Kenilworth School and Sixth Form

6th Form Transition Booklet to OCR A level Computer Science

Using this Booklet

This pack contains a programme of activities and resources to prepare you to start an A Level in Computer Science in September. It is aimed to be used throughout the remainder of the summer term and over the summer holidays to ensure you are ready to start your course in September.

The pack is divided into some of the key topics you will study in A level Computer Science. There are a range of different activities suggested for you to do in each topic area.

The world of computer science continues to develop at an amazing rate. The challenge for you as a computer scientist is to be able to respond to this everchanging world and to develop the knowledge and skills that will help you to understand technology that hasn’t yet been invented!

Course Overview

Content Overview

Component 1: Computer Systems

You will learn:

- The internal workings of the (CPU), data exchange, software development, data types.
- Systems Architecture / Memory / Storage
- Wired / Wireless networks / Network Topologies
- Systems security / Systems software
- Ethical, Legal, Cultural and Environmental concerns.

Component 2: Algorithms and Programming

You will learn:

- What is meant by computational thinking (thinking abstractly, thinking ahead, thinking procedurally etc.)
- Problem solving and programming – how computers and programs can be used to solve problems
- Algorithms and how they can be used to describe and solve problems.

Component 3: Programming Project

You will learn:

- To Analyse and Design a coded solution to a problem including the ability to:
- Develop a coded solution fully annotating the developed code to explain its function
- Identify test procedures which evidence functionality to show how it matches the design criteria and to identify successes and any limitations…

Assessment Overview

COMPUTER SYSTEMS (01)
140 MARKS
2 HOURS AND 30 MINUTES
WRITTEN PAPER
(NO CALCULATORS ALLOWED)

40%
OF TOTAL A LEVEL

ALGORITHMS AND PROGRAMMING (02)
140 MARKS
2 HOURS AND 30 MINUTES
WRITTEN PAPER
(NO CALCULATORS ALLOWED)

40%
OF TOTAL A LEVEL

PROGRAMMING PROJECT (03)
70 MARKS
80 GUIDED LEARNING HOURS
NON-EXAM ASSESSMENT

20%
OF TOTAL A LEVEL

Read the course specification here: https://www.ocr.org.uk/Images/170844-specification-accredited-a-level-gce-computer-science-h446.pdf

Our Expectations

In addition to the school's entry requirements…

- Develop your skills as a resilient and independent, self-evaluative learner. As an independent learner, if you miss a lesson, it is your own responsibility to catch up with the work missed.
- Be able to problem solve and work within a team collaboratively.
- Develop a systematic approach to problem solving.
- Have a suitable computer / laptop at home with Python installed to be able to complete tasks independently.
- Develop your capacity to think creatively, analytically, logically and critically.
- Develop the ability to analyse problems in computational terms through practical experience of solving such problems, including writing programs.
- Seek out opportunities to apply the academic principles learned in the classroom to real-world systems.
- Stay up to date with current technology news and developments in computing.
- Develop your computer programming skills outside of the classroom to ensure you can program with confidence.
- Be proactive and actively look for ways to expand your knowledge and get better at each stage and topic.

Review and Review

BBC Bitesize

You can use the full BBC Bitesize OCR GCSE course (read and do the tests) to recap your knowledge to prepare you for A level computer science.

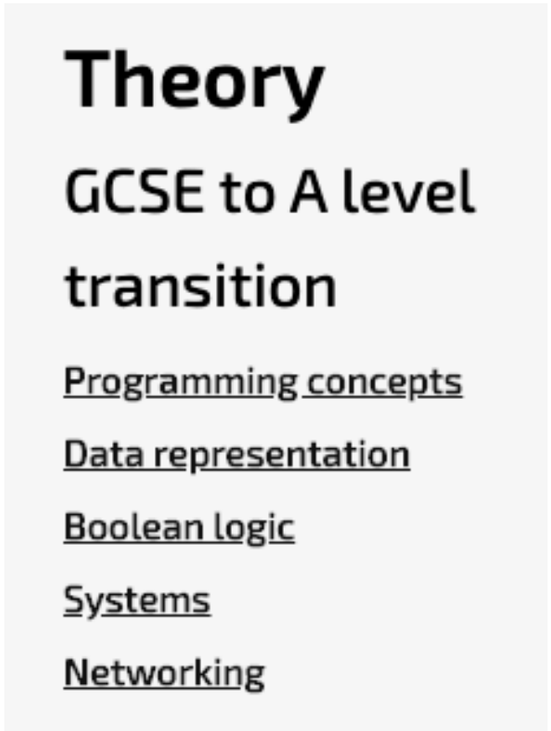
https://www.bbc.co.uk/bitesize/examspecs/zmtchbk

Isaac Computer Science

Isaac Computer Science contains theory and interactive quizzes for all of the A Level topics.

Go to Topics where you will find some transition exercises to complete:

https://isaaccomputerscience.org/topics



Programming

Python programming is fundamental for A level Computer Science.

You need to practise and develop your programming skills outside of the classroom to ensure you can program with confidence. Here are three online resources to help you with this:

1. Python Snakify

Snakify is an interactive manual for learning Python3. There is a theory section and problems to solve for every programming construct! https://snakify.org/en/lessons/print_input_numbers/

2. Python programming Course

Complete the following python programming course—this will take you approximately 10-15 hours
https://www.futurelearn.com/courses/python-in-hpc/2/todo/63998

3. Object Oriented Programming (OOP) in Python Course

Watch this video about **OOP**: https://youtu.be/pTB0EiLXUC8

Go to the following **OOP course** to complete: https://www.futurelearn.com/courses/object-oriented-principles

Read

CS4FN (Computer Science for Fun) is a magazine on computer science aimed at school students "Explore how computer science is also about people, solving puzzles, creativity, changing the future and, most of all, having fun." It is printed twice a year and has an associated website with additional articles.

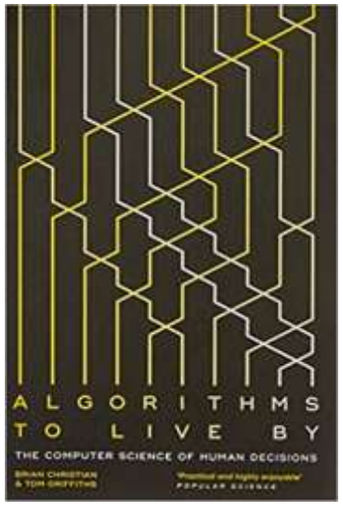
http://www.cs4fn.org

Recommended Reading

Computational Fairy Tales

by Jeremy Kubica

It's a quest that will take you from learning the basics of programming in a blacksmith's forge to fighting curses with recursion. Fifteen seers delivered the same prophecy, without so much as a single minstrel to lighten the mood: an unknown darkness threatens the kingdom. Suddenly, Princess Ann finds herself sent forth alone to save the kingdom. Leaving behind her home, family, and pet turtle Fido, Princess Ann must face goblin attacks, magical curses, arrogant scholars, an unpleasant oracle, and rude Boolean waiters.



Algorithms to Live By

by Christian and Griffiths

Simple, precise algorithms used by computers can also untangle very human questions. Modern life is constrained by limited space and time, limits that give rise to a particular set of problems. What should we do, or leave undone, in a day or a lifetime? How much messiness should we accept? The authors explain how to have better hunches and when to leave things to chance, how to deal with overwhelming choices and how best to connect with others. *Algorithms To Live By* is full of practical takeaways to help you solve common decision-making problems and illuminate the workings of the human mind.

Watch

BBC CLICK

BBC Click is the programme for everyone interested in the internet and computing. Whether it's e-commerce, new developments and products, or gadgets and games, BBC Click looks at the tools that will revolutionise business and personal life in the future.

This is a really useful website for staying up to date with current technological news and support you in the A level topic concerning ethics, morals, legal and cultural issues surrounding computer science.

Task 1: BBC click review of 2019

This includes space travel, electric cars, 5G and the increased use by police of facial recognition.

Watch the video: https://www.bbc.co.uk/iplayer/episode/m000d45t/click-best-of-2019

Write an article, summarising one of the topics from the Click review, highlighting one of the aspects they discussed and what were the advantages, or disadvantages of this.

Task 2: Artificial Intelligence (AI) and Coronavirus

The following video looks at how AI tools could help track the virus spread and find new treatments.

Watch the video: https://www.bbc.co.uk/iplayer/episode/m000g8w5/click-can-ai-help-fight-coronavirus

Do some further research on AI and see below example exam question and have a go at answering.

Answer the following question: "Developments in Artificial Intelligence mean that in twenty year's time most people will be unemployed." Discuss whether or not you agree with this statement.

Listen

NETWORK SECURITY AND THREATS

You will discuss and learn about systems security, firewalls and encryption during your A level.

Listen to the following Podcast which talks about security, hacking and university hacking.

Podcast: https://www.smashingsecurity.com/176

Task 1: Write a summary from the **podcast**—what are the key points they discuss? They talk about some Zoom meeting ‘hacks’, the Computer Misuse Act, Cybercrime, data breaches at Warwick University and lots more!

Another great podcast about cyber security is the Sophos Naked Security Podcast: https://nakedsecurity.sophos.com/category/audio-and-video/podcast/