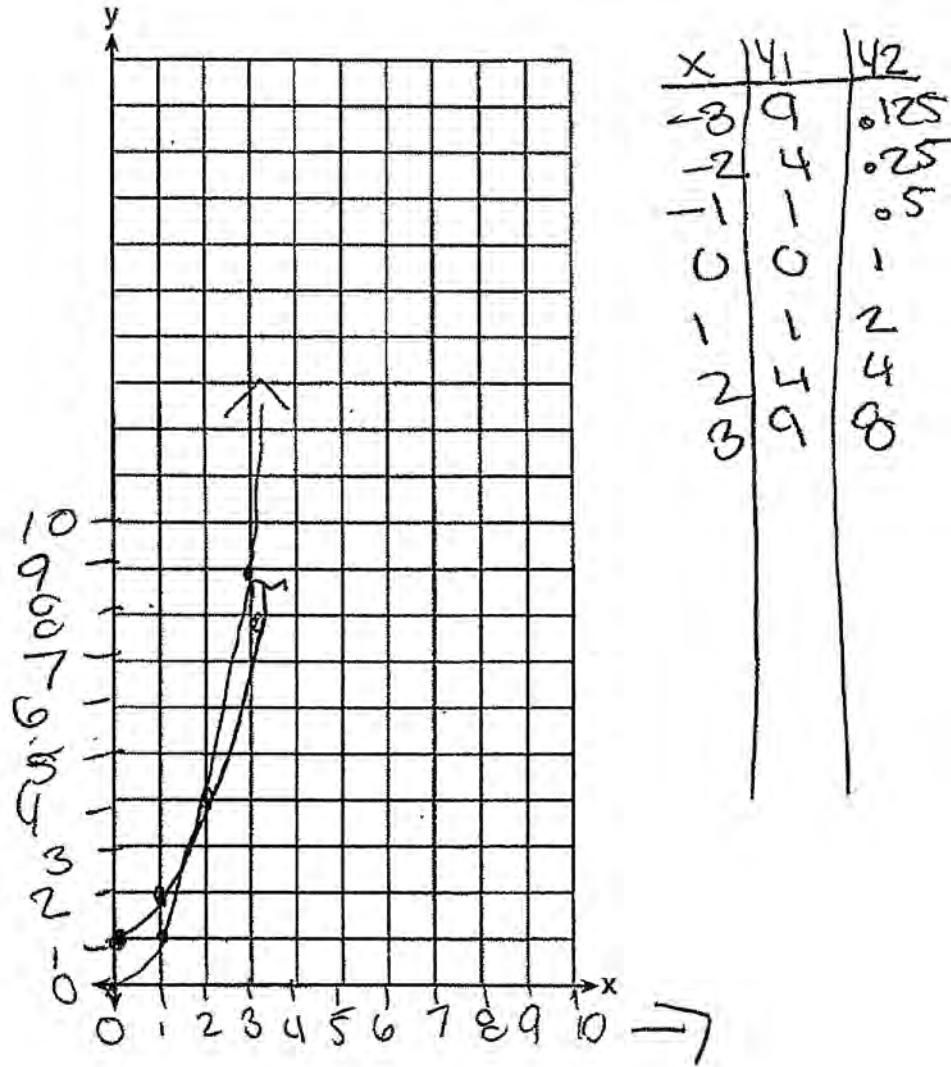
State which function, $f(x)$ or $g(x)$, has a greater value when $x = 20$. Justify your reasoning.

2^x

Score 3: The student did not justify 2^x .

Question 33

33 Graph $f(x) = x^2$ and $g(x) = 2^x$ for $x \geq 0$ on the set of axes below.

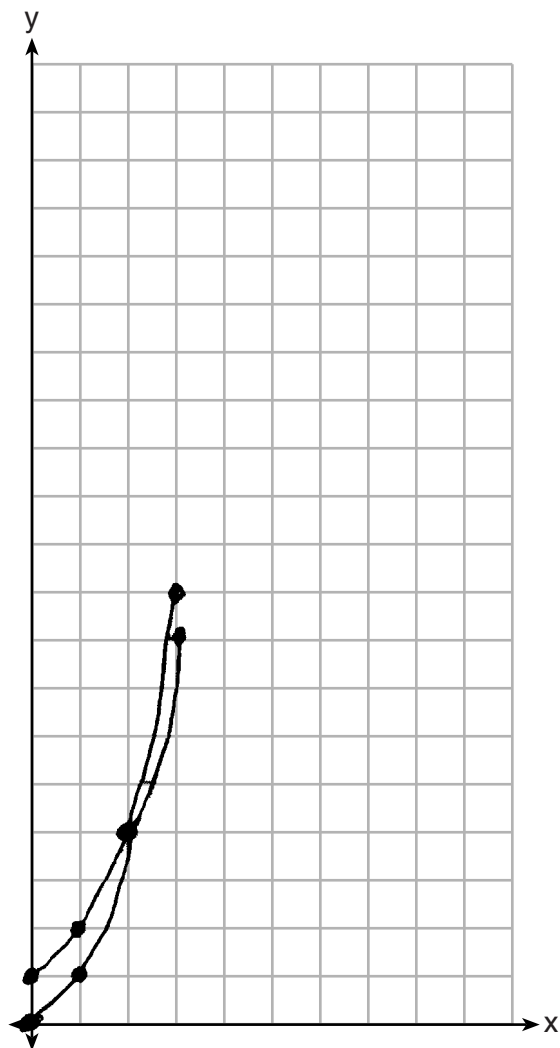


State which function, $f(x)$ or $g(x)$, has a greater value when $x = 20$. Justify your reasoning.

Score 2: The student has a correct graph, but shows no further work.

Question 33

33 Graph $f(x) = x^2$ and $g(x) = 2^x$ for $x \geq 0$ on the set of axes below.



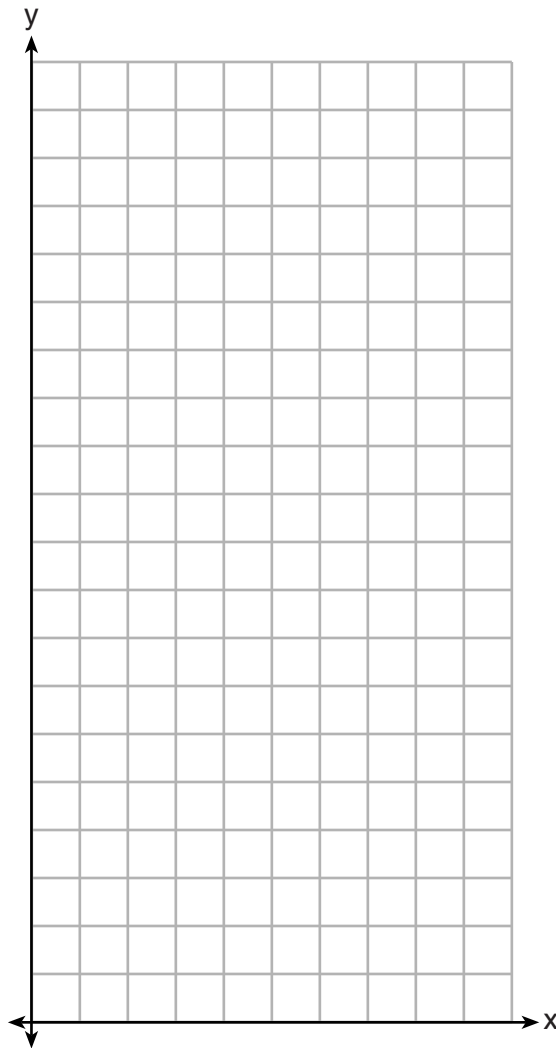
State which function, $f(x)$ or $g(x)$, has a greater value when $x = 20$. Justify your reasoning.

$g(x)$

Score 2: The student has one graphing error by not using arrows and did not justify $g(x)$.

Question 33

33 Graph $f(x) = x^2$ and $g(x) = 2^x$ for $x \geq 0$ on the set of axes below.



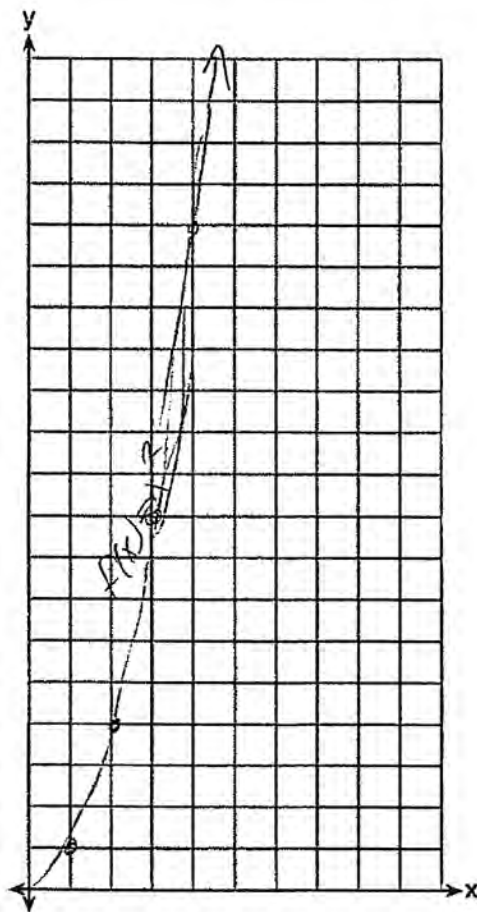
State which function, $f(x)$ or $g(x)$, has a greater value when $x = 20$. Justify your reasoning.

$$f(x) = 20^2 = 400$$
$$g(x) = 2^{20} = 1,048,576$$

Score 2: The student has a correct function and justification, but no graph.

Question 33

33 Graph $f(x) = x^2$ and $g(x) = 2^x$ for $x \geq 0$ on the set of axes below.



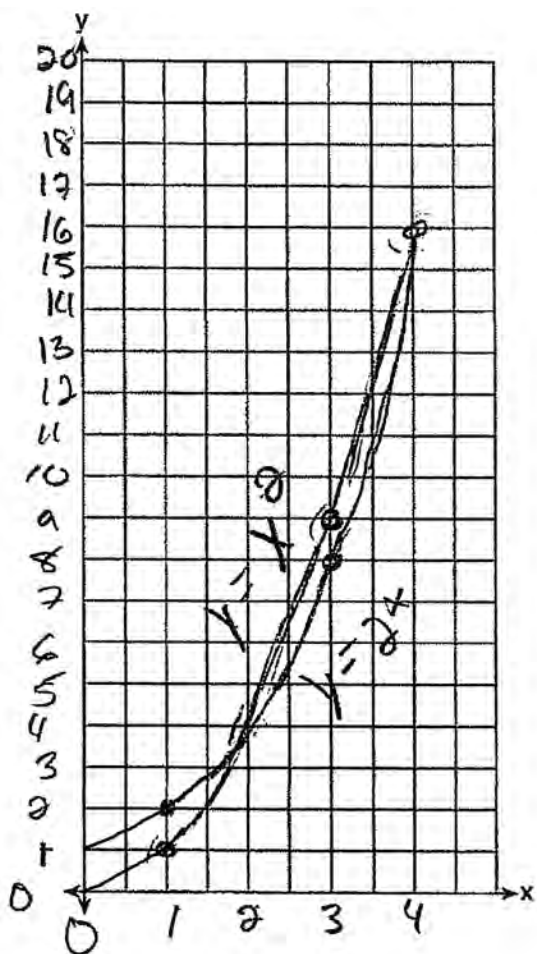
State which function, $f(x)$ or $g(x)$, has a greater value when $x = 20$. Justify your reasoning.

I am not sure how to do this.

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

Question 33

33 Graph $f(x) = x^2$ and $g(x) = 2^x$ for $x \geq 0$ on the set of axes below.



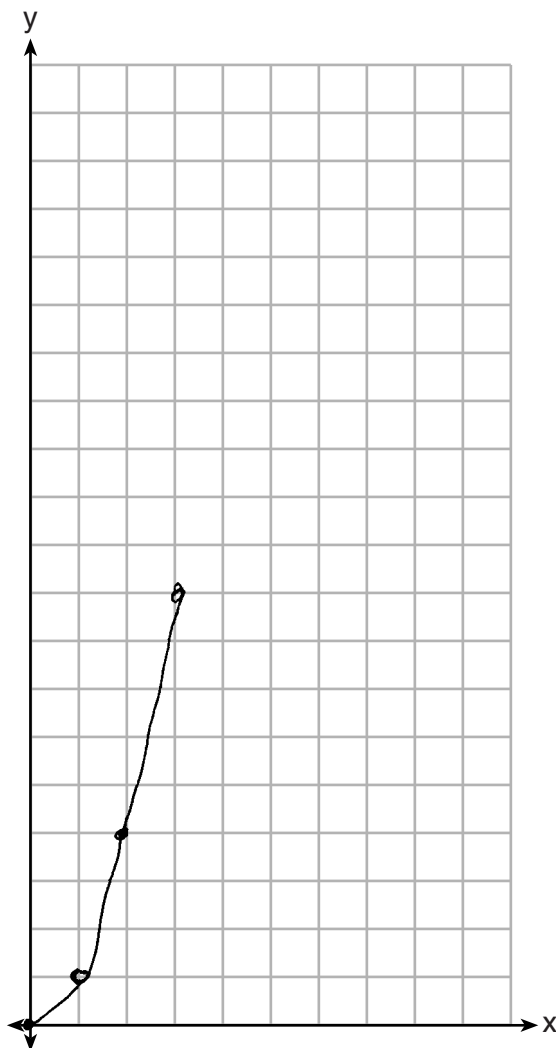
State which function, $f(x)$ or $g(x)$, has a greater value when $x = 20$. Justify your reasoning.

$y = x^2$ has a greater value
when $x = 20$

Score 1: The student did not put arrows on the graphs drawn and there is no further correct work.

Question 33

33 Graph $f(x) = x^2$ and $g(x) = 2^x$ for $x \geq 0$ on the set of axes below.



State which function, $f(x)$ or $g(x)$, has a greater value when $x = 20$. Justify your reasoning.

$f(x)$

Score 0: The student did not graph one function completely correct and no further correct work is shown.

Question 34

34 Solve for x algebraically: $7x - 3(4x - 8) \leq 6x + 12 - 9x$

$$\begin{aligned}7x - 12x + 24 &\leq 6x + 12 - 9x \\-12x + 24 &\leq 6x - 9x \\-12x + 24 &\leq -3x \\+12x &\quad +12x \\12 &\leq 3x \\4 &\leq x \\x &\geq 6\end{aligned}$$

If x is a number in the interval $[4,8]$, state all integers that satisfy the given inequality. Explain how you determined these values.

$\{6, 7, 8\}$, I know this because when solving the inequality I got " $x \geq 6$ " which means equal to or greater than 6. So "6, 7, 8"

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

Question 34

34 Solve for x algebraically: $7x - 3(4x - 8) \leq 6x + 12 - 9x$

$$7x - 3(4x - 8) \leq 6x + 12 - 9x$$

$$7x - 12x + 24 \leq 6x + 12 - 9x$$

$$\begin{array}{r} -5x + 24 \leq -3x + 12 \\ +3x \qquad +3x \end{array}$$

$$\begin{array}{r} -2x + 24 \leq 12 \\ -24 \quad -24 \end{array}$$

$$\frac{-2x}{-2} \leq \frac{-12}{-2}$$

$$\boxed{x \geq 6}$$

If x is a number in the interval $[4,8]$, state all integers that satisfy the given inequality. Explain how you determined these values.

6, 7 and 8 will satisfy the integers because x is greater than or equal to 6 and 8 is the only number out of 4 and 8 that is bigger than 6.

Score 3: The student wrote an incorrect explanation.

Question 34

34 Solve for x algebraically: $7x - 3(4x - 8) \leq 6x + 12 - 9x$

$$\begin{aligned}7x - 12x + 24 &\leq 6x + 12 - 9x \\-5x + 24 &\leq -3x + 12 \\-2x &\leq -12 \\x &\leq 6\end{aligned}$$

If x is a number in the interval $[4,8]$, state all integers that satisfy the given inequality. Explain how you determined these values.

4, 5, 6
because they are the numbers less than or equal to six in the interval

Score 3: The student did not reverse the inequality symbol when dividing by a negative, but gave appropriate numbers and explanation.

Question 34

34 Solve for x algebraically: $7x - 3(4x - 8) \leq 6x + 12 - 9x$

$$\begin{aligned}7x - 12x + 24 &\leq 6x + 12 - 9x \\-5x + 24 &\leq -3x + 12 \\12 &\leq 2x \\6 &\leq x\end{aligned}$$

If x is a number in the interval $[4,8]$, state all integers that satisfy the given inequality. Explain how you determined these values.

$\{4, 5, 6\}$

The bracket $[]$ means that it includes all numbers between the two numbers in the brackets as well as the two numbers shown. The bracket meant $4 \leq x \leq 8$, and 4, 5, 6 are equal to or less than 6.

Score 3: The student did not state the correct integers, but gave an appropriate explanation.

Question 34

34 Solve for x algebraically: $7x - 3(4x - 8) \leq 6x + 12 - 9x$

$$\begin{aligned} 7x - 3(4x - 8) &\leq 6x + 12 - 9x \\ 7x - 12x + 24 &\leq 6x - 3x + 12 \\ -5x + 24 &\leq -3x + 12 \\ +5x &\quad +5x \\ \hline 24 &\leq 2x + 12 \\ -12 &\quad -12 \\ \hline 12 &\leq 2x \\ \frac{12}{2} &\leq \frac{2x}{2} \\ \boxed{6} &\leq x \end{aligned}$$

If x is a number in the interval $[4,8]$, state all integers that satisfy the given inequality. Explain how you determined these values.

4 5 6 7 8

I got these numbers because if x is in the interval between 4 and 8 then it's one of the answers above

Score 2: The student solved the inequality correctly, but showed no further correct work.

Question 34

34 Solve for x algebraically: $7x - 3(4x - 8) \leq 6x + 12 - 9x$

$$\begin{aligned}7x - 12x + 24 &\leq 6x + 12 - 9x \\-5x + 24 &\leq 6x - 9x + 12 \\-5x + 24 &\leq -3x + 12 \\+3x &\quad +3x \\ \hline -2x + 24 &\leq 12 \\ -24 &\quad -24 \\ \hline -2x &\leq -12 \\ -2 &\quad -2 \\ \hline x &\leq 6\end{aligned}$$

If x is a number in the interval $[4,8]$, state all integers that satisfy the given inequality. Explain how you determined these values.

Score 1: The student did not reverse the inequality symbol when dividing by a negative and showed no further correct work.

Question 34

34 Solve for x algebraically: $7x - 3(4x - 8) \leq 6x + 12 - 9x$

$$7x - 12x - 24 \leq 6x + 12 - 9x$$

$$\begin{array}{r} -5x - 24 \leq -3x + 12 \\ +3x + 24 \quad +3x + 24 \end{array}$$

$$\frac{-2x}{-2} \leq \frac{36}{-2}$$

$$x \leq -18$$

If x is a number in the interval $[4,8]$, state all integers that satisfy the given inequality. Explain how you determined these values.

4, 5, 6, 7, 8 are all in
my interval because everything
above -18 is included

Score 0: The student gave a completely incorrect response.

Question 35

- 35 The volume of a large can of tuna fish can be calculated using the formula $V = \pi r^2 h$. Write an equation to find the radius, r , in terms of V and h .

$$\begin{array}{l} \frac{V}{\pi r^2} \\ \frac{V = \pi r^2 h}{\pi} \quad \frac{V}{\pi h} = r^2 \\ \frac{V}{\pi} = r^2 h \quad \frac{V}{\pi} \div h = r^2 \rightarrow \boxed{\sqrt{\frac{V}{\pi} \div h} = r} \end{array}$$

Determine the diameter, to the *nearest inch*, of a large can of tuna fish that has a volume of 66 cubic inches and a height of 3.3 inches.

$$\begin{array}{l} 66 = \pi r^2 (3.3) \\ \sqrt{\frac{66}{\pi} \div 3.3} = r \\ 2.5 = r \\ \boxed{5 = d} \end{array} \quad \begin{array}{r} 2.5 \\ \times 2 \\ \hline 5.0 \end{array}$$

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

Question 35

35 The volume of a large can of tuna fish can be calculated using the formula $V = \pi r^2 h$. Write an equation to find the radius, r , in terms of V and h .

$$r = \sqrt{\left(\frac{V}{\pi h}\right)}$$

Determine the diameter, to the *nearest inch*, of a large can of tuna fish that has a volume of 66 cubic inches and a height of 3.3 inches.

3m.

$$\boxed{6m}$$



$$r = \sqrt{\left(\frac{V}{\pi h}\right)}$$

$$r = \sqrt{\left(\frac{66}{3.3\pi}\right)}$$

$$r = \sqrt{\left(\frac{66}{10.36725576}\right)}$$

$$r = \sqrt{6.366197724}$$

$$r = 2.523132522$$

$$r = 3m.$$

$$d = 2r$$

$$d = 6m.$$

Score 3: The student made a premature rounding error.

Question 35

- 35 The volume of a large can of tuna fish can be calculated using the formula $V = \pi r^2 h$. Write an equation to find the radius, r , in terms of V and h .

$$\frac{V}{\pi h} = \frac{\pi r^2 h}{\pi h}$$
$$\sqrt{\frac{V}{\pi h}} = \sqrt{r^2}$$
$$\sqrt{\frac{V}{\pi h}} = r$$

Determine the diameter, to the *nearest inch*, of a large can of tuna fish that has a volume of 66 cubic inches and a height of 3.3 inches.

$$V = \pi r^2 h$$

$$\frac{66}{3.3\pi} = \frac{\pi r^2 (3.3)}{3.3\pi}$$

$$\sqrt{20\pi} = \sqrt{r^2}$$

$$r = 7.926654595$$

$$d = 2r$$

$$d \approx 16 \text{ meters}$$

Score 3: The student multiplied by π instead of dividing by π .

Question 35

- 35 The volume of a large can of tuna fish can be calculated using the formula $V = \pi r^2 h$. Write an equation to find the radius, r , in terms of V and h .

$$VH = \pi r^2$$

Determine the diameter, to the *nearest inch*, of a large can of tuna fish that has a volume of 66 cubic inches and a height of 3.3 inches.

$$66 \cdot 3.3 = \pi r^2$$

$$\frac{217.8}{\pi} = \frac{\pi r^2}{\pi}$$

$$\sqrt{69.328} = \sqrt{r^2}$$

$$8.326 = r$$

$$2r = d$$

$$2(8.326) = d$$

$$\begin{aligned} 16.652 &= d \\ 17 &= d \end{aligned}$$

The diameter would be 17 meters.

Score 2: The student stated an incorrect equation but solved it appropriately.

Question 35

- 35 The volume of a large can of tuna fish can be calculated using the formula $V = \pi r^2 h$. Write an equation to find the radius, r , in terms of V and h .

$$\frac{V}{\pi h} = \frac{\pi r^2 h}{\pi h}$$

$$\frac{V}{\pi h} = r^2$$

Determine the diameter, to the *nearest inch*, of a large can of tuna fish that has a volume of 66 cubic inches and a height of 3.3 inches.

$$V = \pi r^2 h$$

$$\frac{66}{\pi \cdot 3.3} = \frac{\pi r^2 \cdot 3.3}{\pi \cdot 3.3}$$

$$\frac{66}{10.36725576}$$

$$r^2 = 6.366197722$$

$$d = 5.046265043$$

$$\sqrt{6.366197722}$$

Score 2: The student did not take the square root of r^2 and did not round the diameter.

Question 35

- 35 The volume of a large can of tuna fish can be calculated using the formula $V = \pi r^2 h$. Write an equation to find the radius, r , in terms of V and h .

$$\frac{V}{h} = \frac{\pi r^2 h}{h}$$
$$\frac{x}{\pi} \quad x = (r)^2$$

Determine the diameter, to the *nearest inch*, of a large can of tuna fish that has a volume of 66 cubic inches and a height of 3.3 inches.

$$\frac{66}{3.3} = \pi (r)^2 \frac{3.3}{3.3}$$
$$\frac{20}{\pi} = \frac{\pi (r)^2}{\pi}$$
$$6.3662 = (r)^2 \quad r = 2.523$$

Score 1: The student found the correct radius, but no further correct work is shown.

Question 35

- 35 The volume of a large can of tuna fish can be calculated using the formula $V = \pi r^2 h$. Write an equation to find the radius, r , in terms of V and h .

$$V = \pi r^2 h$$
$$V = 4\pi h$$
$$V = 12.56637061(h)$$

Determine the diameter, to the *nearest inch*, of a large can of tuna fish that has a volume of 66 cubic inches and a height of 3.3 inches.

$$V = \pi r^2 h$$
$$66 = \pi r^2 (3.3)$$
$$\frac{66}{3.3\pi} = \frac{3.3\pi r^2}{3.3\pi}$$
$$62.83185307 = r^2$$

$d = 126 \text{ m}$

Score 0: The student gave a completely incorrect response.

Question 36

36 The table below shows the attendance at a museum in select years from 2007 to 2013.

x	Year	2007	2008	2009	2011	2013
y	Attendance (millions)	8.3	8.5	8.5	8.8	9.3

State the linear regression equation represented by the data table when $x = 0$ is used to represent the year 2007 and y is used to represent the attendance. Round all values to the nearest hundredth.

$$y = 0.16x + 8.27$$

State the correlation coefficient to the nearest hundredth and determine whether the data suggest a strong or weak association.

$$r = 0.97$$

The data suggest a strong association.

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

Question 36

36 The table below shows the attendance at a museum in select years from 2007 to 2013.

Attendance at Museum

Year	2007	2008	2009	2011	2013
Attendance (millions)	8.3	8.5	8.5	8.8	9.3

State the linear regression equation represented by the data table when $x = 0$ is used to represent the year 2007 and y is used to represent the attendance. Round all values to the nearest hundredth.

Put values into Stat, edit, then found LinReg(ax+b)

$y = .1577586207x + 8.264827586$
 $y = .16x + 8.27$

State the correlation coefficient to the nearest hundredth and determine whether the data suggest a strong or weak association.

the correlation coefficient is .9745077635, which means the data has a strong association (the correlation coefficient is close to "1"). This means that it is clear that as years go by, more people attend the museum.

Score 3: The student did not round the correlation coefficient.

Question 36

36 The table below shows the attendance at a museum in select years from 2007 to 2013.

Year	2007	2008	2009	2011	2013
Attendance (millions)	8.3	8.5	8.5	8.8	9.3

State the linear regression equation represented by the data table when $x = 0$ is used to represent the year 2007 and y is used to represent the attendance. Round all values to the nearest hundredth.

$$y = 0.16x + 8.27$$

State the correlation coefficient to the nearest hundredth and determine whether the data suggest a strong or weak association.

strong association

Score 2: The student stated a correct equation, but no credit is given for strong with no proof.

Question 36

36 The table below shows the attendance at a museum in select years from 2007 to 2013.

Attendance at Museum

Year	2007	2008	2009	2011	2013
Attendance (millions)	8.3	8.5	8.5	8.8	9.3

State the linear regression equation represented by the data table when $x = 0$ is used to represent the year 2007 and y is used to represent the attendance. Round all values to the *nearest hundredth*.

$$y = .158x - 308$$

State the correlation coefficient to the *nearest hundredth* and determine whether the data suggest a strong or weak association.

$$.975 = \text{Strong}$$

Score 1: The student has an incorrect equation and the correlation coefficient is rounded incorrectly.

Question 36

36 The table below shows the attendance at a museum in select years from 2007 to 2013.

Attendance at Museum

Year	2007	2008	2009	2011	2013
Attendance (millions)	8.3	8.5	8.5	8.8	9.3

State the linear regression equation represented by the data table when $x = 0$ is used to represent the year 2007 and y is used to represent the attendance. Round all values to the *nearest hundredth*.

$$y = 0.23(x) + 8.22$$

State the correlation coefficient to the *nearest hundredth* and determine whether the data suggest a strong or weak association.

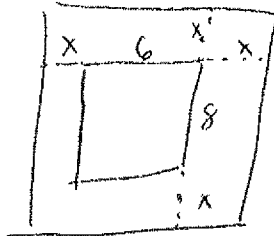
Strong positive correlation

Score 0: The student receives no credit for stating strong with no correlation coefficient.

Question 37

37 A rectangular picture measures 6 inches by 8 inches. Simon wants to build a wooden frame for the picture so that the framed picture takes up a maximum area of 100 square inches on his wall. The pieces of wood that he uses to build the frame all have the same width.

Write an equation or inequality that could be used to determine the maximum width of the pieces of wood for the frame Simon could create.



$$(2x+8)(2x+6) = 100$$

$$4x^2 + 12x + 16x + 48 = 100$$

$$4x^2 + 28x + 48 = 100$$

$$4x^2 + 28x - 52 = 0$$

Explain how your equation or inequality models the situation.

The frame needs to have the same amount "x" added to both sides of the picture making it 2x on both the length and the width. Area tells us we have to multiply them together.

Solve the equation or inequality to determine the maximum width of the pieces of wood used for the frame to the *nearest tenth of an inch*.

$$4x^2 + 28x - 52 = 0$$

$$4(x^2 + 7x - 13) = 0$$

$$x = \frac{-7 \pm \sqrt{7^2 - 4(1)(-13)}}{2}$$

$$x = 1.5$$

$$x = -8.5 \text{ reject}$$

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

Question 37

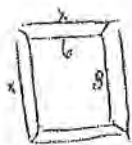
37 A rectangular picture measures 6 inches by 8 inches. Simon wants to build a wooden frame for the picture so that the framed picture takes up a maximum area of 100 square inches on his wall. The pieces of wood that he uses to build the frame all have the same width.

Write an equation or inequality that could be used to determine the maximum width of the pieces of wood for the frame Simon could create.

Let x = width of the frame

$$\cancel{100 \leq} 100 \geq (8+2x)(6+2x)$$

Explain how your equation or inequality models the situation.



The area can not be more than 100 sq. in. Since the frame has two parts added to each side, we need $2x$ added to the six and the eight.

Solve the equation or inequality to determine the maximum width of the pieces of wood used for the frame to the *nearest tenth of an inch*.

$$100 \geq 48 + 16x + 12x + 4x^2$$

$$100 \geq 4x^2 + 28x + 48$$

$$0 \geq 4x^2 + 28x - 52$$

$$\cancel{0 \geq 4(x^2 + 13x - 13)}$$

$$0 \geq 4(x^2 + 7x - 13)$$

$$x \leq \frac{-7 \pm \sqrt{7^2 - 4(1)(-13)}}{2}$$

$$x \leq 1.5 \quad \text{or} \quad \cancel{8.5}$$

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

Question 37

37 A rectangular picture measures 6 inches by 8 inches. Simon wants to build a wooden frame for the picture so that the framed picture takes up a maximum area of 100 square inches on his wall. The pieces of wood that he uses to build the frame all have the same width.

Write an equation or inequality that could be used to determine the maximum width of the pieces of wood for the frame Simon could create.

$$(x+8)(x+6) = 100$$

Explain how your equation or inequality models the situation.

My x represents the amount a picture is increased. Area is length times width. $x+8$ is my new length and $x+6$ is my new width.

Solve the equation or inequality to determine the maximum width of the pieces of wood used for the frame to the *nearest tenth of an inch*.

$$x^2 + 14x + 48 = 100$$

$$x^2 + 14x + 49 = 52 + 49$$

$$(x+7)^2 = 101$$

$$x+7 = \pm\sqrt{101}$$

$$x = -7 \pm \sqrt{101}$$

$$x = 3.05$$

Max frame
width =
1.5

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

Question 37

37 A rectangular picture measures 6 inches by 8 inches. Simon wants to build a wooden frame for the picture so that the framed picture takes up a maximum area of 100 square inches on his wall. The pieces of wood that he uses to build the frame all have the same width.

Write an equation or inequality that could be used to determine the maximum width of the pieces of wood for the frame Simon could create.

$$x = \text{width}$$
$$100 \geq (2x+8)(2x+6)$$

Explain how your equation or inequality models the situation.

$(2x+8)$ is the new length of the picture + the frame
 $(2x+6)$ is the new width of the picture + the frame
width \times length = area

Solve the equation or inequality to determine the maximum width of the pieces of wood used for the frame to the nearest tenth of an inch.

$$100 \geq 4x^2 + 28x + 48$$
$$0 \geq 4x^2 + 28x - 52$$
$$0 \geq 4(x^2 + 7x - 13)$$
$$x \leq -7 \pm \sqrt{7^2 - 4(1)(-13)}$$
$$1.5$$
$$-8.5$$

Score 5: The student did not reject the negative answer.

Question 37

37 A rectangular picture measures 6 inches by 8 inches. Simon wants to build a wooden frame for the picture so that the framed picture takes up a maximum area of 100 square inches on his wall. The pieces of wood that he uses to build the frame all have the same width.

Write an equation or inequality that could be used to determine the maximum width of the pieces of wood for the frame Simon could create.

$$(8+2x)(6+2x) = 100$$

Explain how your equation or inequality models the situation.

I multiplied length times width

Solve the equation or inequality to determine the maximum width of the pieces of wood used for the frame to the *nearest tenth of an inch*.

$$\begin{aligned} 48 + 28x + 4x^2 &= 100 \\ x^2 + 7x + 12 &= 25 \\ x^2 + 7x - 13 &= 0 \\ \frac{-7 \pm \sqrt{49 - 4(-13)}}{2} &= 1.5 \end{aligned}$$

Score 5: The student has an incomplete explanation.

Question 37

37 A rectangular picture measures 6 inches by 8 inches. Simon wants to build a wooden frame for the picture so that the framed picture takes up a maximum area of 100 square inches on his wall. The pieces of wood that he uses to build the frame all have the same width.

Write an equation or inequality that could be used to determine the maximum width of the pieces of wood for the frame Simon could create.

$$(6+x)(8+x) \leq 100$$

Explain how your equation or inequality models the situation.

$6+x$ is my new width
 $8+x$ is my new length

Solve the equation or inequality to determine the maximum width of the pieces of wood used for the frame to the *nearest tenth of an inch*.

$$\begin{aligned} 48 + 14x + x^2 &= 100 \\ x^2 + 14x + 48 &= 100 \\ x^2 + 14x + 49 &= 52 + 49 \\ (x+7)^2 &= 101 \\ x+7 &= \pm\sqrt{101} \\ x &= -7 \pm \sqrt{101} \\ x &= 3.05 \end{aligned} \quad \begin{array}{l} \text{Width} = \\ 3.1 \end{array}$$

Score 4: The student has an incomplete explanation and did not divide the width by 2.

Question 37

37 A rectangular picture measures 6 inches by 8 inches. Simon wants to build a wooden frame for the picture so that the framed picture takes up a maximum area of 100 square inches on his wall. The pieces of wood that he uses to build the frame all have the same width.

Write an equation or inequality that could be used to determine the maximum width of the pieces of wood for the frame Simon could create.

$$(8+2x)(6+2x) = 100$$

Explain how your equation or inequality models the situation.

THE FRAME NEEDS TO HAVE THE SAME
Amount to both sides of THE PICTURE,
making it $2x$ on both the length and the width.
Area tells us to multiply them together

Solve the equation or inequality to determine the maximum width of the pieces of wood used for the frame to the nearest tenth of an inch.

$$\begin{aligned}48 + 4x^2 &= 100 \\4x^2 + 100 - 48 &= 0 \\4x^2 + 52 &= 0\end{aligned}$$

$$\begin{aligned}4(x^2 + 13) &= 0 \\x^2 + 13 &= 0 \\x &= \pm \sqrt{13} \\x &= 3.6 \text{ inch}\end{aligned}$$

Score 3: The student wrote a correct equation and explanation, but no further correct work is shown.

Question 37

37 A rectangular picture measures 6 inches by 8 inches. Simon wants to build a wooden frame for the picture so that the framed picture takes up a maximum area of 100 square inches on his wall. The pieces of wood that he uses to build the frame all have the same width.

Write an equation or inequality that could be used to determine the maximum width of the pieces of wood for the frame Simon could create.

Let $x =$ addition to width

$$(6+2x)(8+2x) \leq 100$$

Explain how your equation or inequality models the situation.

The max is 100 sq in and he wants the same width on all sides so it must be $2x$ so that it is added to all 4 sides of picture

Solve the equation or inequality to determine the maximum width of the pieces of wood used for the frame to the nearest tenth of an inch.

$$(6+2x)(8+2x) \leq 100$$
$$x = 1.5 \quad \text{max width is } 1.5 \text{ in}$$

Score 3: The student wrote a correct inequality but gave an incorrect explanation, and stated 1.5, but showed no work.

Question 37

37 A rectangular picture measures 6 inches by 8 inches. Simon wants to build a wooden frame for the picture so that the framed picture takes up a maximum area of 100 square inches on his wall. The pieces of wood that he uses to build the frame all have the same width.

Write an equation or inequality that could be used to determine the maximum width of the pieces of wood for the frame Simon could create.

$$(2x + 8)(2x + 6) = 100$$

Explain how your equation or inequality models the situation.

Solve the equation or inequality to determine the maximum width of the pieces of wood used for the frame to the *nearest tenth of an inch*.

Score 2: The student wrote a correct equation.

Question 37

37 A rectangular picture measures 6 inches by 8 inches. Simon wants to build a wooden frame for the picture so that the framed picture takes up a maximum area of 100 square inches on his wall. The pieces of wood that he uses to build the frame all have the same width.

Write an equation or inequality that could be used to determine the maximum width of the pieces of wood for the frame Simon could create.

Explain how your equation or inequality models the situation.

Solve the equation or inequality to determine the maximum width of the pieces of wood used for the frame to the *nearest tenth of an inch*.

1.5

Score 1: The student has a correct answer but no work is shown.

Question 37

37 A rectangular picture measures 6 inches by 8 inches. Simon wants to build a wooden frame for the picture so that the framed picture takes up a maximum area of 100 square inches on his wall. The pieces of wood that he uses to build the frame all have the same width.

Write an equation or inequality that could be used to determine the maximum width of the pieces of wood for the frame Simon could create.

$$(8 + 2x)(6 + 2x)$$

Explain how your equation or inequality models the situation.

Solve the equation or inequality to determine the maximum width of the pieces of wood used for the frame to the *nearest tenth of an inch*.

Score 1: The student wrote a correct expression.

Question 37

37 A rectangular picture measures 6 inches by 8 inches. Simon wants to build a wooden frame for the picture so that the framed picture takes up a maximum area of 100 square inches on his wall. The pieces of wood that he uses to build the frame all have the same width.

Write an equation or inequality that could be used to determine the maximum width of the pieces of wood for the frame Simon could create.

Explain how your equation or inequality models the situation.

$$\text{area} = \text{length} \times \text{width}$$

Solve the equation or inequality to determine the maximum width of the pieces of wood used for the frame to the *nearest tenth of an inch*.

Score 0: The student wrote an incomplete explanation and no further work.

Regents Examination in Algebra I (Common Core) – August 2015

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

(Use for the August 2015 exam only.)

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