

Lesson 7 – Systems of Linear Equations

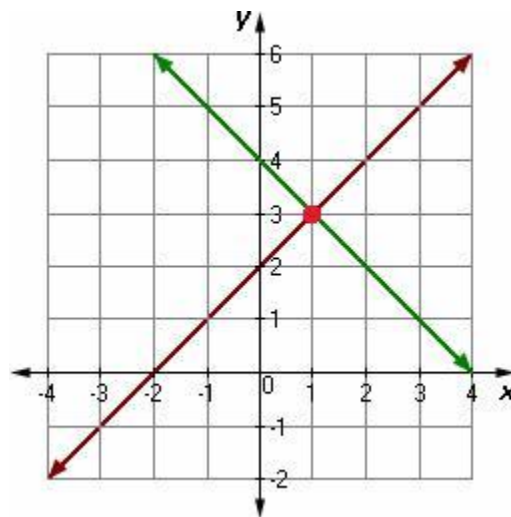
A system of linear equations consists of two (straight) lines. The solution of a system of linear equations is the point of intersection. (ie. We must find the coordinates of the point of intersection).

There are three methods to solve a system of linear equations:

- 1- Table of values
- 2- Graphically
- 3- Algebraically

There are three algebraic methods to solve a system of linear equations:

- 1- Comparison
- 2- Substitution
- 3- Elimination



Comparison Method

When both equations of the lines are in function form we use the comparison method.

Ex. $y_C = 2x_C + 9$ $y_D = -3x_D - 1$

At the point of intersection: $y_C = y_D$

Therefore: $2x + 9 = -3x - 1$

Now solve for x : $5x + 9 = -1$

$$5x = -10$$

$$x = -2$$

Using either of the original equations find y given the value of x just found:

$$y_C = 2x_C + 9$$

$$y_C = 2(-2) + 9$$

$$y_C = 5$$

Check using the other equation:

$$y_D = -3x_D - 1$$

$$y_D = -3(-2) - 1$$

$$y_D = 6 - 1$$

$$y_D = 5$$

Therefore the solution to this system is $(-2, 5)$

Ex. A school principal must choose between two transportation companies for a field trip. Company G charges a base amount of \$120 plus \$1.50 per student. Company H charges a base amount of \$80 plus \$2 per student. How many students must attend the field trip for the transportation cost to be the same for both companies?

Let x : Number of students
 y : Cost of transportation

Company G has equation: $y_G = 1.5x_G + 120$

and Company H has equation: $y_H = 2x_H + 100$

When the costs are the same: $y_G = y_H$

Using the comparison method: $1.5x + 120 = 2x + 100$

$$-0.5x + 120 = 100$$

$$-0.5x = -20$$

$$x = 40$$

Therefore 40 students must attend the field trip for the transportation cost to be the same for both companies.

To go further, the cost of transportation when there are 40 students would be:

$$y = 2(40) + 100$$

$$y = \$180$$