# Sorting Algorithms

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**Basic :**

1. [Sorting Terminology](https://www.geeksforgeeks.org/sorting-terminology/)
2. [Stability in sorting algorithms](https://www.geeksforgeeks.org/stability-in-sorting-algorithms/)
3. [Time complexities of Standard Sorting Algorithms](https://www.geeksforgeeks.org/time-complexities-of-all-sorting-algorithms/)
4. [External Sorting](https://www.geeksforgeeks.org/external-sorting/)

**Sorting Algorithms :**

1. [Selection Sort](https://www.geeksforgeeks.org/selection-sort/)
2. [Bubble Sort](https://www.geeksforgeeks.org/bubble-sort/)
3. [Recursive Bubble Sort](https://www.geeksforgeeks.org/recursive-bubble-sort/)
4. [Insertion Sort](https://www.geeksforgeeks.org/insertion-sort/)
5. [Recursive Insertion Sort](https://www.geeksforgeeks.org/recursive-insertion-sort/)
6. [Merge Sort](https://www.geeksforgeeks.org/merge-sort/)
7. [Iterative Merge Sort](https://www.geeksforgeeks.org/iterative-merge-sort/)
8. [Quick Sort](https://www.geeksforgeeks.org/quick-sort/)
9. [Iterative Quick Sort](https://www.geeksforgeeks.org/iterative-quick-sort/)
10. [Heap Sort](https://www.geeksforgeeks.org/heap-sort/)
11. [Counting Sort](https://www.geeksforgeeks.org/counting-sort/)
12. [Radix Sort](https://www.geeksforgeeks.org/radix-sort/)
13. [Bucket Sort](https://www.geeksforgeeks.org/bucket-sort-2/)
14. [ShellSort](https://www.geeksforgeeks.org/shellsort/)
15. [TimSort](https://www.geeksforgeeks.org/timsort/)
16. [Comb Sort](https://www.geeksforgeeks.org/comb-sort/)
17. [Pigeonhole Sort](https://www.geeksforgeeks.org/pigeonhole-sort/)
18. [Cycle Sort](https://www.geeksforgeeks.org/cycle-sort/)
19. [Cocktail Sort](https://www.geeksforgeeks.org/cocktail-sort/)
20. [Strand Sort](https://www.geeksforgeeks.org/strand-sort/)
21. [Bitonic Sort](https://www.geeksforgeeks.org/bitonic-sort/)
22. [Pancake sorting](https://www.geeksforgeeks.org/pancake-sorting/)
23. [Binary Insertion Sort](https://www.geeksforgeeks.org/binary-insertion-sort/)
24. [BogoSort or Permutation Sort](https://www.geeksforgeeks.org/bogosort-permutation-sort/)
25. [Gnome Sort](https://www.geeksforgeeks.org/gnome-sort-a-stupid-one/)
26. [Sleep Sort – The King of Laziness / Sorting while Sleeping](https://www.geeksforgeeks.org/sleep-sort-king-laziness-sorting-sleeping/)
27. [Structure Sorting (By Multiple Rules) in C++](https://www.geeksforgeeks.org/structure-sorting-in-c/)
28. [Stooge Sort](https://www.geeksforgeeks.org/stooge-sort/)
29. [Tag Sort (To get both sorted and original)](https://www.geeksforgeeks.org/tag-sort/)
30. [Tree Sort](https://www.geeksforgeeks.org/tree-sort/)
31. [Cartesian Tree Sorting](https://www.geeksforgeeks.org/cartesian-tree-sorting/)
32. [Odd-Even Sort / Brick Sort](https://www.geeksforgeeks.org/odd-even-sort-brick-sort/)
33. [QuickSort on Singly Linked List](https://www.geeksforgeeks.org/quicksort-on-singly-linked-list/)
34. [QuickSort on Doubly Linked List](https://www.geeksforgeeks.org/quicksort-for-linked-list/)
35. [3-Way QuickSort (Dutch National Flag)](https://www.geeksforgeeks.org/3-way-quicksort-dutch-national-flag/)
36. [Merge Sort for Linked Lists](https://www.geeksforgeeks.org/merge-sort-for-linked-list/)
37. [Merge Sort for Doubly Linked List](https://www.geeksforgeeks.org/merge-sort-for-doubly-linked-list/)
38. [3-way Merge Sort](https://www.geeksforgeeks.org/3-way-merge-sort/)

**Library Implementations of Sorting Algorithms :**

1. [Know Your Sorting Algorithm | Set 1 (Sorting Weapons used by Programming Languages)](https://www.geeksforgeeks.org/know-sorting-algorithm-set-1-sorting-weapons-used-programming-languages/)
2. [Know Your Sorting Algorithm | Set 2 (Introsort- C++’s Sorting Weapon)](https://www.geeksforgeeks.org/know-your-sorting-algorithm-set-2-introsort-cs-sorting-weapon/)
3. [Comparator function of qsort() in C](https://www.geeksforgeeks.org/comparator-function-of-qsort-in-c/)
4. [sort() in C++ STL](https://www.geeksforgeeks.org/sort-c-stl/)
5. [C qsort() vs C++ sort()](https://www.geeksforgeeks.org/c-qsort-vs-c-sort/)
6. [Arrays.sort() in Java with examples](https://www.geeksforgeeks.org/arrays-sort-in-java-with-examples/)
7. [Collections.sort() in Java with Examples](https://www.geeksforgeeks.org/collections-sort-java-examples/)

**Misc :**

1. [Asymptotic Analysis and comparison of sorting algorithms](https://www.geeksforgeeks.org/asymptotic-analysis-comparison-sorting-algorithms/)
2. [Hoare’s vs Lomuto partition scheme in QuickSort](https://www.geeksforgeeks.org/hoares-vs-lomuto-partition-scheme-quicksort/)
3. [Serial Sort v/s Parallel Sort in Java](https://www.geeksforgeeks.org/serial-sort-vs-parallel-sort-java/)
4. [An Insertion Sort time complexity question](https://www.geeksforgeeks.org/insertion-sort-time-complexity-question/)
5. [Time complexity of insertion sort when there are O(n) inversions?](https://www.geeksforgeeks.org/time-complexity-insertion-sort-inversions/)
6. [Lower bound for comparison based sorting algorithms](https://www.geeksforgeeks.org/lower-bound-on-comparison-based-sorting-algorithms/)
7. [Which sorting algorithm makes minimum number of memory writes?](https://www.geeksforgeeks.org/which-sorting-algorithm-makes-minimum-number-of-writes/)
8. [When does the worst case of Quicksort occur?](https://www.geeksforgeeks.org/when-does-the-worst-case-of-quicksort-occur/)
9. [Can QuickSort be implemented in O(nLogn) worst case time complexity?](https://www.geeksforgeeks.org/can-quicksort-implemented-onlogn-worst-case-time-complexity/)
10. [QuickSort Tail Call Optimization (Reducing worst case space to Log n )](https://www.geeksforgeeks.org/quicksort-tail-call-optimization-reducing-worst-case-space-log-n/)
11. [Why Quick Sort preferred for Arrays and Merge Sort for Linked Lists?](https://www.geeksforgeeks.org/why-quick-sort-preferred-for-arrays-and-merge-sort-for-linked-lists/)
12. [Where is Heap Sort used practically?](https://www.geeksforgeeks.org/where-is-heap-sort-used-practically/)
13. [Find memory conflicts among multiple threads](https://www.geeksforgeeks.org/find-memory-conflicts-among-multiple-threads/)

**Coding Problems :**

1. [Sort elements by frequency | Set 1](https://www.geeksforgeeks.org/sort-elements-by-frequency/)
2. [Sort elements by frequency | Set 2](https://www.geeksforgeeks.org/sort-elements-by-frequency-set-2/)
3. [Count Inversions in an array | Set 1 (Using Merge Sort)](https://www.geeksforgeeks.org/counting-inversions/)
4. [Sort an array of 0s, 1s and 2s](https://www.geeksforgeeks.org/sort-an-array-of-0s-1s-and-2s/)
5. [Find the Minimum length Unsorted Subarray, sorting which makes the complete array sorted](https://www.geeksforgeeks.org/minimum-length-unsorted-subarray-sorting-which-makes-the-complete-array-sorted/)
6. [Find whether an array is subset of another array | Added Method 3](https://www.geeksforgeeks.org/find-whether-an-array-is-subset-of-another-array-set-1/)
7. [Sort a nearly sorted (or K sorted) array](https://www.geeksforgeeks.org/nearly-sorted-algorithm/)
8. [Sort numbers stored on different machines](https://www.geeksforgeeks.org/sort-numbers-stored-on-different-machines/)
9. [Sort a linked list of 0s, 1s and 2s](https://www.geeksforgeeks.org/sort-a-linked-list-of-0s-1s-or-2s/)
10. [A Pancake Sorting Problem](https://www.geeksforgeeks.org/a-pancake-sorting-question/)
11. [Find number of pairs (x, y) in an array such that x^y > y^x](https://www.geeksforgeeks.org/find-number-pairs-xy-yx/)
12. [Count all distinct pairs with difference equal to k](https://www.geeksforgeeks.org/count-pairs-difference-equal-k/)
13. [C Program for Bubble Sort on Linked List](https://www.geeksforgeeks.org/c-program-bubble-sort-linked-list/)
14. [Sort n numbers in range from 0 to n^2 – 1 in linear time](https://www.geeksforgeeks.org/sort-n-numbers-range-0-n2-1-linear-time/)
15. [C Program to Sort an array of names or strings](https://www.geeksforgeeks.org/c-program-sort-array-names-strings/)
16. [Sort an array according to the order defined by another array](https://www.geeksforgeeks.org/sort-array-according-order-defined-another-array/)
17. [Given a sorted array and a number x, find the pair in array whose sum is closest to x](https://www.geeksforgeeks.org/given-sorted-array-number-x-find-pair-array-whose-sum-closest-x/)
18. [Sort an array in wave form](https://www.geeksforgeeks.org/sort-array-wave-form-2/)
19. [Check if any two intervals overlap among a given set of intervals](https://www.geeksforgeeks.org/check-if-any-two-intervals-overlap-among-a-given-set-of-intervals/)
20. [How to efficiently sort a big list dates in 20’s](https://www.geeksforgeeks.org/how-to-efficiently-sort-a-big-list-dates-in-20s/)
21. [Sort an almost sorted array where only two elements are swapped](https://www.geeksforgeeks.org/sort-an-almost-sorted-array-where-only-two-elements-are-swapped/)
22. [Find the point where maximum intervals overlap](https://www.geeksforgeeks.org/find-the-point-where-maximum-intervals-overlap/)
23. [Sort a linked list that is sorted alternating ascending and descending orders?](https://www.geeksforgeeks.org/how-to-sort-a-linked-list-that-is-sorted-alternating-ascending-and-descending-orders/)
24. [C++ program for Sorting Dates using Selection Sort](https://www.geeksforgeeks.org/c-program-for-sorting-dates-using-selection-sort/)
25. [How to sort an array of dates in C/C++?](https://www.geeksforgeeks.org/how-to-sort-an-array-of-dates-in-cc/)
26. [Sorting Strings using Bubble Sort](https://www.geeksforgeeks.org/sorting-strings-using-bubble-sort-2/)
27. [Maximum product of a triplet (subsequnece of size 3) in array](https://www.geeksforgeeks.org/find-maximum-product-of-a-triplet-in-array/)
28. [Find missing elements of a range](https://www.geeksforgeeks.org/find-missing-elements-of-a-range/)
29. [Find a permutation that causes worst case of Merge Sort](https://www.geeksforgeeks.org/find-a-permutation-that-causes-worst-case-of-merge-sort/)
30. [Minimum sum of two numbers formed from digits of an array](https://www.geeksforgeeks.org/minimum-sum-two-numbers-formed-digits-array/)
31. [Find minimum difference between any two elements](https://www.geeksforgeeks.org/find-minimum-difference-pair/)
32. [Convert an array to reduced form | Set 1 (Simple and Hashing)](https://www.geeksforgeeks.org/convert-an-array-to-reduced-form-set-1-simple-and-hashing/)
33. [Sorting Vector of Pairs in C++ | Set 1 (Sort by first and second)](https://www.geeksforgeeks.org/sorting-vector-of-pairs-in-c-set-1-sort-by-first-and-second/)
34. [Sorting Vector of Pairs in C++ | Set 2 (Sort in descending order by first and second)](https://www.geeksforgeeks.org/sorting-vector-of-pairs-in-c-set-2-sort-in-descending-order-by-first-and-second/)
35. [Sorting 2D Vector in C++ | Set 1 (By row and column)](https://www.geeksforgeeks.org/sorting-2d-vector-in-c-set-1-by-row-and-column/)
36. [Sorting 2D Vector in C++ | Set 2 (In descending order by row and column)](https://www.geeksforgeeks.org/sorting-2d-vector-in-c-set-2-in-descending-order-by-row-and-column/)
37. [Sorting 2D Vector in C++ | Set 3 (By number of columns)](https://www.geeksforgeeks.org/sorting-2d-vector-c-set-3-number-columns/)
38. [Find Surpasser Count of each element in array](https://www.geeksforgeeks.org/find-surpasser-count-of-each-element-in-array/)
39. [Rearrange positive and negative numbers with constant extra space](https://www.geeksforgeeks.org/rearrange-positive-and-negative-numbers/)
40. [Sort an array according to count of set bits](https://www.geeksforgeeks.org/sort-array-according-count-set-bits/)
41. [Count distinct occurrences as a subsequence](https://www.geeksforgeeks.org/count-distinct-occurrences-as-a-subsequence/)
42. [Minimum number of swaps required to sort an array](https://www.geeksforgeeks.org/minimum-number-swaps-required-sort-array/)
43. [Number of swaps to sort when only adjacent swapping allowed](https://www.geeksforgeeks.org/number-swaps-sort-adjacent-swapping-allowed/)
44. [Minimum swaps to make two arrays identical](https://www.geeksforgeeks.org/minimum-swaps-to-make-two-array-identical/)
45. [Find elements larger than half of the elements in an array](https://www.geeksforgeeks.org/find-elements-larger-half-elements-array/)
46. [Count minimum number of subsets (or subsequences) with consecutive numbers](https://www.geeksforgeeks.org/count-minimum-number-subsets-subsequences-consecutive-numbers/)
47. [Sum of all elements between k1’th and k2’th smallest elements](https://www.geeksforgeeks.org/sum-elements-k1th-k2th-smallest-elements/)
48. [Number of sextuplets (or six values) that satisfy an equation](https://www.geeksforgeeks.org/number-sextuplets-six-values-satisfy-equation/)
49. [Sort an array according to absolute difference with given value](https://www.geeksforgeeks.org/sort-an-array-according-to-absolute-difference-with-given-value/)
50. [Minimize the sum of product of two arrays with permutations allowed](https://www.geeksforgeeks.org/minimize-sum-product-two-arrays-permutations-allowed/)
51. [Position of an element after stable sort](https://www.geeksforgeeks.org/position-element-stable-sort/)
52. [Chocolate Distribution Problem](https://www.geeksforgeeks.org/chocolate-distribution-problem/)
53. [Sort even-placed elements in increasing and odd-placed in decreasing order](https://www.geeksforgeeks.org/sort-even-placed-elements-increasing-odd-placed-decreasing-order/)
54. [Permute two arrays such that sum of every pair is greater or equal to K](https://www.geeksforgeeks.org/permute-two-arrays-sum-every-pair-greater-equal-k/)
55. [Chose k array elements such that difference of maximum and minimum is minimized](https://www.geeksforgeeks.org/k-numbers-difference-maximum-minimum-k-number-minimized/)
56. [Sort an array when two halves are sorted](https://www.geeksforgeeks.org/sort-array-two-halves-sorted/)
57. [Find pair with greatest product in array](https://www.geeksforgeeks.org/find-pair-with-greatest-product-in-array/)
58. [Minimum swap required to convert binary tree to binary search tree](https://www.geeksforgeeks.org/minimum-swap-required-convert-binary-tree-binary-search-tree/)
59. [K-th smallest element after removing some integers from natural numbers](https://www.geeksforgeeks.org/k-th-smallest-element-removing-integers-natural-numbers/)
60. [Check whether Arithmetic Progression can be formed from the given array](https://www.geeksforgeeks.org/check-whether-arithmetic-progression-can-formed-given-array/)
61. [Bucket Sort To Sort an Array with Negative Numbers](https://www.geeksforgeeks.org/bucket-sort-to-sort-an-array-with-negative-numbers/)
62. [Possible to form a triangle from array values](https://www.geeksforgeeks.org/possible-form-triangle-array-values/)
63. [Maximum difference between frequency of two elements such that element having greater frequency is also greater](https://www.geeksforgeeks.org/maximum-difference-between-frequency-of-two-elements-such-that-element-having-greater-frequency-is-also-greater/)
64. [Check if reversing a sub array make the array sorted](https://www.geeksforgeeks.org/check-reversing-sub-array-make-array-sorted/)
65. [Find all triplets with zero sum](https://www.geeksforgeeks.org/find-triplets-array-whose-sum-equal-zero/)
66. [Sort a Matrix in all way increasing order](https://www.geeksforgeeks.org/sort-matrix-way-increasing-order/)
67. [Sort array after converting elements to their squares](https://www.geeksforgeeks.org/sort-array-converting-elements-squares/)
68. [Sort all even numbers in ascending order and then sort all odd numbers in descending order](https://www.geeksforgeeks.org/sort-even-numbers-ascending-order-sort-odd-numbers-descending-order/)
69. [Sorting Big Integers](https://www.geeksforgeeks.org/sorting-big-integers/)
70. [Sort an array of large numbers](https://www.geeksforgeeks.org/sort-array-large-numbers/)
71. [Sort 3 Integers without using if condition or using only max() function](https://www.geeksforgeeks.org/sort-3-integers-without-using-condition-using-max-function/)
72. [Minimum difference between max and min of all K-size subsets](https://www.geeksforgeeks.org/minimum-difference-max-min-k-size-subsets/)
73. [Minimum swaps to reach permuted array with at most 2 positions left swaps allowed](https://www.geeksforgeeks.org/minimum-swaps-reach-permuted-array-2-positions-left-swaps-allowed/)
74. [Convert an array to reduced form | Set 2 (Using vector of pairs)](https://www.geeksforgeeks.org/convert-array-reduced-form-set-2-using-vector-pairs/)
75. [Find sum of non-repeating (distinct) elements in an array](https://www.geeksforgeeks.org/find-sum-non-repeating-distinct-elements-array/)
76. [Minimum sum of absolute difference of pairs of two arrays](https://www.geeksforgeeks.org/minimum-sum-absolute-difference-pairs-two-arrays/)
77. [Find the largest multiple of 3 from array of digits | Set 2 (In O(n) time and O(1) space)](https://www.geeksforgeeks.org/find-largest-multiple-3-array-digits-set-2-time-o1-space/)
78. [Noble integers in an array (count of greater elements is equal to value)](https://www.geeksforgeeks.org/noble-integers-in-an-array-count-of-greater-elements-is-equal-to-value/)
79. [Find maximum height pyramid from the given array of objects](https://www.geeksforgeeks.org/find-maximum-height-pyramid-from-the-given-array-of-objects/)
80. [Program to check if an array is sorted or not (Iterative and Recursive)](https://www.geeksforgeeks.org/program-check-array-sorted-not-iterative-recursive/)
81. [Smallest Difference Triplet from Three arrays](https://www.geeksforgeeks.org/smallest-difference-triplet-from-three-arrays/)
82. [Smallest Difference pair of values between two unsorted Arrays](https://www.geeksforgeeks.org/smallest-difference-pair-values-two-unsorted-arrays/)
83. [Find whether it is possible to make array elements same using one external number](https://www.geeksforgeeks.org/find-whether-possible-make-array-elements-using-one-external-number/)
84. [Sort an array of strings according to string lengths](https://www.geeksforgeeks.org/sort-array-strings-according-string-lengths/)
85. [Check if it is possible to sort an array with conditional swapping of adjacent allowed](https://www.geeksforgeeks.org/check-possible-sort-array-conditional-swapping-adjacent-allowed/)
86. [Sort an array after applying the given equation](https://www.geeksforgeeks.org/sort-array-applying-given-equation/)
87. [Print array of strings in sorted order without copying one string into another](https://www.geeksforgeeks.org/print-array-strings-sorted-order-without-copying-one-string-another/)
88. [Sort elements on the basis of number of factors](https://www.geeksforgeeks.org/sort-elements-basis-number-factors/)