ALGEBRA II

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

ALGEBRA II
(Common Core)

Friday, June 16, 2017 — 1:15 to 4:15 p.m., only

Student Name ______________________________

School Name ______________________________

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

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

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

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

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

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

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

Notice …

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

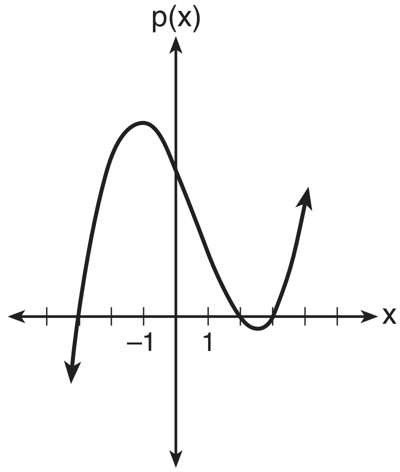
DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN.

Part I

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

Use this space for computations.

1 The graph of the function $p(x)$ is sketched below.



Which equation could represent $p(x)$?

(1) $p(x) = (x^2 - 9)(x - 2)$

(2) $p(x) = x^3 - 2x^2 + 9x + 18$

(3) $p(x) = (x^2 + 9)(x - 2)$

(4) $p(x) = x^3 + 2x^2 - 9x - 18$

2 What is the solution to $8(2^{x+3}) = 48$?

(1) $x = \frac{\ln 6}{\ln 2} - 3$

(2) $x = 0$

(3) $x = \frac{\ln 48}{\ln 16} - 3$

(4) $x = \ln 4 - 3$

Use this space for computations.

3 Cheap and Fast gas station is conducting a consumer satisfaction survey. Which method of collecting data would most likely lead to a biased sample?

(1) interviewing every 5th customer to come into the station

(2) interviewing customers chosen at random by a computer at the checkout

(3) interviewing customers who call an 800 number posted on the customers' receipts

(4) interviewing every customer who comes into the station on a day of the week chosen at random out of a hat

4 The expression $6xi^3(-4xi + 5)$ is equivalent to

(1) $2x - 5i$

(2) $-24x^2 - 30xi$

(3) $-24x^2 + 30x - i$

(4) $26x - 24x^2i - 5i$

5 If $f(x) = 3|x| - 1$ and $g(x) = 0.03x^3 - x + 1$, an approximate solution for the equation $f(x) = g(x)$ is

(1) 1.96

(2) 11.29

(3) $(-0.99, 1.96)$

(4) $(11.29, 32.87)$

6 Given the parent function $p(x) = \cos x$, which phrase best describes the transformation used to obtain the graph of $g(x) = \cos(x + a) - b$, if a and b are positive constants?

(1) right a units, up b units

(2) right a units, down b units

(3) left a units, up b units

(4) left a units, down b units

Use this space for computations.

7 The solution to the equation $4x^2 + 98 = 0$ is

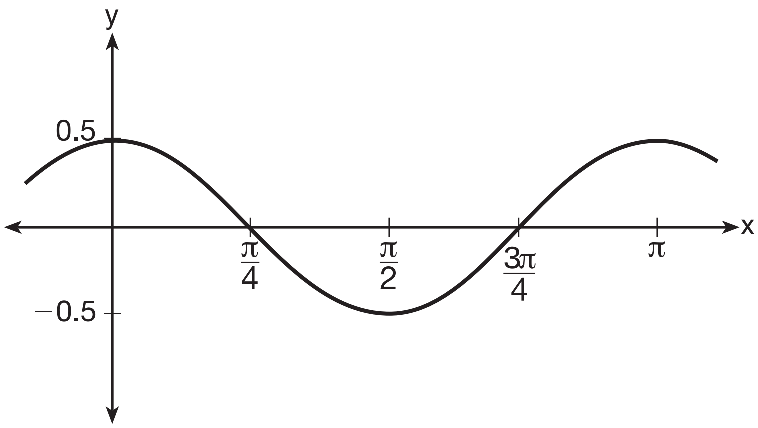
(1) ± 7

(2) $\pm 7i$

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

(4) $\pm \frac{7i\sqrt{2}}{2}$

8 Which equation is represented by the graph shown below?



(1) $y = \frac{1}{2} \cos 2x$

(2) $y = \cos x$

(3) $y = \frac{1}{2} \cos x$

(4) $y = 2 \cos \frac{1}{2}x$

9 A manufacturing company has developed a cost model, $C(x) = 0.15x^3 + 0.01x^2 + 2x + 120$, where x is the number of items sold, in thousands. The sales price can be modeled by $S(x) = 30 - 0.01x$. Therefore, revenue is modeled by $R(x) = x \bullet S(x)$.

The company's profit, $P(x) = R(x) - C(x)$, could be modeled by

(1) $0.15x^3 + 0.02x^2 - 28x + 120$

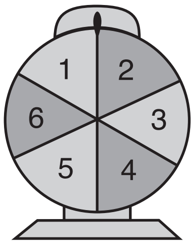
(2) $-0.15x^3 - 0.02x^2 + 28x - 120$

(3) $-0.15x^3 + 0.01x^2 - 2.01x - 120$

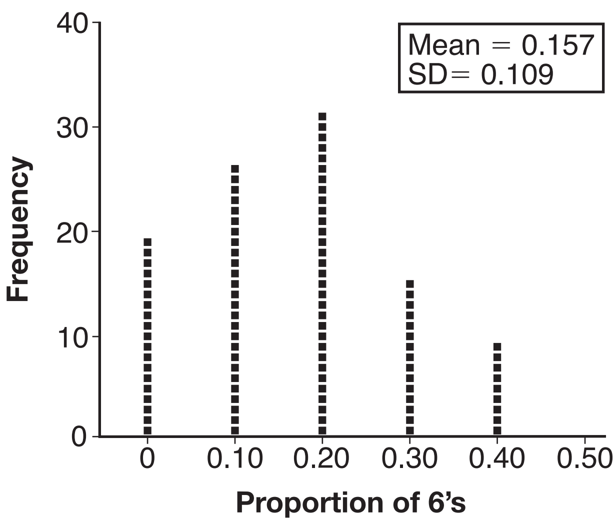
(4) $-0.15x^3 + 32x + 120$

Use this space for computations.

10 A game spinner is divided into 6 equally sized regions, as shown in the diagram below.



For Miles to win, the spinner must land on the number 6. After spinning the spinner 10 times, and losing all 10 times, Miles complained that the spinner is unfair. At home, his dad ran 100 simulations of spinning the spinner 10 times, assuming the probability of winning each spin is $\frac{1}{6}$. The output of the simulation is shown in the diagram below.



Which explanation is appropriate for Miles and his dad to make?

(1) The spinner was likely unfair, since the number 6 failed to occur in about 20% of the simulations.

(2) The spinner was likely unfair, since the spinner should have landed on the number 6 by the sixth spin.

(3) The spinner was likely not unfair, since the number 6 failed to occur in about 20% of the simulations.

(4) The spinner was likely not unfair, since in the output the player wins once or twice in the majority of the simulations.

Use this space for computations.

11 Which binomial is a factor of $x^4 - 4x^2 - 4x + 8$?

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

(2) $x + 2$ (4) $x + 4$

12 Given that $\sin^2 \theta + \cos^2 \theta = 1$ and $\sin \theta = -\frac{\sqrt{2}}{5}$, what is a possible value of $\cos \theta$?

(1) $\frac{5 + \sqrt{2}}{5}$ (3) $\frac{3\sqrt{3}}{5}$

(2) $\frac{\sqrt{23}}{5}$ (4) $\frac{\sqrt{35}}{5}$

13 A student studying public policy created a model for the population of Detroit, where the population decreased 25% over a decade. He used the model $P = 714(0.75)^d$, where P is the population, in thousands, d decades after 2010. Another student, Suzanne, wants to use a model that would predict the population after y years. Suzanne's model is best represented by

(1) $P = 714(0.6500)^y$ (3) $P = 714(0.9716)^y$

(2) $P = 714(0.8500)^y$ (4) $P = 714(0.9750)^y$

14 The probability that Gary and Jane have a child with blue eyes is 0.25, and the probability that they have a child with blond hair is 0.5. The probability that they have a child with both blue eyes and blond hair is 0.125. Given this information, the events blue eyes and blond hair are

I: dependent
II: independent
III: mutually exclusive

(1) I, only (3) I and III

(2) II, only (4) II and III

Use this space for computations.

15 Based on climate data that have been collected in Bar Harbor, Maine, the average monthly temperature, in degrees F, can be modeled by the equation $B(x) = 23.914\sin(0.508x - 2.116) + 55.300$. The same governmental agency collected average monthly temperature data for Phoenix, Arizona, and found the temperatures could be modeled by the equation $P(x) = 20.238\sin(0.525x - 2.148) + 86.729$.

Which statement can *not* be concluded based on the average monthly temperature models x months after starting data collection?

(1) The average monthly temperature variation is more in Bar Harbor than in Phoenix.

(2) The midline average monthly temperature for Bar Harbor is lower than the midline temperature for Phoenix.

(3) The maximum average monthly temperature for Bar Harbor is 79° F, to the nearest degree.

(4) The minimum average monthly temperature for Phoenix is 20° F, to the nearest degree.

16 For $x \neq 0$, which expressions are equivalent to one divided by the sixth root of x?

$$\text{I. } \frac{\sqrt[6]{x}}{\sqrt[3]{x}} \qquad \text{II. } \frac{x^{\frac{1}{6}}}{x^{\frac{1}{3}}} \qquad \text{III. } x^{-\frac{1}{6}}$$

(1) I and II, only

(2) I and III, only

(3) II and III, only

(4) I, II, and III

17 A parabola has its focus at (1,2) and its directrix is $y = -2$. The equation of this parabola could be

(1) $y = 8(x + 1)^2$

(2) $y = \frac{1}{8}(x + 1)^2$

(3) $y = 8(x - 1)^2$

(4) $y = \frac{1}{8}(x - 1)^2$

Use this space for computations.

18 The function $p(t) = 110e^{0.03922t}$ models the population of a city, in millions, t years after 2010. As of today, consider the following two statements:

I. The current population is 110 million.
II. The population increases continuously by approximately 3.9% per year.

This model supports

(1) I, only
(2) II, only
(3) both I and II
(4) neither I nor II

19 To solve $\frac{2x}{x-2} - \frac{11}{x} = \frac{8}{x^2 - 2x}$, Ren multiplied both sides by the least common denominator. Which statement is true?

(1) 2 is an extraneous solution.
(2) $\frac{7}{2}$ is an extraneous solution.
(3) 0 and 2 are extraneous solutions.
(4) This equation does not contain any extraneous solutions.

20 Given $f(9) = -2$, which function can be used to generate the sequence $-8, -7.25, -6.5, -5.75, \ldots$?

(1) $f(n) = -8 + 0.75n$
(2) $f(n) = -8 - 0.75(n - 1)$
(3) $f(n) = -8.75 + 0.75n$
(4) $f(n) = -0.75 + 8(n - 1)$

21 The function $f(x) = 2^{-0.25x} \bullet \sin\left(\frac{\pi}{2}x\right)$ represents a damped sound wave function. What is the average rate of change for this function on the interval $[-7,7]$, to the *nearest hundredth*?

(1) -3.66
(2) -0.30
(3) -0.26
(4) 3.36

Use this space for computations.

22 Mallory wants to buy a new window air conditioning unit. The cost for the unit is \$329.99. If she plans to run the unit three months out of the year for an annual operating cost of \$108.78, which function models the cost per year over the lifetime of the unit, $C(n)$, in terms of the number of years, n, that she owns the air conditioner?

(1) $C(n) = 329.99 + 108.78n$

(2) $C(n) = 329.99 + 326.34n$

(3) $C(n) = \dfrac{329.99 + 108.78n}{n}$

(4) $C(n) = \dfrac{329.99 + 326.34n}{n}$

23 The expression $\dfrac{-3x^2 - 5x + 2}{x^3 + 2x^2}$ can be rewritten as

(1) $\dfrac{-3x - 3}{x^2 + 2x}$

(2) $\dfrac{-3x - 1}{x^2}$

(3) $-3x^{-1} + 1$

(4) $-3x^{-1} + x^{-2}$

24 Jasmine decides to put \$100 in a savings account each month. The account pays 3% annual interest, compounded monthly. How much money, S, will Jasmine have after one year?

(1) $S = 100(1.03)^{12}$

(2) $S = \dfrac{100 - 100(1.0025)^{12}}{1 - 1.0025}$

(3) $S = 100(1.0025)^{12}$

(4) $S = \dfrac{100 - 100(1.03)^{12}}{1 - 1.03}$

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]

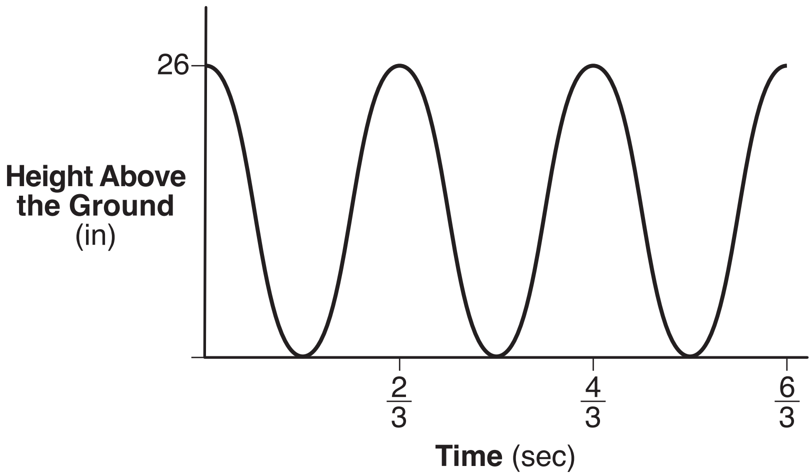
25 Given $r(x) = x^3 - 4x^2 + 4x - 6$, find the value of $r(2)$.

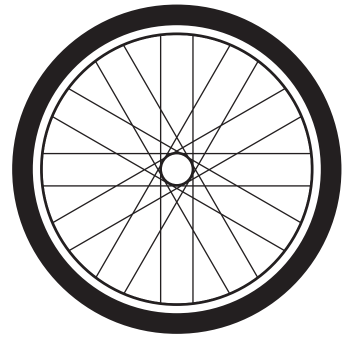
What does your answer tell you about $x - 2$ as a factor of $r(x)$? Explain.

26 The weight of a bag of pears at the local market averages 8 pounds with a standard deviation of 0.5 pound. The weights of all the bags of pears at the market closely follow a normal distribution. Determine what percentage of bags, to the *nearest integer*, weighed *less* than 8.25 pounds.

27 Over the set of integers, factor the expression $4x^3 - x^2 + 16x - 4$ completely.

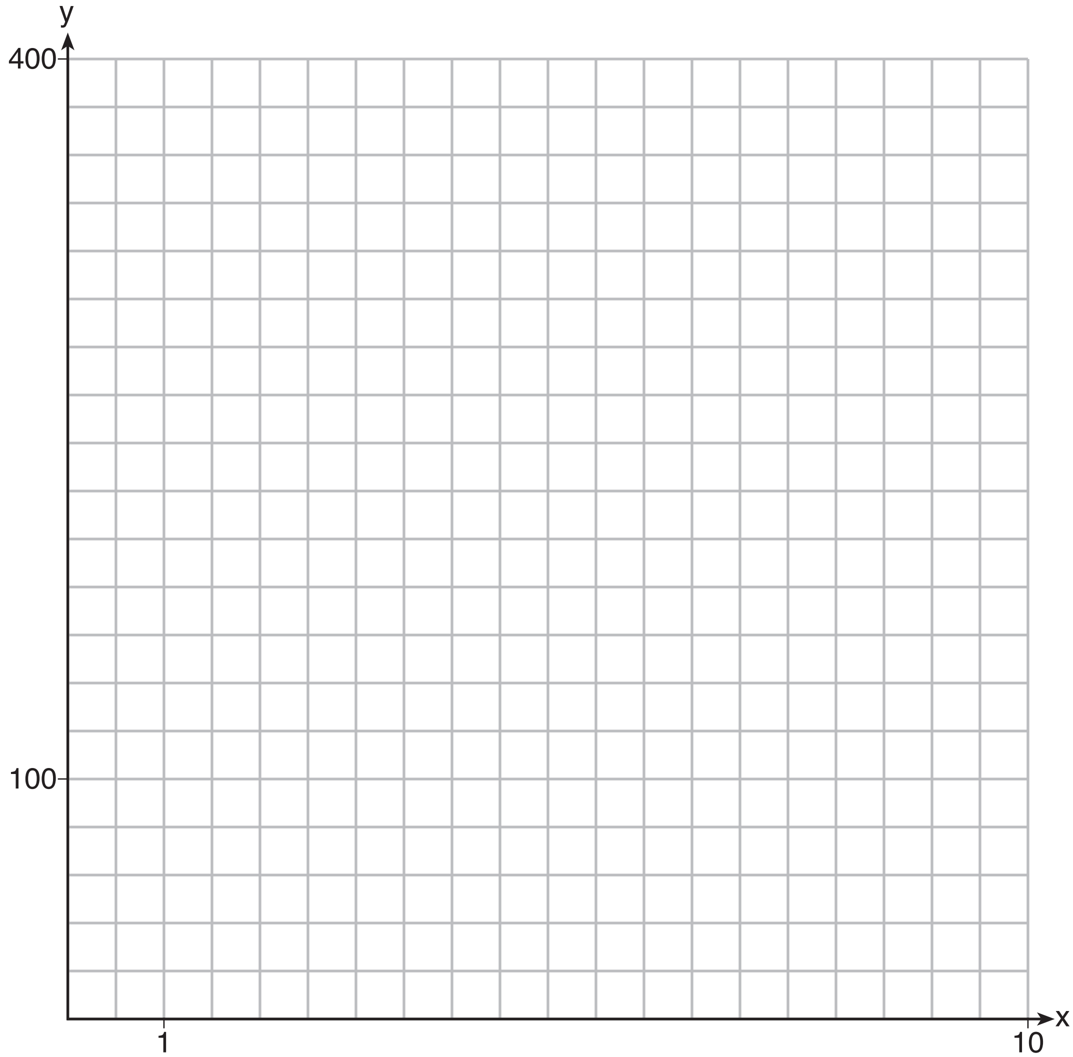
28 The graph below represents the height above the ground, h, in inches, of a point on a triathlete's bike wheel during a training ride in terms of time, t, in seconds.





Identify the period of the graph and describe what the period represents in this context.

29 Graph $y = 400(.85)^{2x} - 6$ on the set of axes below.



30 Solve algebraically for all values of x:

$$\sqrt{x-4} + x = 6$$

31 Write $\sqrt[3]{x} \bullet \sqrt{x}$ as a single term with a rational exponent.

32 Data collected about jogging from students with two older siblings are shown in the table below.

	Neither Sibling Jogs	One Sibling Jogs	Both Siblings Jog
Student Does Not Jog	1168	1823	1380
Student Jogs	188	416	400

Using these data, determine whether a student with two older siblings is more likely to jog if one sibling jogs or if both siblings jog. Justify your answer.

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 Solve the following system of equations algebraically for all values of x, y, and z:

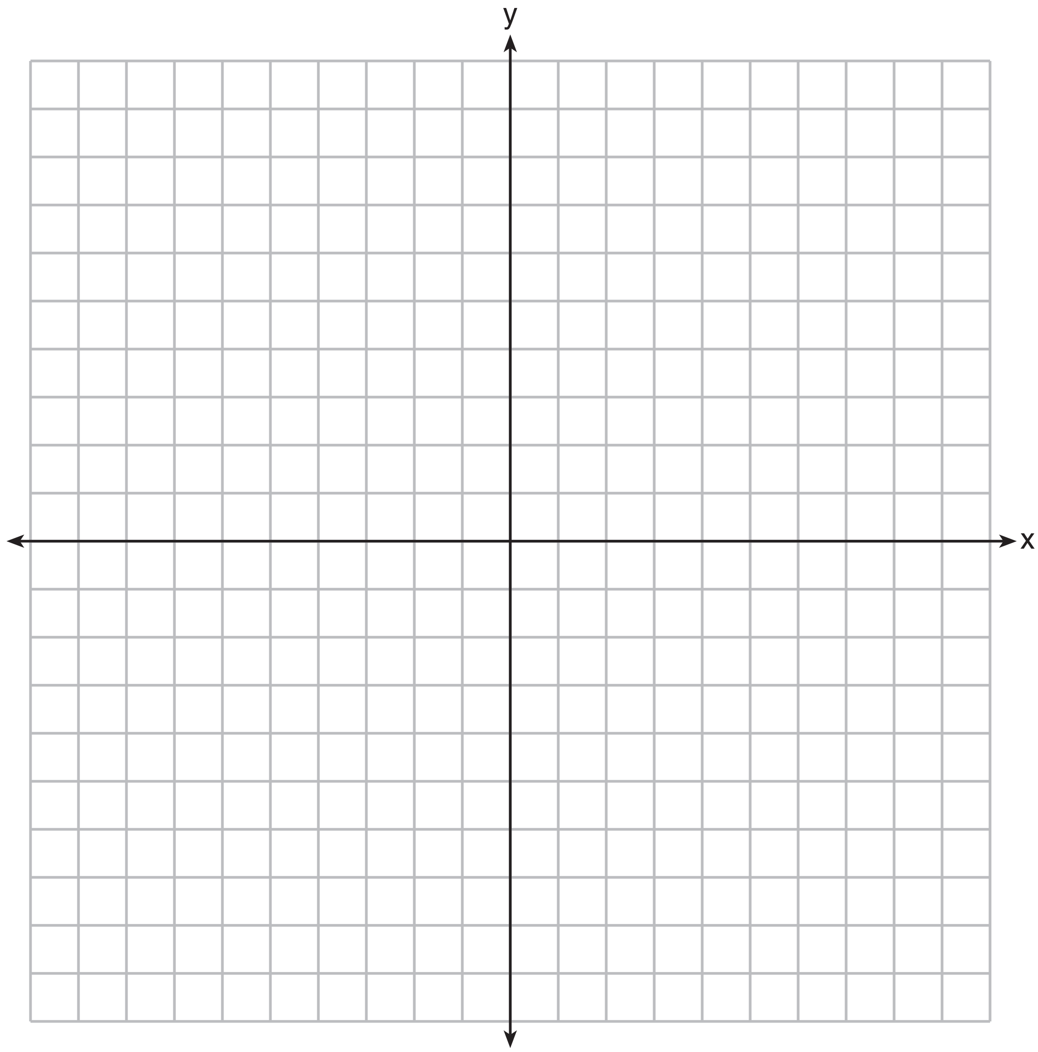
$$\begin{gathered} x + y + z = 1 \\ 2x + 4y + 6z = 2 \\ -x + 3y - 5z = 11 \end{gathered}$$

34 Jim is looking to buy a vacation home for $172,600 near his favorite southern beach. The formula to compute a mortgage payment, M, is $M = P \bullet \frac{r(1+r)^N}{(1+r)^N - 1}$ where P is the principal amount of the loan, r is the monthly interest rate, and N is the number of monthly payments. Jim's bank offers a monthly interest rate of 0.305% for a 15-year mortgage.

With no down payment, determine Jim's mortgage payment, rounded to the *nearest dollar*.

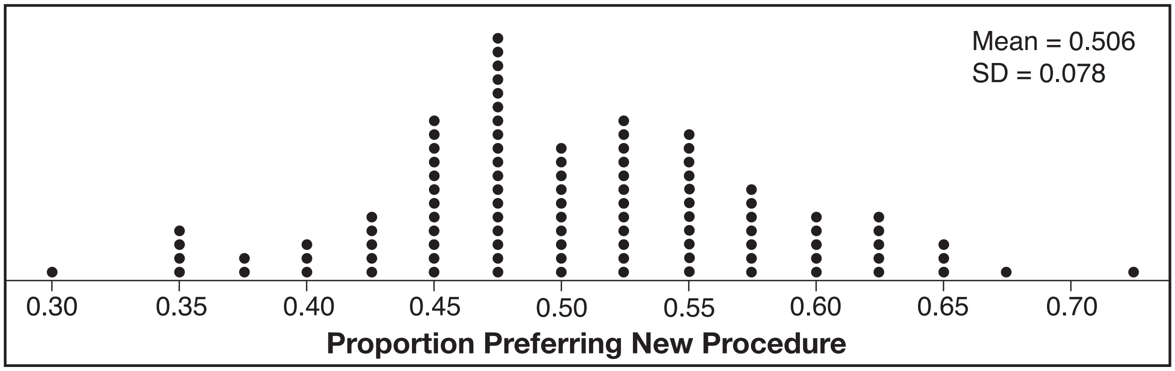
Algebraically determine and state the down payment, rounded to the *nearest dollar*, that Jim needs to make in order for his mortgage payment to be $1100.

35 Graph $y = \log_2(x + 3) - 5$ on the set of axes below. Use an appropriate scale to include *both* intercepts.



Describe the behavior of the given function as x approaches -3 and as x approaches positive infinity.

36 Charlie's Automotive Dealership is considering implementing a new check-in procedure for customers who are bringing their vehicles for routine maintenance. The dealership will launch the procedure if 50% or more of the customers give the new procedure a favorable rating when compared to the current procedure. The dealership devises a simulation based on the minimal requirement that 50% of the customers prefer the new procedure. Each dot on the graph below represents the proportion of the customers who preferred the new check-in procedure, each of sample size 40, simulated 100 times.



Assume the set of data is approximately normal and the dealership wants to be 95% confident of its results. Determine an interval containing the plausible sample values for which the dealership will launch the new procedure. Round your answer to the *nearest hundredth*.

Forty customers are selected randomly to undergo the new check-in procedure and the proportion of customers who prefer the new procedure is 32.5%. The dealership decides *not* to implement the new check-in procedure based on the results of the study. Use statistical evidence to explain this decision.

Part IV

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

37 A radioactive substance has a mass of 140 g at 3 p.m. and 100 g at 8 p.m. Write an equation in the form $A = A_0\left(\frac{1}{2}\right)^{\frac{t}{h}}$ that models this situation, where h is the constant representing the number of hours in the half-life, A_0 is the initial mass, and A is the mass t hours after 3 p.m.

Using this equation, solve for h, to the *nearest ten thousandth*.

Determine when the mass of the radioactive substance will be 40 g. Round your answer to the *nearest tenth of an hour*.

Tear Here

Tear Here

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

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

Tear Here

Tear Here

Tear Here

High School Math Reference Sheet

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

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

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

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

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

Tear Here

ALGEBRA II (COMMON CORE)

Tear Here

Tear Here

Printed on Recycled Paper

ALGEBRA II (COMMON CORE)

FOR TEACHERS ONLY

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

ALGEBRA II (Common Core)

Friday, June 16, 2017 — 1:15 to 4:15 p.m., only

SCORING KEY AND RATING GUIDE

Mechanics of Rating

The following procedures are to be followed for scoring student answer papers for the Regents Examination in Algebra II (Common Core). More detailed information about scoring is provided in the publication *Information Booklet for Scoring the Regents Examination in Algebra II (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 Friday, June 16, 2017. Because scale scores corresponding to raw scores in the conversion chart may change from one administration to another, it is crucial that, for each administration, the conversion chart provided for that administration be used to determine the student's final score. The student's scale score should be entered in the box provided on the student's separate answer sheet. The scale score is the student's final examination score.

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

Part I

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

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

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

The Department is providing supplemental scoring guidance, the "Model Response Set," for the Regents Examination in Algebra II (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/algebratwo/.

General Rules for Applying Mathematics Rubrics

I. General Principles for Rating

The rubrics for the constructed-response questions on the Regents Examination in Algebra II (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 II (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]** −6, and a correct explanation is written.

[1] One computational error is made.

or

[1] One conceptual error is made.

or

[1] −6, but the explanation is 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.

(26) **[2]** 69, and correct work is shown.

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

or

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

or

[1] 69, 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.

(27) **[2]** $(x^2 + 4)(4x - 1)$ and correct work is shown.

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

or

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

or

[1] $x^2(4x - 1) + 4(4x - 1)$ is written, but no further correct work is shown.

or

[1] $(x^2 + 4)(4x - 1)$, but no work is shown.

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

(28) **[2]** $\frac{2}{3}$ and a correct description is written.

[1] One computational error is made.

or

[1] One conceptual error is made.

or

[1] $\frac{2}{3}$, but the description is incomplete 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.

(29) **[2]** A correct graph is drawn.

[1] One computational or graphing error is made.

or

[1] One conceptual error is made.

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

(30) **[2]** 5 and correct algebraic work is shown.

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

or

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

or

[1] Appropriate work is shown, but 8 is not rejected.

or

[1] 5, but a method other than algebraic is used.

or

[1] 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.

(31) **[2]** $x^{\frac{5}{6}}$ and correct work is shown.

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

or

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

or

[1] $x^{\frac{5}{6}}$, but no work is shown.

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

(32) **[2]** Both siblings jog 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.

[0] Both siblings jog, 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.

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]** $x = 0$, $y = 2$, and $z = -1$, and correct algebraic work is shown.

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

or

[3] Appropriate work is shown to find two solutions, but no further correct work is shown.

[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 one solution, but no further correct work is shown.

or

[2] $x = 0$, $y = 2$, and $z = -1$, 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 eliminate a variable in order to create a system of two equations, but no further correct work is shown.

or

[1] $x = 0$, $y = 2$, and $z = -1$, but no work is shown.

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

(34) **[4]** 1247 and 20,407, and correct work is shown.

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

or

[3] Appropriate work is shown to find 1247 and 152,193, but no further correct work is shown.

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

or

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

or

[2] Appropriate work is shown to find 1247 or 20,407, but no further correct work is shown.

or

[2] 1247 and 20,407, but no work is shown.

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

or

[1] A correct substitution is made in the mortgage payment formula, but no further correct work is shown.

or

[1] 1247 or 20,407, but no work is shown.

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

(35) **[4]** A correct graph is drawn and a correct description is given, such as $x \to -3$, $y \to -\infty$, and as $x \to \infty$, $y \to \infty$.

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

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

or

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

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

or

[1] As $x \to -3$, $y \to -\infty$, or as $x \to \infty$, $y \to \infty$.

[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]** A correct interval is stated, such as (0.35, 0.66), and correct work is shown, and a correct explanation is written.

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

or

[3] Appropriate work is shown, but the sample proportion is used to find the interval.

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

or

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

or

[2] A correct interval, and correct work is shown, but no further correct work is shown.

or

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

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

[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]** $100 = 140\left(\frac{1}{2}\right)^{\frac{5}{h}}$ or equivalent, 10.3002, 18.6, and correct work is shown.

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

[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 one conceptual error and one computational error are made.

or

[3] Appropriate work is shown to find 10.3002, 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] Appropriate work is shown to find 18.6, but no further correct work is shown.

or

[2] 10.3002 and 18.6, but no work is shown.

[1] $100 = 140\left(\frac{1}{2}\right)^{\frac{5}{h}}$, but no further correct work is shown.

or

[1] 10.3002 or 18.6, but no work is shown.

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

Map to the Common Core Learning Standards
Algebra II (Common Core)
June 2017

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

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

Regents Examination in Algebra II (Common Core)

June 2017

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

The *Chart for Determining the Final Examination Score for the June 2017 Regents Examination in Algebra II (Common Core)* will be posted on the Department's web site at: http://www.p12.nysed.gov/assessment/ by Friday, June 16, 2017. Conversion charts provided for previous administrations of the Regents Examination in Algebra II (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 II (Common Core)

Friday, June 16, 2017 — 1:15 to 4:15 p.m.

MODEL RESPONSE SET

Table of Contents

Question 25

25 Given $r(x) = x^3 - 4x^2 + 4x - 6$, find the value of $r(2)$.

$$r(x) = x^3 - 4x^2 + 4x - 6$$
$$r(2) = (2)^3 - 4(2)^2 + 4(2) - 6$$
$$r(2) = 8 - 4(4) + 8 - 6$$
$$r(2) = -6$$

What does your answer tell you about $x - 2$ as a factor of $r(x)$? Explain.

x - 2 would not be a factor of r(x) because when doing substitution in this problem x=2 because

$$\begin{array}{r} x - 2 = 0 \\ +2 \quad +2 \\ \hline x = 2 \end{array}$$

and when 2 was plugged into the equation for x that was not zero.

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

Question 25

25 Given $r(x) = x^3 - 4x^2 + 4x - 6$, find the value of $r(2)$.

$$\begin{array}{r|rrrr} 2 & 1 & -4 & 4 & -6 \\ & & 2 & -4 & 0 \\ \hline & 1 & -2 & 0 & -6 \end{array}$$

$r(2) = -6$

What does your answer tell you about $x - 2$ as a factor of $r(x)$? Explain.

$(x-2)$ is not a factor of $r(x)$ because the remainder was -6 and not 0.

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

Question 25

25 Given $r(x) = x^3 - 4x^2 + 4x - 6$, find the value of $r(2)$.

$r(2) = x^3 - 4x^2 + 4x - 6$

$r(2) = (2)^3 \div 4(2)^2 + 4(2) - 6$

$r(2) = 8 - 16 + 8 - 6$

$\boxed{r(2) = -6}$

What does your answer tell you about $x - 2$ as a factor of $r(x)$? Explain.

$$
\begin{array}{r}
x^2 - 2x + 0x \\
x-2 \,\big)\, x^3 - 4x^2 + 4x - 6 \\
-(x^3 - 2x^2) \\
-2x^2 + 4x - 6 \\
-(-2x^2 + 4x) \\
0x - 6 \\
-(0x + 0) \\
-6
\end{array}
$$

x-2 is not a facter of $x^3 - 4x^2 + 4x - 6$

Score 1: The student gave an incomplete explanation.

25 Given $r(x) = x^3 - 4x^2 + 4x - 6$, find the value of $r(2)$.

$$r(2) = 2^3 - 4(2)^2 + 4(2) - 6$$
$$= 6 - 8 + 8 - 6$$
$$= 0$$

What does your answer tell you about $x - 2$ as a factor of $r(x)$? Explain.

x-2 is a factor of r(x) since the remainder would be zero.

Score 1: The student stated a correct explanation based on an incorrect value.

Question 25

25 Given $r(x) = x^3 - 4x^2 + 4x - 6$, find the value of $r(2)$.

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

$\boxed{r(2) = -22}$

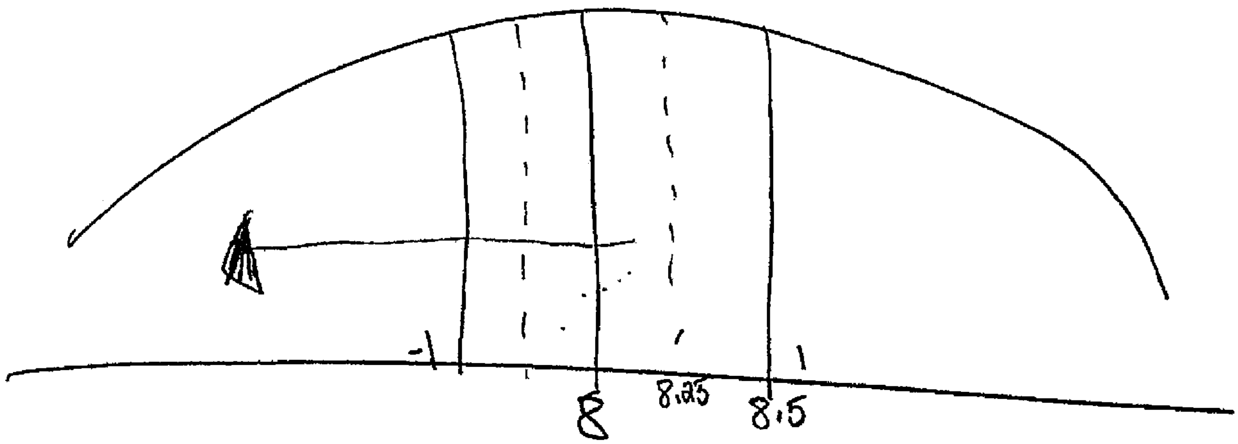
What does your answer tell you about $x - 2$ as a factor of $r(x)$? Explain.

the other factor could be positive since the answer is negative and one of the factors is negative

Score 0: The student gave a completely incorrect response.

26 The weight of a bag of pears at the local market averages 8 pounds with a standard deviation of 0.5 pound. The weights of all the bags of pears at the market closely follow a normal distribution. Determine what percentage of bags, to the *nearest integer*, weighed *less* than 8.25 pounds.

.5



69%

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

Question 26

26 The weight of a bag of pears at the local market averages 8 pounds with a standard deviation of 0.5 pound. The weights of all the bags of pears at the market closely follow a normal distribution. Determine what percentage of bags, to the *nearest integer*, weighed *less* than 8.25 pounds.

19.1 +

50 + 19.1

69%

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

Question 26

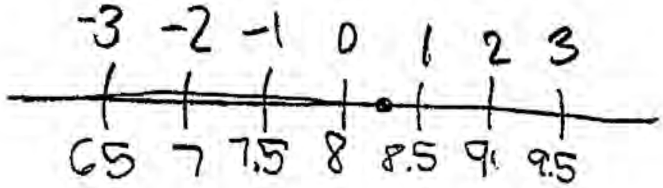
26 The weight of a bag of pears at the local market averages 8 pounds with a standard deviation of 0.5 pound. The weights of all the bags of pears at the market closely follow a normal distribution. Determine what percentage of bags, to the *nearest integer*, weighed *less* than 8.25 pounds.

lower: 1,00
upper: 8.25
μ : 8
σ : 0.5
= .6914624678
= 1.0

Score 1: The student made an error by not converting to a percent correctly.

Question 26

26 The weight of a bag of pears at the local market averages 8 pounds with a standard deviation of 0.5 pound. The weights of all the bags of pears at the market closely follow a normal distribution. Determine what percentage of bags, to the *nearest integer*, weighed *less* than 8.25 pounds.



$\boxed{69.1\%}$

Score 1: The student made a rounding error.

Question 26

26 The weight of a bag of pears at the local market averages 8 pounds with a standard deviation of 0.5 pound. The weights of all the bags of pears at the market closely follow a normal distribution. Determine what percentage of bags, to the *nearest integer*, weighed *less* than 8.25 pounds.

$$\frac{\bar{x}-\bar{x}}{\sigma_x} \qquad \frac{8.25-8}{0.5} = \frac{0.25}{0.5} = 0.5$$

23%

Score 0: The student gave an incorrect response.

Question 27

27 Over the set of integers, factor the expression $4x^3 - x^2 + 16x - 4$ completely.

$4x^3-x^2+16x-4, \quad x^2(4x-1)+4(4x-1)$

$\boxed{(x^2+4)(4x-1)}$

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

Question 27

27 Over the set of integers, factor the expression $4x^3 - x^2 + 16x - 4$ completely.

$(x^2 + 4)(4x - 1)$

$x^2 + 4 = 0$ | $4x - 1 = 0$

$-4 \quad -4$ | $+1 \quad +1$

$\sqrt{x^2} = \sqrt{-4}$ | $\frac{4x}{4} = \frac{1}{4}$

$x = \pm 2i$ | $x = \frac{1}{4}$

Score 1: The student made a conceptual error by finding roots.

Question 27

27 Over the set of integers, factor the expression $4x^3 - x^2 + 16x - 4$ completely.

$x^2(4x-1)+4(4x-1)$

$x^2+4=0 \qquad 4x-1=0$

$\quad -4 \; -4 \qquad\quad +1 \; +1$

$\sqrt{x^2}=\sqrt{-4} \qquad \frac{4x}{4}=\frac{1}{4}$

$x=\sqrt{-4}$

$x=\sqrt{-1}(\sqrt{4})$

$x=i2 \qquad x=1/4$

Score 1: The student wrote $x^2(4x-1)+4(4x-1)$, but showed no further correct work.

Question 27

27 Over the set of integers, factor the expression $4x^3 - x^2 + 16x - 4$ completely.

$4x^3 - x^2 + 16x - 4$

$x^2(4x-1)$ | $4(4x-1)$

$(4x-1)(x^2+4) \to 4x^3 + 16x - x^2 - 4$

$(4x-1)(x+2)(x+2)$

Score 1: The student made one factoring error.

Question 27

27 Over the set of integers, factor the expression $4x^3 - x^2 + 16x - 4$ completely.

$(4x^3 - x^2)(16x - 4)$

$-x^2$

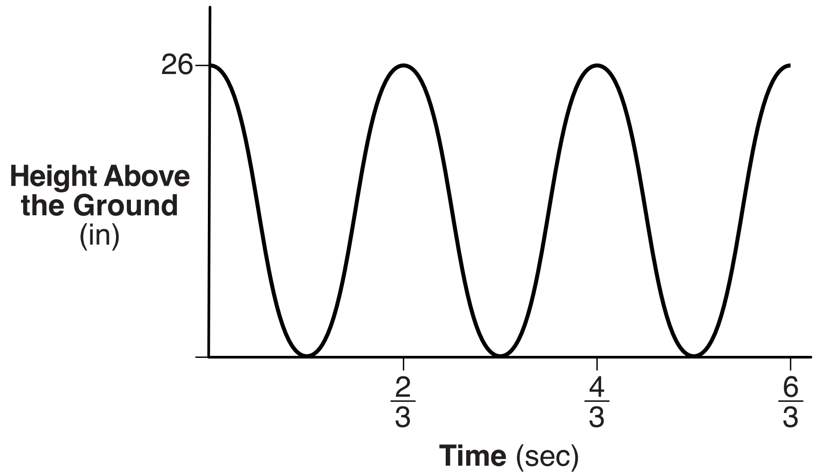
$x^2(-4x - 1) \; -4(+4x - 1)$

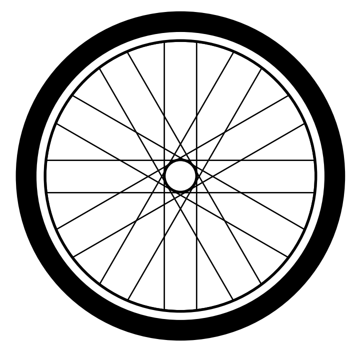
$\boxed{(x^2 - 4)(+4x - 1)}$

Score 0: The student made multiple factoring errors.

Question 28

28 The graph below represents the height above the ground, h, in inches, of a point on a triathlete's bike wheel during a training ride in terms of time, t, in seconds.





Identify the period of the graph and describe what the period represents in this context.

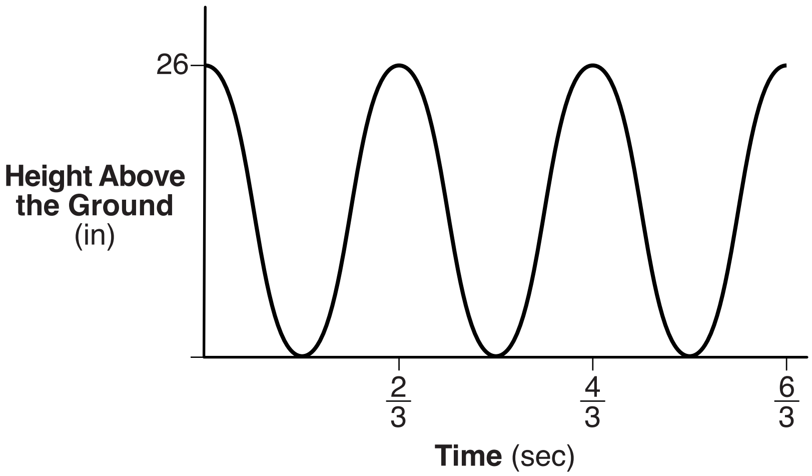
Period $= \frac{2}{3}$

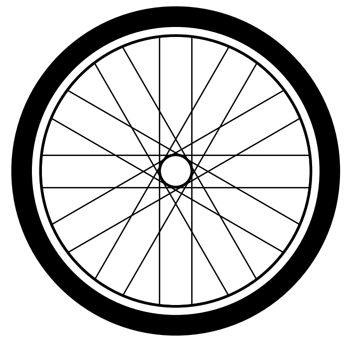
This means it take $\frac{2}{3}$ seconds for the top of the wheel to make a full rotation

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

Question 28

28 The graph below represents the height above the ground, h, in inches, of a point on a triathlete's bike wheel during a training ride in terms of time, t, in seconds.





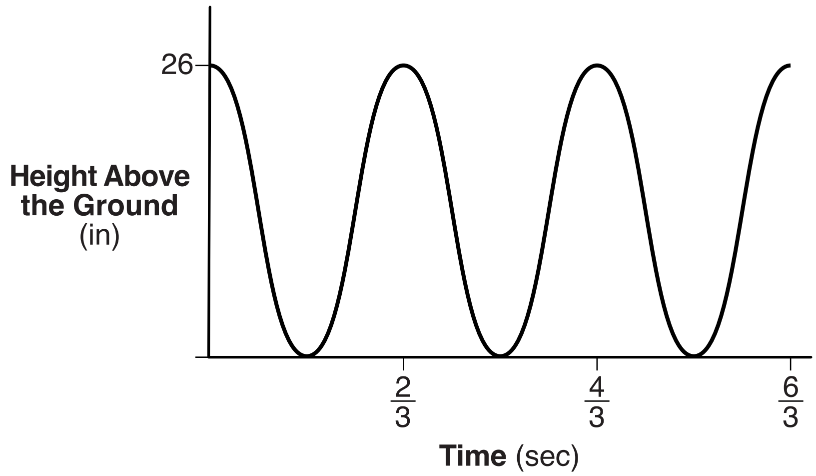
Identify the period of the graph and describe what the period represents in this context.

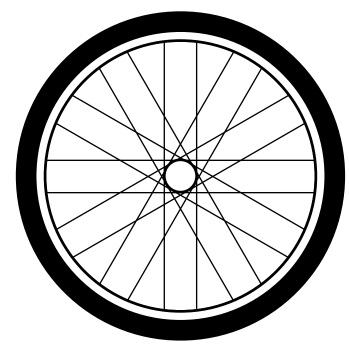
Period is $\frac{2}{3}$, It is the amount of time for the graph to reach the starting height

Score 1: The student did not describe the period in context.

Question 28

28 The graph below represents the height above the ground, h, in inches, of a point on a triathlete's bike wheel during a training ride in terms of time, t, in seconds.





Identify the period of the graph and describe what the period represents in this context.

$\frac{4}{3} - \frac{2}{3} = \frac{2}{3}$

$13\cos\left(\frac{2}{3}x\right) + 13$

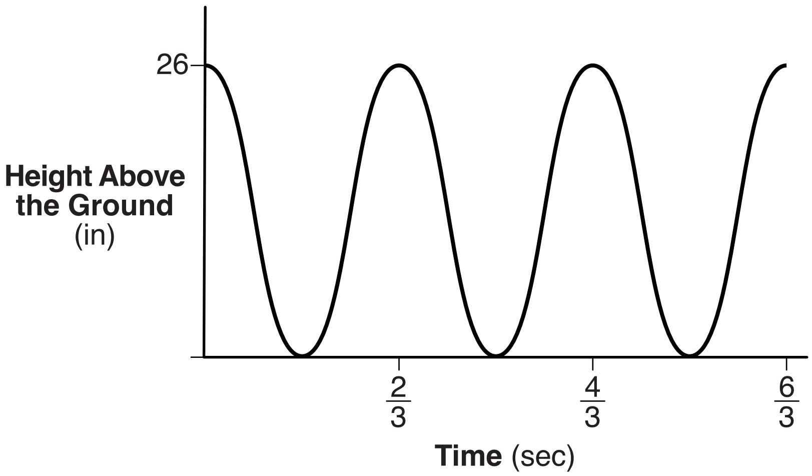
Period = 2/3

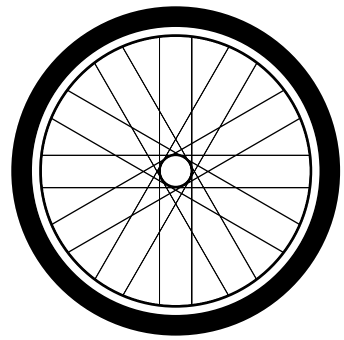
The period is 2/3 and in this context the period is representing the amount of time the rider's wheel is in the air for.

Score 1: The student gave an incomplete description.

Question 28

28 The graph below represents the height above the ground, h, in inches, of a point on a triathlete's bike wheel during a training ride in terms of time, t, in seconds.





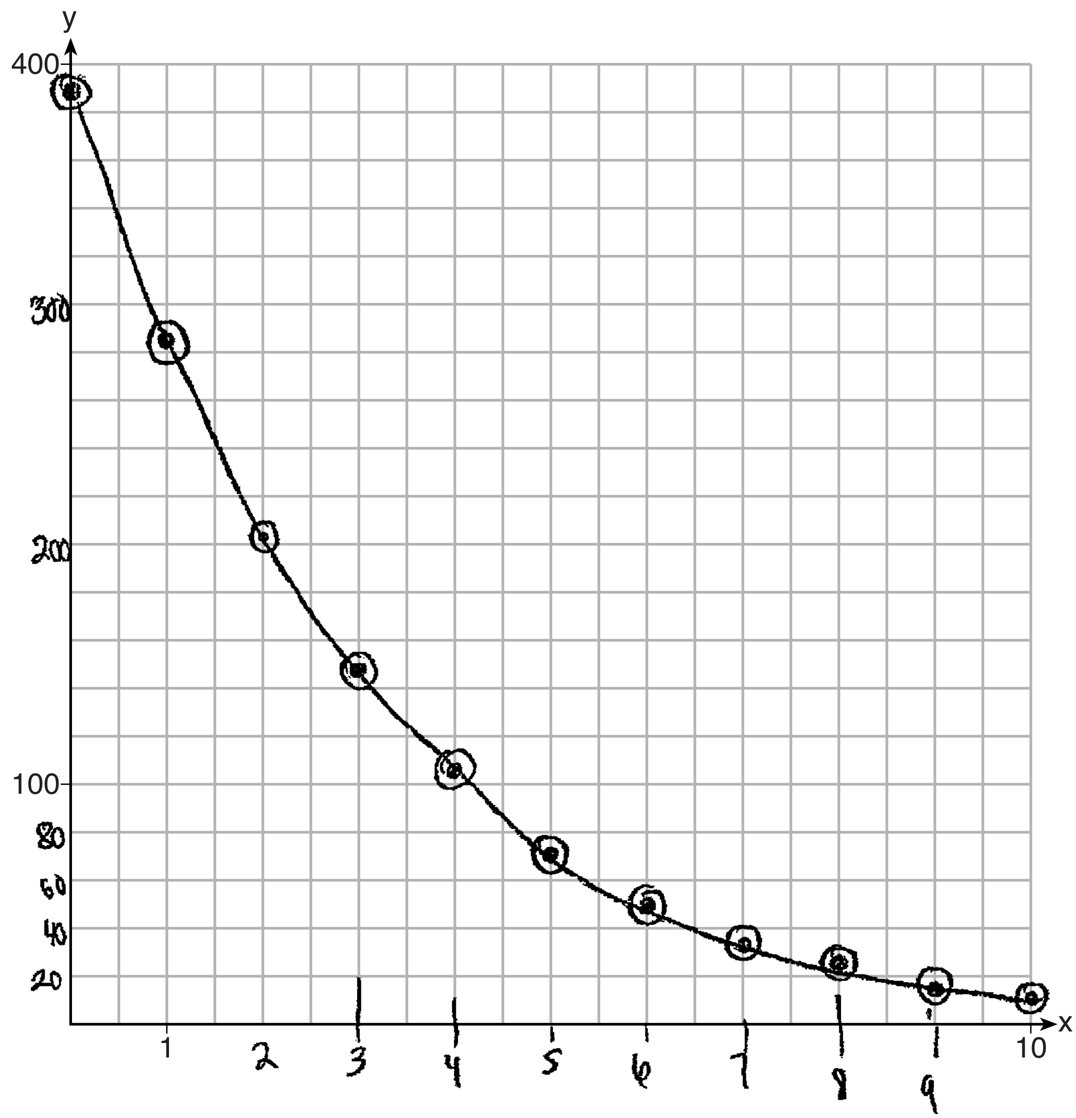
Identify the period of the graph and describe what the period represents in this context.

period represents the amount of full turns the wheel does in a specific amount of time.

Score 0: The student gave a completely incorrect response.

Question 29

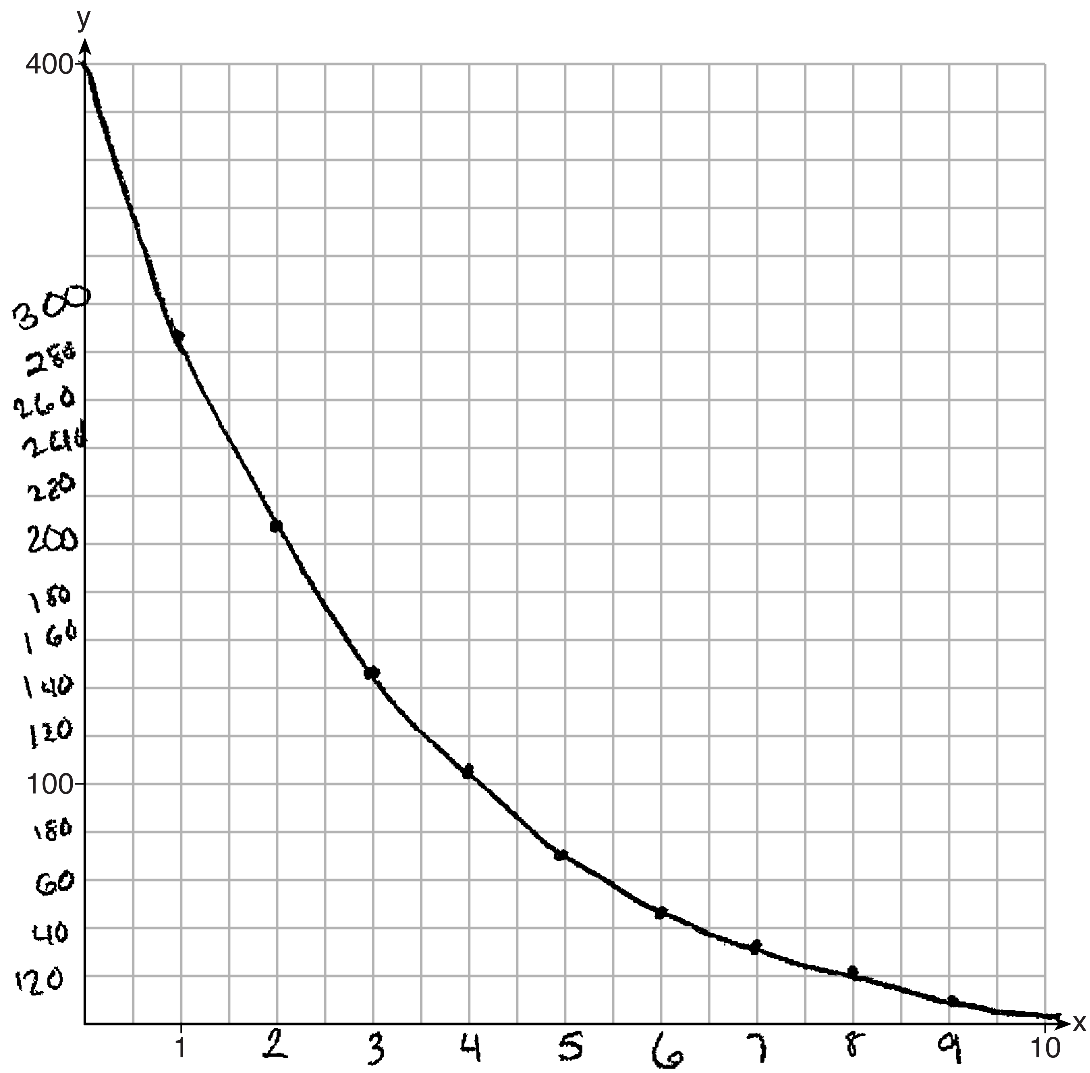
29 Graph $y = 400(.85)^{2x} - 6$ on the set of axes below.



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

Question 29

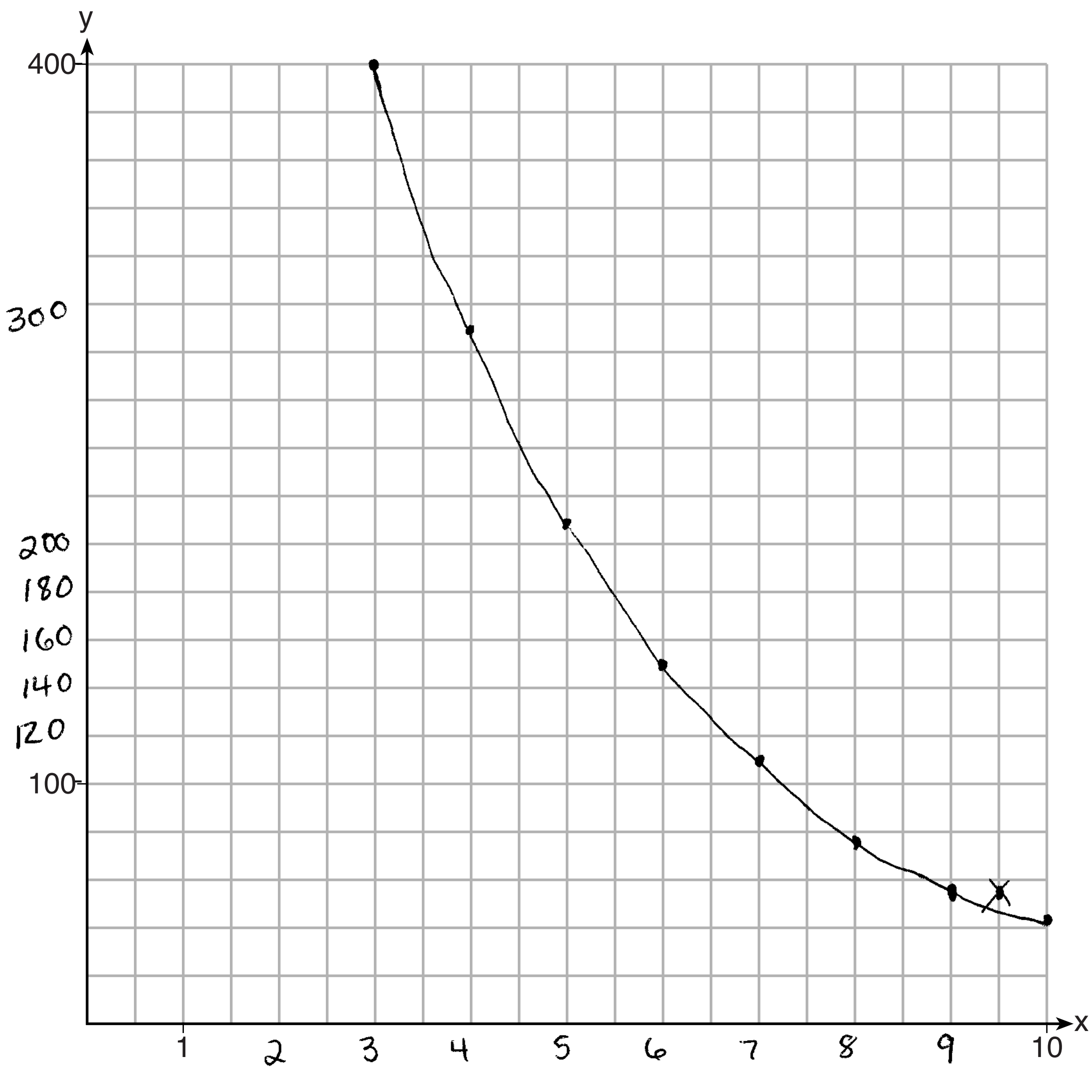
29 Graph $y = 400(.85)^{2x} - 6$ on the set of axes below.



Score 1: The student made an error graphing the y-intercept.

Question 29

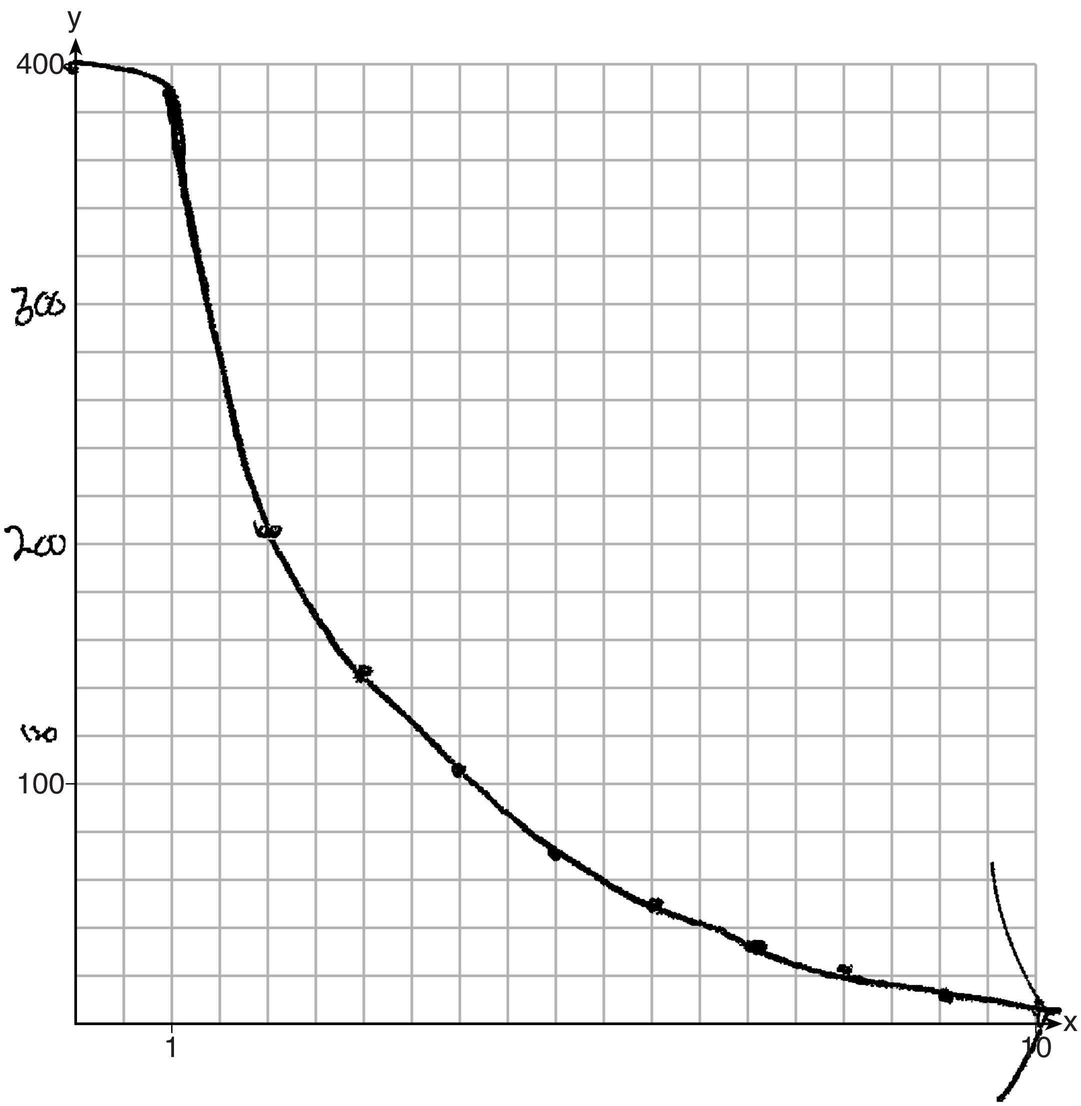
29 Graph $y = 400(.85)^{2x} - 6$ on the set of axes below.



Score 1: The student incorrectly entered the equation as $y = 400(.85)^{2x-6}$.

Question 29

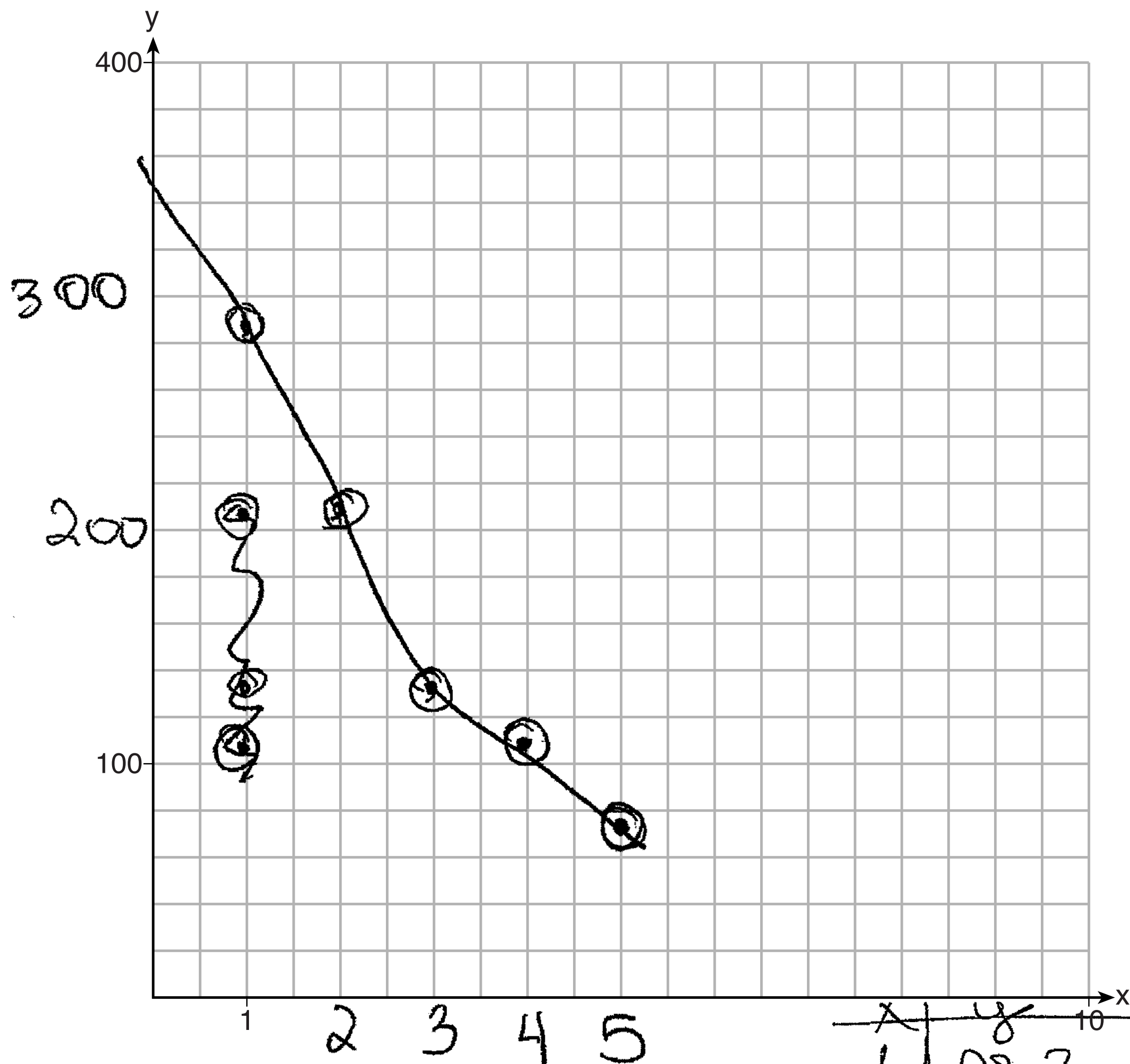
29 Graph $y = 400(.85)^{2x} - 6$ on the set of axes below.



Score 0: The student made multiple graphing errors.

Question 29

29 Graph $y = 400(.85)^{2x} - 6$ on the set of axes below.



$400(.85)^{2(1)} - 6 = 283$

$400(.85)^{2(2)} - 6 =$

x	y
1	283
2	202.8
3	144.86
4	103
5	72.75

Score 0: The student made multiple graphing errors.

Question 30

30 Solve algebraically for all values of x:

$$\sqrt{x-4} + x = 6$$

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

$x^2-6x-6x+36$

$x^2-12x+36$

$\sqrt{x-4} + x = 6$

$-x \quad -x$

$(\sqrt{x-4})^2 = (-x+6)^2$

$\cancel{x-4} = x^2-12x+36$

$\cancel{-x+4} \quad -x+4$

$x^2-13x+40=0$

$(x-8)(x-5)=0$

$x-8=0 \qquad x-5=0$

$+8 \quad +8 \qquad +5 \quad +5$

$\cancel{x=8}$, $x=5$

extraneous

$\sqrt{(8)-4}+8=6 \qquad \sqrt{(5)-4}+5=6$

$\sqrt{4}+8=6 \qquad \sqrt{1}+5=6$

$2+8=6 \qquad 1+5=6$

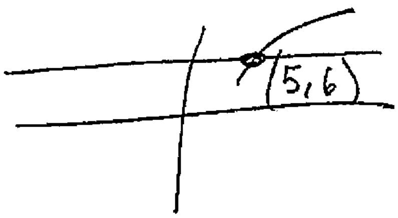
$10 \neq 6 \qquad 6=6$ ✓

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

Question 30

30 Solve algebraically for all values of x:

$$\underbrace{\sqrt{x-4}}_{}^{y_1} + x = \overset{y_2}{6}$$



x	y_1	y_2
4	4	6
5	6	6
8	10	6

$x = 5$

Score 1: The student did not use an algebraic method.

30 Solve algebraically for all values of x:

$$\sqrt{x-4}+x=6$$

$$\sqrt{x-4}=6-x$$

$$x-4=36-12x+x^2$$

$$x^2-13x+40=0$$

$$(x-5)(x-8)=0$$

$$\boxed{x=5,8}$$

Score 1: The student did not reject 8.

Question 30

30 Solve algebraically for all values of x:

$$\sqrt{x-4} + x = 6$$

$$\sqrt{x-4}^{\,2} + x = 6^2$$

$$x-4+x=36$$

$$\underline{\;+4 \qquad\quad +4\;}$$

$$x+x=40$$

$$\frac{2x}{2} = \frac{40}{2}$$

$$\boxed{x=20}$$

Score 0: The student made a conceptual error and did not check for extraneous roots.

Question 31

31 Write $\sqrt[3]{x} \bullet \sqrt{x}$ as a single term with a rational exponent.

$x^{1/3} \cdot x^{1/2} =$

$x^{5/6}$

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

Question 31

31 Write $\sqrt[3]{x} \cdot \sqrt{x}$ as a single term with a rational exponent.

$$x^{\frac{1}{3}} \cdot x^{\frac{1}{2}} = x^{\left(\overset{\frac{2}{6}}{\frac{1}{3}} + \overset{\frac{3}{6}}{\frac{1}{2}}\right)} = x^{5/6}$$

$$= \boxed{\sqrt[6]{x^5}}$$

Score 1: The student's response did not have a rational exponent.

Question 31

31 Write $\sqrt[3]{x} \cdot \sqrt{x}$ as a single term with a rational exponent.

$\sqrt[3]{x} \cdot \sqrt{x}$

$x^{1/3} \cdot x^{1/2} \rightarrow \frac{1}{3} \cdot \frac{1}{2} = \frac{1}{6}$

$x^{1/6}$

Score 1: The student multiplied the exponents.

Question 31

31 Write $\sqrt[3]{x} \bullet \sqrt{x}$ as a single term with a rational exponent.

$\sqrt[3]{x^1} \cdot \sqrt[2]{x^1}$

$\sqrt[6]{x^2}$

$x^{2/6}$

Score 1: The student made an error when multiplying radicands with different indices.

Question 31

31 Write $\sqrt[3]{x} \bullet \sqrt{x}$ as a single term with a rational exponent.

$\sqrt[3]{x} \cdot \sqrt{x}$

roots

$\sqrt[3]{x^2}$

$x^{\frac{2}{3}}$

Score 0: The student made an error when multiplying radicands with different indices and assumed the index of $\sqrt{x}$ to be 1.

Question 31

31 Write $\sqrt[3]{x} \bullet \sqrt{x}$ as a single term with a rational exponent.

$$\sqrt[3]{x} \cdot \sqrt{x}$$

$$\sqrt[3]{x^2}$$

Score 0: The student gave an incorrect response.

Question 32

32 Data collected about jogging from students with two older siblings are shown in the table below.

	Neither Sibling Jogs	One Sibling Jogs	Both Siblings Jog
Student Does Not Jog	1168	1823	1380
Student Jogs	188	416	400

Using these data, determine whether a student with two older siblings is more likely to jog if one sibling jogs or if both siblings jog. Justify your answer.

$$P(SJ|OJ) = \frac{P(SJ \cap OJ)}{P(OJ)} = \frac{\frac{416}{5375}}{\frac{2239}{5375}} = .19$$

$$P(SJ|BJ) = \frac{P(SJ \cap BJ)}{P(BJ)} = \frac{\frac{400}{5375}}{\frac{1780}{5375}} = .22$$

A student is more likely to jog if both siblings jog since after calculating the probability of a student jogging given their sibling jogs, there is a higher probability for a student to jog if both do

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

Question 32

32 Data collected about jogging from students with two older siblings are shown in the table below.

	Neither Sibling Jogs	One Sibling Jogs	Both Siblings Jog
Student Does Not Jog	1168	1823	1380
Student Jogs	188	416	400
		2239	1780

Using these data, determine whether a student with two older siblings is more likely to jog if one sibling jogs or if both siblings jog. Justify your answer.

P(S | one)

$\frac{416}{2239}$

.1858

P(S | two)

$\frac{400}{1780}$

.2247

more likely

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

Question 32

32 Data collected about jogging from students with two older siblings are shown in the table below.

	Neither Sibling Jogs	One Sibling Jogs	Both Siblings Jog
Student Does Not Jog	1168	1823	1380
Student Jogs	188	416	400

Using these data, determine whether a student with two older siblings is more likely to jog if one sibling jogs or if both siblings jog. Justify your answer.

$P(J|O) = \frac{P(J \text{ and } O)}{P(O)}$ $\quad$ $P(J/B) = \frac{P(J \text{ and } B)}{P(B)}$

$= 416 / 2239$ $\quad$ $= 400/1780$

$P(J|O) = 0.187$ or 18.7% $\quad$ $P(J/B) = 0.225$ or 22.5%

It is more likely a student will jog if both siblings jog b/c the probability of a kid jogging whose siblings both jog is 22.5%, where a kid with one sibling who jogs – probability of jogging is 18.7%.

Score 1: The student made a computational error evaluating $P(J|O)$.

Question 32

32 Data collected about jogging from students with two older siblings are shown in the table below.

	Neither Sibling Jogs	One Sibling Jogs	Both Siblings Jog
Student Does Not Jog	1168	1823	1380
Student Jogs	188	416	400

Using these data, determine whether a student with two older siblings is more likely to jog if one sibling jogs or if both siblings jog. Justify your answer.

$\frac{416}{5375} = .077 = 7.7\%$

$\frac{400}{5375} = .074 = 7.4\%$

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

Question 33

33 Solve the following system of equations algebraically for all values of x, y, and z:

$$\begin{cases} x + y + z = 1 \\ \cancel{2x + 4y + 6z = 2} \\ -x + 3y - 5z = 11 \end{cases}$$

$2x + 2y + 2z = 2$

$-2x + 4y + 6z = 2$

$-2y - 4z = 0$

$y + 2z = 0$

$4y - 4z = 12$

$y - z = 3$

$-3z = 3$

$z = -1$

$y = 2$

$x = 0$

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

Question 33

33 Solve the following system of equations algebraically for all values of x, y, and z:

$$x + y + z = 1$$
$$2x + 4y + 6z = 2$$
$$(-x + 3y - 5z = 11)\ 2$$

$y = 3$
$z = \frac{3}{2}$
$x = \frac{-7}{2}$

$(x + y + z = 1)\ 2$
$2x + 4y + 6z = 2$

$\cancel{2x} + 2y + 2z = 2$
$-\cancel{2x} + 4y + 6z = 2$

$-2y - 4z = 0$
$+10y - 4z = 24$

$\frac{\cancel{8}y}{\cancel{8}} = \frac{24}{8}$

$y = 3$

$x + \frac{6}{2} + \frac{3}{2} = 11$

$x + \frac{9}{2} = \frac{2}{2} - \frac{9}{2}$
$\quad - \frac{9}{2}$

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

$+\ \cancel{2x} + 4y + 6z = 2$
$-\cancel{2x} + 6y - 10z = 22$

$10y - 4z = 24$

$10(3) - 4z = 24$
$3\cancel{0} - 4z = 24$
$-3\cancel{0} \qquad -30$

$\frac{\cancel{-4}z}{\cancel{-4}} = \frac{-6}{-4}$

$z = \frac{3}{2}$

$\boxed{y = 3,\ z = \frac{3}{2},\ x = \frac{-7}{2}}$

Score 3: The student made a computational error when subtracting $10y$ from $-2y$.

Question 33

33 Solve the following system of equations algebraically for all values of x, y, and z:

$z=1$
$x=0$
$y=0$

$\cancel{x}+y+z=1$
$-\cancel{x}+3y-5z=11$
$4y-4z=12$
$2y-8z=0\,(-2)$

$x+y+z=1\,(-2)$
$-\cancel{2x}-2y-2z=-2$
$\cancel{2x}+4y-6z=2$
$2y-8z=0$

$\cancel{4y}-4z=12$
$-\cancel{4y}+16z=0$
$\frac{12z}{12}=\frac{12}{12}$
$z=1$

$-3x-\cancel{3y}-3z=-3$
$-x+\cancel{3y}-5z=11$
$-4x-\cancel{8z}=8$
$-8x+\cancel{8z}=-8$
$-12x=0$
$x=0$

$-4x-\cancel{4y}-4z=-4$
$2x+\cancel{4y}+6z=2$
$-2x+2z=-2\,(4)$

$0+y+1=1$
$y=0$

Score 3: The student made one transcription error by writing $2x + 4y - 6z = 2$.

Question 33

33 Solve the following system of equations algebraically for all values of x, y, and z:

① $\cancel{x} + y + z = 1$

$\cancel{x} + 3y - 5z = 11$

$4y - 4z = 12$

② $2x + 4y + 6z = 2$

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

$\cancel{2x} + 4y + 6z = 2$

$-\cancel{2x} - 2y - 2z = -2$

$2y + 4z = 0$

③ $4y - \cancel{4z} = 12$

$2y + \cancel{4z} = 0$

$\frac{6y}{6} = \frac{12}{6}$

$\boxed{y = 2}$

④ $2x + 4y + 6z = 2$

Score 2: The student gave one solution with appropriate work.

Question 33

33 Solve the following system of equations algebraically for all values of x, y, and z:

$$-1 \quad x + y + z = 1$$
$$2x + 4y + 6z = 2$$
$$2 \quad -x + 3y - 5z = 11$$

$$\begin{array}{l} -6x - 6y - 6z = 1 \\ \underline{2x + 4y + 6z = 2} \\ -4\cancel{x} - 2y = 3 \\ \underline{4\cancel{x} + 8y = 12} \\ \frac{6y}{6} = \frac{15}{6} \\ y = 2.5 \end{array}$$

$$\begin{array}{l} -2\cancel{x} + 6y - 10z = 22 \\ \underline{+\ \cancel{2x} + 4y + 6z = 2} \\ 10y - 4z = 24 \\ \cdot(2.5) \\ 2\cancel{5} - 4z = 24 \\ \underline{-\cancel{25} \qquad -25} \\ \frac{-4z}{-4} = \frac{-1}{-4} \\ z = .25 \end{array}$$

$$\begin{array}{l} 5x + 5y + \cancel{5z} = 1 \\ \underline{-x + 3y - \cancel{5z} = 11} \\ 4x + 8y = 12 \\ 4x + 8(2.5) = 12 \end{array}$$

Score 2: The student made a computational error, but found appropriate values for y and z.

Question 33

33 Solve the following system of equations algebraically for all values of x, y, and z:

$$x + y + z = 1$$
$$-x + 3y - 5z = 11$$
$$4y - 4z = 12$$

$$2x + 4y + 6z = 2$$
$$+ \quad -2x + 6y - 10z = 22$$
$$10y - 4z = 24$$

$$4y - 4z = 12$$
$$10y - 4z = 24$$
$$\cancel{14y = 36}$$

Score 1: The student did enough work to create a system of equations.

Question 33

33 Solve the following system of equations algebraically for all values of x, y, and z:

$$\begin{aligned} + \quad \cancel{x}+y+z&=1 \\ \cancel{-x}+3y-5z&=11 \\ \hline 4y+6z&=12 \end{aligned}$$

$$\begin{aligned} 2x+4\cancel{y}+6\cancel{z}&=2 \\ \div \quad \cancel{4y}+\cancel{6z}&=12 \\ \hline \frac{2x}{2}&=\frac{10}{2} \\ \boxed{x=5} \end{aligned}$$

$$\begin{aligned} -3(x+y+z)&=1 \\ -3x-3\cancel{y}-3z&=-3 \\ - \quad -5+\cancel{3}y-5z&=11 \\ \hline 2+2z&=-14 \\ -2 \qquad &\quad -2 \\ \hline \frac{2z}{2}&=\frac{-16}{2} \\ \boxed{z=-8} \end{aligned}$$

$$\begin{aligned} 5+y+(-8)&=1 \\ -3y&=1 \\ +3 \quad &\quad +3 \\ \hline \boxed{y=4} \end{aligned}$$

Score 0: The student gave an incorrect response.

Question 34

34 Jim is looking to buy a vacation home for \$172,600 near his favorite southern beach. The formula to compute a mortgage payment, M, is $M = P \bullet \frac{r(1+r)^N}{(1+r)^N - 1}$ where P is the principal amount of the loan, r is the monthly interest rate, and N is the number of monthly payments. Jim's bank offers a monthly interest rate of 0.305% for a 15-year mortgage.

With no down payment, determine Jim's mortgage payment, rounded to the *nearest dollar*.

$$M = (172{,}600) \cdot \frac{0.00305(1+0.00305)^{12 \cdot 15}}{(1+0.00305)^{12 \cdot 15} - 1}$$

$$M = \frac{(172{,}600)(0.00305)(1.00305)^{180}}{(1.00305)^{180} - 1}$$

$$M = 1247.493394$$

$$\boxed{\$1247}$$

Algebraically determine and state the down payment, rounded to the *nearest dollar*, that Jim needs to make in order for his mortgage payment to be \$1100.

Let x = down payment

$$1100 = \frac{(172{,}600 - x)(0.00305)(1.00305)^{180}}{(1.00305)^{180} - 1}$$

$$(172{,}600 - x)(0.00305)(1.00305)^{180} = (1100)(1.00305^{180} - 1)$$

$$172{,}600 = \frac{(1100)(1.00305^{180} - 1)}{(0.00305)(1.00305)^{180}}$$

$$x = 172{,}600 - \frac{(1100)(1.00305^{180} - 1)}{(0.00305)(1.00305)^{180}}$$

$$\boxed{\$20{,}407}$$

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

34 Jim is looking to buy a vacation home for \$172,600 near his favorite southern beach. The formula to compute a mortgage payment, M, is $M = P \bullet \frac{r(1+r)^N}{(1+r)^N - 1}$ where P is the principal amount of the loan, r is the monthly interest rate, and N is the number of monthly payments. Jim's bank offers a monthly interest rate of 0.305% for a 15-year mortgage.

With no down payment, determine Jim's mortgage payment, rounded to the *nearest dollar*.

.0027767222

$$M = P \cdot \frac{r(1+r)^N}{(1+r)^N - 1}$$

$$M = 172.600 \cdot \frac{.00305(1+.00205)^{180}}{((1+.00305)^{180} - 1}$$

$$M = 1366.$$

Algebraically determine and state the down payment, rounded to the *nearest dollar*, that Jim needs to make in order for his mortgage payment to be \$1100.

$M = 1{,}100$

$= .0079125174$

$1{,}100 = x \cdot (.0079125179)$

$x = 139{,}020$

$$\begin{array}{r} 172{,}600 \\ -139{,}020 \\ \hline \$33{,}580 \end{array}$$

Down payment

Score 3: The student made a transcription error before calculating the fraction.

Question 34

34 Jim is looking to buy a vacation home for \$172,600 near his favorite southern beach. The formula to compute a mortgage payment, M, is $M = P \bullet \frac{r(1 + r)^N}{(1 + r)^N - 1}$ where P is the principal amount of the loan, r is the monthly interest rate, and N is the number of monthly payments. Jim's bank offers a monthly interest rate of 0.305% for a 15-year mortgage.

With no down payment, determine Jim's mortgage payment, rounded to the *nearest dollar*.

$$M = 172600 \cdot \frac{.00305(1+.00305)^{180}}{(1+.00305)^{180} - 1}$$

$$M = 1247.493394$$

Algebraically determine and state the down payment, rounded to the *nearest dollar*, that Jim needs to make in order for his mortgage payment to be \$1100.

$$\frac{1100}{1000} = P \cdot \frac{.00305(1+.00305)^{180}}{(1+.00305)^{180} - 1}$$

$$\frac{1100}{.0072276558} = \frac{P \cdot .0072276558}{.0072276558}$$

$$P = 152193.1906$$

$$\begin{array}{r} 172600 \\ -\ 152193.1906 \\ \hline 20406.80935 \end{array}$$

Score 3: The student made a rounding error.

Question 34

34 Jim is looking to buy a vacation home for \$172,600 near his favorite southern beach. The formula to compute a mortgage payment, M, is $M = P \bullet \dfrac{r(1+r)^N}{(1+r)^N - 1}$ where P is the principal amount of the loan, r is the monthly interest rate, and N is the number of monthly payments. Jim's bank offers a monthly interest rate of 0.305% for a 15-year mortgage.

With no down payment, determine Jim's mortgage payment, rounded to the *nearest dollar*.

$$172{,}600 \bullet \frac{.00305(1+.00305)^{180}}{(1+.00305)^{180}-1} = \frac{.005276727\text{2}}{.730074504.}$$

$$= \underline{1247 \text{ dollars}}$$

Algebraically determine and state the down payment, rounded to the *nearest dollar*, that Jim needs to make in order for his mortgage payment to be \$1100.

$$x \bullet \frac{.0052767272}{.730074504} = 1100$$

Score 2: The student did not calculate the down payment.

Question 34

34 Jim is looking to buy a vacation home for \$172,600 near his favorite southern beach. The formula to compute a mortgage payment, M, is $M = P \bullet \dfrac{r(1+r)^N}{(1+r)^N - 1}$ where P is the principal amount of the loan, r is the monthly interest rate, and N is the number of monthly payments. Jim's bank offers a monthly interest rate of 0.305% for a 15-year mortgage.

With no down payment, determine Jim's mortgage payment, rounded to the *nearest dollar*.

$$M = 172600 \cdot \frac{.305(1+.305)^{15}}{(1+.305)^{15}-1}$$

\$ 53632

Algebraically determine and state the down payment, rounded to the *nearest dollar*, that Jim needs to make in order for his mortgage payment to be \$1100.

$$1100 = x \cdot \frac{.305(1+.305)^{15}}{(1.305)^{15}-1}$$

$x = 3540.04$

$172600 - 3540.04 = 169059.96$

Score 1: The student used incorrect values to find the mortgage payment. The down payment was rounded incorrectly with these values.

Question 34

34 Jim is looking to buy a vacation home for \$172,600 near his favorite southern beach. The formula to compute a mortgage payment, M, is $M = P \bullet \frac{r(1+r)^N}{(1+r)^N - 1}$ where P is the principal amount of the loan, r is the monthly interest rate, and N is the number of monthly payments. Jim's bank offers a monthly interest rate of 0.305% for a 15-year mortgage.

With no down payment, determine Jim's mortgage payment, rounded to the *nearest dollar*.

$$M = 172,600 \cdot \frac{.00305(1.00305)^{15}}{(1.00305)^{15} - 1}$$

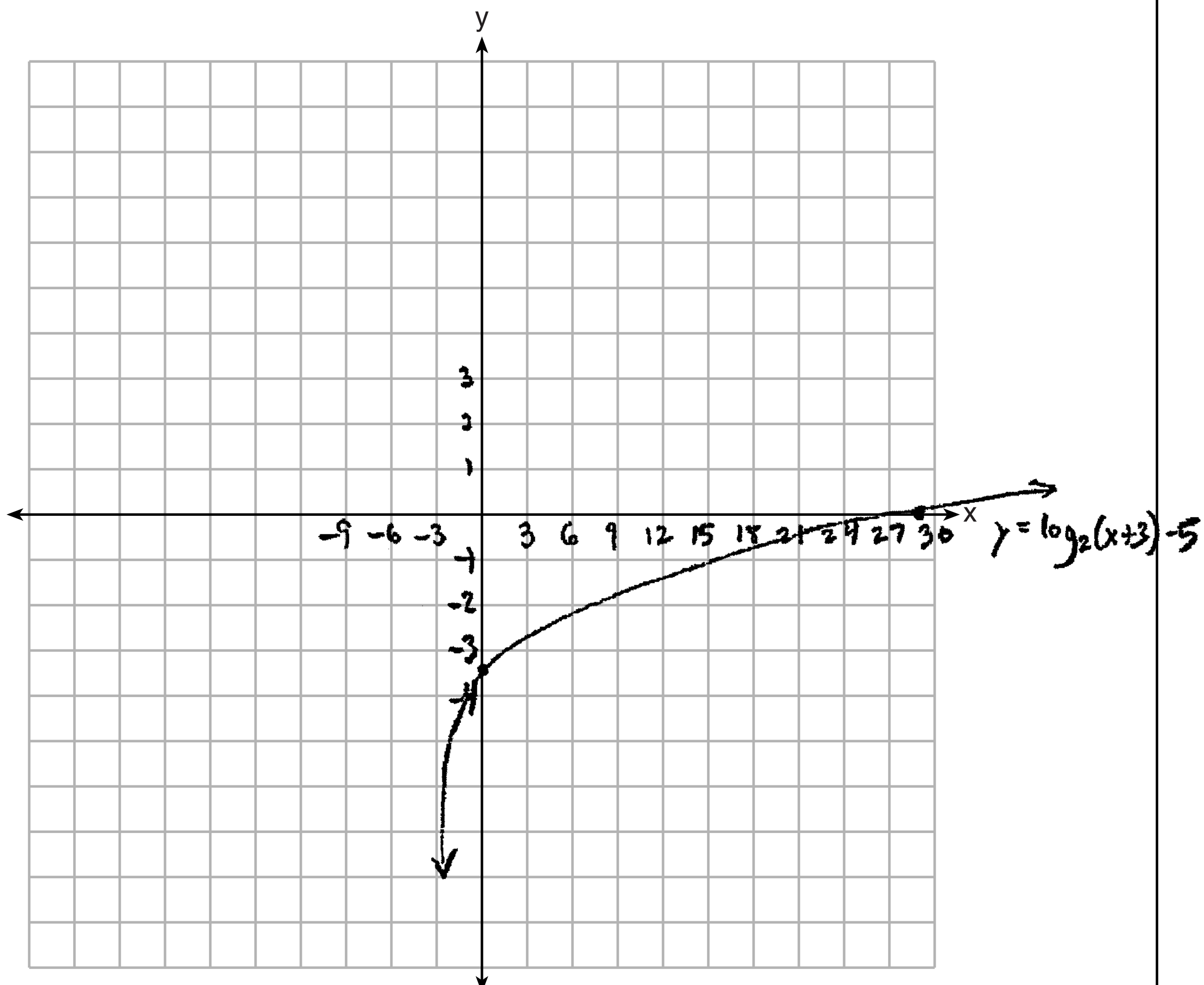
$$M = 11,806$$

Algebraically determine and state the down payment, rounded to the *nearest dollar*, that Jim needs to make in order for his mortgage payment to be \$1100.

Score 0: The student used 15 instead of 180 and made a computational error.

Question 35

35 Graph $y = \log_2(x + 3) - 5$ on the set of axes below. Use an appropriate scale to include *both* intercepts.



Describe the behavior of the given function as x approaches -3 and as x approaches positive infinity.

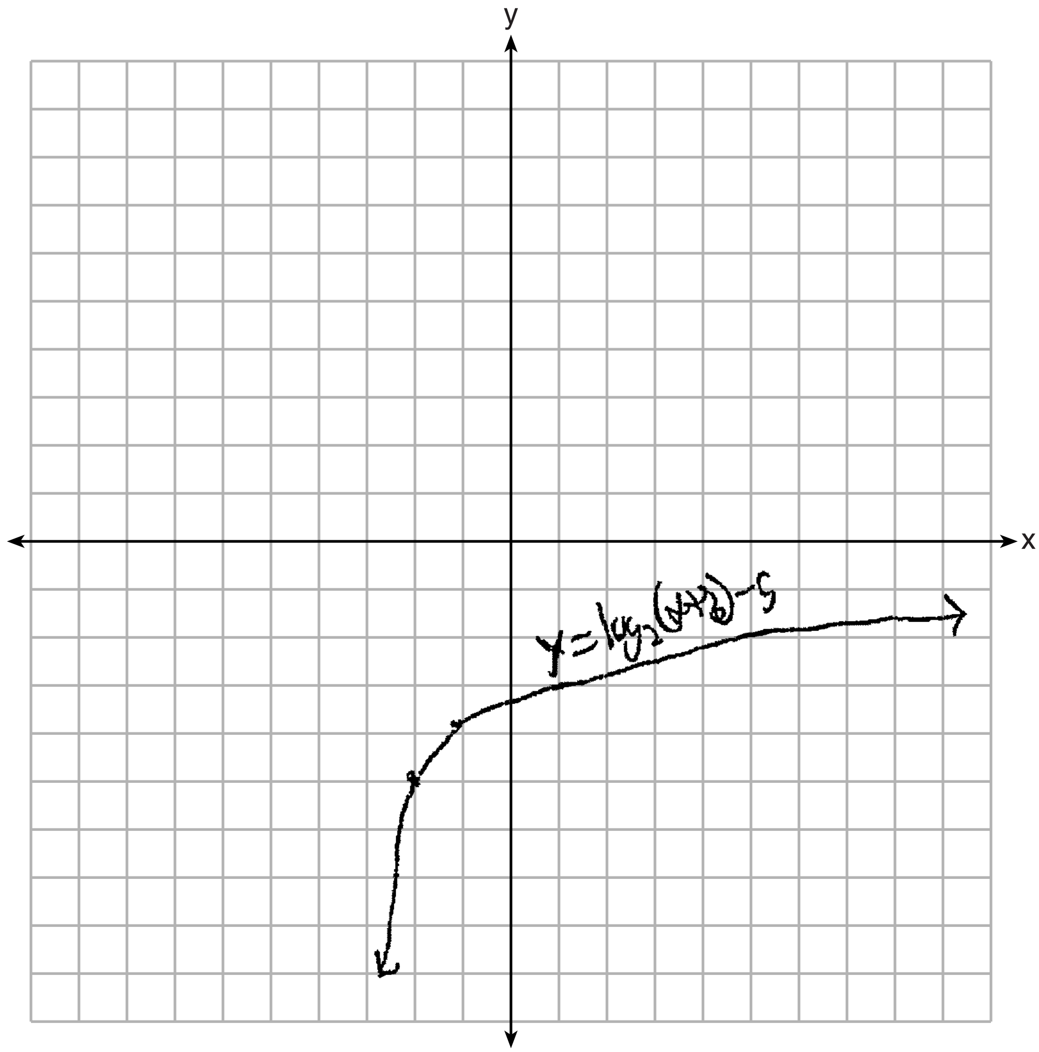
As $x \to -3$, $f(x) \to -\infty$

As $x \to \infty$, $f(x) \to \infty$

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

Question 35

35 Graph $y = \log_2(x + 3) - 5$ on the set of axes below. Use an appropriate scale to include *both* intercepts.



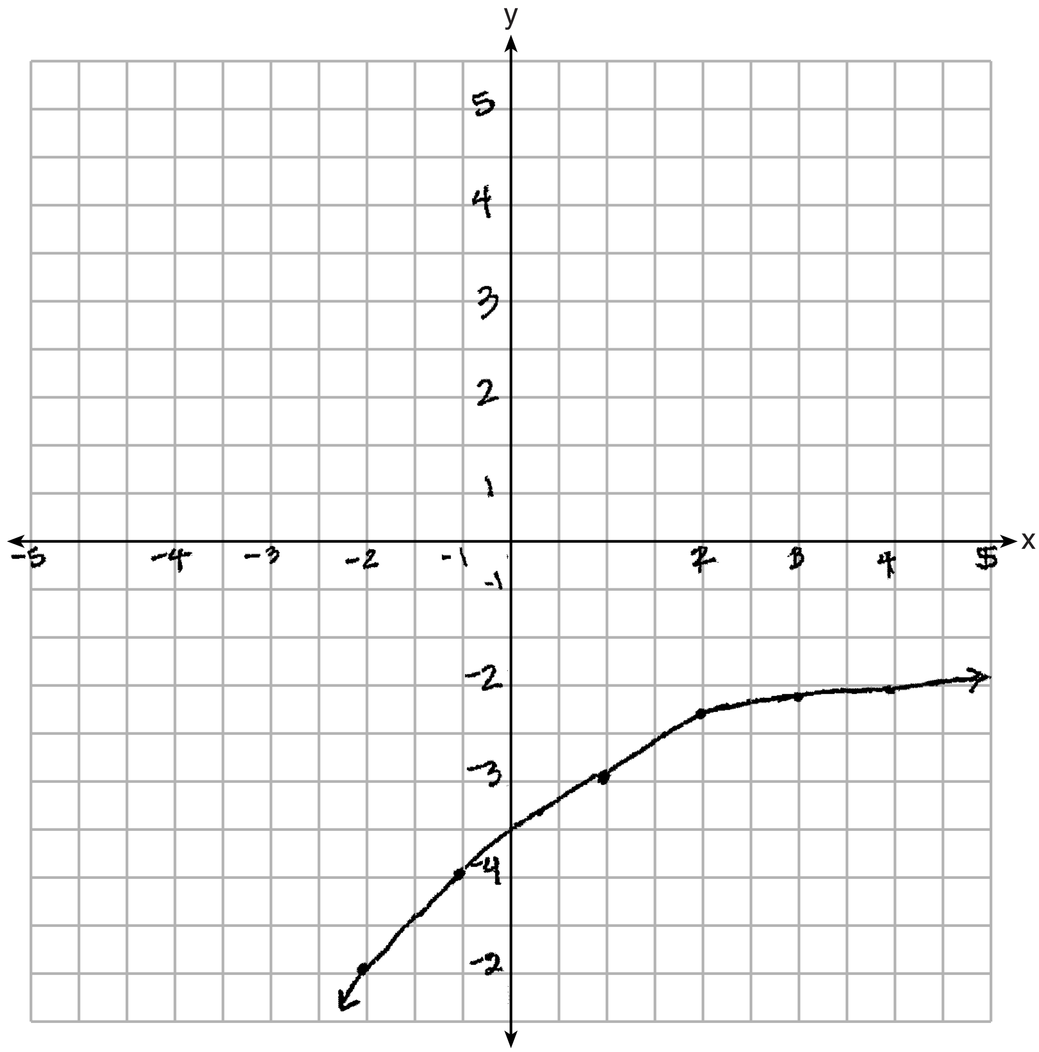
Describe the behavior of the given function as x approaches -3 and as x approaches positive infinity.

As x approaches -3, y approaches negative infinity.
As x approaches positive infinity, y approaches positive infinity

Score 3: The student did not graph both intercepts.

Question 35

35 Graph $y = \log_2(x + 3) - 5$ on the set of axes below. Use an appropriate scale to include *both* intercepts.



Describe the behavior of the given function as x approaches -3 and as x approaches positive infinity.

$x \to -3$

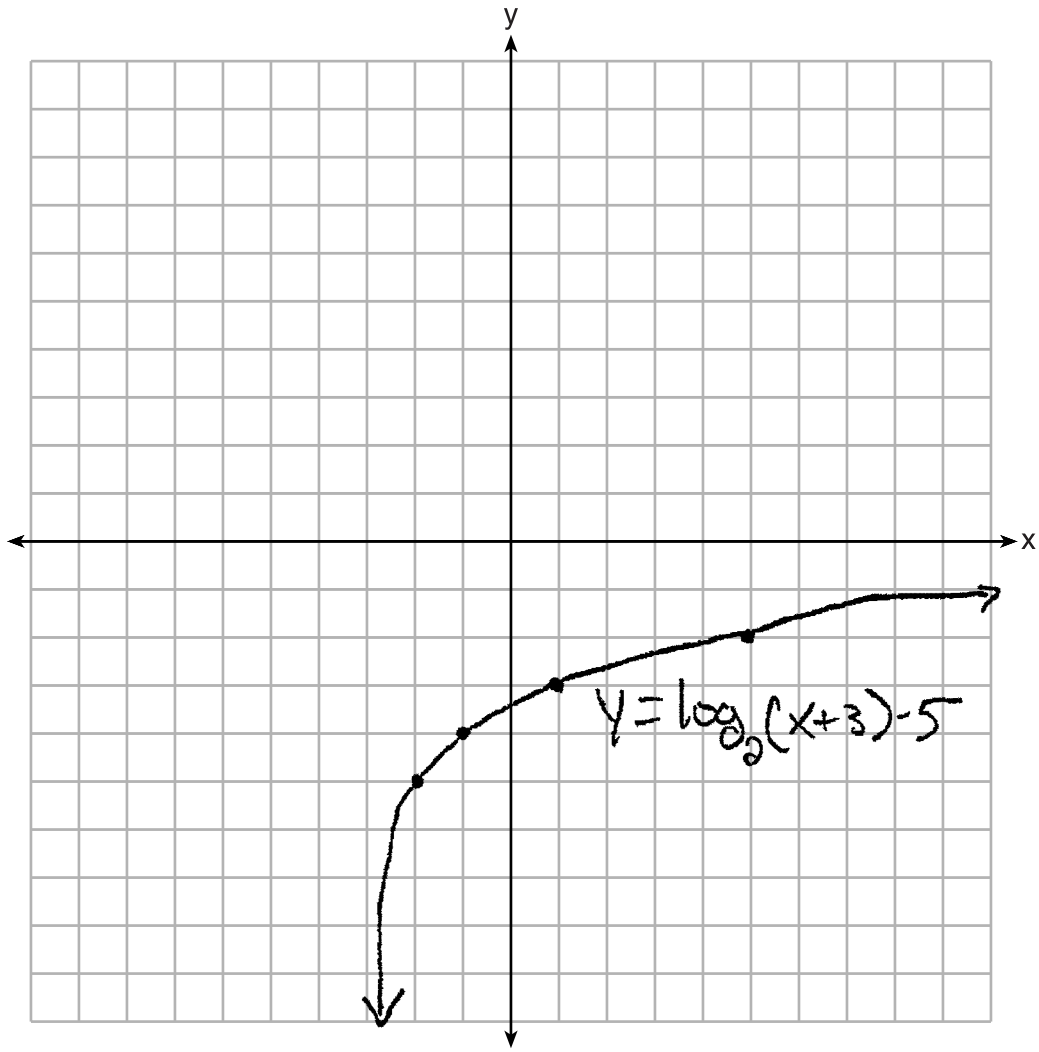
$x \to \infty$

As x approaches -3, the end behavior is to negative infinity. As x approaches positive infinity, the end behavior is to positive infinity.

Score 2: The student gave an appropriate description, but the graph was incorrect.

Question 35

35 Graph $y = \log_2(x + 3) - 5$ on the set of axes below. Use an appropriate scale to include *both* intercepts.



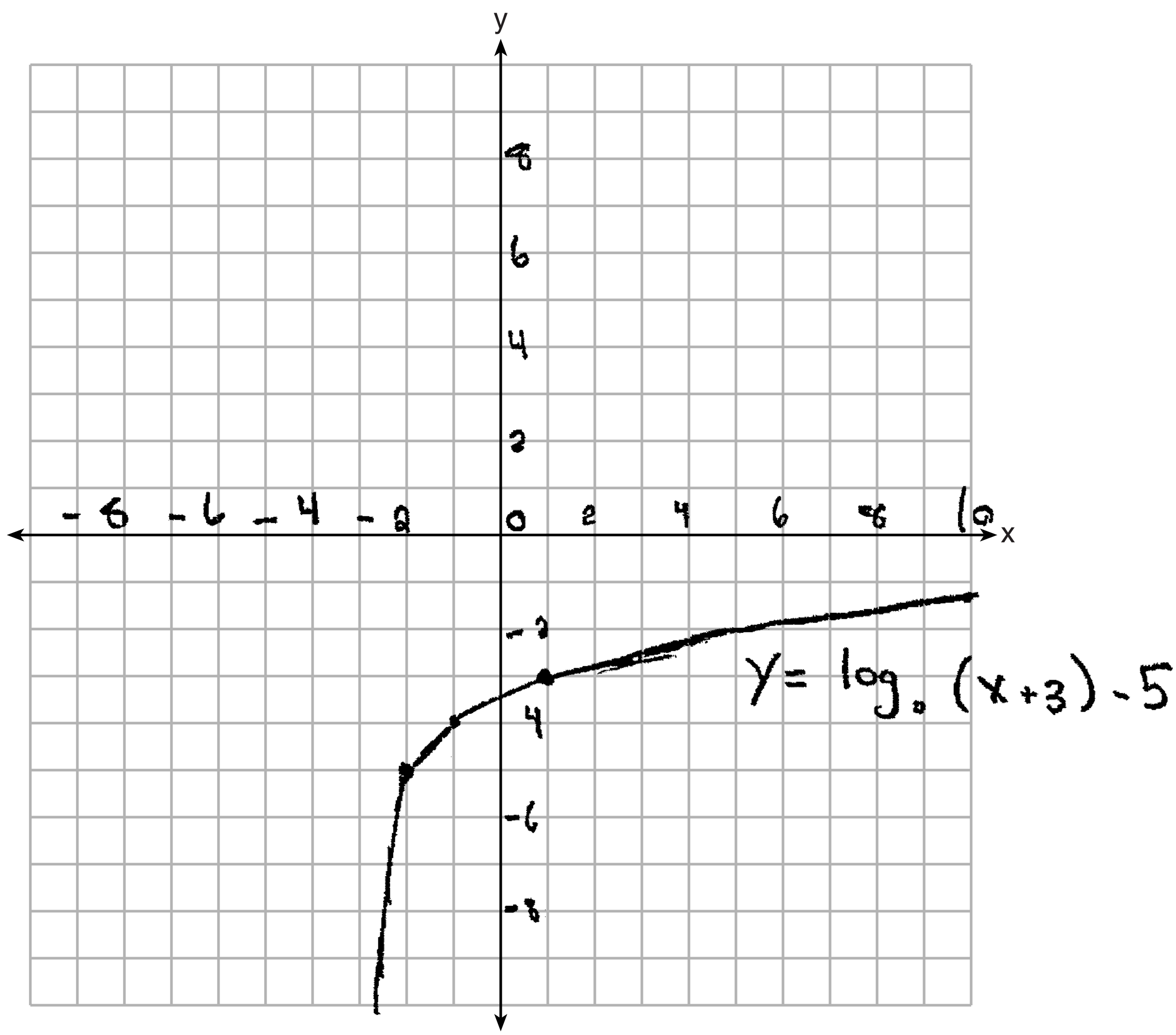
Describe the behavior of the given function as x approaches -3 and as x approaches positive infinity.

As x approaetes positive infinity so does the graph, It rises above -3

Score 2: The student did not graph both intercepts and only described the right end behavior correctly.

Question 35

35 Graph $y = \log_2(x + 3) - 5$ on the set of axes below. Use an appropriate scale to include *both* intercepts.



Describe the behavior of the given function as x approaches -3 and as x approaches positive infinity.

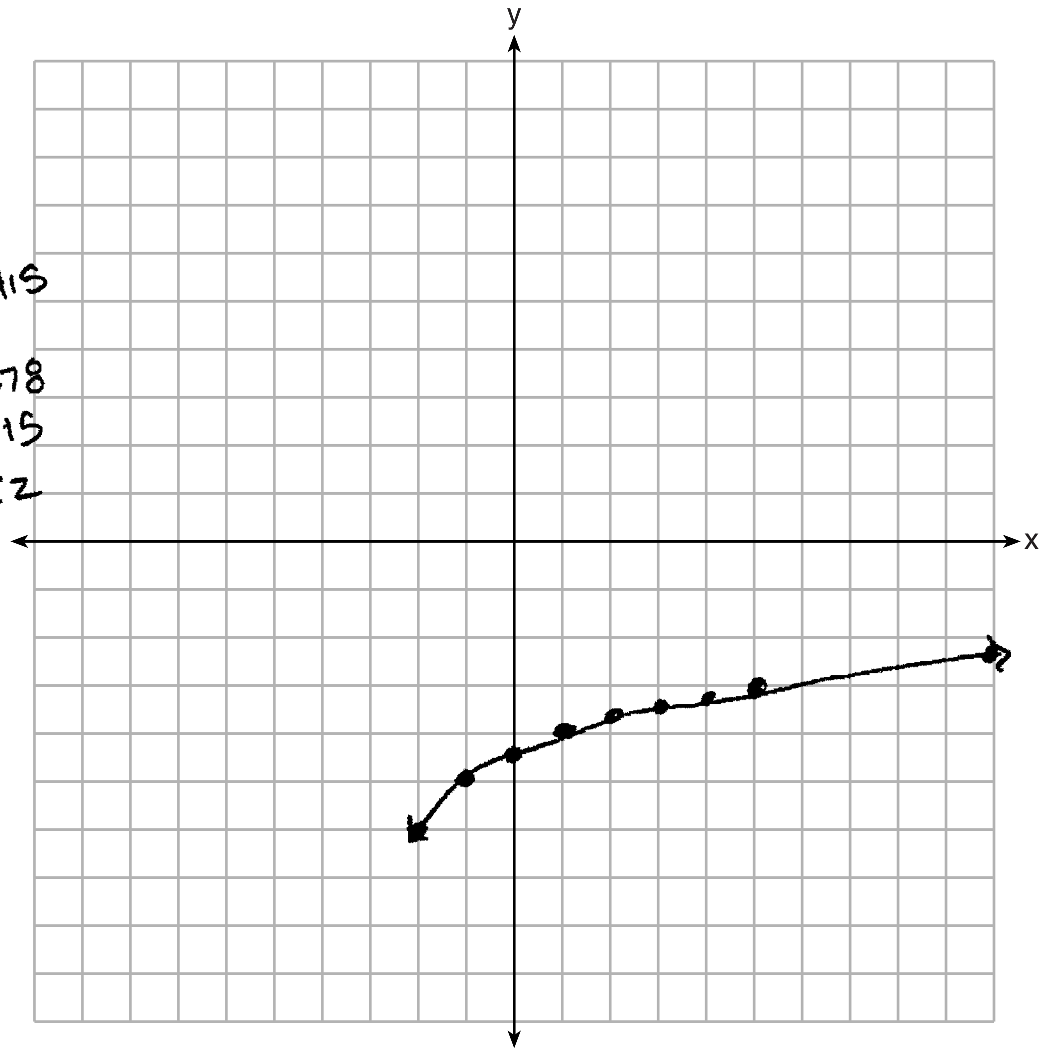
As x approached -3, it reaches an asimtope when it never reaches -3, and as x approaches positive infinity, the number interval increases get smaller and smaller,

Score 1: The student made one graphing error and described the end behavior incorrectly.

Question 35

35 Graph $y = \log_2(x + 3) - 5$ on the set of axes below. Use an appropriate scale to include *both* intercepts.

x	y
-2	-5
-1	-4
0	-3.415
1	-3
2	-2.678
3	-2.415
4	-2.192
5	-2
10	-1.3



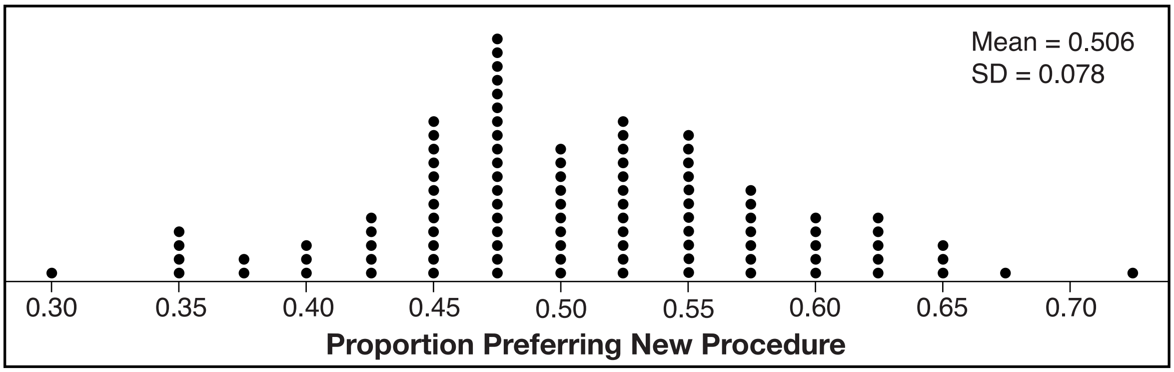
Describe the behavior of the given function as x approaches -3 and as x approaches positive infinity.

As x approaches -3, no y values will appear and as x approaches positive infinity the values start to increase gradually.

Score 0: The student gave an incorrect response.

Question 36

36 Charlie's Automotive Dealership is considering implementing a new check-in procedure for customers who are bringing their vehicles for routine maintenance. The dealership will launch the procedure if 50% or more of the customers give the new procedure a favorable rating when compared to the current procedure. The dealership devises a simulation based on the minimal requirement that 50% of the customers prefer the new procedure. Each dot on the graph below represents the proportion of the customers who preferred the new check-in procedure, each of sample size 40, simulated 100 times.



Assume the set of data is approximately normal and the dealership wants to be 95% confident of its results. Determine an interval containing the plausible sample values for which the dealership will launch the new procedure. Round your answer to the *nearest hundredth*.

$0.506 \pm 2 \times 0.078 =$

$= 0.506 \pm 0.156$

$0.35 \le x \le 0.66.$

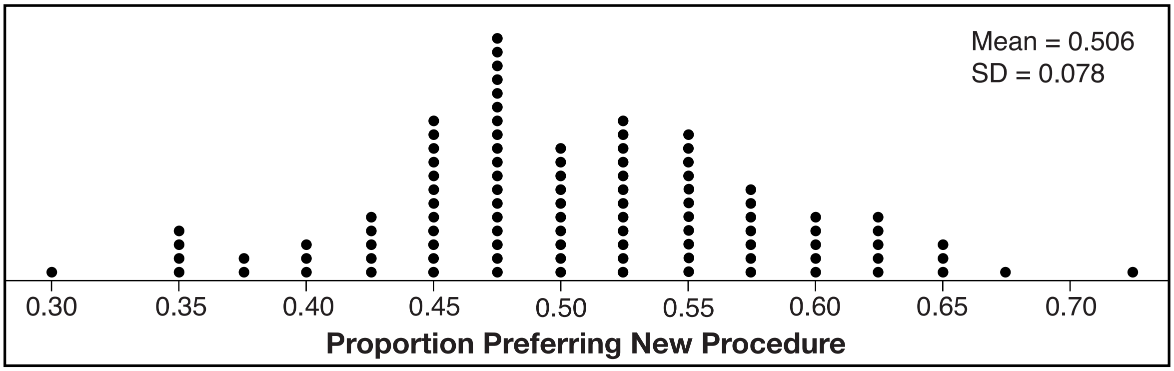
Forty customers are selected randomly to undergo the new check-in procedure and the proportion of customers who prefer the new procedure is 32.5%. The dealership decides *not* to implement the new check-in procedure based on the results of the study. Use statistical evidence to explain this decision.

Since there are 32.5% of the customers prefer the new produre and this is below. the 95% confident of the population proportion

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

Question 36

36 Charlie's Automotive Dealership is considering implementing a new check-in procedure for customers who are bringing their vehicles for routine maintenance. The dealership will launch the procedure if 50% or more of the customers give the new procedure a favorable rating when compared to the current procedure. The dealership devises a simulation based on the minimal requirement that 50% of the customers prefer the new procedure. Each dot on the graph below represents the proportion of the customers who preferred the new check-in procedure, each of sample size 40, simulated 100 times.



Assume the set of data is approximately normal and the dealership wants to be 95% confident of its results. Determine an interval containing the plausible sample values for which the dealership will launch the new procedure. Round your answer to the *nearest hundredth*.

Margin of error $= 2(.078) = 0.156$

Interval $= 0.325 \pm 0.156$

$(.17, .48)$

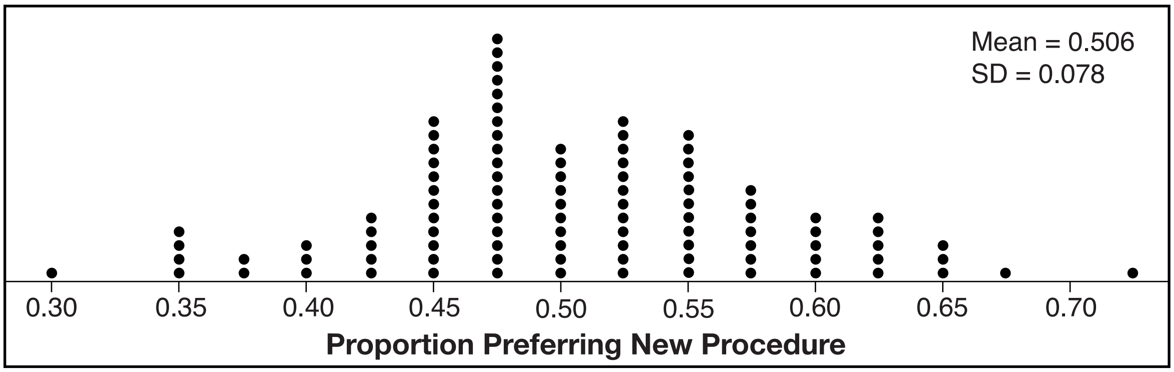
Forty customers are selected randomly to undergo the new check-in procedure and the proportion of customers who prefer the new procedure is 32.5%. The dealership decides *not* to implement the new check-in procedure based on the results of the study. Use statistical evidence to explain this decision.

Since 32.5% is inside of the interval, the dealership should implement the new check in procedure.

Score 3: The student used the sample to create an interval.

Question 36

36 Charlie's Automotive Dealership is considering implementing a new check-in procedure for customers who are bringing their vehicles for routine maintenance. The dealership will launch the procedure if 50% or more of the customers give the new procedure a favorable rating when compared to the current procedure. The dealership devises a simulation based on the minimal requirement that 50% of the customers prefer the new procedure. Each dot on the graph below represents the proportion of the customers who preferred the new check-in procedure, each of sample size 40, simulated 100 times.



Assume the set of data is approximately normal and the dealership wants to be 95% confident of its results. Determine an interval containing the plausible sample values for which the dealership will launch the new procedure. Round your answer to the *nearest hundredth*.

Margin of error = $2(0.078) = \boxed{0.156}$

$\hat{p} = 0.325$

Interval: 0.325 ± 0.156

$\boxed{(0.17, 0.48)}$

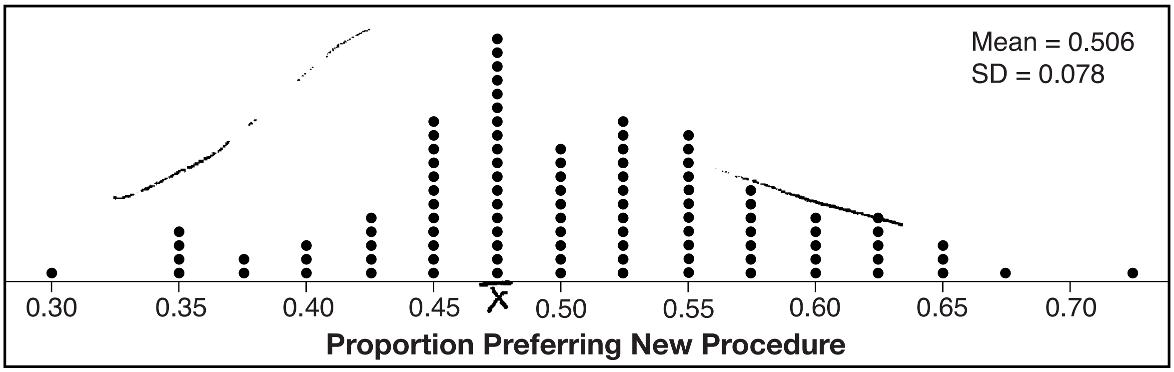
Forty customers are selected randomly to undergo the new check-in procedure and the proportion of customers who prefer the new procedure is 32.5%. The dealership decides *not* to implement the new check-in procedure based on the results of the study. Use statistical evidence to explain this decision.

Since 50% (0.5) is outside of the interval, the dealership should not implement the new check-in procedure.

Score 2: The student used the sample to create an interval and the 50% to explain the decision.

Question 36

36 Charlie's Automotive Dealership is considering implementing a new check-in procedure for customers who are bringing their vehicles for routine maintenance. The dealership will launch the procedure if 50% or more of the customers give the new procedure a favorable rating when compared to the current procedure. The dealership devises a simulation based on the minimal requirement that 50% of the customers prefer the new procedure. Each dot on the graph below represents the proportion of the customers who preferred the new check-in procedure, each of sample size 40, simulated 100 times.



Assume the set of data is approximately normal and the dealership wants to be 95% confident of its results. Determine an interval containing the plausible sample values for which the dealership will launch the new procedure. Round your answer to the *nearest hundredth*.

0.506 − .078 = .428 − .078 = .35 lower
0.506 + .078 = .584 + .078 = .662 upper
The interval is between .35 − .66. to be within 95% confidence

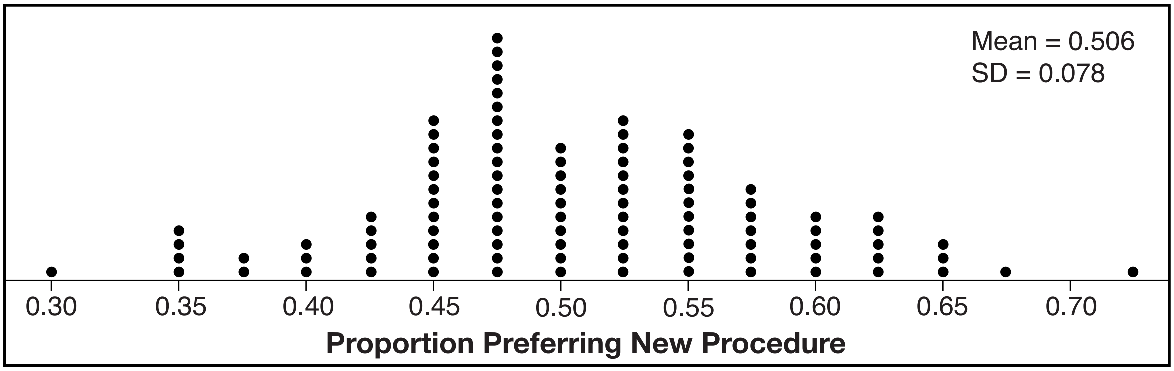
Forty customers are selected randomly to undergo the new check-in procedure and the proportion of customers who prefer the new procedure is 32.5%. The dealership decides *not* to implement the new check-in procedure based on the results of the study. Use statistical evidence to explain this decision.

The results do not show a normal mound shaped bell-curve. The data is skewed right.

Score 2: The student gave a correct interval.

Question 36

36 Charlie's Automotive Dealership is considering implementing a new check-in procedure for customers who are bringing their vehicles for routine maintenance. The dealership will launch the procedure if 50% or more of the customers give the new procedure a favorable rating when compared to the current procedure. The dealership devises a simulation based on the minimal requirement that 50% of the customers prefer the new procedure. Each dot on the graph below represents the proportion of the customers who preferred the new check-in procedure, each of sample size 40, simulated 100 times.



Assume the set of data is approximately normal and the dealership wants to be 95% confident of its results. Determine an interval containing the plausible sample values for which the dealership will launch the new procedure. Round your answer to the *nearest hundredth*.

There is a 95% certainty that 35% → 66% of Customers prefer the Procedure

$\bar{X} = .506$

$\sigma = 0.098$

$.506 \pm .156$

$2\sigma = .156$

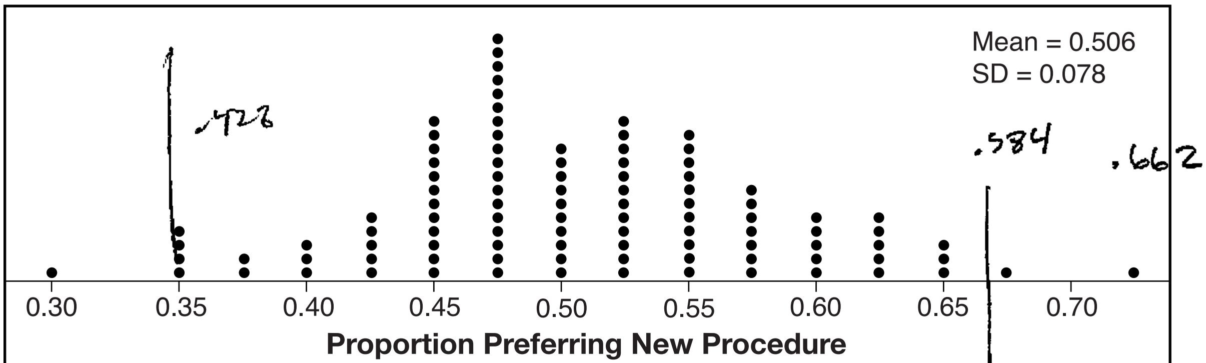
Forty customers are selected randomly to undergo the new check-in procedure and the proportion of customers who prefer the new procedure is 32.5%. The dealership decides *not* to implement the new check-in procedure based on the results of the study. Use statistical evidence to explain this decision.

While the data says that the Procedure could be favorable, there's also a very good chance that the procedure would be unfavorable.

Score 2: The student found a correct interval, but did not use the statistical evidence to explain the decision.

Question 36

36 Charlie's Automotive Dealership is considering implementing a new check-in procedure for customers who are bringing their vehicles for routine maintenance. The dealership will launch the procedure if 50% or more of the customers give the new procedure a favorable rating when compared to the current procedure. The dealership devises a simulation based on the minimal requirement that 50% of the customers prefer the new procedure. Each dot on the graph below represents the proportion of the customers who preferred the new check-in procedure, each of sample size 40, simulated 100 times.



Assume the set of data is approximately normal and the dealership wants to be 95% confident of its results. Determine an interval containing the plausible sample values for which the dealership will launch the new procedure. Round your answer to the *nearest hundredth*.

0.35 to 0.66

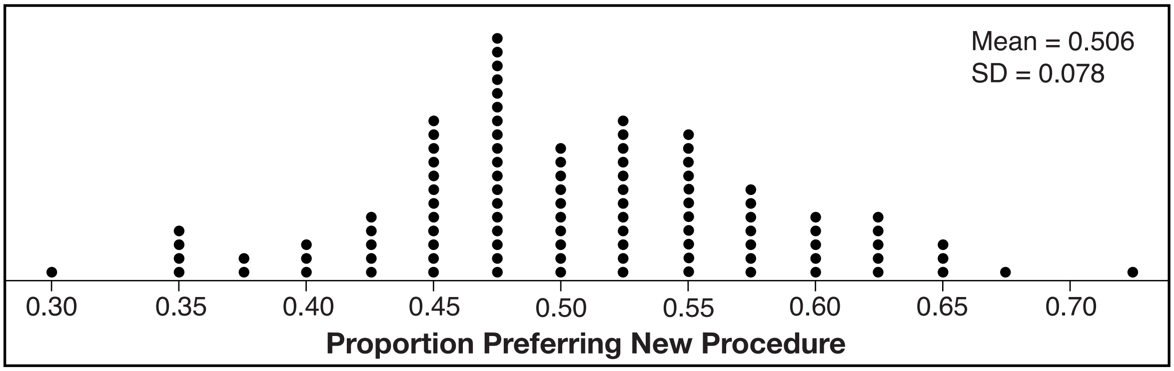
Forty customers are selected randomly to undergo the new check-in procedure and the proportion of customers who prefer the new procedure is 32.5%. The dealership decides *not* to implement the new check-in procedure based on the results of the study. Use statistical evidence to explain this decision.

Only 32.5% of customers prefer the new procedure and 50% of customers need to prefer it in order to implement it. That did not happen so the dealership does not implement it.

Score 1: The student found the correct interval, but showed no work and did not use statistical evidence to explain the decision.

Question 36

36 Charlie's Automotive Dealership is considering implementing a new check-in procedure for customers who are bringing their vehicles for routine maintenance. The dealership will launch the procedure if 50% or more of the customers give the new procedure a favorable rating when compared to the current procedure. The dealership devises a simulation based on the minimal requirement that 50% of the customers prefer the new procedure. Each dot on the graph below represents the proportion of the customers who preferred the new check-in procedure, each of sample size 40, simulated 100 times.



Assume the set of data is approximately normal and the dealership wants to be 95% confident of its results. Determine an interval containing the plausible sample values for which the dealership will launch the new procedure. Round your answer to the *nearest hundredth*.

Mean = .506
SD = .078

.35, .428, .506, .584, .662

.35 – .662

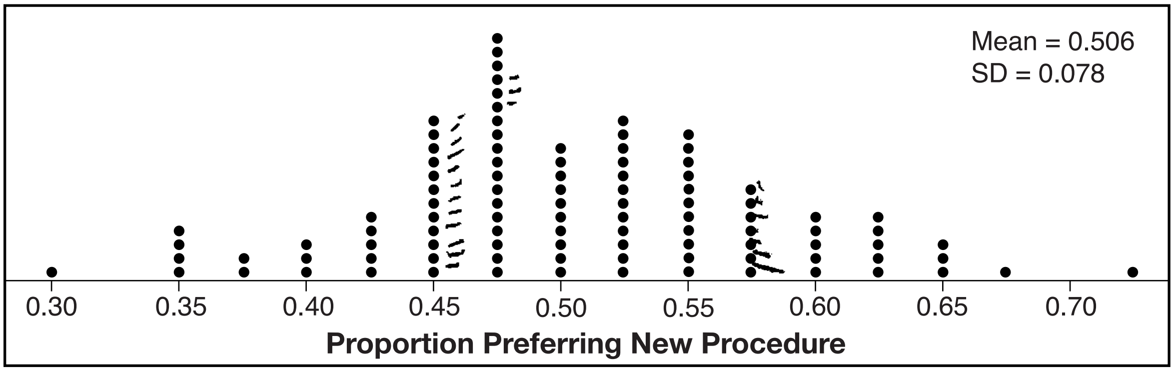
Forty customers are selected randomly to undergo the new check-in procedure and the proportion of customers who prefer the new procedure is 32.5%. The dealership decides *not* to implement the new check-in procedure based on the results of the study. Use statistical evidence to explain this decision.

The percentage of people that prefer the new check in procedure is only 32.5% which is 17.5% lower than 50%

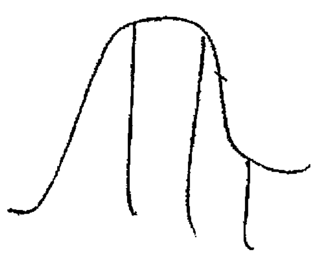
Score 1: The student gave an incorrectly rounded interval, and did not use statistical evidence to explain the decision.

Question 36

36 Charlie's Automotive Dealership is considering implementing a new check-in procedure for customers who are bringing their vehicles for routine maintenance. The dealership will launch the procedure if 50% or more of the customers give the new procedure a favorable rating when compared to the current procedure. The dealership devises a simulation based on the minimal requirement that 50% of the customers prefer the new procedure. Each dot on the graph below represents the proportion of the customers who preferred the new check-in procedure, each of sample size 40, simulated 100 times.



Assume the set of data is approximately normal and the dealership wants to be 95% confident of its results. Determine an interval containing the plausible sample values for which the dealership will launch the new procedure. Round your answer to the *nearest hundredth*.



0.35 - 0.662

Forty customers are selected randomly to undergo the new check-in procedure and the proportion of customers who prefer the new procedure is 32.5%. The dealership decides *not* to implement the new check-in procedure based on the results of the study. Use statistical evidence to explain this decision.

There is a ~~[illegible]~~ good chance that the result will be under 50%, as it goes low as 35%.

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

37 A radioactive substance has a mass of 140 g at 3 p.m. and 100 g at 8 p.m. Write an equation in the form $A = A_0\left(\frac{1}{2}\right)^{\frac{t}{h}}$ that models this situation, where h is the constant representing the number of hours in the half-life, A_0 is the initial mass, and A is the mass t hours after 3 p.m.

$$100 = 140\left(\tfrac{1}{2}\right)^{\frac{5}{h}}$$

Using this equation, solve for h, to the *nearest ten thousandth*.

10.3002 hrs

$$\frac{100}{140} = \frac{\cancel{140}\left(\frac{1}{2}\right)^{\frac{5}{h}}}{\cancel{140}}$$

$$\frac{5}{7} = \left(\frac{1}{2}\right)^{\frac{5}{h}}$$

$$\frac{\log \frac{5}{7}}{\log .5} = \frac{\frac{5}{h}\cancel{\log \frac{1}{2}}}{\cancel{\log .5}}$$

$$\frac{5}{h} = \frac{.4854268}{1}$$

$$\frac{5}{.4854268} = \frac{\cancel{.4854268}h}{\cancel{.4854268}}$$

$$h = 10.3002$$

Determine when the mass of the radioactive substance will be 40 g. Round your answer to the *nearest tenth of an hour*.

18.6 hrs

$$\frac{40}{140} = \frac{\cancel{140}\left(\frac{1}{2}\right)^{\frac{t}{10.3002}}}{\cancel{140}}$$

$$\frac{2}{7} = \frac{1}{2}^{\frac{t}{10.3002}}$$

$$\frac{\log \frac{2}{7}}{\log\left(\frac{1}{2}\right)} = \frac{\frac{t}{10.3002}\cancel{\log \frac{1}{2}}}{\cancel{\log\left(\frac{1}{2}\right)}}$$

$$\frac{1.8073549}{1} = \frac{t}{10.3002}$$

$$18.6 = t$$

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

Question 37

37 A radioactive substance has a mass of 140 g at 3 p.m. and 100 g at 8 p.m. Write an equation in the form $A = A_0\left(\frac{1}{2}\right)^{\frac{t}{h}}$ that models this situation, where h is the constant representing the number of hours in the half-life, A_0 is the initial mass, and A is the mass t hours after 3 p.m.

$$100 = 140\left(\tfrac{1}{2}\right)^{5/h}$$

Using this equation, solve for h, to the *nearest ten thousandth*.

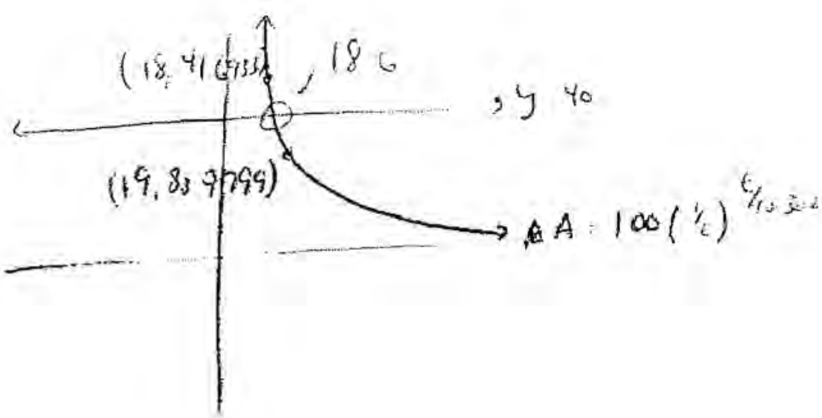
$$100 = 140\left(\tfrac{1}{2}\right)^{5/h}$$

$$\frac{5}{7} = \left(\tfrac{1}{2}\right)^{5/h}$$

$$\log \tfrac{5}{7} = \frac{5}{h}\log \tfrac{1}{2}$$

$$h = \frac{5\log \frac{1}{2}}{\log \frac{5}{7}} = 10.3002$$

Determine when the mass of the radioactive substance will be 40 g. Round your answer to the *nearest tenth of an hour*.



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

Question 37

37 A radioactive substance has a mass of 140 g at 3 p.m. and 100 g at 8 p.m. Write an equation in the form $A = A_0\left(\frac{1}{2}\right)^{\frac{t}{h}}$ that models this situation, where h is the constant representing the number of hours in the half-life, A_0 is the initial mass, and A is the mass t hours after 3 p.m.

$\boxed{100 = 140\left(\frac{1}{2}\right)^{\frac{5}{h}}}$ $A = 140_g\left(\frac{1}{2}\right)^{\frac{t}{17.5}}$

$\cancel{20 = 5h}$

$\cancel{4 = 1h}$

$\cancel{h = 17.5}$

Using this equation, solve for h, to the *nearest ten thousandth*.

$100 = 140\left(\frac{1}{2}\right)^{\frac{5}{h}} \rightarrow \frac{100}{140} = \frac{1}{2}^{\frac{5}{h}} \rightarrow \ln 100 - \ln 140 = \frac{5}{h}\ln\frac{1}{2}$

$-.336\ldots = \left(\frac{5}{h}\right)\left(\frac{-.693\ldots}{1}\right)$

$-\frac{.336\ldots}{1} = \frac{-3.465\ldots}{h}$

$-.336h = \frac{-3.465}{-.336} \rightarrow \boxed{h = 10.3002}$

Determine when the mass of the radioactive substance will be 40 g. Round your answer to the *nearest tenth of an hour*.

$40 = 140\left(\frac{1}{2}\right)^{\frac{\cancel{5}}{10.3002}}$

$\ln\frac{40}{140} = \frac{\cancel{5}}{10.3002}\ln\frac{1}{2}$

$3.557h = \frac{-3.465}{3.557}$

$\boxed{18.1}$

Score 5: The student gave a partial solution for the time.

Question 37

37 A radioactive substance has a mass of 140 g at 3 p.m. and 100 g at 8 p.m. Write an equation in the form $A = A_0\left(\frac{1}{2}\right)^{\frac{t}{h}}$ that models this situation, where h is the constant representing the number of hours in the half-life, A_0 is the initial mass, and A is the mass t hours after 3 p.m.

$$100 = 140\left(\frac{1}{2}\right)^{\frac{5}{h}}$$

Using this equation, solve for h, to the *nearest ten thousandth*.

$$\frac{5}{7} = \left(\frac{1}{2}\right)^{\frac{5}{h}}$$

$$\log_{\frac{1}{2}} \frac{5}{7} = \frac{5}{h}$$

$$h = 10.3002 \text{ hours}$$

Determine when the mass of the radioactive substance will be 40 g. Round your answer to the *nearest tenth of an hour*.

$$40 = 140\left(\frac{1}{2}\right)^{\frac{t}{10.3002}}$$

Score 4: The student did not determine when the weight of the substance will be 40g.

Question 37

37 A radioactive substance has a mass of 140 g at 3 p.m. and 100 g at 8 p.m. Write an equation in the form $A = A_0\left(\frac{1}{2}\right)^{\frac{t}{h}}$ that models this situation, where h is the constant representing the number of hours in the half-life, A_0 is the initial mass, and A is the mass t hours after 3 p.m.

Using this equation, solve for h, to the *nearest ten thousandth*.

$$\frac{100}{140} = \frac{140\left(\frac{1}{2}\right)^{5/x}}{140}$$

$$\frac{100}{140} = \left(\frac{1}{2}\right)^{5/x}$$

$$\frac{\log_{1/2}\left(\frac{100}{140}\right)}{1} = \frac{5}{x}$$

$$\frac{5}{\log_{1/2}\left(\frac{100}{140}\right)} = x$$

$$x = 10.3002$$

Determine when the mass of the radioactive substance will be 40 g. Round your answer to the *nearest tenth of an hour*.

Score 3: The student did not write the equation in terms of h, and did not determine when the substance will be 40 g.

Question 37

37 A radioactive substance has a mass of 140 g at 3 p.m. and 100 g at 8 p.m. Write an equation in the form $A = A_0\left(\frac{1}{2}\right)^{\frac{t}{h}}$ that models this situation, where h is the constant representing the number of hours in the half-life, A_0 is the initial mass, and A is the mass t hours after 3 p.m.

$$100 = 140\left(\frac{1}{2}\right)^{\frac{5}{h}}$$

Using this equation, solve for h, to the *nearest ten thousandth*.

$$\frac{100}{140} = \frac{140\left(\frac{1}{2}\right)^{5/h}}{140}$$

$$0.7143 = \left(\frac{1}{2}\right)^{5/h}$$

$$\ln(0.7143) = \frac{5}{h}\ln 0.5$$

$$\boxed{h = 10.3008}$$

Determine when the mass of the radioactive substance will be 40 g. Round your answer to the *nearest tenth of an hour*.

$$40 = 140\left(\frac{1}{2}\right)^{\frac{5}{h}}$$

$$0.2857 = \left(\frac{1}{2}\right)^{5/h}$$

$$\ln(0.2857) = \frac{5}{h}\ln\left(\frac{1}{2}\right)$$

$$\boxed{h = 2.8}$$

Score 3: The student gave a correct equation, but rounded too early.

Question 37

37 A radioactive substance has a mass of 140 g at 3 p.m. and 100 g at 8 p.m. Write an equation in the form $A = A_0\left(\frac{1}{2}\right)^{\frac{t}{h}}$ that models this situation, where h is the constant representing the number of hours in the half-life, A_0 is the initial mass, and A is the mass t hours after 3 p.m.

$100 = 140\left(\frac{1}{2}\right)^{\frac{t}{h}}$

$140 \to 100 = \frac{40}{8} = 8$
$3 \to 8$

$700 = 13$

Using this equation, solve for h, to the *nearest ten thousandth*.

$100 = 140\left(\frac{1}{2}\right)^{\frac{5}{h}}$

$.7142 = \left(\frac{1}{2}\right)^{\frac{5}{h}}$

$\frac{\log .7142}{\log .5} = \frac{5}{h}\frac{\log .5}{\cancel{\log .5}}$

$\frac{.4855999 61}{1} = \frac{5}{h}$

$\boxed{h = 10.297}$

Determine when the mass of the radioactive substance will be 40 g. Round your answer to the *nearest tenth of an hour*.

$\cancel{40 = 140\left(\frac{1}{2}\right)^{x}}$

idk

Score 2: The student gave a correct equation, but rounded too early and incorrectly rounded h.

Question 37

37 A radioactive substance has a mass of 140 g at 3 p.m. and 100 g at 8 p.m. Write an equation in the form $A = A_0\left(\frac{1}{2}\right)^{\frac{t}{h}}$ that models this situation, where h is the constant representing the number of hours in the half-life, A_0 is the initial mass, and A is the mass t hours after 3 p.m.

what?

what is A? t?

$\cancel{A = 140\left(\frac{1}{2}\right)^{t}}$

$100 = 140\left(\frac{1}{2}\right)^{\frac{5}{h}}$

Using this equation, solve for h, to the *nearest ten thousandth*.

$100 = 140\left(\frac{1}{2}\right)^{\frac{5}{h}}$

$\frac{5}{7} = \left(\frac{1}{2}\right)^{\frac{5}{h}}$

$\log \frac{5}{7} = \frac{5}{h} \log \frac{1}{2}$

$.4854268 = \frac{5}{h}$

$.09708 = h$

$.0971 = h$

Determine when the mass of the radioactive substance will be 40 g. Round your answer to the *nearest tenth of an hour*.

$40 = 140\left(\frac{1}{2}\right)^{\frac{x}{5}}$

3.26 hours

Score 2: The student gave a correct equation, but made a conceptual error in solving for h.

Question 37

37 A radioactive substance has a mass of 140 g at 3 p.m. and 100 g at 8 p.m. Write an equation in the form $A = A_0\left(\frac{1}{2}\right)^{\frac{t}{h}}$ that models this situation, where h is the constant representing the number of hours in the half-life, A_0 is the initial mass, and A is the mass t hours after 3 p.m.

Using this equation, solve for h, to the *nearest ten thousandth*.

~~At~~

$$\frac{100}{140} = \frac{140(1/2)^{5/h}}{140}$$

$$\frac{.714}{.5} = \frac{1/2^{5/h}}{.5} \quad 5 \cdot 1.428 = 5/h \cdot 5$$

$$7.143 = h$$

Determine when the mass of the radioactive substance will be 40 g. Round your answer to the *nearest tenth of an hour*.

14.9 hours

$$\frac{40}{140} = \frac{140(1/2)^{t/7.143}}{140}$$

14.0817

$$\frac{.2857}{1/2} = \frac{1/2^{t/7.143}}{1/2}$$

$$7.143 \cdot .5714 = t/\cancel{7.143}\ \cancel{7.143}$$

Score 1: The student gave a correct equation.

37 A radioactive substance has a mass of 140 g at 3 p.m. and 100 g at 8 p.m. Write an equation in the form $A = A_0\left(\frac{1}{2}\right)^{\frac{t}{h}}$ that models this situation, where h is the constant representing the number of hours in the half-life, A_0 is the initial mass, and A is the mass t hours after 3 p.m.

$$100 = 140\left(\tfrac{1}{2}\right)^{\frac{5}{h}}$$

Using this equation, solve for h, to the *nearest ten thousandth*.

$$100 = 140\left(\tfrac{1}{2}\right)^{\frac{5}{h}}$$

$$\frac{100}{70} = \frac{\cancel{70}^{\frac{5}{h}}}{\cancel{70}}$$

$$\cdot 5\, 1.429 = \frac{5}{h} \cdot \cancel{5}$$

$$h = 7.143$$

Determine when the mass of the radioactive substance will be 40 g. Round your answer to the *nearest tenth of an hour*.

$$40 = 140\left(\tfrac{1}{2}\right)^{\frac{5}{h}}$$

$$\frac{40}{70} = \frac{\cancel{70}^{\frac{5}{h}}}{\cancel{70}}$$

$$5 \cdot \quad 0.571 = \frac{5}{h} \cdot \cancel{5}$$

$$h = 2.857$$

3 hours

Score 0: The student gave a completely incorrect response.

Regents Examination in Algebra II (Common Core) – June 2017

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

(Use for the June 2017 exam only.)

Raw Score	Scale Score	Performance Level
86	**100**	5
85	**99**	5
84	**98**	5
83	**97**	5
82	**97**	5
81	**96**	5
80	**95**	5
79	**94**	5
78	**94**	5
77	**93**	5
76	**92**	5
75	**92**	5
74	**91**	5
73	**90**	5
72	**90**	5
71	**89**	5
70	**89**	5
69	**88**	5
68	**88**	5
67	**87**	5
66	**87**	5
65	**86**	5
64	**86**	5
63	**86**	5
62	**85**	5
61	**84**	4
60	**84**	4
59	**83**	4
58	**83**	4

Raw Score	Scale Score	Performance Level
57	**82**	4
56	**82**	4
55	**82**	4
54	**81**	4
53	**81**	4
52	**80**	4
51	**80**	4
50	**80**	4
49	**79**	4
48	**79**	4
47	**79**	4
46	**78**	4
45	**78**	4
44	**77**	3
43	**77**	3
42	**77**	3
41	**76**	3
40	**76**	3
39	**75**	3
38	**75**	3
37	**74**	3
36	**74**	3
35	**73**	3
34	**72**	3
33	**72**	3
32	**71**	3
31	**70**	3
30	**69**	3
29	**68**	3

Raw Score	Scale Score	Performance Level
28	**67**	3
27	**66**	3
26	**65**	3
25	**64**	2
24	**63**	2
23	**62**	2
22	**60**	2
21	**59**	2
20	**56**	2
19	**55**	2
18	**53**	1
17	**52**	1
16	**50**	1
15	**48**	1
14	**45**	1
13	**43**	1
12	**41**	1
11	**38**	1
10	**35**	1
9	**32**	1
8	**29**	1
7	**26**	1
6	**23**	1
5	**19**	1
4	**16**	1
3	**12**	1
2	**8**	1
1	**4**	1
0	**0**	1

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

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

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