

Bubble Sort

Exercise

```
class Tester {  
    static int noOfSwaps = 0;  
    static int noOfPasses = 0;  
  
    public static void swap(int[] elements, int firstIndex, int secondIndex) {  
        int temp = elements[firstIndex];  
        elements[firstIndex] = elements[secondIndex];  
        elements[secondIndex] = temp;  
        noOfSwaps++;  
    }  
  
    public static int bubbleSort(int[] elements) {  
        int n = elements.length;  
        boolean swapped;  
        for (int i = 0; i < n - 1; i++) {  
            swapped = false;  
            for (int j = 0; j < n - i - 1; j++) {  
                if (elements[j] > elements[j + 1]) {  
                    swap(elements, j, j + 1);  
                    swapped = true;  
                }  
            }  
            noOfPasses++;  
            System.out.println("After pass " + (i + 1) + ":");  
            displayArray(elements);  
        }  
    }  
}
```

```
        if (!swapped) {  
            break; // If no elements were swapped, array is already sorted  
        }  
    }  
    return noOfPasses;  
}
```

```
public static void displayArray(int[] elements) {  
    for (int element : elements)  
        System.out.print(element + " ");  
    System.out.println();  
}
```

```
public static void main(String[] args) {
```

```
    int[] elements = { 23, 67, 45, 76, 34, 68, 90 };
```

```
    System.out.println("Given array:");
```

```
    displayArray(elements);
```

```
    int noOfPasses = bubbleSort(elements);
```

```
    System.out.println("=====");
```

```
    System.out.println("Total number of passes needed to sort the array: " + noOfPasses);
```

```
    System.out.println("=====");
```

```
    System.out.println("Array after sorting:");
```

```
        displayArray(elements);  
  
    }  
}
```

Output-

```
C:\Users\student\Desktop>java Tester  
Given array:  
23 67 45 76 34 68 90  
After pass 1:  
23 45 67 34 68 76 90  
After pass 2:  
23 45 34 67 68 76 90  
After pass 3:  
23 34 45 67 68 76 90  
After pass 4:  
23 34 45 67 68 76 90  
=====
```

Total number of passes needed to sort the array: 4

```
=====
```

Array after sorting:
23 34 45 67 68 76 90