

A Level Computer Science Bridging Unit

Course Title			Examination Board and Website Address		
Computer Science			AQA: AQA Computer Science and IT AS and A-level Computer Science		
Course Introduction					
Paper 1	40% of A-level	On screen exam 2½ hours 100 marks	<ol style="list-style-type: none"> 5. Data Representation – Number systems, information coding, encryption 6. Computer Systems – Logic Gates, Boolean Algebra, translators, classification of programming, system software 7. Computer Architecture – Machine code, assembly language, CPU, internal & external components 8. Consequences of uses of Computing – Moral, legal and ethical considerations 9. Communication and Networking – Communication methods, topologies, wireless, the internet, TCP/IP, CRUD applications, REST, JSON, JavaScript 10. Databases – Data modelling, relational databases, SQL, client server database 11. Big Data – Volume/velocity/variety, fact based models, distributed processing and functional programming 12. Fundamentals of Functional Programming – Function type, first-class object, function application, partial function application, composition of functions, ma, filter, reduce, lists 13. NEA – The computing Practical Project 		
Paper 2	40% of A-level	Paper exam 2½ hours 100 marks			
NEA	20% of A-level	75 marks			
Topic List <ol style="list-style-type: none"> 1. Programming – Imperative, procedural-oriented, OOP, recursive techniques 2. Data Structures – Arrays, lists, dictionaries, hash tables, queue, graph, tree, stack, vector, fields 3. Algorithms – Traversal, search, sort, optimisation 4. Theory of Computation – Abstraction, automation, FSM, language hierarchy, complexities, Turing machines 					

Bridging Tasks

Task 1:

Complete the questions below to assess your current knowledge on how data is represented in a computer system.

1. A) Convert the following hexadecimal number into 12-bit binary:

4 A F

--	--	--	--	--	--	--	--	--	--	--	--

[3 Marks]

- (b) The 2016 Olympic Games will be held in Rio de Janeiro. A timer that counts down to the opening of the Games is shown on a microprocessor-controlled display.

The number of hours, minutes and seconds until the Games open are held in three 8-bit registers.

The present register values are:

0	1	1	0	1	0	0	1
---	---	---	---	---	---	---	---

105 hours

0	0	1	0	0	0	0	0
---	---	---	---	---	---	---	---

32 minutes

0	0	0	1	0	1	0	0
---	---	---	---	---	---	---	---

20 seconds

The timer will count **down** in seconds.

Show the values in each 8-bit register **30 seconds** after the time shown above:

--	--	--	--	--	--	--	--

hours

--	--	--	--	--	--	--	--

minutes

--	--	--	--	--	--	--	--

seconds

Task 2

A simple symmetric encryption system is used to encrypt messages. Each letter of the alphabet is substituted by another letter.

Plain text

a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Cypher text

v	p	n	a	q	b	r	u	z	s	c	o	y	k	w	f	x	i	e	m	d	j	t	l	h	g
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

(a) Convert the following plain text to cypher text.

Plain text: **d a t a s e c u r i t y**

Cypher text:

.....
[2]

(b) A new cypher text is created by shifting each letter of the alphabet **five** places to the right.

Show the new cypher text below.

Plain text

a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

New cypher text

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

[2]

(c) State, giving a reason, which cypher text would be more secure.

.....
.....
.....

. [2]

Task 3

The Visual Bay Sick Diner specialises in simplistic pub style catering, with a set menu for convenience and speed. Diners select from three different meal packaged options (standard £8, premium £12, deluxe £15); each with a set starter, main, dessert and drink. The diner can cater for up to 25 people at any one time, with fixed tables of a maximum of 5 people to any one table.

The Diner works on a no-booking policy, so guests turn up and see if a table is available. As a result, the host needs to know what is available and when existing guests began their meal to give accurate meal times.

Upon ordering at a table, the waiter will ask which menu option each guest would like. This is then stored with a booking reference (Table number & number of guests & day & three letters of month & waiter initials; all in upper case).

Upon request, a waiter can generate a food order on screen to recall to the kitchen what is required; in a tabular manner. They can also generate a digital receipt, formatted with full details of the evening (title/date/time/orders/pricing/total/taxes/discounts/tips). If guests have a "sick" card, they receive 10% off standard, 15% off premium and 20% off deluxe meals on Tuesdays, Thursdays or Sundays.

A system is required to provide the functionality above with appropriate validation, optional file writing and anything else you feel professionally appropriate.

What you will hand in:

1. Pseudocode algorithm.
2. Commented code following a consistent house style.
3. Program walkthrough (input/output screens with explanations).
4. Discussion of project limitations.