

module2_lecture2

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So let me give you a couple more examples. This is an example which is kind of related to an example that I did in module one. Remember I talked about the political party which is fighting in an election and that has three constituencies, Hilly Valley and Plain. Right. So more generally, so sorry, just three districts, Hilly, Valley and Plain. More generally think of a constituency which has N districts, right. And let's say we're talking about Party L here. And the number of votes that it receives in District J is V_J . And so there are J districts. Sorry, there are N districts. So J runs from one, this is district one, two, so on up to N . And now, suppose I want to know, what's the total number of votes that Party L receives in that whole constituency? So what I have to do is, I have to add up the votes that it gets in each district. So what I have to do is I have to look at district one, how many votes does it get? That's V_1 ? How many votes does it get in district two? That is V_2 . How many does it get in V_3 , and so on? And how many does it get in district N , that's V_N . Now, see, this is a summation. And again, I can use my summation notation to denote this much more succinctly. So what am I going to do? I'm going to use the sigma notation here. And I'm adding up, what am I adding up? I'm adding up the votes that it gets in each district. So that's V_J . And where does this index run from? It runs from J equal to one, that's district one, up to N , because that's the last district. So this is the summation notation for this term here.

One thing to note, note here, right? So in the previous example, I had used i as my index. But now I'm using J as my index. It doesn't matter, because, see J is a running variable, right? All it's telling you is that J , when J is one, this is this, when J is two, it's this, when J is three it's this. I could have used anything as the index variable, right? So for example, this is the same as instead of V_J , I could have said V_K . And K is running from one through N . So it doesn't matter what I call the index, what it just denotes, is that this where is it starting from? Where is it ending? So let's do one more example. And so suppose I wanted to know what's what was the total number of COVID cases last year. So what I'm going to do is I'm going to look at the number of cases in January, number of cases in February, March, April and so on, right. So, if I call January as month one, right, February as month two, March as month three, right, and up to December as month 12. So, the total number of COVID cases will just be N_1 plus N_2 plus N_3 plus so on up to N_{12} . And how can I denote this as a simple summation? Again, I'm going to use the summation notation. What am I adding, that second thing, what am I

adding up over? $\sum_{T=1}^{12} N_T$ right? So $\sum_{T=1}^{12} N_T$ is the number of COVID cases in month T. And where does this index run from? It runs from, starts at 1 ends up at 12. So, so the total number of COVID cases is just, can be denoted by this summation notation here.

Now, you, it may not be that you want to know the total number of COVID cases over the entire year, maybe you only want to know the number of cases only in the second half of the year. Only between months July to December. So, in that case, what are you going to do? Right, I'm going to only add up the cases in July, which is month 7, plus month 8, and so on, up to month 12. And how can I denote this again, in the summation notation? I do summation $\sum_{T=7}^{12} N_T$. But see where T starts from now, it starts at 7. So it starts at T equal to 7. And where does it end? It ends at 12. So, it ends at 12. So, the number of total COVID cases in July to December can be denoted by the summation. So, your index need not always start from 1, it can start from 7, right, depending on what you're trying to add. So, this is the essence of the summation notation. So, hope you've got an initial understanding of this. And just to test this out a little bit, let me give you a clicker question at this point. And the question is, again, just related to the example that we just did that which of the following expressions denote the, denotes the total number of COVID cases last year during the summer months? That is the months of June, July and August? So please stop the video at the stage and try out the clicker question.

So hope you got a chance to do the clicker question and hopefully, it wasn't too difficult. So what it asks you is the number, the total number of COVID cases over the months, June through August? So June is month 6, so I want to know, N_6 plus N_7 , that's July, plus N_8 , which is August. And how do I denote the summation of just these three terms using the summation notation? So this will be summation $\sum_{T=6}^8 N_T$. And where does T start from? It starts from 6 and ends up in 8. So the correct clicker, correct answer to the clicker question here is C. So let's stop this clip here. And I'll pick up on the summation notation in the next video.