



Math Objectives

- Students will visualize a solution to a system of equations.
- Students will explore a system that intersects in one point and identify the ordered pair that represents the solution.
- Students will use appropriate tools strategically. (CCSS Mathematical Practice)

Vocabulary

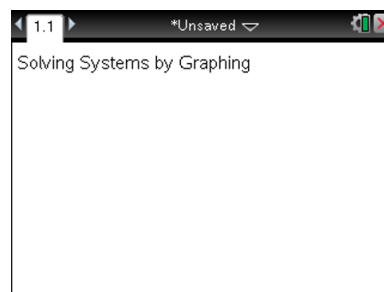
- solution
- system of equations
- linear equations

About the Lesson

- In this activity, students will explore the solution to a system of linear equations. They will move a point on the x-axis to change the x-coordinate of a point on each of the lines. They will determine when the point on each line is a solution to the system of equations. This method could provide visual cues to help students determine if their algebraic solution is reasonable.

TI-Nspire™ Navigator™ System

- Use Screen Capture to observe students' work as they proceed through the activity.
- Use Live Presenter to have a student illustrate how he/she moved the point on the x-axis.



TI-Nspire™ Technology Skills:

- Open a document.
- Move from one page to another.

Tech Tip:

- Make sure the font size on your TI-Nspire handheld is set to Medium.

Lesson Materials:

Student Activity

Solving_Systems_by_Graphing.pdf

Solving_Systems_by_Graphing.doc


TI-Nspire document

Solving_Systems_by_Graphing.tns

Visit www.mathnspired.com for lesson updates and tech tip videos.



Discussion Points and Possible Answers

Tech Tip: If students experience difficulty dragging a point, check to make sure that they have moved the arrow until it becomes a hand (☞) getting ready to grab the point. Also, be sure that the word *point* appears. Then press **ctrl**  to grab the point and close the hand (☞). When finished moving the point, press **esc** to release the point. Once a function has been graphed, the entry line can be shown by pressing **ctrl** **G**. The entry line can also be expanded or collapsed by clicking the chevron.

Teacher Tip: A document that provides instructions on creating the TI-Nspire document, *Solving_Systems_by_Graphing.tns*, is provided with the other files for this activity at the mathnspired.com web site.

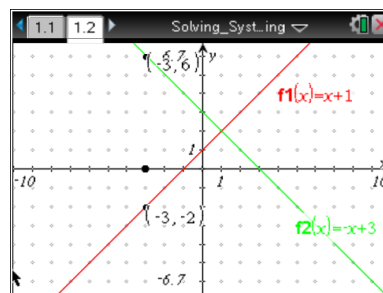
Move to page 1.2.

Questions 1–3 refer to the system of equations graphed in the

TI-Nspire document: $f1(x) = x + 1$

$$f2(x) = -x + 3$$

Move the point that is on the x-axis to the left or right as needed.



1. Move the point so that $x = -2$ in both sets of coordinates. Is either of these ordered pairs a solution to the given system of equations? Justify your answer.

Answer: When $x = -2$, the value of the function $f1$ is -1 . When $x = -2$, the value of the function $f2$ is 5 . Since the function values are not equal, this is not a solution to the system of equations.

2. Move the point so that $x = 3$ in both sets of coordinates. Is either of these ordered pairs a solution to the given system of equations? Justify your answer.

Answer: When $x = 3$, the value of the function $f1$ is 4 . When $x = 3$ the value of the function $f2$ is 0 . Since the function values are not equal, this is not a solution to the system of equations.

3. What is the solution to the system pictured? Explain how you know.

Answer: The solution to the system pictured is $(1, 2)$. These are the coordinates of the point that is the intersection of the two lines. That is, when $x = 1$, the y -coordinate on each line is 2 .



Tech Tip: Students can change the equation of the line graphed by moving the cursor on top of the textbox containing the equation and clicking twice to make edits to the equation. Students could also add the new functions introduced, $f3(x)$ and $f4(x)$, in the function entry line.

4. Jean told the class that she knew of another system that had the same solution as the system pictured in the graph. Her system is

$$f1(x) = x + 1$$

$$f3(x) = 4x - 2$$

Bryan argued that he thought that the system with the same solution as the system pictured in the graph was the following:

$$f2(x) = -x + 3$$

$$f4(x) = 2x$$

Who is right? Explain your reasoning.

Answer: Both students are correct. The solution to both systems is the ordered pair (1, 2). A graph would show that $f1(x)$ and $f3(x)$ intersect at the point (1, 2) and $f2(x)$ and $f4(x)$ also intersect at (1, 2).

5. Find the solution to the following system graphically. Show the necessary work to check the solution.

$$f1(x) = x + 1$$

$$f2(x) = -x - 3$$

Answer: The solution to the system is (-2, -1). These are the coordinates of the point that is the intersection of the two lines. That is, when $x = -2$, the y -coordinate on each line is -1.

6. Find the solution to the following system graphically. Show the necessary work to check the solution.

$$f1(x) = -x + 3$$

$$f2(x) = -x - 3$$

Answer: This system has no solution. The lines do not intersect. The equations have the same slope and a different y -intercept. Consequently, the graphs of these lines are parallel. They do not have any points in common.



7. How does the solution to the system in problem 6 compare to the solution of the system in the previous problems? Justify your answer.

Answer: This system does not have a solution, whereas the other systems had one solution, a point of intersection.

Wrap Up

Upon completion of the discussion, ensure that students understand:

- What is meant by the reference to an ordered pair as a solution to a system of linear equations.
- The point of intersection of two lines is the solution to that system of linear equations.

Assessment

Solve the system that follows graphically. Explain why the ordered pair you give as the answer is the solution to the system.

$$y = 2x - 1$$

$$y = -x + 5$$

Answer: When $x = 2$, y is equal to 3 in each equation. (2, 3) is the point of intersection of the graphs of the two equations.