MPM2D Name: Ann Surkey **Unit 1 Test** (pm version)
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G1: Model and solve problems involving the intersection of two straight lines.

1. Is (6, 3) the solution to the following system?

① $x - 3y = -3$
② $-3y = 12 + 2x$

Support your decision in the following two ways. **DO NOT SOLVE ALGEBRAICALLY!**

a) Perform a formal check.

① $(6) - 3(3) = -3$
$6 - 9 = -3$
$-3 = -3$ ✓

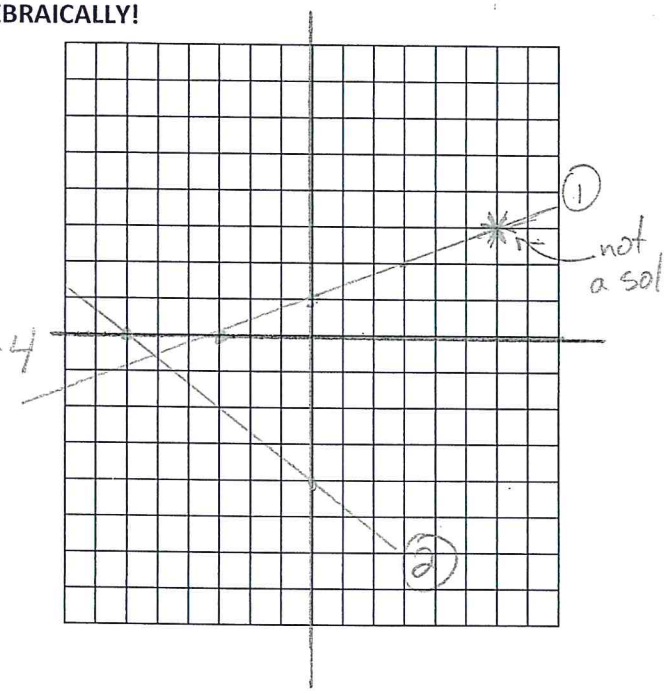
② $-3(3) = 12 + 2(6)$
$-9 = 12 + 12$
$-9 = 24$ X

∴ (6, 3) is not a soln

b) Verify graphically.

① $-3y = -3 - x$
$y = \frac{1}{3}x + 1$

② $y = \frac{-2}{3}x - 4$



2. a) Solve the system using the elimination method.

① $x - 2y = -3$)2
② $2x + 3y = 8$

$2x - 4y = -6$
$-\ 2x + 3y = 8$
$-7y = -14$
$y = +2$

Sub into ①
$x - 2(2) = -3$
$x - 4 = -3$
$x = 1$ Soln = (1, 2)

b) Solve the system using the substitution method.

① $x - y = 9$
② $y = -x + 3$

Sub ② into ①
$x - (-x + 3) = 9$
$x + x - 3 = 9$
$2x = 12$
$x = 6$
Sub into ②
$y = -(6) + 3$
$y = -3$

Soln = (6, -3)

3. For each situation below, model the linear system that you would use to solve the problem. **DO NOT SOLVE THESE PROBLEMS.** Models should include **clearly defined variables** and the **two equations** that would be used to solve.

a) A store owner sells peanuts for \$4.80/kg and raisins for \$2.40/kg. He decides to mix raisins and peanuts and sell the mixture as a TV snack for \$3.36/kg. He decides to make up 100 kg of the snack. How many kilograms of peanuts and raisins will he need?

Let p = mass of peanuts (kg)
r = mass of raisins (kg)

$$p + r = 100$$
$$(4.80)p + (2.40)r = (3.36)(1)$$
$\leftarrow 1$ kg.

b) Mike invested \$8000, part at 9% and the remainder at 12%. The total interest earned in these investments was \$810. How much did he invest at each rate?

Let x = \$ invested at 9%
y = \$ invested at 12%

$$x + y = 8000$$
$$0.09x + 0.12y = 810$$

c) When 4 times the larger of 2 numbers is added to 3 times the smaller, the result is 68. Seven times the larger number less 5 times the smaller is 37. What are the numbers?

Let x = larger #
y = smaller #

$$4x + 3y = 68$$
$$7x - 5y = 37$$

4. Given the following equation, create a linear system that has **infinite solutions**. Clearly explain your reasoning.
$-2x + 4y = 6$

Infinite Solutions means Same line.

$-2x+4y=6$
$-4x+8y=12$ * need 2

5. Create a linear system that has the solution (-3, 2). Run a formal check to verify your equations.

Need 2 lines that include $(-3, 2)$

① $y = mx + b$
Let $m = 2$ $(2) = (2)(-3) + b$
$2 = -6 + b$
$b = 8$

② $y = mx + b$
Let $m = 1$ $(2) = (1)(-3) + b$
$2 = -3 + b$
$b = 5$

$\therefore$ $y = 2x + 8$ $y = x + 5$ has the sol'n $(-3, 2)$

6. The solution to this system of equations is (5, 2). Find the values of m and n.

① $(3 - m)x + (-2 + n)y = 7$
② $x = y + n$

② $5 = 2 + n$
$n = 3$

① $(3-m)(5) + (-2+(3))(2) = 7$
$15 - 5m - 4 + 6 = 7$
$-5m = -10$
$m = 2$

$\therefore$ $m = 2$
$n = 3$