



INFORMATION BOOKLET FOR ADMINISTERING AND SCORING THE REGENTS EXAMINATIONS IN MATHEMATICS A AND MATHEMATICS B

(including a supplement to the *Guide for Rating Regents Examinations in Mathematics*)

General Information

The general procedures to be followed in administering Regents Examinations are provided in the publications *Regents Examinations*, *Regents Competency Tests*, and *Proficiency Examinations: School Administrator's Manual*, 2001 edition, and *Directions for Administering and Scoring Regents Examinations* (DET 541). The *School Administrator's Manual* may be accessed on the Department's web site at: <http://www.emsc.nysed.gov/osa/hsinfo/gen/sam2001.pdf>.

Questions about general administration procedures for Regents Examinations should be directed to the Office of State Assessment at 518-474-8220 or 518-474-5099. For information about the rating of the Mathematics A or Mathematics B examination, contact the Office of Curriculum, Instruction, and Instructional Technology at 518-473-9471.

School administrators may photocopy this booklet and distribute copies to school personnel who will be involved in the administration and scoring of these examinations.

Description of the Examination in Mathematics A

Beginning with the January 2004 administration, the Examination in Mathematics A will have a total of 39 questions in four parts. Students are to answer all 39 questions. No choice is permitted. Students are to record their answers to Part I questions on the detachable answer sheet, which is printed as the last page of the examination booklet. They are to record their answers to the questions in Parts II, III, and IV in the examination booklet. Students must also clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc., they used in arriving at their answers to Parts II, III, and IV questions.

Mathematics A Breakdown

Part	Question Type	Number of Questions	Maximum Number of Credits per Question	Total Number of Raw Score Credits
I	multiple choice	30	2	60
II	open ended	5	2	10
III	open ended	2	3	6
IV	open ended	2	4	8
TOTAL		39		84

The total-test raw score must be converted to a scaled score using a conversion chart for the examination.

Description of the Examination in Mathematics B

The Regents Examination in Mathematics B has four parts, with a total of 34 questions. Students are to answer all 34 questions. No choice is permitted. Students are to record their answers to Part I questions on the detachable answer sheet, which is printed as the last page of the examination booklet. They are to record their answers to the questions in Parts II, III, and IV in the examination booklet. Students must also clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc., they used in arriving at their answers to Parts II, III, and IV questions.

Mathematics B Breakdown

Part	Question Type	Number of Questions	Maximum Number of Credits per Question	Total Number of Raw Score Credits
I	multiple choice	20	2	40
II	open ended	6	2	12
III	open ended	6	4	24
IV	open ended	2	6	12
TOTAL		34		88

The total-test raw score must be converted to a scaled score using a conversion chart provided on the scoring key for the examination.

Administering the Examinations in Mathematics A and Mathematics B

Students are to be allowed a maximum of three hours in which to complete each examination. They should write all work in pen except for graphs and drawings, which should be done in pencil.

Scrap paper is *not* permitted. Students may use the blank spaces in the examination booklet and the page of graph paper at the end of the booklet as scrap paper. Schools should have a supply of graph paper available for students who request it in the event that they need to change their work on graphs.

Use of Calculator and Supplementary Material

Each student taking the Mathematics A Regents Examination must have a scientific calculator, a straightedge, and a compass available for his or her exclusive use during the entire scheduled time for the examination. Graphing calculators without symbol manipulation are permitted, but not required. Each student taking the Mathematics B Regents Examination must have a graphing calculator without symbol manipulation, a straightedge, and a compass available for his or her exclusive use during the entire scheduled time for the examination. The memory of any calculator with programming capability must be cleared or reset when students enter the testing room. The use of operating manuals, instruction or formula cards, or other information concerning the operation of calculators is not permitted. Calculators that can be used to communicate with other calculators are not permitted.

Scoring the Examinations

The Regents Examinations in Mathematics A and Mathematics B are to be scored by committees of mathematics teachers. No one teacher is to score all the questions on a student's paper. The committee must consist of at least three teachers. Each of these teachers is responsible for scoring a selected number of the open-ended questions. The more teachers serving on a committee, the fewer questions each teacher scores. This process yields more consistent and reliable scores and allows scoring to proceed more quickly.

Each examination is accompanied by a scoring key that includes the answers to the Part I multiple-choice questions and rubrics for scoring each of the open-ended questions. Teachers should become thoroughly familiar with the rubrics for the questions they are scoring before beginning the scoring process.

The detachable answer sheet contains a table with spaces for recording the Part I score; the score for each question in Parts II, III, and IV; the total-test raw score; and the scaled score.

Determining the Student's Final Examination Score

A chart for converting the student's total-test raw score to a scaled score is provided for each administration. For most administrations of Mathematics A and Mathematics B, the conversion chart is provided in the scoring key. Due to added quality control measures, the conversion chart will not be included in the scoring key for the January 2004 administration of Mathematics A. School personnel will be able to access the conversion chart for this examination on the Department's web site on or about February 10, 2004 at: <http://www.emsc.nysed.gov/osa/home.html>. **Because the scaled scores corresponding to raw scores in the conversion chart may change from one examination administration to another, it is *crucial* that, for each administration, you use *only* the conversion chart provided in the scoring key for that administration to determine the student's final score.** Take extreme care in recording the student's scores on each part of the examination, adding these scores to determine the total-test raw score, and using the conversion chart to obtain the correct scaled score.

For a Regents diploma, a score of 65 on a Regents examination in mathematics is passing. For a local diploma, a score of 55–64, as determined by a public school district or nonpublic school, also may be considered passing. Public school districts or nonpublic schools may establish a passing score lower than 65 for awarding a local diploma to those students who first enter grade 9 in the 1997–98 through the 2004–05 school years.

Rescoring Student Answer Papers

All student answer papers within a certain range of scaled scores below the passing score must be scored a second time. For each examination administration, this range of scores will be specified in the scoring key. For the second scoring, a different committee of teachers may score the student's paper or the original committee may score the paper, but no teacher should score the same open-ended questions that he or she scored in the first rating of the paper. It is the responsibility of the school principal to assure that the student's final examination score is based on a fair, accurate, and reliable scoring of the student's answer paper.

Specific Information for Scoring the Regents Examinations in Mathematics A and Mathematics B

The information below refers to the scoring of open-ended questions on the Mathematics A and Mathematics B Regents Examinations and is intended as a supplement to the *Guide for Rating Regents Examinations in Mathematics*.

The open-ended questions (Parts II, III, and IV) on the Mathematics A and Mathematics B examinations should be scored in accordance with these guidelines:

- If the student gives one legible response, even if it is crossed out, teachers should score the response.
- If there are two or more responses with some crossed out, teachers should score only the response not crossed out.
- If there are one or more partial responses and one complete response, teachers should score the complete response. No credit is deducted for incorrect startups.
- If there are two or more complete responses, teachers should score each one. Credit will be allocated in the following way:

If one response is completely correct and the others are completely incorrect, teachers should award 50% credit and round down (2 credits for a 4-credit question, 1 credit for a 2-credit question, and 1 credit for a 3-credit question).

If each response warrants more than 50%, the lesser of the responses is awarded credit. (For example, if a 4-credit question is done two ways, with one worth 4 credits and another worth 3 credits, the student should be awarded 3 credits for the question.)

- If the question requires the student to include units of measure, full credit cannot be awarded if the student omits the unit. Students may include the appropriate unit of measure even if it is not required.

Examples:

If the question asks for the number of feet in the length of a figure, no unit is required in the answer.

If the question asks for the dimensions of a figure, the proper unit of measure is required in the answer in order to receive full credit.

The rubric will specify how much credit is awarded if units are not used when required.

- If a student gives only a correct numerical answer to a problem but does not show how he or she arrived at the answer, the student will be awarded only 1 credit. All constructed-response questions require the student to show work. If the question has only one part, this rule is straightforward, but this rule needs some clarification for multiple-part questions.

A fully correct answer for a multiple-part question requires correct responses for all parts of the question. For example, if a 3-credit question has three parts, the correct response to one or two parts of the question that required work to be shown is *not* considered a fully correct response with no work shown and would receive 0 credits.

The rubric of a multiple-part question will specify credit for various amounts of work shown.

- Students should receive 0 credits if the solution is completely incorrect, irrelevant, or incoherent or if a correct response was arrived at using an obviously incorrect procedure.

This last statement is illustrated by a student who, when asked to find one leg of a right triangle if the hypotenuse is 5 and the other leg is 3, gives a correct response of 4 by showing that 4 is the average of 3 and 5.

The method of solution must be obviously incorrect to warrant a score of 0.

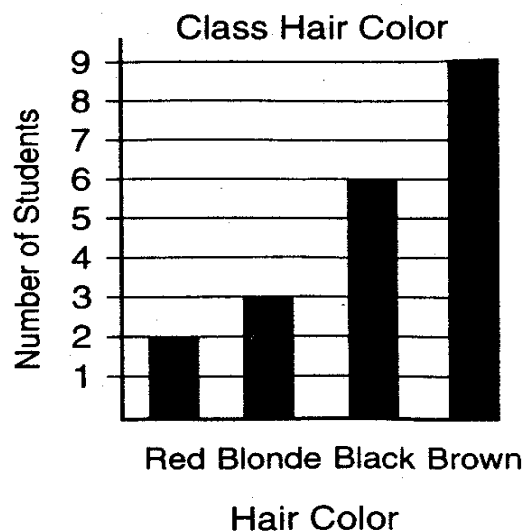
In some cases, the rubric will specifically state which responses should receive a score of 0.

- Students who use trial and error to solve a problem must show their method. Merely showing that the answer checks or is correct is not considered a complete response for full credit. Most rubrics will address this issue directly. For more detail, teachers are encouraged to consult the *Guide for Rating Regents Examinations in Mathematics*.

Examples of Scored Student Responses with Comments

Sample Question 1 – Mathematics A

The graph below shows the hair colors of all the students in a class. What is the probability that a student chosen at random from this class has black hair?



Rubric

[2] $6/20$, and appropriate work is shown.

[1] A fraction with a correct numerator or denominator is given, and some work is shown.

or

[1] $6/20$, 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.

Student Response

$$\begin{array}{r}
 20C_6 \quad 21 \cdot 20 \cdot 19 \cdot 18 \cdot 17 \cdot 16 \\
 \hline
 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 \\
 20C_6 \quad 4 \cdot 3 \cdot 2 \cdot 1 \cdot 5 \\
 \hline
 12 \cdot 8 \cdot 4 \cdot 3 \cdot 2 \\
 \hline
 38760
 \end{array}$$

Comment

Score: 0

The student has crossed out the first part of the response, so only the second part is scored. The student has confused probability with combinations, which is irrelevant in this problem.

Student Response

$$6/39 \quad 9+8+7+6+5+4+3+2+1=39 \text{ students}$$

Comment

Score: 1

The student has a correct numerator but did not compute a proper denominator. The student has shown work and has an answer in fractional form.

Student Response

$$\begin{array}{l}
 \frac{6}{20} \rightarrow \text{total number of students w/ black hair.} \\
 \rightarrow \frac{\text{average of}}{\text{total number of students}}
 \end{array}$$

Comment

Score: 2

The student has a correct answer with appropriate work shown.

Sample Question 2 – Mathematics A

There are four students, all of different heights, who are to be randomly arranged in a line. What is the probability that the tallest student will be first in line and the shortest student will be last in line?

Rubric

- [3] $\frac{2}{24}$ or an equivalent answer and an appropriate explanation are given or appropriate work is shown, such as a tree diagram, sample space, or permutations.
- [2] Appropriate work is shown, but one computational error is made.
- or*
- [2] Appropriate work is shown, but only a numerator or denominator is determined correctly.
- or*
- [2] $\frac{2}{24}$ or an equivalent answer is given, but only work for either the numerator or denominator is shown.
- [1] The probability of the tallest or the probability of the shortest student being in the property position is correct, such as $\frac{1}{4}$.
- or*
- [1] Only a tree diagram, sample space, or permutations are shown.
- or*
- [1] $\frac{2}{24}$ or an equivalent answer, 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.

Student Response

Handwritten student response showing calculations: $4P_2$, 24.3 , 5 , 2.1 , 1 .

Comment

Score: 0

The student's response shows major misunderstanding of the problem.

Student Response

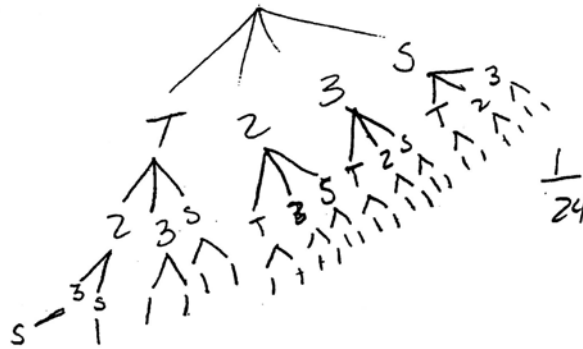
$$\frac{2}{24}$$

Comment

Score: 1

The student has given a correct answer but has not shown any work.

Student Response



Comment

Score: 2

The student has shown appropriate work but has determined correctly only a numerator or a denominator.

Student Response

1 = tallest 2 = 2nd tallest
4 = shortest 3 = 3rd tallest
~~4!~~ 4! = number of orders
24 total orders
only 2 possibilities for tallest & shortest last:
front 1 2 3 4 back
1 3 2 4
therefore the probability is $\frac{2}{24}$

Comment:

Score: 3

The student has a complete and correct response.

Sample Question 3 – Mathematics A

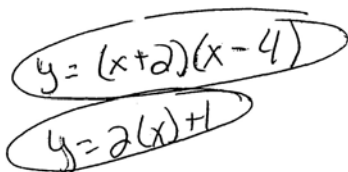
Solve the following system of equations algebraically.

$$\begin{aligned}y &= x^2 + 4x - 2 \\ y &= 2x + 1\end{aligned}$$

Rubric

- [4] $(-3, -5)$, $(1, 3)$, and appropriate algebraic work is shown.
- [3] Appropriate algebraic work is shown, but $x = -3$ and $x = 1$ are given as the solution.
or
- [2] $(-3, -5)$, $(1, 3)$, but a graphic solution is shown.
or
- [2] Correct substitution and an algebraic equation set equal to zero are shown, but the result is not factored, such as $x^2 + 2x - 3 = 0$.
- [1] Any correct substitution is shown, such as $2x + 1 = x^2 + 4x - 2$.
or
- [1] $(-3, -5)$, $(1, 3)$, but no algebraic 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.
-

Student Response



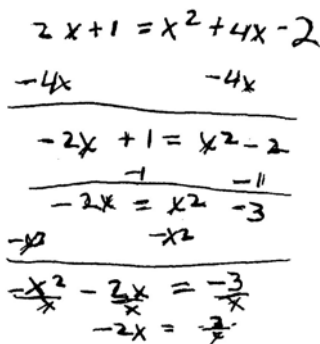
$y = (x+2)(x-4)$
 $y = 2(x)+1$

Comment

Score: 0

The student's response shows major misunderstanding of the problem.

Student Response



$2x + 1 = x^2 + 4x - 2$
 $\begin{array}{r} -4x \qquad -4x \\ \hline -2x + 1 = x^2 - 2 \\ \hline \quad -1 \quad -1 \\ -2x = x^2 - 3 \\ \hline -x^2 \quad -x^2 \\ \hline -x^2 - 2x = -3 \\ \hline \quad -2x = -\frac{3}{2} \end{array}$

Comment

Score: 1

The student correctly substituted for y , but has shown no further correct work.

Student Response

$$\begin{array}{r}
 2x+1 = x^2+4x-2 \\
 \underline{-1} \qquad \qquad \underline{+1} \\
 2x = x^2+4x-3 \\
 \underline{-2x} \qquad \qquad \underline{-2x} \\
 0 = x^2+2x-3 \\
 (x+3)(x-1) \\
 \\
 (3,-1)
 \end{array}$$

Comment

Score: 2

The student has put the equation in standard form (set equal to zero) but has shown no further correct work.

Student Response

$$\begin{array}{r}
 2x+1 = x^2+4x-2 \\
 \underline{-2x} \qquad \qquad \underline{-2x} \\
 1 = x^2+2x-2 \\
 \underline{-1} \qquad \qquad \underline{=1} \\
 0 = x^2+2x-3 \\
 (x+3)(x-1) = 0 \\
 \begin{array}{l}
 x+3=0 \\
 \boxed{x=-3}
 \end{array}
 \quad
 \begin{array}{l}
 x-1=0 \\
 \boxed{x=1}
 \end{array}
 \end{array}$$

Comment

Score: 3

The student has shown appropriate algebraic work but has given only part of the correct solution.

Student Response

$$\begin{aligned}y &= x^2 + 4x - 2 - 2x + 1 = 0 \\y &= x^2 + 2x - 3 = 0 \\x^2 + 2x - 3 &= 0 \\(x-1)(x+3) \\x=1 \quad | \quad x=-3 \\y &= 2(1)+1 \quad | \quad y = 2(-3)+1 \\y &= 2 \cdot 1 + 1 \quad | \quad y = -6 + 1 = -5 \\y &= 3 \quad | \quad y = -5 \\(1, 3) \quad & \quad (-3, -5)\end{aligned}$$

Comment

Score: 4

The student has a complete and correct answer.

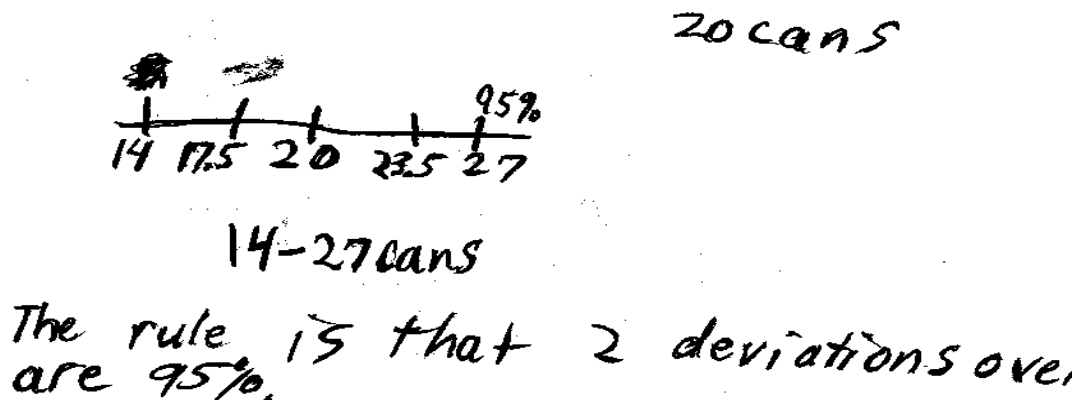
Sample Question 1 – Mathematics B

A survey of the soda drinking habits of the population in a high school revealed the mean number of cans of soda consumed per person per week to be 20, with a standard deviation of 3.5. If a normal distribution is assumed, find an interval that contains the total number of cans per week that approximately 95% of the population of this school will drink. Explain why you selected that interval.

Rubric

- [2] 13–27, and a curve is drawn and labeled correctly, and a correct explanation is given.
or
- [2] The correct answer and a statement explaining how to interpret the curve are given, but no curve is drawn.
- [1] An appropriate method is used, but one mathematical error is made.
or
- [1] A correct answer based on an incorrect curve is given.
or
- [1] A correct answer is given, but no curve is drawn, and no explanation of the curve is given.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
-

Student Response

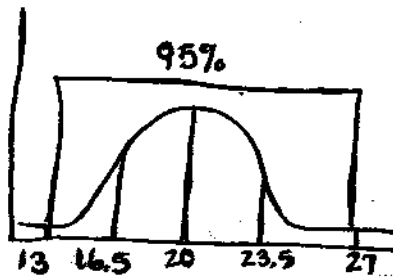


Comment

Score: 1

The student's answer shows partial understanding. The range is slightly off, and the explanation is somewhat vague.

Student Response



13-27

13-27 is the answer because 95% is two standard deviations away from the mean. 7 is subtracted and added to 20, the answer is 13-27.

Comment

Score: 2

The student has provided a correct answer and an appropriate explanation.

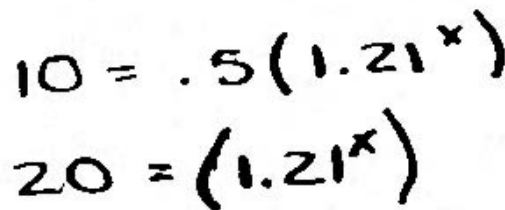
Sample Question 2 – Mathematics B

In the equation $y = .5(1.21^x)$, y represents the number of snowboarders in millions and x represents the number of years since 1988. Find the first year in which the number of snowboarders will be 10 million. (Only an algebraic solution will be accepted.)

Rubric

- [4] 2003 or 2004 (since the calculator yields 15.7, either year is acceptable), and appropriate work is shown, such as solving the log problem algebraically.
- [3] An appropriate method is shown and 15.7 is determined algebraically, but the correct year is not determined.
- or*
- [3] A computational error is made solving the log problem, but the answer is used correctly to find a year.
- [2] A graph is sketched, and 15.7 is determined, and the year is found.
- or*
- [2] A trial-and-error method (with at least 3 trials) is used, and the correct year is found.
- or*
- [2] An attempt to use logs is made, but multiple computational errors are made, but a year is found.
- or*
- [2] Only a correct log equation is set up.
- [1] The equation is set equal to 10 or 10,000,000, but it is not solved.
- or*
- [1] 2003 or 2004, 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.
-

Student Response


$$10 = .5(1.21^x)$$
$$20 = (1.21^x)$$

Comment

Score: 1

The student set the equation equal to 10 and properly divided by 0.5 but never showed log analysis.

Student Response

$$\begin{aligned}10 &= .5(1.21^x) \\20 &= 1.21^x \\ \log 20 &= x \log 1.21\end{aligned}$$

Comment

Score: 2

The student set up a correct log equation but went no further.

Student Response

$$\begin{aligned}10\,000\,000 &= 0.5(1.21^x) \\20\,000\,000 &= 1.21^x \\ \log 20\,000\,000 &= \log 1.21^x \\ \log 20\,000\,000 &= x \log 1.21 \\ \frac{\log 20\,000\,000}{\log 1.21} &= x \\ 88 \text{ yrs.} &= x\end{aligned}$$

1988
+ 88
in year 2076 there will be 10 million

Comment

Score: 3

The student has made only one minor error, using 10,000,000 instead of 10.

Student Response

$$y = .5(1.21^x)$$

$$\frac{10}{.5} = \frac{.5(1.21^x)}{.5}$$

$$20 = 1.21^x$$

$$\frac{\log 20}{\log 1.21} = \frac{x \log 1.21}{\log 1.21}$$

$$\frac{\log 20}{\log 1.21} = x$$

$$15.71569941 = x$$

$$16 = x$$

$$\begin{array}{r} 1588 \\ + 16 \\ \hline 2004 \end{array}$$

2004

Comment

Score: 4

The student has a complete and correct response.

Sample Question 3 – Mathematics B

The volume of a particular gas was determined at various pressures. P represents the pressure (in atmospheres) and is the independent variable on the horizontal axes, and V represents the volume (in liters) and is the dependent variable on the vertical axes. Create a scatter plot and find the curve of best fit. (Round answer constants to the *nearest tenth*.) Using the regression equation found, estimate V if $P = 2.5$.

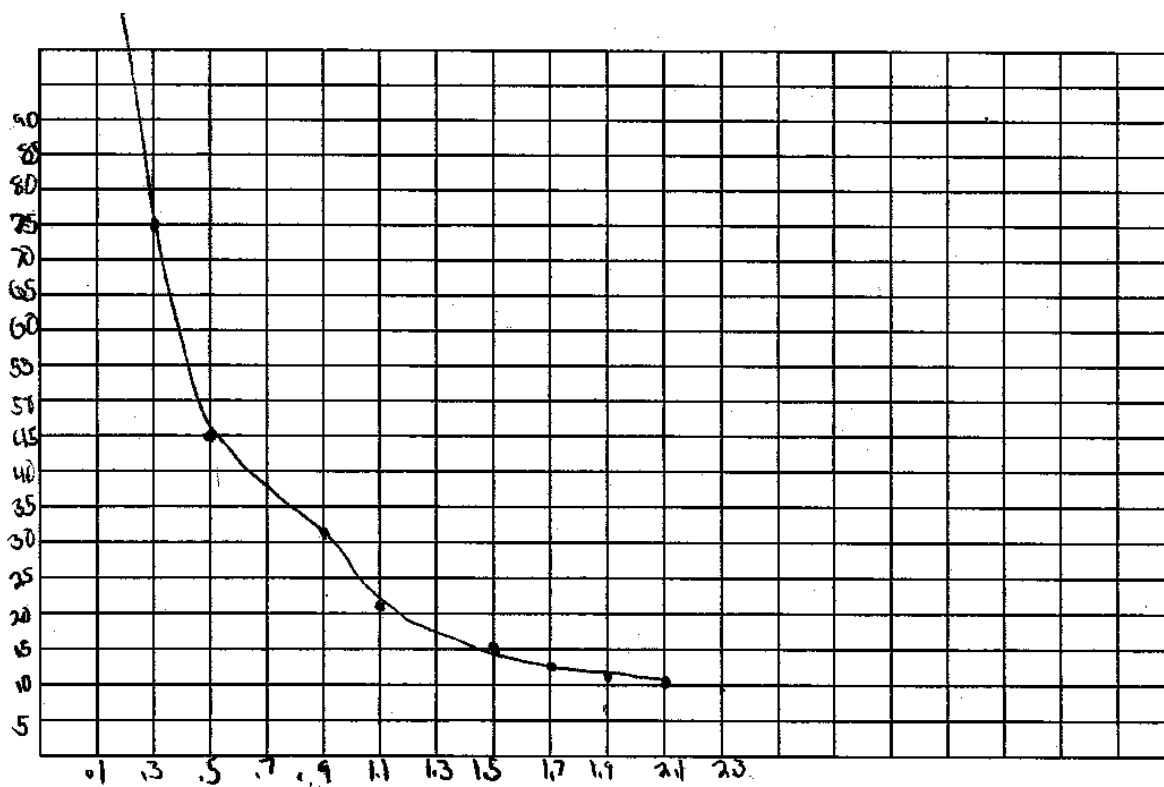
P	V
0.1	225
0.3	74.999
0.5	45
0.7	32.139
0.9	25
1.1	20.45
1.5	15
1.7	13.24
1.9	11.84
2.1	10.71
2.3	9.78

Rubric

- [6] A correct scatter plot, including labeled axes, and an equation of best fit with $V = 22.5 P^{-1}$, $P = 2.5$, and $V = 9$ are shown.
- [5] An appropriate method is shown, but points are plotted incorrectly.
or
- [5] An appropriate method is shown, but one computational error is made finding the equation or V .
- [4] An appropriate method is shown, but an incorrect type of function for the equation is used.
or
- [4] An appropriate method is shown, but the axes are not labeled and some points are plotted incorrectly.
or
- [4] An appropriate method is shown, but no functional value of 2.5 is determined and one graphing error is made.
- [3] A completely incorrect graph is shown, but a correct equation and functional value of 2.5 are given.
or
- [3] A correctly drawn graph is shown, but no equation or an incorrect equation is given, and no equation or an incorrect functional value at 2.5 is given.
- [2] A correct scatter plot is given, but the axes are not labeled.
or
- [2] Only a correct equation is given.

- [1] A correct scatter plot is given, but minor errors on intervals of the axes are made.
or
- [1] Only a correct value at 2.5 is given, 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.
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Student Response



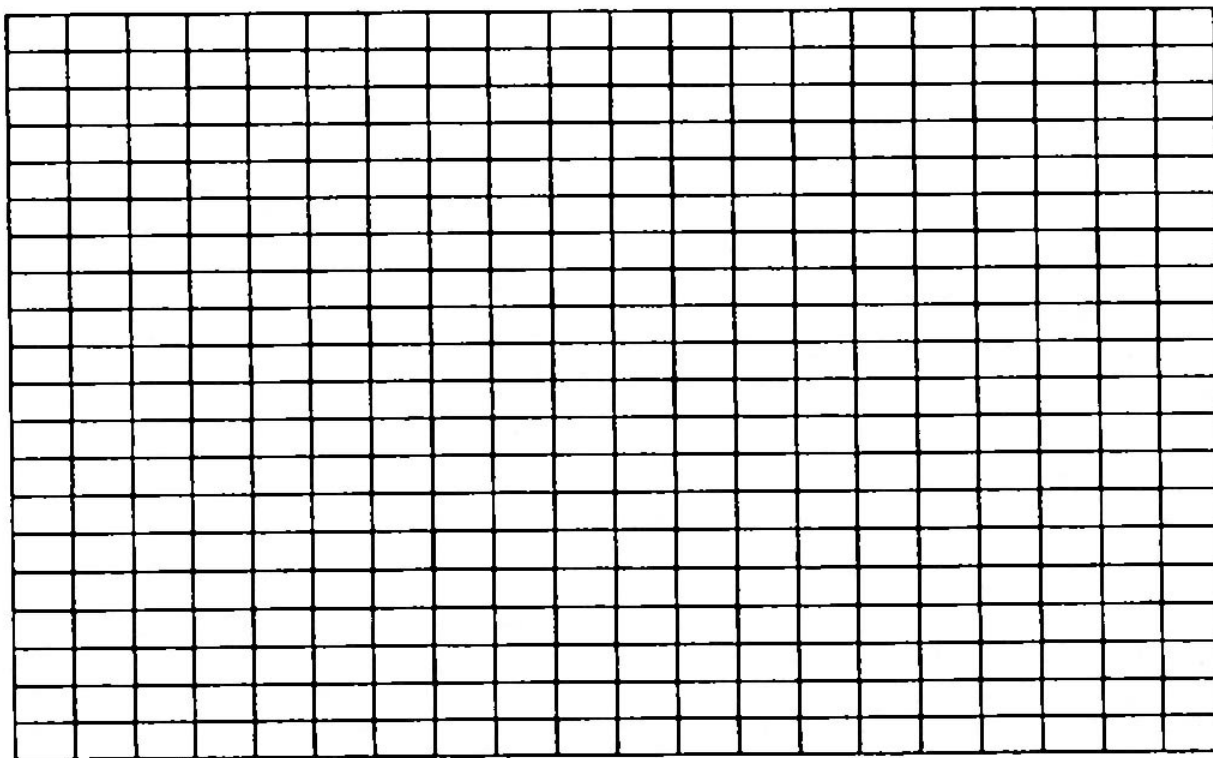
Comment

Score: 1

The student has shown minimal work in an attempt to draw a scatter plot.

Student Response

$$V = 22.498 P^{-1}$$

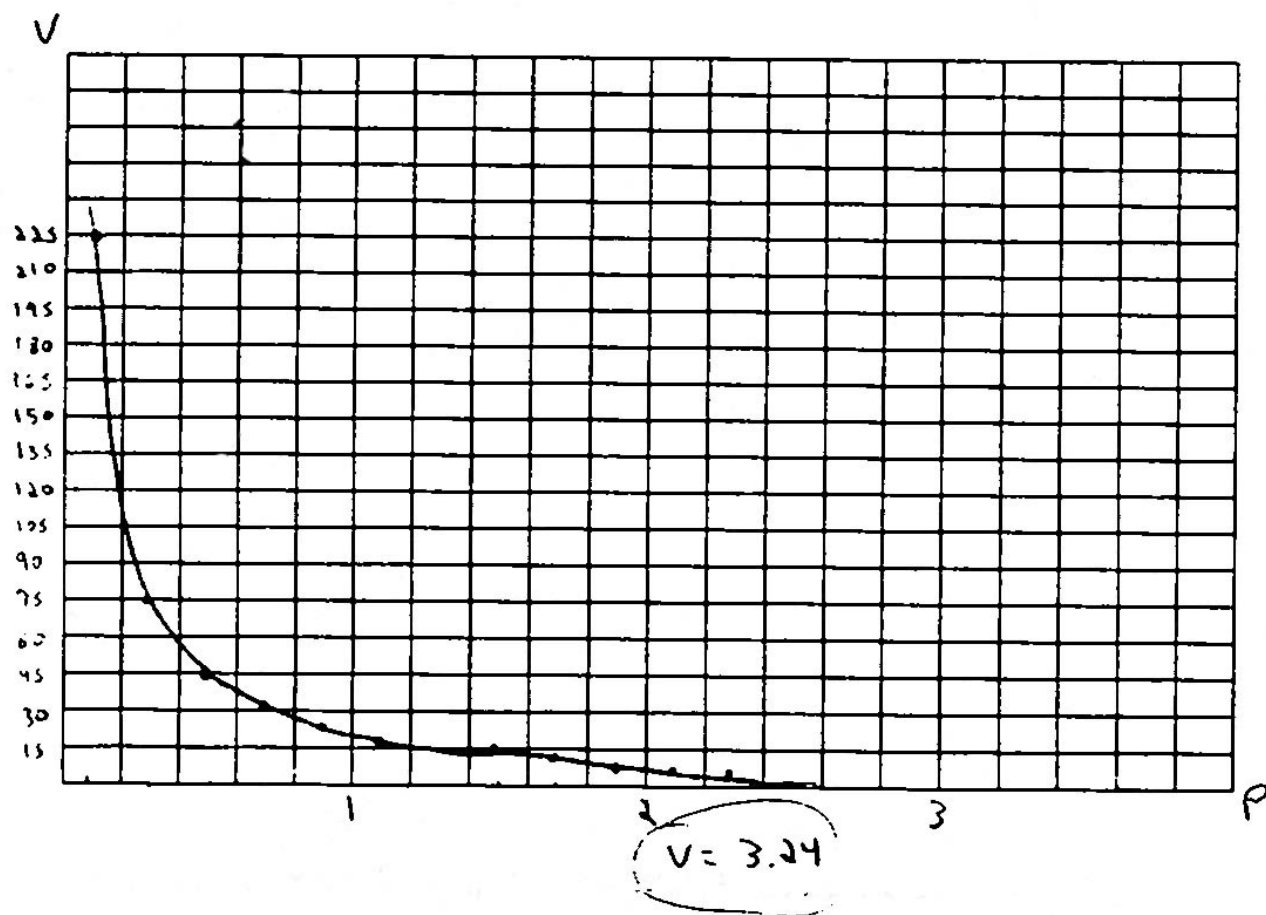


Comment

Score: 2

The student has shown only a correct equation.

Student Response



Comment

Score: 3

The student has drawn an acceptable graph but has not shown any regression equation.

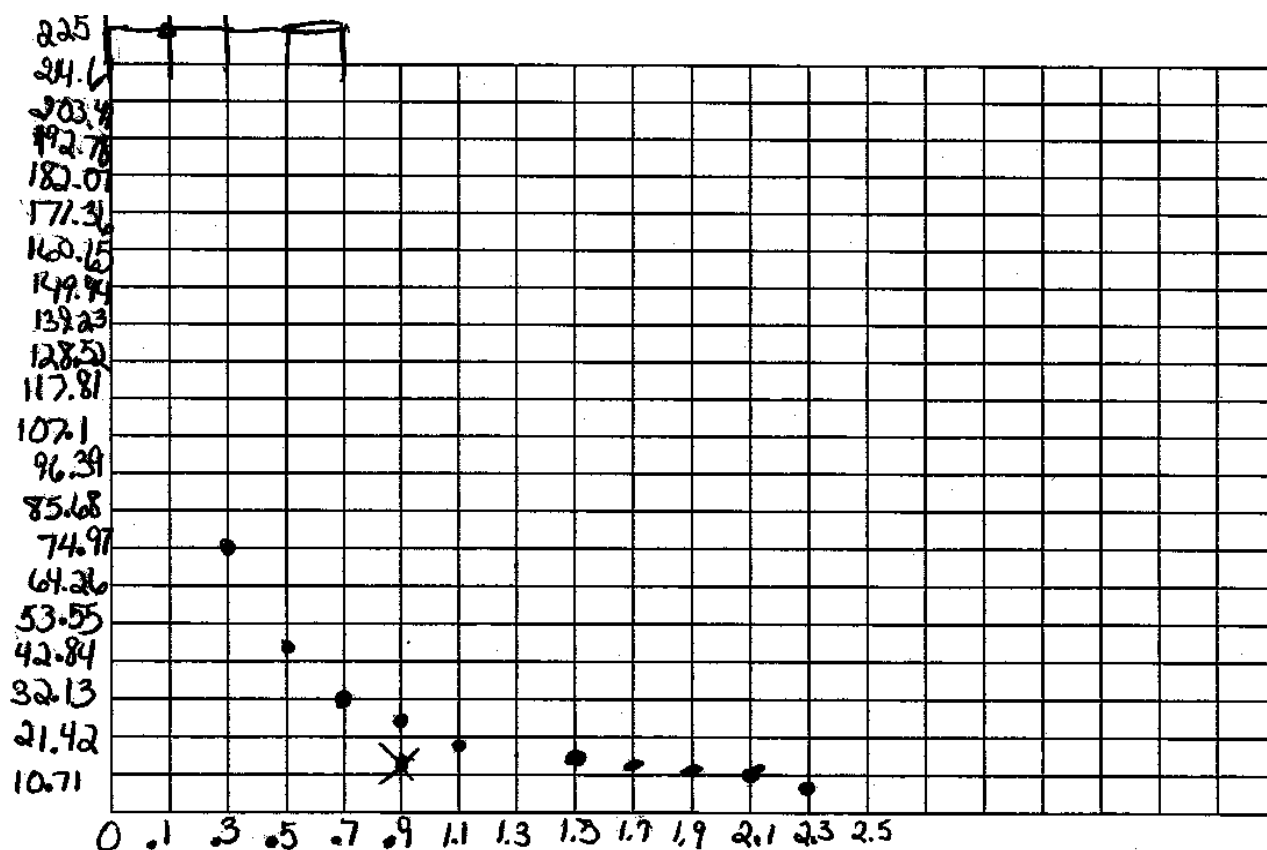
Student Response

cubic regression

$$y = -88.3x^3 + 394.2x^2 - 547.6x + 246.2$$

$x = 2.5$

$$y = -38.4375$$

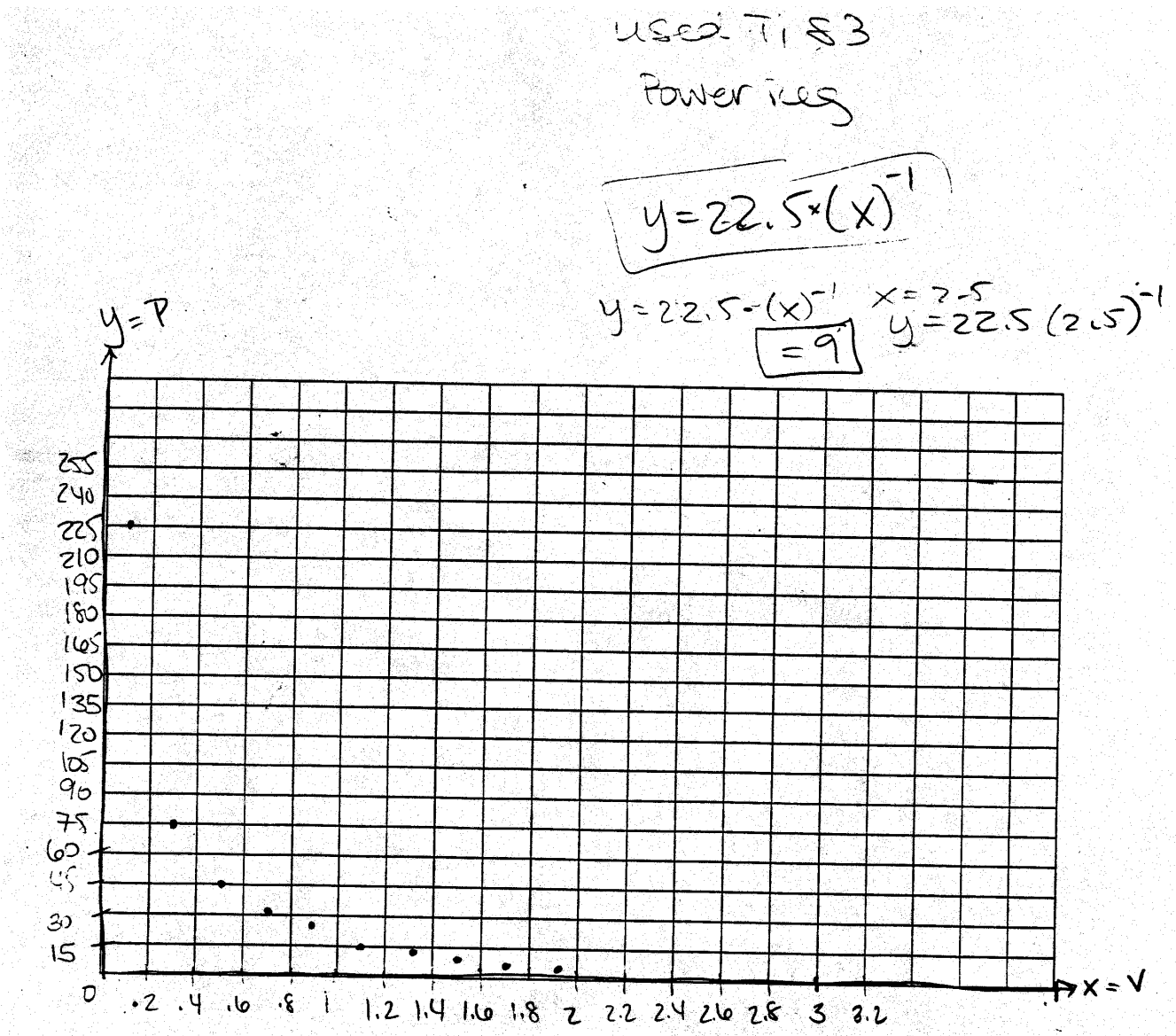


Comment

Score: 4

The student has shown an incorrect regression line but has continued to find an appropriate value for y (V). Also, no labels appear on the axes.

Student Response



Comment

Score: 5

The student has made a minor error labeling the axes, showing the y-axis equal to P when it should be V .

Student Response

quadratic ($R^2 = .7$)
 $y = 78.3x^2 - 246.1x + 185.3$
 logarithmic ($R^2 = -.9$)
 $y = 36.3 + -59.4 \ln x$

linear $R^2 = -.7$
 $y = -57.4x + 112.3$
~~* power~~ ($R^2 = -.9999...$)
 $y = 22.5x^{-1}$

$$V = 22.5 P^{-1}$$

$$V = 22.5 (2.5)^{-1}$$

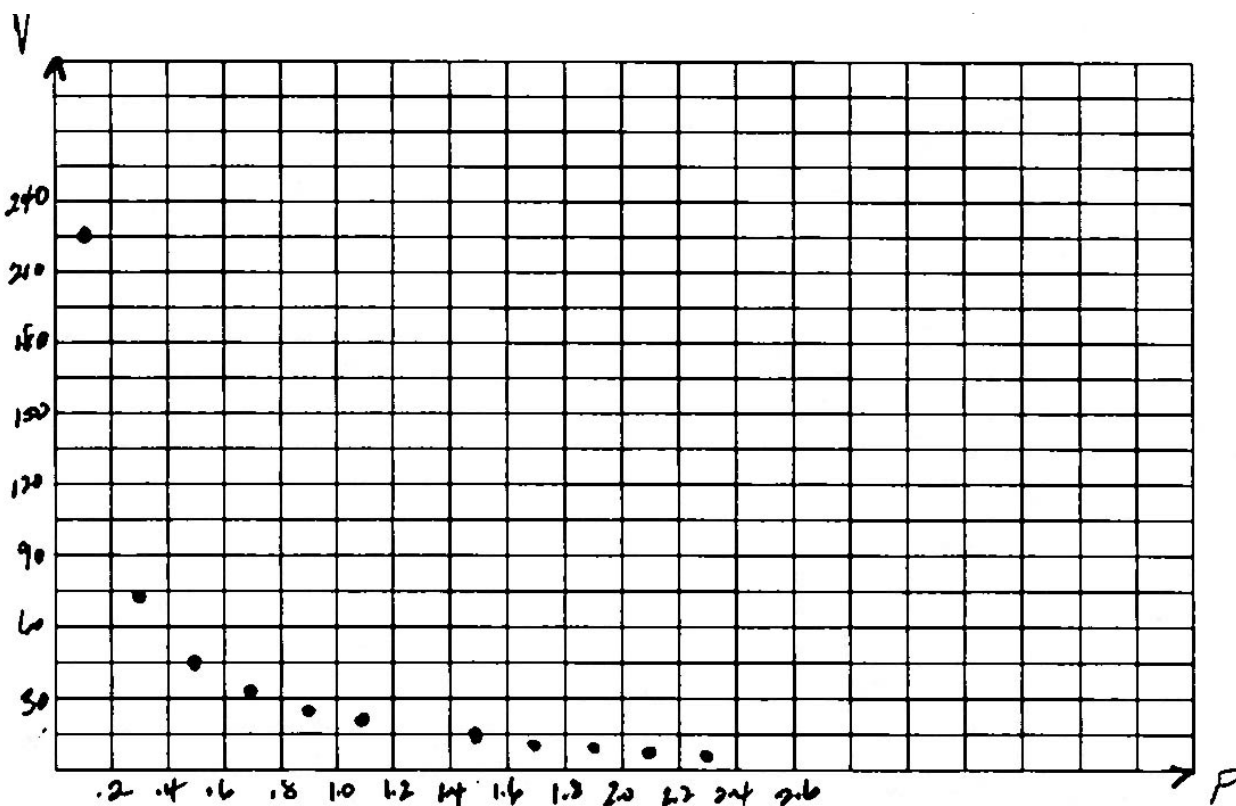
$$V = 9$$

$$P \rightarrow L1$$

$$V \rightarrow L2$$

$$[-.12, 2.57] \text{ by } [-26.8074, 261.5874]$$

STAT0209



Comment

Score: 6

The student's response is correct and complete.