Let's talk about unit rates. A unit rate is just a ratio of two different quantities each with different units. So maybe the most common unit rate you're going to see every time you drive down the road, and that's the speed limit. So for example 60 miles per hour or per 1 hour is a unit rate.

We've got a ratio, in this case a fraction comparing two different quantities. And they each have different units. So 60 miles per hour is a unit rate.

Another example might be maybe I save $200 every 1 month. So $200 per month is another example of a unit rate. I'm comparing two different quantities, and each of these quantities have a different unit.

So let's review how to use a conversion factor to convert between different units. So let's say I want to know 26.2 miles, what that is equivalent to in feet. 26.2 miles is the distance of a marathon. So we're going to start with 26.2 miles. And I want to multiply that by a conversion factor, which is a fraction that's equal to 1. And in this case, we want to use one that has miles and feet.

So since the conversion factor is a fraction, I want to write 26.2 miles also as a fraction. So I can just write it as 26.2 miles over 1. And then for my conversion factor, I want to have miles in the denominator of the fraction so that when I multiply they will cancel out.

I know that 1 mile is equal to 5,280 feet. And so now when I multiply these two fractions together, my miles in the numerator and miles in the denominator of each fraction will cancel out. And I'll be left with the units of feet, which is what I'm looking for. So I know my units will be when I'm looking for. And so now I just need to multiply my fraction in the numerators and the denominator.

So 26.2 times 5,280 is 138,336. And then my denominator, I have 1 times 1, which is just 1. Again, my units are feet. So this is just equal to 138,336 feet, which again, is 26.2 miles, or the distance of a marathon.

All right, let's do an example converting between unit rates. So I want to convert 40 miles per hour to be something in inches per second. And when we are converting rates, we need to convert multiple units. So I need to both convert between miles to inches and from hours to seconds. So I'm going to use conversion factors to do that.

So let's start with 40 miles per hour or 40 miles in 1 hour. And I'm going to start by focusing on my distance, so converting from miles to inches. So my conversion factor, if I want to cancel at the miles, I want to use a conversion factor with miles in the denominator so it will cancel with this miles in the numerator.

So I know that 1 mile is equivalent to 5,280 feet. So now I see that my miles here and here cancel, and now my units are in terms of feet. However, I need to go one step farther because I want to get to inches. So now I'm going to multiply by a conversion factor that has feet in the denominator so that the feet here will cancel. I know that 1 foot is equal to 12 inches. So now here my feet cancel, and my units for my distance are in inches. So I'm halfway there.

Now I want to focus on converting from hours to seconds. So I'm going to multiply by a conversion factor that has hours in the numerator so that it will cancel with hours here and the denominator. So I know that 1 hour is equal to 60 minutes. So my hours here and here will cancel.

But I'm not quite at seconds yet, so I need to use one more conversion factor. So I want one that has minutes in the numerator so that it will cancel with minutes here in the denominator. And I know that 1 minute is equal to 60 seconds. So here my minutes will cancel, and I'll be left with seconds.

So I can check that my distance unit is in inches, which is what I want. And my time unit is in seconds, which is also what I wanted. So now I'm done. I just need to simplify the numbers in my fraction so I can figure out what the value in inches per second is.

So simplifying my numerators by multiplying, I'm going to do 40 times 5,280 times 12 times 1 times 1. And that gives me 2 million 534,400 inches. And in my denominator I've got 1 times 1 times 1 times 60 times 60, which is 3,600. And again this is inches and seconds.

And now dividing these two values, I'm going to get 704 inches per second. So traveling at 40 miles per hour is the same as traveling at 704 inches per second.

So let's go over our key points from today. Make sure you get these in your notes if you don't have them already so you can refer to them later. So unit rates are ratios comparing two quantities with different units.

And conversion factors, which can be used to convert between different units, can also then be used to convert between different rates. So I hope that these key points and the examples that we did helped you understand a little bit more about converting unit rates. Keep on practicing, and keep using your notes and soon you'll be a pro. Thanks for watching.