

## Understanding Solutions of Systems

### Using Tables and Graphs

ID: 8201

 Time required  
 30 minutes

#### Activity Overview

*In this activity, students graph two linear functions and estimate the solution of the system graphically using the trace feature. Then they examine function tables to find the exact solution of the system.*

#### Topic: Linear Systems

- *Graph a pair of linear equations and estimate their solution using the Intersection Point(s) command.*

#### Teacher Preparation and Notes

- *This activity is appropriate for students in Algebra 1. It is assumed that students are familiar with linear functions and their graphs.*
- *This activity is designed to have students explore **individually and in pairs**. However, an alternate approach would be to use the activity in a whole-class format. By using the computer TI-84 emulator software and the questions found on the student worksheet, you can lead an interactive class discussion about solutions of systems.*
- *The worksheet is intended to guide students through the main ideas of the activity. You may wish to have the class record their answers on separate sheets of paper, or just use the questions posed to engage a class discussion.*
- **To download the student worksheet, go to [education.ti.com/exchange](http://education.ti.com/exchange) and enter "8201" in the keyword search box.**

#### Associated Materials

- *SolutionsOfSystems\_Student.doc*

#### Suggested Related Activities

*To download any activity listed, go to [education.ti.com/exchange](http://education.ti.com/exchange) and enter the number in the keyword search box.*

- *Linear Inequalities (TI-84 Plus family) — 8773*
- *Tri This! (TI-84 Plus family) — 12142*
- *Introduction to Systems of Equations (TI-Nspire technology) — 9354*

### System 1

Students will enter the two equations and use the window settings given on the worksheet.

**NOTE:** This is a friendly window that gives nice decimals when tracing functions. Because of the dimensions of the graphing screen, a friendly window can be obtained by making the **Xmin** and **Xmax** multiples of 4.7 and the **Ymin** and **Ymax** multiples of 3.1.

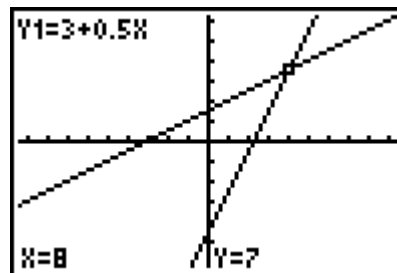
When students view the graph, they will see that the two lines intersect at one point. They are to use the **Trace** feature to estimate the coordinates of the intersection.

Students should understand that since the point (8, 7) exists on both graphs, then it is the only solution for both graphs.

Then students will examine the table of values. Students should see that at an x-value of 8, the y-value for both Y1 and Y2 is 7. This point, (8, 7), is the solution to this system of linear equations.

After returning to the graph, they will use the **intersect** command from the Calculate menu to find the exact solution.

Plot1	Plot2	Plot3
Y1 = 3+0.5X		
Y2 = -9+2X		
Y3 =		
Y4 =		
Y5 =		
Y6 =		
Y7 =		



X	Y1	Y2
2	4	-5
3	4.5	-4.5
4	5	-4
5	5.5	-3.5
6	6	-3
7	6.5	-2.5
8	7	-2

X=8

### System 2

Students will examine the second system using the same process as the first system. They will enter the two equations and the new window settings given on the worksheet. They should estimate the intersection point.

This time, when using the table of values students will notice that there is no y-value that is the same for a given x-value. However, between the x-values of 3 and 4, the y-values look like they may be the same. By changing the table setup, students will be able to find the exact x-value.

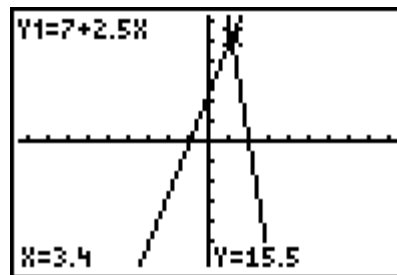
Plot1	Plot2	Plot3
Y1 = 7+2.5X		
Y2 = 35.9-6X		
Y3 =		
Y4 =		
Y5 =		
Y6 =		
Y7 =		

X	Y1	Y2
0	7	35.9
1	9.5	29.9
2	12	23.9
3	14.5	17.9
4	17	11.9
5	19.5	5.9
6	22	-1

X=3

When tracing the graphs for the first system, students were able to land their cursor exactly on the intersection. This time, the cursor will get near but not exactly on the intersection. Since students know the x-value from the table, they can directly enter it by pressing  $\boxed{3} \boxed{.} \boxed{4} \boxed{\text{ENTER}}$  when in **Trace** mode.

Students will use the **intersect** command to confirm the coordinates of the solution found using the table.



**Extension/Homework – System 3**

Have students try other systems, like  $y = 2x + 7$  and  $y = -3 + 2x$ . They can also examine systems that include a function that is not linear.

