#### **Burst Balloons In C++**

```
#include <iostream>
#include <climits>
using namespace std;
int sol(int arr∏, int n) {
  int dp[n][n];
  // Initialize the dp array with zeros
  for (int i = 0; i < n; i++) {
     for (int j = 0; j < n; j++) {
        dp[i][j] = 0;
  }
  for (int g = 0; g < n; g++) {
     for (int i = 0, j = g; j < n; i++, j++) {
        int maxCoins = INT_MIN;
        for (int k = i; k \le j; k++) {
          int left = (k == i) ? 0 : dp[i][k - 1];
          int right = (k == j) ? 0 : dp[k + 1]
[j];
          int val = (i == 0 ? 1 : arr[i - 1]) *
arr[k] * (j == n - 1 ? 1 : arr[j + 1]);
          int total = left + right + val;
          maxCoins = max(maxCoins,
total);
        dp[i][j] = maxCoins;
  return dp[0][n - 1];
int main() {
  int arr[] = \{2, 3, 5\};
  int n = sizeof(arr) / sizeof(arr[0]);
  cout \ll sol(arr, n) \ll endl;
  return 0;
}
```

#### Dry Run of sol(arr, 3)

### Given Input:

```
arr[] = \{2, 3, 5\}
n = 3
```

#### Step 1: Initialize DP Table (dp[n][n])

$$dp = \{ \{0, 0, 0\}, \\ \{0, 0, 0\}, \\ \{0, 0, 0\} \}$$

#### Step 2: Iterate Over Gaps (g)

#### Gap g = 0 (Single Balloons)

For g = 0, each cell dp[i][i] represents bursting a single balloon.

i	j	k (only choic e)	Left	Right	Value	dp[i] [j]
0	0	0	0	0	1×2×3 =6	6
1	1	1	0	0	2×3×5 =30	30
2	2	2	0	0	3×5×1 =15	15

## **Updated DP Table:**

$$dp = \{ \{6, 0, 0\}, \\ \{0, 30, 0\}, \\ \{0, 0, 15\} \}$$

#### Gap g = 1 (Two Balloons)

Now we consider **two consecutive balloons**.

Case (i=0, j=1):

k	Left	Right	Value	Total
0	0	30	1×2×5=10	40
1	6	0	1×3×5=15	21

dp[0][1] = max(40, 21) = 40

Case (i=1, j=2):

k	Left	Rig ht	Value	Total
1	0	15	2×3×1=6	21
2	30	0	2×5×1=10	40

dp[1][2] = max(21, 40) = 40

# **Updated DP Table:**

$$dp = \{ \{6, 40, 0\}, \\ \{0, 30, 40\}, \\ \{0, 0, 15\} \}$$

## Gap g = 2 (Full Array)

Now we consider the **entire array** (i=0, j=2).

k	Left (dp[0] [k-1])	Right (dp[k+1] [2])	Value	Total
0	0	40	1×2×1=2	42

k	Left (dp[0] [k-1])	Right (dp[k+1] [2])	Value	Total
1	6	15	1×3×1=3	24
2	40	0	1×5×1=5	45

dp[0][2] = max(42, 24, 45) = 45

## Final DP Table:

### Final Answer:

The function returns dp[0][n-1] = dp[0][2] = 45.

# **Final Output:**

45

Output:-

45