Hi, and welcome. My name is Anthony Varela. And today we're going to talk about literal equations. So we'll see examples of different literal equations. And then we're going to practice rewriting the literal equation for the other variables in that equation.

So let's start off by talking about what an equation is. Well, it's a statement that two quantities are equal in value. So this equation tells us that 3x is the same value as 6.

Now let's compare this then to 3x equals 6y. This is still an equation. It relates two quantities as being equal to each other. 3x is the same value as 6y.

But this is an example of a literal equation. It's an equation with more than one variable. And we actually encounter literal equations all the time in mathematics.

For example, y equals mx plus b is a literal equation. This is the equation to a line in slope intercept form.

Literal equations are oftentimes formulas. And we use formulas to calculate certain quantities and measurements. And depending on what we know and what we need to solve, it might be helpful to rewrite the literal equation.

So for example, the area of a rectangle has the formula A equals L times W. Area equals the length times the width. Now depending on what dimensions I know, I might know the measurement for area. I might want to rewrite this equation and write this as L equals something or W equals something instead of A equals something.

So to do this, what I'm going to do is divide both sides by L to have an equation for W. W equals the area divided by the length.

Similarly, I can take the area and divide by the width. And that would give me an equation for the length. Length equals area divided by the width.

So we're going to go over some other common formulas that are literal equations and rewrite for all of the different variables. We're going to use distance equals rate times time, the area of a circle as being pi times the radius squared, and our Pythagorean theorem.

So a distance rate in time is actually very similar to our area of a rectangle. We have distance equals rate times time. So if I wanted to write an equation for rate, I would divide distance by time. So r equals d over t. If I wanted to write an equation for time, I would divide distance by the rate. t equals d over r.

So now let's go on to our area of a circle. And so the area of a circle is pi times r squared, where r is the radius to the circle. And that's our only variable here. Remember, pi is a number.

So I'd like to rewrite this equation to say r equals something. Well, I see that r is being squared. And then we're multiplying it by pi.

So what we're going to do is we're going to divide by pi first. So we're going to divide the area by pi because this exponent of 2 is applied to the radius, not to pi. So now we have the radius squared equals the area divided by pi.

So to isolate r, we're going to take the square root of both sides. And the radius is the square root of the area divided by pi.

The last equation is the Pythagorean theorem. And this relates the legs of a right triangle to its hypotenuse. So a and b are the legs, and c is the hypotenuse. a squared plus b squared equals c squared.

And I'd like to rewrite this equation so that I have a equals something, b equals something, and c equals something. Well, then almost to my c equals something equation, all you need to do is take the square root of both sides. So c equals the square root of a squared plus b squared.

Well, now let's begin with our Pythagorean theorem. And let's rewrite this so that our equation says a equals something. So first, I need to move that b squared term to the other side of the equal sign.

So I'm going to subtract it out. So I have a squared equals c squared minus b squared. Well, then I'll take the square root. And I have my equation a equals the square root of c squared minus b squared.

Similarly, we're going to begin with our Pythagorean theorem. We've already written for c equals and a equals, so we want to isolate b on one side of the equal sign. So I'm going to move my a squared term over through subtraction. So b squared equals c squared minus a squared.

And I'll finish this up by taking the square root. So now we have an equation that has b on one side of the equals sign.

So let's review our lesson on a literal equations. Well, a literal equation contains more than one variable. And they're very common in mathematics.

We looked at some formulas that are all literal equations. And we practiced rewriting them for each variable. And this involved applying inverse operations in the reverse order of operations to isolate a variable.

So thanks for watching this tutorial on literal equations. Hope to see you next time.