ACTAAP

Arkansas Comprehensive Testing, Assessment, and Accountability Program

Teacher Handbook

Algebra I
End-of-Course Examinations

2010–2011 Administrations

This document is the property of the Arkansas Department of Education, and all rights of this document are reserved by the Arkansas Department of Education. Arkansas public schools may reproduce this document in full or in part for use with teachers, students, and parents. All other uses of this document are forbidden without written permission from the Arkansas Department of Education. All inquiries should be sent to the Assessment Office at the Arkansas Department of Education, 501-682-4558.

Arkansas Department of Education

Table of Contents

PAGE

Introduction **1**

Scoring Student Responses to Open-Response Items **2**
Reader Training 2
Scoring Procedures 2

Item A—2011 Algebra I **4**
Solution and Scoring 5

Item A Sample Responses and Annotations—2011 Algebra I **7**
Score Point: 4 7
Score Point: 3 8
Score Point: 2 9
Score Point: 1 10
Score Point: 0 11

Item B—2011 Algebra I **12**
Solution and Scoring 13

Item B Sample Responses and Annotations—2011 Algebra I **15**
Score Point: 4 15
Score Point: 3 16
Score Point: 2 17
Score Point: 1 18
Score Point: 0 19

Item C—2011 Algebra I **20**
Solution and Scoring 21

Item C Sample Responses and Annotations—2011 Algebra I **23**
Score Point: 4 23
Score Point: 3 24
Score Point: 2 25
Score Point: 1 26
Score Point: 0 27

Item D—2011 Algebra I **28**
Solution and Scoring 29

Item D Sample Responses and Annotations—2011 Algebra I **32**
Score Point: 4 32
Score Point: 3 33
Score Point: 2 34
Score Point: 1 35
Score Point: 0 36

Table of Contents

Item E—2011 Algebra I **37**
Solution and Scoring 38

Item E Sample Responses and Annotations—2011 Algebra I **41**
Score Point: 4 41
Score Point: 3 42
Score Point: 2 43
Score Point: 1 44
Score Point: 0 45

Item F—2011 Algebra I **46**
Solution and Scoring 47

Item F Sample Responses and Annotations—2011 Algebra I **48**
Score Point: 4 48
Score Point: 3 49
Score Point: 2 50
Score Point: 1 51
Score Point: 0 52

Item G—2011 Algebra I **53**
Solution and Scoring 54

Item G Sample Responses and Annotations—2011 Algebra I **56**
Score Point: 4 56
Score Point: 3 57
Score Point: 2 58
Score Point: 1 59
Score Point: 0 60

Item H—2011 Algebra I **61**
Solution and Scoring 62

Item H Sample Responses and Annotations—2011 Algebra I **63**
Score Point: 4 63
Score Point: 3 64
Score Point: 2 65
Score Point: 1 66
Score Point: 0 67

Introduction

The **Arkansas Comprehensive Testing, Assessment, and Accountability Program (ACTAAP)** includes Mid-Year and Spring Algebra End-of-Course Examinations for students completing Algebra I or the equivalent for high school graduation credit. In addition to the Mid-Year and Spring administrations, a Fall Algebra I End-of-Course Examination and Fall and Spring administrations of the Online Alternative Test for Algebra I were offered for students who were retesting in Algebra I. The examinations consist of questions that directly assess student knowledge. The fall, mid-year, and spring examinations consist of both multiple-choice and open-response questions while the online examinations consist of only multiple-choice questions. The *Arkansas Algebra I Mathematics Curriculum Framework* is the basis for the development of the Algebra I End-of-Course Examinations.

In January or May 2011, all students who had completed or were completing the required course work for Algebra I for high school graduation credit participated in the Mid-Year or Spring Algebra I End-of-Course Examination. Students retesting in Algebra I were also provided the opportunity to test with the Fall, Mid-Year, and/or Spring Algebra I End-of-Course Examination and/or the Online Alternative Test for Algebra I. Results of the Algebra I End-of-Course Examination will be provided to all students, schools, and districts to be used as the basis for instructional change.

This handbook provides information regarding the scoring of student responses to the Algebra I open-response items. It describes the scoring procedures and the scoring criteria (rubrics) used to assess student responses. Copies of actual student responses are provided, along with scores given to those responses, to illustrate how the scoring criteria were applied to Algebra I open-response items.

Additional information about the Algebra I End-of-Course Examination is available through the Arkansas Department of Education. Questions can be addressed to the Assessment Office at 501-682-4558.

Scoring Student Responses to Open-Response Items

The multiple-choice and open-response test items for the Algebra I End-of-Course Examination are developed with the assistance and approval of the Algebra I Content Advisory Committee. This committee is composed of active Arkansas educators with expertise in Mathematics education. The Algebra I Content Advisory Committee develops and reviews multiple-choice and open-response items to ensure that they reflect the *Arkansas Algebra I Mathematics Curriculum Framework*.

While multiple-choice items are scored by machine to determine if the student chose the correct answer from four options, open-response items must be scored by trained "readers" using a pre-established set of scoring criteria.

Reader Training

Readers are trained to score only one content area. Qualified readers for the Arkansas scoring will be those with a four-year college degree in English, language arts, education, mathematics, science, or related fields.

Before readers are allowed to begin assigning scores to any student responses, they go through intensive training. The first step in that training is for the readers to read the Algebra I open-response items as they appear in the test booklet and to respond—just as the student test takers are required to do. This step gives the readers some insight into how the students might have responded. The next step is the readers' introduction to the scoring rubric. All of the specific requirements of the rubric are explained by the Scoring Director who has been specifically trained to lead the scoring group. Then responses (anchor papers) that illustrate the score points of the rubric are presented to the readers and discussed. The goal of this discussion is for the readers to understand why a particular response (or type of response) receives a particular score. After discussion of the rubric and anchor papers, readers practice scoring sets of responses that have been pre-scored and selected for use as training papers. Detailed discussion of the responses and the scores they receive follows.

After three or four of these practice sets, readers are given "qualifying rounds." These are additional sets of pre-scored papers, and, in order to qualify, each reader must score in exact agreement on at least 80% of the responses and have no more than 5% non-adjacent agreement on the responses. Readers who do not score within the required rate of agreement are not allowed to score the Algebra I End-of-Course Examination responses.

Once scoring of the actual student responses begins, readers are monitored constantly throughout the project to ensure that they are scoring according to the criteria. Daily and cumulative statistics are posted and analyzed, and Scoring Directors or Team Leaders reread selected responses scored by the readers. These procedures promote reliable and consistent scoring. Any reader who does not maintain an acceptable level of agreement is dismissed from the project.

Scoring Procedures

All student responses to the Algebra I End-of-Course Examination open-response test items are scored independently by two readers. Those two scores are compared, and responses that receive scores that are non-adjacent (a "1" and a "3," for example) are scored a third time by a Team Leader or the Scoring Director for resolution.

On the following pages, open-response items are presented as they appeared in the *2011 Mid-Year* and *Spring Algebra I End-of-Course Examinations*. The specific scoring rubric for each item and annotated responses for each score point of the rubric follows. The goal is for classroom teachers and their students to understand how responses are scored. It is hoped that this understanding will help students see what kind of performance is expected of them on the Algebra I End-of-Course Examination.

ALGEBRA I RESPONSES

A. The function $h = -16t^2 + 128t$ represents the relationship between the height of an object, h, and the time in the air, t.

1. Copy and complete the following table in your answer document.

t	h
0	
1	
4	
7	
8	

2. Sketch a graph of the function on the grid provided for the period $0 \le t \le 8$.

3. Label the coordinates of the zeros.

4. For this scenario, what do the x coordinates of the zeros represent?

BE SURE TO LABEL YOUR RESPONSES 1, 2, 3, AND 4.

Item A Scoring Rubric—2011 Algebra I

Score	Description
4	The student earns 4 points. No incorrect work is included
3	The student earns 3–3½ points.
2	The student earns 2–2½ points.
1	The student earns ½–1½ points or some minimal understanding is shown.
0	The student earns 0 points. No understanding is shown.
B	Blank—No Response. A score of "B" will be reported as "NA." (No attempt to answer the item. Score of "0" assigned for the item.)

SOLUTION AND SCORING

4 points possible:

<table>
<tr><th>Part</th><th>Points</th></tr>
<tr><td>1</td><td>

1 point possible

1 point: Correct and complete table, as shown below:
(5 correct values are listed for *h*)

t	*h*
0	0
1	112
4	256
7	112
8	0

OR

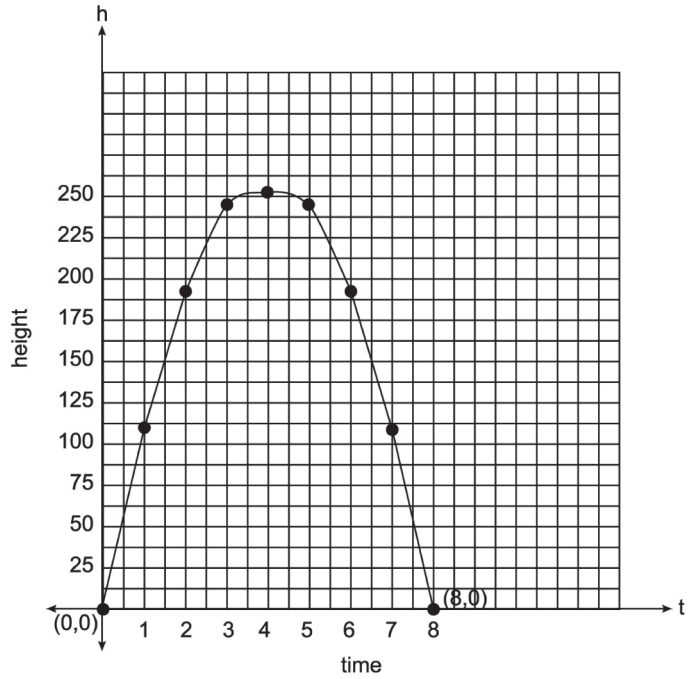
½ point: 4 correct values are listed for *h*

</td></tr>
<tr><td>2</td><td>

1 point possible

1 point: Correct graph as shown below:

- All points plotted correctly
- Curve is drawn containing all points plotted for $0 \le t \le 8$
- Axes are labeled *t* and *h*, time and height, or equivalent
- Intervals are consistent on both axes



</td></tr>
</table>

Part	Points
2	**1 point possible (continued)** **OR** ½ point: Everything is correct on the graph except the points are NOT connected or Graph contains one or two errors Ex: Axes not labeled Ex: Axes are reversed (not a function) Ex: One point plotted incorrectly and inconsistent interval on h-axis Ex: Segments are drawn containing plotted points rather than a curve Ex: Inconsistent intervals on both h and t axes Ex: Arrows on parabola or graph includes points for which $t < 0$ or $t > 8$ **Note: No credit for graph of a straight line**
3	**1 point possible** 1 point: Correct zeros: (0, 0) and (8, 0) are named or are identified on the graph or Correct zeros based on an incorrect graph of a quadratic equation in Part 2 or Correct zeros based on table in Part 1
4	**1 point possible** 1 point: Correct explanation Give credit for the for the following or equivalent: • The x coordinates of the zeros represent the times when the object is on the ground • The first zero is when the object is about to go up and the second zero is the time it hits the ground. **OR** ½ point: • Correct explanation for one of the zeros: Ex: "It's when the object hits the ground." Ex: "It's before the object goes up." or • Vague explanation Ex: "The time to take to get a height of zero."

SCORE POINT: 4

Part 1		**Points**
Correct answers:	All values in table are correct.	**1**

Part 2

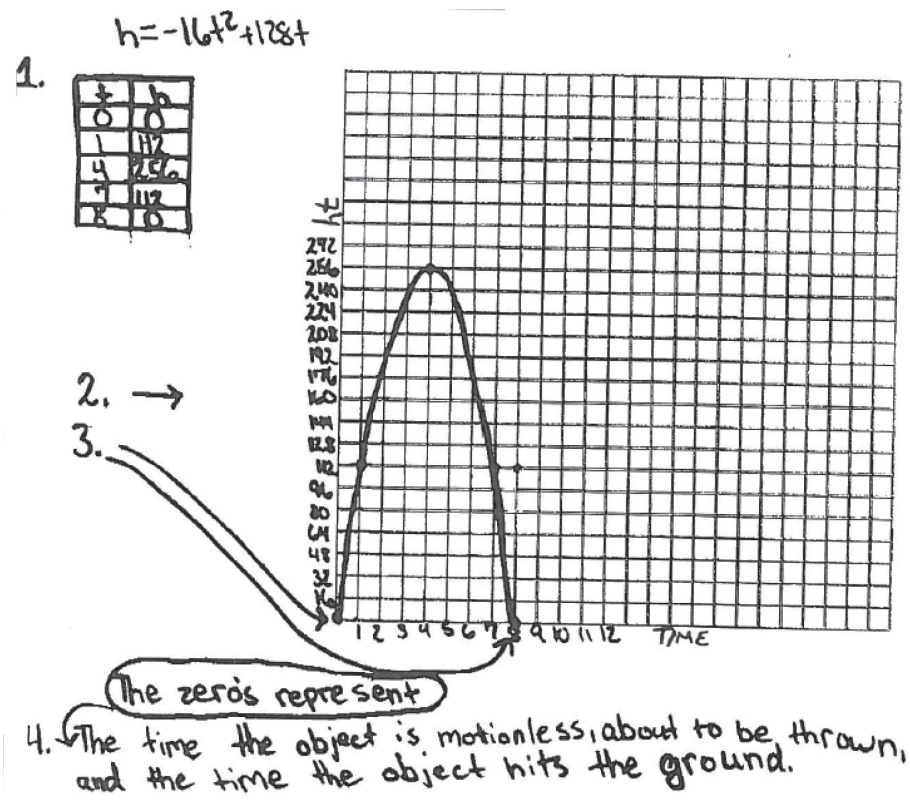
Correct graph:	All points are plotted correctly Curve is drawn for $0 \le t \le 8$ Axes are labeled Intervals are consistent	**1**

Part 3

Correct:	Zeros are identified on the graph	**1**

Part 4

Correct explanation:	"object about to be thrown and...it hits the ground"	**1**
	Total Points	**4**



SCORE POINT: 3

Part 1

		Points
Correct answers:	All required values in table are correct as are the additional values added to help in graphing.	**1**

Part 2

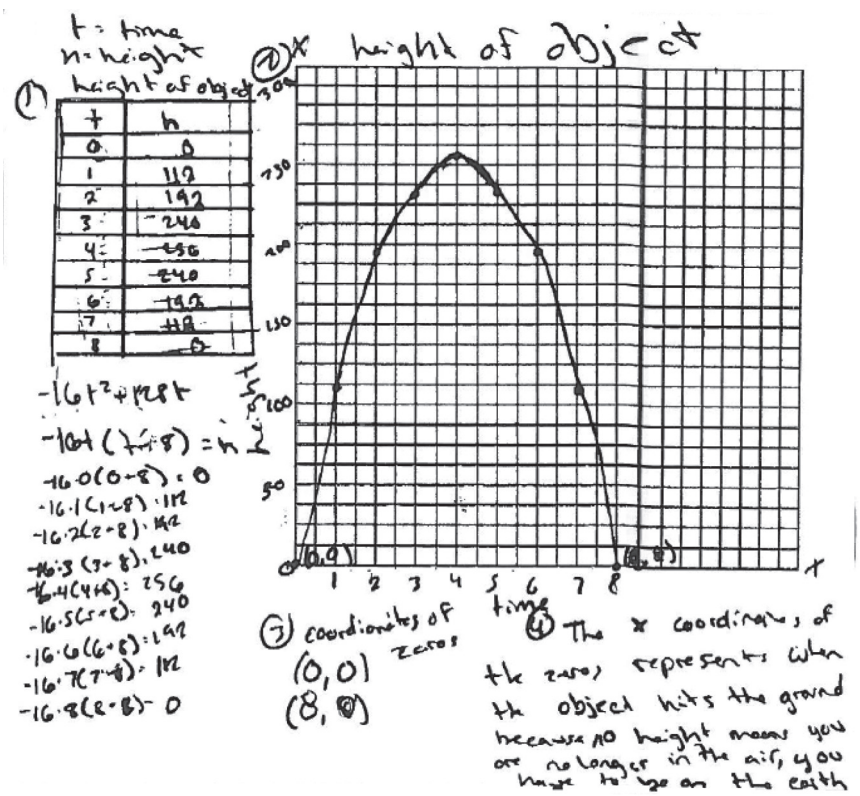
Correct graph:	All points from Part 1 table are plotted correctly Curve is drawn for $0 \le t \le 8$ Axes are labeled Intervals are consistent	**1**

Part 3

Correct answers:	(0, 0) and (8, 0) named and labeled on the graph	**1**

Part 4

Partially correct explanation:	(8, 0) is correctly explained as when the object hits the ground. There is no explanation for (0, 0)	½
	Total Points	**3½**



SCORE POINT: 2

Part 1

		Points
Correct answers:	All values in table are correct.	**1**

Part 2

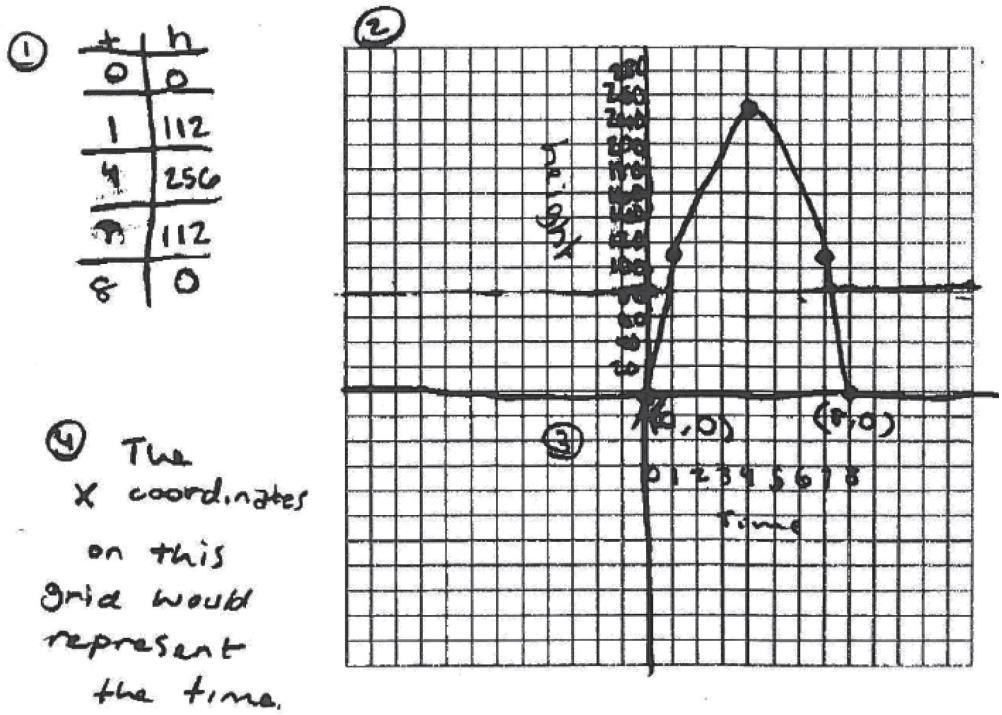
Partially correct graph:	Points are plotted correctly Curve is drawn for $0 \le t \le 8$ Axes are labeled Intervals are inconsistent on h-axis	½

Part 3

Correct answers:	(0, 0) and (8, 0) are identified on the graph	**1**

Part 4

Incorrect explanation:	"represent the time"	–
	Total Points	**2½**



SCORE POINT: 1

Part 1		**Points**
4 correct answers 1 incorrect answer:	(4, –512)	½

Part 2

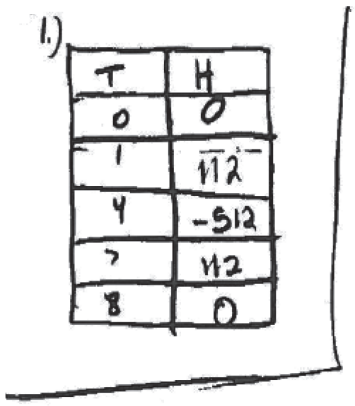
Incorrect graph:		–

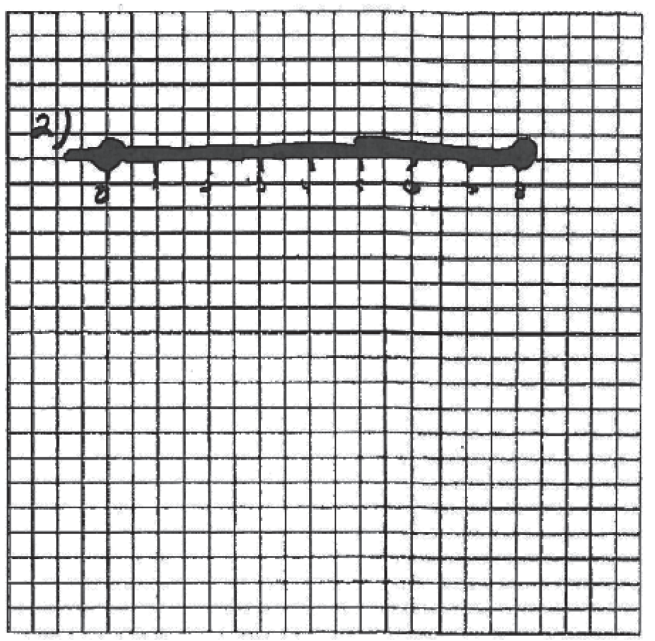
Part 3

Correct answers:	(0, 0) and (8, 0) are named as zeros	**1**

Part 4

Incorrect explanation:	"The starting and ending point of the line"	–
	Total Points	**1½**





3.) (0,0) + (8,0)

4.) The starting and ending point of the line on the graph

SCORE POINT: 0

Part 1		**Points**
3 correct answers 2 incorrect answers:	(4, 768), (8, 3072)	–

Part 2

Missing graph		–

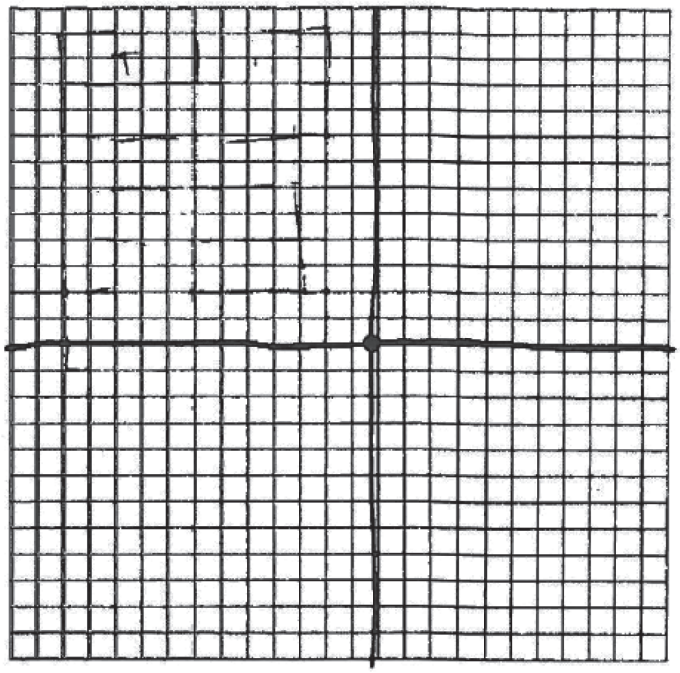
Part 3

No zeros named		–

Part 4

Incorrect explanation:	"0's represent the vertex"	–
	Total Points	**0**

T	H
0	0
1	112
4	768
7	112
8	3072



4) the 0s represent the vertex of the function.

B. Ray charges $25 to mow a lawn plus $10 per hour to weed gardens.

1. Mr. Ortega wants to have his lawn mowed and his garden weeded. Copy the table below in your answer document. Fill in the table and show the total cost that Mr. Ortega would have to pay Ray for each of the times listed.

Ray's Costs

Hours of Weeding	Total Cost in dollars (lawn and garden)
0	
1	
2	
3	

2. Write an equation that represents how much it will cost, C, for Ray to mow a lawn and do h hours of weeding.

3. Write an inequality that shows how many hours of weeding Mr. Ortega can receive if he wants to spend no more than $82.

4. Solve the inequality you wrote in Part 3 to find how many full hours Mr. Ortega can receive. Show your work or explain your answer.

BE SURE TO LABEL YOUR RESPONSES 1, 2, 3, AND 4.

Item B Scoring Rubric—2011 Algebra I

Score	Description
4	The student earns 4 points. No incorrect work is included
3	The student earns 3–3½ points.
2	The student earns 2–2½ points.
1	The student earns ½–1½ points or some minimal understanding is shown.
0	The student earns 0 points. No understanding is shown.
B	Blank—No Response. A score of "B" will be reported as "NA." (No attempt to answer the item. Score of "0" assigned for the item.)

SOLUTION AND SCORING

4 points possible:

<table>
<tr><th>Part</th><th>Points</th></tr>
<tr><td>1</td><td>
1 point possible
1 point: Correct and complete table, as shown below:
(4 correct values are listed for Total Cost)

Ray's Costs
<table>
<tr><th>Hours of Weeding</th><th>Total Cost in dollars (lawn and garden)</th></tr>
<tr><td>0</td><td>$25</td></tr>
<tr><td>1</td><td>$35</td></tr>
<tr><td>2</td><td>$45</td></tr>
<tr><td>3</td><td>$55</td></tr>
</table>
OR
½ point: 3 correct values are listed for Total Cost
or
3 correct values are listed for Total Cost based on an incorrect non-zero cost given for 0 hours of weeding.

Note for Parts 2 and 3: Other variables may be used at any level if defined. If not defined this becomes a 3/4 issue.
</td></tr>
<tr><td>2</td><td>
1 point possible
1 point: Correct equation: $C = 25 + 10h$ (or equivalent)

OR
½ point: Correct expression: $25 + 10h$
</td></tr>
<tr><td>3</td><td>
1 point possible
1 point: Correct inequality: $25 + 10h \leq 82$ (or equivalent)
(or correct inequality based on an incorrect equation in Part 2)
or
$10h \leq 82$ (or equivalent)
(Based on the wording in Part 3 this prompt could be read to mean weed only)
</td></tr>
</table>

Part	Points
4	**1 point possible** 1 point: Correct # of hours: 5 (accept 5.7 or 5 hours, 42 minutes) (or correct # based on incorrect inequality in Part 3) Correct procedure shown or explained • $25 + 10h \leq 82$ $10h \leq 57$ $h \leq 5.7$ → So he can get 5 full hours. • Correct guess and check procedure: $10(5) + 25 = \$75$ $10(6) + 27 = \$85$ (Shows that 5 hours works and 6 hours does not) • $82 - 25 = 57$ $57 \div 10 = 5.7$ So 5 is the number of full hours • Continues Part 1 table to 6 hours with correct answer of 5 **OR** ½ point: • Correct # of hours: 5 (accept 5.7 or 5 hours, 42 minutes) Procedure is incomplete or missing or • # of hours is incorrect due to a calculation, copy or rounding error Correct procedure is shown or explained or • Correctly solves $25 + 10h \geq 82$ with an answer of 5, 5.7 or 5 hours, 42 minutes

SCORE POINT: 4

Part 1		**Points**
Correct answers:	All values in table are correct.	**1**

Part 2

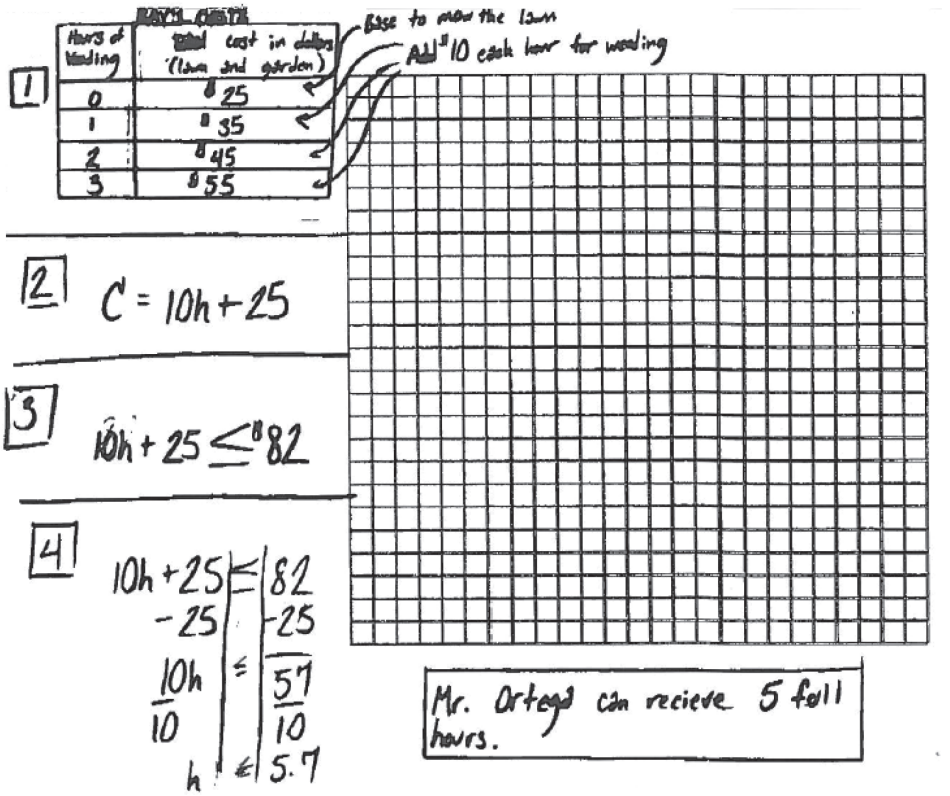
Correct equation:	$C = 10h + 25$	**1**

Part 3

Correct inequality:	$10h + 25 \leq \$82$	**1**

Part 4

Correct answer: and Correct procedure:	5 full hours 25 is subtracted from both sides of Part 3 inequality. Both sides are divided by 10 and the quotient is truncated.	**1**
	Total Points	**4**



1

Hours of Mowing	Total cost in dollars (lawn and garden)
0	$25
1	$35
2	$45
3	$55

Base to mow the lawn

Add $10 each hour for weeding

2 $C = 10h + 25$

3 $10h + 25 \leq \$82$

4

$10h + 25 \leq 82$

$-25 \quad -25$

$\frac{10h}{10} \leq \frac{57}{10}$

$h \leq 5.7$

Mr. Ortega can recieve 5 full hours.

SCORE POINT: 3

Part 1		**Points**
Correct answers:	All values in table are correct.	**1**

Part 2		
Correct equation:	$C = 10h + 25$	**1**

Part 3		
Correct inequality:	$\$82 \geq 10h + 25$	**1**

Part 4		
Answer missing: and Procedure missing:	No value is specifically stated. One particular value is shown to satisfy the inequality but the inequality is not solved for h.	–
	Total Points	**3**

1.) Ray's Cost

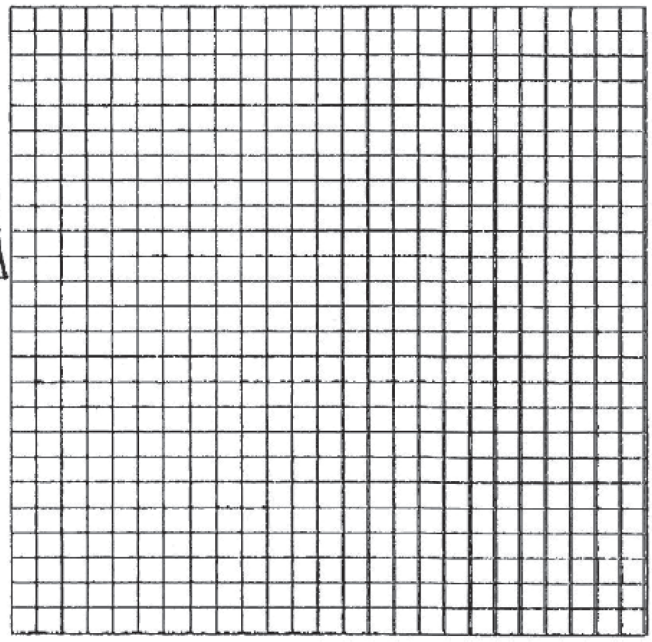
Hours of weeding	Total Cost in dollars (lawn and garden)
0	25
1	35
2	46
3	55

2.) $C = 10h + 25$

3.) $\$82 \geq 10h + 25$

4.) $\$82 \geq (10 \cdot 5) + 25$

$\$82 \geq \$75$



SCORE POINT: 2

Part 1

		Points
Correct answers:	All values in table are correct.	1

Part 2

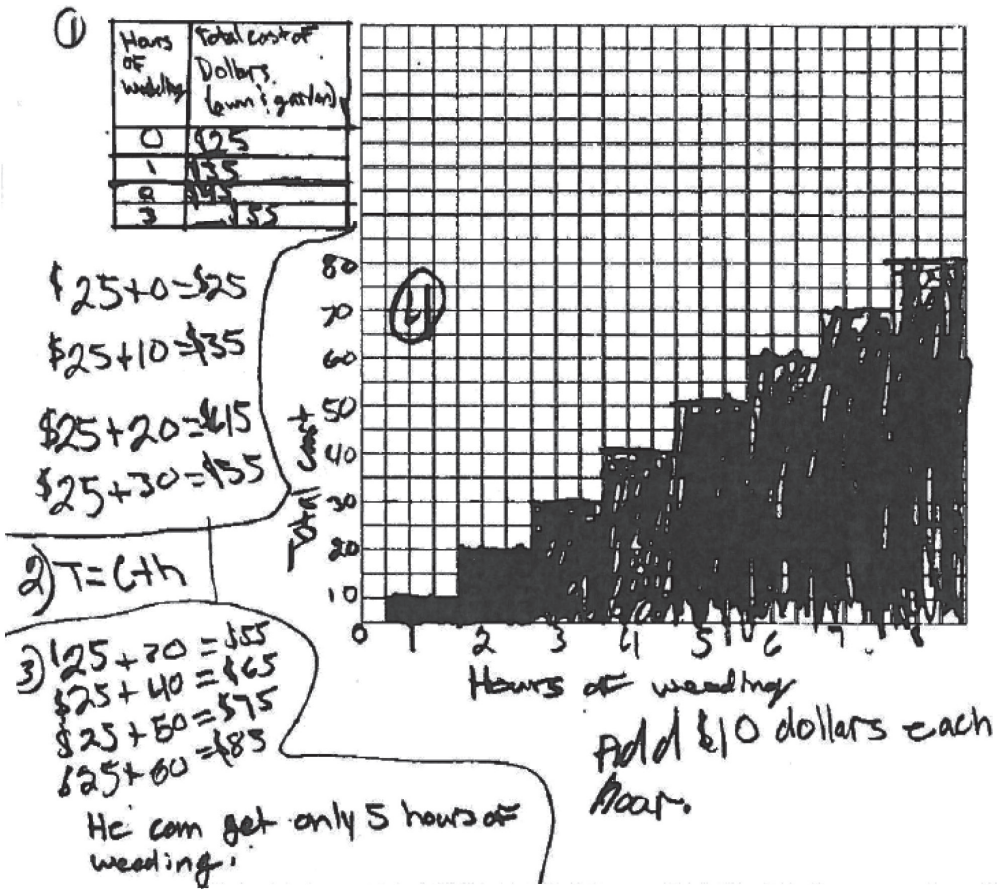
Incorrect equation:	$T = c + h$	–

Part 3

Inequality missing		–

Part 4

Correct answer (given in Pt 3): and Correct procedure (given in Pt 3):	5 hours Continues Part 1 table to 6 hours. Graph in Part 4 does not contradict any information given in Part 3.	1
	Total Points	**2**



SCORE POINT: 1

Part 1

		Points
1 correct answer: 3 incorrect answers:	(0, 25) Cost values for 1, 2 and 3 hours are incorrect.	–

Part 2

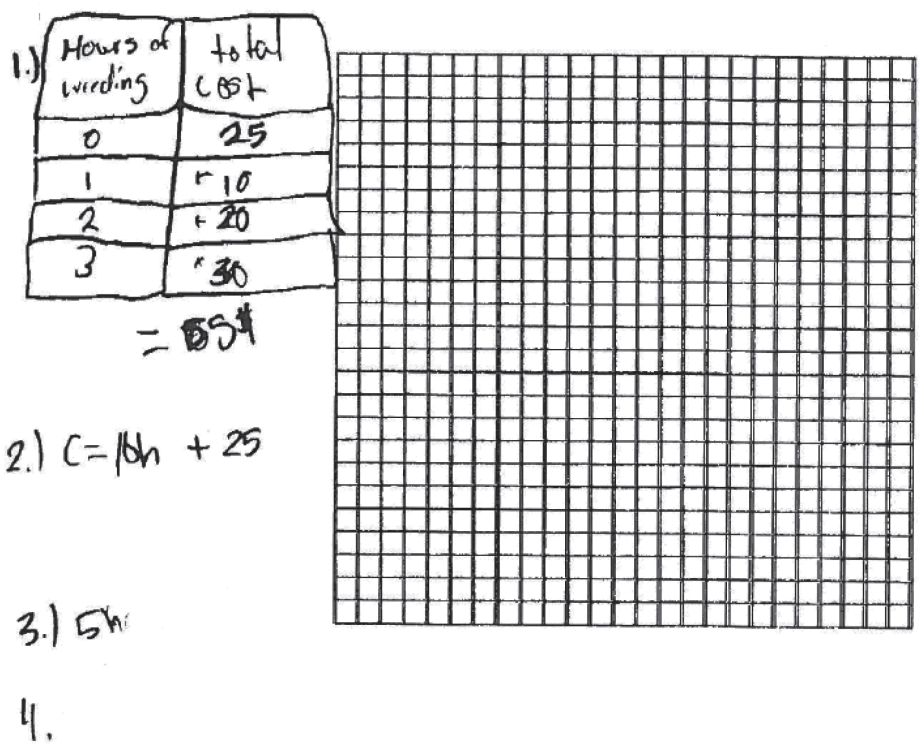
Correct equation:	$C = 10h + 25$	**1**

Part 3

Inequality missing:	$5h$	–

Part 4

Missing		–
	Total Points	**1**



1.)

Hours of weeding	total cost
0	25
1	+ 10
2	+ 20
3	+ 30

= 85$

2.) C = 10h + 25

3.) 5h

4.

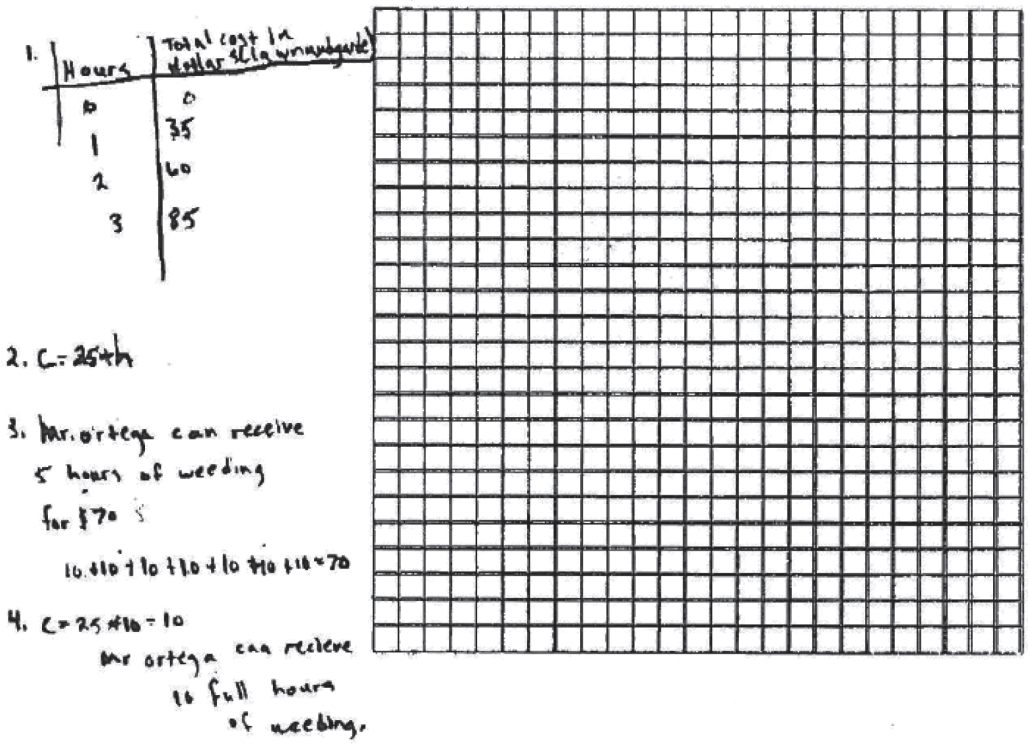
SCORE POINT: 0

Part 1		**Points**
Incorrect answers:	All values in table are incorrect except for (1,35).	–

Part 2		
Incorrect equation:	$C = 25 + h$	–

Part 3		
Missing inequality		–

Part 4		
Incorrect answer: and Missing procedure	10 hours	–
	Total Points	**0**



1.

Hours	Total cost in dollar sign whole
0	0
1	35
2	60
3	85

2. C = 25+h

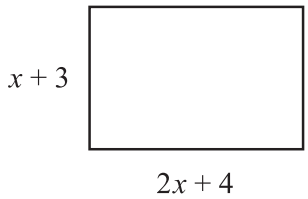
3. Mr. ortega can receive 5 hours of weeding for $70

10+10+10+10+10+10=70

4. C = 25+10 = 10

Mr ortega can recieve 10 full hours of weeding.

C. Use the rectangle below to answer the following questions.



1. Find the perimeter of the rectangle shown above in terms of x. Simplify your answer. Show your work.

2. If each side is doubled, what is the new perimeter of this rectangle in terms of x? Simplify your answer. Show your work.

3. Find the area of the original rectangle shown above in terms of x. Simplify your answer. Show your work.

4. If each side is doubled, what is the new area of this rectangle in terms of x? Simplify your answer. Show your work.

BE SURE TO LABEL YOUR RESPONSES 1, 2, 3, AND 4.

Item C Scoring Rubric—2011 Algebra I

Score	Description
4	The student earns 4 points. The response contains no incorrect work.
3	The student earns 3–3½ points.
2	The student earns 2–2½ points.
1	The student earns ½–1½ points or some minimal understanding is shown.
0	The student earns 0 points. No understanding is shown.
B	Blank—No Response. A score of "B" will be reported as "NA." (No attempt to answer the item. Score of "0" assigned for the item.)

SOLUTION AND SCORING

4 points possible:

Part	Points
1	**1 point possible** 1 point: Correct perimeter: $6x+14$ Correct procedure shown and/or explained Give credit for the following or equivalent: • $P = 2(x+3)+2(2x+4)$ $= 2x+6+4x+8$ (not required) $= 6x+14$ • Figure is drawn, all 4 sides labeled correctly with answer of $6x + 14$ **OR** ½ point: • Correct perimeter: $6x+14$ Work is incomplete or missing or • Perimeter is correct but is not in simplest form Correct procedure is shown and/or explained or • Perimeter is incorrect due to 1 calculation or copy error Correct procedure is shown and/or explained
2	**1 point possible** 1 point: Correct new perimeter: $12x+28$ (or correct perimeter, simplified, based on an incorrect perimeter in Part 1) Correct procedure shown and/or explained Give credit for the following or equivalent: • $P = 2(6x+14)$ $= 12x+28$ • $P = 2\left[2(2x+4)+2(x+3)\right]$ $= 2\left[4x+8+2x+6\right]$ $= 2\left[6x+14\right]$ $= 12x+28$ • Figure is drawn, all 4 sides labeled correctly with answer of $12x+28$ • Figure is drawn, all 4 sides labeled correctly in Part 1 and 2 non-adjacent sides labeled correctly in Part 2 with answer of $12x+28$ **OR** ½ point: • Correct new perimeter: $12x+28$ Work is incomplete or missing or • Perimeter is correct but is not in simplest form Correct procedure is shown and/or explained or • Perimeter is incorrect due to 1 calculation or copy error Correct procedure is shown and/or explained

Part	Points
3	**1 point possible** 1 point: Correct area: $2x^2+10x+12$ Correct procedure shown and/or explained Give credit for the following or equivalent: • A = $(2x+4)(x+3)$ = $2x^2+6x+4x+12$ (not required) = $2x^2+10x+12$ **OR** ½ point: • Correct area: $2x^2+10x+12$ Work is incomplete or missing or • Area is correct but is not in simplest form Correct procedure is shown and/or explained or • Area is incorrect due to 1 calculation or copy error Correct procedure is shown and/or explained
4	**1 point possible** 1 point: Correct new area: $8x^2+40x+48$ Correct procedure shown and/or explained Give credit for the following or equivalent: • A = $(4x+8)(2x+6)$ = $8x^2+24x+16x+48$ (not required) = $8x^2+40x+48$ • Quadruples Part 3 area **OR** ½ point: • Correct new area: $8x^2+40x+48$ Work is incomplete or missing or • Area is correct but is not in simplest form Correct procedure is shown and/or explained or • Area is incorrect due to 1 calculation or copy error Correct procedure is shown and/or explained

SCORE POINT: 4

Part 1

		Points
Correct perimeter: and Correct procedure:	$6x + 14$ Finds the sum of the lengths of the four sides.	**1**

Part 2

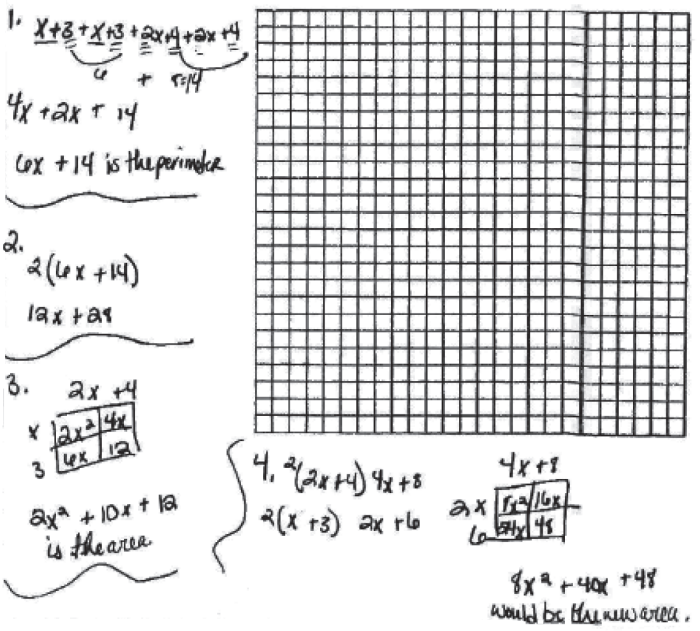
Correct perimeter: and Correct procedure:	$12x + 28$ Doubles the Part 1 perimeter.	**1**

Part 3

Correct area: and Correct procedure:	$2x^2 + 10x + 12$ Finds the product of the lengths of the base and height.	**1**

Part 4

Correct area: and Correct procedure:	$8x^2 + 40x + 48$ Doubles the length of the base and height and finds the product.	**1**
	Total Points	**4**



SCORE POINT: 3

Part 1

		Points
Correct perimeter: and Correct procedure:	$6x + 14$ Doubles the length of the base and height and finds the sum.	**1**

Part 2

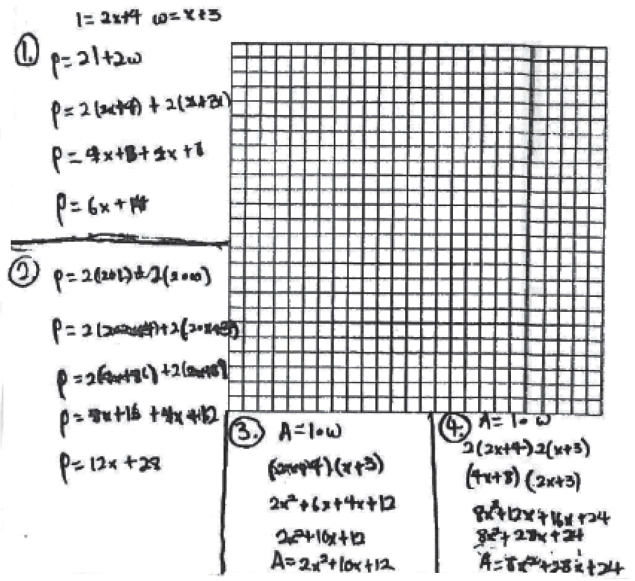
Correct perimeter: and Correct procedure:	$12x + 28$ Calculates two times twice the length of the base and height and adds.	**1**

Part 3

Correct area: and Correct procedure:	$2x^2 + 10x + 12$ Finds the product of the lengths of the base and height.	**1**

Part 4

Incorrect area: and Correct procedure with calculation error:	$8x^2 + 28x + 24$ $2(2x + 4) + 2(x + 3)$ $(4x + 8)(2x + 3)$ calc err $8x^2 + 12x + 16x + 24$ $8x^2 + 28x + 24$	½
	Total Points	**3 ½**



SCORE POINT: 2

Part 1

		Points
Incorrect perimeter: and Correct procedure with 1 calculation error:	$6x + 10$ $P = 2(2x + 4) + 2(x + 3)$ $4x + 4$ (calc err) $+ 2x + 6 = 6x + 10$	½

Part 2

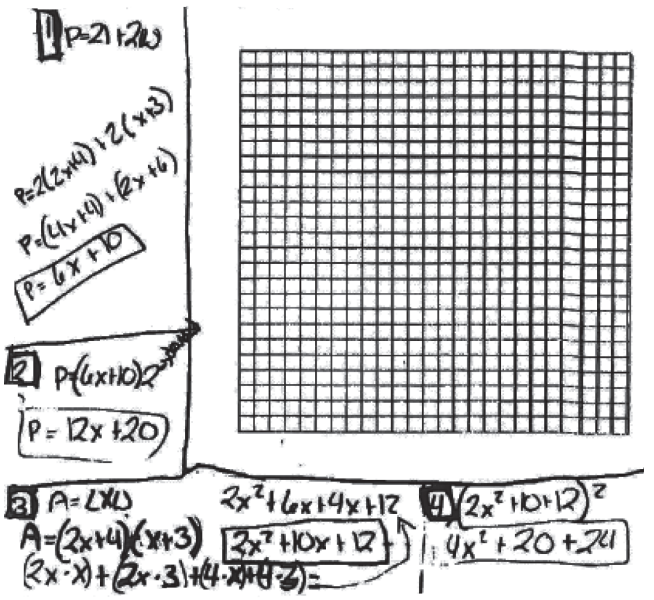
Correct perimeter (based on Pt 1): and Correct procedure:	$12x + 20$ Doubles the Part 1 perimeter.	1

Part 3

Correct area: and Correct procedure:	$2x^2 + 10x + 12$ Finds the product of the lengths of the base and height.	1

Part 4

Incorrect area: and Incorrect procedure (with copy error):	$4x^2 + 20 + 24$ Attempts to double Part 3 area. $(2x^2 + 10$ (copy err) $+ 12)2$ $4x^2 + 20 + 24$	–
	Total Points	**2 ½**



SCORE POINT: 1

Part 1

		Points
Incorrect perimeter: and Correct procedure with 1 copy error:	$8x + 14$ $2 \cdot (2x \text{ (copy error)} + 3) + (2) \cdot (2x + 4)$	½

Part 2

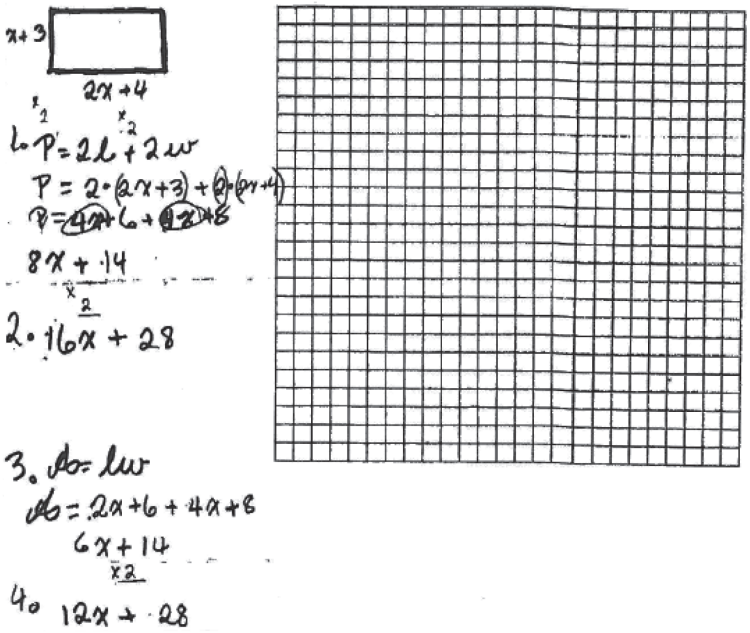
Correct perimeter (based on Part 1): and Correct procedure:	$16x + 28$ Doubles the Part 1 perimeter.	1

Part 3

Incorrect area: and Incorrect procedure:	$6x + 14$ Doubles the lengths of the base and height and finds the sum.	–

Part 4

Incorrect area: and Incorrect procedure:	$12x + 28$ Doubles the Part 3 area.	–
	Total Points	**1½**



SCORE POINT: 0

Part 1

		Points
Incorrect perimeter: and Incorrect procedure:	$3x + 12$ $2x + 4 \bullet x + 3$	–

Part 2

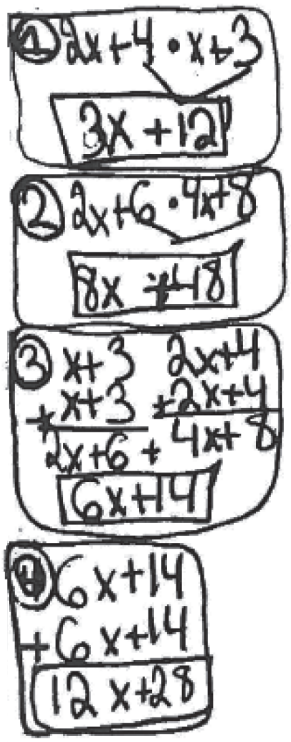
Incorrect perimeter: and Incorrect procedure:	$8x + 48$ $2x + 6 \bullet 4x + 8$	–

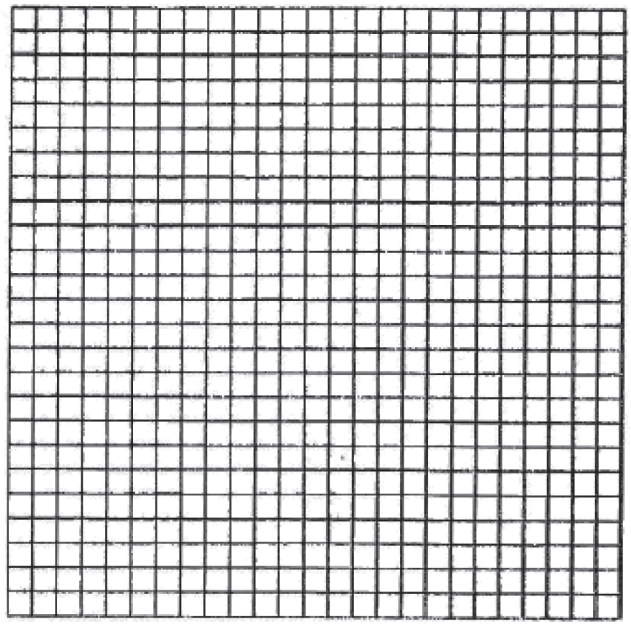
Part 3

Incorrect area: and Incorrect procedure:	$6x + 14$ Finds the perimeter.	–

Part 4

Incorrect area: and Incorrect procedure:	$12x + 28$ Doubles Part 3 answer.	–
	Total Points	**0**





D. The table below shows the number of flowers that a store has in stock and the number of flowers that have been ordered by customers.

Flowers in Stock and Ordered

Flower	In Stock (dozens)	Customer Orders (dozens)
Red rose	45	30
Yellow rose	20	16
Red carnation	23	25
Yellow carnation	12	8

1. Create two matrices, one representing the flowers in stock and one representing the flowers that customers have ordered. Be sure to use all correct labels.

2. Create a new matrix representing the difference between the flowers in stock and the flowers that customers have ordered. Show your work.

3. Using the matrix created in Part 2, determine whether or not all the orders can be filled. List which, if any, orders that cannot be filled. Explain your answer.

BE SURE TO LABEL YOUR RESPONSES 1, 2, AND 3.

Item D Scoring Rubric—2011 Algebra I

Score	Description
4	The student earns 4 points. No incorrect work is included
3	The student earns 3–3½ points.
2	The student earns 2–2½ points.
1	The student earns ½–1½ points or some minimal understanding is shown.
0	The student earns 0 points. No understanding is shown.
B	Blank—No Response. A score of "B" will be reported as "NA." (No attempt to answer the item. Score of "0" assigned for the item.)

SOLUTION AND SCORING

4 points possible:

Note: Full credit may be given if labels on rows and columns are interchanged and numbers are located in the correct corresponding position.

Part	Points
1	**2 points possible** 2 points: 2 correct and complete matrices, as shown below: Flowers in Stock (not required) $\begin{array}{c} \\ \text{Red} \\ \text{Yellow} \end{array}\begin{array}{c} \begin{array}{cc} \text{Rose} & \text{Carnation} \end{array} \\ \begin{pmatrix} 45 & 23 \\ 20 & 12 \end{pmatrix} \end{array}$ **or** $\begin{array}{c} \\ \text{Rose} \\ \text{Carnation} \end{array}\begin{array}{c} \begin{array}{cc} \text{Red} & \text{Yellow} \end{array} \\ \begin{pmatrix} 45 & 20 \\ 23 & 12 \end{pmatrix} \end{array}$ **or** $\begin{array}{c} \begin{array}{cccc} \text{RR} & \text{YR} & \text{RC} & \text{YC} \end{array} \\ \begin{pmatrix} 45 & 20 & 23 & 12 \end{pmatrix} \end{array}$ **or** $\begin{array}{c} \text{RR} \\ \text{YR} \\ \text{RC} \\ \text{YC} \end{array}\begin{pmatrix} 45 \\ 20 \\ 23 \\ 12 \end{pmatrix}$ Customer Orders (not required) $\begin{array}{c} \\ \text{Red} \\ \text{Yellow} \end{array}\begin{array}{c} \begin{array}{cc} \text{Rose} & \text{Carnation} \end{array} \\ \begin{pmatrix} 30 & 25 \\ 16 & 8 \end{pmatrix} \end{array}$ **or** $\begin{array}{c} \\ \text{Rose} \\ \text{Carnation} \end{array}\begin{array}{c} \begin{array}{cc} \text{Red} & \text{Yellow} \end{array} \\ \begin{pmatrix} 30 & 16 \\ 25 & 8 \end{pmatrix} \end{array}$ **or** $\begin{array}{c} \begin{array}{cccc} \text{RR} & \text{YR} & \text{RC} & \text{YC} \end{array} \\ \begin{pmatrix} 30 & 16 & 25 & 8 \end{pmatrix} \end{array}$ **or** $\begin{array}{c} \text{RR} \\ \text{YR} \\ \text{RC} \\ \text{YC} \end{array}\begin{pmatrix} 30 \\ 16 \\ 25 \\ 8 \end{pmatrix}$ **OR** 1 point: • 7 entries are correct Correct labels are included and are properly placed **or** • All 8 entries are correct Labels are incomplete or missing

Part	Points
2	**1 point possible** 1 point: Correct and complete matrix as shown below: (or correct matrix based on incorrect answer(s) in Part 1) $\begin{array}{c} \\ \text{Red} \\ \text{Yellow} \end{array}\begin{array}{c} \begin{array}{cc} \text{Rose} & \text{Carnation} \end{array} \\ \begin{pmatrix} 15 & -2 \\ 4 & 4 \end{pmatrix} \end{array}$ **or** $\begin{array}{c} \\ \text{Rose} \\ \text{Carnation} \end{array}\begin{array}{c} \begin{array}{cc} \text{Red} & \text{Yellow} \end{array} \\ \begin{pmatrix} 15 & 4 \\ -2 & 4 \end{pmatrix} \end{array}$ **or** $\begin{array}{c} \begin{array}{cccc} \text{RR} & \text{YR} & \text{RC} & \text{YC} \end{array} \\ \begin{pmatrix} 15 & 4 & -2 & 4 \end{pmatrix} \end{array}$ **or** $\begin{array}{c} \text{RR} \\ \text{YR} \\ \text{RC} \\ \text{YC} \end{array}\begin{pmatrix} 15 \\ 4 \\ -2 \\ 4 \end{pmatrix}$ Correct procedure shown or explained Give credit for the following or equivalent: • $45-30=15$ $\quad 23-25=-2$ $20-16=4$ $\quad 12-8=4$ • $\begin{pmatrix} 45 & 20 \\ 23 & 12 \end{pmatrix} - \begin{pmatrix} 30 & 16 \\ 25 & 8 \end{pmatrix} = \begin{array}{c} \\ \text{Rose} \\ \text{Carnation} \end{array}\begin{array}{c} \begin{array}{cc} \text{Red} & \text{Yellow} \end{array} \\ \begin{pmatrix} 15 & 4 \\ -2 & 4 \end{pmatrix} \end{array}$ • $\begin{pmatrix} 45 & 20 & 23 & 12 \end{pmatrix} - \begin{pmatrix} 30 & 16 & 25 & 8 \end{pmatrix} = \begin{array}{c} \begin{array}{cccc} \text{RR} & \text{YR} & \text{RC} & \text{YC} \end{array} \\ \begin{pmatrix} 15 & 4 & -2 & 4 \end{pmatrix} \end{array}$ **OR** ½ point: • 4 entries are correct Labels are correct and complete Procedure is incomplete or missing or • 3 entries are correctly placed and labeled 1 entry is incorrect due to a calculation or copy error Procedure is shown or explained or • 4 entries are correct Procedure is correct and complete Labels are incomplete or missing

Part	Points
3	**1 point possible** 1 point: Correct answer and explanation (or correct answer and explanation based on an incorrect matrix in Part 2) Give credit for the following or equivalent: • "No, the store does not have enough flowers to fill the orders. The negative number (-2) means they don't have enough red carnations." **OR** ½ point: Answer is missing but explanation would support the correct answer. Ex: "Well the matrix has -2 dozen red carnations." Ex: "There's a negative number in the matrix." or Answer is correct but explantion is vague or contains some misstatement. Ex: "No because they're 2 red carnations short."

SCORE POINT: 4

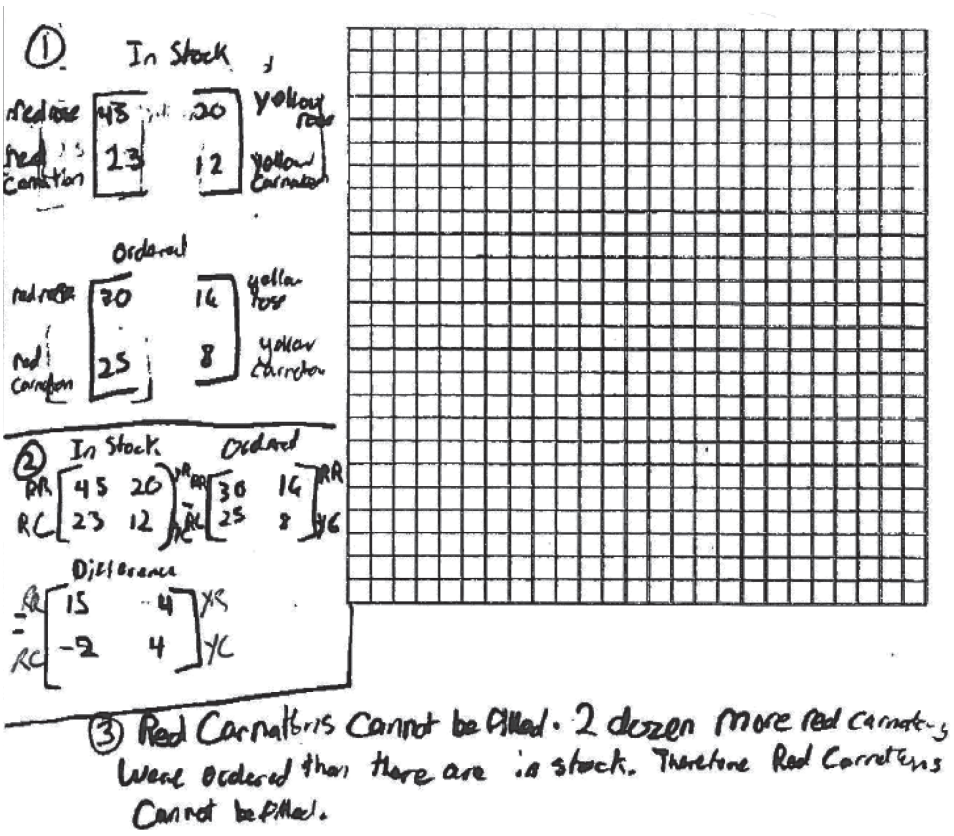
Part 1		**Points**
2 correct matrices		**2**

Part 2

Correct matrix: and Correct procedure:	 Finds the difference of the two Part 1 matrices.	**1**

Part 3

Correct answer: and Correct explanation:	"Red carnations cannot be filled." "2 dozen more...ordered than there are in stock"	**1**
	Total Points	**4**



SCORE POINT: 3

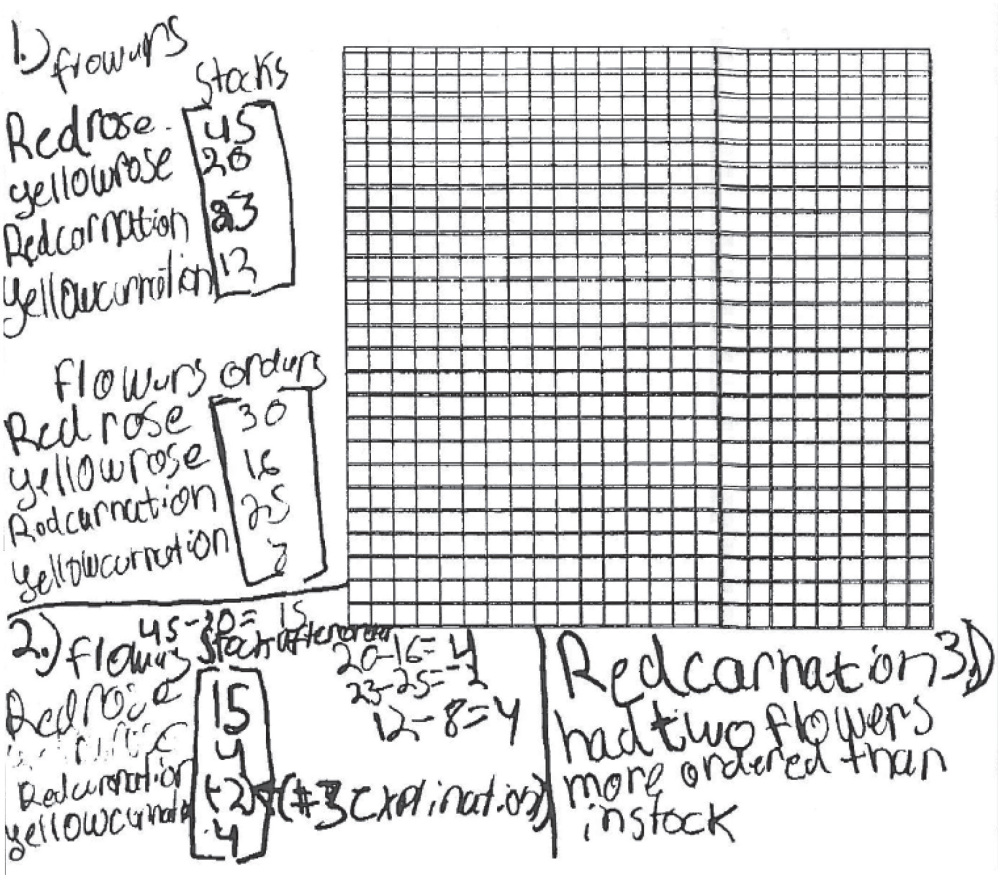
Part 1		**Points**
2 correct matrices		**2**

Part 2

Correct matrix: and Correct procedure:	Finds differences element by element in Part 1 matrices.	**1**

Part 3

Correct answer (implied): and Support containing a misstatement:	Red carnation "two flowers more ordered than in stock" (Should be 2 dozen)	½
	Total Points	**3½**



SCORE POINT: 2

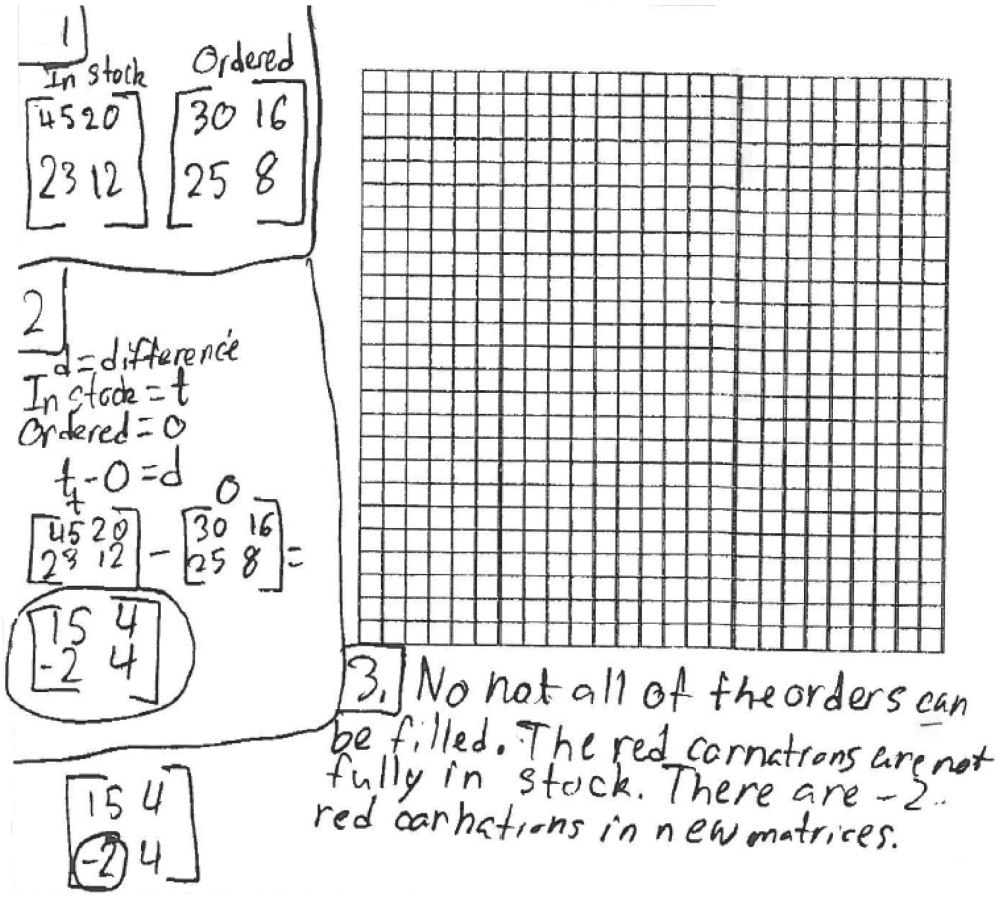
Part 1		**Points**
2 partially correct matrices:	All elements are correct. Labels are missing.	**1**

Part 2

Partially correct matrix: and Correct procedure:	All elements are correct. Labels are missing. Finds the difference of the Part 1 matrices.	½

Part 3

Correct answer: and Support with misstatement:	No "There are -2 red carnations"	½
	Total Points	**2**



SCORE POINT: 1

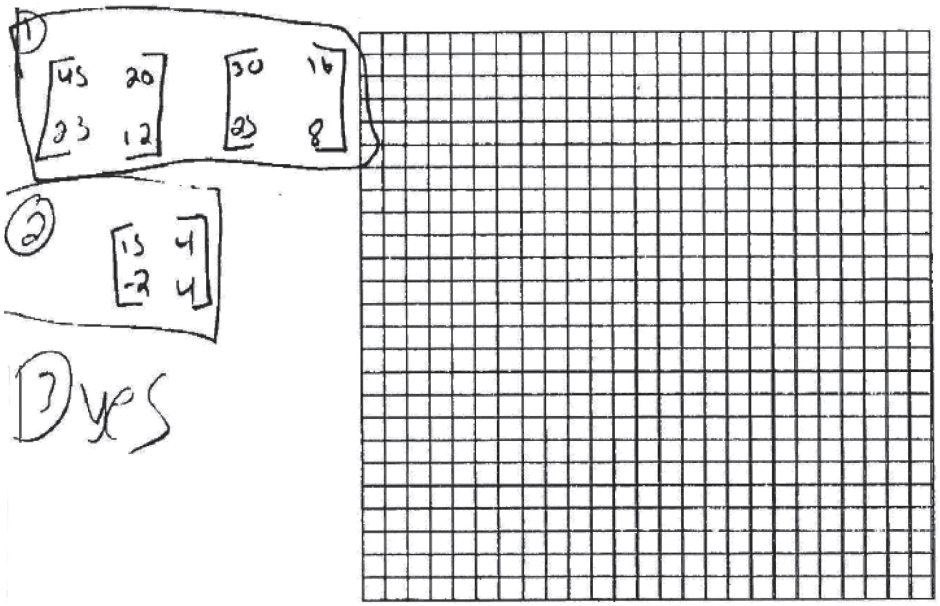
Part 1		**Points**
2 partially correct matrices:	All elements are correct. Labels are missing.	**1**

Part 2

Partially correct matrix: and Missing procedure:	All elements are correct. Labels are missing	–

Part 3

Incorrect answer:	"yes"	–
	Total Points	**1**

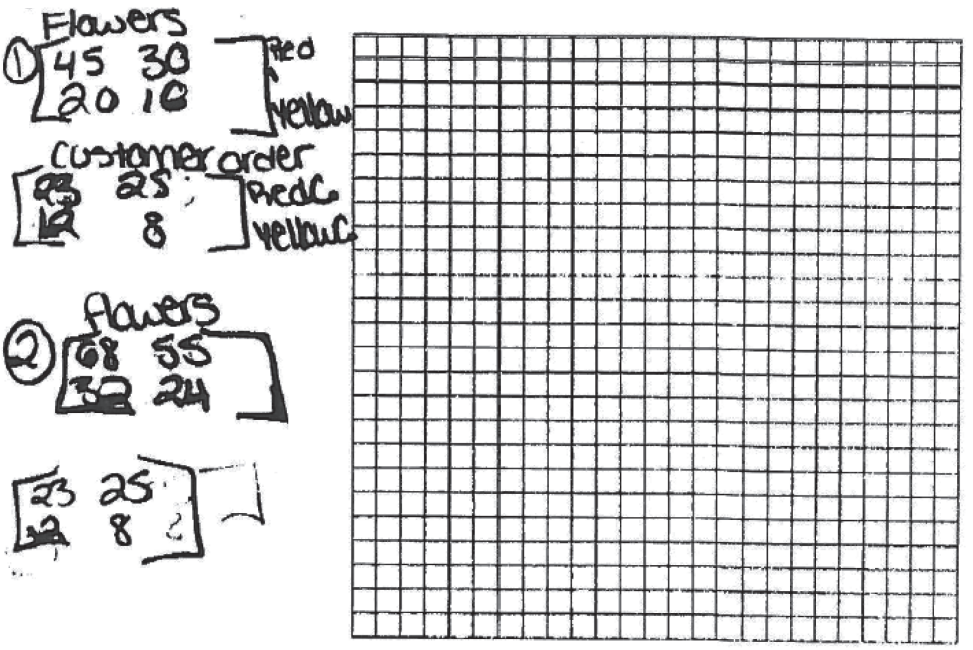


SCORE POINT: 0

Part 1		**Points**
No correct matrices:	Uses values for both in stock and customer orders in both matrices.	–

Part 2		
Incorrect matrix:	Matrix given is sum of the two Part 1 matrices.	–

Part 3		
Incorrect answer:	"yellow carnations can't be filled"	–
	Total Points	**0**



3 The yellow carnations can't be filled all the way.

E. A tiling contractor charges a $150.00 set-up fee and $20.00 per square foot of tile installation.

1. Write an equation that he could use to determine the price to charge his customers if a is the number of square feet to be tiled and C is the cost.

2. Copy the table below into your answer document. Complete the table.

Cost of Tiling

Square Footage (a)	Cost (C)
10	
20	
30	
40	
50	

3. On the grid provided in your answer document, graph the y-intercept and one other coordinate pair. Draw a straight line through the points. Be sure to label your axes and give a title to your graph.

4. Explain changes to the slope and y-intercept, if any, if the contractor raised the price per square foot to be tiled.

BE SURE TO LABEL YOUR RESPONSES 1, 2, 3, AND 4.

Item E Scoring Rubric—2011 Algebra I

Score	Description
4	The student earns 4 points. Graph in Part 3 is titled No incorrect work is included
3	The student earns 3–3½ points.
2	The student earns 2–2½ points.
1	The student earns ½–1½ points or some minimal understanding is shown. Ex: Equation in Part 1 which would be correct if different variables were defined
0	The student earns 0 points. No understanding is shown.
B	Blank—No Response. A score of "B" will be reported as "NA." (No attempt to answer the item. Score of "0" assigned for the item.)

SOLUTION AND SCORING

4 points possible:

<table>
<tr><th>Part</th><th>Points</th></tr>
<tr><td>1</td><td>

1 point possible
1 point: Correct equation: $C = 150 + 20a$
Note: Different variables may be used if defined.

OR
½ point: Correct expression: $150 + 20a$
or
Correct equation with variables which have not been defined

</td></tr>
<tr><td>2</td><td>

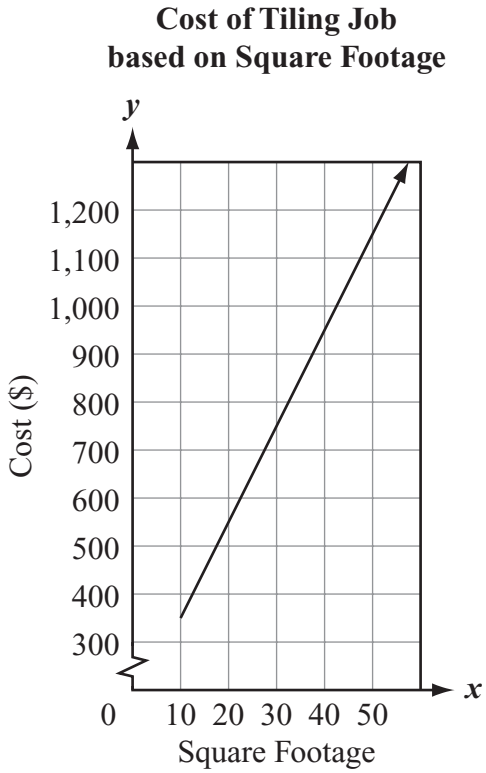
1 point possible
1 point: Correct and complete table, as shown below:
(5 correct values are listed for C)

Cost of Tiling

Square Footage (a)	Cost (C)
10	$350
20	$550
30	$750
40	$950
50	$1,150

OR
½ point: 4 correct values are listed for C
or
Work contains one calculation error made at any point. Subsequent values are correct based on error.
Note: Do not give credit if first value is $200.

</td></tr>
</table>

Part	Points
3	**1 point possible** 1 point: Correct graph, as shown below: **Note: Title of graph is required for a "4".**  Graph must contain: *y*-intercept plotted correctly one other coordinate pair plotted correctly consistent intervals on both axes both axes labeled line, ray, or segment is drawn **OR** ½ point: One or two errors Ex: Inconsistent intervals on both axes Title missing and axes unlabeled **Note: Consider missing labels on one or both axes to be one error** **Consider inconsistent interval on either axis to be one error** **If both axes have inconsistent intervals that is two errors** **Title is a 3 / 4 issue**

Part	Points
4	**1 point possible** 1 point: Correct explanation Give credit for the following or equivalent: • "Slope will be steeper if the price per square foot were increased." **Note: The response may include the fact that the *y*-intercept will not change, but this statement is not required. If statement regarding *y*-intercept is made it must be correct or no credit is awarded.**

SCORE POINT: 4

Part 1		**Points**
Correct equation:	$C = 20a + 150$	**1**

Part 2

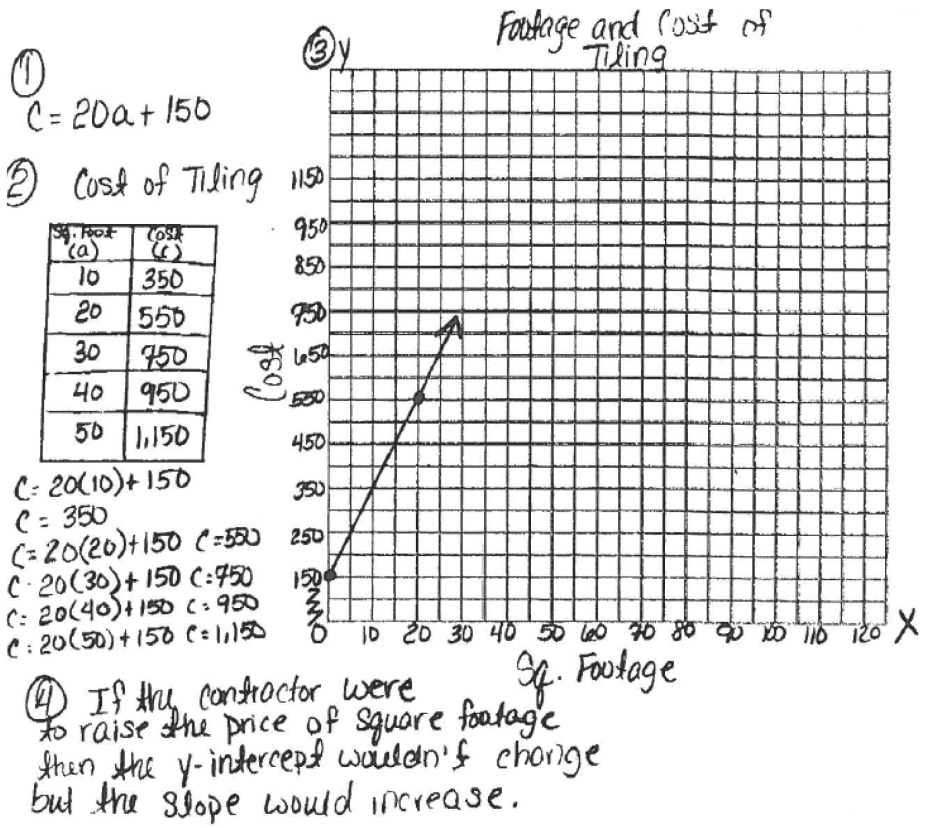
Correct table		**1**

Part 3

Correct graph:	Correct y-intercept One additional point correctly plotted Consistent intervals Axes labeled Ray is drawn Graph is titled (required for a "4")	**1**

Part 4

Correct explanation:	"y-intercept wouldn't change but the slope would increase"	**1**
	Total Points	**4**



SCORE POINT: 3

Part 1		**Points**
Correct equation:	$C = 20a + 150$	**1**

Part 2

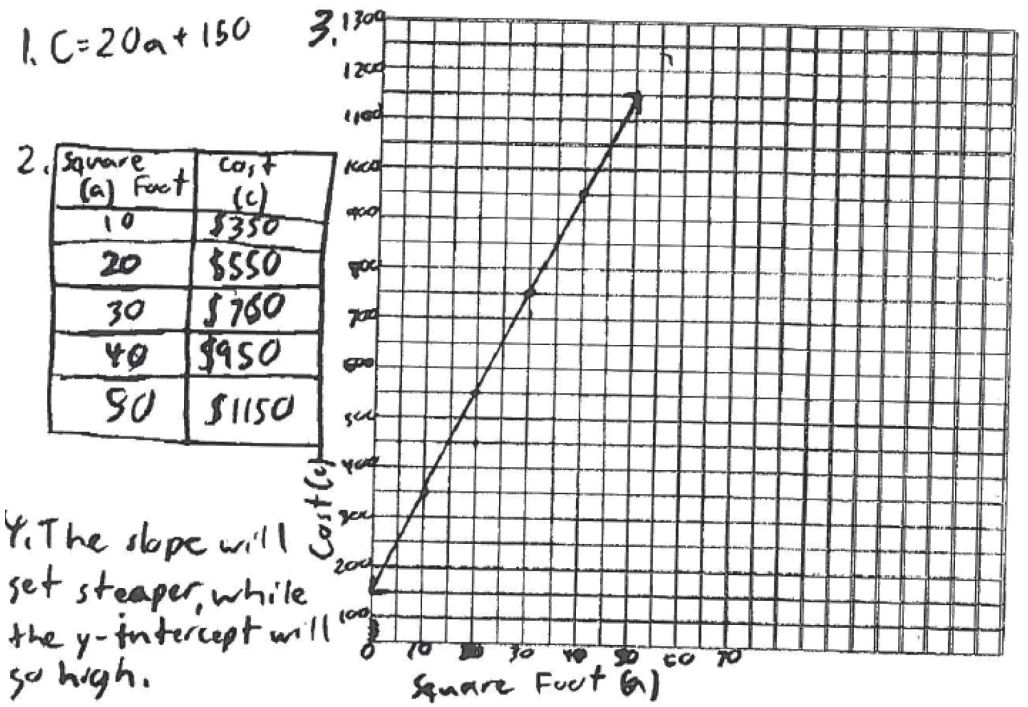
Correct table		**1**

Part 3

Correct graph:	Correct y-intercept Several additional points correctly plotted Consistent intervals Axes labeled Line is drawn Graph is not titled	**1**

Part 4

Incorrect explanation:	"the y-intercept will go high"	–
	Total Points	**3**



SCORE POINT: 2

Part 1		**Points**
Correct equation:	$C = 20.00a + \$150.00$	**1**

Part 2

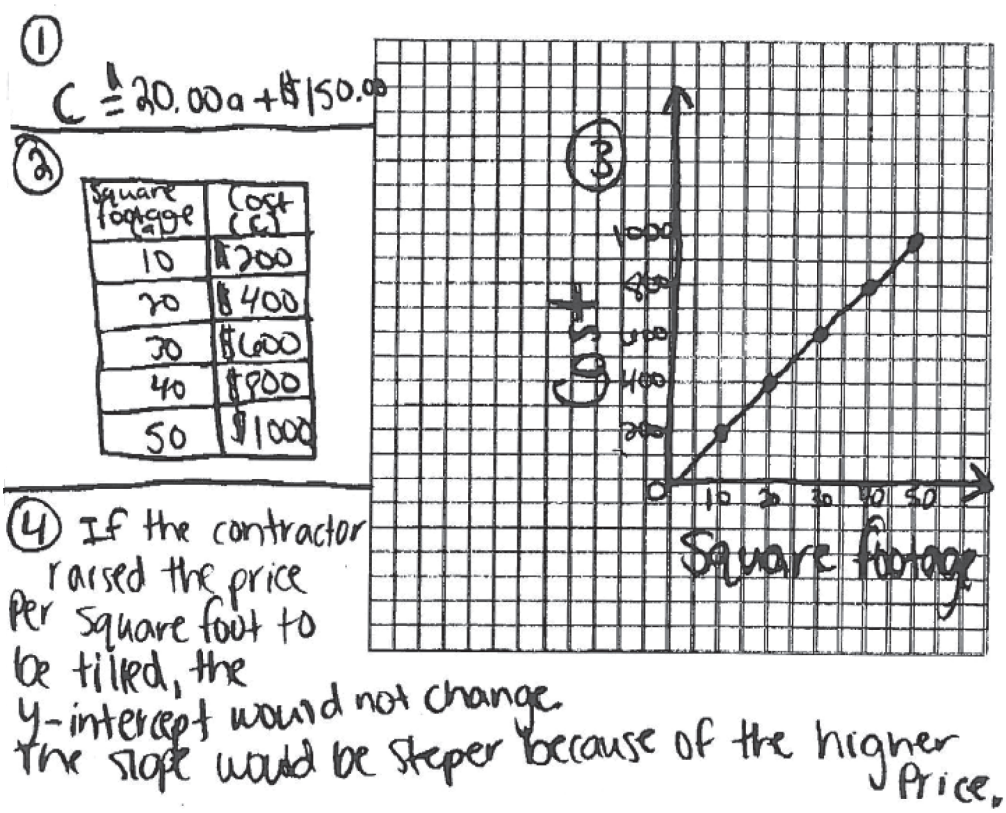
Incorrect table:	y-intercept is not used	–

Part 3

Partially correct graph:	y-intercept incorrect All points from table correctly plotted Consistent intervals Axes are labeled Segment drawn Graph is not titled	½

Part 4

Correct explanation:	"y-intercept would not change. The slope would be steper"	**1**
	Total Points	**2½**



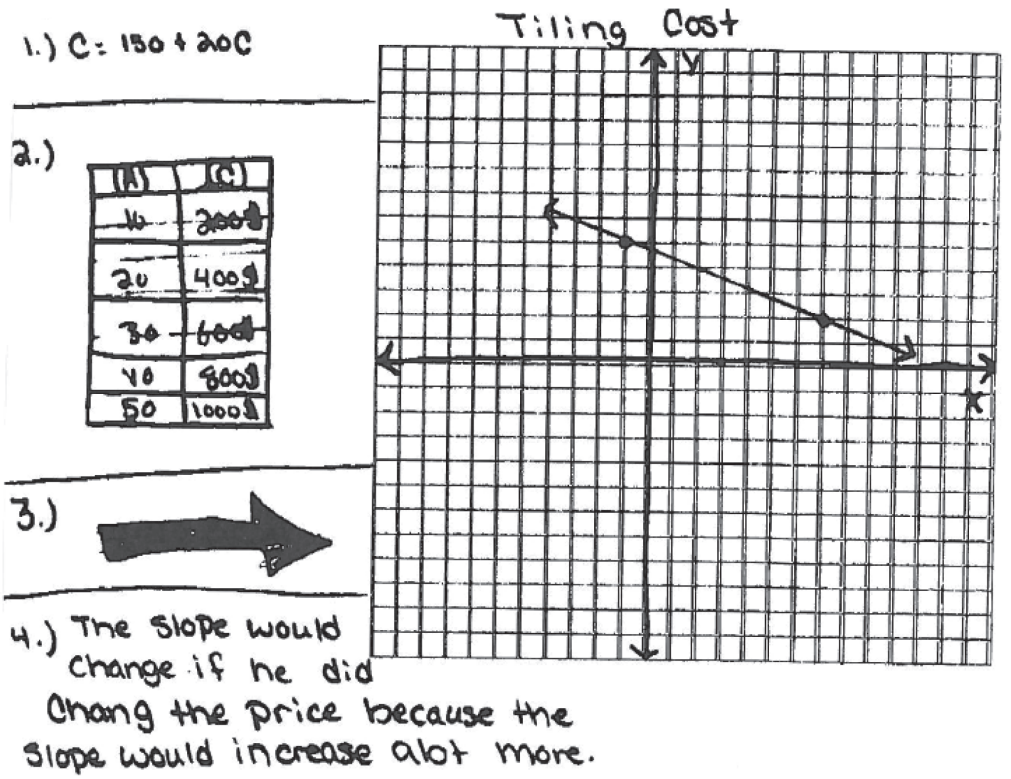
SCORE POINT: 1

Part 1		**Points**
Incorrect equation:	$C = 150 + 20C$	–

Part 2		
Incorrect table:	y-intercept is not used	–

Part 3		
Incorrect graph		–

Part 4		
Correct explanation:	"the slope would increase a lot more"	**1**
	Total Points	**1**



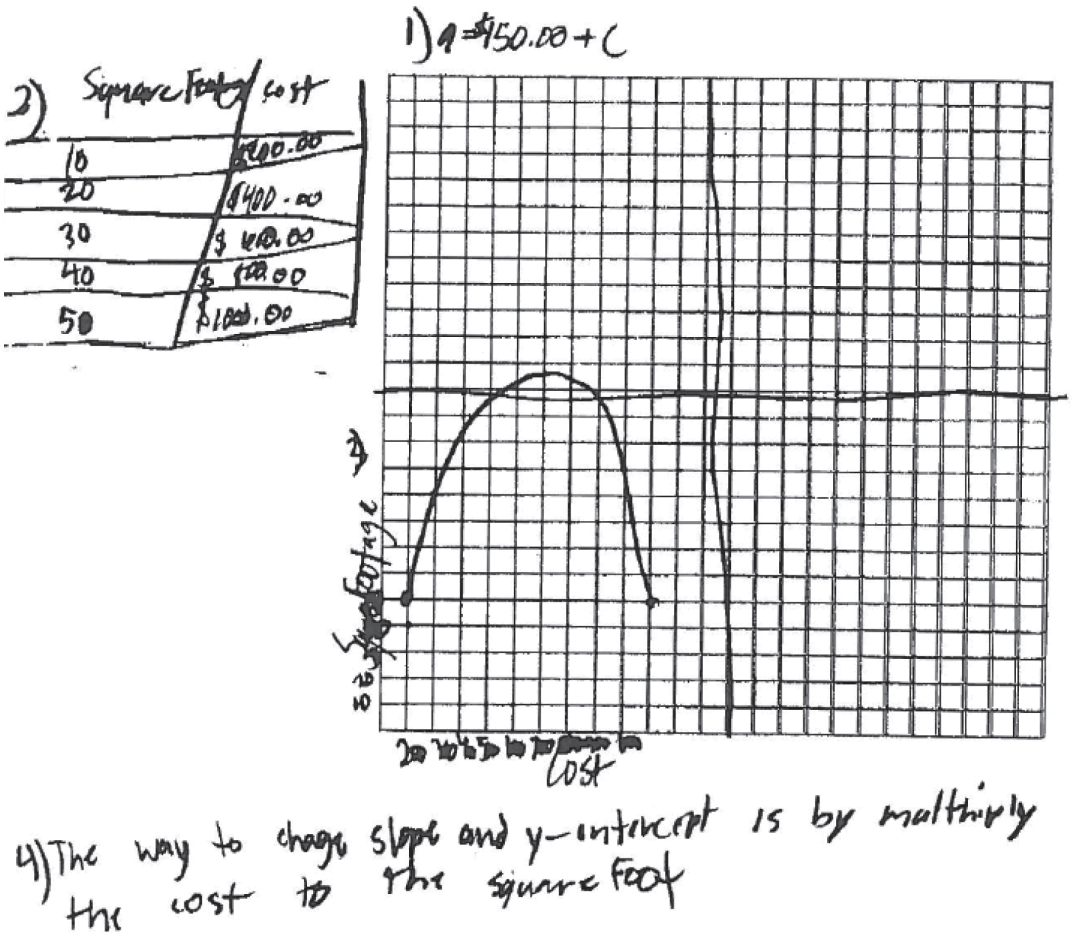
SCORE POINT: 0

Part 1		**Points**
Incorrect equation:	$a = \$150.00 + C$	–

Part 2		
Incorrect table:	y-intercept is not used	–

Part 3		
Incorrect graph		–

Part 4		
Incorrect explanation:	Discusses way to change slope and y-intercept (incorrectly) but does not say the slope increases.	–
	Total Points	**0**



4) The way to change slope and y-intercept is by multiply the cost to the square foot

F. A polynomial expression is given below.

$$2x^2 + 2x - 24$$

1. Factor out the greatest common factor (GCF) of the expression.

2. Continue factoring, and state the complete factorization of the expression.

3. Change the expression to $2x^2 - 2x - 24$. Showing all the steps, completely factor the new expression.

BE SURE TO LABEL YOUR RESPONSES 1, 2, AND 3.

Item F Scoring Rubric—2011 Algebra I

Score	Description
4	The student earns 4 points. Response contains no incorrect work
3	The student earns 3 points.
2	The student earns 2 points.
1	The student earns 1 point or some minimal understanding shown. Ex: Dividing by 2 in Part 1 and/or Part 3 with correct factoring of remaining trinomial. Ex: Correct but incomplete factorization in Part 2
0	The student earns 0 points. No understanding is shown.
B	Blank—No Response. A score of "B" will be reported as "NA." (No attempt to answer the item. Score of "0" assigned for the item.)

SOLUTION AND SCORING

Part	Points
1	**1 point possible** 1 point: Correct answer**:** $\mathbf{2(x^2 + x - 12)}$
2	**1 point possible** 1 point: Correct factorization: $\mathbf{2(x + 4)(x - 3)}$ **Note: Factors may be written in any order or they may be a correct factorization of a quadratic expression given in Part 1.**
3	**2 points possible** 1 point: Correct 1st step in factoring: Give credit for the following: • $2(x^2 - x - 12)$ or $(2x + 6)(x - 4)$ or $(2x - 8)(x + 3)$ **AND** 1 point: Correct factorization: $\mathbf{2(x + 3)(x - 4)}$ **Note: Factors may be written in any order.**

SCORE POINT: 4

Part 1		**Points**
Correct answer:	$2(x^2 + x - 12)$	**1**

Part 2		
Correct answer:	$2(x + 4)(x - 3)$	**1**

Part 3		
Correct 1st step: Correct final answer:	$2(x^2 - x - 12)$ $2(x - 4)(x + 3)$	**1** **1**
	Total Points	**4**

1) $2x^2 + 2x - 24$
$= 2(x^2 + x - 12)$

2) $2x^2 + 2x - 24$
$= 2(x^2 + x - 12)$
$= 2(x + 4)(x - 3)$

3) $2x^2 \cdot 2x - 24$
$2(x^2 - x - 12)$
$= 2(x - 4)(x + 3)$

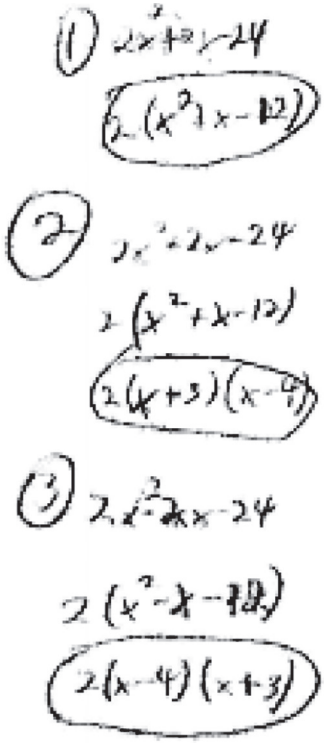
factors of 12
$1 \cdot 12$ $\{3 \cdot 4\}$
$2 \cdot 6$ $\{4 \cdot 3\}$

SCORE POINT: 3

Part 1		**Points**
Correct answer:	$2(x^2 + x - 12)$	**1**

Part 2		
Incorrect answer:	$2(x + 3)(x - 4)$	–

Part 3		
Correct 1st step: Correct final answer:	$2(x^2 - x - 12)$ $2(x - 4)(x + 3)$	**1** **1**
	Total Points	**3**

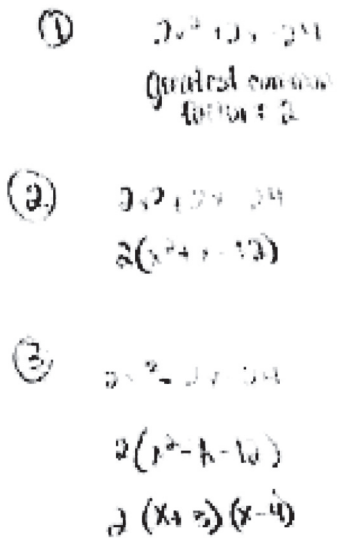


SCORE POINT: 2

Part 1		**Points**
Incorrect answer:	"Greatest common factor: 2"	–

Part 2		
Incorrect answer:	$2(x^2 + x + 12)$	–

Part 3		
Correct 1st step: Correct final answer:	$2(x^2 - x - 12)$ $2(x + 3)(x - 4)$	**1** **1**
	Total Points	**2**

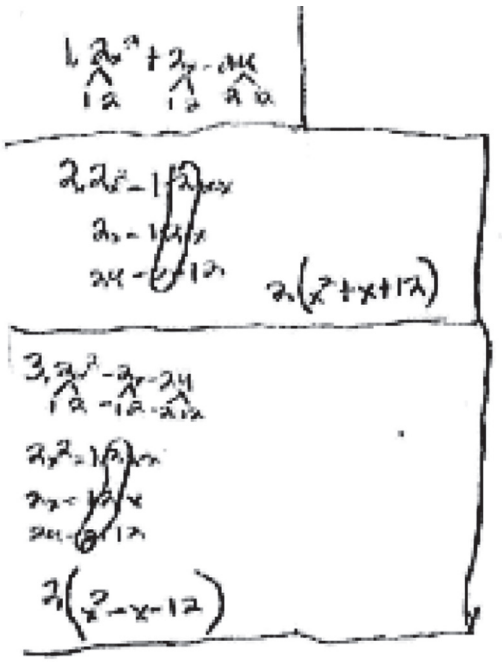


SCORE POINT: 1

Part 1		**Points**
Incorrect answer:	Shows that 2 is GCF	–

Part 2		
Incorrect answer:	$2(x^2 + x + 12)$	–

Part 3		
Correct 1st step:	$2(x^2 - x - 12)$ and stops	**1**
	Total Points	**1**

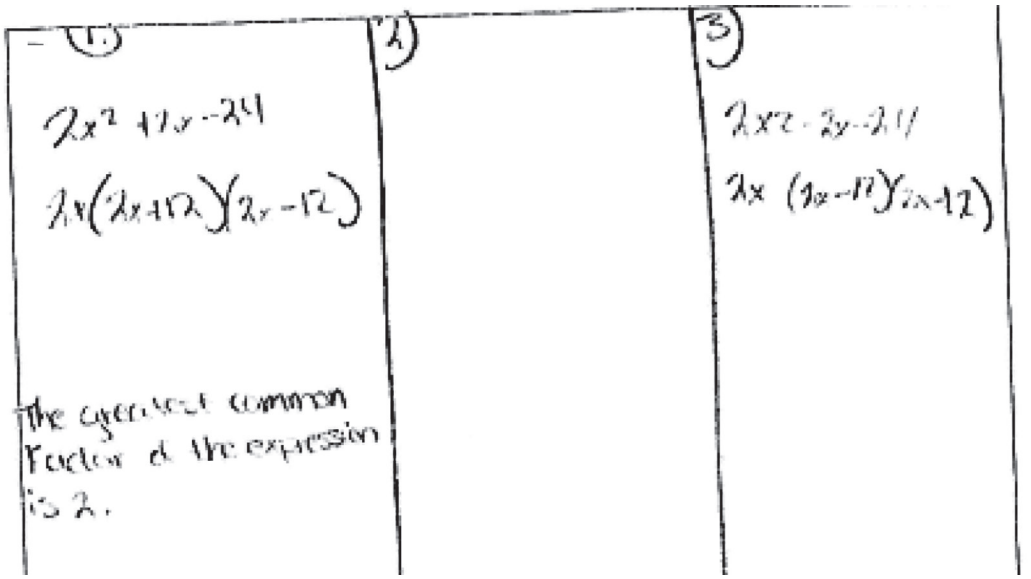


SCORE POINT: 0

Part 1		**Points**
Incorrect answer:	$2x(2x + 12)(2x - 12)$	–

Part 2		
Missing answer		–

Part 3		
Incorrect answer:	$2x(2x - 12)(2x + 12)$	–
	Total Points	**0**



G. At noon, a pump started emptying an oil storage tank at a constant rate. The tank started with 2,400 barrels of oil and emptied at a rate of 360 barrels per hour.

1. Write an equation that represents the relationship between B, the number of barrels of oil remaining in the tank and t, the number of hours that the pump has been emptying the tank.

2. How many barrels were in the tank at 5 P.M.? Show the work by which you determined your answer.

3. At what time will the tank be empty? Show how you determined your answer.

BE SURE TO LABEL YOUR RESPONSES 1, 2, AND 3.

Item G Scoring Rubric—2011 Algebra I

Score	Description
4	The student earns 5 points. Response contains the correct label of "P.M." in Part 3. The response contains no incorrect work.
3	The student earns 3–4½ points.
2	The student earns 2–2½ points.
1	The student earns ½–1½ points or some minimal understanding shown.
0	The student earns 0 points. No understanding is shown.
B	Blank—No Response. A score of "B" will be reported as "NA." (No attempt to answer the item. Score of "0" assigned for the item.)

SOLUTION AND SCORING

Part	Points
1	**1 point possible** 1 point: Correct equation: $\boldsymbol{B = 2400 - 360t}$ **(or equivalent)** **OR** ½ point: Correct expression: $\mathbf{2400 - 360}\boldsymbol{t}$
2	**2 points possible** 1 point: Correct answer: **600** or correct answer based on incorrect equation or expression in Part 1 expressed in terms of B and t **AND** 1 point: Correct and complete procedure shown and/or explained Work may contain 1 calculation or copy error Give credit for the following or equivalent: • $B = 2{,}400 - 360(5)$ $B = 2{,}400 - 1{,}800 = \#$ or • "After 1 hour, there are 2400 – 360, or 2040 barrels left. After 2 hours, there are 2040 – 360, or 1680 left. After 3 hours, 1680 – 360, or 1320 left. After 4, 1320 – 360, or 960 left. After 5, 960 – 360, or 600 barrels left."

Part	Points
3	**2 points possible** 2 points: Correct answer: **6:40 P.M.** or correct answer based on incorrect equation or expression in Part 1 and Correct and complete procedure shown and/or explained $0 = 2400 - 360t$ $2400 = 360t$ $6\frac{2}{3}$ hrs $= t$ **OR** 1½ points: Correct answer based on rounding to at least two decimal places Ex: 6:40 P.M. $2400 = 360t$ 6.67 hrs $= t$ 6 hrs 40.2 min $= t$ Ex: 6:39:36 P.M. $360t = 2400$ $t = 6.66$ hrs **OR** 1 point: Correct answer: 6:40 P.M. Procedure missing or incomplete or Correct and complete procedure but answer is missing or incorrect due to calculation or copy error Ex: $360t = 2400$ $t = 6\frac{2}{3}$ hrs **OR** ½ point: Incorrect or missing answer due to rounding too soon with some correct work shown Ex: 6:42 P.M. $2400 = 360t$ 6.7 hrs $= t$ .7 hrs = 42 mins or Answer is missing or incorrect due to calculation error with rounding to at least two decimal places

SCORE POINT: 4

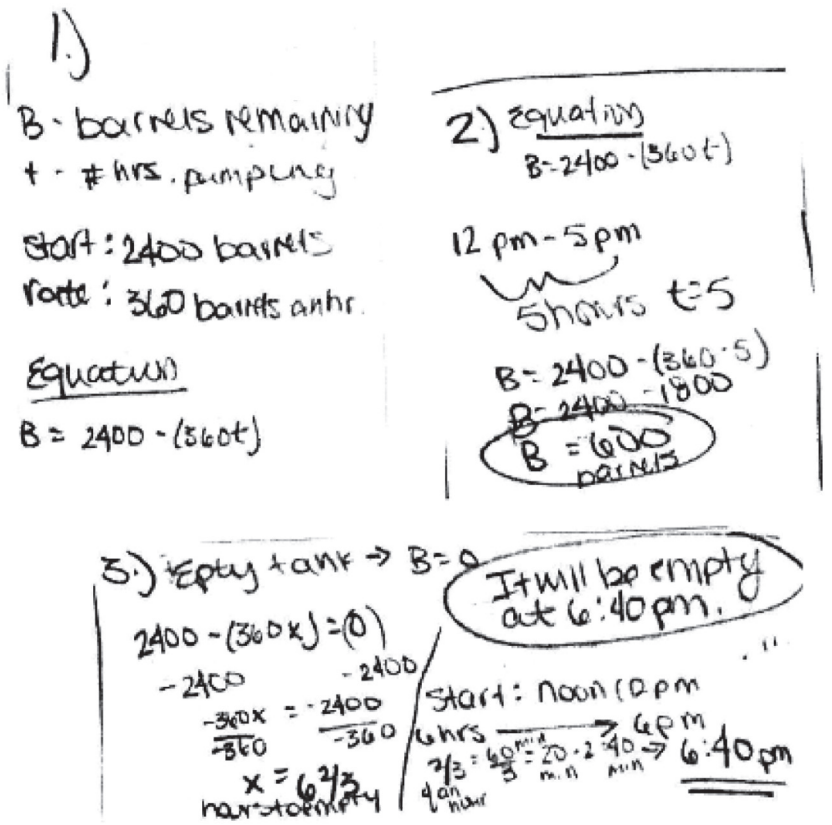
Part 1		**Points**
Correct equation:	$B = 2400 - 360t$	**1**

Part 2

Correct answer: Correct and complete procedure:	600 Barrels $t = 5$ $B = 2400 - 360 \cdot 5$ $B = 2400 - 1800$ $B = \#$	**1** **1**

Part 3

Correct answer with correct and complete procedure:	6:40 P.M. $2400 - 360x = 0$ $x = 6\frac{2}{3}$ $\frac{2}{3}$ hr = 40 min	**2**
	Total Points	**5**



SCORE POINT: 3

Part 1		**Points**
Correct equation:	$B = 2400 - 360t$	**1**

Part 2

Correct answer: Correct and complete procedure:	600 barrels $B = 2400 - 360(5)$ $B = 2400 - 1800 = \#$	**1** **1**

Part 3

Correct answer based on rounding:	6:40 P.M. 600 ÷360 = 1.67 [hours] .67 × 60 = 40.2 [minutes]	**1½**
	Total Points	**4½**

1.) 2,400
- 360t

B= 2,400-360t.

2.) B=2,400 -360t
B = 2,400 - 360(5)
B= 2,400 -1800
B=600
at 5:00p.m., there were 600 barrels in the tank.

3. The tank will be empty at 6:40 p.m.
600 ÷ 360 = 1.67
.67×60 = 40.20

SCORE POINT: 2

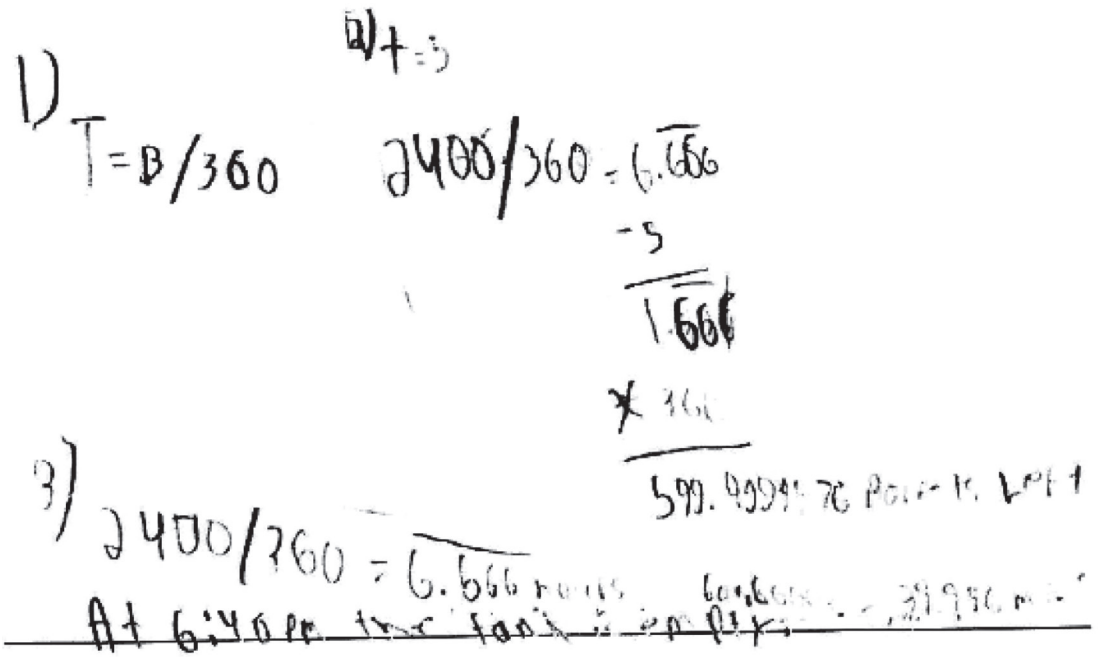
Part 1		**Points**
Incorrect equation:	$T = \frac{B}{360}$	–

Part 2

Incorrect answer (rounding error): Correct and complete procedure:	599.99 barrels $t = 5$ $\frac{2400}{360} = 6.\overline{666}$ -5 $1.\overline{666}$ $\times 360$ $\#$	– **1**

Part 3

Correct answer based on rounding to at least 2 decimal places:	6:40 P.M $\frac{2400}{360} = 6.\overline{666}$ hours $60 \cdot .66666 = 39.9996$	**1½**
	Total Points	**2½**

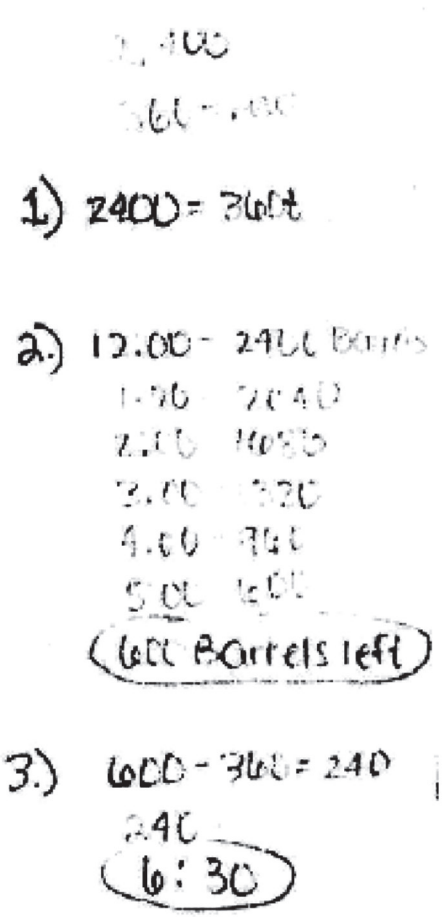


SCORE POINT: 1

Part 1		**Points**
Incorrect equation:	$2400 = 360t$	–

Part 2		
Correct answer: Procedure missing	600 barrels Constructs table of barrels remaining but does not show or explain how values are calculated	**1** –

Part 3		
Incorrect answer: Incorrect procedure:	6:30 600 – 360 = 240	–
	Total Points	**1**

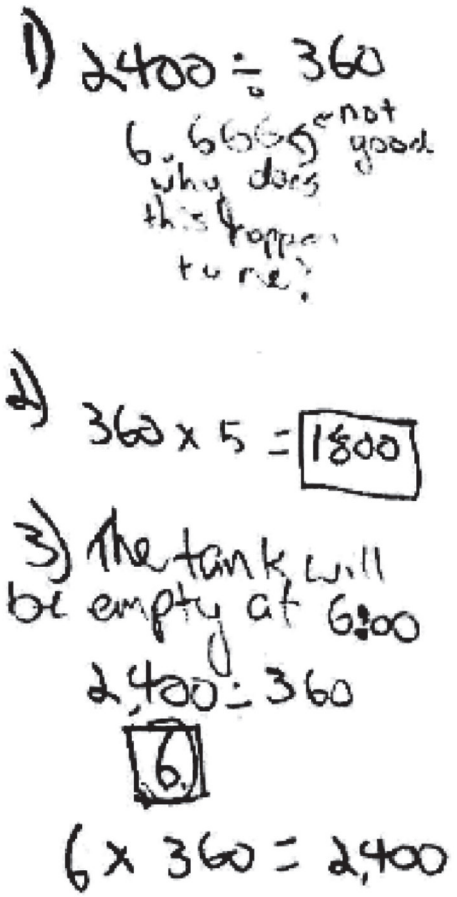


SCORE POINT: 0

Part 1		Points
Equation missing		–

Part 2		
Incorrect answer: Incomplete procedure:	1800 360 × 5 = 1800	–

Part 3		
Incorrect answer with incorrect procedure:	6:00 2400 ÷ 360 = 6 etc.	–
	Total Points	**0**



H. A truck driver has a choice of two highways to use for his delivery route. The highway with the least slope will give him the best gas mileage, therefore spending less of his income on gas.

1. The first highway, Highway A, rises 633.6 feet over 10,560 feet of length. What is the slope of Highway A in simplest fraction form?

2. The second highway, Highway B, rises 475.2 feet over 5,280 feet of length. What is the slope of Highway B in simplest fraction form?

3. Which highway should the truck driver use to save money on gas? Justify your answer.

BE SURE TO LABEL YOUR RESPONSES 1, 2, AND 3.

Item H Scoring Rubric—2011 Algebra I

Score	Description
4	The student earns 4 points. The response contains no incorrect work
3	The student earns 3 points.
2	The student earns 2 points.
1	The student earns 1 point or some minimal understanding shown.
0	The student earns 0 points. No understanding is shown Ex: Both slopes are correct, but neither is in simplest form Ex: Procedure for finding both slopes is correct, but each contains a calculation error
B	Blank—No Response. A score of "B" will be reported as "NA." (No attempt to answer the item. Score of "0" assigned for the item.)

SOLUTION AND SCORING

Part	Points
1	**1 point possible** 1 point: Correct answer: $\frac{3}{50}$ **Note: Work is not required**
2	**1 point possible** 1 point: Correct answer: $\frac{9}{100}$ **Note: Work is not required**
3	**2 points possible** **Note: Do not give any credit in Part 3 if answer is correct, but there is no correct procedure in Parts 1 and/or 2.** 2 points: Correct answer of "Highway A" (or correct answer based on incorrect slope(s) in Parts 1 and/or 2, using correct procedure) with correct and complete explanation. Answer must be based on Parts 1 and 2. Give credit for the following or equivalent: • "It's Highway A because $\frac{3}{50}$ is less than $\frac{9}{100}$." or • "Highway A is cheaper since .06 < .09." or • "A because its slope is less that B's slope." **or** 1 point: Give credit for the following or equivalent: • Answer is correct, but explanation is incomplete or vague, but not incorrect: Ex: "Highway A because it's less." or • Answer is missing, but comparison is correct and complete Ex: "$\frac{3}{50} < \frac{9}{100}$" **Note: Do not give any credit if answer is incorrect** **Note: Do not give any credit if answer is correct with incorrect or missing explanation**

SCORE POINT: 4

Part 1		**Points**
Correct slope:	$\frac{3}{50}$	**1**

Part 2		
Correct slope:	$\frac{9}{100}$	**1**

Part 3		
Correct answer with correct and complete justification:	Highway A Highway has smaller slope	**2**
	Total Points	**4**

1. Highway A $\frac{633.6}{10,560}$ $633.6 \div 10,560 = .06 = \frac{6}{100}$

$\frac{6 \div 2}{100 \div 2}$ $\frac{3}{50}$ $\frac{3}{50}$

2. Highway B $\frac{475.2}{5280}$ $475.2 \div 5280 = .09 = \frac{9}{100}$

$\frac{9}{100}$

3. Highway A $\frac{3 \times 2}{50 \times 2} = \frac{6}{100}$ Highway B $\frac{9}{100}$

A B

$\frac{6}{100}$ or $\frac{9}{100}$

less

Highway A

Highway A has a smaller slope than Highway B.

The driver should take Highway A.

SCORE POINT: 3

Part 1		**Points**
Correct slope:	$\frac{3}{50}$	**1**

Part 2		
Correct slope but not in simplest form:	$\frac{4.5}{50}$	–

Part 3		
Correct answer with correct and complete justification:	Highway A "highway A has the lower slope"	**2**
	Total Points	**3**

1. (10,560, 6336)

$\frac{6336}{10,560} = \frac{3}{50}$ is the slope for highway A.

2. $\frac{4752}{5280} = \frac{9}{100} = \frac{4.5}{50}$ is the slope for highway B

3. they should use highway A because the slope is $\frac{3}{50}$ and the slope for highway B is $\frac{4.5}{50}$; there for highway A has the lower slope.

SCORE POINT: 2

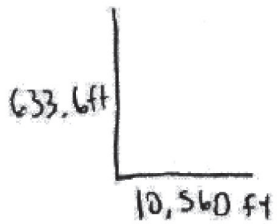
Part 1		**Points**
Correct slope:	$\frac{3}{50}$	**1**

Part 2		
Correct slope:	$\frac{9}{100}$	**1**

Part 3		
Correct answer but with incorrect justification:	Highway A "it is shorter"	–
	Total Points	**2**

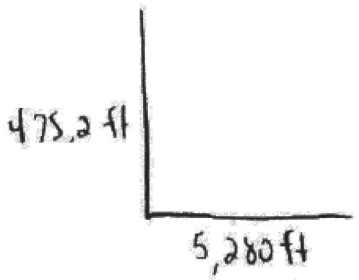
1.) Highway A – 3/50

633.6 ÷ 10560
.06 = 3/50



2.) Highway B – 9/100

475.2 ÷ 5,280
.09 = 9/100



3.) The truck driver should take highway A, because it is shorter than highway B with a 3/50 slope, and it will save money on gas.

SCORE POINT: 1

Part 1		**Points**
Incorrect slope:	$\frac{53}{8800}$ ft	–

Part 2		
Correct slope:	$\frac{9}{100}$ ft	**1**

Part 3		
Incorrect answer based on Parts 1 and 2:	Highway B	–
	Total Points	**1**

① $\frac{633.6 \text{ ft.}}{10{,}560 \text{ ft.}} = \frac{53}{8800}$ ft

② $\frac{475.2 \text{ ft}}{5{,}280 \text{ ft}} = \frac{9}{100}$ ft

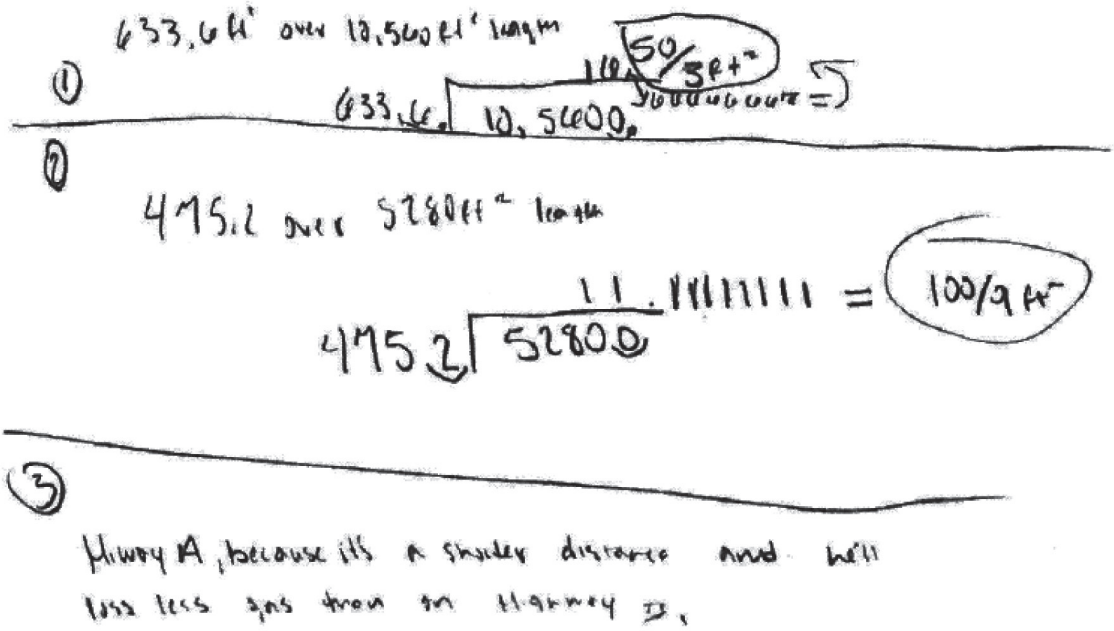
③ The highway the truck driver should use is highway B he will save more money on gas. Highway B rises 9 feet over 100 feet of length, compared to highway A which rises 53 ft over 8800 feet of length.

SCORE POINT: 0

Part 1		**Points**
Incorrect slope:	$\frac{50}{3\text{ft}^2}$	–

Part 2		
Incorrect slope:	$\frac{100}{9\text{ft}^2}$	–

Part 3		
Incorrect answer based on Parts 1 and 2:	Highway A	–
	Total Points	**0**



ACTAAP

Arkansas Comprehensive Testing, Assessment, and Accountability Program

DEVELOPED FOR THE ARKANSAS DEPARTMENT OF EDUCATION, LITTLE ROCK, AR 72201

QAI 08286-AR1104-TH-A

QAI08286