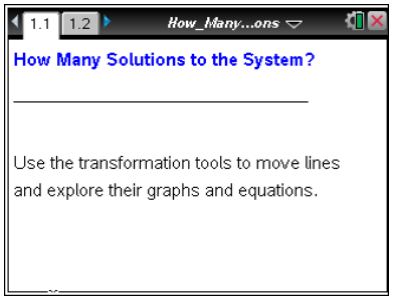
How Many Solutions to the System?

Student Activity

Name _____

Class _____

Open the TI-Nspire™ document How_Many_Solutions.tns.



This activity lets you manipulate the graph of a line to see how its equation changes. When a system of linear equations is represented by two lines, the number of solutions to that system depends on the relationship between the lines. You can use the **Rotation** tool and the **Translation** tool to perform transformations on a movable line.

Note: In this document, only Line 2 is movable.

Move to page 1.2.

Press ctrl ▶ and ctrl ◀ to navigate through the lesson.

1. a. As you rotate () Line 2, describe the changes you observe in its graph and its equation.

   b. As you translate () Line 2, describe the changes you observe in its graph and its equation.

2. Move Line 2 so that it has exactly one point in common with Line 1. If you make the slope of Line 2 the same as the slope of Line 1, can the lines still have only one point in common? Explain.

3. Move Line 2 so the lines do not have any points in common. How can you be certain these lines never intersect?

4. The point of intersection of two lines is a solution to a system of equations. How is the graph of a linear system with no solution different from the graph of a linear system with only one solution?

5. Joel says a system of linear equations will always have exactly one solution whenever the slopes of the two lines are different. Is Joel correct? Why or why not?

6. a. Move Line 2 so that there is more than one point of intersection with Line 1. What do you observe about the two lines?

   b. How many solutions are there to the system represented by two lines that have more than one point of intersection? Explain your reasoning.

7. Given a system in which one of the equations is $y = -7x + 4$, create a second equation such that the resulting system has:

   a. Exactly one solution

   b. No solution

   c. Infinitely many solutions

8. What could you say to convince another student that your answers to question 7 are correct?