

Name \_\_\_\_\_

## Activity 3.1 – Solving Linear Systems Using Tables

An example of a *system of linear equations* in two variables  $x$  and  $y$  is the following:

$$y = 2x + 4 \quad \text{Equation 1}$$

$$y = -3x + 44 \quad \text{Equation 2}$$

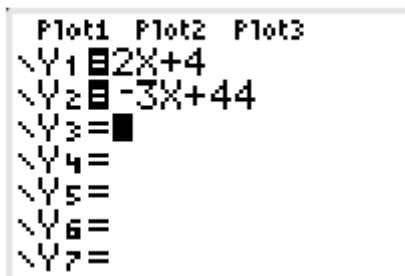
A *solution* of a system of equations in two variables is an ordered pair  $(x, y)$  that is a solution of both equations. One way to solve a system is to use the *table* feature of a graphing calculator.

**EXPLORE**      Solve a system

Use a table to solve the system of equations above.

### STEP 1 Enter equations

Press **Y =** to enter the equations. Enter Equation 1 as  $y_1$ , and Equation 2 as  $y_2$ .



### STEP 2 Make a table

Set the starting  $x$ -value of the table to 0 and the step value to 1. Then use the *table* feature to make a table.

X	Y <sub>1</sub>	Y <sub>2</sub>
1	6	41
2	8	38
3	10	35
4	12	32
5	14	29
6	16	26
7	18	23

X=7

### STEP 3 Find the solution

Scroll through the table until you find an  $x$ -value for which  $y_1$  and  $y_2$  are equal. Use this  $x$ -value and  $y$ -value to write an ordered pair. This is the solution of the system. The solution of the system is  $(8, 20)$ .

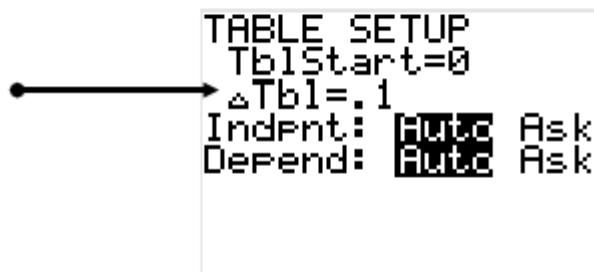
X	Y <sub>1</sub>	Y <sub>2</sub>
5	14	29
6	16	26
7	18	23
8	20	20
9	22	17
10	24	14
11	26	11

X=11

Solve each system of equations. For each system that has a single solution, show a table with the solution, a table row above it, and a table row below it like this:

7	18	23
8	20	20
9	22	17

If you cannot find a solution, you may need to change your table settings to tenths, or even hundredths. Change your table increment, by pressing  $2^{nd}$ , TBLSET, like this:



If you still cannot find a solution, explain why not.

Solve each system. Show a table for systems that have a solution(s) or an explanation for systems that do not have a solution.

$$\begin{aligned} 1) \quad y &= -3x + 4 \\ y &= 8x + 4 \end{aligned}$$

$$\begin{aligned} 2) \quad y &= -6x - 11 \\ y &= -3x - 5 \end{aligned}$$

$$\begin{aligned} 3) \quad y &= -3x - 4 \\ y &= -5x - 10 \end{aligned}$$

$$\begin{aligned} 4) \quad y &= 4x - 29 \\ y &= -2x + 19 \end{aligned}$$

$$\begin{aligned} 5) \quad y &= -8x - 14 \\ y &= 9x + 3 \end{aligned}$$

$$\begin{aligned} 6) \quad y &= 4x + 12 \\ y &= -4x - 28 \end{aligned}$$

$$\begin{aligned} 7. \quad y &= 2x + 5 \\ y &= -x + 2 \end{aligned}$$

$$\begin{aligned} 8. \quad y &= 4x + 1 \\ y &= 4x - 8 \end{aligned}$$

$$\begin{aligned} 9. \quad y &= 4x - 3 \\ y &= x + 1 \end{aligned}$$

$$\begin{aligned} 10. \quad y &= 2x - 3 \\ y &= x + 1 \end{aligned}$$

$$\begin{aligned} 11. \quad 8x - 4y &= 16 \\ -6x + 3y &= 3 \end{aligned}$$

$$\begin{aligned} 12. \quad 6x - 2y &= -2 \\ -3x - 7y &= 17 \end{aligned}$$

$$\begin{aligned} 13. \quad x + y &= 11 \\ -x - y &= -11 \end{aligned}$$

$$\begin{aligned} 14. \quad -2x + y &= 5 \\ y &= -x + 2 \end{aligned}$$

$$\begin{aligned} 15. \quad 5x + 5y &= 5 \\ 5x + 3y &= 4.2 \end{aligned}$$

**Answer the following:**

1. Why is it not possible for a linear system of equations to have exactly two solutions?
2. Why does the system in Exercise 13 have an infinite number of solutions?
3. If a system of linear equations in two variables has no solution, how would you describe the graphs of the equations in the system? *Explain.*
4. Describe the possible graphs of a system of linear equations in two variables. Relate the graphs to the possible number of solutions of such a system.