Hi. My name is Anthony Varela, and today we're going to be converting unit rates. So first, we're going to start off by talking about how to convert units. Then, we'll look into rates and unit rates. And then, finally, we'll be able to convert unit rates. So when we're converting units, we want to use a conversion factor to cancel units to go from one unit to another.

So for example, if I'd like to convert 210 seconds into minutes, first what I'm going to do is write down the relationship that I know between seconds and minutes. And that is that there are 60 seconds in 1 minute. This is going to help me design my conversion factor.

So I'm going to start with my 210 seconds. And I like to put that over 1, because my conversion factor is going to be in the form of a fraction. So I'd like to start with a fraction here. And then, I'm going to multiply it by a conversion factor. And now, I need to decide what goes on top and what goes on bottom.

Well, I'd like to cancel out my units of seconds. So because I see seconds in the numerator, here in my conversion factor, I'd like seconds to be in my denominator. So going to have 60 seconds in the denominator. And then, what does 60 seconds equal? That equals 1 minute. I'll have that in my numerator.

So now, you see I'm multiplying 210 seconds by a fraction that's cleverly disguised as 1. Because 1 minute and 60 seconds are the same thing. If I have equal quantities in my numerator and denominator, this doesn't change the value. We're just changing the units.

So now, when I multiply these two fractions, well, I have my 210 over 60. Those are my numbers. But what are my units? Well, I see that I've canceled out my units seconds, because I see it on the top and the bottom here. And that leaves me then with just minutes.

So I have 210 over 60. And I know that this is in minutes. And 210 divided by 60 is 3.5. So I have converted 210 seconds into 3.5 minutes, using this conversion factor. Well, before we get on the converting unit rates, let's talk about rates and unit rates.

So a rate is a ratio of two quantities with different types of units. So for example, if I drove 80 miles in 2 hours, I could describe this as a rate of 80 miles per 2 hours. I have a ratio of two different quantities. And I have one unit of distance, or length, on the top. And then, I have a unit of time on the bottom. So this is a rate.

Well, a unit rate and then has a denominator of one so. We're going to take our 80 miles per 2 hours and do that division. 80 divided by 2 would give me 40. And then, I have miles per hour, or miles per 1 hour. And this is that unit rate. Another example would be working 40 hours in 5 days. If I divide, I would get 8 hours per one day. And that's the unit rate, 8 hours per day.

So when we're talking about rates and unit rates, it's a ratio between two quantities with different units. And our denominator is 1 in a unit rate. So now, let's convert unit rates. And the example I'm going to use is the speed of sound. So the speed of sound is 340.29 meters per second. And I'd like to convert this into miles per hour.

So first, I'm going to write down some relationships I know between meters and miles and then seconds and hours. So 1 mile is the same as 1,609.34 meters. And then, 1 hour is the same as 3,600 seconds. So I'm going to be using these two relationships to design my conversion factors.

So in converting then meters per second to miles per hour, I'm going to start with my speed of sound. And I'm going to be creating a couple of different conversion factors. And I'm going to focus on one unit at a time. So first, I'd like to go from meters to miles. So I'm going to set up a conversion factor that would cancel out meters and leave this expressed in miles.

So I'm going to put my 1,609.34 meters on the bottom. So this cancels out my meters. And then, I have one mile in the numerator here. So now, if I were to go ahead and multiply these two fractions, I would have miles per second. But I'd like miles per hour. So I'm going to have another conversion factor here.

I've already taken care of my unit of distance. I need to take care of my unit of time now. So I want to go from seconds into hours. So I need to cancel out my units of seconds, which is here in the denominator. So I need more seconds in the numerator of this conversion factor. So 3,600 seconds over 1 hour.

So now, if I were to multiply through then, this is what I would get. I'd get my numbers here, 340.29. I'm not going to write the times 1 and then have my times 3,600. And I know that this is going to be expressed in miles, because I canceled out my meters. In the denominator, I'm not going to write the 1's, but I have my 1,609.34.

And I know that this is going to be in hours, because I canceled out my units of seconds. So now, let's go ahead and do this multiplication and division here. I get some pretty large numbers, but I want a unit rate. So I'm actually going to divide this 1 million something over 1,609.34. And that's going to

give me 761.21 miles per hour, where we round to the nearest hundredth.

So that is my unit rate then for the speed of sound expressed in miles per hour. So when we're converting unit rates, remember, you're going to be using multiple conversions to change all of your units. So let's review converting unit rates. When we're converting units, we use conversion factors to cancel units.

Unit rates is a ratio between two quantities with different types of units. And the denominator is always 1. And when we're converting unit rates, we use multiple conversions to change our units. And a tip is to focus on one unit at a time. Well, thanks for watching this video on converting unit rates. Hope to catch you next time.