CAC
CAIRO AMERICAN COLLEGE

Name: _____Date : _____

IM2 Unit TEST – Linear Relations & Linear Systems
Teacher: Mr. Rawlings, Mr. Smith, Mr. Santowski
Score:_____

PART 1 - CALCULATOR INACTIVE QUESTIONS

SHOW ALL WORK AND WRITE ALL ANSWERS IN THE SPACES PROVIDED.

Maximum marks will be given for correct answers. Where an answer is wrong, some marks may be given for correct method, provided the answer is supported by written working.

1. Mr. S. would like to use the linear function $2x - 3y - 15 = 0$ in his DIAL project.

(14 marks)

a. Does this line go through the point (-3,-7)? Show/explain your analysis. (2)

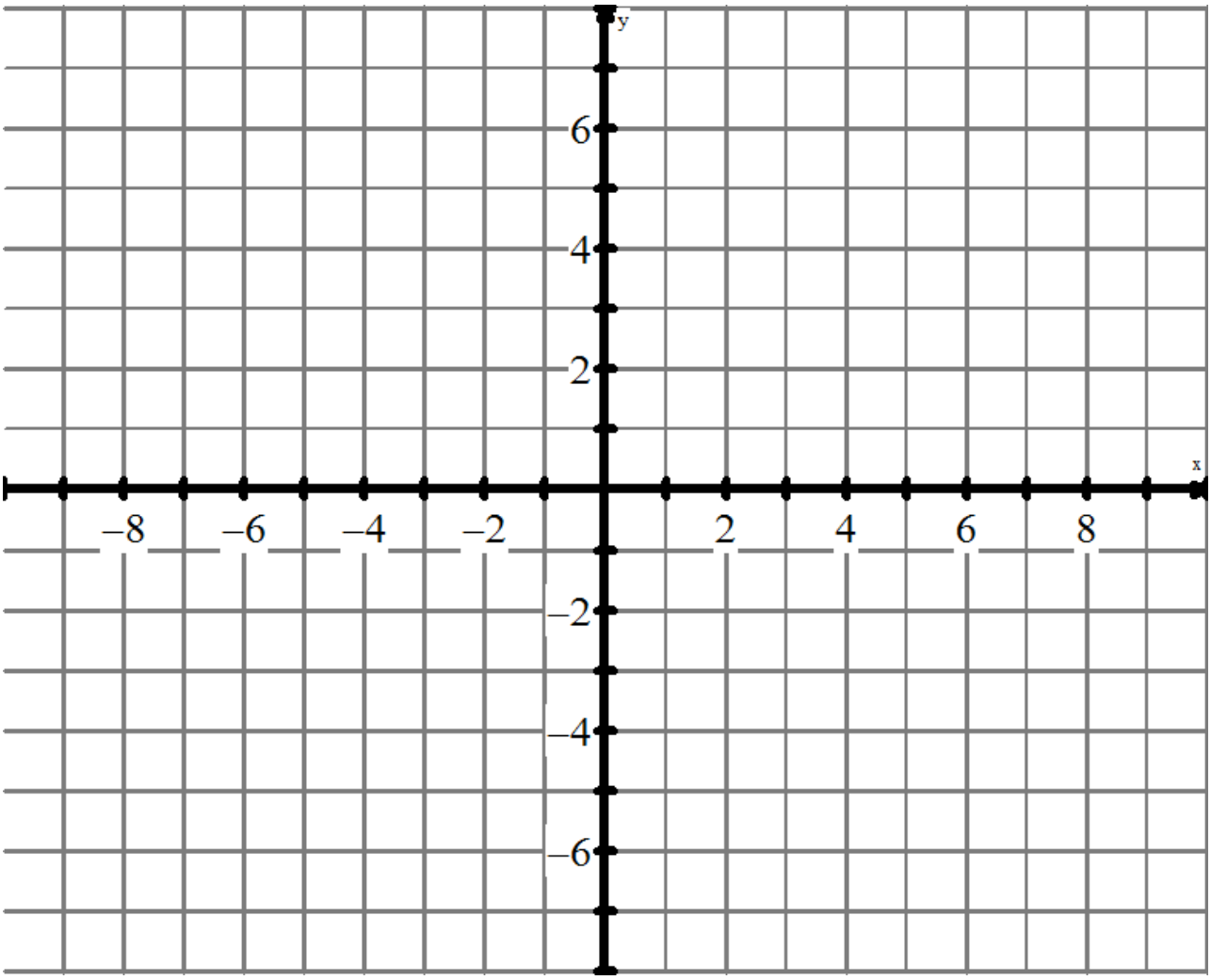
b. Mr. S. also needs to know the slope of this line. Calculate the slope of this line. (2)

c. Write the equation for this line in point-slope form. (1)

d. A second line is now added into the drawing, $y = 2x - 1$. Where will this new line intersect with the first line of $2x - 3y - 15 = 0$? (4)

e. Draw both lines $2x - 3y - 15 = 0$ and $y = 2x - 1$ on the graph provided, using the domain $\{x \in R \mid -6 < x \leq 6\}$

(5)



2. You are given the following linear system $\begin{aligned} 15 - 6y &= 9x \\ 3x + 2y &= 8 \end{aligned}$. Mr. Rawlings looks at these equations of the systems and declares that this system has no solution. How does he know?

(3 marks)

3. Juan is a cashier at a store. He has a total of $650 in bills. He has 80 bills consisting of $5 bills and $10 bills. How many of each type does he have? Show/explain the analysis or work that leads to your conclusion.

(5 marks)

4. To find the solution of the system defined by $2x - 3y = 13$ and $5x - y = 13$, you first need to decide what algebraic method you will use (elimination or substitution).

(8 marks)

a. Which method will you use and explain why (2)

b. Solve the system using the method of your choosing. (4)

c. Verify that your solution is correct. (2)

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PART 2 - CALCULATOR ACTIVE

A graphing display calculator MAY be used in this part of the test. Maximum marks will be given for correct answers. Where an answer is wrong, some marks may be given for correct method, provided this is shown by written working. Solutions found from a graphic display calculator should be supported by suitable working, e.g. if graphs are used to find a solution, you should sketch these as part of your answer.

1. Explain what it means to "solve a system of linear equations."

(1 mark)

2. You are given the linear system with these two equations: $\begin{matrix} -3x+2y=4 \\ 12x+ay=b \end{matrix}$. Determine the values of a and b such that this system has infinite solutions. Explain how the graphs of the equations will be related.

(3 marks)

3. You will be required to use the TI-84 calculator to provide a graphic solution to the following linear system:

Line #1 which is defined as $y = -\frac{1}{4}x + 6$ and Line #2: $4x - 8y = 40$.

(11 marks)

a. Determine the x- and y-intercepts of Line #2: $4x - 8y = 40$ (2)

b. In order to graph Line #2 on the TI-84, the equation must be changed into slope-intercept form. Mr. Smith thinks he has changed it into $y = \frac{1}{2}x - 5$. Show that Mr. Smith is correct. (2)

c. Use the TI-84 to graph the two lines and thus find the solution of this system. (2)

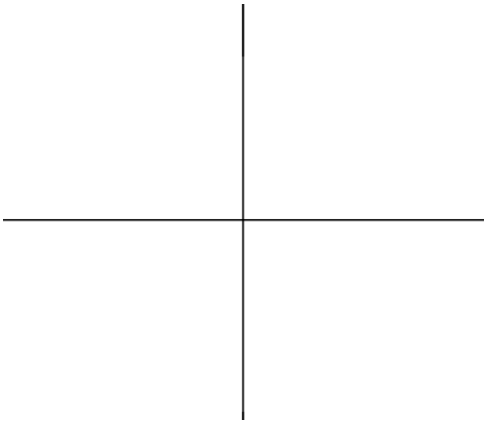
Solution is:_____.

d. State the window settings on the TI-84 that were necessary to determine the solution. (2)

Xmin = Ymin =

Xmax = Ymax =

e. Provide a PROPERLY LABELED SKETCH of your linear system on the grid provided. Label each function & the intersection point. (3)



4. A Grade 9 class is raising money for a school building project in Tanzania. To buy 25 desks and 30 chairs, the students need to raise $792.50. To buy 40 desks and 25 chairs, they will need to raise $1055. How much does it cost to provide a desk and chair for 2 (two) students?

(10 marks)

a. First, you will need to define the variables you will need in writing the equations. (2)

Let x represent ➔ Let y represent ➔

b. Mr. Smith has written several pairs of equations that might be helpful in answering the question. Select the appropriate pair of equations and explain WHY you are selecting this pair of equations. (2)

Equations Choice #1	Equations Choice #2	Equations Choice #3
$y = 40x + 1055$	$40x + 25y = 1055$	$y = 25x + 1055$
$y = 25x + 792.50$	$25x + 30y = 792.50$	$y = 30x + 792.50$

c. Solve the system using any method you wish. Show/explain only relevant working. (2)

d. Now answer the original question: how much does it cost to provide desks and chairs for 2 students? (1)

e. The Gr 9 class only manages to raise $500 in their fund raising. List 2 different combinations of desks and chairs that this class can donate. Show/explain the analysis that leads to your "options" (3)

5. Your new job is offering you two payment options for a 30 day period. Below are the two payment plan descriptions.

(12 marks)

Option 1:

(a) You are given 1,000,000 (1 million) dollar to start, and paid 120,000 dollars every day for 30 days. Write an equation to model this option.

$y =$ _____.

Option 2:

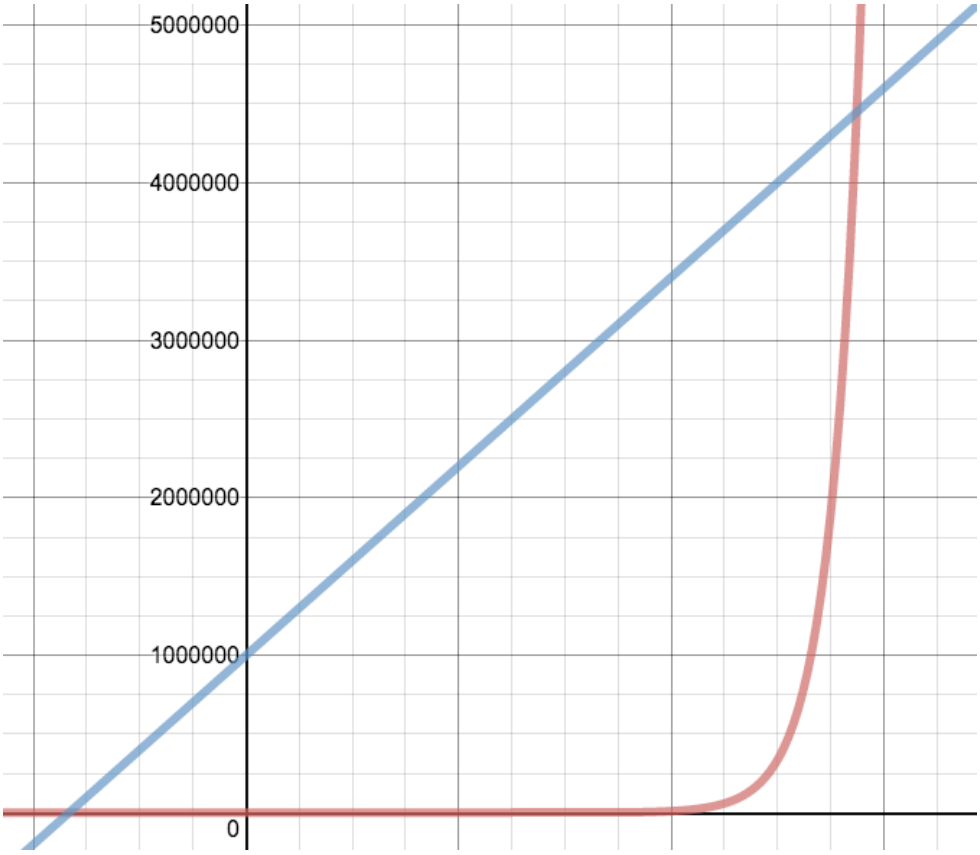
You start with 1 cent (100 cents = 1 dollar) and that is doubled every day for 30 days. The **exponential equation** for this situation is given to you as $y = 0.01(2)^x$

(b) What do your two variables represent in this problem?

Let x represent:

Let y represent:

To help you work through this question, you have been provided with a graph modeling this situation with both options graphed. Please use your TI-84 calculator, this graph below and your two equations to answer the following questions.



(c) What is an appropriate domain and range for this problem? Explain the thinking/reasoning behind your choice (3).

Domain: Range:

(d) Find **both solutions** to this system of equations. Label them on the diagram below above. Explain how you found the solution to this system. (3)

(e) Which option would you choose and why? Explain in detail using your work above to justify your reasoning. (2)