

Section 1: Normal Binary Search (Easy)

These problems require straightforward application of binary search on a sorted array.

Q1. Binary Search Given a sorted array of integers, find the index of a target element. Return -1 if not found.  LeetCode: <https://leetcode.com/problems/binary-search/>

Q2. Search Insert Position Given a sorted array and a target, return the index if found, else return the index where it would be inserted.  LeetCode: <https://leetcode.com/problems/search-insert-position/>

Q3. First and Last Position of Element in Sorted Array Find the starting and ending position of a given target in a sorted array.  LeetCode: <https://leetcode.com/problems/find-first-and-last-position-of-element-in-sorted-array/>

Q4. Count Occurrences in a Sorted Array Given a sorted array, count how many times a given element appears.  GFG: <https://www.geeksforgeeks.org/count-occurrences-in-a-sorted-array/>

Q5. Floor and Ceil in Sorted Array Find the floor (largest element $\leq x$) and ceil (smallest element $\geq x$) of a given number in a sorted array.  GFG: <https://www.geeksforgeeks.org/floor-in-a-sorted-array/>

Section 2: Binary Search on Rotated Sorted Array (Medium)

These problems involve applying binary search when the sorted array has been rotated at some pivot.

Q1. Search in Rotated Sorted Array Given a rotated sorted array with distinct values, search for a target element.  LeetCode: <https://leetcode.com/problems/search-in-rotated-sorted-array/>

Q2. Find Minimum in Rotated Sorted Array Find the minimum element in a rotated sorted array.  LeetCode: <https://leetcode.com/problems/find-minimum-in-rotated-sorted-array/>

Q3. Search in Rotated Sorted Array II (with duplicates) Same as Q1 but the array may contain duplicate values. How does this affect your approach?  LeetCode: <https://leetcode.com/problems/search-in-rotated-sorted-array-ii/>

Q4. Find Rotation Count Given a rotated sorted array, find how many times it has been rotated.  GFG: <https://www.geeksforgeeks.org/find-rotation-count-rotated-sorted-array/>

Q5. Find the Pivot / Rotation Point Find the index of the pivot element (the largest element before rotation) in a rotated sorted array.  GFG:

<https://www.geeksforgeeks.org/find-the-rotation-point-in-a-sorted-rotated-array/>

Section 3: Binary Search on Answer (Hard)

These problems don't search in an array directly. Instead, you binary search over the answer space and use a check/feasibility function.

Q1. Koko Eating Bananas Find the minimum eating speed such that Koko can eat all bananas within h hours.  LeetCode: <https://leetcode.com/problems/koko-eating-bananas/>

Q2. Aggressive Cows (Classic Problem) Place C cows in N stalls such that the minimum distance between any two cows is maximized.  GFG:

<https://www.geeksforgeeks.org/aggressive-cows-problem-binary-search/>  SPOJ:
<https://www.spoj.com/problems/AGGRCOW/>

Q3. Book Allocation Problem Allocate books to M students such that the maximum pages assigned to a student is minimized.  GFG:

<https://www.geeksforgeeks.org/allocate-minimum-number-pages/>  LeetCode (similar):
<https://leetcode.com/problems/split-array-largest-sum/>

Q4. Median of Two Sorted Arrays Find the median of two sorted arrays of different sizes in $O(\log(\min(n,m)))$ time.  LeetCode:

<https://leetcode.com/problems/median-of-two-sorted-arrays/>

Q5. Minimize Maximum Distance to Gas Station Given gas station positions, add K more stations to minimize the maximum gap between consecutive stations.  LeetCode:

<https://leetcode.com/problems/minimize-max-distance-to-gas-station/>