DAY 7: Special Cases

Materials

Copies: 7.1 Special Cases
                            7.2 Mixed Review
                            Ticket out the Door – Day 7

Supplies: rulers – 1 per student

Word Wall Words: no new words today

Objective

Students will predict the number of solutions to a system of linear equations by using their thinking map and then solve system of linear equations by substitution. Students will discover that if the simplified solutions equivalent (i.e., $3 = 3$), there are infinitely many solutions. Students will discover that when the equations are not equal (i.e., $4 \neq 6$), there is no solution to the system of linear equations.

Student Talk Strategy

Think – Pair – Share for activity 3.1

Academic Language Use

<u>Linear Equation</u> – An equation that makes a straight line when graphed, and is often written in the form $y = \text{m}x + \text{b}$.

<u>Solution to a Linear Equation</u> – A solution to a linear equation $y = mx + b$ is an ordered pair (c, d) with the property that when you substitute c for x and d for y in the equation, the equation is satisfied, or is *true.*

<u>System of Equations</u> – A system of equations involves the relationship between two or more equations and can be used to model a number of real-world situations.

<u>Solution to a System of Linear Equations</u> - A *solution* to a system of linear equations is the point(s) of intersection of the lines or the value of the variables that satisfy the equations. The number of *solutions* can vary from one, to none, to infinitely many solutions.

Activity Notes

30 Minutes: Special Cases When Using Substitution

Have students move next to a partner and get out their thinking map that they created on Day 5 and pass out activity sheet 7.1 and a ruler to each student. Ask for a volunteer to read the directions. Check for understanding by asking questions about how they will be able to determine the number of solutions, how they will verify their answer, etc. Instruct partners that they have 5 minutes to complete problem number 1, which has been started for them in part b. Set a timer for 5 minutes and walk around checking

for understanding and accuracy. At the end of 5 minutes have a pair of students present their solution to the class. Repeat the process for number 2. Number 2 is a set of parallel lines, in which there is no solution to the system. As students are working through number 2 you will want to stop and have a class discussion as to why the students obtain the answer $4 \neq 1$ when they simplify their work and what it means in terms of the solution.

Instruct students that they will now have 5 minutes to complete number 3 with their partner and set a timer. In this problem, the result is *infinitely many solutions*. As with number 2, you will want to stop and have a discussion about what it means when students arrive at the equation $10 = 10$. Put the following on the board, $x = x$, or $4 = 4$, or $y = y$ and use think-pair-share to ask students to explain what it would mean if they arrived at these solutions when simplifying. Have students think quietly for 15 seconds, share with their partner for 30 seconds and then randomly select students to report out what they and their partner discussed. You may want to have students pick 1 or 2 points on the lines they graphed and have them substitute the values for x and y in to the original equations to see that there is more than one point that make both equations true.

Allow students 10 minutes to work with their partner on problems 4-6. Set a timer for 10 minutes and walk around and ask guiding questions and check for understanding. In problem number 4, if students solve for x first, they will arrive at $3x = 0$ and may arrive at the misconception that there is no solution for the system, when in fact the value of x is 0. The solution for number 4 is (0, 3); number 5 is *no solution* (-1 $\neq$ 2); number 6 is *infinitely many solutions* (1 = 1). After 10 minutes have passed, have partners that you know arrived at the correct solutions present their work and explain how they arrived at their answers to the class.

25 Minutes – Mixed Review
Pass out activity sheet 7.2, which is a mixed review of systems in linear equations. Instruct students that they will have 20 minutes with their partner to complete problems one through ten and that they may use any materials they have previously worked on to help them out. Set a timer for 20 minutes and walk around to check for understanding and accuracy.

Number 4 may pose some difficulty for students, as they have been setting an equation equal to y before substituting it in to the second equation. However, in number 4, it will be easier for students to solve for x in the first equation and then substitute it in to the second. When most partners are at this point, you may want to stop and have a brief class discussion about which variable would be easier to solve for before using substitution.

After 20 minutes have passed, have the class come together and present their solutions. If students struggled on any particular problems, you may want to go over those problems, such as setting up the equations for the application problems.

5 Minutes: Ticket out the Door
Pass out the Ticket out the Door and collect it as soon as each student finishes (so that you can discuss mistakes with students as they turn it in).