

Shell sort uses a series of increments and then sorts the list by repeatedly comparing  $i$  and  $i - inc$ . Its comparisons push larger elements to the top, and its  $O(n \cdot q)$  ( $q$  average number of swaps) time comparison cycles. with  $O(\log n)$  cycles gives  $O(qn \log n)$  time, uses  $O(1)$  auxiliary memory, but is unstable. Now, how about  $q$ ? It'll land in the middle of the elements on average (due to each cycle being a set of repeated insertion sorts). So, it's roughly  $O(n/s)$ ,  $s$  being the cycle size. This means it's actually  $O(n^2)$ . Its grade is **C** due to this time complexity.