

Pattern-3 (Array Rotation Matching)

Array Rotation means shifting elements circularly

- Left rotation - elements move left, first goes to end
- Right rotation - elements move right, last goes to front.

Rotation is circular, not linear

When to use-

- Circular shifting (left/right)
- Rotated arrays
- Checking rotated sorted order
- Shifting by k positions
- Wrap-around behaviour

Time Complexity - $O(n)$

Space Complexity - $O(1)$

Core techniques used - Used for rotating array in-place

→ Right rotate by k - Reverse entire array
Reverse first k elements
Reverse remaining element

This is why Reverse array pattern comes before Rotate

→ Modulo Handling - Always do - $k = k \% n$
(prevents extra rotation)

→ One liner Interview - "Array rotation problems uses circular shifting, often optimized using the reverse techniques to achieve $O(n)$ time and $O(1)$ space

→ Questions on Day 11 on Array Rotation in skillians sheet.

Important in this pattern (Algo)-

A Right rotate by K (Logic)

reverse (arr, 0, $n-1$)

reverse (arr, 0, $K-1$)

reverse (arr, K , $n-1$)

B Left rotate by K

reverse (arr, 0, $K-1$)

reverse (arr, K , $n-1$)

reverse (arr, 0, $n-1$)