

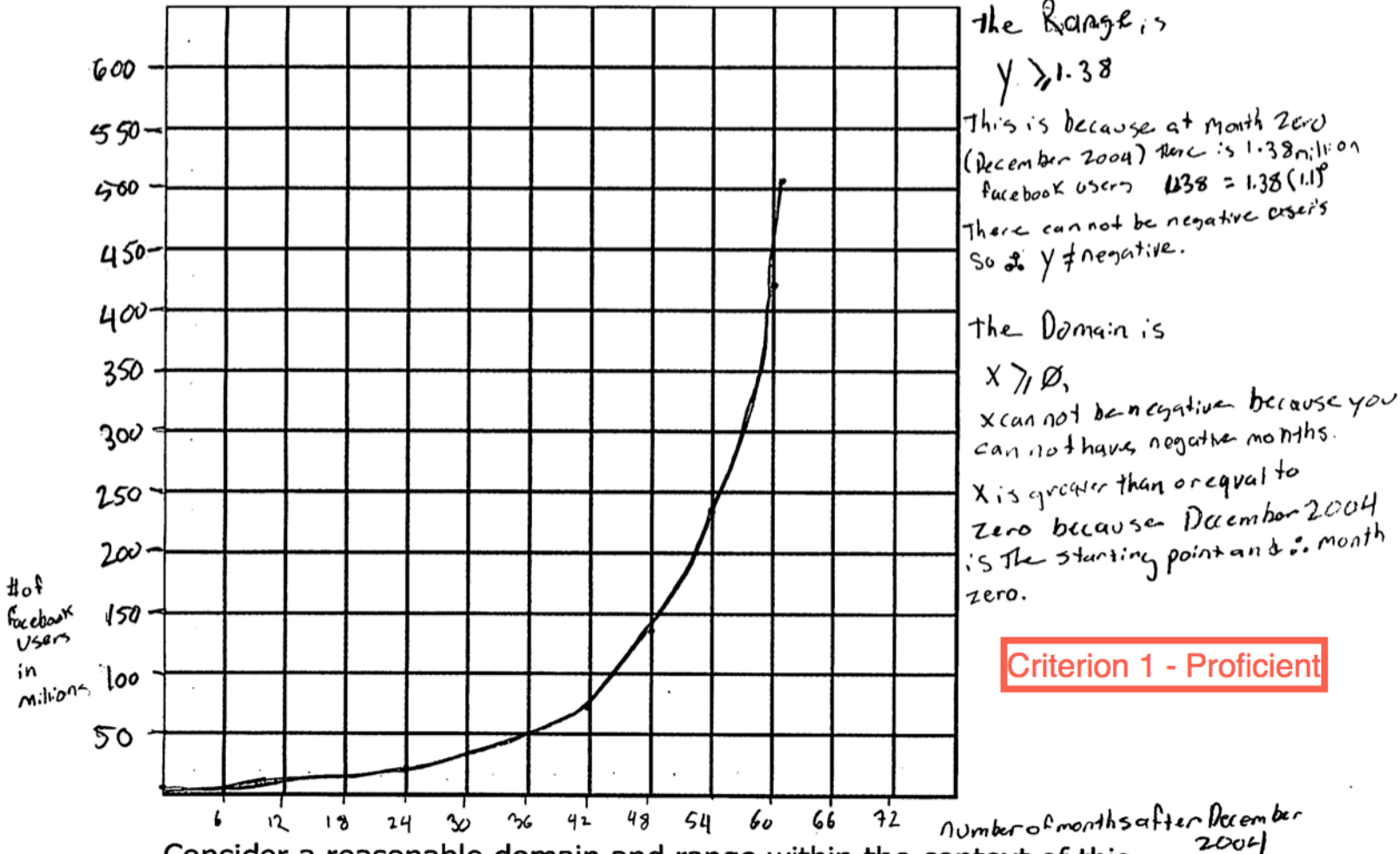
Mathematics 30-1  
Performance Assessment: First Steps

Facebook Users

Name \_\_\_\_\_

Sample 1

Graph the function from the student task.



Consider a reasonable domain and range within the context of this situation. Does the graph fit within this domain and range?

**Next Steps**

- Use the equation to predict what the total number of Facebook users should have been in August of 2012.
- Discuss whether that is a reasonable prediction.
- Use your equation to determine when the population should have hit 1 billion users.

August 2012 is 92 months after December 2004.

$$\therefore x = 92$$

T!

$$U = 1.38 (1.1)^x$$

$$U = 1.38 (1.1)^{92}$$

$$U = 1.38 (6428.76)$$

$$U = 8871.69 \text{ million}$$

$$U = 8.87169 \text{ billion}$$

Criterion 2 - Part 1  
Excellent

This is not reasonable growth. Exponential functions increase rapidly, but there is not even 8.8 billion people on the planet. At a certain point exponential functions do not make sense anymore when dealing with a finite number for example, people.

Criterion 2 - Part 2  
Excellent

$$U = 1.38 (1.1)^x$$
$$1 \text{ billion} = 1.38 (1.1)^x$$
$$1000 \text{ million} = 1.38 (1.1)^x$$
$$\frac{1000}{1.38} = \frac{1.38}{1.38} (1.1)^x$$
$$724.64 = (1.1)^x$$

Criterion 3 - Excellent

I predict that there will be 1 billion or more users after 70 months (October 2010)

$$U = 1.38 (1.1)^{69}$$
$$U = 990.7 \text{ million}$$

(less than 1 billion)

$$U = 1.38 (1.1)^{70}$$
$$U = 1089.9 \text{ million}$$

(more than one billion)

$\therefore$  70 months after Dec 2004 there would be more than 1 billion facebook users.

**Mathematics 30-1**  
**Performance Assessment: Rubric**  
**Facebook Users**

Student \_\_\_\_\_ Sample 1 \_\_\_\_\_ Date \_\_\_\_\_

Level Criteria	4 Excellent	3 Proficient	2 Adequate	1 Limited *	Insufficient/ Blank *
<p><b>Graph an exponential function</b> (Relations and Functions 9)</p> <p>[C, CN, T, V]</p>	<p>Draws an accurate graph and provides an <b>in-depth</b> description of the domain and range.</p>	<p>Draws an accurate graph and provides a <b>sufficient</b> description of the domain and range.</p> <p style="color: red;">The graph is accurate and the domain is well explained. The range considers the 1.38 million users at month zero, but doesn't consider possible limitations within the context.</p>	<p>Draws an accurate graph and provides a <b>partial</b> description of the domain and range.</p>	<p>Draws an <b>inaccurate</b> graph and provides a <b>flawed</b> description of the domain and range.</p>	<p>No score is awarded because there is insufficient evidence of student performance based on the requirements of the assessment task.</p>
<p><b>Calculate the number of users</b> (Relations and Functions 10)</p> <p>[C, CN, PS, R]</p>	<p>Applies the given function <b>correctly</b> to determine the number of users.</p> <p style="color: red;">The student has correctly determined the month number, and used the function correctly to determine the number of users.</p> <p>Provides a <b>perceptive</b> discussion of the reasonableness of the answer.</p> <p style="color: red;">The student perceptively considers limitations on the population.</p>	<p>Applies the given function in a <b>substantially correct</b> manner to determine the number of users.</p> <p>Provides a <b>thoughtful</b> discussion of the reasonableness of the answer.</p>	<p>Applies the given function in a <b>partially correct</b> manner to determine the number of users.</p> <p>Provides a <b>simplistic</b> discussion of the reasonableness of the answer.</p>	<p><b>Unable</b> apply the given function to determine the number of users.</p>	

**Mathematics 30-1**  
**Performance Assessment: Rubric**

**Facebook Users**

<p style="text-align: center;"><b>Solve exponential equation graphically and algebraically</b> (Relations and Functions 7 and 8) [C, CN, ME, R, T]</p>	<p>Algebraically manipulates the exponential equation <b>correctly</b> to verify the graphical prediction.</p> <p>The student's algebraic calculations support the prediction made from the graph. Note that the student didn't use logarithms, but that the solution is still algebraic and therefore valid. Note, also that the student didn't change the 70 months into "October, 2010" and still received full credit. The assessment here was on exponents and logarithms, not on adding 70 months to December, 2004.</p>	<p>Algebraically manipulates the exponential equation in a <b>substantially correct</b> manner to verify the graphical prediction.</p>	<p>Algebraically manipulates the exponential equation in a <b>partially correct</b> manner to verify the graphical prediction.</p>	<p><b>Unable</b> to manipulate the exponential equation to verify the graphical prediction.</p>
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\* When work is judged to be limited or insufficient, the teacher makes decisions about appropriate intervention to help the student improve.