

## Unit 2B

- ① Graphing Systems
- ② Solve by Substitution
- ③ Solve by Elimination
- ④ Skills Check
- ⑤ Linear Inequalities
- ⑥ Systems of inequalities

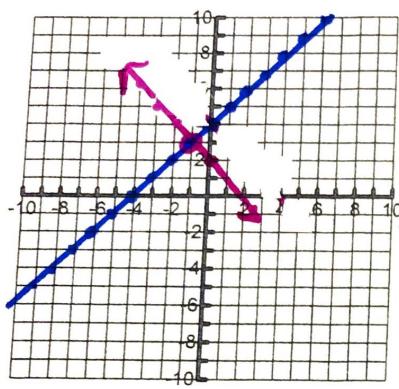
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**Solving Systems by Graphing****Steps**

1. Make sure each equation is in slope-intercept form:  $y = mx + b$ .
2. Graph each equation on the same graph paper.
3. The point where the lines intersect is the solution.  
If they don't intersect then there's no solution.
4. Check your solution algebraically!

$$\begin{aligned} 1. \quad & 2x - 2y = -8 \\ & 2x + 2y = 4 \end{aligned}$$

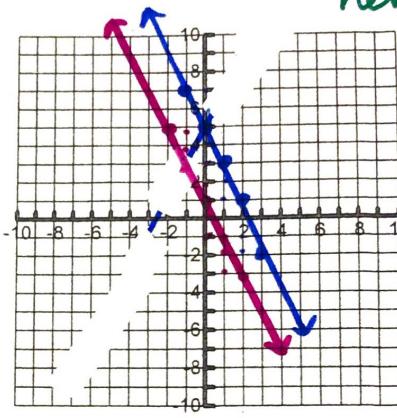
$$\begin{aligned} -2y &= -2x - 8 \\ y &= x + 4 \end{aligned}$$



$$\begin{aligned} 2y &= -2x + 4 \\ y &= -x + 2 \end{aligned}$$

(0, 4)

$$\begin{aligned} 2. \quad & y = -2x + 5 \\ & y = -2x + 1 \end{aligned}$$

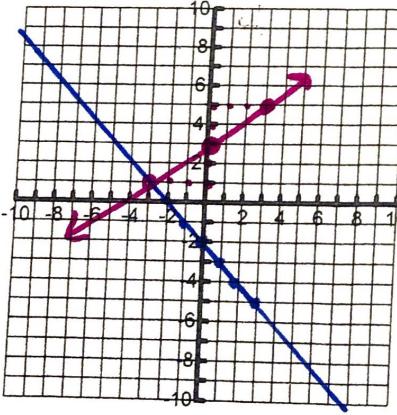


**Same SLOPE!**  
parallel lines  
never intersect

no solution

$$\begin{aligned} 3. \quad & x + y = -2 \\ & 2x - 3y = -9 \end{aligned}$$

$$\begin{aligned} y &= -x - 2 \\ -3y &= -2x - 9 \end{aligned}$$

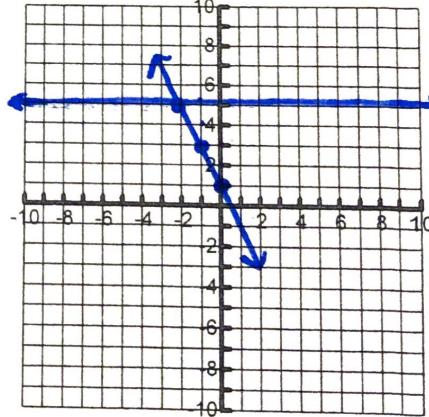


$$y = \frac{2}{3}x + 3$$

(-3, 1)

$$\begin{aligned} 4. \quad & y = 5 \\ & 2x + y = 1 \end{aligned}$$

$$y = -2x + 1$$



(-3, 5)

**Types of solutions:**

- If the lines have the same y-intercept  $b$ , and the same slope  $m$ , then the system has infinitely many solutions.
- If the lines have the same slope  $m$ , but different y-intercepts  $b$ , the system has no solutions.
- If the lines have different slopes  $m$ , the system has one solution.



## Solving Systems by Elimination

### Steps

1. Arrange the equations with like terms in columns.
2. Multiply, if necessary, to create opposite coefficients for one variable.
3. Add/Subtract the equations.
4. Substitute the value to solve for the other variable.
5. Write your answer as an ordered pair.
6. Check your answer.

$$\begin{array}{r} \cancel{2x - 2y = -8} \\ + 2x + 2y = 4 \\ \hline \underline{4x = -4} \\ \frac{4x}{4} = \frac{-4}{4} \\ x = -1 \end{array}$$

$$\begin{array}{l} 2(-1) + 2y = 4 \\ -2 + 2y = 4 \\ 2y = 6 \\ y = 3 \end{array}$$

$$\boxed{(-1, 3)}$$

$$\begin{array}{r} \cancel{4x + 3y = 16} \\ + 2x - 3y = 8 \\ \hline \underline{6x = 24} \\ \frac{6x}{6} = \frac{24}{6} \\ x = 4 \end{array}$$

$$\boxed{(4, 0)}$$

$$\begin{array}{r} 2(4) - 3y = 8 \\ 8 - 3y = 8 \\ -8 \\ \hline -3y = 0 \\ \frac{-3y}{-3} = \frac{0}{-3} \\ y = 0 \end{array}$$

$$\begin{array}{r} \cancel{3x + 2y = 7} \\ -3x + 4y = 5 \\ \hline \underline{6y = 12} \\ y = 2 \end{array}$$

$$\begin{array}{l} 3x + 2(2) = 7 \\ 3x + 4 = 7 \\ 3x = 3 \\ x = 1 \end{array}$$

$$\boxed{(1, 2)}$$

$$\begin{array}{r} \cancel{2[2x - 3y = -2]} \\ -4x + 5y = 2 \\ \hline -4x + 5(2) = 2 \end{array}$$

$$\begin{array}{r} \cancel{4x - 6y = -4} \\ -4x + 5y = 2 \\ \hline -y = -2 \end{array}$$

$$\begin{array}{l} \frac{-y}{-1} = \frac{-2}{-1} \\ y = 2 \end{array}$$

$$\begin{array}{l} -4x = -8 \\ \frac{-4x}{-4} = \frac{-8}{-4} \\ x = 2 \end{array}$$

$$\boxed{(2, 2)}$$

$$\begin{array}{r} \cancel{5x + 2y = 7} \\ 2[-4x + y = -16] \\ \hline \underline{5x + 2y = 7} \\ \underline{-8x + 2y = -32} \\ 13x = 39 \\ x = 3 \end{array}$$

$$\begin{array}{l} 5(3) + 2y = 7 \\ 15 + 2y = 7 \\ 2y = -8 \\ y = -4 \end{array}$$

$$\boxed{(3, -4)}$$

$$\begin{array}{r} \cancel{2x + 3y = 1} \\ 4x - 2y = 10 \\ \hline \underline{4x - 2y = 10} \end{array}$$

$$\begin{array}{r} \cancel{-4x + -6y = -2} \\ 4x - 2y = 10 \\ \hline -8y = 8 \end{array}$$

$$y = -1$$

$$\begin{array}{l} 4x - 2(-1) = 10 \\ 4x + 2 = 10 \\ 4x = 8 \\ x = 2 \end{array}$$

$$\boxed{(2, -1)}$$

## Solving Systems of Equations - Skills Check

The tables below represent two functions. Using only the information provided, determine the solution to the system of equations.

1) Solution(s): (3, -1)

Function A	
x	y
-2	4
-1	3
0	2
1	1
2	0
3	-1
4	-2

Function B	
x	y
0	-7
1	-5
2	-3
3	-1
4	1
5	3
6	5

2) Solution(s): no Solutions

x	f(x)
-3	8
-2	10
-1	12
0	14
1	16
2	18
3	20
4	22

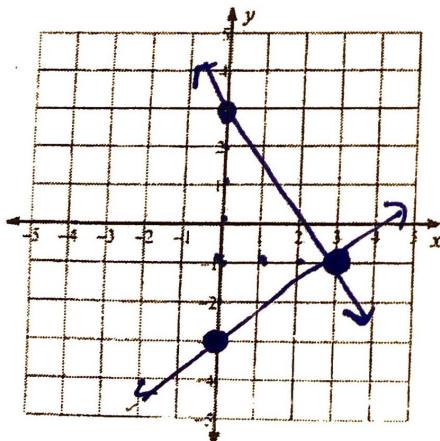
x	g(x)
-3	-2
-2	0
-1	2
0	4
1	6
2	8
3	10
4	12

$$y = 2x + 14 \quad y = 2x + 4$$

Solve each system by graphing.

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

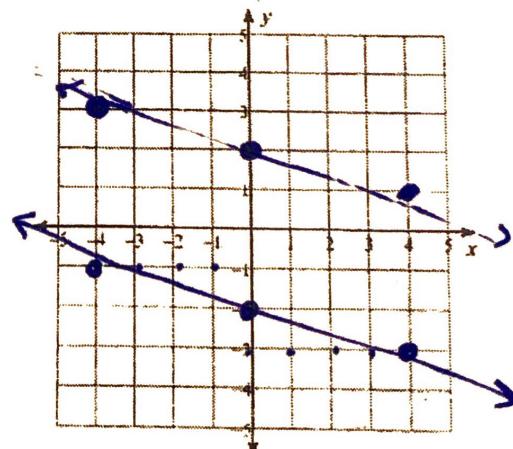
$$y = \frac{2}{3}x - 3$$



Solution(s): (3, -1)

4)  $y = -\frac{1}{4}x + 2$

$$y = -\frac{1}{4}x - 3$$



Solution(s): no Solutions

Solve each system by substitution.

$$\begin{aligned} 5) \quad & y = 6x - 4 \\ & y = 4x - 2 \end{aligned}$$

Solution(s):  
(1, 2)

$$6x - 4 = 4x - 2$$

$$2x = 2$$

$$x = 1$$

$$y = 4(1) - 2$$

$$y = 2$$

$$\begin{aligned} 6) \quad & y = 3x - 8 \\ & 2x - 5y = -12 \end{aligned}$$

Solution(s):  
(4, 4)

$$2x - 5(3x - 8) = -12$$

$$2x - 15x + 40 = -12$$

$$-13x + 40 = -12$$

$$-40 \quad -40$$

$$\frac{-13x}{13} = \frac{-52}{13}$$

$$x = 4$$

$$y = 3(4) - 8$$

$$y = 12 - 8$$

$$y = 4$$

Solve each system by elimination.

$$\begin{aligned} 7) \quad & \left[ \begin{array}{l} -3x - 6y = 6 \\ 6x + 12y = -12 \end{array} \right] \\ & \underline{-6x - 12y = 12} \\ & 0 + 0 = 0 \\ & 0 = 0 \checkmark \end{aligned}$$

Solution(s):  
infinitely many solutions

$$\begin{aligned} 8) \quad & \left[ \begin{array}{l} 9x + 5y = -17 \\ 7x + 9y = -3 \end{array} \right] \\ & \underline{-7} \quad \underline{9} \end{aligned}$$

Solution(s):  
(-3, 2)

$$\cancel{-63x - 35y = 119}$$

$$\cancel{63x + 81y = -27}$$

$$\frac{46y}{46} = \frac{92}{46}$$

$$\boxed{y = 2}$$

$$7x + 9(2) = -3$$

$$7x + 18 = -3$$

$$7x = -21$$

$$x = -3$$

# WORD Problems

- ① There are 66 total marbles. Some are yellow and some are green.  
The number of yellow marbles is 6 more than 4 times the number of green marbles.  
Find the number of yellow marbles.

$$y + g = 66$$

$$y = 4g + 6$$

$$\begin{aligned}y &= 4(12) + 6 \\y &= 48 + 6 \\y &= 54\end{aligned}$$

$$4g + 6 + g = 66$$

$$5g = 60$$

$$\boxed{g = 12}$$

- ② We are planting 2 trees.

Tree A : 84 inches, grows 2 in per year

Tree B : 72 inches, grows 8 in per year

After how many years will they be the same height?

$$y = 2x + 84$$

$$y = 8x + 72$$

$$2x + 84 = 8x + 72$$

$$12 = 6x$$

$$\boxed{12 = x}$$

12 years

Name Linear Inequalities

Date \_\_\_\_\_ Period \_\_\_\_\_

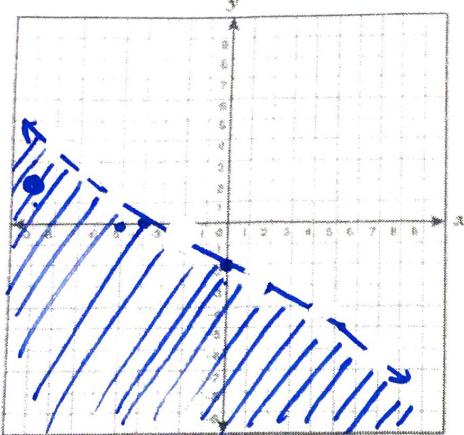
## Graphing and Solving Linear Inequalities

Graph each linear inequality.

Then determine which of the given ordered pairs is a solution. Check all that apply.

$$0 < -2F$$

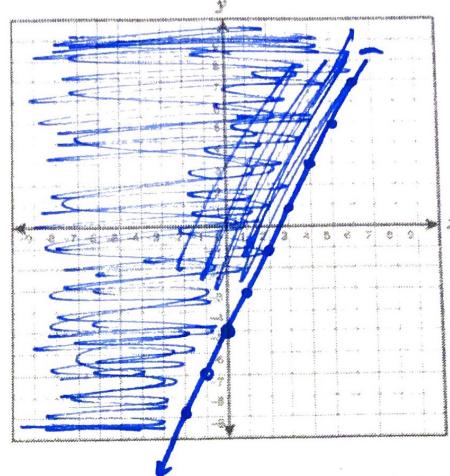
1.  $y < -\frac{1}{2}x - 2$



Solutions:

- (-9, 2)
- (-5, 0)
- (0, -2)
- (3, -2)

2.  $y \geq 2x - 5$



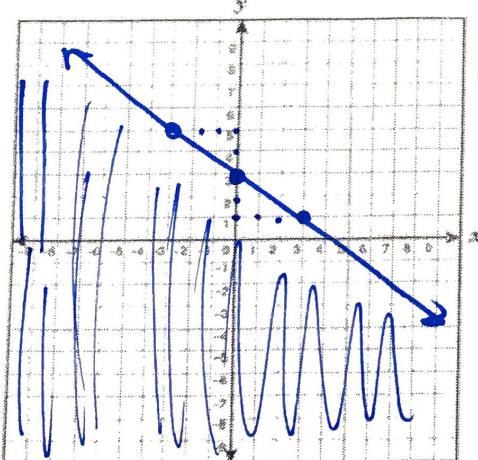
Solutions:

- (-2, -9)
- (0, -4)
- (3, -2)
- (5, -10)

3.  $2x + 3y \leq 9$

$$3y \leq -2x + 9$$

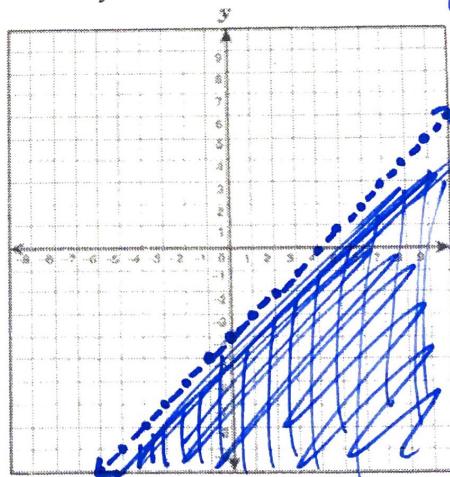
$$y \leq -\frac{2}{3}x + 3$$



Solutions:

- (-7, 0)
- (0, 7)
- (7, 0)
- (0, -7)

4.  $x - y > 4$



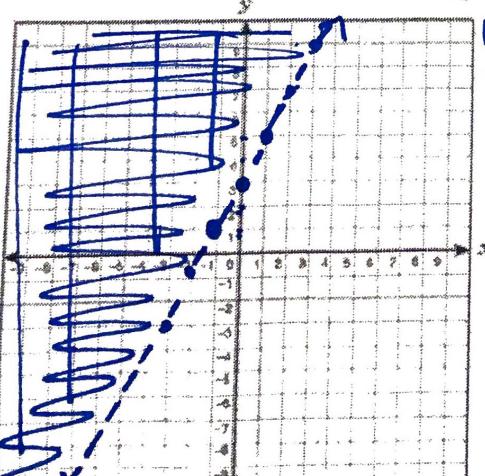
Solutions:

- (-4, 0)
- (0, 4)
- (0, -4)
- (4, 0)

5.  $4x - 2y < -6$

$$-2y < -4x - 6$$

$$y > 2x + 3$$



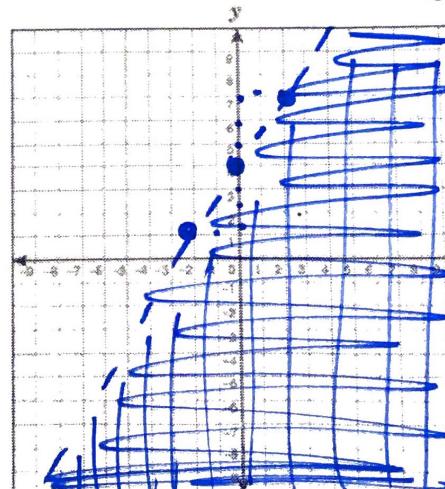
Solutions:

- (5, 1)
- (1, 5)
- (-5, -1)
- (-1, 5)

6.  $9x - 6y > -24$

$$-6y > -9x - 24$$

$$y < \frac{3}{2}x + 4$$



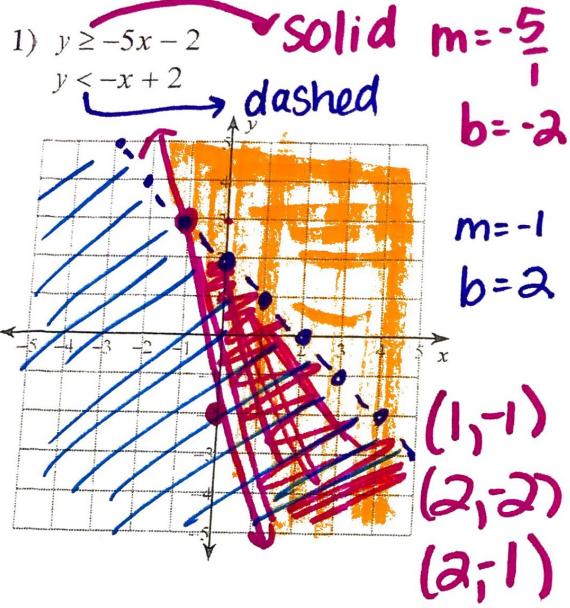
Solutions:

- (-2, 3)
- (-3, -2)
- (0, 0)
- (2, 5)

# Systems of Inequalities

## Graphing Systems of Inequalities

Sketch the solution to each system of inequalities.



Date \_\_\_\_\_ Period \_\_\_\_\_

dashed  
2)  $y < \frac{1}{3}x - 3$   $m = \frac{1}{3}$   $b = -3$

$y \geq -\frac{4}{3}x + 2$   $m = -\frac{4}{3}$   $b = 2$

