Rubric and Sample Responses

Question 1

RUBRIC

Score	Description
8	Response demonstrates thorough understanding of constructing linear functions in the form of $y = mx + b$ from a graph. • Assign 2 points for each correct equation, with explanation of the variables. (4 points total) • Assign 2 points for the explanation of how to find each equation. (4 points total)

SAMPLE RESPONSE

Part a.

Community #1:

$y = 12.08x + 179$; where x is the 2013 Property Valuation and y is the 2013 Tax Bill

$y = 0.43x – 159$; where x represents the square footage and y represents the Valuation

Community #2:

$y = 0.17x – 38$; where x represents the square footage and y represents the Valuation

$y = 8.13x – 5$; where x represents the 2013 Valuation and y represents the 2013 Tax Bill

Part b.

First, I found I found two points on the line. Then I subtracted the y-value of the second from the y-value of the first point. I did the same with the x-values of the 2 points. Then, I divided the difference between the y-values by the difference between the x-values. This gave me the slope, or the value of m in the formula $y = mx + b$. $\frac{y_1 - y_2}{x_1 - x_2}$

Then, I used the slope and an x-value to find the y-intercept. I did this by substituting the values for x and y for a point on the line into the formula $y = mx + b$.

Question 2

RUBRIC

Score	Description
2	Response demonstrates thorough understanding of the definition of a function. • Assign 1 point for each correctly defining a function. • Assign 1 point for explaining the importance of using a function for this application.

SAMPLE RESPONSE

It is a function because each input produces only one output (or, there is only one y- value for every x-value.) If the town used a rule that was not a function, two properties with the same valuation could be taxed differently. It would be unfair.

Question 3

RUBRIC

Score	Description
5	Response demonstrates understanding of a practical application of slope. • Assign 1 point for part a. • Assign 2 points for part b. • Assign 2 points for part c.

SAMPLE RESPONSE

Part a. Rate of change (response must include "change")

Part b. Both are linear and both are increasing, but one is growing faster than the other.

Part c. In the first equation, m represents dollar per square foot rate. In the second equation, m represents the tax rate or tax amount per $1000 home price.

Question 4

RUBRIC

Score	Description
4	Response demonstrates thorough understanding of combining simultaneous linear equations in the form of $y = mx + b$ to form a new function. • Assign 2 points for correct equation, with explanation of the variables. • Assign 2 points for the explanation of how to find the equation. (2 points total)

SAMPLE RESPONSE

Part a. Community #1: y = 5.1944x – 1741.72
Community #2: y = 1.3821x – 313.94

Part b. Substituted the equation for valuation into the variable for valuation in the other equation

Question 5

RUBRIC

Score	Description
4	Response demonstrates thorough understanding of graphing an equations in the form $y = mx + b$. • Assign 2 points for a completely correct graph. • Assign 2 points for a completely correct explanation.

SAMPLE RESPONSE

Answers will vary slightly, depending on the final tax bill equation. Student should explain the x or y-value used to find and graph the coordinates of two points.

Question 6

RUBRIC

Score	Description
2	Response demonstrates thorough understanding of graphing an equations in the form $y = mx + b$. • Assign 2 points for a completely correct graph. • Assign 2 points for a completely correct explanation.

SAMPLE RESPONSE

Answers will vary slightly, depending on the final tax bill equation. Student should explain the x or y-value used to find and graph the coordinates of two points.

Question 7

RUBRIC

Score	Description
3	Response demonstrates understanding of practical applications of slope and functions. *b* • Assign 1 point for identifying the rate represented by the slope. • Assign 2 points for explaining how the community can use the function.

SAMPLE RESPONSE

Part a. Slope represents the tax rate per square foot.

Part b. The community could use this function to forecast revenue for the community by identifying the homes on the market, their square footage and the potential increase or decrease in revenue streams.

Question 8

RUBRIC

Score	Description
3	Response demonstrates understanding how to compare functions. • Assign 1 point for each part.

SAMPLE RESPONSE

Part a. Community #1: 2013: $132,200; 2012: $125,220; 2011: $118,503
Community #2: 2013: $40,573; 2012: $37,260; 2011: $35,247

Part b. Add all 17 2014 tax bills based on the tax prediction equation developed in previous question. The totals are:
Community #1: $147,107.96
Community #2: $58101.41
*Values may differ based on equation in question 02923

Part c. Community #1:
Each new employee salary is $72,000. 147,107.96 ÷ 72,000 = 2.04.
Yes, the community could afford 2 full time employees.
Community #2: Each employee salary is $22,000. 58101.41 ÷ 22,000 = 2.64
Yes, the community could afford 2 full time employees and 1 half time employee.