Notes from a Video

Introduction

Welcome to the math lesson with Mr. J. In this video, I will guide you through a mini course on solving multi-step equations. We will cover everything from two-step equations to equations involving the distributive property and variables on both sides. Each section is organized into chapters and timestamped for your convenience. Feel free to jump to the sections you need. Let's start with some basic two-step equations and progress from there.

Two-Step Equations

When solving two-step equations, our goal is to isolate the variable by using inverse operations. We want to undo the operations on the side of the equation with the variable. Remember, whatever we do to one side of the equation, we must do to the other to keep the equation balanced and equivalent.

Example 1: 3x + 10 = 28

To solve this equation, we need to isolate the variable x. We start by undoing the addition. The inverse operation of addition is subtraction, so we subtract 10 from both sides of the equation. This cancels out the 10s on the left side, leaving us with 3x = 18. Next, we undo the multiplication by dividing both sides by 3. The 3s cancel out, and we are left with x = 6. We can check our solution by plugging in 6 for x and verifying that both sides of the equation are equal.

Example 2: 9y - 12 = 15

In this equation, we need to isolate the variable y. We start by undoing the subtraction. The inverse operation of subtraction is addition, so we add 12 to both sides of the equation. This cancels out the -12 on the left side, leaving us with 9y = 27. Next, we undo the multiplication by dividing both sides by 9. The 9s cancel out, and we are left with y = 3. We can check our solution by plugging in 3 for y and verifying that both sides of the equation are equal.

Example 3: D/8 + 32 = 41

In this equation, we have a variable on both sides. We start by undoing the addition. The inverse operation of addition is subtraction, so we subtract 32 from both sides of the equation. This cancels out the 32s on the left side, leaving us with D/8 = 9. Next, we undo the division by multiplying both sides by 8. The 8s cancel out, and we are left with D = 72. We can check our solution by plugging in 72 for D and verifying that both sides of the equation are equal.

Example 4: 2 = H/5 - 9

In this equation, we have a variable on the right side. We start by undoing the subtraction. The inverse operation of subtraction is addition, so we add 9 to both sides of the equation. This cancels out the -9 on the right side, leaving us with 2 + 9 = H/5. Next, we undo the division by multiplying both sides by 5. The 5s cancel out, and we are left with 2 * 5 = H. Simplifying, we get H = 10. We can check our solution by plugging in 10 for H and verifying that both sides of the equation are equal.

Equations with Two Terms in the Numerator

In this section, we will look at equations where one side is set up in fractional form. We will use inverse operations to isolate the variable and solve the equation.

Example 1: x + 7/3 = 5

To solve this equation, we start by undoing the addition. The inverse operation of addition is subtraction, so we subtract 7/3 from both sides of the equation. This cancels out the 7/3 on the left side, leaving us with x = 5 - 7/3. To simplify the right side, we need a common denominator, which is 3. So we have x = 15/3 - 7/3, which gives us x = 8/3. We can check our solution by plugging in 8/3 for x and verifying that both sides of the equation are equal.

Example 2: 9 + 2/3 = 10y - 6

In this equation, we start by undoing the subtraction. The inverse operation of subtraction is addition, so we add 6 to both sides of the equation. This cancels out the -6 on the right side, leaving us with 9 + 2/3 = 10y. To simplify the left side, we need a common denominator, which is 3. So we have 27/3 + 2/3, which gives us 29/3. We can check our solution by plugging in 29/3 for y and verifying that both sides of the equation are equal.

Equations with Variables on Both Sides

In this section, we will look at equations where the variable appears on both sides. Our goal is to get the variable on one side of the equation and then solve for its value.

Example 1: 5x - 4 = 2x + 11

To solve this equation, we start by getting the variable on one side. In this case, let's get rid of the 2x on the right side. The inverse operation of addition is subtraction, so we subtract 2x from both sides of the equation. This cancels out the 2x on the right side, leaving us with 5x - 2x = 11 - 4. Simplifying, we get 3x = 7. Next, we divide both sides by 3 to isolate the variable. The 3s cancel out, and we are left with x = 7/3. We can check our solution by plugging in 7/3 for x and verifying that both sides of the equation are equal.

Example 2: 3y + 8 = 10y - 6

In this equation, we start by getting the variable on one side. Let's get rid of the 3y on the left side. The inverse operation of addition is subtraction, so we subtract 3y from both sides of the equation. This cancels out the 3y on the left side, leaving us with 8 = 10y - 3y. Simplifying, we get 8 = 7y. Next, we divide both sides by 7 to isolate the variable. The 7s cancel out, and we are left with y = 8/7. We can check our solution by plugging in 8/7 for y and verifying that both sides of the equation are equal.

Conclusion

In this mini course, we covered various types of multi-step equations, including two-step equations, equations with the distributive property, equations with variables on both sides, and equations with two terms in the numerator. We used inverse operations and combined like terms to solve these equations. Remember to always check your solutions by plugging them back into the original equation. Keep practicing, and you'll become a pro at solving multi-step equations.