



## **General Certificate of Education**

# **Computing 6510**

## **CPT1 Computer Systems, Programming and Networking Concepts**

# **Mark Scheme**

*2008 examination – January series*

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Component	Software	Hardware	Hardware and Software
An application program	√		
A printed circuit board which controls the wash programme inside a washing machine			√
Main memory chips in the PC		√	

3

More than one entry per row – look for a single tick  
 If mixture of X and ticks used mark (as long as one entry per row)

- 2 (a) **Processor/CPU;** Max 2  
 Explanation – faster execution of (program) instructions / the fetch-execute cycle is faster;  
**R.** more ‘calculations per second’  
 Simultaneous processes possible / duel/quad–core processor ;  
  
**Additional processor ;**  
 Processing is shared between two processors ;  
  
**Graphics Card ;**  
 Explanation – increasing the speed at which images are rendered ;  
  
**(main) memory / RAM ;**  
 Explanation – reduces main memory to disc transfers ;  
 Fit memory which has a faster read/write speed ;  
  
**R. Clock**  
**A.** Explanation - increasing the clock speed/over-clocking ;  
  
**R. Cache**  
**A.** Explanation – program instructions are fetched faster from cache than main memory ;  
 ;
- 2 (b) **Secondary storage/memory/disc store // (external) hard disk ;** 2  
**A.** HDD/ Hard drive  
 Explanation – the storage space/capacity is increased;  
**R:** ‘bigger hard drive’ or similar
- 2 (c) **Hub device / USB ports ;** Max 2  
**Card with additional serial /parallel ports / PCMCIA / USB ports ;**  
**R.** Card with additional I/O ports  
 Explanation – will allow/support the simultaneous connection of several devices ;
- 3 (a) (Sound/voice) recording/er // sampling/er (software) // audio capture software ; Max 2  
 Operating system **A.** OS;  
 Driver ;

		Codec ; <b>R.</b> Microphone software <b>R.</b> Analogue to digital converter	
3	(b)	(i) Number of samples/measurements taken <u>per second/unit time</u> ; Frequency/how often samples are recorded/taken ; <b>R.</b> Rate of ...” <b>R.</b> “Intervals at which ...”	Max 1
3	(b)	(ii) 1000 samples/measurements per second ; 1 sample/measurement per millisecond (ms) ; 1000 Hz /1 KHz ; <b>R.</b> 1000 (only)	Max 1
3	(c)	8 (bits) ;	1
3	(d)	(i) (Sound) quality will be improved/clearer <b>R.</b> Smoother // better/higher resolution //more accurate // higher fidelity ; the height of the wave will be measured more precisely/accurately ; <b>R.</b> larger range of frequencies is possible	Max 1
3	(d)	(ii) The size of the sound file will increase // file uses more memory / disk space ; <b>R.</b> ‘uses more space’	1
3	(e)	0110 1100 ;	1
3	(f)	<i>All correct answers must fit the context of how the byte(s) are interpreted by the application program (not by the user of the application).</i>	Max 3

Program instruction(s) // machine code ;  
Integer (number) ;  
Real (number) / Floating point ;  
Exponent ;  
Mantissa ;  
(BUT Real/Floating Point + Exponent + Mantissa scores Max 2)  
BCD (number) ;  
**R.** Number / denary / binary

ASCII (code) ;  
Unicode ;  
EBCDIC ;  
Character (BUT not in addition to specific codes above) **R.** Keystroke ;

Address / pointer /memory reference **R.** Location ;  
String **R.** Word ;  
Format code // system setting / device status/signal ;

**A.** any ‘data type’ descriptor (e.g. Boolean) – any three data types gets Max 3 but excluding any answers above ;  
**A.** Colour ;

- 4 (a) 3<sup>rd</sup> (generation) ; 1
- 4 (b) (i) (Program) 2 ; (Program) 3; 1
- 4 (b) (ii) (Program) 1 ; 1
- 4 (c) 3

	Assembler	Compiler	None
Program 1		√	
Program 2	√		
Program 3			√

If more than one entry per row – look for a single tick  
 If mixture of X and ticks used - mark (as long as only one tick per row)

- 4 (d) The interpreter software is resident in memory at the same time as the application program is run ; Max 2  
 The interpreter recognises/translates/reads/converts each statement **A.** instruction/line;  
**T/O** if added “converts to machine code”  
 (Syntax) checks the program ; line-by-line ; if ‘error free’ the statement /line is executed ;  
 The interpreter calls a procedure/code to execute the statement ;  
 When (first) error encountered program execution is halted ;
- 4 (e) The processor/architecture/(hardware) platform is different ; Max 1  
 instructions are not the same ;  
 Assembler software is processor/architecture specific ;  
**A.** Assembler software is ‘machine specific’  
  
 The computers use a different operating system ;  
**R.** the ‘computer’ might be ...  
**R.** possible bugs in the software
- 5 (a) (i) (x, y) coordinates ; **R.** Position Max 2  
 Length / Width ;  
 Line width/thickness ; line colour ; line style ;  
 Fill colour ; fill style ;  
 (Text) Label / Caption ;  
 Object/identifier name ;  
 Object type ;  
**A.** any property considered reasonable  
**R.** Colour
- 5 (a) (ii) Vector graphics store properties/description/coordinates for each object Max 2  
 ;  
 Mathematical equations/formulae generate each object ;  
 Properties (**A.** by example) can be re-calculated / re-scaled ;  
 The drawing is re-rendered/re-drawn when properties are changed ;  
**I.** Any reference to bitmaps/pixels

5	(a)	(iii)	Allows for future editing of the graphic (without loss of quality/distortion) ; Potential for graphics libraries ;	Max 1	
5	(b)	(i)	1 (byte) ;	1	
5	(b)	(ii)	960 KB // 1280 x 768 / 1024 ;	1	
5	(b)	(iii)	480 KB // <b>ft</b> answer given for (ii) /2 ;	1	
6	(a)		<u>Bits</u> are sent along a single wire/line ; <u>bits</u> are sent one after another ; <b>R.</b> Bits of (the) data	Max 1	
6	(b)	(i)	Data <u>bit</u> ; Parity (bit) ; Signal to start data transfer/strobe ; Signal 'ready to receive data' / busy; Signal to acknowledge data transfer / Complete ; Out of paper/ink / error ; On-line/off-line ; Handshaking //control <u>signal</u> /status <u>signal</u> (BUT only if <u>not</u> by example above) ; Ground ;	Max 2	
6	(b)	(ii)	Transmission over long distances ; When a high data transfer rate is required ; <b>A.</b> No driver is available ;	Max 1	
6	(c)		Data is transmitted intermittently (rather than as a steady stream) ; Sender and receiver are only synchronized when data is being sent // start bit synchronises the receiver ; <b>R.</b> Description only of start and stop bits	1	
7	(a)		<pre> CarFailed := False Input NextCar For Position ← 1 to 4   Do     NextCategory ← SingleCharacter( A. NextCar ; , B. Position ; )     If C. NextCategory = '0' / NextCategory &lt;&gt; '1' ;       Then CarFailed ← True Etc... </pre> <b>Part C - I.</b> omission of quotes <b>A.</b> double quotes		3

7 (b)

3

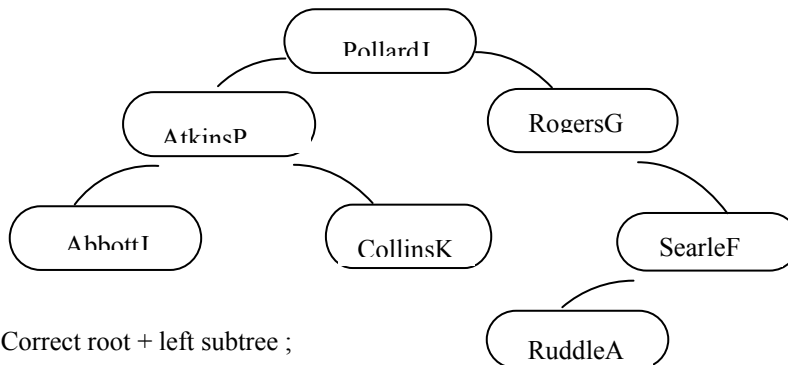
Variable	Data Type	Comment
Position	D Integer ;	E loop counter/loop control ; Takes the range of value 1, 2, 3 and 4 ; <b>Indicates</b> the current test/category or suitable description ; Provides an index for the <u>string</u> // indicates the position in the <u>string</u> ;
NextCar	String	
NextCategory	F Char ;	
CarFailed	Boolean	

- 8 (a) 0000 0001 0000 1001 1
- 8 (b) (i) 0000 0001 1001 0101 1
- 8 (b) (ii) *Answer must refer to/identify the shaded group of bits ...* 1

1000 0001 **1010** 0100

The bits 1010 are not a valid BCD digit/are not allowed ;  
The bits 1010 represent 'ten'/a two digit number ;  
Correct group identified (as above) + "digits in BCD are only in the range 0 to 9 / maximum 9 or equivalent" ;

9 (a)



Correct root + left subtree ;  
Correct root + right subtree ;

I. identification of PollardJ as the root  
A. a complete 'left-right' mirrored image.

2

- 9 (b) (i) PollardJ, AtkinsP, CollinsK from a correctly drawn left sub-tree ; 1
- 9 (b) (ii) 4 from a correctly drawn right sub-tree ; 1

- 10 (a) 2-D array ; 1
- 10 (b) Shows that sales person 2; did meet their target; for Quarter 3 / July-September ; Max 1

10 (c)

Person	Quarter	Target [Person, Quarter]	NewArray			
			[1]	[2]	[3]	[4]
	1, 2, 3, 4		0	0	0	0 ;
1	1	Y				
	2	N		1 ;		
	3	Y				
	4 ;	N				1
2	1	N	1			
	2	N		2		
	3	Y				
	4	Y				
3 ;	1	N	2 ;			
	2	N		3		
	3	N			1	
	4	N				2 ;

- NewArray initial values all 0 ; 1
- Person loop counter 1 to 3 ; 1
- Person 1 - is followed by quarters 1 to 4 in sequence; 1
- NewArray[2] = 1 for person = 1 and Quarter = 2 ; 1
- Final NewArray[1] = 2 ; 1
- Final NewArray[2 and 3 and 4] values are correct ; 1

- 10 (d) Stores the (total) number of sales staff who did not meet their target // the (total) number of sales targets not met ; for each quarter ; 2