Solving Systems of Equations

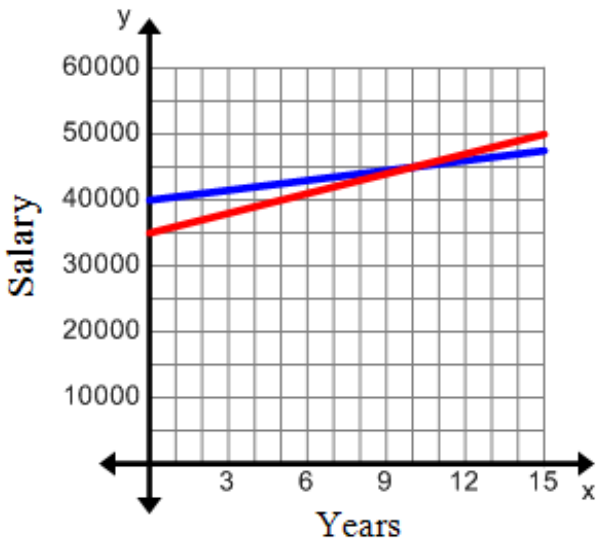
Example 1: Emily just graduated from college with a degree in computer science. She has two job offers. Krazy Komputers will pay her a base salary of $40,000 with a $500 raise each year that she works there. Pear Pads will pay her a base salary of $35,000 with a $1,000 increase each year that she works there. How many years would Emily have to work at Pear Pads to make the same salary as she would if she were to work at Krazy Komputers?

Let x equal the number of years that Emily works at a company and let y be her salary. Write an equation to represent the salary for each job.

Krazy Komputers: $y = 40,000 + 500x$

Pear Pads: $y = 35,000 + 1,000x$

Use a graphing calculator or graphing software to graph the two equations.



The ordered pair (10, 45,000) is the intersection of the two lines. In other words, after 10 years Emily would make $45,000 at either job.

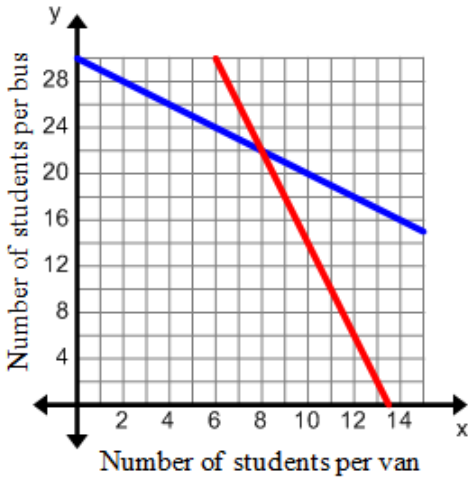
Example 2: The state fair is a popular field trip destination. This year the senior class at Sunnyside High and the senior class at Riverside High both planned trips there. The senior class at Sunnyside High rented and filled 8 vans and 8 buses with 240 students. Riverside High rented and filled 4 vans and 1 bus with 54 students. Every van had the same number of students in it as did the buses. Find the number of students in each van and in each bus.

Define the variables. Let x represent the number of students per van and let y represent the number of students per bus. Write an equation for Sunnyside High and Riverside High.

Sunnyside High: $8x + 8y = 240$

Riverside High: $4x + y = 54$

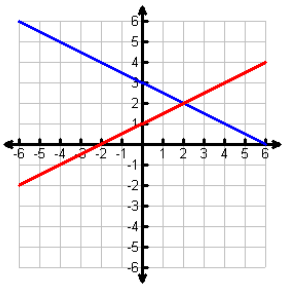
Use a graphing calculator or graphing software to graph each equation.



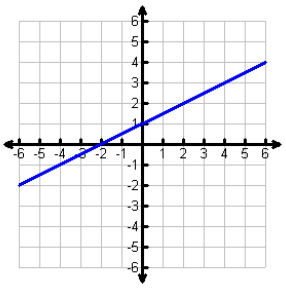
The ordered pair (8, 22) is the intersection of the two lines. Because *x* is representing the number of students per van, there are 8 students per van and because *y* is representing the number of students per bus, there are 22 students per bus.

NUMBER OF SOLUTIONS OF A LINEAR SYSTEM

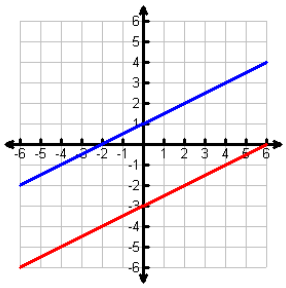
The relationship between the graph of a linear system and the system's number of solutions is described below.



Exactly One Solution



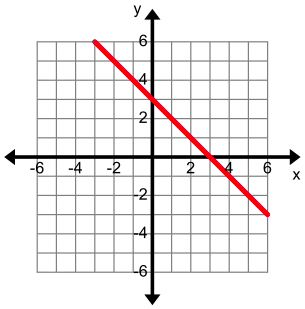
Infinitely Many Solutions



No solution

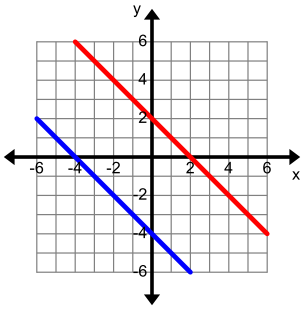
Example 3: Solve each system of equations graphically and determine if there is one, infinitely many or no solution.

A) $\begin{aligned} 3x+3y&=9 \\ x+y&=3 \end{aligned}$



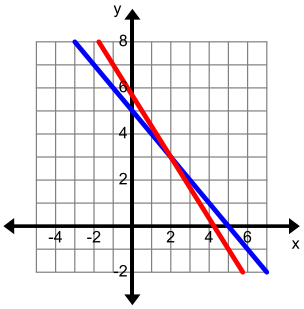
Infinitely Many Solutions

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



No Solution

C) $\begin{aligned} x+y&=5 \\ 8x+6y&=34 \end{aligned}$



One Solution (2, 3)