

# module2\_lecture9

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## SUMMARY KEYWORDS

clicker question, term, formula, seats, series, stadium, arithmetic, add, divided, increase, arise, gauss, complexity, tier, reiterate, how many, case, previous, means, sum

## SPEAKERS

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Okay, let's do one more example which makes use of this Gauss' formula. So think of a stadium which is tiered in the sense that the seats increase their tiers, and in each tier, the number of seats increase, right? So what I mean is a stadium like this. So let's say it starts off with 6 seats. And in every tier, the number of seats goes up by 4, let's say, okay. So tier one has 6 seats, and each tier this is, is plus 4. And the question is, how many seats in total? So what we are doing here is add, starting from 6, next one will be 10. Next tier will be 14, and so on.

So what's the last term? So remember, we started out with 6, right, and there are 9 more other tiers, in which there is an increase of 4 each. So that means the last tier, we'll have 9 times 4, that's 36 more seats than the first tier. So the last tier we'll have 42 seats. So the question then is, what's the sum from 6 through 42. So that's, that's what we need to find out. Now, again, let's make use of Gauss' formula. First term, last term, so that's 6 plus 42, times the number of terms, there are 10 tiers, so the number of terms here is 10 divided by 4. So that will be the total. So that's again, 10 divided by 4 times 48. So let's do 2 and 24. So that's 240. So this is the total number of seats in the stadium.

So just to finish up this section on Gauss' formula, let me just reiterate some of the terms. So here we're talking about an arithmetic series where you're adding, to get the next term in this in the series, what do you do is add a constant, right, so the next term is one more than the previous term, or the next term is four more than the previous term, but it's that same constant. So in the case of this stadium, each term increases by four, this is four, this is four, this is four, and so on. In Kim's case, each term was greater than the previous term by one. So that's the idea again of an arithmetic series. And the formula for the general formula for finding the sum of such an arithmetic series is either the first term plus the last term times the number of terms divided by two. So this is a simple enough formula. Sometimes the only, if you remember the formula, the only trick, the only kind of complexity that may arise, a little wrinkle that may arise, is to find out, to figure out the number of terms, right? So for example, if you're trying to look at this, adding up from 33 to 60, where it's increased by 3, so 33, 36, 39, so on, right, and you're trying to figure out how many terms are I adding in there. So, so one easy way that I find out is that if, if you look at the series, like here, so this is a trick, which sometimes works to figure out the number of terms. So see, if we look at all of

these terms, they're all, the common factor is 3. So if I take that out, so I'm doing 11 plus 12, plus so on up to 20. So what that means is that there are 10 terms here. And if I want to figure out the summation, so it's 10 terms divided by 2, multiplied by first term plus last term, which is 33 plus 60. Right? So this is 5 times 93. And that's 5 3's are 15, 5 times a 45, and 46.

Okay, so, so that's how you add an arithmetic series. So next, what I have for you is a clicker question. So please stop the video at this stage, and try the clicker question on your own. Okay, so hope we were able to do the clicker question. So what it asks you to do is add up the numbers 4, 8, 12, so on up 100. So again, we're going to make use of Gauss' formula. It's 4, and that's the first term, plus the last term which is 100, times the number of terms divided by 2. And the only little complexity here, it's not even a complexity. But in case, the only question that may arise is how many terms are there. And again, the easiest way to look at it is that if I take 4 outside, the common factor 4 outside, then this is 1 plus 2 plus 3, so on up to 25. So what that means is that there are 25 terms, right? So this is going to be number of terms is 25. So we just have to figure that out, right? So that it's 25 over 2 times 104. So let's cancel that, that's 52. And then, so 25 times 2 is 50. So 5 carried over 25 times 5 is 125 plus 5, that's 130. So the answer to this clicker question is 1300. So what, so what so far we have done is looked at the arithmetic series. Again, to reiterate, the definition of that is, is that when the next term increases by a particular number each time. So in this clicker question, the next term is 4 more than the previous one, and so on. And we saw this formula for adding up a set of numbers like that. It's first plus last term times the number of terms divided by two. So let's stop this clip here. And in the next clip, we'll be looking at a different type of series, which is called the geometric series.