Equations and Inequalities I

SUMMARY KEYWORDS
write, equation, english, interval, inequalities, mathematical symbol, symbols, equal, negative, represent, negative infinity, square bracket, mathematical notation, number, language, slides, question, circle, expression, math notation

SPEAKER: Robert McKeown

Hello, and welcome to ALEKS walkthrough video number two. I'm Professor Robert McKeown, and I'm very happy that you decided to check out my video. Today we're going to take a closer look at equations. And we're also going to learn about mathematical notation. We can think of mathematical notation as a language, just like English, or Mandarin, or French is a language. It's the language of mathematics. And so I hope by the end of today's video, or perhaps after a little bit of practice, you'll become comfortable translating English into math notation, and translating math notation back into English. Now, I'm not going to try and cover every single topic. In ALEKS, I'm just going to cover the topics that I feel are most helpful to you. Either because they're important or because they're fundamental. And by learning them, it's easy to go further into more detail. As usual, with these videos, what I expect from you, I expect you to have your pencil paper, you can print out the slides. If you have lots of devices, maybe you want to even write your notes on a second device on a tablet or something like that. Whatever works for you, but I highly recommend you work along with the problems or try the problem first, and then watch the video. So if you're ready, I'm ready. Mathematics has its own language of symbols. These symbols, give you instructions and describe some of the mathematical values and variables that you'll be working with. Like any language, we can translate it into English. If you look at the slide in front of you, you can see some mathematical symbols in the left column, how we would the English expression so how we would actually say these things, and then I've given you a little bit of their meaning. And so I want to take a few moments to explain to you interval and set notation that'll help you answer some of the questions and ALEKS take a moment and familiarize yourself with the table. Looking at the example, I can write this mathematical symbol in English, which I'm going to do for you now this is an interval and four is the low point or the lowest value and the interval runs up to its largest value. And since it really has no upper limit, there is no largest value. We represent that concept with the infinity symbol, right. So infinity symbols are not numbers, infinity symbol represents a concept. No upper limit on this. The next thing I want you to notice is that we have a square bracket. square bracket represents a close bracket. And so what does this mean? This means the interval includes the value for so in English, x is in. Right That's our n symbol the interval for To infinity, where infinity is representing a concept that there's no, there's no upper limit, whatever number however big a number, you can imagine, X can take on that value, there's one more thing I'd like to show you. And that's an alternative way of expressing this thing. Mathematically, and so I could write x is greater than and equal to, or I should say or equal to x is greater than or equal to four. And if I write that, you know, these things are equivalent. So that's an alternative way of writing it. And that's going to come in handy when you look at the problems on ALEKS. And when they ask you to go from an expression like x is

greater than or equal to four to writing the the set or interval notation. Now let's go to the next slide. And let's take a look at the next example. So the table is the same. But the example down here is a little bit different. So let's go through this example. Now, the variable v is in the interval from negative five to negative two. Now, I said that, but what about the round brackets and the square brackets. So now what values can be take on? Well, we've got around bracket. And so v must be larger than negative five. And we've got a square bracket over here. And so v has to be less than or equal to negative two. Now, here I am on ALEKS. And so we have a question from Alex. It says solve the compound inequality. And so we're given two equations. This time, both equations have X as the unknown variable. And then we're told write this solution in interval notation. If there is no solution to these two inequalities, enter that funny looking zero, or that circle with a line through it, which is our null set, also sometimes called the empty set. Now you are going to work on this problem on a piece of paper, I'm going to take us back to our slides. And so here we are in the slides. And we want to write the solution to this in interval notation. So we'll start with this equation on the left hand side, I've got three X, I'll subtract six of both sides of the equation. So I'll just write that as we have x must be less than six. Now let's take a look at our other expression. So I see I've got a two x minus two on the left hand side, I'm going to add two to both sides of the equation. So I'm going to have two x is less than or equal to negative eight plus two. So that gives me two x is less than or equal to negative six, and x is less than or equal to divide in both sides of the equation by two, I get negative three. Now, the question had a very important instruction, very important instruction that I have ignored so far, and that is right here. So the question is saying that either the question on the left is correct or true. And the question on the right is, or the question on the right is correct. And true. So x must be less than six, or it must be less than and equal to negative three. So I'll draw a real number line. And I'm going to have six over here, and negative three over there. Now, if I want to start with this equation, now I'm going to write the equation over here. And I'll write this one over here as well. And so you can see that if x is less than six, the inequality is satisfied. But I'm going to draw a circle, an empty circle, here to represent that this is open. And that's an analogy. You can think of that as the an open bracket that we saw previously. Then over here, x can be equal to negative three. So I'm going to draw a solid.to represent it as being closed. So a circle or a dot with hollow in the middle, that's open, solid dots going to be closed. Now we can go over to ALEKS and solve the question or I should say put the answer, ALEKS. Before we move over to ALEKS, though, maybe I should point out to you that, notice that if x is less than or equal to three, then x is also less than six. And since either one of these inequalities has to hold, the correct answer is going to be x must be less than six. And so x is in the set negative infinity to six with a round bracket to represent that x cannot take on the value of six, it's an open set can't take on the value six. So here we are in ALEKS, we have the same question that we're given before. What is the interval here that we're looking for? Well, we know that it's going to be rounded brackets. and the value of x can be as low a number as you can imagine, so I'm going to put a negative infinity symbol in there. And the maximum value it can take on is something just a little bit less than six. And so we represent or I should say, a little bit less than Oh, no, sorry, that was six. any value less than six. Now I'll check my answer. And we got the correct answer on ALEKS. The interval of x is going to be between negative infinity and six but it cannot take on the value six. So we have the rounded bracket.