DAY 4: Stinky Feet, The Eliminator & Slider

Materials

Copies: 4.1 Stinky Feet
4.2 The Eliminator! - II
4.3 Elimination Slider II (1 copy for teacher prepared)
Ticket out the Door – Day 4

Supplies: No Supplies Needed

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 equation 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 4.1 and activity 4.2

Academic Language Use

Linear Equation – An equation that makes a straight line when graphed, and is often written in the form $y = mx + b$.
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

10 minutes: Stinky Feet

Pass out activity sheet 4.1 and have students move their desks next to a partner. The purpose of this activity is to reinforce the idea of elimination, and to get students ready to eliminate a variable with "un-like" coefficients. Read the opening paragraph to students, stopping to place emphasis on the fact the odor eliminating spray now can eliminate two units of odor, or move the Stinky Feet indicator two units closer to zero. Select a volunteer to read the final paragraph before number 1 and then complete number one as a class, asking students to think for 10 seconds on their own, and then share with their partner the answer to this question: "Why are does it only take 3 sprays to eliminate an odor of -6?" Randomly select a pair of students to share what they discussed. Continue asking pairs until you hear something similar to: "The new formula can eliminate two units of odor so it only takes 3 sprays." Have students record *3 sprays* on the line provided. Go through the math equation with the students, ask questions to students selected at random to check for understanding.

Set a timer for 5 minutes and instruct students that they are to work on problems 2 through 5 with their partner. At the end of 5 minutes, randomly select partners to come up and share their answers to problems 2 through 5.

Ask a student volunteer to read through the introduction to number 6. Go through problem 6a with the class as a whole, randomly selecting students to help you fill in the blanks. Have students work with their partner through 6b and ask for a pair to come present their solution to the class. Ask for a volunteer to read through the final statements to conclude the activity.

35 minutes: The Eliminator II

Pass out activity sheet 4.2 and ask students to look at the problem on page one and the problem on page two. Using think-pair-share, instruct pairs to think, for 20 seconds about whether they would add or subtract the two equations on each page to solve by elimination. After 20 seconds, have pairs share with each other for 30 seconds regarding which method they would use for problems one and two and then randomly select pairs to explain which method they chose for each problem and why. Set a timer for 7 minutes and have students complete the first two review problems for elimination and the bullets on the bottom of page 2. Walk around to monitor student progress and ask guiding questions if students are having trouble. Be sure to check for errors such as when students are subtracting on page 2 that ALL terms are subtracted and not just the leading terms. After 7 minutes have elapsed (or when most students are complete with both pages) 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. Once both problems have been presented, read through the two bullets together as a class, while filling in the blanks for all to see.

Have students turn the page and look at problem 3. 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.
Read through the 1st step question and sentence frame as a class and fill in the blank with *coefficients*. 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.

Ask students to look closely at the coefficients of the two equations to discuss, for 20 seconds, if they could possibly multiply the second equation by a number so that it would have a coefficient in one of the equations that would be the same, or opposite as one coefficient of the top equation and what they would multiply by. (Have students recall that in the Stinky Feet II activity to eliminate an odor of -9, if each spray eliminated 3 units of odor they would have to use 3 sprays; or (3 sprays)(3 units) = 9; 9 + -9 = 0.) After 20 seconds, fill in the sentence frame and guide students through the partially solved problem. Stop in the middle column to ask several students why the bottom equation is being multiplied by 2. Instruct students that they will have 2 minutes to complete the remainder of the problem with their partner.

Repeat the same procedure above for problem 4 walking students through the multiplication process to obtain like coefficients. Some students may offer to multiply through by 2, others may state the problem should be multiplied through by 6. Both are correct, and if you are comfortable with it, divide the class in half and instruct one half of the class to solve by multiplying the bottom equation by 2 and the other half to solve by multiplying the bottom equation by 6. Bring the class back together after solving and discuss if the solution ended up the same and why.

Have students turn to problem five and read the directions at the top of the page. With their partner, have students answer the question in the box for problem 5. Randomly select pairs to read through their answers. Students should notice that subtracting the two equations should solve the problem. Set a timer for 3 minutes and allow students to solve problem 5, while walking around to monitor student progress. After 3 minutes have elapsed (or students have completed the problem) select a pair of students to present their solution to the class. Repeat the same process for number 6. Students should suggest that the top equation be multiplied through by 2. If you find students are struggling to set up the equations for elimination, stop the class and go through the problem together.

10 minutes (or remaining time until 5 minutes before class ends): Elimination Slider
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, 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.

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).