

CAMBRIDGE INTERNATIONAL EXAMINATIONS  
GCE Advanced Subsidiary Level and GCE Advanced Level

## MARK SCHEME for the November 2003 question papers

### 9691 COMPUTING

<b>9691/01</b>	Paper 1 (Written Paper 1), maximum raw mark 90
<b>9691/02</b>	Paper 2 (Practical Tasks), maximum raw mark 60
<b>9691/03</b>	Paper 3 (Written Paper 3), maximum raw mark 90

These mark schemes are published as an aid to teachers and students, to indicate the requirements of the examination. They show the basis on which Examiners were initially instructed to award marks. They do not indicate the details of the discussions that took place at an Examiners' meeting before marking began. Any substantial changes to the mark scheme that arose from these discussions will be recorded in the published *Report on the Examination*.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes must be read in conjunction with the question papers and the *Report on the Examination*.

- CIE will not enter into discussions or correspondence in connection with these mark schemes.

CIE is publishing the mark schemes for the November 2003 question papers for most IGCSE and GCE Advanced Level syllabuses.

**CAMBRIDGE**  
INTERNATIONAL EXAMINATIONS

November 2003

**GCE A/AS LEVEL**

MARK SCHEME

MAXIMUM MARK: 90

SYLLABUS/COMPONENT: 9691/01

COMPUTING  
Written Paper 1



Page 1	Mark Scheme	Syllabus	Paper
	GCE A/AS LEVEL – NOV 2003	9691	1

- 1 (a) (i) A number of different pieces of **software/programs** that can **share** data  
(ii) Contains documentation with the software/software that allows the user to produce something useful  
(iii) Generic software can be used in different situations to accomplish different things/general purpose software

(3)

- (b) (i) - Batch processing is the **collecting** together of data **before** being **processed**  
- Real time is a process where the output is produced quickly enough to affect the next input.

- (ii) Batch processing, e.g. payroll  
- not time sensitive  
Real time, e.g. computer game  
- the player must be able to affect the game

(6)

2 In each case, the suitable use stated is an example.

- (i) - Prompts operator for inputs/Specified areas for the data/Data entered in order/in format  
- Operator taking information over phone  
- Does not allow information to be missed out/simple to use
- (ii) - Icons used to stand for options/when selected, command code is run/normally accessed by use of mouse or other pointing device/WIMP  
- Non-experienced user/child in school  
- Restricts access to certain parts of the system
- (iii) - Set of commands recognised by the OS/typed in at prompt/need to be learned by user  
- Technician  
- Allows access to whole system/does not use large amount of memory (1 per -, max 3 per doty, max 9)

(9)

3 13, 18, 19, 21, 21  
1 per value with follow through marking from one error and –1 (misread) if more than 5 values given

(5)

- 4 - Comments typed in as part of code  
- using special reserved word making clear it is a comment/explains clearly the purpose of code
- Meaningful data names  
- so that reference to a complex list is not necessary/less chance of error

Page 2	Mark Scheme	Syllabus	Paper
	GCE A/AS LEVEL – NOV 2003	9691	1

- Indentation of program lines
  - to make it obvious which lines of code go together
  
  - Modularity
  - splitting code into smaller parts so that the solution is easier to follow  
(1 per -, max 2 per method, max 3 methods, max 6)
- (6)

- 5 (a)**
- A member of a **standard** character set/set of codes the computer understands
  - Represented in a single byte/7 or 8 bits used per character
  - Standard nature allows for communication between systems  
(1 per -, max 2)
- (2)

- (b)**
- Date/integer
  - Integer
  - Boolean/yes or no
  - Currency/floating pt/real/integer
- (4)

- (c) (i)** Storage space for one data item/one student's name
- (ii)** All the data about all the students in the college
- (iii)** All the data about a single student
- (3)

- 6**
- (Processor) fills buffer/data temporarily stored in buffer
  - then gets on with some other task
  
  - Data emptied from buffer to secondary storage
  - without holding up processor
  
  - When buffer empty
  - interrupt sent to processor
  - requesting refilling of buffer
  - from storage device
  - leading to register contents from current job being stored
  
  - Mention of double buffering
  - Vectored interrupts
  - mention of priorities  
(1 per -, max 6)
- (6)

Page 3	Mark Scheme	Syllabus	Paper
	GCE A/AS LEVEL – NOV 2003	9691	1

- 7 (a) - Network card(s)  
 - Cable  
 - Server (of some sort)/hub  
 - Network operating system/communications software/network versions of applications packages  
 (1 per -, max 2 for hardware, max 3) (3)
- (b) - Text based are relatively small files  
 - because each character only takes one byte  
  
 - Graphics tend to be large files  
 - because each character can take up to 3 bytes  
 (1 per -, max 1 for idea of size and one for explanation, max 2) (2)
- (c) Advantages  
 - sharing of hardware  
 - sharing of software  
 - sharing of files  
 - communication  
 - students may use any machine to access their work  
 - installation of software is easy  
  
 Disadvantages  
 - difficulty of securing data  
 - fault in network can affect whole system  
 - complexity of the hardware  
 - need for technical administrator  
 - spread of viruses  
 (1 per -, max 2 for advantages, max 2 for disadvantages, max 4) (4)
- (d) (i) - **Communications** need a set of **rules**  
 - to govern the way that communication is controlled  
  
 (ii) - Individual layers can be altered  
 - without altering other layers  
 - when hardware/software is changed  
 (1 per -, max 2 per dot, max 4) (4)
- 8 (i) - Custom written is software written specifically for the purpose/designed for one customer  
 - Off the shelf is generic/covers many problem solutions/ready made/can be bought in a shop (2)
- Custom written only sensible choice because  
 - application is a one off (2)

<b>Page 4</b>	<b>Mark Scheme</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>GCE A/AS LEVEL – NOV 2003</b>	<b>9691</b>	<b>1</b>

- 9 (a)**
- Passive system is one that supplies information without allowing it to be altered
  - Interactive system supplies information and allows it to be altered
  - Interactive system here
    - otherwise operators cannot alter automatic process.

(4)

- (b) (i)** - HCI is the means by which the human and the computer communicate.

(1)

- (ii)**
- Prioritising of information
  - Volume of information
  - Information overload
  - Colour used
  - Colour blindness
  - Sound (not too many)
  - Different hardware, e.g. printer for very important information
  - Placement of hardware
  - Data input techniques
  - Expertise of staff
  - Tasks to be done
  - Type of data representation (textual/graphical/...)

(1 per -, max 5)

(5)

- 10**
- Direct or big bang
  - Old system is turned off and new system is brought on line
  - If it does not work then admin must shut down
  - Training/Files must all be in place
  - Dual running or parallel running
  - Both systems run simultaneously
  - until sure that the new system works/Finds bugs in new system
  - very expensive/time consuming
  - Allows training to be carried out while it is working
  - Phasing/Pilot running
  - Some sections are introduced while others run old system
  - not changed over until running properly
  - allows training to be carried out
  - Key parts of new system run alongside old system
  - until fully tested
  - Problem because full data not tested as in dual running
  - Allows return to original system if new system does not work
- (Note: Allow pilot and phased introductions if it is clear that they are clearly understood)

(1 per -, max 3 per method, max 9)

(9)

<b>Page 5</b>	<b>Mark Scheme</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>GCE A/AS LEVEL – NOV 2003</b>	<b>9691</b>	<b>1</b>

- 11**
- Barcode consists of (pairs of) dark lines
  - of (three) varying thicknesses
  - which combine to give a (character) code
  - used to identify worker
- 
- OCR is a means of computer reading standard characters/Optical character recognition
  - Light reflected off characters/determines shape of character
  - comparing the values with examples in memory
  - fewer characters the better
  - used for reading times
  - different days signified by different positions on the card
- (1 per -, max 3 per type, max 6)
- (6)

- 12**
- Workers will need to do extra work for changeover
  - e.g. preparing new data files
- 
- Workers will need training in new systems
- 
- New skills will be learned which will mean
  - workers are better qualified (paid)
  - some workers may (not be able to learn new systems) lose jobs.
  - disruption to routine during changeover
  - jobs will become less paper based
  - adverse effects of things like RSI/sitting at desk all day
- (1 per -, max 4)
- (4)

**CAMBRIDGE**  
INTERNATIONAL EXAMINATIONS

**November 2003**

**GCE A/AS LEVEL**

**MARK SCHEME**

**MAXIMUM MARK: 60**

**SYLLABUS/COMPONENT: 9691/02**

**COMPUTING  
Practical Tasks**



<b>Page 1</b>	<b>Mark Scheme</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>GCE A/AS LEVEL – NOV 2003</b>	<b>9691</b>	<b>2</b>

### Practical Tasks Assessment Form

<b>Centre Number</b>		<b>Centre Name</b>	
<b>Candidate Number</b>		<b>Candidate Name</b>	

The mark points indicated on the mark scheme are listed below. Indicate with a tick where each mark has been awarded.

<b>Question 1 (a)</b>		✓
<b>Maximum 8 marks</b>		
	Data capture form to include:	
	- name	
	- membership number	
	- age/date of birth	
	- gender (tick box or similar)	
	- type of membership (tick box or similar)	
	- travel distance (choice of answers)	
	- frequency of visits	
	Scale for:	
	- the quality of the sports facilities at the club	
	- the quality of the social facilities at the club	
	- the sports training classes that are offered	
	- value for money of the club	
	(radio buttons perfectly acceptable)	
	- suggestion box	
	<b>Sub-Total 1 (a)</b>	
<b>Question 1 (b) (i)</b>		
<b>Maximum 5 marks</b>		
	Data source includes:	
	- title, forename, surname fields	
	- 3 address fields	
	- membership number field	
	- membership type field	
	- membership renewal date field	
	- all 4 types of membership included	
	<b>Sub-Total 1 (b) (i)</b>	
<b>Question 1 (b) (ii)</b>		
<b>Maximum 6 marks</b>		
	Standard letter to include:	
	- club logo	
	- address of club	
	- date of letter	
	- member's address in correct position	
	- suitable font size (letter fits on single sheet of paper)	
	- personalised letter	
	- table of fees	
	- return slip	
	<b>Sub-Total 1 (b) (ii)</b>	

<b>Page 2</b>	<b>Mark Scheme</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>GCE A/AS LEVEL – NOV 2003</b>	<b>9691</b>	<b>2</b>

<b>Question 1 (c)</b>		
<b>Maximum 6 marks</b>		
	User guide to include instructions for:	
	- starting mail merge	
	- producing data source	
	- producing standard letter	
	- shutting down the system	
	User guide includes:	
	- troubleshooting guide	
	- example data source input screen	
	- example standard letter	
	- example output letter	
	<b>Sub-Total 1 (c)</b>	
<b>Question 2 (a)</b>		
<b>Maximum 9 marks</b>		
	Diagram to include:	
	- at least three levels	
	- sequence of actions which will work	
	- top layer has a title	
	- initialise	
	- input data	
	- total data	
	- calculate mean	
	- checks minimum	
	- checks maximum	
	- output mean, maximum, minimum	
	<b>Sub-Total 2 (a)</b>	
<b>Question 2 (b)</b>		
<b>Maximum 9 marks</b>		
	Algorithm to include:	
	- initialise the total (= 0 or first value)	
	- initialise the maximum (= very small or first value)	
	- initialise the minimum (= very large or first value)	
	For each value:	
	- add to total	
	- compare with maximum	
	- change maximum if necessary	
	- compare with minimum	
	- change minimum if necessary	
	- divide total by 9	
	- output results	
	<b>Sub-Total 2 (b)</b>	
<b>Question 2 (c)</b>		
<b>Maximum 3 marks</b>		
	Algorithm to include:	
	- rogue value in input list	
	- counter is initialised	
	- increment counter	
	- divide total by counter	
	<b>Sub-Total 2 (c)</b>	

<b>Page 3</b>	<b>Mark Scheme</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>GCE A/AS LEVEL – NOV 2003</b>	<b>9691</b>	<b>2</b>

<b>Question 3 (a) (i)</b>		
<b>Maximum 4 marks</b>		
	Template:	
	- all cells are labelled, e.g. name, date, etc.	
	function/formulae:	
	- number of days hired	
	- cost per day	
	- total cost	
	- date	
	<b>Sub-Total 3 (a) (i)</b>	
<b>Question 3 (a) (ii)</b>		
<b>Maximum 1 mark</b>		
	Printout	
	<b>Sub-Total 3 (a) (ii)</b>	
<b>Question 3 (b)</b>		
<b>Maximum 9 marks</b>		
	Screenshots of validation checks	
	For title:	
	- existence check	
	- suitable test data and error message	
	For invoice number:	
	- format check (not range check)	
	- suitable test data and error message	
	For type of car:	
	- existence check	
	- suitable test data and error message	
	For date of hire:	
	- valid date	
	- suitable test data and error message	
	For date of return:	
	- valid date	
	- suitable test data and error message	
	- date is after date of hire	
	- suitable test data and error message	
	<b>Sub-Total 3 (b)</b>	
	<b>Total (max 60)</b>	

**CAMBRIDGE**  
INTERNATIONAL EXAMINATIONS

**November 2003**

**GCE A/AS LEVEL**

**MARK SCHEME**

**MAXIMUM MARK: 90**

**SYLLABUS/COMPONENT: 9691/03**

**COMPUTING**  
**Written Paper 3**



Page 1	Mark Scheme	Syllabus	Paper
	GCE A/AS LEVEL – NOV 2003	9691	3

- 1 (a)**
- Employees can train in own time
  - at own speed
  - can skip parts they already are happy with
  - (Testing of understanding) can use virtual systems
  - Training may be done at home/not necessary to shut store
  - Employee can train on additional areas in order to advance
  - Training programs can be individually tailored
  - Testing may be revisited as often as necessary/can revisit areas as required
  - Training tailored, automatically, according to test results
  - Results of tests reported to management through system
  - Different teaching approaches possible
  - Workers not intimidated by being in a group
- (1 per -, max 6)

(6)

- (b) (i)**
- Not feasible
  - Involves using both methods at each checkout
  - Customers would not put up with delays
- (ii)**
- A few tills change
  - Useful for training
  - No danger of problems if don't work
  - Store can remain open during changes
- (iii)**
- Implications for training staff
  - All tills changed at once
  - If system does not work, store must shut/problems arise
- (1 per -, max 2 per dotted, max 6)

(6)

- 2**
- Page or partition of software in memory rather than whole job
  - Partitioning of memory
  - variable sizes to suit
  - varying jobs
  - Pages of memory
  - of fixed size
  - jobs do not have to occupy contiguous pages
  - mention of virtual memory
  - mention of swapping
- Note: Segmentation equivalent to partitioning  
(1 per -, max 5)

(5)

Page 2	Mark Scheme	Syllabus	Paper
	GCE A/AS LEVEL – NOV 2003	9691	3

- 3 (a)**
- Whole program not written
  - so may not compile
  - Testing needs to be done
  - diagnostics will be more complete
  - individual segments can be run
  - allowing errors to be isolated
  - running will be necessary after very minor changes
  - continual compilation of whole code is wasteful/time consuming
- (1 per -, max 5) (5)
- (b)**
- Check on grammar of statements
  - Error diagnostics are issued
  - Jump destinations checked for existence
  - Control constructs checked
  - Check that variables have been declared
  - Check for existence of library modules
- (1 per -, max 3) (3)
- 4 (a)**
- When procedure is finished
  - it is necessary to return to place that procedure was called from
- (2)
- (b) (i)**
- Stack/linked list
- (1)
- (ii)**
- Necessary to use return addresses in correct order
  - which is reverse of calling order
  - Stack is LIFO/FILO
  - which reverses the order
- (1 per -, max 3) (3)
- (iii)**
- Parameters needed in execution of procedure
  - placed on stack to be read (by calling program to be read) by procedure
  - Parameters returned by procedure placed on stack
  - after return address has been read.
- (1 per -, max 2) (2)
- 5**
- Value in PC placed in MAR
  - PC incremented (anywhere)
  - Contents of address in MAR placed in MDR
  - Contents of MDR placed in CIR
  - Op code in CIR is decoded
  - Address is copied from CIR to MAR
  - Contents of address in MAR placed in MDR/sent to accumulator
  - Contents of MDR sent to accumulator
  - Registers reset ready for next instruction
- (1 per -, max 7) (7)

<b>Page 3</b>	<b>Mark Scheme</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>GCE A/AS LEVEL – NOV 2003</b>	<b>9691</b>	<b>3</b>

- 6 (a) (i)** 01010100 / 00000100
- (ii)** 10101100 / 00000100  
(1 per byte) (4)
- (b) (i)** 01111111 / 01111111
- (ii)** 10111111 / 10000000  
(1 per byte) (4)
- 7 (a)**
- Hits will be from qualified people
  - Higher proportion of hits from interested parties
  - Greater chance of finding interesting information because of smaller number of sites
  - Less chance of misleading/hoax sites
  - Chance to keep research results restricted
  - More sensible discussion groups set up
  - Faster access because of smaller amount of data
  - May lose chance of sensible comment because person does not have access
  - Access/membership can be controlled
- (1 per -, max 6) (6)
- (b)**
- Impossible to do otherwise
  - because technology does not exist
  - e.g. train astronauts to land on Mars
  - Dangerous to do otherwise
  - because the result may be hostile to humans
  - e.g. train reactor operators to deal with emergencies
  - Too costly to do otherwise
  - because budget would not cover costs
  - e.g. test different suspension systems for new car.
- (1 per -, max 2 examples) (6)
- 8 (i)**
- Data can only be accessed by the methods provided by the class
  - Name can only be accessed from the class Person
- (ii)**
- Where one class is a subclass of another it can use its methods
  - Pupil can use getname() from Person
- (4)

Page 4	Mark Scheme	Syllabus	Paper
	GCE A/AS LEVEL – NOV 2003	9691	3

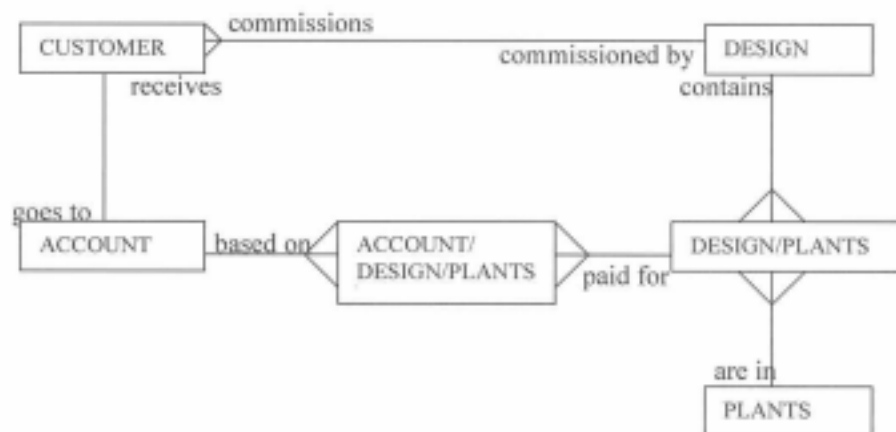
- 9 (a) - Jobs sent to storage  
 - When storage of job complete  
 - reference to job stored in spool queue  
 - along with location in storage.  
 (1 per -, max 3) (3)

- (b) - Processor can only process one job at a time  
 - Two types of job, I/O bound and processor bound  
 - I/O must have priority in order to  
 - allow peripherals to operate while processor bound job is processed  
 (1 per -, max 3) (3)

- 10 (a) (i) - Error check, Q full  
 - Insert data at ARRAY(Head pointer)  
 - Increment Head pointer  
 (ii) - Error check, Q empty  
 - Read data at ARRAY(Tail pointer)  
 - Increment Tail pointer  
 Note: Allow variation if consistent  
 (1 per -, max 2 per dotted, max 4) (4)

- (b) - Head pointer may leave ARRAY  
 - Loop to bottom of array (circular Q)  
 - Array may fill because Array is static and Q is dynamic  
 - Use linked list to hold Q instead of Array  
 (1 per -, max 2) (2)

11 (a)



Mark points:

- 1 for each of original tables, max 3
- 1 for a link table
- 2 for an example of a two-way relationship shown
- 1 for each correct link, max 4

(10)



<b>Page 5</b>	<b>Mark Scheme</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>GCE A/AS LEVEL – NOV 2003</b>	<b>9691</b>	<b>3</b>

- (b) - Eucalyptus AND  
- Batch 12  
- found in PLANTS table  
- Individual gardens found in Design/Plants table  
- Customer for those gardens are found (via account in Accounts table)  
(1 per -, max 4)

(4)