Systems of Equations

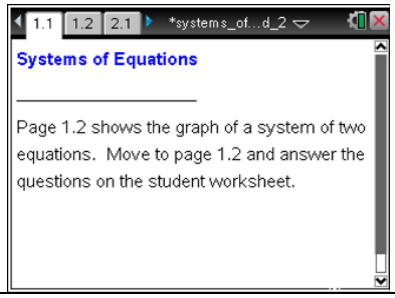
Student Activity

Name _____

Class _____

Open the TI-Nspire document *Systems_of_Equations.tns.*

What is a system of equations? What does it mean to solve a system of equations? How can we use mathematics to help us check our solutions? In this activity, you will explore the answers these questions.



Move to page 1.2.

Tech Tip: To move point *P* along the *x*-axis, move the cursor to that point until you see the open hand and "point *P*." To grab the point, press ctrl. You will see the hand close. Then move the point to the left or right as needed.

Tech Tip: To move point *P* along the *x*-axis, tap and drag your finger on the screen to the left or right as needed.

A ***system of equations*** is a set of two or more equations with the same variables. In ***solving a system of equations***, your goal is to find values for these variables that satisfy all equations in the system simultaneously. For example, the system below consists of two equations and two variables. In this case, the variables are *x* and *y*.

$$\begin{cases} x - y = -1 \\ x + y = 3 \end{cases}$$

To solve this system, your goal would be to find values of *x* and *y* that simultaneously satisfy both equations. In Questions 1-3, we will refer to this system and work towards finding the solution.

1. On page 1.2 the graphs of both of these equations are shown. On each of these graphs, a point is labeled with its coordinates. There is also a point P on the *x*-axis that is not labeled. What do all three points have in common? What is different?

2. Move point *P* so that $x = -3$ in both sets of coordinates. The graph shows that the point $(-3,6)$ is a solution to the equation $x + y = 3$. This can be shown algebraically. When you substitute the x- and *y*-coordinate values into the equation, the statement is true. That is, $-3 + 6 = 3$. How can you tell that the point (-3, 6) is not a solution to the equation $x - y = -1$? Justify your answer graphically and algebraically.

3. Move Point *P* until you find a point that will satisfy both equations at the same time. How do you

know you have found the solution to the system graphically? How can you show that you have the solution algebraically?

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In Questions 4-6, we will refer to the system below.

$$\begin{cases} 2x - 2y = 6 \\ 2x + y = -6 \end{cases}$$

4. Which of the following statements is true and how do you know?

   The point $(1, -8)$ is a solution to only one of the equations.
   The point $(1, -8)$ is a solution to the system of equations.
   The point $(1, -8)$ is a solution to none of the equations.

5. Which of the following statements is true and how do you know?

   The point $(-1, -4)$ is a solution to only one of the equations.
   The point $(-1, -4)$ is a solution to the system of equations.
   The point $(-1, -4)$ is a solution to none of the equations.

6. Which of the following statements is true and how do you know?

   The point $(-4, 5)$ is a solution to only one of the equations.
   The point $(-4, 5)$ is a solution to the system of equations.
   The point $(-4, 5)$ is a solution to none of the equations.

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In Question 7, we will refer to the system below and work towards finding the solution.

$$\begin{cases} 2x - y = -4 \\ 4x - 2y = 2 \end{cases}$$

7. How is this system different than the previous systems?

8. What is the solution to this system?