PennX: SD3x
Algorithm Design and Analysis
Edx.org (moocs)

Algorithm

↓ word (sooth AD)

al-Khwarizmi
(how to solve quadratic eq and linear systems of eq)

Euclid: (300BC)
Came with first algorithm
Father of geometry
Algorithm for greatest common divisor of two integers
↓ used in cryptographic systems for example
Insure the security of credit card and transactions online

Why study algorithms?

While learning programming language you are understanding the syntax of a programming language.

Strip the syntax
↓
you get thinking abstractly
↓

Allows you to understand and reason about more complex programming and computational tasks.

Why data structures are important?

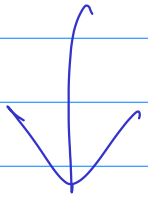
When we design complex programs we need to manage data structures that have data arranged in very specific ways to allow easy access to certain operations.

We need to be clever.

(in order to be efficient)

So that we don't spend all our time finding the solution to a problem.

How fast the algorithm will be before you actually code it.



this is one of the main reason to study algorithms.

other reasons:

commonalities between different problems:

Same algorithms can be used to solve one problem and another problem.

You no longer have to start from scratch.

To solve bigger problems
You have to solve smaller problems

then bootstrap you way to solving bigger and bigger problems

Two ways to do it:

1) Top down view

(Take a big problem, do a bit of reduction, and get a slightly smaller problem and continue this

2/ Bottom-up manner

(Solve the smallest problem first, solve the slightly bigger problem and slightly bigger pablem until you have solved the problem you want to solve.

Examples:

Top down

Towers of Hanoi

Bottom-up

Insertion Sort.