

SUMMER WORK Computer Science

Head of Department

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Exam Board

AQA

Specification

7156/7157

COURSE DETAILS

Examination

The course is examined as a whole at the end of Y13 through two exams and an NEA.

The Unit 1 on-screen exam which students will be assessed through answering questions on algorithms and programming and will be expected to create or modify programs written in Python. Unit 2 is assessed through a written exam covering hardware, software and mathematical concepts. The Non-Examined Assessment (NEA) is completed in year 13 and is worth 20% of the final grade.

Unit 1: (Y12 and Y13)

This unit will cover student's ability to program using standard programming concepts such as definite and indefinite iteration with conditions, use of arithmetic, relational and Boolean operations. Students will also program using a procedural-orientated method. Students will also develop their knowledge of the theoretical side of computer science from fundamentals of programming, fundamentals of data structures (single and multidimensional arrays), systematic approaches to problem solving (how to build suitable programs from set problems) and the theory of computation (abstraction, decomposition, composition and automation). In year 13 this unit will also include the fundamentals of algorithms and the skills learnt whilst studying the systematic approach to problem solving.

Unit 2: (Y12 and Y13).

This unit focuses on fundamentals of data representation which is heavily maths orientated. This focuses on natural, rational, irrational, real and ordinal numbers plus different number systems used by computers to represent data. Fundamentals of computer systems includes hardware, software and programming languages. Fundamentals of computer organization and architecture (how the CPU works and interprets and works with data). Consequences of uses of computing (ethical, moral and legal implications of working with IT systems) and the fundamentals of communication and networking (how computer networks work and transfer data). For Y13 this unit also includes fundamentals of databases, big data and the fundamentals of functional programming.

Unit 3: Non-Exam Assessment – The computing practical project

The non-exam assessment assesses a student's ability to use the knowledge and skills gained through the course to solve or investigate a practical problem of their choice. Students will be expected to follow a systematic approach to problem solving. When creating the project, a student will analyse, design, create and test a program to solve a problem, this could be a website with dynamic content and a database backend, a mobile app, an application for artificial intelligence, a computer game or something completely different.

SUMMER WORK FOR INTRODUCTION TO YEAR 12

The main requirement will be for you to be confident in programming in Python to a GCSE level

| TASK | TOPIC | |
|------|-----------------------------|--|
| 1. | Fundamentals of Programming | Complete the 11 Python Learning Tasks by clicking on the word "Objective" from the getting started with Python section on the webpage . Each task sheet must have evidence of the completed activity. Please provide a screen shot of the code with annotation stating what the code does and a screen shot of the code running. |
| 2. | Programming Challenges | Having completed task 1 above, complete 1 of the Python challenges per difficulty level for each of the Python Challenges (Objectives 1-11). Please provide a screen shot of the code with annotation stating what the code does and a screen shot of the code running. |

Suggested reading:

The new Turing omnibus, A K Dewdney, (Palgrave Macmillan, 2003)

How to think like a mathematician, Kevin Houston, (Cambridge University Press, 2009)

Computer Science Illuminated Sixth Edition, Nell Dale, John Lewis, (Jones and Bartlett, 2015)

Algorithmics: The Spirit of Computing by David Harel (Addison Wesley, 2004)

Computer Science: An Overview by J. Glenn Brookshear (Addison Wesley, 2006)

The Principles of Computer Hardware by Alan Clements (fourth edition, Oxford, 2006)

Structured Computer Organisation by Andrew Tanenbaum (fifth edition, Prentice Hall, 2005)

Computational Thinking by Jeannette Wing of Carnegie-Mellon University available from <https://www.cs.cmu.edu/~15110-s13/Wing06-ct.pdf>

Helpful websites:

<https://www.w3schools.com/python/>

<https://isaacomputerscience.org/topics>

This website has a great section on GCSE to A level transition and outlines the required knowledge for starting A level

TV documentary

Explained season 2 episode 6- Coding (on Netflix)