Introduction to Solving Linear Systems by Graphing

Overview: Students will use Activity Center to plot points that are solutions to linear equations and discover where the solution to the linear system lies. This introduces students to the concept that the solution to a linear system in two variables is the point that lies on the graphs of both equations.

Before the activity:

Pre-requisite knowledge: The students should already know how to

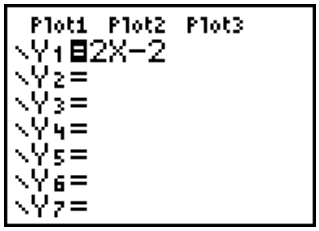
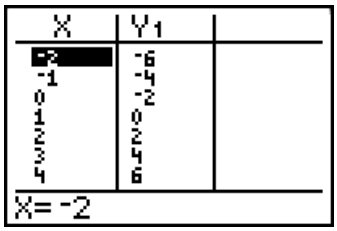
- Log into and use the various functions of TI-Navigator.
- Determine solutions to a linear equation in two variables by using the table function on their handheld.
- Solve equations for y.
- Use y= and the table function on their handheld to enter an equation and determine ordered pairs that are solutions to that equation.

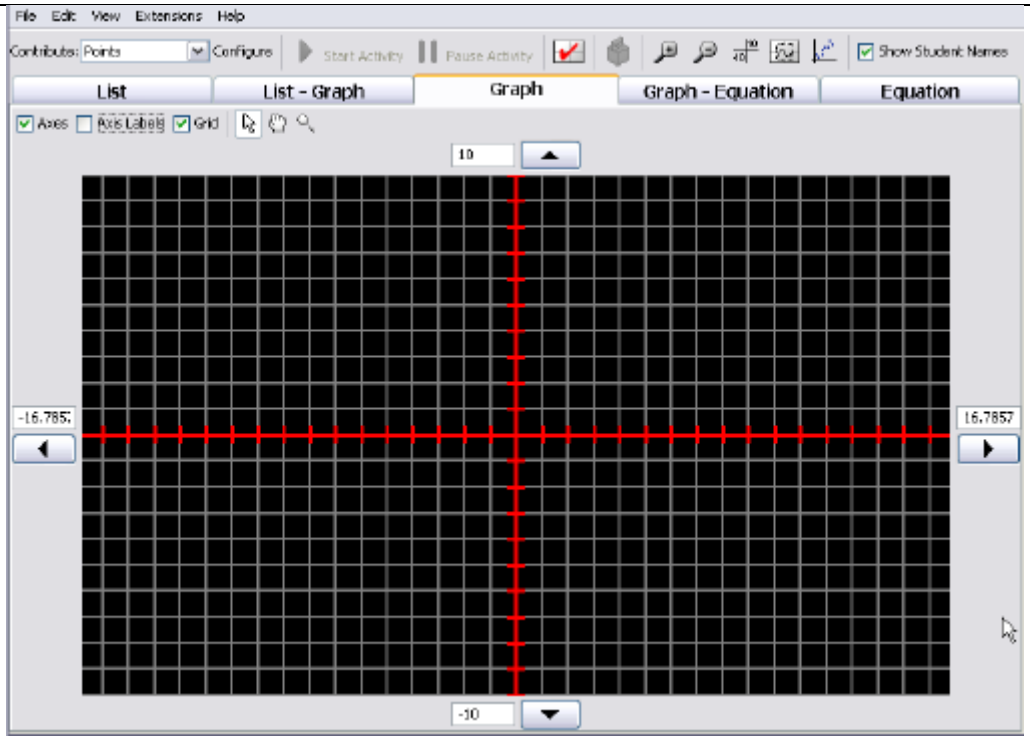
During the activity (overview):

Divide the class into two groups and assign one equation from the linear system to each group. Each member of the group finds one solution to the equation by using the table function on their handheld.

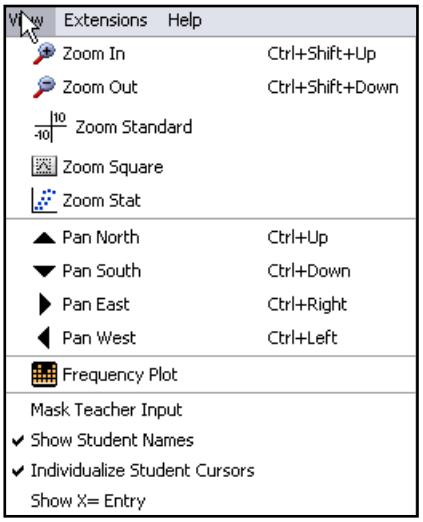
Teacher sets up Activity Center as described below, students enter their solutions as points on the graph. When enough points have been entered to see the lines clearly, pause or stop the activity and determine the solution to the system, which will be the one point that is on both lines.

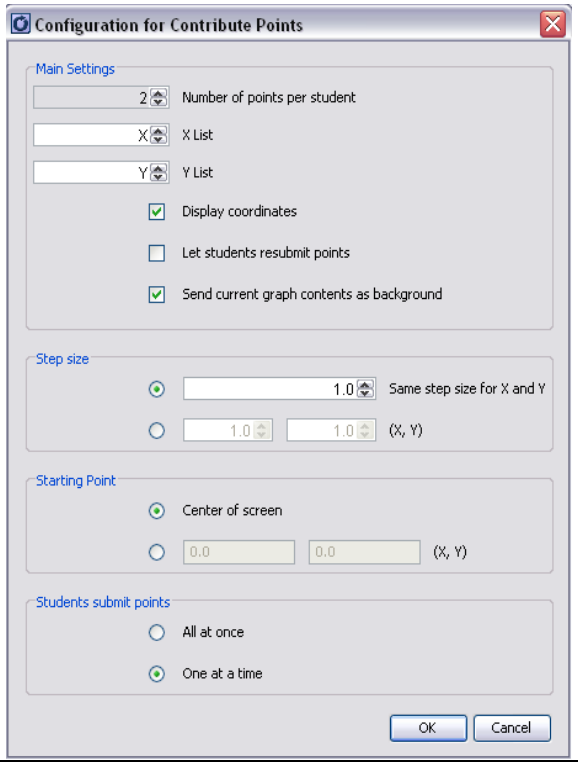
Step-by-Step Instructions

Start TI-Navigator and Begin Class. Have students log in.
1. Divide the class into two groups. Assign each group one of these equations. $\begin{cases} y = -\frac{1}{2}x + 8 \\ y = 2x - 2 \end{cases}$
2. Each member of the group finds one ordered pair that is a solution to their equation, by using the table function on their handheld.    
Teacher configures Activity Center as shown below, so that students contribute **points**, show **axes** and **grid**, use a **square grid**, centered at (0,0).

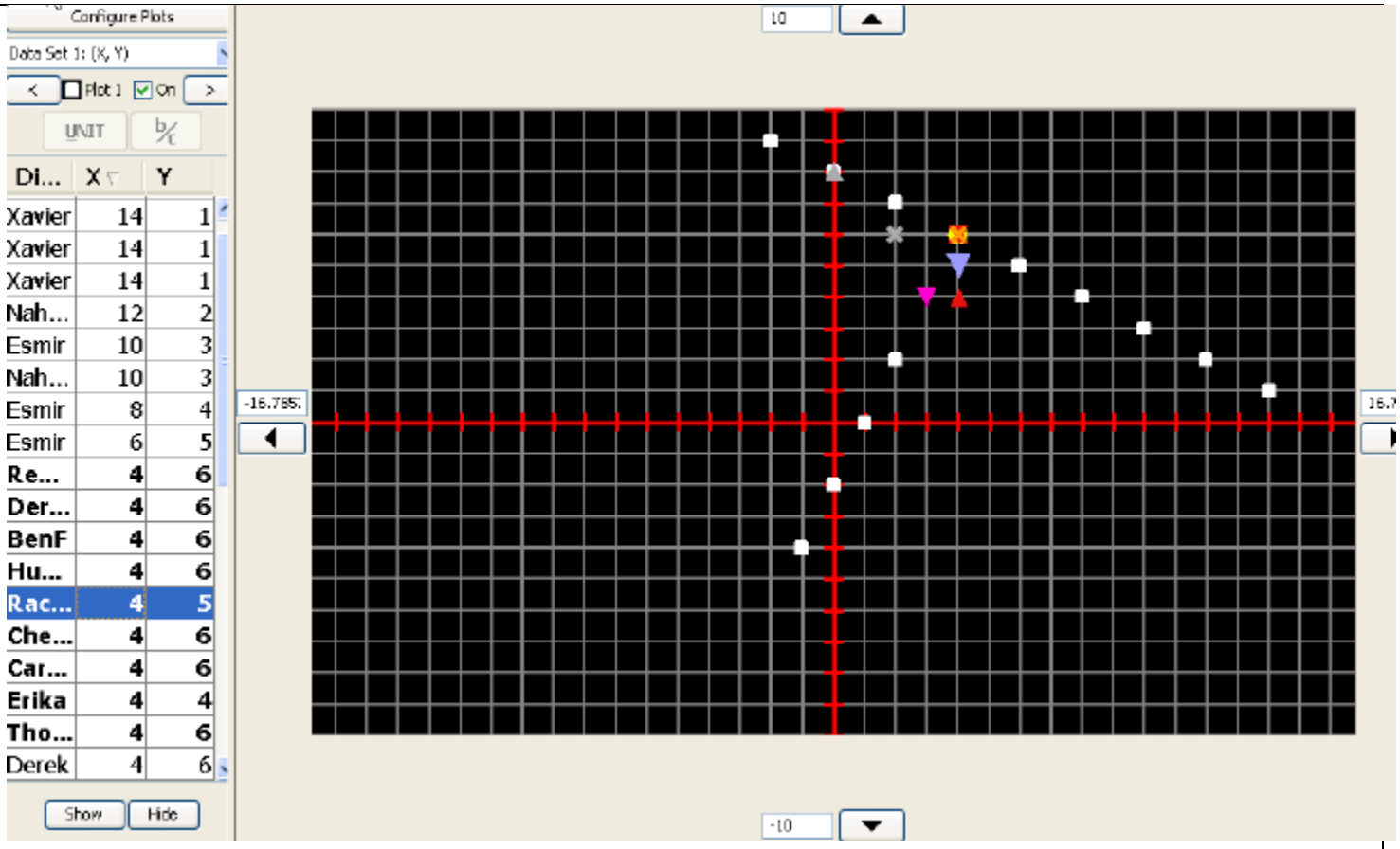


3. Be sure to **Individualize Student Cursors** using the **View menu.**





4. Teacher **Starts Activity,** students contribute points. When all students have entered their points, teacher **Pauses** or **Stops Activity.**



5. Discussion:

- **a.** Are all the points that you see really solutions to the equations? If not, why not? Did the student count incorrectly, press **enter** at the wrong time or miscalculate? (Teacher can delete incorrect points by highlighting, then pressing the delete key on the computer).
- **b.** Do you see any points that are on both lines? Which student(s) entered those points? Are those students in different groups? Why is that point on both lines?
- **c.** If that point (in this example, (4,6)) is on both lines, it is a solution to both equations and is called the **solution to the system of equations.**

6. Use the **Edit** menu to **Clear Activity Data** and assign new equations from the following. Repeat the above activity as many times as desired until students have grasped the concept.

a. $\begin{Bmatrix} x+y=6 \\ x-y=12 \end{Bmatrix}$ Solution: (9, -3)

b. $\begin{Bmatrix} 5x-y=-5 \\ 3x+6y=-3 \end{Bmatrix}$ Solution: (-1, 0)

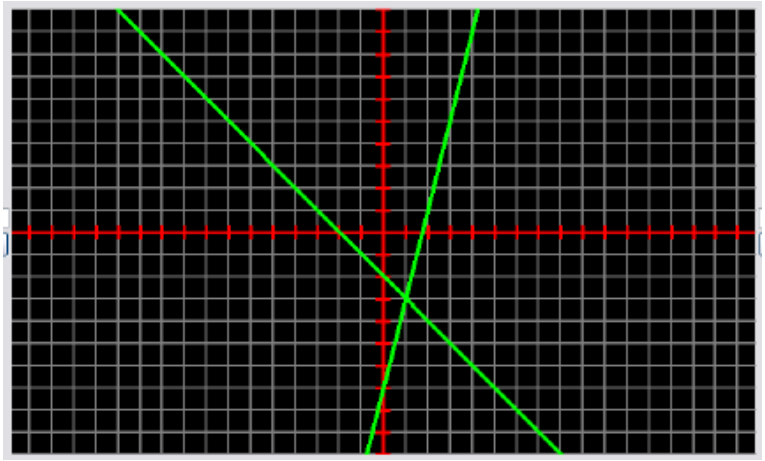
c. $\begin{Bmatrix} 2-7x=9y \\ 2y-4x=6 \end{Bmatrix}$ Solution: (-1, 1)

7. Assessment: Load the first of the four attached Activity Center settings documents (LinearSystems1.act) and project the image on your screen. Ask the students to determine the solution to the system. Teacher opens **Quick Poll** and asks students to submit their solution via Quick Poll. Repeat with the other LinearSystems.act documents.

Hint: Using Quick Poll rather than Activity Center to submit responses prevents students from seeing other students' responses before they answer.

Hint: Before loading the next file, LinearSystems2.act, be sure to **Clear Activity Data,** or the second set of graphs

will appear over the first set.



This is **LinearSystems1.act.** The solution is (1, -3).

8. **Extensions:**
    a. Change the **Configuration for Contribute Points** to have non-integer steps, and include systems with non-integer solutions.
    b. Include systems with no solution or infinitely many solutions.