MFM 2P   Name: _Solutions._   Date: _____

Assignment: Linear Systems

KU /1~~5~~ A /12 PS 1 2 3 4 C 1 2 3 4

Part A—Multiple Choice
1. Select the equation that shows $3x - 4y = 12$ in the form $y = mx + b$.

(a) $y = \frac{3}{4}x - 3$ ⃝ ✓   (b) $y = -\frac{3}{4}x + 3$ (c) $y = -\frac{4}{3}x + 3$ (d) $y = -\frac{3}{4}x - 3$

$3x - 4y = 12$
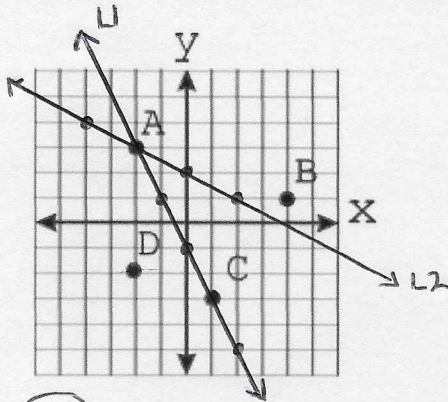$-4y = -3x + 12$
$\frac{-4y}{-4} = \frac{-3x}{-4} + \frac{12}{-4}$
$y = \frac{3}{4}x - 3$

[/1]

2. Draw the following lines and select the point whose ordered pair is a solution. **Use a ruler.**

L1: One line has a slope of $\frac{-2}{1}$ and the y-intercept is –1.

L2: The other line has a slope of $-\frac{1}{2}$ and the y-intercept is 2.   ✓ ✓
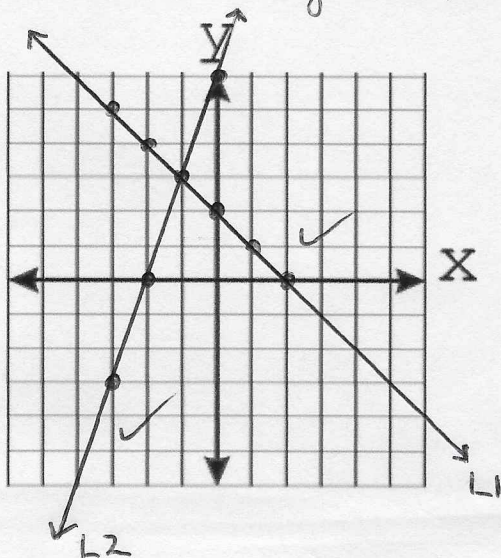

(a) A ⃝ ✓   (b) B   (c) C   (d) D

[3]

3. Graph the following system of equations. Then, select the solution.

L1: $Y = -x + 2$ (y-intercept = 2 ; slope = $\frac{-1}{1}$)
L2: $y = 3x + 6$ (y-intercept = 6 ; slope = $\frac{3}{1}$)

(a) (–3, 1)

(b) (–1, 3) ⃝ ✓
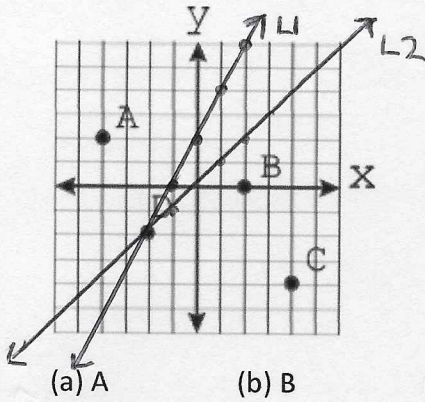
c) (2, 0)

(d) (1, –3)

[/3]

4. Draw the following system of equations and select the point whose ordered pair is the solution. **Use a ruler.**

L1: $y = 2x + 2$ (y-intercept 2; slope $= \frac{2}{1}$) ✓

L2: $-x + y = 0 \rightarrow y = x$ (y-intercept 0; slope $= \frac{1}{1}$) ✓   [/3]

(a) A   (b) B   (c) C   (d) D ✓

5. By performing a 'check', show that (-1, 5) is the point of intersection for the following system of equations.

LS (1)   RS (1)   LS (2)   RS (2)

$2x - y = -7$ (1) $2x - y$ -7 $6x + 3y$ 9

$6x + 3y = 9$ (2) $2(-1) - 5$ $6(-1) + 3(5)$ [/5]

$-2 - 5$ ✓✓ $-6 + 15$ ✓✓

-7 9

Since LS = RS in both equations (1) and (2), (-1, 5) is the POI. ✓

Part B-Application

Solve each problem on lined paper. Show all steps to each of your solutions.

1. Jim's company manufactures skateboards. The production costs are given by $y = 0.2x + 20$, where x is the number of skateboards manufactured. The revenue is given by $y = 0.35x$. How many skateboards must the company sell to break even?

a) 118

b) 125

c) 134 ✓

d) 146

Use the method of substitution to solve.

$0.2x + 20 = 0.35x$ ✓

$20 = 0.35x - 0.20x$ $\frac{20}{0.15} = \frac{0.15x}{0.15}$

$20 = 0.15x$ $133.\overline{3} = x$ ✓

∴ 134 skateboards need to be sold to break even.   [A /3]

2. Use the process of substitution and select the solution to this system of linear equations.

$y = 1 - x$

$2x + y = 4$

(see next page for solution)

a) (3, 2)   b) (2, 3)   c) (3, -2)   d) (-3, -2)   [A /4]

Part B

#2. $y = 1 - x$ (1)

$2x + y = 4$ (2)

Substitute (1) into (2):

$2x + (1-x) = 4$ ✓

$2x - x + 1 = 4$

$x + 1 = 4$

$x = 4 - 1$

$x = 3$ ✓

Set $x = 3$ in (1) to find y.

$y = 1 - x$

$y = 1 - 3$ ✓

$y = -2$

∴ The POI is $(3, -2)$

#3. $y = 4x - 18$ (1)

$2x + 3y = 9$ (2)

Substitute (1) into (2):

$2x + 3(4x - 18) = 9$

$2x + 12x - 54 = 9$

$14x - 54 = 9$

$14x = 9 + 54$

$14x = 63$

$\dfrac{14x}{14} = \dfrac{63}{14}$

$x = 4.5$

Set $x = 4.5$ in (1) to find y.

$y = 4x - 18$

$y = 4(4.5) - 18$

$y = 18 - 18$

$y = 0$

∴ The POI is $(4.5, 0)$.

Check in (2)

LS   RS

$2x + 3y$ ⑨

$2(4.5) + 3(0)$

$9 + 0$

⑨