

# Insertion Sort

## MCQs



**Q1. What is the running time of an insertion sort algorithm if the input is already sorted?**

- a)  $O(N)$
- b)  $O(N \log N)$
- c)  $O(N^2)$
- d)  $O(\log N)$

**Q2. Which of the following examples represent the worst case input for an insertion sort?**

- a) array in sorted order
- b) large array
- c) normal unsorted array
- d) array sorted in reverse order

**Q3. What will the array look like after the fourth pass during sorting it using Insertion sort?**  
**Array elements: 20, 16, 12, 8, 4, 1**

- a) 16, 20, 12, 8, 4, 1
- b) 12, 16, 20, 8, 4, 1
- c) 8, 12, 16, 20, 4, 1
- d) 4, 8, 12, 16, 20, 1

**Q4. How many passes would be required during insertion sort to sort an array of 5 elements?**

- a) 1
- b) Depends on order of elements
- c) 4
- d) 5

**Q5. Which of the following options contain the correct feature of an insertion sort algorithm?**

- a) anti-adaptive
- b) dependable
- c) stable, not in-place
- d) stable, in-place

**ANSWERS:**

1. a)  $O(N)$

**Explanation:** If the input is pre-sorted, the running time is  $O(N)$ , because the test in the inner for loop always fails immediately and the algorithm will run quickly.

2.d) array sorted in reverse order

**Explanation:** The worst case input for an insertion sort algorithm will be an array sorted in reverse order and its running time is quadratic.

3.d) 4, 8, 12, 16, 20, 1

**Explanation:** First pass = 16, 20, 12, 8, 4, 1

Second pass = 12, 16, 20, 8, 4, 1

Third pass = 8, 12, 16, 20, 4, 1

Fourth pass = 4, 8, 12, 16, 20, 1

4. c) 4

**Explanation:** Number of passes =  $n-1$  where  $n$  is the number of elements in the array.

5. d) stable, in-place

**Explanation:** An insertion sort is stable, adaptive, in-place and incremental in nature.

