North Halifax Grammar School – A Level Transition Work

A Level Computing

Specification Link

OCR - A-Level Computer Science H446
https://www.ocr.org.uk/Images/170844-specification-accredited-a-level-gce-computer-science-h446.pdf

Overview - Course Content

Computer systems (01)
Duration: 2 hours 30 mins
Weighting: 40%

Topics: The characteristics of contemporary processors, input, output and storage devices, software development, Exchanging data, Data types, data structures and algorithms, Legal, moral, cultural and ethical issues.

Algorithms and programming (02)
Duration: 2 hours 30 mins
Weighting: 40%

Topics: Elements of computational thinking, Problem solving and programming, Algorithms to solve problems and standard algorithms.

Programming project (03)
Non-exam assessment.
Weighting: 20%

Students will be expected to analyse a problem (10 marks), and design (15 marks), develop and test (25 marks), and evaluate and document (20 marks) a program. The program must be to solve it written in a suitable programming language.

Recommended Reading - Watching

Videos
Craig n Dave YouTube channel
Computer Science Tutor - YouTube channel

Textbook
Hodder Education: OCR A-Level Computer Science (George Rouse, Jason Pitt, Sean O'Byrne)

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Revision Guide
Hodder Education: My Revision Notes OCR A-Level Computer Science (George Rouse, Jason Pitt, Sean O'Byrne)

Reading

- Computer Science: An Overview (J.Glenn Brookshear - Dennis Brylow)
- But How Do It Know: (J.Clark Scott)
- Code: (Charles Petzold)

TRANSITION RESEARCH
Logic gates, circuits and truth tables
Students need to know the standard symbols for AND, OR and NOT. Students need to know the standard truth tables for AND, OR and NOT.

Basic logic tutorials from Cambridge Assessment
Useful resources for teaching about logic circuits and truth tables are available from Cambridgegcsecomputing.org

http://www.cambridgegcsecomputing.org/computing-hardware-main

These are basic tutorials that explain the principles for the main logic gates, these can be used before asking students to try the practical activities such as:

Logic simulator
Once the basic concepts are identified students can experiment with logic gates using a suitable simulator: Useful free logic gate simulator is available for Windows operating systems from Steve Kollmansberger at South Puget College: http://www.kolls.net/gatesim/

Physical models for logic circuits
1. An excellent demonstration of physical models for this can be found in the youtube video http://www.youtube.com/watch?v=H-53TVR9EOw

Typically students can watch the video and create their own versions of these logic 'machines' with lego, plastic track and marbles or use the domino based demonstrations.

2. It is relatively straightforward to appreciate the AND and NOT statements from these but OR is often used as an exclusive 'either or' construct and using the dominoes demonstration for the OR gate may help to show what OR means in Boolean logic. http://www.youtube.com/watch?v=SudixyugiX4 (Neil Fraser)

When working with truth tables for logic circuits students should be taught to decompose the problem into the separate units, processing the output from each logic gate to create the input for the next gate.

For example (A AND B) OR C

Process A AND B to get an output R (for example)

A	B	C	R = (A+B)	R OR C
0	0	0	0	0
0	0	1	0	1
0	1	0	0	0
0	1	1	0	1
1	0	0	0	0
1	0	1	0	1
1	1	0	1	1
1	1	1	1	1

Now use the values in the table for R as the inputs to the truth table for R OR C

TRANSITION TASK

Write out the truth tables for the expressions

NOT (A AND B) and ((NOT A) OR (NOT B))

What do you notice?