

Algebra 2
 Section 3.1 Notes
 Solving Systems Using Tables and Graphs

Name Key
 Date _____ Hour _____

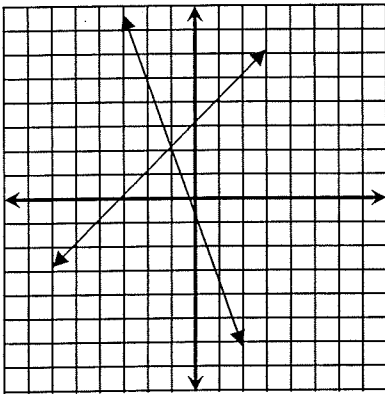
A system of equations is a collection of equations in the same variables.

The solution of a system of two linear equations in x and y is any ordered pair, (x, y) that satisfies **BOTH** equations.

The solution (x, y) is also the point of INTERSECTION for the graphs of the lines in the system.

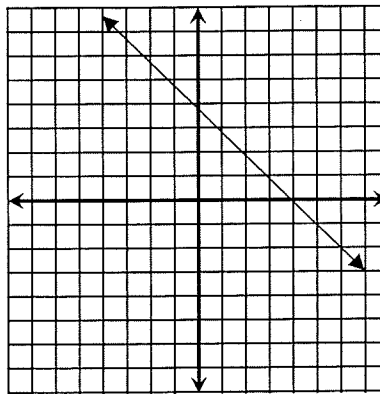
There are three possible solutions for a system of two linear equations in two variables.

Intersecting lines



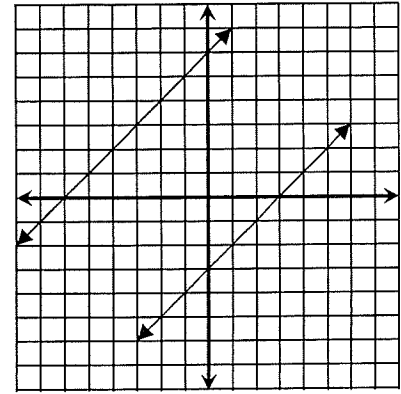
Exactly one solution

Coinciding lines (same line)



Infinitely many solutions
 (any point on the line)

Parallel lines



No solution

Classifications:

Consistent
 Independent

← has 1 answer

Consistent
 Dependent

← has inf. ans.

Inconsistent
 Independent

∅ answers

different slope
 (same or different)

same slope
 (same or different)

same slope
 (same or different)

same y-intercept
 (same or different)

different y-intercept
 (same or different)

When they are coinciding (the same) line we will write the solution in set notation using the equation of the line in slope-intercept form. $\{(x, y) : y = mx + b\}$

$$\left\{ (x, y) : y = \frac{1}{2}x + 1 \right\}$$

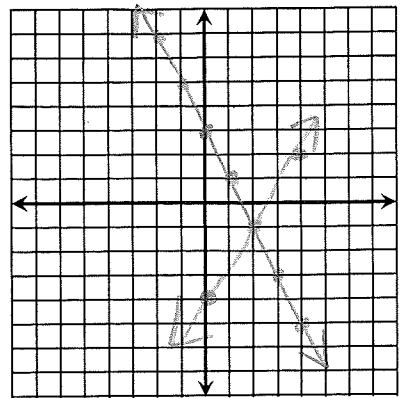
inf. Sol.

Examples:

Graph each system, find the solution, describe the lines, and classify the system.

1. $\begin{cases} 2x + y = 3 \\ 3x - 2y = 8 \end{cases}$ First rewrite each equation in slope-intercept form and then graph.

$$\begin{aligned} 2x + y &= 3 \\ \underline{y} &= -2x + 3 \\ 3x - 2y &= 8 \\ -2y &= \frac{-3x + 8}{-2} & y &= \frac{3}{2}x - 4 \end{aligned}$$

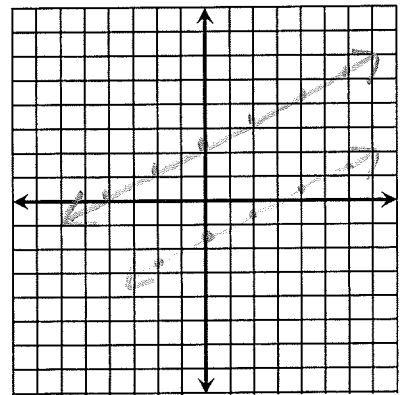


The solution is (2, -1), they are intersecting lines,
the system is independent and consistent.

2. $\begin{cases} x - 2y = 3 \\ x + 5 = 2y \end{cases}$ \rightarrow $\begin{aligned} -2y &= \frac{-x + 3}{-2} \\ y &= \frac{1}{2}x - \frac{3}{2} \end{aligned}$ \leftarrow $\frac{1}{2}$

$\frac{1}{2}x + 2.5 = y$

$y = \frac{1}{2}x - 1.5$

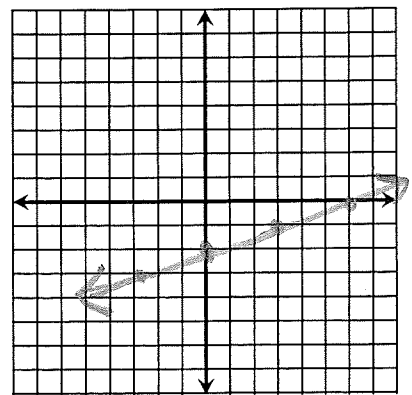


There is No Sol., the lines are Parallel,
the system is inconsistent / independent.

3. $\begin{cases} x - 3y = 6 \\ 2x = 6y + 12 \end{cases}$ $\begin{aligned} x - 3y &= 6 \\ -3y &= \frac{-x + 6}{-3} \\ y &= \frac{1}{3}x - 2 \end{aligned}$

$\frac{2x - 12}{6} = \frac{6y}{6}$

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



The solution is infinite, the lines are coinciding (same),
the system is dependent and consistent.

$$\{(x, y) : y = \frac{1}{3}x - 2\}$$

Without graphing, is the system independent, dependent, or inconsistent?

$$4. \begin{cases} 4y - 2x = 6 \\ 8y = 4x - 12 \end{cases}$$

$$\frac{4y}{4} = \frac{2x+6}{4}$$

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

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

independent
inconsistent

$$5. \begin{cases} 2x + 3y = 1 \\ 4x + y = -3 \end{cases} \rightarrow \frac{3y}{3} = \frac{-2x+1}{3}$$

$$y = -4x - 3$$

intersecting lines
independent
consistent

Solve the problem by writing a system of equations and graphing. Use the **story problems solving plan**.

6. A store sells small notebooks for \$8 and large notebooks for \$10. If you buy 6 notebooks and spend \$56, how many of each size did you buy?

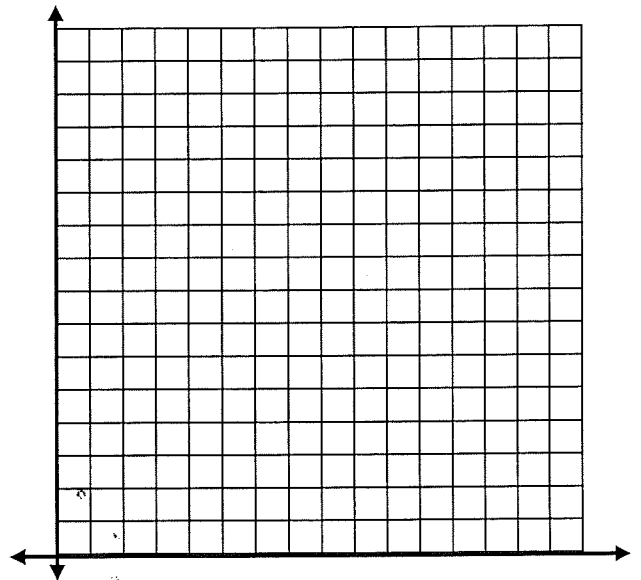
$$\begin{aligned} -8(s + l = 6) \\ 8s + 10l = 56 \end{aligned}$$

$$\begin{aligned} -8s - 8l = -48 \\ 8s + 10l = 56 \end{aligned}$$

$$2l = 8$$

$$l = 4$$

4 large
2 small

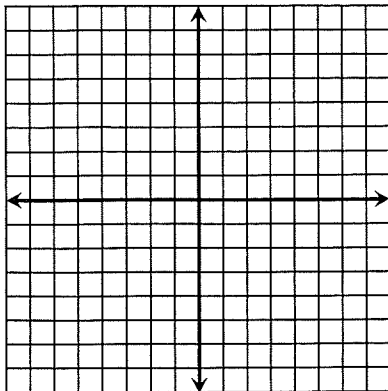


3.1 Algebra 2
Homework

Name _____

A. Graph each system. **B. Write the solution** from the graph. **C. Describe** the lines (independent/dependent, consistent/inconsistent).

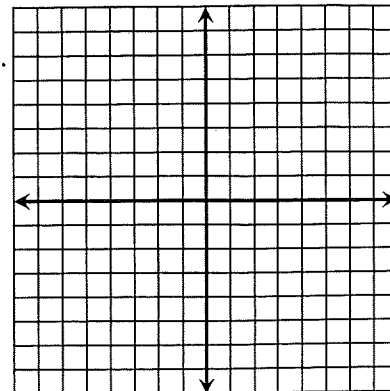
1.
$$\begin{cases} x + y = -1 \\ x - y = 3 \end{cases}$$
 A.



B. _____

C. _____

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

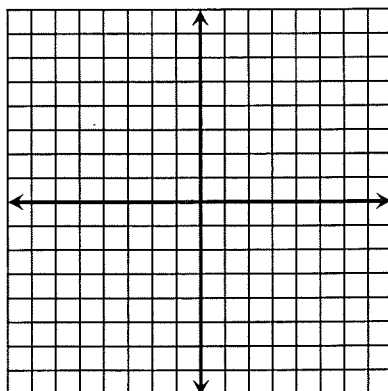


B. _____

C. _____

A. Graph each system. **B. Write the solution** from the graph. **C. Describe** the lines (independent/dependent, consistent/inconsistent).

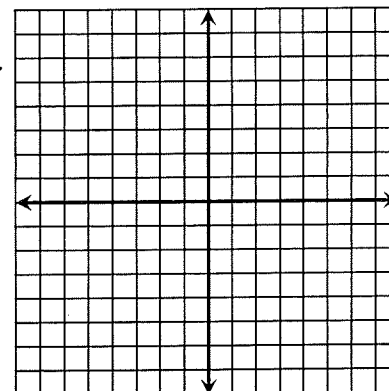
3.
$$\begin{cases} y = -3x \\ x + y = 2 \end{cases}$$
 A.



B. _____

C. _____

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



B. _____

C. _____

Without graphing, is the system independent, dependent, or inconsistent?

5.
$$\begin{cases} x + 3y = 9 \\ 9y + 3x = 27 \end{cases}$$

6.
$$\begin{cases} y = \frac{2}{3}x - 5 \\ y = -\frac{2}{3}x - 3 \end{cases}$$