Algebra 1R
Chapter 6 & 7 – Day 1 Notes

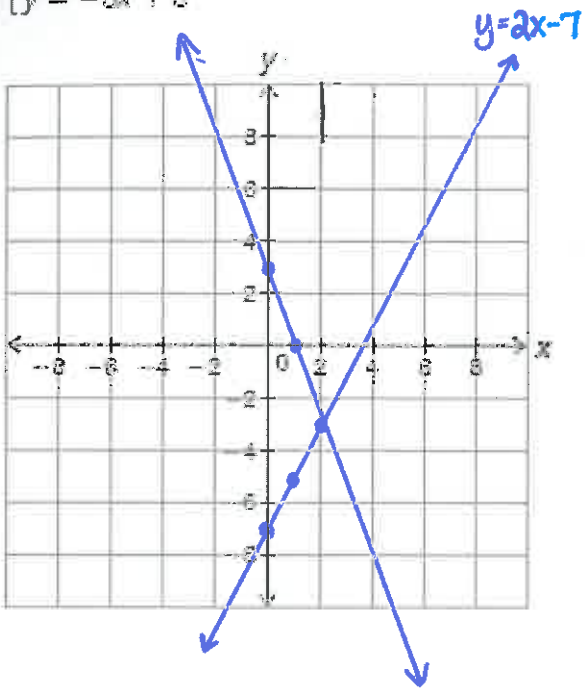
Name_____

Systems of Equations and Inequalities

Section 6-1: Solving Linear Systems Graphically and Algebraically

1. Use the slope and y-intercept to graph the system of equations.

$$\begin{cases} y = 2x - 7 \\ y = -3x + 3 \end{cases}$$



$y = 2x - 7$
$m = \frac{2}{1}$
$b = -7$

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

2. What is the solution to the system of equations?

$(2, -3)$

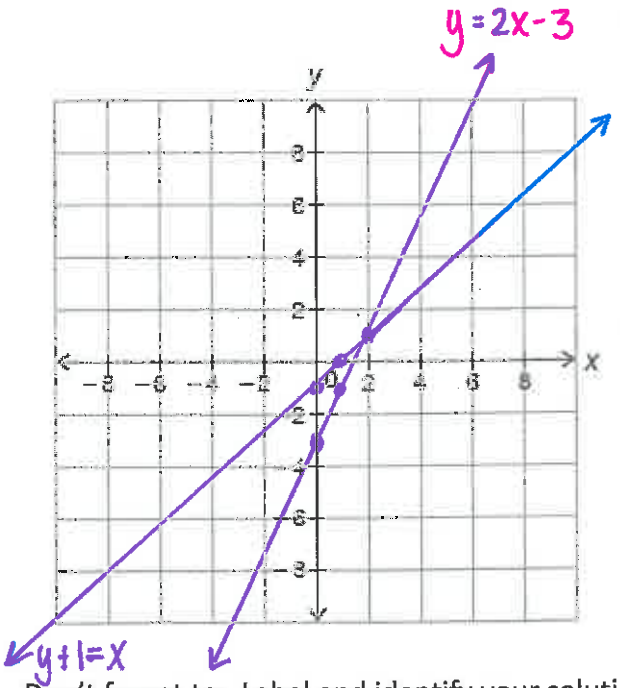
3. Use algebraic substitution to check your answer to Question 2

$y = 2x - 7$
$-3 = 2(2) - 7$
$-3 = 4 - 7$
$-3 = -3$ ✓

$y = -3x + 3$
$-3 = -3(2) + 3$
$-3 = -6 + 3$
$-3 = -3$ ✓

Solve the following system of equations by graphing. $y = 2x - 3$

$y + 1 = x$ → solve for y



$y = 2x - 3$

$m = \frac{2}{1}$

$b = -3$

$y + 1 = x$

$-1 \quad -1$

$y = x - 1$

$m = \frac{1}{1}$

$b = -1$

Solution: (2, 1)

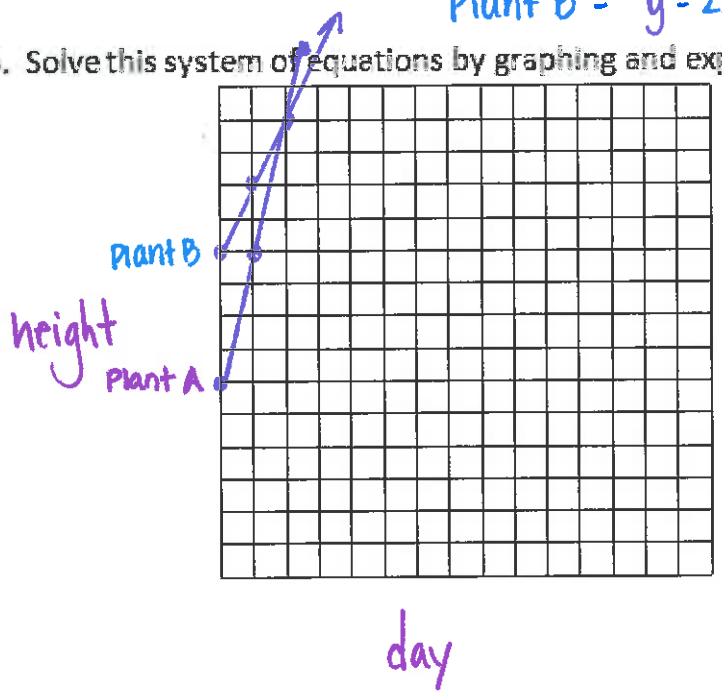
Don't forget to: Label and identify your solution.

Ex. Suppose you are testing two fertilizers on bamboo plants A and B, which are growing under identical conditions. Plant a is 6 inches tall and growing at a rate of 4 inch/day. Plant B is 10 inches tall and growing at a rate of 2 inch/day.

a. Write a system of equations that models each plants height where y is the height and x is the number of days. Plant A = $y = 4x + 6$

Plant B = $y = 2x + 10$

b. Solve this system of equations by graphing and explain what the solution means.



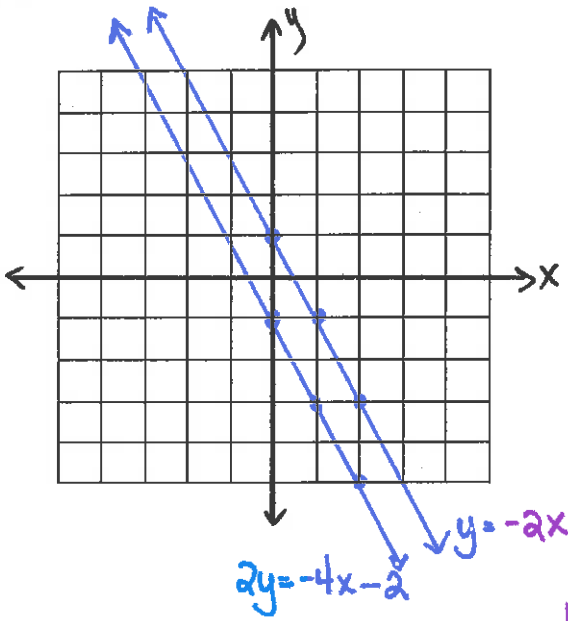
Solution (2, 14)

At day 2 both plants will be 14 inches tall.

System with no solution

What would cause a system of equations to have no solution???? * both equations will have the same slope.

Ex. Solve by graphing. $y = -2x + 1$ $2y = -4x - 2$



$y = -2x + 1$

$m = -\frac{2}{1}$

$b = 1$

$\frac{2y}{2} = \frac{-4x}{2} - \frac{2}{2}$

$y = -2x - 1$

$m = -\frac{2}{1}$

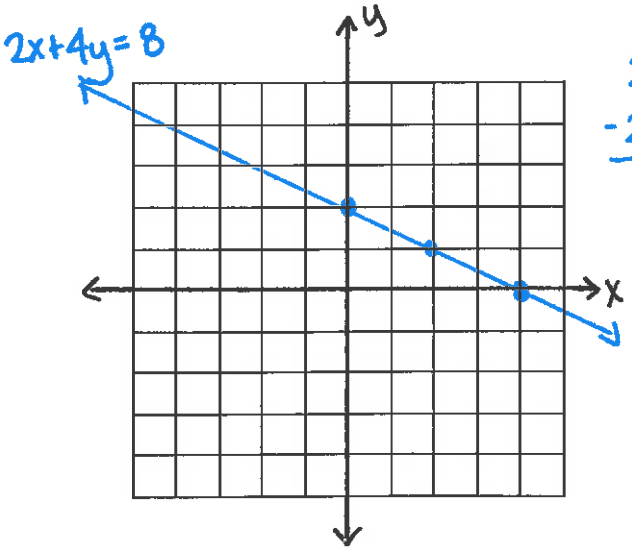
$b = -1$

No solution, the lines do not cross

System with infinite solutions

What would cause a system of equations to have infinite solutions???? * both equations are the same line.

Ex. Solve by graphing. $2x + 4y = 8$ $y = -\frac{1}{2}x + 2$



$2x + 4y = 8$

$-2x \quad -2x$

$\frac{4y}{4} = \frac{-2x}{4} + \frac{8}{4}$

$y = -\frac{1}{2}x + 2$

$m = -\frac{1}{2}$

$b = 2$

$y = -\frac{1}{2}x + 2$

$m = -\frac{1}{2}$

$b = 2$

Infinite solutions, they are the same line

Solving a System of Equations by the Substitution Method

Procedure:

1. Write one of the equations with one of the variables by itself (ex: $y = 3x+4$ or $x = 2x-7$)
2. Substitute this into the other equation
3. Solve for the variable
4. Substitute this value into the other equation to solve for the other variable
5. Write your answer as an ordered pair
6. Check your answer in both equations

Examples:

1. $x = y - 2$
   $x + y = 18$

$y - 2 + y = 18$
$2y - 2 = 18$
$+2 \quad +2$
$\frac{2y}{2} = \frac{20}{2}$
$y = 10$

$x = y - 2$
$x = 10 - 2$
$x = 8$
$(8, 10)$

CK: $x = y - 2$
$8 = 10 - 2$
$8 = 8$
$10 + 8 = 18$
$18 = 18$ ✓

2. $x - 2y = -2$
   $2x - y = 5$

$x - 2y = -2$
$+2y \quad +2y$
$x = 2y - 2$

$2(2y-2) - y = 5$
$4y - 4 - y = 5$
$3y - 4 = 5$
$+4 \quad +4$
$\frac{3y}{3} = \frac{9}{3}$
$y = 3$

$x - 2(3) = -2$
$x - 6 = -2$
$+6 \quad +6$
$x = 4$

CK: $x - 2y = -2$
$4 - 2(3) = -2$
$4 - 6 = -2$
$-2 = -2$ ✓

$2x - y = 5$
$2(4) - 3 = 5$
$8 - 3 = 5$
$5 = 5$ ✓

3. $x = y$
   $5x - 4y = -2$

$5x - 4x = -2$
$x = -2$

$x = y$
$-2 = y$

CK: $5(-2) - 4(-2) = -2$
$-10 + 8 = -2$
$-2 = -2$ ✓

$x = y$
$-2 = -2$ ✓

4. $4x + 3y = 27$
   $y = 2x - 1$

$4x + 3(2x-1) = 27$
$4x + 6x - 3 = 27$
$10x - 3 = 27$
$+3 \quad +3$
$\frac{10x}{10} = \frac{30}{10}$
$x = 3$

$y = 2(3) - 1$
$y = 6 - 1$
$y = 5$

CK: $4(3) + 3(5) = 27$
$12 + 15 = 27$
$27 = 27$ ✓

$5 = 2(3) - 1$
$5 = 6 - 1$
$5 = 5$ ✓

5. $x = 3y + 1$
$5y - 2x = 1$

$5y - 2(3y+1) = 1$

$5y - 6y - 2 = 1$

$-y - 2 = 1$

$+2 \quad +2$

$-y = 3$

$\boxed{y = -3}$

$x = 3(-3) + 1$

$x = -9 + 1$

$\boxed{x = -8}$

CK: $x = 3y + 1$

$-8 = 3(-3) + 1$

$-8 = -9 + 1$

$-8 = -8$ ✓

$5y - 2x = 1$

$5(-3) - 2(-8) = 1$

$-15 + 16 = 1$

$1 = 1$ ✓

6. $3x - 2y = 11$
$x + 2y = 9$

$x + 2y = 9$

$-2y \quad -2y$

$x = -2y + 9$

$3(-2y+9) - 2y = 11$

$-6y + 27 - 2y = 11$

$-8y + 27 = 11$

$-27 \quad -27$

$\frac{-8y}{-8} = \frac{-16}{-8}$

$y = 2$

$x + 2y = 9$

$x + 2(2) = 9$

$x + 4 = 9$

$-4 \quad -4$

$x = 5$

CK: $3x - 2y = 11$

$3(5) - 2(2) = 11$

$15 - 4 = 11$

$11 = 11$ ✓

$x + 2y = 9$

$5 + 2(2) = 9$

$5 + 4 = 9$

$9 = 9$ ✓