

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
GCE Advanced Level

**MARK SCHEME for the October/November 2009 question paper  
for the guidance of teachers**

<p style="text-align: center;"><b>9691 COMPUTING</b></p> <p><b>9691/31</b>                      Paper 31 (Written), maximum raw mark 90</p>
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- 1 (a) Any sensible organisation e.g. supermarket.
- (b) e.g. for a supermarket:
- Customer names and addresses from deliveries
    - valuable to advertisers/gives a breakdown of who the typical shopper is from their neighborhood
  - Amounts of goods sold in period of time
    - allows comparison between brands to ensure popular brand stocked/ to act as bargaining tool when setting costs of goods
  - Bank account details/credit card details linked to addresses
    - Mail order companies to know who to send expensive offers to
  - Goods bought by individual shoppers
    - to sell to mail order companies/aimed mailshots
  - Sales over different parts of the store
    - to help with designing layout to maximise profits
  - Individuals who respond to mailshots/offers
    - target offers at responsive customers.
- (1 per -, max 3 pairs, max 6) [6]
- 2 (a) -Intranet is a closed/private network rather than open/public network
- More secure because access controlled by bank...
  - by use of IDs and passwords
  - level of access
  - cuts down on time wasted on junk mail/unsuitable material.
  - All important because the information is very sensitive.
- (1 per -, max 4) [4]
- (b) Problems:
- Hackers attack communications
  - Hackers attack customer data
  - Data being distributed leading to unsolicited communications
- Measures:
- Encrypting data
  - Digital signatures to guarantee reliability of source
  - Passwords to enter user's area/database
  - Use of firewall to block unwanted access
  - Workers subject to D.P. legislation
  - Portable storage devices not allowed.
- (1 per -, max 2 for concerns, max 4 for solutions, max 5) [5]
- 3 (a) Marks points:
- Address in instruction is decoded
  - Contents of that memory location contain an address
  - The address of the data to be used.
- [3]
- (b) -Some areas of memory cannot be addressed because size of memory address > space available in instruction
- Memory address will fit in a memory location
- [2]

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- 4 (a) -Terminal (with small amount of processing power)  
 -Normal peripherals of mouse/key board/screen/printer  
 -Storage in form of hard drive (to store confidential documents)  
 -Storage in form of flash memory/cartridge... (to allow portability of data)  
 (1 per -, max 3) [3]
- (b) -Cable  
 -fixes position of machine  
 -secure  
 -Wireless  
 -can move machine and yet remain in contact  
 -insecure, subject to hacking/eavesdropping.  
 -coax cable  
 -cheap to install for school  
 -fibre-optic connection  
 -more secure/faster transmission of data  
 (1 for two methods; 1 each for comparisons; 1 for general point. Max 3) [3]
- (c) (i) -Individual who can be covered for time off/Whole group who could be trained en masse if school admin did not function  
 -Learning about system requirements/learning about the use of the software  
 -Comparison between technical and user requirements  
 (1 per -, max 2) [2]
- (ii) -Can be done in own time  
 -At own pace  
 -No personality clashes with tutor  
 -Can learn on actual software to be used  
 -Done without affecting running of school/no down time  
 -Electronic, so progress can be automatically monitored.  
 (1 per -, max 4) [4]
- (d) (i) Advantage: Searching is quicker because a binary search can be used.  
 Disadvantage: When index needs changing many of the contents must be moved. [2]
- (ii) -Insert details in file  
 -Insert index entry in one of free space list  
 -Start from head of list pointer  
 Repeat  
 -If points to value > new student  
 -Then alter pointers to insert new value here in list. End  
 -Else follow pointer to new value to compare  
 -Until no more values in list  
 -Insert new value and move null pointer. End  
 (1 per -, max 6) [6]

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- 5 -Address of instruction copies from PC to MAR  
 -PC incremented  
 -Instruction at address stored in MAR copied to MDR/MBR  
 -Instruction copied from MDR/MBR to CIR  
 -Instruction code in CIR is decoded  
 -Address in CIR copied to MAR  
 -Because Jump instruction, address in MAR copied to PC  
 (1 per -, max 6) [6]
- 6 Lexical:  
 -Instructions are tokenised  
 -Some of characters must be combined to create token for keyword  
 -If keyword does not exist in internal dictionary of keywords  
 -check for valid variable name  
 -against rules stated in BNF  
 -Error is reported  
 Syntax:  
 -Each keyword has an associated syntax  
 -Tokens are checked to ensure that they match the syntax for that keyword.  
 - e.g. Do left and right brackets match?/Does punctuation for Print keyword match rules?/...  
 -error is reported (only credit once)  
 (1 per -, max 5) [5]
- 7 (a) (i) An application where the output is produced quickly enough to affect the next input. [1]  
 (ii) -Any sensible example e.g. Check a PIN at an ATM machine  
 -must be done before offering a service on the card proffered. [2]
- (b) -Touch sensor to ensure that window is not opened  
 -Pressure sensor/pad by door to sense someone stepping on it  
 -Infra-red sensor to pick up body heat of someone in room  
 -Sound sensor to hear broken glass if window broken  
 -Light sensor to detect when a light beam is broken  
 (2 per -, 1 for sensor + 1 for use. N.B. uses are examples, max 3 sensors) [6]
- 8 (a) (i) -A table holding information about the database  
 -Used by managers of the database, not users  
 -Maps logical database to physical storage  
 -Allows existence check on data to be carried out.  
 (1 per -, max 2) [2]
- (ii) -The language used to allow the manager to write the...  
 -description of the data items to be stored in the database  
 -defines the structure of the tables. [2]
- (iii) -Language used allow user to access data...  
 -store data...  
 -change data in a database  
 -search for data in the database.  
 (1 per -, max 2) [2]

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- (b) (i) -Most items of data only need to be stored once...  
-because tables are linked allowing the contents of all tables to be used via access one. [2]
- (ii) -Access to areas of data can be easily controlled because...  
-users each have their own view of data  
-DBMS can control views using access rights.  
-Regular back ups of the data can be made...  
-automatically by the DBMS to alternative hardware.  
(1 per -, max 2) [2]
- (iii) -less chance of contradictions being caused  
-as most information is only stored once.  
-data protected from misguided or malicious processing/alteration  
-leading user to trust in the correctness of the data  
(1 per -, max 2) [2]
- 9 (a) (i) Only one user has access at a time. [1]
- (ii) -Application Programming Interface  
-provides platform to run software  
-file management  
-manipulation of files  
-memory management  
-paging/virtual memory/scheduling  
-processor management  
-interrupt handling/scheduling  
-I/O management / handles data transfers  
-between areas of processor/between primary memory and secondary storage.  
-device drivers / handles data between processor and I/O peripherals  
-using instructions in device drivers and control of buffers  
- user interface  
-a method of communicating with computer/suitable example  
-Utility software  
-offers series of software to carry out housekeeping/monitor and maintain and use the hardware.  
-Security/privacy  
-will protect data by copying to other media automatically/sets up passwords to restrict access to files.  
(1 per -, max 2 components, max 4) [4]
- (b) (i) -O.S. hides the complexities of the system from users.  
-User believes that their computer is a stand-alone.  
-User is unaware of sharing resources.  
(1 per -, max 2) [2]
- (ii) -Sets up files and directories for user.  
-Allows group access to some files.  
-Access to files dictated by user I.D.  
(1 per -, max 2) [2]

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- 10 (i) -Information must be collected before anything else is done.  
-Documentation is done alongside all other tasks  
-Information must be analysed before solution attempted.  
-Data files can be created alongside problem solution.  
-Design must be completed before software can be written.  
-Design and software can be done alongside data files.  
-Testing must be documented.  
-Project must be finished before implementation.  
(1 per -, max 6) [6]
- (ii) -Critical Path: AGH or ABDFH. [1]
- (iii) -Least Time: 29 days. [1]