What Is a Solution to a System of Equations? Name _____

Student Activity   Class _____

In these activities, you will investigate systems of linear equations. After completing the activities, discuss and/or present your findings to the rest of the class.

Activity 1 [Page 1.3]

1. Two equations involving the same variables are called a system of equations.

    a. Recall, what is a solution to a linear equation of the form $ax + b = c$?

    b. What do you think is meant by a solution to a system of two equations?

    c. **Reset** and **Submit**. Refer to the class discussion. What is the solution to the system $y = 2x = 3$ and $x + y = 9$? Explain why.

    d. Do you think every system of equations will have a solution? Why or why not?

Activity 2 [Page 1.5]

1. Do not **Reset**. For each of the following, predict the point of intersection of the lines representing the equations and predict the solution for the system. Then use the TNS activity to check your answer. (Note you can display the second equations by cycling through the New Right equations.)

    a. $2x - y = 4$ and $y = 2$

b. $2x - y = 4$ and $x = 1$

c. $2x - y = 4$ and $-x + 3y = 1$

d. $2x - y = 4$ and $2x + 2y = 8$

Activity 3 [Page 1.7]

1. The equation on the left is $y = 2x + 1$. Answer each of the following and explain how the graph can be used to check your answer.

   a. Select an equation on the right in the form $y = \_\_ x + \_\_$ and enter values in the blanks to create a system of equations that will not have a solution. Explain your reasoning.

   b. Select **Edit** and change the equation on the right to one of the form $\_\_ x + \_\_ y = \_\_$ so the system will have $x = -2$ as the *x*-coordinate of the point of intersection.

   c. Select **Edit** and change the equation on the right to one of the form $\_\_ x + \_\_ y = \_\_$ so that two points that lie on the graph of $y = 2x + 1$ equation are in the solution of the system.

2. Reset page 1.7. Select **New** until you generate a new equation on the left that passes through the vertical axis on the screen. Answer each of the following and explain how the graph can be used to check your answer. Hint: Grabbing and dragging the point on the equation might help you find an answer.

    a. Select an equation on the right in the form $y = \_\_\, x + \_\_$ and enter values in the blanks to create a system of equations that will not have a solution. Explain your reasoning.

    b. Select **Edit** and change the equation on the right to one of the form $\_\_\, x + \_\_\, y = \_\_$ to produce a system of equations with the *x*-intercept of both equations as the solution. (If the point on the *x*-axis for the given line is not visible on the screen, generate a new line.)

    c. Select **Edit** and change the equation on the right to one of the form $\_\_\, x + \_\_\, y = \_\_$ to produce a system of equations where one of the equations is a horizontal line.

    d. Select **Edit** and change the equation on the right to one of the form $y = \_\_ x + \_\_$ to produce an equation whose solution set is a point in the third quadrant.

3. Identify the following as true or false. Find an example from the TNS activity to support your thinking.

   a. If a system does not have a solution, no value of x will make both equations in the system true.

   b. If two lines intersect at the point (0, 0), the system will not have a solution.

   c. If one equation is a multiple of the other, the system will have infinitely many solutions.

   d. $x = 3$ and $y = 4$ is a system of equations with the solution $(-3, 4)$.