MFM2P Name: _____ Date: _____

Practice Test –Linear Systems of Equations

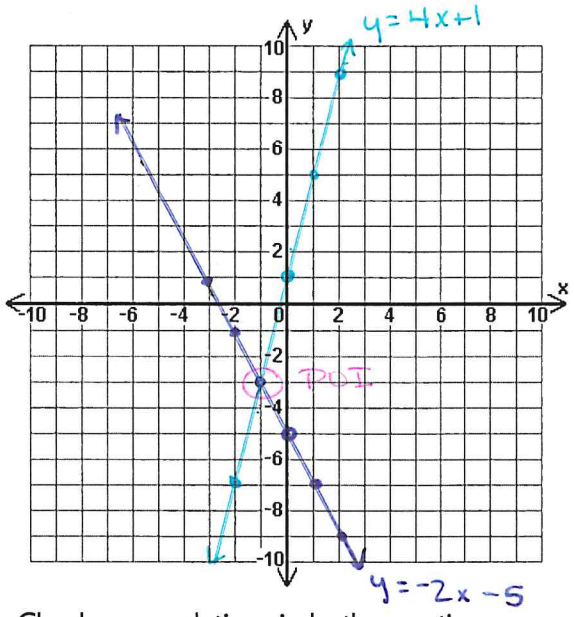
Show all work in a neat and organized manner!!!

1. Solve the following system of linear equations by GRAPHING using the $y = mx + b$ method.

$y = -2x - 5$ $m = -\frac{2}{1}$ $b = -5$

$y = 4x + 1$ $m = \frac{4}{1}$ $b = 1$

Remember to LABEL your graph.



The Point of Intersection is (-1, -3)

2. Solve the following linear system by **SUBSTITUTION**. Check your solutions in both equations.

$y = 2x + 1$ ①

$y = -x - 23$ ②

$2x + 1 = -x - 23$

$2x + x = -23 - 1$

$\frac{3x}{3} = \frac{-24}{3}$

$\boxed{x = -8}$

Sub $x = -8$ into ①

$y = 2x + 1$

$y = 2(-8) + 1$

$y = -16 + 1$

$\boxed{y = -15}$

∴ POI is (-8, -15)

Check (-8, -15)
x y

LS	RS
y	2x+1
= -15	= 2(-8)+1
	= -16+1
	= -15 ✓

LS	RS
y	-x-23
-15	-(-8)-23
	8-23
	-15 ✓

3. Is the point (-3, 2) a solution to the following linear system? SHOW YOUR WORK.

$2x - 3y = -12$

$6x + 5y = -8$

CHECK (-3, 2)
x y

LS	RS
2x-3y	-12
= 2(-3)-3(2)	
= -6-6	
= -12 ✓	

LS	RS
6x+5y	-8
= 6(-3)+5(2)	
= -18+10	
= -8 ✓	

∴ It is a solution

4. Solve the following linear system by **ELIMINATION**. Check both solutions.

$x - y = 3$ ①
$2x + y = 3$ ②

$x - y = 3$
$+ \; 2x + y = 3$
$[x + 2x] \not{y} = [3 + 3]$
$3x = 6$
$\frac{3x}{3} = \frac{6}{3}$
$x = 2$

Sub $x = 2$ into ①
$x - y = 3$
$(2) - y = 3$
$-y = 3 - 2$
$-y = 1$
$\frac{-y}{-1} = \frac{1}{-1}$
$y = -1$

∴ POI is $(2, -1)$

CHECK $(2, -1)$
$x \quad y$

LS	RS
$x - y$	3
$(2) - (-1)$	
$2 + 1$	
3	✓

LS	RS
$2x + y$	3
$= 2(2) + (-1)$	
$= 4 - 1$	
$= 3$	✓

5. Consider the linear system $x + y = 5$
$x - y = 7$

a) To eliminate the x terms, would you add or subtract the two equations? Subtract

b) To eliminate the y terms, would you add or subtract the two equations? add

c) Will you end up with the same point of intersection if you add OR subtract the two equations? Explain.

Yes. The POI is the only point that the two lines share

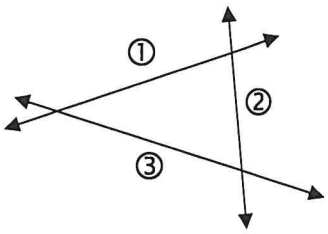
6. It is possible for a system of linear equations to have **NO** solution. Consider the linear system
$y = 2x + 3$
$y = 2x - 4$
There is no solution (point of intersection) between these two lines. How can you tell?

When the lines are parallel, they will never intersect.

Parallel lines have the same slope

7. The sides of a triangle lie on the following three lines.

$x + y = 15$ ①
$-x - 2y = -8$ ②
$5x + 2y = 48$ ③



a) Use *elimination* **or** *substitution* on ① and ② to find the coordinates of the point of intersection

$x + y = 15$
$+ \quad -x - 2y = -8$
$\cancel{x} + [y + (-2y)] = [15 + (-8)]$
$-y = 7$
$\frac{-y}{-1} = \frac{7}{-1}$
$\boxed{y = -7}$

Sub $y = -7$ into ①
$x + y = 15$
$x + (-7) = 15$
$x = 15 + 7$
$\boxed{x = 22}$

∴ POI is $(22, -7)$

b) Use *elimination* **or** *substitution* on ② and ③ to find the coordinates of the point of intersection

$-x - 2y = -8$
$+ \quad 5x + 2y = 48$
$[-x + 5x] + \cancel{2y} = [-8 + 48]$
$\frac{4x}{4} = \frac{40}{4}$
$\boxed{x = 10}$

Sub $x = 10$ into ②
$-x - 2y = -8$
$-(10) - 2y = -8$
$-2y = -8 + 10$
$\frac{-2y}{-2} = \frac{2}{-2}$
$\boxed{y = -1}$

∴ POI is $(10, -1)$

c) Use *elimination* **or** *substitution* on ① and ③ to find the coordinates of the point of intersection

$x + y = 15 \xrightarrow{\times 5} 5x + 5y = 75$
$5x + 2y = 48$

So..
$5x + 5y = 75$
$- \quad 5x + 2y = 48$
$\cancel{5x} + [5y - 2y] = [75 - 48]$
$\frac{3y}{3} = \frac{27}{3}$
$\boxed{y = 9}$

Sub $y = 9$ into ①
$x + y = 15$
$x + (9) = 15$
$x = 15 - 9$
$\boxed{x = 6}$

∴ POI is $(6, 9)$

APPLICATION

8. At an exclusive Pearl Jam concert two types of tickets were sold (adult tickets and student tickets). This situation can be represented by the following system of equations:

Let **A** represent the number of adult tickets sold.
Let **S** represent the number of student tickets sold.

$$75\mathbf{A} + 50\mathbf{S} = 32\,500 \quad (1)$$
$$\mathbf{A} + \mathbf{S} = 475 \quad (2)$$

a) From one of the above equations, how many tickets in total were sold?

475 tickets were sold

b) From one of the above equations, how much did an adult ticket cost? How much did a student ticket cost?

- An adult ticket cost $75
- A student ticket cost $50

c) How much was the TOTAL sales for ALL the tickets sold?

$ 32 500

d) Solve the system of equations to determine how many adult tickets were sold and how many student tickets were sold.

② × 75

$75(A + S = 475)$

$75A + 75S = 35625$ ③

① & ③

$75A + 50S = 32500$

$-\ 75A + 75S = 35625$

$-25S = -3125$

$S = 125$

sub $S = 125$ into ②

$A + S = 475$

$A + (125) = 475$

$A = 475 - 125$

$A = 350$

∴ There were 125 student tickets and 350 adult tickets sold.