Hi and welcome. My name is Anthony Varela, and today we're going to talk about equivalent equations. So we're going to talk about what are equivalent equations, what does it mean for two equations to be equivalent, and then, how can I tell if two equations are equivalent? So when talking about equivalent equations, two equations are equivalent if they have the same solution set in each equation. So here's an example of two equations that are equivalent. And I've written down their solutions.

In both cases, x equals 2. So let's go ahead and show, then, that these have the same solution set. So working with the equation that we see on the left side of the screen, 8 equals 3x plus 2, I'm going to plug in 2 for x. And now I have 8 equals 6 plus 2. 8 equals 8. That's a true statement. So x equals 2 is a solution for that equation.

Let's go ahead and work on our other equation, 16 equals 6x plus 4 when x equals 2. This gives me 16 equals 6 times 2 plus 4, 16 equals 12 plus 4, and 16 equals 16 is a true statement. So x equals 2 is a solution for the equation on the right. So now you can see that these two equations here can be considered equivalent equations, because their solution sets are the same.

So how can we determine, then, if equations are equivalent? Well, what we'll do, then, is we'll solve for each equation and see if their solution sets are the same. So here, I have two equations, 6x minus 2 equals 7, and 9x minus 4 equals 14. I want to know if these two equations are equivalent.

So let's go through the process of solving each equation and then we'll compare their solution sets. So in the first equation, the one on the left, I'm going to add 2 to both sides of the equation. So I have 6x equals 9. Well, now I need to divide both sides of my equation by 6, and this will give me x equals 1.5. So that's the solution to the equation on the left.

We need to solve the equation on the right and see if we get x equals 1.5. So to solve first, we need to add 4 to both sides of the equation. So this gives me 9x equals 18. And then when you divide both sides by 9, we get x equals 2. So now, comparing our two solution sets, because 1.5 does not equal 2, these two equations are not equivalent. They have different solution sets.

So let's take a look at another example. Our equation on the left is 2/3x plus 7 equals 19. The equation on the right is 1.5x minus 15 equals 12. Let's solve both of these equations, and then we'll compare their solution sets.

So solving for the equation on the left first, we subtract 7 from both sides of the equation. So we have 2/3x equals 12. And now we need to divide both sides by 2/3. And dividing by a fraction, I find it easier to multiply by that fraction's reciprocal. So I'm going to multiply by 3/2. That's the same as dividing by 2/3.

So that gets x on one side of the equation. And then 12 multiplied by 3/2 equals 18. So I've solved my first equation. X equals 18. Let's see if x equals 18 as a solution to our second equation.

So the first thing I need to do is add 15 to both sides of this equation. So 1.5x equals 27. And now I need to divide both sides by 1.5. And I get x equals 18. So here, these two equations are equivalent, because they have the same solution set.

And that's really it for this tutorial on equivalent equations. Remember that equivalent equations are equations that have the same solution sets, so solve for each equation and compare their solutions. If they have the same solutions, they're equivalent equations. If they have different solution sets, they are not equivalent equations. Well, thanks for watching this tutorial on equivalent equations. Hope to see you next time.