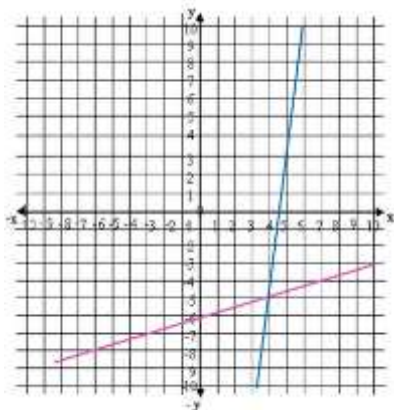


# SOLVING LINEAR SYSTEMS BY GRAPHING Guided Notes

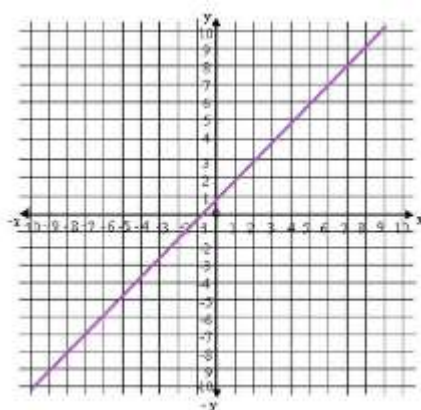
**LINEAR SYSTEM OF EQUATIONS:** is a set of equations with the same variables. When we are solving systems graphically, we have to find the intersection between the two lines.

For two variable systems, there are three possible types: Independent, inconsistent and dependent.

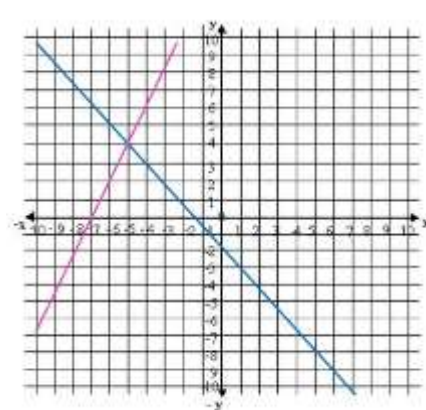
1.



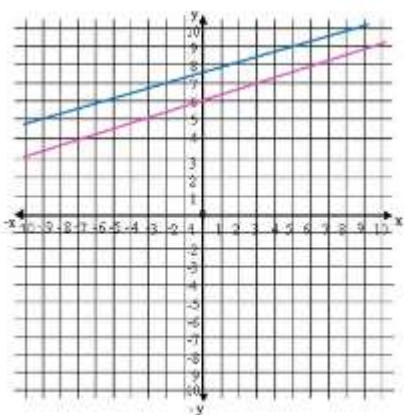
2.



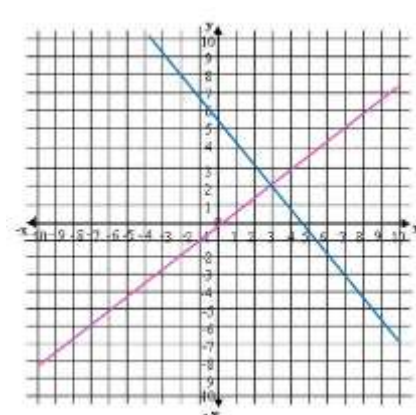
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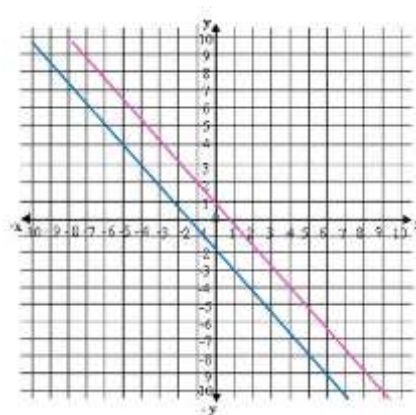
4.



5.



6.



**INDEPENDENT SYSTEM** is a system where two distinct non-parallel lines intersect at one specific point  $(x,y)$ .

Graphs:

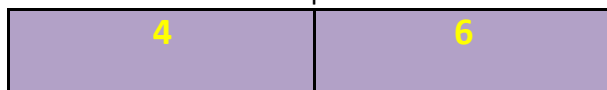
1	3	5
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**INCONSISTENT SYSTEM** is a system where two distinct lines are parallel. Since parallel lines never intersect, then there can be no solution.

# SOLVING LINEAR SYSTEMS BY GRAPHING

 Guided Notes

Graphs:



**DEPENDENT SYSTEM** is a system where appears to show only one line. Actually, there are two lines, one upon the other, then it has infinite solutions.

Graph:



**LINEAR FUNCTION** to graph a linear function it is necessary to find its point of intersection with the axes.

- X axis, where  $y=0$
- Y axis, where  $x=0$

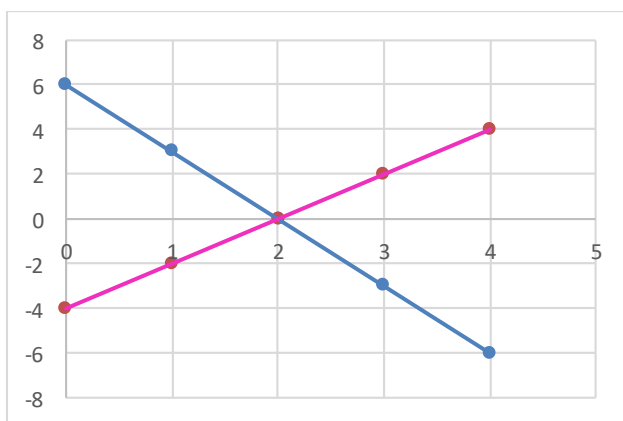
**EQUATION OF A LINEAR FUNCTION** it is represented by the following equation:

$$y - y_1 = m(x - x_1)$$

Where  $m$  is the slope of the line and  $(x_1, y_1)$  is a point that belongs to the linear function. The slope can be calculated by selecting two points from the graph and substituting them in the following equation:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

**Sample Problem 1:** From the given graph, identify the equations of the linear function that compose the system:



Select two points for each linear function to calculate its equation, one point would be the intersection point and the other a point that belong to each of the corresponding linear function.

**SOLVING LINEAR SYSTEMS BY GRAPHING** Guided Notes

- For the blue line: (2,0) and (0,6)

$$y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$$

$$y - 0 = \frac{6 - 0}{0 - 2}(x - 2)$$

$$y = -3x + 6 \rightarrow 3x + y = 6$$

- For the pink line: (2,0) and (4,4)

$$y - 0 = \frac{4 - 0}{4 - 2}(x - 2)$$

$$y = 2(x - 2)$$

$$y = 2x - 4 \rightarrow 2x - y = 4$$

Finally:

$$\begin{cases} 3x + y = 6 \\ 2x - y = 4 \end{cases}$$

**Sample Problem 2:** Find the solution of the following system by graphing:

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

One easy way to graph each linear function is to find its intercepts with the axes.

1.  $x + y = 7$

# SOLVING LINEAR SYSTEMS BY GRAPHING Guided Notes

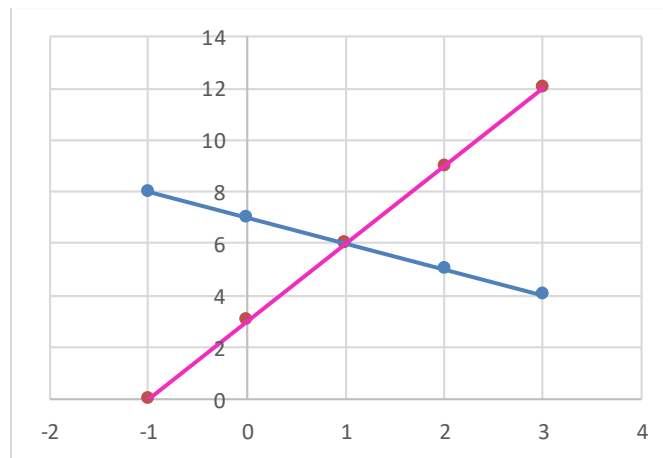
$$x = 0 \rightarrow y = 7 \rightarrow (0,7)$$

$$y = 0 \rightarrow x = 7 \rightarrow (7,0)$$

$$3x - y = -3$$

$$x = 0 \rightarrow y = 3 \rightarrow (0,3)$$

$$y = 0 \rightarrow x = -1 \rightarrow (-1,0)$$



**Sample Problem 3:** Identify the solution of the system and determine what type of system is

The solution of the system is given by the point of intersection between the lines, in this case is the point (1,4) and it represents an independent system.

