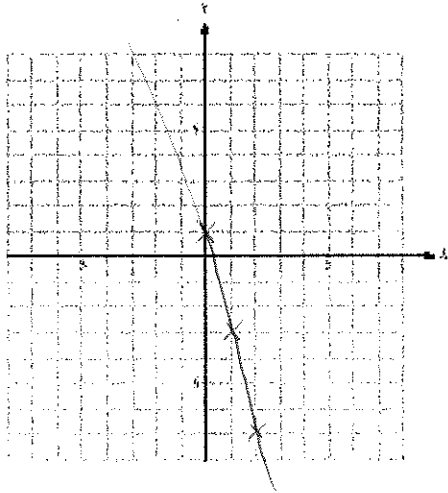


Year End Review: Systems of Equations

A system of equations is two or more equations with two or more variables. For example, the equations $2x + 3y = 12$ and $4x + 7y = 28$ is a system of equations. The solution of a linear system can be the intersection point of the two equations. This point can be found algebraically or graphically.

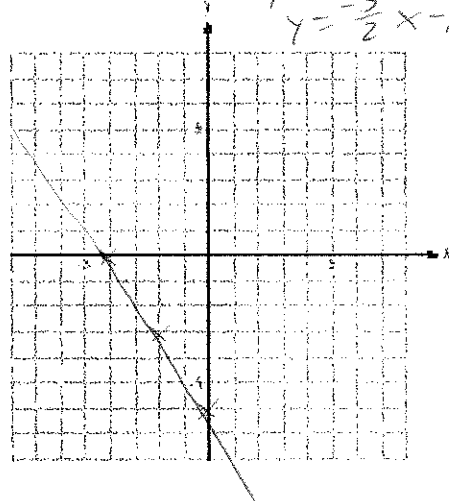
Example 1: Graph the following lines.

a) $y = -4x + 1$



(b) $3x + 2y = -12$

$$2y = -3x - 12$$
$$y = -\frac{3}{2}x - 6$$



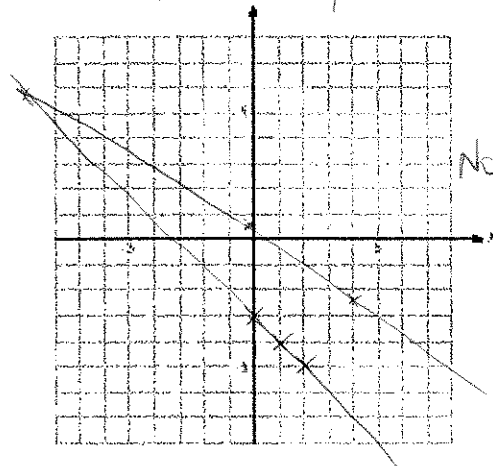
To solve graphically, the two equations must be rearranged to isolate y , graphed, and find the intersection point.

Example 2: Find the solution to the following systems of equations.

$$2x + 2y = 6$$
$$3x + 4y = 3$$

$$2y = -2x + 6$$
$$4y = -3x + 3$$

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



Note: Solution on final exam will be easily read off and not off the provided graph.

The steps to solve a linear system by substitution are

1. Isolate for a variable in one equation.
(Does not matter which equation or variable)
2. Substitute this new equation into the other equation not used yet.
3. Solve for the variable.
4. Find the value of the other variable.

Example 3: Solve the following systems by substitution.

a) $x - y = 3$
 $x + y = 5$ $y = -x + 5$
 $x - (-x + 5) = 3$
 $2x - 5 = 3$
 $2x = 8$
 $x = 4$
 $4 - y = 3$
 $y = 1$

(b) $2x - 4y = -2$
 $x + 4y = -4$ $x = -4y - 4$
 $2(-4y - 4) - 4y = -2$
 $-8y - 8 - 4y = -2$
 $-12y - 8 = -2$
 $-12y = 6$
 $y = -0.5$
 $x + 4(-0.5) = -4$
 $x - 2 = -4$
 $x = -2$

The steps to solve a linear system by elimination are:

1. Obtain equal but opposite coefficients in front of one variable.
2. Add this new equation and the second original equation.
3. Solve for x and y.

Example 4: Solve the following linear systems using the elimination method.

a) $3x - 2y = 12$
 $2(2x + y = 1)$
 $3x - 2y = 12$
 $4x + 2y = 2$

 $7x = 14$
 $x = 2$
 $3(2) - 2y = 12$
 $6 - 2y = 12$
 $-2y = 6$
 $y = -3$
 $3x - 2(-3) = 12$
 $3x + 6 = 12$ $3x = 6$
 $x = 2$

(b) $2(4x + 3y = 19)$
 $7x - 6y = -23$
 $8x + 6y = 38$

 $15x = 15$
 $x = 1$
 $4(1) + 3y = 19$
 $4 + 3y = 19$
 $3y = 15$
 $y = 5$