Hi, and welcome back. My name is Anthony Varela, and the topic of this lesson is set notation and interval notation. So we're going to be looking at inequalities on number lines, and we're going to write the solution in set notation and in interval notation, so we're going to see two ways to write the same thing.

So let's start with the set notation first, and here is our number line. We see that it's highlighting all values that's greater than 5, but not including 5. So as a reminder, if we're not including exact values, we write this on the number line using either open circles or curved parentheses.

If we are including exact values, we would write this using closed circles or filled-in circles or square brackets. So we can see here that our number line highlights all x values greater than 5 but not including 5. So to write this in set notation, I would pull up my curly braces that we use to define sets.

And I'll write this, saying all x values such that-- so we have this vertical line that means such that-- and now what's our condition. x has to be greater than 5, so we just write that as an inequality then in our braces. So that is how we write the solution in set notation. So set notation reads, all x such that x is, and then whatever our statement of inequality is.

Let's take a look at another number line. Here we have a range of values going from negative 3 to 4. And we see that we are including negative 3, but we're not including 4. So to write this in set notation, we would have all x such that x is in between negative 3 and 4. And remember, our inequality symbol here has to include or equal to but not here.

Now let's talk about interval notation. So here is the same number line we saw before. It highlights all x values greater than 5, not including 5. So to write this in interval notation, I think about where that highlighted range starts and where it stops.

Well, it starts at 5, and it goes all the way to positive infinity. So now to finish off this in interval notation, I need to use either parentheses or brackets, depending on if I'm including exact values or not. So I'm not including the exact value of 5, so I have my curve parenthesis there.

And then with infinities, we always use curve parentheses there because infinity isn't a defined number. So with interval notation, we always have our starting point and our stopping point. And then we need to enclose them in either square brackets or curve parentheses. Remember, always curved parentheses with infinities.

So looking at our other number line from before, this highlighted range from negative 3 to 4, we are including negative 3 in our solution but not 4. So writing this in interval notation, where does my range start and where does it stop? Well, it starts at negative 3 and goes to 4.

Now what type of brackets or parentheses am I going to use here? Well, I'm including negative 3, so I use my square bracket there. Not including 4, so I have my curve parenthesis there.

I'd like to talk about another type of inequality. This is called an "or" compound inequality. And there's some background about why it's called this. It's a compound inequality because we see more than one range of values highlighted on our number line. So there's more than one inequality at work here.

And we call it an "or" compound inequality because there is no such number that is less than negative 3 and greater than 4. It could only be one or the other. So that's why we call it an "or" compound inequality.

Let's go ahead and write the solution in both set notation and interval notation. Let's start with set notation first. So what I'm going to do first is take my in-- my highlighted ranges individually and write a statement of inequality.

So, here, this is all x values that are less than or equal to negative 3. And this represents all x values that are greater than 4. And I'm going to use these two inequalities to write these in set notation. I just connect them with the word "or."

So this reads, all x values such that x is less than or equal to negative 3, or x is greater than 4. So set notation with "or" compound inequalities would look something like this. How would we write this in interval notation?

Well, let's describe the two intervals that we see. So on the one hand, we see an interval from negative infinity to negative 3. And here we see 4 to positive infinity. And now notice next to my infinities in both cases, I have my parentheses, and I have my square bracket here because we're including negative 3, but I don't have that here because we're not including 4.

So now how do I use these two intervals to write my "or" compound inequality in interval notation? Well, I would just put two these two together using this symbol U, which means union. So I'm taking the union of these two intervals, putting them together. So that's how we can write the solution to "or" compound inequalities in set notation and interval notation.

Let's do some final practice before we wrap up. So we see two number lines here. We're going to write the solution to the first number line in set notation and write the solution to the second bottom number line in interval notation.

So thinking about the top one first, my range of values from negative 12 to 7. So this is all x values that are in between negative 12 and 7. And notice, I'm not including exact values of negative 12 or the exact value of 7. So now to put this in set notation, I just add my curly braces and the x such that x is in between negative 12 and 7.

Let's take a look at the bottom one here. This is an "or" compound inequality again, so we get to use that union symbol, which I think is neat. What are my two intervals?

Well, this goes from negative infinity to 3, and we're not including 3, so I have my parentheses there. My second interval goes from 14 to positive infinity. So I have 14 to positive infinity, including the exact value there, so I have my square brace. And we put in our union symbol to show the union of my two intervals.

So let's review set notation and interval notation. Remember, if you're excluding exact values, you used open circles or parentheses. If you're including exact values, you used filled-in circles or square braces. Set notation reads, all x such that x is blah, blah, blah, blah, blah, fill in your statement of inequality. And we see an example there with our "or" compound inequality.

In interval notation, think about where your interval starts, where it stops, and then think about if you're going to use square brackets or curve parentheses, depending on if you're excluding or including exact values. And with our "or" compound inequality, we use that union symbol to bring together our two intervals. So thanks for watching this tutorial on set notation and interval notation. Hope to see you next time.