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SPEAKERS

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Welcome back. Now we're going to apply those rules that we learned about fractional exponents to some practice problems. And you can see how useful these rules are in practice. Our first question is asking us to rationalize the denominator and simplify. All that really means is, we don't like having square roots in the denominator, it makes it more of an awkward expression. If you wanted to actually solve this for a number, you would have to use your calculator and solve for the square root of five and the square root of three. So it might be easier if we simplify this such that we'll only have one square root and it will be in the numerator. And we can do that by multiplying both the numerator and denominator by the square root of five. So if I have the square root of three here, over the square root of five, I'm going to multiply it by the square root of five over the square root of five. And that's going to give me the square root of three times the square root of five, the square root of five times the square root of five, that's just going to be equal to five. Now we've gotten rid of the square root in the denominator. So our next step is going to be to simplify the numerator, I can rewrite the numerator as three times five to the square root over five. And that's going to give us square root of 15 over five, and so that's the rationalized, rationalized just means no square root. Or any root for that matter, we'll talk about other kinds of roots in a few minutes, no square root in the denominator and we simplify the numerator as much as possible. Let's try the next problem. We've got one over the square root of 50. And we want to rationalize and simplify it. And so to start, we're going to multiply the numerator and denominator by the square root of 50. So we get square root of 50 over 50 can write it like that. Now, now we just need to simplify. What can we do to simplify this? Well, I can look at the numerator and I could rewrite it as well maybe not 10, how about 25 times to over 50 We can separate the square root of 25 multiplied by the square root of two over 50. Now we've got five square root of 25 is just five times the square root of two over 50, and five if I divide five in the numerator divided five in the denominator, we get the square root of two over 10.

And there is our rationalized and simplified answer.

What I showed you with the square root, those rules can also be applied to roots other than the square root. So we can look at the cube root, the fifth root, any root you want. Those rules I showed you will also apply to these nth root problems. So let's look at our first practice problem. It says what is the solution to hate to the power of 1/3 While you might know that eight to the power of 1/3 is

equal to the cube root or a third root and if I break this eight into its factors we will get to times two times two. And that is equal to two to the power of three to the cube root, which is just going to be equal to two, write two times two times two is equal to eight. So maybe I'll take a step back, and I'll rewrite this as two to the power of three in brackets. The exponent fraction one over three, and that's going to be equal to two to the power of three, times one over three, which is just equal to, which is just equal to two.

Let's look at our next problem, we've got one over 32. And it's to the power of one over five. So we could rewrite this as one over 32 to the cube root, or sorry, not the cube root, but to the fifth root. So hence the five right up there. So intuitively, intuitively, you might ask yourself what number multiplied by itself, five times is equal to one over three, two. So let's use some factoring to help us I'm going to rewrite this as one over two, one over two, one over two, one over two, and one over two. Right, if we take one half and multiply it by itself five times, we're going to get one over 32. And I'm then going to rewrite this as

one half to the power of five, rewrite it again, one half, to the power of five. All that in brackets, one over five, which is going to be equal to one half, five times one over five. And the final answer is just equal to one half.

Here's the rule written in a general form. If you have a which has some positive number. And as a positive number, now, I guess we saw that this doesn't necessarily have to be positive could just be a number. N definitely does need to be positive for sure. Then we can go back and forth between the square root version here and the fractional exponent version over here.

Before we end the video, let's go over one more problem together. This one is more challenging, and it's also one that students at university often make mistakes on. So let's go through this and make sure that you really understand how to apply the rules that you've seen over the last few videos. I'm just going to write not correct. Make sure that you don't think that this is actually the right answer. So let's try and solve this properly. Square root of one over 16 plus the that the square root of one over 16 plus one over 25 like so. And we want to work with that The inside of the exponent before we deal with the outside, so we want to apply bad maths

because of course, this is equal to one over 16 plus one over 25 to the power of one half. And now you can see that I've got brackets on the inside. So we're working with the brackets on the inside. And the first thing we want to do is find a common denominator between 16 and 25. And it turns out that they don't have any common factors. So we're going to do the following. We're going to have one over 16. And we're going to multiply it by the denominator value over itself. So that we're doing the same operation to the numerator is the denominator and not changing the answer. plus one over 25, multiply by 16. Over 16. Of course, this whole thing still got the square root on the outside. Now what do we get? We're gonna get 25 plus 16 divided by 425 times four is 100. Times four again, gives us 401 half. And now we've got 41. Over 400, could write a square root like that. Can we simplify this a little bit? Well, you could plug it into your calculator now and come up with a value if we don't want to do that. We could we could divide both. Well, no, we don't can't really do that can't really do very

much. With this. There's no common factors between 41 and 400. But if you plug that into your calculator, you'll find that the answer is correct that the answer to this thing here, way up there is 0.32. If we follow our rules properly

there you have it, you've made it through the end of fractions and exponents. Remember, these topics are fundamental. It's not enough just to kind of know what they are or know 75% You want to know 100% You want to really master them. They come up endlessly again and again and again. And it'll be so much easier for you as a university student. Knowing these rules by heart, I promise you it's a worthwhile investment.