## Question 1

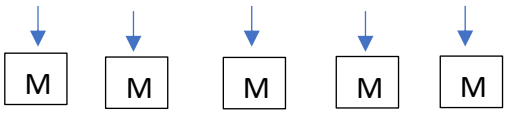
Counting the numbers occurrences of each letter S, N, A, K, E, as $n_s, n_n, n_a, n_k, n_e$ in the original sequence. And the string has a number of n letters.

Let $M = min\{n_s, n_n, n_a, n_k, n_e\}$

Clearly, the level of venom $L \leq M$

Then, try to delete some of the letters we can get sequence:

{S S … S N N … N A A … A K K … K E E … E}




It is an example, maybe the sequence of the same letters would not in this order.

Firstly, try L = M, delete some letters and become the figure above, if succeed, the maximum venom = M

Else, if is cannot delete like the figure, we try to use binary search to find the optimal solution.

For Example, we first take $L = \left\lceil \frac{1}{2} M \right\rceil$ and try to delete the letters.

According to binary search,

If $L = \left\lceil \frac{1}{2} M \right\rceil$ works, take $L = \left\lceil \frac{3}{4} M \right\rceil$

If $L = \left\lceil \frac{1}{2} M \right\rceil$ not works, try $L = \left\lceil \frac{1}{4} M \right\rceil$

If $L = \left\lceil \frac{3}{4} M \right\rceil$ works try to check the $L = \left\lceil \frac{7}{8} M \right\rceil$, else check the $L = \left\lceil \frac{5}{8} M \right\rceil$

…..

And so on, until we can get the optimal solution.

As the binary search's time complexity is $O(logn)$ and the string has n letters, this algorithm runs in $O(nlogn)$.