

## With an insertion sort:

### Pseudocode:

```
1. //Insertion Sort:
2.
3.   for i ← 1 to i ≤ size-1 step i++ ←  $\theta(n-1)$ 
4.   do{
5.       j ← I ←  $\theta(1)$ 
6.       While j > 0 and myArr[j-1] > myArr[j] ←  $\theta(n)$ 
7.       do{
8.           temp ← myArr[j] ←  $\theta(1)$ 
9.           myArr[j] ← myArr[j-1] ←  $\theta(1)$ 
10.          myArr[j-1] ← temp; ←  $\theta(1)$ 
11.          j-- ←  $\theta(1)$ 
12.      }
13.  }
```

### Complexity:

Best case of insertion sort is:  $O(n)$ .

Worst case of insertion sort is:  $O(n^2)$

## Code using C programming language:

```
1  #include <stdio.h>
2  #include <stdlib.h>
3
4  int main()
5  {
6      int size; //The number of the array's elements.
7      printf("Enter the size of the array:\t"); //ask for enter the size of an array
8      scanf("%d" , &size); // take the size from the user
9      int myArr[size]; //enter the size of elements
10
11     printf("Enter an element:\t");
12     //Loop to enter the element to array:
13
14     for (int i = 0 ; i < size ; i++)
15     {
16         scanf("%d" , &myArr[i]);
17     } // O(n)
18
19
20     //Insertion Sort:
21
22     for(int i = 1 ; i <= size-1 ; i++)
23     { //O(n)
24         int j = i;
25         while(j > 0 && myArr[j-1] > myArr[j])
26         {
27             int temp = myArr[j];
28             myArr[j] = myArr[j-1];
29             myArr[j-1] = temp;
30             j--;
31         }
32     } //O(n^2)
33
34     int max = myArr[size-1];
35     int count = 0 ; //Counter to count how much the largest number is iterated
36     //now myArr is sorted:
37
38     for (int i = size-1 ; i >= 0 ; i--)
39     {
40         if(max == myArr[i])
41         {
42             count++;
43         }
44     }
45     printf("The Largest number is iterated :   %d" ,count);
46
47
48     return 0;
49 }
50
51
```

## Without a sort method:

### pseudocode:

```
1.  Max ← sizeOfCandy[0]  ← θ(1)
2.  int count ← 1; // in case first element is the largest one  θ(1)
3.
4.  For i ← 1 to i < numberOfCandy step i++ ← θ(n-1)
5.  do{
6.      if sizeOfCandy[i] > max { ← θ(1)
7.          max ← sizeOfCandy[i] ← θ(1)
8.          Count ← 1 ← θ(1)
9.      }
10.     else if (sizeOfCandy[i]==max){
11.         count++ ← θ(1)
12.     }
13. }
14. Print the counter. ← Θ(1)
```

### Complexity:

In the best case:  $O(n)$

In the worst case:  $O(n)$

## Code using C:

```
1  #include <stdio.h>
2  #include <stdlib.h>
3
4  int main() {
5
6      int numberOfCandy;
7      // Enter number of candies
8      printf("Enter number of candies: \t");
9      scanf("%d", &numberOfCandy);
10     // Enter size of candies
11     printf("Enter candies: \t");
12     int sizeOfCandy [numberOfCandy];
13
14     for( int i=0;i<numberOfCandy;i++){
15         printf("Enter the next candy: \t");
16         scanf("%d", &sizeOfCandy[i]);
17     } // o(n)
18
19     int max=sizeOfCandy[0];
20     int count =1; // in case first element is the largest one
21
22     for(int i = 1; i < numberOfCandy; i++){
23         if (sizeOfCandy[i]>max){
24             max = sizeOfCandy[i];
25             count=1; // count from beginning
26         }else if (sizeOfCandy[i]==max){
27             count++;
28         }
29     }
30
31     printf("The number that the largest number has been iterated is :    %d", count);
32     return 0;
33 }
34
```