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### Worst Case Analysis

- Heapsort
  - Heapsort is “extremely consistent” in the runtime from worst to average.  
When you make the array to be in heap order you make it set in a priority format. Thus running the percolates as  $n/2$  doesn't change much with regards to the order. After which, so does the deleting max would still be consistent and thus a worst case cannot easily be differentiated. So the big O notation would always be around  $O(n \lg n)$ .
- Mergesort
  - Mergesort is dependent on the relative costs of comparing elements and moving into an array. The divide and conquer technique is always going to break down the array so there is virtually no difference in different arrays.  
With the number of comparisons when being  $n$  it will always be big O of  $n \lg n$ .
- Quicksort
  - Quick sort relies on the array being generally random. At the worst case the pivot would end up on the smallest element. This generally would occur when you have a sorted or reverse-sorted array. Making the quicksort function swap after traversing the whole array to find the elements. Worst case is  $O(n^2)$ .