1. Which data structure is commonly used to implement a frequency array?
   1. **Array**
   2. Linked list
   3. Stack
   4. Queue
2. What does a frequency array store?
   1. **Count of occurrences of elements**
   2. Prefix sum of elements
   3. Maximum subarray sum
   4. Length of subarrays
3. Which algorithm uses a prefix array to efficiently compute prefix sums?
   1. Binary search
   2. Kadane's algorithm
   3. Sliding window
   4. **Prefix sum algorithm**
4. What is the time complexity to compute prefix sums using a prefix array?
   1. O(1)
   2. **O(n)**
   3. O(log n)
   4. O(n log n)
5. Which problem can be efficiently solved using prefix sums?
   1. **Finding the maximum subarray sum**
   2. Finding the longest subarray with zero sum
   3. Finding the number of subarrays with a given sum
   4. Finding the smallest subarray with a sum greater than a given value
6. In the sliding window technique, what does the window represent?
   1. **Subarray**
   2. Prefix sum
   3. Frequency array
   4. Binary search range
7. What is the advantage of using the sliding window technique?
   1. **It reduces the time complexity of the algorithm.**
   2. It guarantees an optimal solution for any problem.
   3. It simplifies the implementation of prefix arrays.
   4. It eliminates the need for auxiliary data structures.
8. Which algorithm uses the sliding window technique to find the longest subarray with a given sum?
   1. Kadane's algorithm
   2. Binary search algorithm
   3. **Two-pointer algorithm**
   4. Prefix sum algorithm
9. What is the time complexity of the sliding window technique?
   1. O(1)
   2. **O(n)**
   3. O(n log n)
   4. O(n^2)
10. Which of the following is NOT a step in the sliding window technique?
    1. Initialize window boundaries
    2. **Compute prefix sums**
    3. Update the window based on a condition
    4. Compute the maximum or minimum value in the window
11. Which problem can be efficiently solved using the sliding window technique?
    1. Finding the median of an array
    2. **Finding the number of distinct elements in a subarray**
    3. Sorting an array in non-decreasing order
    4. Finding the maximum prefix sum in an array
12. Which algorithm is used to find the smallest subarray with a sum greater than a given value?
    1. Kadane's algorithm
    2. Binary search algorithm
    3. **Two-pointer algorithm**
    4. Prefix sum algorithm
13. Which data structure is commonly used to implement a two-pointer algorithm?
    1. **Array**
    2. Linked list
    3. Stack
    4. Queue
14. What is the time complexity of the two-pointer algorithm?
    1. O(1)
    2. **O(n)**
    3. O(log n)
    4. O(n log n)
15. Which problem can be efficiently solved using the two-pointer algorithm?
    1. Finding the maximum subarray sum
    2. **Finding the longest palindromic substring**
    3. Finding the number of subarrays with a given sum
    4. Finding the smallest subarray with a sum greater than a given value
16. Which algorithm uses two pointers to find the longest palindromic substring?
    1. Kadane's algorithm
    2. Binary search algorithm
    3. **Two-pointer algorithm**
    4. Prefix sum algorithm
17. In the two-pointer algorithm, what do the two pointers represent?
    1. Subarray boundaries
    2. Prefix sum boundaries
    3. Frequency array boundaries
    4. **Indices in the array**
18. What is the advantage of using two pointers in algorithm design?
    1. **It reduces the time complexity of the algorithm.**
    2. It guarantees an optimal solution for any problem.
    3. It simplifies the implementation of prefix arrays.
    4. It eliminates the need for auxiliary data structures.
19. Which problem can be efficiently solved using two pointers?
    1. **Finding the maximum subarray sum**
    2. Finding the longest subarray with zero sum
    3. Finding the number of subarrays with a given sum
    4. Finding the smallest subarray with a sum greater than a given value
20. In the sliding window technique, what is the role of the two pointers?
    1. They define the size of the sliding window.
    2. They keep track of the maximum or minimum value in the window.
    3. **They determine when to expand or shrink the window.**
    4. They compute the prefix sums of the elements in the window.
21. Which problem can be efficiently solved using a frequency array?
    1. Finding the median of an array
    2. **Finding the number of distinct elements in a subarray**
    3. Sorting an array in non-decreasing order
    4. Finding the maximum prefix sum in an array
22. What is the time complexity of computing frequencies using a frequency array?
    1. O(1)
    2. **O(n)**
    3. O(n log n)
    4. O(n^2)
23. Which algorithm uses a frequency array to find the number of distinct elements in a subarray?
    1. Kadane's algorithm
    2. Binary search algorithm
    3. Two-pointer algorithm
    4. **Sliding window algorithm**
24. In the sliding window algorithm, how is the frequency array updated when the window moves?
    1. **The count of the outgoing element is decreased, and the count of the incoming element is increased.**
    2. The count of all elements in the window is recomputed from scratch.
    3. The frequency array is not updated during the sliding window algorithm.
    4. The frequency array is updated only when the window shrinks.
25. What is the time complexity of finding the maximum prefix sum using a frequency array?
    1. O(1)
    2. **O(n)**
    3. O(log n)
    4. O(n log n)
26. Which problem can be efficiently solved using a prefix array?
    1. Finding the median of an array
    2. Finding the number of distinct elements in a subarray
    3. Sorting an array in non-decreasing order
    4. **Finding the maximum prefix sum in an array**
27. What is the time complexity of computing prefix sums using a prefix array?
    1. O(1)
    2. **O(n)**
    3. O(log n)
    4. O(n log n)
28. Which algorithm uses a prefix array to find the maximum prefix sum in an array?
    1. **Kadane's algorithm**
    2. Binary search algorithm
    3. Two-pointer algorithm
    4. Prefix sum algorithm
29. In the prefix sum algorithm, what is the role of the prefix array?
    1. **It stores the prefix sums of elements in the array.**
    2. It stores the maximum prefix sum encountered so far.
    3. It stores the indices of elements in non-decreasing order.
    4. It stores the frequencies of elements in the array.
30. What is the time complexity of finding the smallest subarray with a sum greater than a given value using a sliding window and two pointers?
    1. O(1)
    2. **O(n)**
    3. O(log n)
    4. O(n log n)
31. Which data structure is commonly used to implement a sliding window?
    1. **Array**
    2. Linked list
    3. Stack
    4. Queue