# **A Level Computer Science Transition Work**

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The OCR A level course builds on the GCSE course and we will assume that you have a good grasp of the skills and content from your GCSE as we don’t have time to cover this again, only build upon it!

Look over the GCSE specification (<https://www.ocr.org.uk/Images/558027-specification-gcse-computer-science-j277.pdf> ) and identify any weaker areas making sure that you review these over the summer to ensure a sound understanding of the course.

Have a look at the A level specification (<https://www.ocr.org.uk/Images/170844-specification-accredited-a-level-gce-computer-science-h446.pdf> ) you will see that there are several areas that cross over. If you would like to see the differences then have a look at the **Craig’n’Dave A level videos** for some of those topics -<https://youtube.com/playlist?list=PLCiOXwirraUBj7HtVHfNZsnwjyZQj97da>

## **Programming refresher!**

As with the GCSE course you need to be able to program!! There are some new concepts that you will be introduced to along the way. **Programming is a skill and you need to keep at it**!

Here are some tasks as a refresher ahead of starting your A Level course.

Head over to the web site: <https://www.learnpython.org/>

Complete the following python tutorials under the heading:

• Hello, World!

• Variables and Types

• Lists

• Basic Operators

• String Formatting

• Basic String Operations

• Conditions

• Loops

• Functions

Each section presents you with theory, code to run and exercises to try out. – keep a record of what you complete

## **Programming challenges**

Have a go at some of these programming challenges and keep a record of the ones you attempt in a word document or presentation - <https://www.ocr.org.uk/images/260930-coding-challenges-booklet.pdf>

## **Independent Research Task (2 hours)**

In this task you get to investigate any area of emerging computer technology which interests you.

You can pick any area which interests you, but examples could be:

* Artificial intelligence
* Robotics
* Automated self driving cards
* Quantum computing

In no more than ONE side of A4 summarise the area you have chosen under the following four headings:

* What is it?
* What are the possible Social, Moral, Cultural and Ethical benefits of this technology on society
* What are the possible Social, Moral, Cultural and Ethical risks of this technology on society
* My conclusion on this technology and what it will mean for our world 10 years from now

You may find these videos useful - SLR 17 – Ethical, morale and cultural issues <https://student.craigndave.org/videos/slr-17-ethical-moral-and-cultural-issues>

## **Systems architecture task (2 hours)**

The CPU “Central Processing Unit” is the central core of any computer system. You will study what it contains and how it works it in depth at A Level.

Start by watching the following 3 videos from Craig ‘n’ Dave

OCR: <https://student.craigndave.org/videos/ocr-alevel-slr01-alu-cu-registers-and-buses>

OCR: <https://student.craigndave.org/videos/ocr-alevel-slr01-fetch-decode-execute-cycle>

OCR: <https://student.craigndave.org/videos/ocr-alevel-slr01-performance-of-the-cpu>

Produce a fully annotated diagram on a single sheet of A4 / A3 paper which shows how the CPU works.

Make sure the diagram includes and covers:

* Major CPU components and what they are for:
  + Arithmetic Logic Unit (ALU)
  + Control Unit (CU)
  + Cache
* The main registers
  + Program Counter (PC)
  + Memory Address Register (MAR)
  + Current Instruction Register (CIR)
  + Memory Data/Buffer Register (MDR / MBR)
* Fetch-decode-execute cycle
* Include annotations which explain how the performance of a CPU can be improved by:
  + Increasing the clock speed
  + Increasing the cache size
  + Increasing the number of cores

## **Applying technical knowledge in context task - Augmented reality (1.5 hours)**

A key skill at A Level is being able to take a topic and then discuss it in the context of different scenarios.

Most theory-based exam questions will be asked in the form of a scenario, simply regurgitating what you know on the topic without contextualising your answer to the scenario will often result in low marks!

The topic for this exercise is “Augmented Reality”. It is a truly fascinating area of technology which has the potential to change almost every aspect of our daily lives.

Watch this brief video to learn more: <https://www.youtube.com/watch?v=vQtwWzfzKXI>

After watching the video discuss the benefits, limitations and risks of augmented reality in the context of:

* Medicine & health care
* Gaming & entertainment
* Schools & learning
* Travel & tourism
* Social media
* Transport & navigation