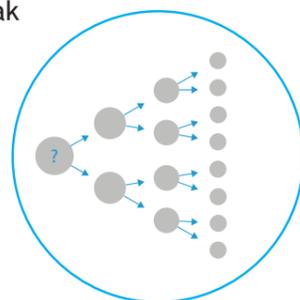


Component 2: Investigation

Term	Definition
Decomposition	Decomposition happens when a problem is broken down into smaller parts so that it can be both understood and managed more effectively.
Pattern recognition	Recognising patterns in complex problems can help to solve them more efficiently. If a problem requires the same processes to be taken many times, then the solution becomes more manageable.
Abstraction	Abstraction is the process of filtering out the characteristics of patterns that are not needed in order to concentrate on those that are required for the solution.
Algorithm	An algorithm is a set of instructions designed to perform a specific task

Decomposition

The aim of decomposition is to break down large problems so that each sub-problem is described in the same level of detail and can be solved independently from the other sub-problems.



One of the advantages of decomposition is that different people can work on different sub-problems. However, a disadvantage would be that the solutions to the sub-problems might not come together to provide a solution to the whole problem.

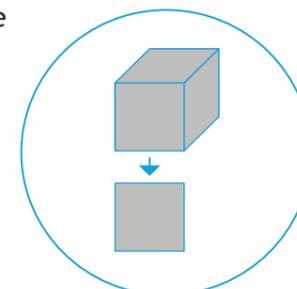
Pattern recognition

Recognising patterns in complex problems can help to solve them more efficiently. If a problem requires the same steps to be taken over and over again, it makes sense to identify that early on so that the process of solving them becomes more manageable.



Abstraction

Abstraction is a technique to reduce something to the simplest set of characteristics that are most relevant to solving the problem.

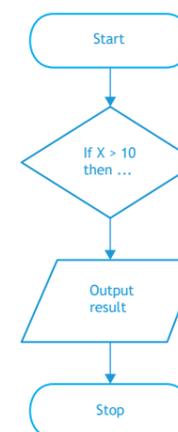


The programmer has to concentrate on the most important aspects of the problem without worrying about fine details.

Algorithm

The algorithm is the list of steps that need to be taken to solve the problem. Used to tell computers what to do, it can also be a useful approach to use with humans.

It is the explanation of input steps to be taken, in the order they need to be taken. This will produce the desired output result.



Modular programming

Pattern recognition and abstraction allow a programmer to identify processes that have the same or similar characteristics. This allows programmers to take a modular approach to develop programs.

Modular design and programming is a method of organising a large computer program into self-contained parts known as modules.

Interfaces

Modular programs should be built of self-contained subroutines. For each module, the interface should be clear, unambiguous and intuitive. The user interface should be consistent through the completed solution.

Analysis of a complex problem

For Component 2 you will need to be able to analyse a given problem which will be available to you in the September of Year 11. You will be able to work on the problem described in the scenario to prepare you to develop the skills you will need to have to be able to undertake the exam in the summer of Year 11.

The scenario will introduce you to a problem situation that can be solved by developing a modular program to carry out the required processing. As you work on the problem you will need to use decomposition, pattern recognition and abstraction. You will then need to design algorithms that will allow you to create the required modules.