What is Computer Science?

1. The Study of Computers

Computer science is the study of the principles and use of computers, from **information**, **algorithms** and **networks** to the **architecture of computers**. This field is a largely broad one and we can divide it into two principle categories: **hardware** and **software**.

While software may seem more important, especially in computer science, it is ultimately the **cohesion** between both that results in the functioning of today's world of computers.

Hardware

- Circuits
- Logic Gates
- CPU Architecture
- Computer Engineering
- Etc.

Software

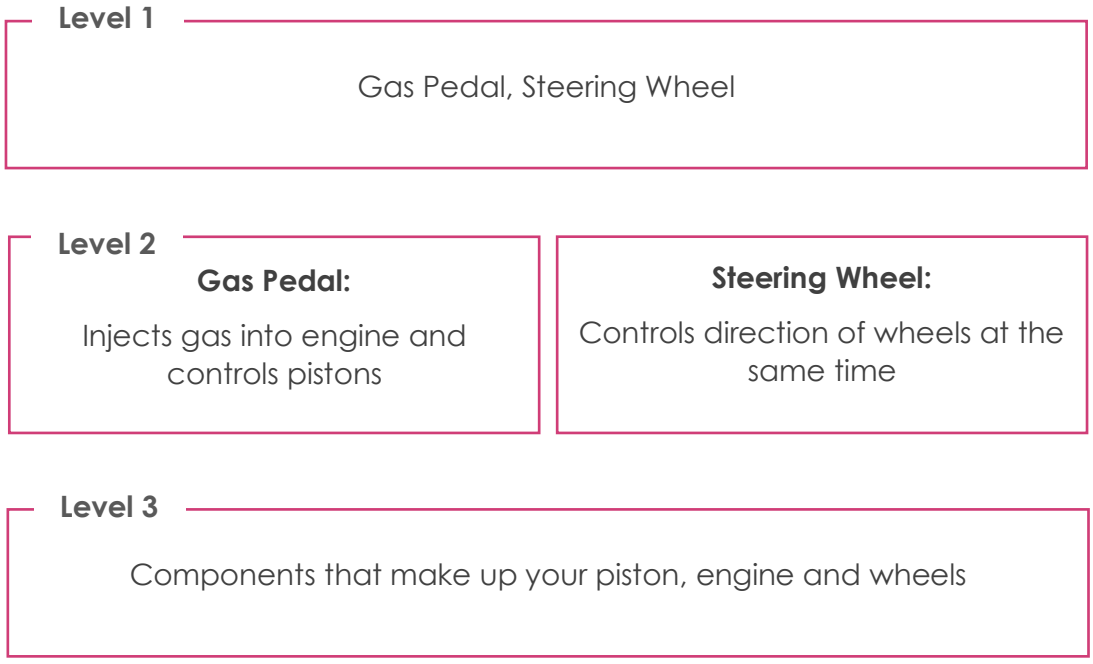
- Compilers
- Programming
- Data Structures
- Algorithms
- Etc.

2. Computational Thinking

More than just learning about how to program, being a computer scientist means thinking like one. At the end of the day, computers don't solve problems, you do, and having a refined mindset towards formulating strategies and skills is where the heart of computer science lies.

3. What is an abstraction?

Abstractions are a key feature of computational thinking. To abstract something means to simplify it and break it down into simpler problems. To exemplify this, we can take a look at a car.



4. Abstractions in programming and problem solving

When developing a program to tackle a problem, once you have created your **abstractions**, the next step is analysis. By **analyzing** your abstractions and tackling each one of them individually, you will ultimately be able to formulate a process by which you can **execute** in order to run your program successfully and solve the targeted problem.

An example of using computational thinking would be in the wine problem.

Assuming you have 6 glasses of wine, three of which are full and the other three empty, move one glass such that the glasses are ordered where every glass next to a full glass is an empty glass. To solve this, we will use the computational thinking model explained above.

Abstraction:

We can break the problem down into a single glass. A single glass can either be full or empty.

Analysis:

To switch between the two states, we either pour away the wine or we fill it up from another cup. Both actions involve the movement of one glass only.

Execution:

Now to solve our problem, we simply take the second glass and pour the wine into the fifth glass. Every filled glass is next to an empty glass and hence we achieved our goal.

Such a method to approach and solve problems is what governs computer science. When creating programs, especially complex ones, being able to identify smaller problems to solve a larger one is a key skill that must be nurtured.