

Subject n° 8bis

SEQUENCES

Please don't write on the exam paper and don't forget to give back the examination paper at the end of the test.

In most theatres, you have more seats in the rows towards the back and fewer seats in the rows up front as the room narrows towards the stage. Imagine having to clean up after a performance attended by children who were all given huge bags of popcorn. You need to plan the amount of time to do the job.

1. The theatre at a local civic centre has 13 seats in the first 3 rows, 15 in the next 3 rows, and the number of seats increases by 2 seats every third row until there are a total of 45 rows in the theatre. How many seats are there?
2. You start the job needing 30 seconds for the first seat. But the more you clean up, the quicker you get, so to finish one seat you need 1% less time than to finish the previous one. Calculate the total amount of time you will need to clean up the whole theatre. Round your answer to the nearest minute.

NB : $1 + 2 + 3 + \dots + n = \frac{n(n+1)}{2}$ and, for $q \neq 1$: $1 + q + q^2 + \dots + q^n = \frac{1 - q^{n+1}}{1 - q}$.