OCR
RECOGNISING ACHIEVEMENT

GCE

Computing

Advanced GCE **A2 H447**

Advanced Subsidiary GCE **AS H047**

Mark Schemes for the Units

January 2010

HX47/MS/R/10J

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Advanced GCE Computing (H447)

Advanced Subsidiary GCE Computing (H047)

MARK SCHEMES FOR THE UNITS

F451 Computer Fundamentals

Question			Expected Answers	Mks
1	(a)	(i)	The physical parts of a computer system	[1]
		(ii)	• External to the computer/attached to the computer/outside the processor/connects to computer • e.g. printer to output hard copy (accept others, with use.) **(1 per •, max 2)**	[2]
	(b)	(i)	Instructions, programs (to make the hardware work)	[1]
		(ii)	• Systems software controls the operation of the hardware/runs the computer/manages the applications • Applications make the computer do something useful/user carry out tasks/provides a useful output	[2]
	(c)	(i)	e.g. airline booking system • It is important that the system is updated before the next input so no double booking (Accept other applications with sensible justification)	[2]
		(ii)	• Inputs are stored • because only useful when full <u>week</u> of values collected • Payroll run on Thursday night/once a week/all at the same time • No need for human to be present • Run in computer downtime/when workers have gone home • No need for instant response to inputs • All processing is similar/data is of similar type • Large amount of data **(1 per •, max 5)**	[5]
2	(a)	(i)	• Packets sent onto network • Find their own routes to destination/use different routes • Packets must be reordered at destination/arrives in wrong order • Packets have identity on label **(1 per •, max 2)**	[2]
		(ii)	• Route reserved before transmission... • for the duration of the transmission • All packets follow same route/in order • Packets must be reassembled at destination/arrives in order **(1 per •, max 2)**	[2]

Question			Expected Answers	Mks
		(iii)	Advantage: • Does not tie up a proportion of the network/Secure because impossible to intercept all packets. • /loss of part of communication will not be fatal/if message does not arrive safely only one packet needs to be resent Disadvantage: • Must be reordered at destination/only as fast as its slowest packet	[2]
	(b)		**Mark band 6-8. Higher level response** Candidate has made a number of points relating to both physical and logical aspects of the answer. Candidate has provided a response which shows a logical flow in its argument and has included, more than one cycle. **Mark band 3-5. Medium level response** Candidate has made a number of points, either about physical or logical aspects of the answer, or the answer is restricted to a single cycle. There will be a logical flow in the response although it will not be complete. Some technical terms will be correctly used and the few spelling and grammatical errors are not obtrusive. **Mark band 0-2. Low level response.** Candidate has made one or two points about either logical or physical aspects of the answer. The response will not contain a logical flow. Technical terms will be absent from the answer and spelling and grammatical errors will affect the readability of the answer. Points include: Physical: • Buffer... • a temporary storage • Interrupt... • message sent to processor/control unit • Type of communication medium • Serial/parallel communication Logical: • Buffer filled by primary memory • Processor can continue other tasks • Buffer emptied to storage • Interrupt sent to request buffer is refilled • Interrupt priority compared with priority of present task • Use of priority to assign interrupt with position in queue • Data arranged in packets/blocks • Data error checked on arrival • Method of error checking explained	[8]

Question			Expected Answers	Mks
3	(a)		• Technically feasible • Economically feasible • Is the workforce capable of running new system • Consideration of budget • Socially feasible. • Is the proposed system legal? • Is the proposed system possible?... • …in given time period • Purpose is to carry out initial enquiries… • …to see if there are any reasons why new system may not be acceptable… • …before starting to produce it • Plan may be revised if study highlights problems **(1 per •, max 5)**	**[5]**
	(b)	(i)	• Input /Output procedures • using processing tools/how to operate the system • Backing up and archiving (procedures) • File searching/maintenance <u>of files</u> • Error messages/trouble shooting • FAQ • Help available from... • Required hardware specifications/system set up procedure • Glossary • Index/contents **(1 per •, max 3)**	**[3]**
		(ii)	• DFD – showing flow of data through system • System flow chart – showing how parts of system interrelate • Flowchart – showing the operations involved/the algorithm • ERD – shows how data tables relate to each other **(1 per •, max 2 pairs, max 4)**	**[4]**
	(c)		• Scanner to input picture already in hard copy – Pixels scanned/reflected light measured • Electronic camera to take picture – lens focuses image onto matrix of receptors/transferred via cable/memory card/USB to computer **(1 per •, max 4)**	**[4]**

Question			Expected Answers	Mks
	(d)		• Information is confidential... • and sensitive • Information must be accurate • Clients must have confidence that measures are taken to protect their data • (Data stored must be refreshed regularly to) ensure irrelevant data is not kept • Need to protect the unwary • Worry about identity theft… • …fraud • Stop data being passed on **(1 per •, max 4)**	**[4]**

Question			Expected Answers	Mks
4	(a)	(i)	• Manages execution of instructions... • by using control signals to other parts of computer • Synchronises actions (using inbuilt clock) • Controls fetch/execute cycle **(1 per •, max 3)**	**[3]**
		(ii)	• Stores OS... • data (currently in use) • software (currently in use)/boot program/operations/instructions **(1 per •, max 3)**	**[3]**
		(iii)	• Carries out arithmetic instructions/calculations • Carries out logical instructions/decisions • Acts as a conduit through which all I/O to computer is done/gateway to processor **(1 per •, max 3)**	**[3]**
	(b)		• Data bus – carries data being transmitted • Address bus – carries identification about where the data is being sent/coming from • Control bus – carries control signals from control unit to allow synchronisation of signals/commands to processor **(1 per -, max 2 pairs, max 4)** (Note: accept: I/O bus/rides bus/VESA/PCI if properly explained)	**[4]**
5	(a)		• Barcode reader – reads (thickness of pairs of) lines (and turns them into a code)/scans code with laser • Magnetic Stripe – on back of card, containing member no. magnetically • Keyboard/manual input – in case automatic data entry fails, number can be typed in/keyboard **(2 per •, max 2 pairs, max 4)**	**[4]**
	(b)		• Sound/light – beep to signify that data has been accepted • Image on screen – showing details of member and books borrowed • Hardcopy output/printout – kept for later use, perhaps to provide evidence for updating other files **(2 per •, max 2 pairs, max 4)**	**[4]**

Question			Expected Answers	Mks
	(c)		• (Worry about) job loss • (Worry about) competence/training • Less time spent on mundane tasks/more time on interesting things like research and helping public • More information available/available when needed • Change of stress levels • More chances of improved qualifications/training makes workers more skilled... • enhanced job prospects/more pay • Expected to be more literate with system • Increased work load to bring new system on line **(1 per •, max 5)**	**[5]**
6		**(i)**	• Reduces size of files – When scripts are being sent electronically to publisher – The compression means they are sent more quickly – They are decompressed using a decompression algorithm at the destination **(1 per •, max 3)**	**[3]**
		(ii)	• Manages data storage/organises data storage – Allows files to be accessed – Allows for deletion/sorting of files **(1 per •, max 3)**	**[3]**
		(iii)	• Contain the instructions to the OS for using a peripheral – e.g. -Would be used when a new printer was bought – in order to (install) communication (protocols) to OS/Control of peripheral by OS – To configure hardware	**[3]**
		(iv)	• Automatically… • makes copy of files – To prevent loss of files – Protects important work by ensuring... – on different hardware/at regular intervals – Incremental backup made **(1 per •, max 3)**	**[3]**

Question			Expected Answers	Mks
7	(a)	(i)	• The rate at which data is transferred (NOT speed)/how many bits in a specific time period • measured in bits per second/baud • Actual rate of data transmission can vary because of other factors like the need to transmit control signals. **(1 per •, max 2)**	**[2]**
		(ii)	e.g. Streaming of a video to a machine – Large amount of data – Time sensitive because... – delay will interrupt video output **(Example + 2 points, max 3)**	**[3]**
	(b)		• To ensure that both devices are ready for data transmission/want to communicate/establish a link • To ensure that same protocol/rules are being used • To ensure synchronisation of signal • To agree error detection rules other sensible part of protocol **(1 per •, max 3)**	**[3]**
8		(i)	01101011 **(1 per nibble, max 2)**	**[2]**
		(ii)	6B **(1 per digit, max 2)**	**[2]**
		(iii)	• Binary values can be taken in groups of four (from right) • and converted into decimal equivalence • Letters used to stand for values from 10 to 15 • = 6 AND 1011=11=B **(2 of first three points = last point, max 3)**	**[3]**

F452 Programming Techniques and Logical Methods

Question			Expected Answers	Marks
1	(a)		MemberID: • String/Text/Alphanumeric • 5 Name: • String/Text/Alphanumeric • 10 – 30 DateJoined: • Date • 2 or 4 or 8 CurrentAverage • Real/Floating Point/Single/Double • 4 or 8 GamesPlayed • Integer • 2, 4 or 8	**[10]**
	(b)		• Answers in part a added up • Multiply by 2000 members • Add 10% (for overheads) • Divide by 1000(or 1024) to get kB • Answer between 45kB and 126kB	**[5]**
	(c)	(i)	Any 4 of: • Records are arranged in order of a primary key... • ... which in this case will be MemberID • An index is kept which is used to jump to groups/blocks of records • Eg the index could hold the positions of the first record with letters A, B, C etc • The index must be in the same order as the records • Mention of multiple indices	**[4]**
		(ii)	Any 2 of: • Given the large number of records... • ... accessing a specific record is faster • ... as you do not have to search sequentially from the beginning.	**[2]**
	(d)	(i)	• "GamesPlayed <= 50" is TRUE (so take left branch) • "DateJoined < 1 year ago" is FALSE (so take right branch) • Category = Improver	**[3]**
		(ii)	• "GamesPlayed <= 50" is FALSE (so take right branch) • "CurrentAverage < 180" is FALSE (so take right branch) • Category = Pro	**[3]**

Question			Expected Answers	Marks
	(e)		• CurrentAverage >= 200 (or equivalent) at * ... • ... in a rhombus • YES and NO labels are present • Category = Pro for correct branch/if CurrentAverage>=200 • Category = Improver for correct branch/if CurrentAverage < 200 • Flowchart reconnected correctly • Include diagram... (Accept other solutions which produce the correct result.)	**[6]**

Question			Expected Answers	Marks
2	(a)		• Sequence	[1]
	(b)	(i)	Any 3 of: • (A variable) which holds an item of data... • ... which is supplied/passed to a subroutine/procedure/function • It is given an identifier when the subroutine is defined • It is substituted by an actual value when the subroutine is called	[3]
		(ii)	• L, W, T	[1]
	(c)		• a = 8 • b = 5 • c = 40 (allow follow through) • d = 44 (allow follow through)	[4]
	(d)		Example: `06 OUTPUT "You will need" + d + " tiles."` Award marks for any 2 of: • Concatenation has been used correctly • Output is user friendly/sentence or label + value	[2]
	(e)		**High level response [6-8 marks]** Candidates will answer the question with complete and comprehensive explanations of how to rewrite the code, justifying each point made. The information will be presented in a structured and coherent form, which may include snippets of programming code as illustrations of points made. There will be few, if any, errors in spelling, grammar and punctuation. Technical terms will be used appropriately and correctly. **Medium level response [3-5 marks]** Candidates will answer the question showing an awareness of a number of techniques for internally documenting code, with some reference to the code provided. The information will be presented in a structured format, giving examples of code to illustrate the points being made with few explanations or justifications. There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct. **Low level response [0-2 marks]** Candidates will demonstrate a limited understanding. A few techniques for writing easily maintainable program code may be mentioned, but not related to the code provided. Information may be a list of points, with few or no descriptions. Information will be poorly expressed and there will be a limited, if any, use of technical terms. Errors of grammar, punctuation and spelling may be intrusive.	

Question			Expected Answers	Marks
	(e) cont'd		Points that may be made: • The variables/procedures should be given more descriptive names such as length, width, tile/findNumberOfTiles, etc using consistent conventions making it easier to tell what the variables represent/procedures do • Code should be indented to show program constructs/blocks for example PROCEDURE/END PROCEDURE making it easier to trace the code and check for incorrect blocks • Add comments to the code and separate it into logical sections making the code easier to read	**[8]**

Question			Expected Answers	Marks
3	(a)	(i)	Any 2 of: • A (group of) statement(s) executed repeatedly... • ... until a condition is met • ... or for a set number of times	[2]
		(ii)	Up to 2 marks per type: • WHILE loop • ... The condition is tested before each iteration • ... and the statements in the loop will be executed if the condition is true • The statements in the loop may not be executed (if the condition is initially false) • FOR loop • ... The number of iterations is fixed • ... according to start and end values of a variable set at the beginning	[4]
	(b)		Any 4 of: • The value of a variable/expression is used • ... to decide which of a number of statement blocks is executed • There can be a default option • In this case, different code blocks for different moves (jump, duck, forward, backward)... • ... will be executed depending on the value of the key input • ... or a sensible response (eg beep) if a wrong key is pressed (accept answers in pseudo-code, or partly in pseudo-code)	[4]
	(c)	(i)	Any 2 of: • The IF statement and the REPEAT loop are <u>nested</u> incorrectly (mark for correct use of the term) • The REPEAT Loop should be completely within the IF statement • Lines 05 and 06 are the wrong way round. • As it is, the REPEAT inside the IF has no UNTIL/ the ENDIF inside the REPEAT has no IF	[2]
		(ii)	• Syntax (error) • When the program is translated.	[2]
	(d)		• Logic Error • Does not perform the algorithm intended by the programmer/suitable example • Detected when program produces incorrect result **OR** • Run-time error • Statement in the code cannot be executed (due to effects not catered for by the program)/division by 0 /overflow/lack of memory/unusual data • Detected when the program crashes	[3]

Question			Expected Answers	Marks
4	(a)	(i)	Any 3 of: • An identifier/ name ... • ... used to refer to a particular memory location... • ... used to store data (which is used by the program) • The data stored may change while the program is running • Allows the algorithm to be written even when the data is not yet known	[3]
		(ii)	• Global variable: TotalVolume • Local variable: i	[2]
		(iii)	Any 4 of: • A global variable is declared at the beginning of a program • ... and is available throughout the program • A local variable is declared within a subprogram/ procedure/function/block of code • ... and is only available within that section of code • ... and is destroyed/deleted when the subprogram exits • A local variable can override a global variable (with the same name)	[4]
	(b)		Any 2 of: • Initialise the variables (TotalWeight and TotalVolume) • Before they are used in an expression • Location may already contain data	[2]
	(c)		Any 4 of: In beta-testing... • ... the nearly complete program... • ... is given to a group of users to test/is tested under normal operating conditions/tested by people who were not involved in the production • The aim is to find any bugs which the programmer has overlooked In acceptance testing... • ... the program is considered complete • The programmer demonstrates the working program to the client • The aim is to show that the program meets all the requirements of the client.	[4]

Question	Expected Answers	Marks
(d)	**Line of Code Executed / Variables Changed** **i / TotalWeight / TotalVolume** **10** — **0** **11** — **0** **13** — **1** **14** — **0.3** **15** — **200** **16** — **2** **13** **14** — **0.4** **15** — **350** **16** — **3** **13** 1 mark per correct value, changed on the correct line	**[9]**

(e)	Any 7 of the following mark points (irrespective of method used to present the algorithm)
	• An algorithm for a function which returns the cost of delivery (accept incorrect calculations, provided the function returns the result of the calculations)
	• The variables TotalWeight and TotalVolume are used in the calculations (as global variables or as parameters of the function)
	• Determines amount of excess weight if any
	• Determines cost of excess weight
	• Determines amount of excess volume if any
	• Determines cost of excess volume
	• Correctly calculates cost of delivery
	
	Example:
	
	`FUNCTION CostOfDelivery()`
	
	`  IF TotalWeight > 1 THEN`
	`  ExtraWeight = TotalWeight – 1`
	`  ExtraWeightUnits = ExtraWeight DIV 0.1`
	`  ExtraWeightCost = ExtraWeightUnits * 0.5`
	`  ELSE`
	`  ExtraWeightCost = 0`
	`  END IF`
	`  IF TotalVolume > 1000 THEN`
	`  ExtraVolume = TotalVolume – 1000`
	`  ExtraVolumeUnits = ExtraVolume DIV 200`
	`  ExtraVolumeCost = ExtraVolumeUnits * 0.5`
	
	`  ELSE`
	`  ExtraVolumeCost = 0`
	`  END IF`
	
	`  Cost of delivery = 5 + ExtraVolumeCost +`
	`  ExtraWeightCost`
	
	`  END FUNCTION`
		[7]

F453 Advanced Computing Theory

Question			Expected Answers	Mks
1	(a)	(i)	• to obtain processor time... • for a higher priority task • to avoid delays • to avoid loss of data • as an indicator to the processor… • that a device needs to be serviced **[max 2]**	**[2]**
1	(a)	(ii)	*example* • (imminent) power failure/system failure • peripheral eg printer (buffer empty)/hardware • clock interrupt • user interrupt eg new user log on request • software *reason* (related to examples chosen): • eg new user can wait… • … but data must be saved before power fails **[max 2 for examples, plus 2 for reason, total max 4]**	**[4]**
1	(b)	(i)	• maximise number of users… • …with no apparent delay • maximise number of jobs processed… • …as quickly as possible • obtain efficient use of processor time / resources… • …dependent upon priorities • …to ensure all jobs obtain processor time/long jobs do not monopolise the processor **[1 per •, in pairs, max 4]**	**[4]**
1	(b)	(ii)	• some jobs are more urgent than others • priorities are used to maximise the use of the computer resources **[max 2]**	**[2]**
2	(a)	(i)	• a language related closely to the computer being programmed/low level language/machine specific • uses descriptive names (for data stores) • uses mnemonics (for instructions) • uses labels to allow selection • each instruction is generally translated into one machine code instruction • may use macros **[max 2]**	**[2]**

Question			Expected Answers	Mks
2	(a)	(ii)	• binary notation • set of all instructions available • to the architecture/which depend on the hardware design of the processor • instructions operate on bytes of data **[max 2]**	**[2]**
2	(a)	(iii)	• reserves storage for instructions and data • replaces mnemonic opcodes by machine codes • replaces symbolic addresses by numeric addresses • creates symbol table to match labels to addresses • checks syntax/offers diagnostics for errors **[max 3]**	**[3]**
2	(b)	(i)	• translates one line/statement… • …then allows it to be run before translation of next line • reports one error at a time… • …and stops **[max 1 pair, max 2]**	**[2]**
2	(b)	(ii)	• translates the whole program as a unit • creates an executable program/intermediate program • may report a number of errors at the same time • optimisation **[max 2]**	**[2]**
2	(c)		*Mark band 6-8. High level response.* Candidate has listed a number of points and explained more than one of them. Candidate has used appropriate technical terminology throughout. There are no spelling or grammatical errors. *Mark band 3-5. Medium level response.* Candidate has listed a number of points, or stated one point and explained it. Candidate has used some technical terminology in the response. There may be spelling or grammatical errors, but they are not obtrusive. *Mark band 0-2. Low level response.* Candidate has attempted to state one or more disparate points. There is a lack of cohesion in the response. Candidate has failed to use correct technical terms in the response. Spelling and grammatical errors affect the readibility of the response. *Points to be made include:* • source program is used as the input • tokens are created from individual symbols and from… • …the reserved words in the program • a token is a fixed length string of binary digits • variable names are loaded into a look-up table / symbol table • redundant characters (eg spaces) are removed • comments are removed • error diagnostics are given • prepares code for syntax analysis	**[8]**

<table>
<tr><th colspan="3">Question</th><th>Expected Answers</th><th>Mks</th></tr>
<tr><td>3</td><td>(a)</td><td></td><td>• fetch, decode, execute
• correct order
[Give 1 mark for the 3 stages, plus 1 mark for all 3 stages in correct order]</td><td>[2]</td></tr>
<tr><td>3</td><td>(b)</td><td>(i)</td><td>
<table>
<tr><th></th><th>RISC only (✓)</th><th>CISC only (✓)</th><th>both RISC and CISC (✓)</th></tr>
<tr><td>Has many addressing modes</td><td></td><td>✓</td><td></td></tr>
<tr><td>Many instructions are available</td><td></td><td>✓</td><td></td></tr>
<tr><td>Uses one or more register sets</td><td></td><td></td><td>✓</td></tr>
<tr><td>Uses only simple instructions</td><td>✓</td><td></td><td></td></tr>
</table>
[1 per correct row, max 4]
</td><td>[4]</td></tr>
<tr><td>3</td><td>(b)</td><td>(ii)</td><td>• RISC: each task may take many cycles
• CISC: a task may be completed in a single cycle
• …as instructions may be more complex than individual instructions in RISC
[max 2]</td><td>[2]</td></tr>
<tr><td>3</td><td>(c)</td><td>(i)</td><td>• a processor that allows the same instruction to operate simultaneously…
• …on multiple data locations
• the same calculation on different data is very fast
• Single Instruction Multiple Data (SIMD)
[max 2]</td><td>[2]</td></tr>
<tr><td>3</td><td>(c)</td><td>(ii)</td><td>(accept any example of a mathematical problem involving large number of similar calculations)
• eg weather forecasting / airflow simulation around new aircraft
[1]</td><td>[1]</td></tr>
</table>

Question			Expected Answers	Mks
4	(a)	(i)	• exponent 010 represents 2 • mantissa 0.1101, move point 2 places right so becomes 011.01 • value is 3.25 *or* • exponent 010 represents 2 • mantissa 0.1101 represents 13/16 or 0.8125 • value is 13/16 multiplied by 2^{2} = 13/4 = 3.25 **[max 3]**	**[3]**
4	(a)	(ii)	• exponent 101 represents -3 • mantissa 0.1, move point 3 places left so becomes 0.0001 • value is 1/16 or 0.0625 *or* • exponent 101 represents -3 • mantissa 0.1 represents ½ or 0.5 • value is ½ multiplied by 2^{-3} = 1/16 or 0.0625 **[max 3]**	**[3]**
4	(b)		• accuracy decreased (as fewer bits available) • range increased (as larger magnitude exponent available) **[2]**	**[2]**
5	(a)	(i)	• start at 'Aberdeen'… • look at each word in turn/then 'Belfast', 'Cardiff' etc… • …until 'York' is found **[max 2]**	**[2]**
5	(a)	(ii)	• look at middle/'Cardiff'/'Glasgow' • 'York' is in second half of list • repeated halving… • …until 'York' is found **[max 3]**	**[3]**
5	(b)		• (usually) faster because… • …half of data is discarded at each step/fewer items are checked **[max 2]**	**[2]**
5	(c)		• if stack is full… • …report error and stop • increment pointer • add data item at position 'pointer' **[last 2 bullets in any order, max 3]**	**[3]**

Question			Expected Answers	Mks
5	(d)			

	30 →	9	46	14	22 ←
swap 30 & 22	22 →	9	46	14	30 ←
	22	9 →	46	14	30 ←
	22	9	46 →	14	30 ←
swap 46 & 30	22	9	30 →	14	46 ←
	22	9	30 →	14 ←	46
swap 30 & 14	22	9	14 →	30 ←	46
	22	9	14	30 → ←	46

split into sublists, repeat…

marks for:

- highlight first number in the list (the 'search number')
- pointer at each end of list
- repeat:
- compare numbers being pointed to…
- …if in wrong order, swap
- move pointer of non-search number
- until pointers coincide so search number in correct position
- split list into 2 sublists
- quick sort each sublist
- repeat until all sublists have a single number
- put sublists back together

5	(d)			

alternative answer using a pivot:

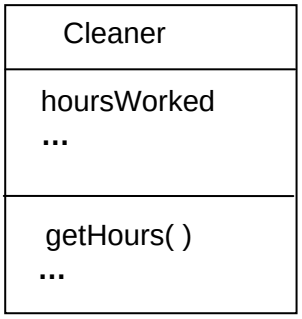
- select an item at random, the pivot
- create two new lists:
- …one with all items less than pivot,
- …other with items greater than pivot
- repeat
- …until lists only have one item

demonstrate this on numbers given, eg:

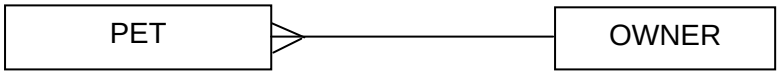
30	9	46	14	22	pivot is 46
30	9	14	22	46	numbers moved to left of pivot as smaller, choose 14 as new pivot for left section
9	14	30	22	46	30 moved to right of 14 as larger

etc

[max 5] **[5]**

Question			Expected Answers	Mks
5	(e)		• insertion sort / bubble sort **[1]**	**[1]**
6	(a)	(i)	• a class has all the attributes and operations of its superclass… • …and may also have attributes & operations of its own • eg an object of class Nurse has surname from StaffMember … • …in addition to daysWorked *(accept other valid examples from diagram.)* **[max 3]**	**[3]**
6	(a)	(ii)	• Dr Connor is an instance of Doctor • surname is inherited from StaffMember • hourlyRate is an attribute of Receptionist…/hourlyRate is not an attribute of Doctor or of StaffMember • …which is not a superclass for Doctor **[max 2]**	**[2]**
6	(b)		 *marks for* • Cleaner/CleaningStaff in correct position only • hoursWorked in correct position only • getHours( ) in correct position only **[max 3]**	**[3]**
6	(c)	(i)	• an instance of a class • a real-world entity • holds attributes and methods • eg oneCleaner / Mrs Jones **[2 out of first 3 bullets, + last bullet, max 3]**	**[3]**
6	(c)	(ii)	• a template for… • …a set of objects… • …that have state and behaviour • eg Cleaner/StaffMember/Doctor/Nurse/Receptionist **[2 out of first 3 bullets, + last bullet, max 3]**	**[3]**
7	(a)	(i)	• only 1 letter allowed • letter missing **[max 2]**	**[2]**

Question			Expected Answers	Mks
7	(a)	(ii)	• identifierA must include 1 or more letters • identifierB need not include any letters • eg $2 is valid for identifierB but not for identifierA… • …while $2ab is valid for both *(accept any valid examples)* **[max 3]**	**[3]**
7	(b)	(i)	• any expression starting with p and using only the terms provided • pqr*- **[2]**	**[2]**
7	(b)	(ii)	• post-order (traversal) **[1]**	**[1]**
7	(b)	(iii)	• multiply tu, obtain 6 • add v, obtain 16 **[2]**	**[2]**
7	(b)	(iv)	• stack **[1]**	**[1]**
7	(b)	(v)	• bracket **[1]**	**[1]**
8	(a)		• the mnemonic part of the instruction/that indicates what it is to do/code for the operation • JMP/ADN **[2]**	**[2]**
8	(b)		• immediate **[1]**	**[1]**
8	(c)		• the use of characters to represent the address of a store location • CD **[2]**	**[2]**
8	(d)		• temporary storage (within ALU) • holds data being processed/used during calculations • deals with the input and output in the processor **[max 2]**	**[2]**
8	(e)		• uses an index register/IR • … and an absolute address… • … to calculate addresses to be used **[max 3]**	**[3]**
8	(f)	(i)	• the instruction gives the address to be used **[1]**	**[1]**
8	(f)	(ii)	• number of addresses available is limited… • …by the size of the address field • code is not relocatable/code uses fixed memory locations [max 2]	**[2]**

Question			Expected Answers	Mks
9	(a)		 **[1 mark for each correct end, max 2]**	**[2]**
9	(b)	(i)	• unique identifier • eg PetId in PET • eg OwnerId in OWNER **[max 2]**	**[2]**
9	(b)	(ii)	• primary key from one table… • …used as an attribute in another… • …to link tables/provide relationship between tables • eg OwnerId stored in PET… • …shows who owns each pet **[max 3]**	**[3]**
9	(c)		*Description(2)* • a file containing descriptions of data in database • used by database managers… • …when altering database structure • Uses metadata to define the tables *Examples/accept references to the database in the question(2)* • names of tables/columns • characteristics of data (eg length, data type) • restrictions on values in columns • meaning of data columns • relationships between data • which programs can access data • identifies primary keys • identifies foreign keys • identifies indexes • defines access rights **[max 4]**	**[4]**
9	(d)		• data description language/DDL **[1]**	**[1]**
9	(e)		• avoid data duplication/save storage • data consistency • data integrity • easier to change data • easier to change data format • data can be added easily • data security/easier to control access to data. **[max 3]**	**[3]**

Grade Thresholds

Advanced GCE Computing (H047/H447)
January 2010 Examination Series

Unit Threshold Marks

Unit		Maximum Mark	A	B	C	D	E	U
F451	Raw	100	73	65	57	50	43	0
	UMS	100	80	70	60	50	40	0
F452	Raw	100	79	72	65	58	52	0
	UMS	100	80	70	60	50	40	0
F453	Raw	120	96	86	76	66	56	0
	UMS	120	96	84	72	60	48	0
F454	Raw	80	64	56	48	40	32	0
	UMS	80	64	56	48	40	32	0

Specification Aggregation Results

Overall threshold marks in UMS (ie after conversion of raw marks to uniform marks)

	Maximum Mark	A	B	C	D	E	U
H047	200	160	140	120	100	80	0

The cumulative percentage of candidates awarded each grade was as follows:

	A	B	C	D	E	U	Total Number of Candidates
H047	11.5	33.1	60.1	81.8	94.6	100	148

148 candidates aggregated this series

For a description of how UMS marks are calculated see:
http://www.ocr.org.uk/learners/ums/index.html

Statistics are correct at the time of publication.

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