

Aim:**Problem Description:**

Given the weights and values of N objects, place them in a bag with a capacity of W to calculate the bag's maximum possible total value. To put it another way, given are two integer arrays, val[0..N-1] and wt[0..N-1], which, respectively, represent values and weights connected to N items.

Additionally, given an integer W that represents the capacity of a knapsack, determine the largest value subset of val[] such that the total of its weights is less than or equal to W. An item cannot be broken; you must either pick it in its entirety or not at all (0-1 property).

Note: Please take a note that we only have one quantity of each item.

Constraints:

$1 \leq N, W \leq 1000$

$1 \leq \text{val}[i], \text{wt}[i] \leq 1000$

Input Format:

- The first line represents the size of both the arrays N.
- The second line represents the set of elements of val[].
- The third line represents the set of elements of wt[].
- The next line contains an integer representing the knapsack capacity W.

Output Format:

- An integer representing the maximum total value in the knapsack which is smaller than or equal to W.

Sample Test Case:

Input: N = 3, W = 4

values[N] = {1,2,3}

weight[N] = {4,5,1}

Output: 3

Source Code:

maxValueInKnapsack.c

```
#include <stdio.h>

int max(int a, int b){
    return(a>b) ? a:b;
}

int knapsack(int val[],int wt[],int n,int W){
    int dp[n+1][W+1];

    for(int i=0;i<=n;i++){
        for (int w=0;w<=W;w++){
            if(i==0 || w==0)
                dp[i][w]=0;
            else if (wt[i-1]<=w)
                dp[i][w]=max(val[i-1]+dp[i-1][w-wt[i-1]], dp[i-1][w]);
            else
                dp[i][w]=dp[i-1][w];
        }
    }
    return dp[n][W];
}
```

```

    }
}
return dp[n][W];
}

int main(){
    int n,W;
    int val[100],wt[100];

    scanf("%d",&n);
    for(int i=0;i<n;i++)
        scanf("%d",&val[i]);
    for (int i=0;i<n;i++)
        scanf("%d",&wt[i]);
    scanf("%d",&W);

    int result=knapsack(val,wt,n,W);
    printf("%d\n",result);

    return 0;
}

```

Execution Results - All test cases have succeeded!

| Test Case - 1 |
|---------------|
| User Output |
| 3 |
| 1 2 3 |
| 4 5 1 |
| 4 |
| 3 |

| Test Case - 2 |
|---------------|
| User Output |
| 3 |
| 1 2 3 |
| 4 5 6 |
| 3 |
| 0 |