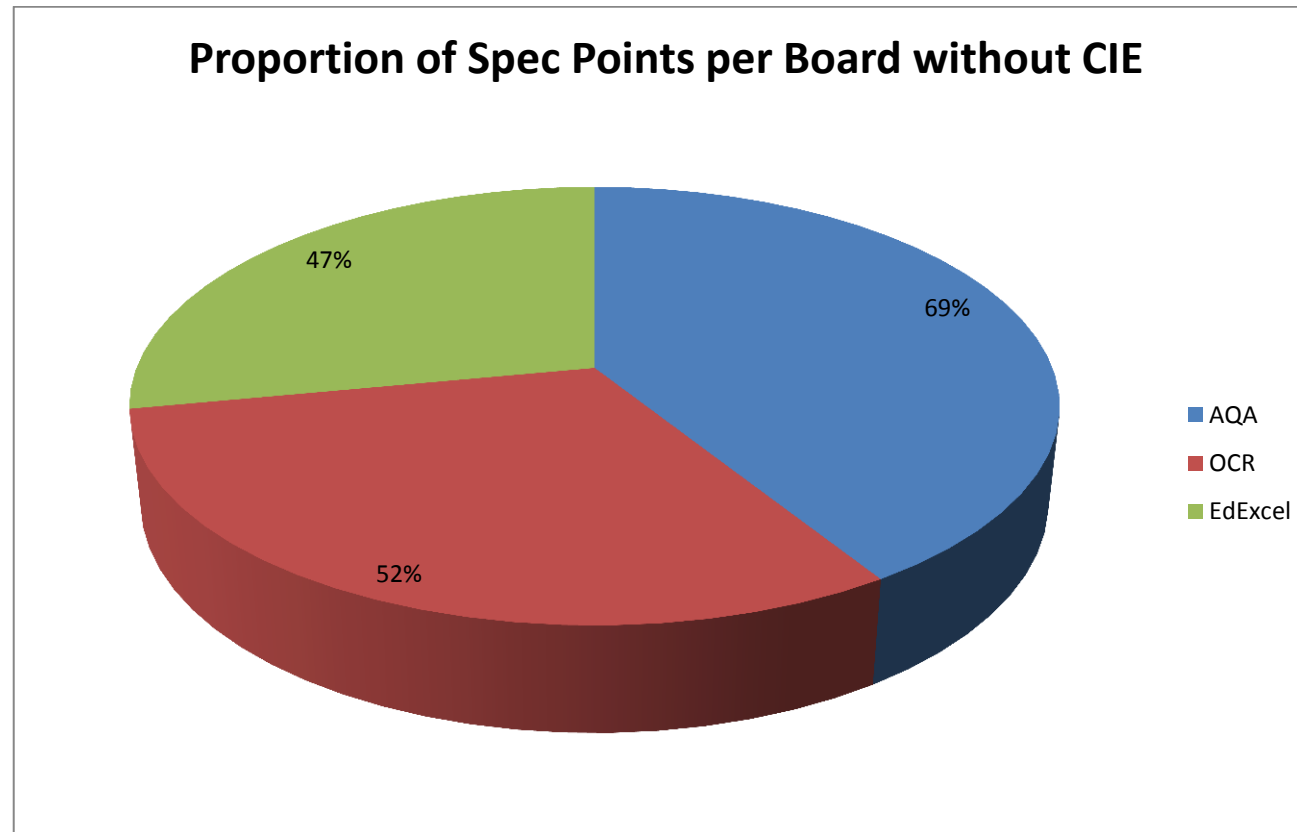
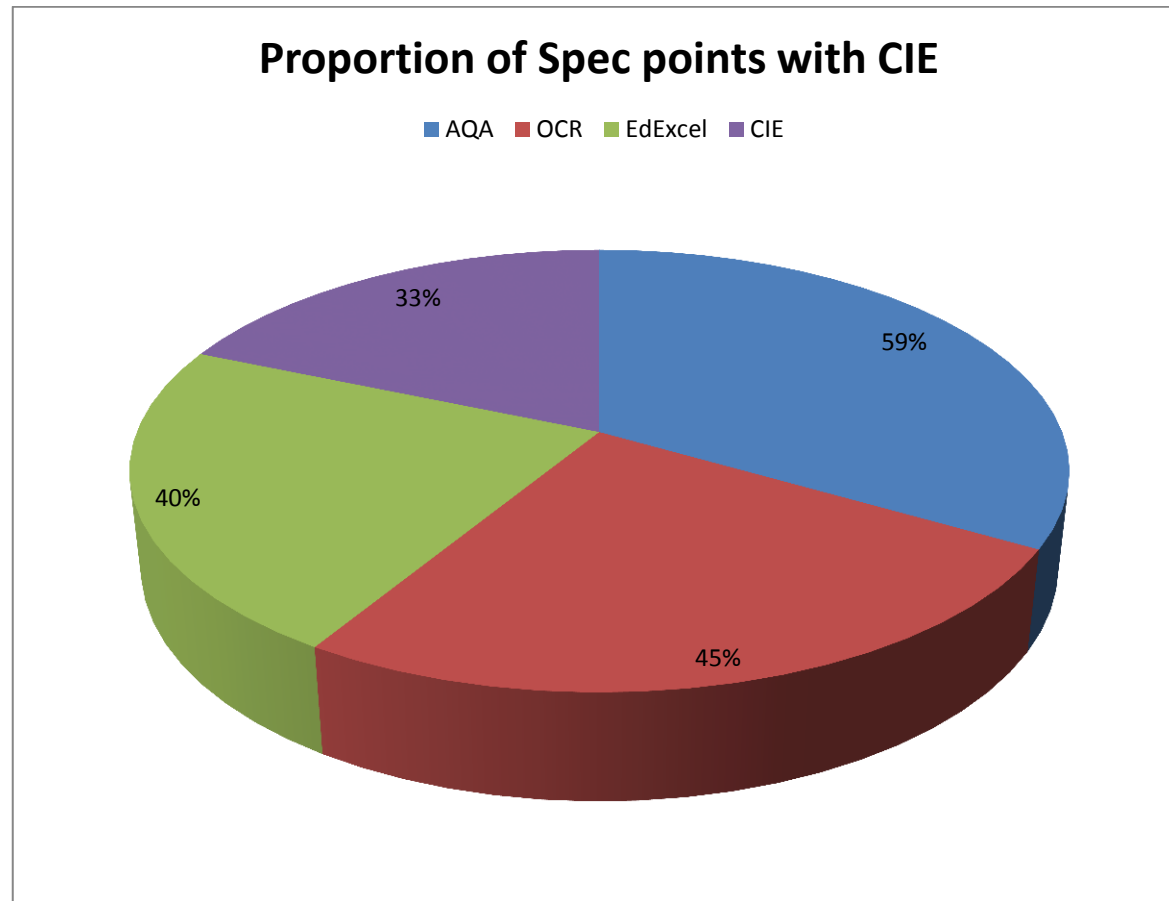


i/GCSE Computer Science – Specification Mapping

- The 3 UK Boards: OCR, AQA & EdExcel as well as the International Board CIE have been used in this mapping
- Together these boards have put together approximately 350 specification points
- This number is approximate since some of the spec points are atomic but others are not so it's not a completely even weighting between spec points
- Also please bear in mind the difference between *outline*, *discuss* & *explain* spec points which are not evenly weighted either
- I have included a proportion per Board with/without CIE for comparison
- The spec points in **red** were those from EdExcel which I felt had no real counterpart in any other spec
- The spec points in **blue** are those from CIE – some of which are substantially heavy
- Points common to all four Boards have been highlighted
- Only CIE still has the INPUT/OUTPUT devices section, the others have abandoned this idea
- Databases are only covered by EdExcel and CIE

- My most marked observation here is that the spec points for EdExcel seem to have been put through a randomiser, since there seems to be no apparent connection between them, sometimes put together in a most illogical manner – but this is a very personal opinion.





	AQA	OCR	EdExcel	CIE
COMPUTATIONAL AND ALGORITHMIC THINKING				
Algorithm - understand & explain	1	1	1	
Decomposition - understand & explain	1	1		
show understanding of computer sub-systems				1
use top-down design				1
use structure diagrams				1
Abstraction - understand & explain	1	1	1	
be able to program abstractions of real-world examples			1	
Algorithmic Thinking		1		
Use pseudo-code to create algorithm	1	1	1	1
Use flowchart to create algorithm	1	1	1	1
use selection/iteration/sequence in algorithms			1	
explain input/process/output for algorithms	1			
determine purpose of algorithm	1	1	1	1
explain standard method of solution of a given algorithm				1
determine output of an algorithm for a set of data (dry-run)			1	1
identify/correct errors in algorithms			1	1
Solve a task with more than one algorithm	1		1	

	AQA	OCR	EdExcel	CIE
Compare efficiency of algorithms	1			1
how to code an algorithm in a high-level language			1	
understand how choice of algorithm is influenced by data structures and data values that need to be manipulated			1	
Linear search: understand & explain	1	1	1	
Binary search: understand & explain	1	1		
Binary search: understand & explain	1		1	
Merge Sort: understand & explain	1	1	1	
Bubble Sort: understand & explain	1	1	1	
Compare & Contrast Merge sort & Bubble sort	1			
Insertion Sort		1		
Decompose a problem to inputs/processing/outputs & initialisations			1	
decompose into sub-tasks			1	
PROGRAMMING				
Data types: integer	1	1	1	1
Data types: real	1	1	1	1
Data types: Boolean	1	1	1	1
Data types: character	1	1	1	1
Data types: string	1	1	1	1
Variable declaration	1	1	1	1
global vs local variables			1	

	AQA	OCR	EdExcel	CIE
Constant declaration	1	1	1	1
Assignment	1	1	1	1
Sequence	1	1	1	1
Iteration	1	1	1	1
Selection	1	1	1	1
Subroutine	1	1	1	1
built-in/ library subprograms			1	1
Definite vs indefinite iteration	1			
Procedures & Functions			1	
subprograms using parameters			1	
Nested selection	1			
nested iteration	1			
identifier names and their importance	1			
Arithmetic Operators,	1	1	1	
Modulo Operator	1	1		
Integer Division	1			
Boolean Operators	1	1	1	
Combining Boolean Operators to two levels		1		
Relational Operators	1	1	1	
Data structures - general	1		1	
Data structures - 1D arrays or similar	1	1	1	
2D arrays		1	1	
Records	1	1	1	
obtain user input from keyboard	1	1	1	
output data/info from computer	1	1	1	

	AQA	OCR	EdExcel	CIE
read/write from/to text file	1	1	1	
String operations	1	1	1	
String conversion operations	1	1		
random number generation	1			
understand subroutines as a concept	1			
explain advantages of subroutines	1			
use of passed parameters in programs	1			
subroutines that return values to calling routine	1			
local variables within subroutines	1			
local variables - good practice	1			
Describe structured programming	1			
Explain advantages of structured approach	1			
write simple data validation routines	1	1		1
verification checks				1
write simple authentication routines	1	1		
select suitable test data	1	1		
justify choice of test data	1			
planning for contingencies		1		
anticipating misuse		1		
maintainability of program - comments/indentation		1		
purpose of testing		1		

	AQA	OCR	EdExcel	CIE
iterative testing		1		
final/terminal testing		1		
identifying syntax and logical errors		1		
low level language	1	1	1	1
high level language	1	1	1	1
assembler, compiler and interpreter		1	1	1
editors, error diagnostics, run-time environment & translators		1		
explain main difference between low/high level languages	1			1
explain differences between machine code and assembly	1			
advantages/disadvantages of low level programming compared with high level programming	1			
DATA REPRESENTATION				
Decimal number base	1			1
Binary number base	1			1
Hexadecimal number base	1			1
why hexadecimal is often used	1			1
unsigned integers, signed integers, two's complement			1	
how binary represents whole numbers	1	1	1	1
use binary in computer registers for a given application eg robotics, digital instruments and counting systems				1
how binary represents text/sound/graphics			1	1

	AQA	OCR	EdExcel	CIE
how hexadecimal represents whole numbers	1		1	1
convert in both directions between:				
binary and decimal	1	1	1	1
binary and hexadecimal	1	1	1	1
decimal and hexadecimal	1	1		1
represent numbers stored in registers and main memory as hexadecimal				1
identify current uses of hexadecimal eg in HTML, MAC address, assembly, machine code & debugging				1
overflow		1	1	
check digits		1		1
checksums, ARG, check digits				1
need to check for errors				1
parity bits for error detection				1
MIDI files, JPEG, MP3 & MP4				1
bit, byte, kilo, mega, giga, tera byte	1	1	1	1
binary arithmetic (3 numbers)	1		1	
binary shift	1			
situations for using binary shift	1			
binary to represent characters		1		
7-bit ASCII	1	1	1	
Unicode	1	1		
sequences of character codes	1	1		
describe purpose of unicode	1	1		
advantages of Unicode over ASCII	1			
Data transmission (serial, parallel)				1

	AQA	OCR	EdExcel	CIE
simplex, duplex and half-duplex data transmission				1
reasons for choosing serial or parallel transmission				1
use of serial/parallel in USB and Integrated Circuit				1
understand pixel	1	1	1	
describe how pixel relates to image	1		1	
size in pixels	1	1		
colour depth	1	1	1	
bitmap representation using pixel & colour depth	1	1	1	
how file size of a bitmap is affected by pixels and colour	1			
calculate bitmap image file size	1	1	1	1
convert binary data into a black & white image	1			
convert a B&W image into binary data	1			
sound as analogue	1	1		
sound wave sampling to create digital version	1	1	1	
sampling rate	1	1		
sampling frequency		1	1	
sample resolution	1		1	
calculate sound file size	1		1	
compression: lossy/lossless		1	1	1
Explain Huffman coding for data compression	1			
interpret Huffman trees	1			

	AQA	OCR	EdExcel	CIE
calculate number of bits needed to store piece of data using Huffman coding	1			
calculate number of bits required to store a piece of uncompressed data in ASCII	1			
Run Length Encoding	1		1	
represent data in RLE frequency/data pairs	1			
relationship between hardware and software	1			
Truth tables for simple logic circuits	1	1	1	1
interpret results of simple truth tables	1			1
create, modify and interpret simple logic circuit diagrams (AND,NOT, OR)	1			1
recognise and use NAND, NOR, XOR				1
INPUT DEVICES				
principles of operation of 2D, 3D scanners, barcode readers, QR code readers, digital cameras, keyboards, mice, touch screens, interactive whiteboard, microphones				1
describe how these principles are applied to real life scenarios eg scanning passports at airports, barcode readers at supermarket checkouts and touch screens on mobile devices				1
describe how a range of sensors can be used to input data into a computer system including temperature, magnetic field, gas, pressure, moisture, humidity, pH and motion				1

	AQA	OCR	EdExcel	CIE
describe how these sensors are used in real-life scenarios: street lights, security devices, pollution control, games, and household and industrial applications				1
SYSTEM ARCHITECTURE				
system software	1			
purpose of translators		1		
error diagnostics				
application software	1			
examples of both types	1			
OS - need and functions	1		1	
utility programs	1		1	
von Neumann Architecture	1	1	1	1
Memory address register		1		1
Memory Data register		1		1
Accumulator		1		
Program Counter				1
Role and operation of				
CPU		1	1	
ALU	1	1	1	
CU	1	1	1	
Clock	1		1	
Bus	1		1	
role of buses in the FDE cycle				1
effect on CPU of	1			
clock speed	1	1		
no of processor cores	1	1		
cache size	1	1		

	AQA	OCR	EdExcel	CIE
cache type	1	1	1	
FDE Cycle - understand and explain	1	1	1	1
differences between main/secondary memory	1			1
differences between RAM and ROM	1	1		1
purpose of ROM		1	1	1
purpose of RAM		1		1
need for virtual memory		1		
why secondary storage is required	1	1		1
different types of storage (SS, optical, magnetic)	1		1	1
flash memory		1		1
offline: DVD, CD, Blu-ray, removable HDD				1
explain operation of SS, optical and magnetic	1	1		1
describe principles of operation of a range of types of storage devices and media including magnetic, optical and solid state				1
describe how these principles are applied to currently available storage solutions such as SSDs, HDDs, USB, DVDs, CDs and Blu-ray discs				1
suitable storage devices and media for a given application - advantages and disadvantages using capacity, speed, portability, durability, reliability, cost		1		
advantages/disadvantages of SS, optical and magnetic storage	1			

	AQA	OCR	EdExcel	CIE
cloud storage	1		1	
advantages/disadvantages of cloud storage compared with local storage	1			
embedded system	1	1	1	
explain difference between embedded/non embedded	1			
Operating system - purpose & function				1
need for interrupts				1
Operating system - user interface		1	1	
OS - user management		1	1	
OS - memory management/multitasking		1	1	
OS - file management		1		
Utility - encryption software		1		
Utility - Defragmentation		1	1	
Utility - Data compression		1	1	
full/ incremental Backup		1	1	
NETWORKS & Internet Technologies				
define computer network	1		1	
benefits and risks of networks	1			
describe PAN	1			
Describe LAN	1	1	1	
Describe WAN	1	1	1	
Factors affecting performance of networks		1		
Wired or wireless	1		1	
network data speeds			1	
discuss benefits/risks of wireless as opposed to wired	1			

	AQA	OCR	EdExcel	CIE
wireless access points		1		
routers/ switches		1		
NIC		1		
transmission media		1		
Star topology - explain	1	1	1	
Bus topology - explain	1		1	
cloud network		1		
virtual network		1		
ring network			1	
mesh network		1	1	
network protocol	1			
Explain the purpose and use of common network protocols including:				
Ethernet	1	1	1	
Wi-Fi	1	1	1	
Wifi encryption		1		
Client server network		1	1	
P2P network		1	1	
DNS		1		
Hosting		1		
TCP (Transmission Control Protocol)	1		1	
UDP (User Datagram Protocol)	1			
IP (Internet Protocol)	1		1	1
HTTP (Hypertext Transfer Protocol)	1		1	1
HTTPS (Hypertext Transfer Protocol Secure)	1		1	1

	AQA	OCR	EdExcel	CIE
HTML (Hypertext Markup Language)				1
distinguish between HTML structure and presentation				1
FTP (File Transfer Protocol)	1		1	
email protocols:	1			
SMTP (Simple Mail Transfer Protocol)	1		1	
IMAP (Internet Message Access Protocol)	1		1	
Internet structure (IP addressing and routers)			1	
web server URLs, ISP			1	1
role of the browser				1
cookies				1
MAC address				1
Understand the need for, and importance of, network security.	1			
Explain the following methods of network security:	1			
• authentication	1			1
• encryption	1	1	1	1
plain text, cypher and use of key				1
• firewall	1	1	1	1
• MAC address filtering.	1			
use of passwords, keyboard and biometric				1
proxy servers				1
SSL & TLS				1

	AQA	OCR	EdExcel	CIE
keep data safe from accidental damage, corruption & human errors				1
describe how knowledge of above can be applied to real-life scenarios eg online banking, shopping				
describe how knowledge of above can be applied to real-life scenarios eg online banking, shopping				
describe how knowledge of passwords, firewalls, SSL, TLS, & encryption can be applied to real-life scenarios eg online banking, shopping				1
keep data safe from malicious actions including unauthorised viewing, deleting, copying and corruption				1
Describe the 4 layer TCP/IP model:	1		1	
• application layer	1		1	
• transport layer	1		1	
• network layer	1		1	
• data link layer.	1		1	
Understand that the HTTP, HTTPS, SMTP, IMAP and FTP operate at the application layer	1	1		
Understand that the TCP and UDP protocols operate at the transport layer	1	1		
Understand that the IP protocol operates at the network layer	1			
packet switching		1	1	
Be able to define the term cyber security	1		1	
describe the main purposes of cyber-security	1		1	
Understand and be able to explain the following	1			
cyber security threats:	1			

	AQA	OCR	EdExcel	CIE
• social engineering techniques	1			
• malicious code	1			
• weak and default passwords	1			
• misconfigured access rights	1			
• removable media	1			
• unpatched and/or outdated software.	1			
Explain what penetration testing is and what it is used for what it	1	1	1	
ethical hacking, commercial analysis tools			1	
Define social engineering	1	1		
describe social engineering & how to protect against it	1			
explain blagging	1			
phishing	1	1	1	1
pharming	1			1
shouldering	1		1	
describe how knowledge of denial of service attacks, phishing and pharming can be applied to real-life scenarios including online banking, shopping				1
Define the term 'malware'.	1			1
unpatched software/USB devices & eavesdropping			1	
Describe what malware is and how it can be protected against	1			
Describe the following forms of malware:	1	1		
computer virus	1			1
trojan	1			
spyware	1			1
adware	1			

	AQA	OCR	EdExcel	CIE
brute force attack		1		1
denial of service attack		1		1
data interception and theft		1		
SQL injection		1		
poor network policy		1		
network policies		1		
anti-malware software		1		
anti-virus and other protection				1
user access levels		1	1	
security issues associated with the 'cloud' & other contemporary storage			1	
Understand and be able to explain the following security measures				
biometric measures (particularly for mobile devices)	1			
password systems	1	1		
CAPTCHA (or similar)	1			
using email confirmations to confirm a user's identity	1			
automatic software updates.	1			
Legal, Ethical, Environmental Factors				
explain current ethical impacts/risks of technology on society	1	1	1	
explain current legal impacts/risks of technology on society	1	1	1	
explain current environmental impacts/risks of technology on society	1	1	1	
investigate and discuss computer science technologies cultural issues		1		

	AQA	OCR	EdExcel	CIE
how key stakeholders are affected by technologies *		1		
cultural implications of Computer Science		1		
open source vs proprietary software		1		
Data Protection Act 1998		1		
Computer Misuse Act 1990		1		
Copyright Designs and Patents Act 1988		1		
Creative Commons Licensing		1		
Freedom of Information Act 2000		1		
data privacy issues	1			
show understanding of computer ethics, including copyright issues and plagiarism				1
distinguish between free software, freeware and shareware				1
show understanding of computer ethics, including copyright issues and plagiarism				1
show understanding of ethical issues raised by spread of electronic communication and computer systems, including hacking, cracking and production of malware				1
ENCRYPTION				
Encryption of data			1	
Caesar cipher algorithm			1	
DATABASES				
Structured & unstructured Databases				1

	AQA	OCR	EdExcel	CIE
Tables, records, fields, relationships, keys			1	1
Query by example				1
NEA ELEMENTS				
Analysis		1	1	N/A
Design: Be aware that before implementing the solution should be designed	1	1	1	N/A
Implementation: be aware that models and algorithms need to be implemented as data structures that a computer can understand	1	1	1	N/A
Testing: test for errors using normal, boundary and erroneous data	1	1	1	N/A
Refining: be aware that code will often require refining as a result of testing	1		1	N/A
Evaluation: how well does the solution meets the requirements of the problem	1	1		N/A