

# ✓ Problem: LeetCode 560 — Subarray Sum Equals K

## 🎯 Goal

Given an array `nums` & an integer `k`, find **total number of subarrays** jinka sum exactly `k` ho.

**Subarray** = continuous elements.

## 💡 Approach Used: Prefix Sum + HashMap

## 🔥 Idea

Prefix Sum store karo, aur check karo:

```
prefix[i] - prefix[j] == k  
→ subarray (j+1 ... i) ka sum k hota hai
```

To simplify:

```
prefix[i] - k = prefix[j]
```

Matlab agar past me koi prefix value mil chuki hai jo `(prefix[i] - k)` ke barabar hai,

to ek valid subarray exists ✓

## ✓ Code (unchanged as you said)

```
class Solution {  
public:  
    int subarraySum(vector<int>& nums, int target) {  
        int n = nums.size();  
        vector<int> pre(n, 0);  
        pre[0] = nums[0];  
        for(int i=1; i<n; i++){  
            pre[i] = nums[i] + pre[i-1];  
        }  
        unordered_map<int,int> mp;  
        int count=0;  
        for(int i=0; i<n; i++){
```

```

if(pre[i]==target) count++;
int x = pre[i] - target;
if(mp.find(x) != mp.end()){
    count += mp[x];
}
mp[pre[i]]++;
}
return count;
};


```

## Explanation (Hinglish)

### Step-by-step

Step	Explanation
1	Prefix sum array banao ( <code>pre[i]</code> stores sum from 0 → i)
2	Map <code>mp</code> store karega: prefixSum → count of how many times seen
3	Iterate array:
4	Agar prefix sum khud <code>k</code> ke equal hai → ek subarray mil gaya from start
5	Compute <code>x = prefix[i] - k</code>
6	Agar <code>x</code> map me hai → wo jitni baar dikha utne valid subarrays
7	Map me prefix count update karo
8	End me <code>count</code> return

## Example Walkthrough

`nums = [1,1,1], k = 2`

i	nums[i]	prefix	prefix-k	map	count
0	1	1	-1	{ } → {1:1}	0
1	1	2	0	{1:1} → {1:1,2:1}	1 
2	1	3	1	{1:1,2:1} → {1:2,2:1,3:1}	2 

Output = 2

## Time & Space Complexity

Complexity	Value
Time	$O(n)$  (efficient)
Space	$O(n)$ for prefix + map

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## ✨ Key Takeaways

- Prefix sum trick + hashmap = best for subarray sum problems.
  - Jab bhi **continuous subarray sum** bole → prefix sum ya sliding window socho.
  - Negative numbers ho toh **sliding window fail** hota, prefix sum required 
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