DAY 5: The Eliminator III & Slider II

Materials

Copies:	4.3 Elimination Slider II (1 copy for teacher prepared) 5.1 The Eliminator III 5.2 Word Problems – Yay! Ticket out the Door – Day 5
Supplies:	Highlighters – 1 per student
Word Wall Words:	Linear Equation Solution for a Linear Equation Systems of Equations Solution to a System of Linear Equations

Objective

Students will continue to solve systems of linear equations by the *elimination method* by adding or subtracting the equations and learn to multiply one or both equations by a constant to manipulate the coefficients of the variables in order to eliminate a variable. Students will play a game with randomly generated equations to determine if they able to eliminate a variable by adding or subtracting two equations, or determine if they need to manipulate an equation by multiplication.

Student Talk Strategy

Think-Pair-Share for activity 5.2

Academic Language Use

Linear Equation – An equation that makes a straight line when graphed, and is often written in the form $y = \mathrm{m}x + \mathrm{b}$.
Solution to a Linear Equation – 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.*
System of Equations – A system of equations involves the relationship between two or more equations and can be used to model a number of real-world situations.
Solution to a System of Linear Equations - 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

5-10 minutes: Elimination Slider II

To open today's class, students will review the idea of having to multiply one of the equations in order to be able to eliminate a variable. Make sure your slider (page 1 of 4.3) has the slit/opening cut out so that the strips can fit in the window. Explain to the class that you will be going around the class, expecting rapid responses for questions. Show the class the slider and do the first example (activity sheet 4.3) as a whole class. To do this, put the first equation from each column in the "windows", one in the right window, and the other in the left window. Ask the question "Can I eliminate a variable right a way by adding or subtracting or do I have to multiply one or both of the equations?" Ask the class to think for 30 seconds and select a volunteer to share, using either the "yes" or "no" sentence frame provided.
Let the class know they will be answering the same questions for each of the new problems that are put into the "windows". Tell the class where you will start and rotate around the room asking each person to do 1 question. There are 64 different possible systems, do not feel you need to hit each and every equation in the time allotted. Continue until all students get to answer 1 problem! Note: To be effective, the pace needs to be quick so that you can get through multiple rotations of the class.

25 minutes: The Eliminator III

Pass out activity sheet 5.1 and ask students to look at the problem on page. Using think-pair-share, instruct pairs to think, for 20 seconds about whether they would add or subtract the two equations to solve by elimination, or if they need to multiply one of them by a constant first. If they decide to multiply, which equation would they multiply and by what number? After 20 seconds, have pairs share with each other for 30 seconds regarding how they would solve for problem one and then randomly select pairs to explain what they would do and why. Note: Some students may suggest multiplying the bottom equation by 2 to eliminate the "x" variable and others may suggest multiplying the bottom equation by 5 to eliminate the "y" variable. This is okay, as both are correct methods. Be sure to verify if they plan to add or subtract the two equations to eliminate the variable.

As a class, read through the sentence frames and fill in the blanks. Ask students to look at what the bottom equation is being multiplied by, and why they think the author chose to multiply by 5 instead of 2. (Because it is easier to add than subtract.) Set a timer for 3 minutes and have students complete the review problem. Walk around to monitor student progress and ask guiding questions if students are having trouble. After 3 minutes have elapsed (or when most students have completed the problem) select pairs whom you know have achieved the correct answer and have showed all the work correctly to come to the front and present their work and solution.

Have students turn the page and look at problem 2. Use think-pair-share to have students think for 10 seconds about whether or not the two equations added or subtracted would result in eliminating a variable. After 10 seconds have students share with their partner and then randomly select 2-3 pairs to share whether or not a variable would be eliminated and possible reasons why it would not be. Repeat the process again, but asking students the question "If one of the equations was multiplied by a constant, would it be possible to eliminate a variable by adding or subtracting?"

Read through the 1st step, 1a as a class and fill in the blank (have students use thumbs up if they believe they can stop and solve or thumbs down if they need to go on to part b). Read through 1b as a class and use thumbs up/down to determine if the problem can be solved by multiplying one of the equations and adding or subtracting, or if it is necessary to move on to 1c. Review with students that to be able to eliminate by adding, the coefficients of one set of variables need to be opposites of each other and to eliminate by subtracting the coefficients need to be the same. Read through 1c as a class, and help them fill in the sentence frame, based upon what the author set the each equation up being to be multiplied by. Ask students why the author might have chosen to multiply the top equation by 2 and the bottom equation by 3, and if there were any other possibilities.

Continue to work through the problem for the students, working out the multiplication and then have students complete the remainder of the problem with their partner.

Set a timer for 10 minutes and have students work with their partners to complete the remaining four problems. The four problems are a mixture of systems that can be solved without manipulation, those that need manipulation of one equation and those that need manipulation of two equations. Walk around to monitor student progress and ask guiding questions to help them solve. Once 10 minutes have elapsed, select pairs, whom have shown their work completely and correctly to present their solutions to the class.

15 minutes: Word Problem Review
Pass out activity sheet 5.2 and highlighters, one per student; have students remain sitting next to a partner. This activity serves as a review of the different types of word problems students have encountered in the unit thus far, as well as to practice solving a system of equations. Read through problem 1 as a class, and have students highlight key elements of the problem, such as *30 coins, nickels, dimes,* and *$5.70*. Set a timer for 5 minutes and have students complete number 1. Walk around to monitor student progress as well as to assist students in setting up and solving the problem. When 5 minutes have elapsed, select a pair of students to present their solution to the class. Repeat the process for problems 2 and 3. Be sure to have students write their answers to each problem in complete sentences at the bottom of each page.

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).