Summary of the Insertion Sort:

Insertion sort is a simple [sorting algorithm](https://en.wikipedia.org/wiki/Sorting_algorithm) that builds the final [sorted array](https://en.wikipedia.org/wiki/Sorted_array) (or list) one item at a time. It is much less efficient on large lists than more advanced algorithms such as [quicksort](https://en.wikipedia.org/wiki/Quicksort), [heapsort](https://en.wikipedia.org/wiki/Heapsort), or [merge sort](https://en.wikipedia.org/wiki/Merge_sort). However, insertion sort provides several advantages:

* Efficient for (quite) small data sets, much like other quadratic sorting algorithms
* More efficient in practice than most other simple quadratic (i.e., [O](https://en.wikipedia.org/wiki/Big_O_notation)(*n*2)) algorithms such as [selection sort](https://en.wikipedia.org/wiki/Selection_sort) or [bubble sort](https://en.wikipedia.org/wiki/Bubble_sort)
* [Adaptive](https://en.wikipedia.org/wiki/Adaptive_sort), i.e., efficient for data sets that are already substantially sorted: the [time complexity](https://en.wikipedia.org/wiki/Time_complexity) is [O](https://en.wikipedia.org/wiki/Big_O_notation)(*kn*) when each element in the input is no more than *k* places away from its sorted position
* [Stable](https://en.wikipedia.org/wiki/Stable_sort); i.e., does not change the relative order of elements with equal keys
* [In-place](https://en.wikipedia.org/wiki/In-place_algorithm); i.e., only requires a constant amount O(1) of additional memory space
* [Online](https://en.wikipedia.org/wiki/Online_algorithm); i.e., can sort a list as it receives it

Insertion sort [iterates](https://en.wikipedia.org/wiki/Iteration), consuming one input element each repetition, and growing a sorted output list. At each iteration, insertion sort removes one element from the input data, finds the location it belongs within the sorted list, and inserts it there. It repeats until no input elements remain. A typical example of the insertion sort in practice is used in the game of cards.

The insertion sort algorithm is the sort unknowingly used by most card players when sorting the cards in their hands. When holding a hand of cards, players will often scan their cards from left to right, looking for the first card that is out of place. For example, if the first three cards of a player's hand are 4, 5, 2, he will often be satisfied that the 4 and the 5 are in order relative to each other, but upon getting to the 2, desires to place it before the 4 and the 5. In that case, the player typically removes the 2 from the list, shifts the 4 and the 5 one spot to the right, and then places the 2 into the first slot on the left.