

Today's Agenda

- Section 3.1 - Solving Linear Systems by Graphing
- Practice Problems
- Classwork / Homework

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Section 3.1 - Solving Linear Systems by Graphing

A **linear system** consists of two equations with two variables each, x and y .

A **solution** of a system is an **ordered pair** (x, y) that satisfies both equations.

When solving systems by graphing, the solution is the **ordered pair**.

1)
$$\begin{cases} 3x - y = 3 \\ x + 2y = 8 \end{cases}$$
 Show that $(2, 3)$ is a solution of this system.

$3(2) - 3 = 3$ ✓
 $2 + 2(3) = 8$ ✓

True for both, so $(2, 3)$ is a solution.

2) Is $(0, 8)$ a solution to the following system?

$$\begin{cases} y = -\frac{3}{2}x + 8 \\ y = -5x + 3 \end{cases}$$

$8 = -\frac{3}{2}(0) + 8$ ✓
 $8 = -5(0) + 3$ ✗ No!!

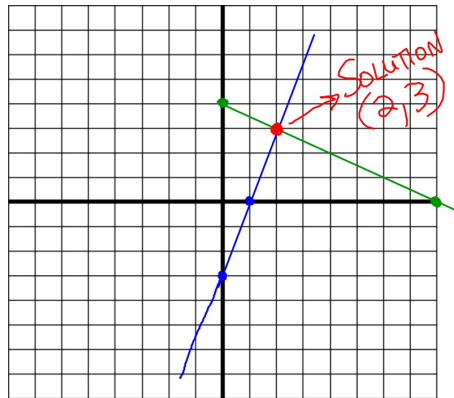
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3)

Graph and solve the system:

① $3x - y = 3$ $\frac{x}{1} \frac{y}{-3}$
 ② $x + 2y = 8$ $\frac{x}{1} \frac{y}{4}$

*** You can solve a system by graphing both equations and seeing where the lines intersect each other!

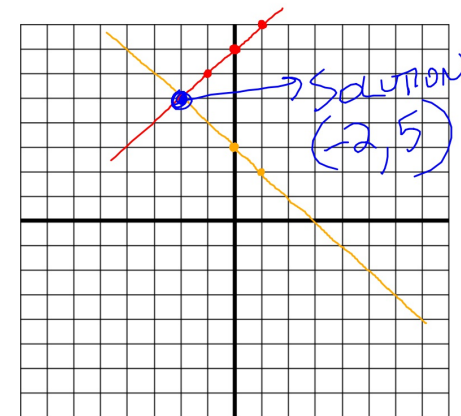


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4)

Graph and solve the system:

① $y = -x + 3$ ✓
 ② $y = x + 7$ ✗



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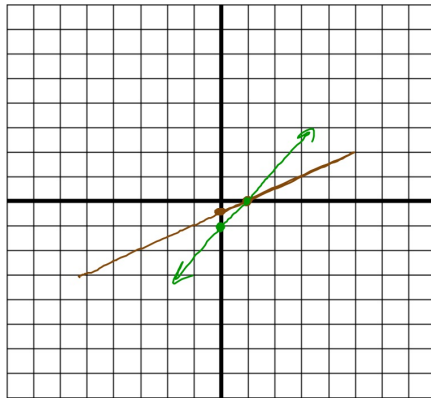
5)

Graph and solve the system:

$$\begin{cases} \textcircled{1} x - 3y = 1 \\ \textcircled{2} -x + y = -1 \end{cases}$$

$$\begin{array}{r|l} x & y \\ \hline 1 & 0 \\ 0 & -1 \end{array}$$

$$\begin{array}{r|l} x & y \\ \hline 0 & -1 \\ 1 & 0 \end{array}$$



Solution (1, 0)

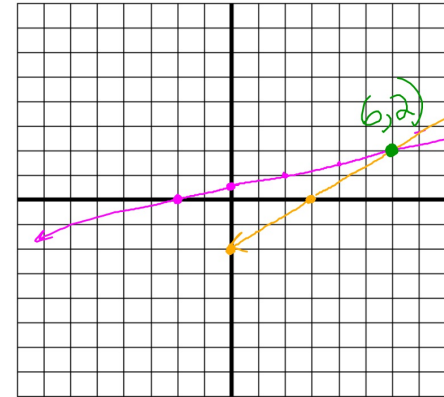
6)

Graph and solve the system:

$$\begin{cases} \textcircled{1} -x + 4y = 2 \\ \textcircled{2} 2x - 3y = 6 \end{cases}$$

$$\begin{array}{r|l} x & y \\ \hline -2 & 0 \\ 0 & \frac{1}{2} \end{array}$$

$$\begin{array}{r|l} x & y \\ \hline 3 & 0 \\ 0 & 2 \end{array}$$



Systems with Many or No Solutions

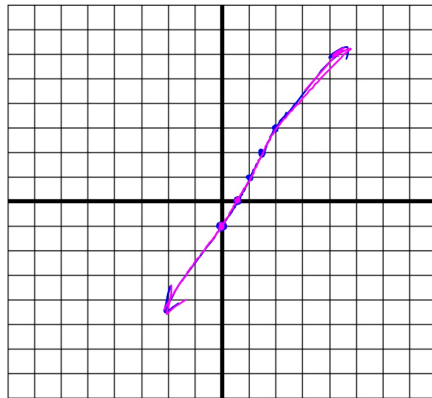
7)

How many solutions are there to...

$$\begin{cases} \textcircled{1} 2x - y = 1 \\ \textcircled{2} -4x + 2y = -2 \end{cases}$$

$$\begin{array}{r|l} x & y \\ \hline 2 & 0 \\ 0 & -1 \end{array}$$

$$\begin{array}{r|l} x & y \\ \hline 2 & 0 \\ 0 & -1 \end{array}$$



Infinitely many solutions

8)

How many solutions are there to...

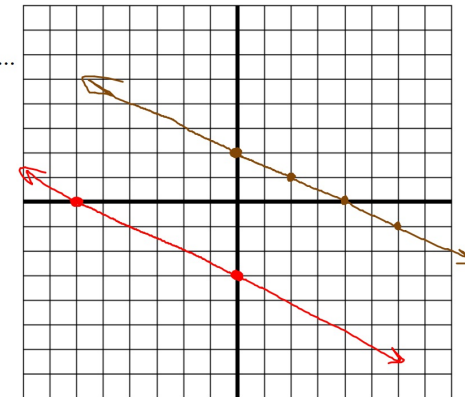
$$\begin{cases} \textcircled{1} y = -\frac{1}{2}x + 2 \\ \textcircled{2} x + 2y = -6 \end{cases}$$

$$\begin{array}{r|l} x & y \\ \hline -6 & 0 \\ 0 & -3 \end{array}$$

$$x + 2y = -6$$

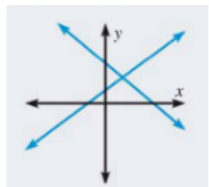
$$y = -\frac{1}{2}x - 3$$

$$y = -\frac{1}{2}x - 3$$



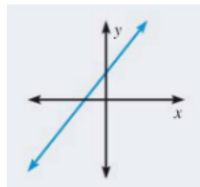
Parallel \rightarrow No Solution

Summary of Solutions to Linear Systems



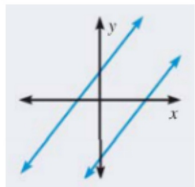
Exactly One

- * different slopes
- * lines intersect at only 1 point



Infinitely Many

- * same slopes and y-intercepts
- * lines are identical



No Solutions

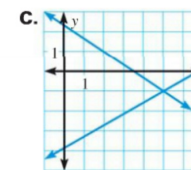
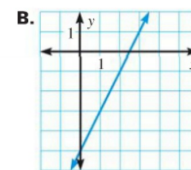
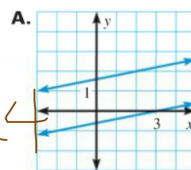
- * parallel lines
- * same slopes
- * different y-intercepts

Matching Graphs Match the linear system with its graph. Tell how many solutions the system has.

23. $2x - y = 5$
 $-4x + 2y = -10$

24. $-x + 5y = 8$
 $2x - 10y = 6$

25. $4x - 7y = 27$
 $-6x - 9y = -21$



24

23

25

$-x + 5y = 8$
 Solve for y $\frac{5}{5}y = \frac{8}{5} + \frac{x}{5}$
 $2x - 10y = 6$
 Solve for y $\frac{-10}{10}y = \frac{-2x + 6}{10}$

Classwork / Homework:

Identifying Solutions Tell whether the ordered pair is a solution of the system.

p.128: # 8-10, 14-15, 29-30, 33

8. $(2, 0)$;
 $2x + y = 4$
 $x - y = 1$

No.

9. $(3, -1)$;
 $x + 2y = 1$
 $-2x + y = -7$

Yes.

10. $(-4, 3)$;
 $x + y = -1$
 $-x - 3y = -5$

Yes.

Graphing Systems Solve the system by graphing. Then check your solution.

14. $y = -\frac{1}{2}x - 1$
 $y = \frac{1}{2}x - 3$

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

only graph # 14, 15, 29

Finding Solutions Graph the linear system and tell how many solutions it has. If it has exactly one solution, find and check the solution.

29. $y = 2x + 4$
 $y = 2x - 1$

30. $-4x + y = 3$
 $8x - 2y = -6$

33. $x - 3y = 6$
 $2x - 6y = 8$

just tell if one, none, or infinite soln