
COMPUTER SCIENCE

9608/42

Paper 4 Written Paper

October/November 2017

MARK SCHEME

Maximum Mark: 75

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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Cambridge International is publishing the mark schemes for the October/November 2017 series for most Cambridge IGCSE[®], Cambridge International A and AS Level components and some Cambridge O Level components.

Question	Answer									Marks									
1(a)	1 mark per shaded group									4									
	Column																		
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20px;"></td> <td style="width: 20px; text-align: center;">1</td> <td style="width: 20px; text-align: center;">2</td> <td style="width: 20px; text-align: center;">3</td> <td style="width: 20px; text-align: center;">4</td> <td style="width: 20px; text-align: center;">5</td> <td style="width: 20px; text-align: center;">6</td> <td style="width: 20px; text-align: center;">7</td> <td style="width: 20px; text-align: center;">8</td> </tr> </table>											1	2	3	4	5	6	7	8
		1	2	3	4	5	6	7	8										
	Conditions	Grade C in Computer Science	Y	Y	Y	Y	N	N	N		N								
		Grade C in Maths	Y	Y	N	N	Y	Y	N		N								
		Grade C in Science	Y	N	Y	N	Y	N	Y		N								
	Actions	Take Computer Science	Y	Y	Y	Y	Y	Y											
		Take Maths	Y	Y			Y	Y											
		Take Physics	Y				Y												

Question	Answer	Marks																																																																												
1(b)	<p>1 mark per column</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2"></th> <th colspan="8">Column</th> </tr> <tr> <th colspan="2"></th> <th>S</th> <th>T</th> <th>U</th> <th>V</th> <th>W</th> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <th rowspan="3" style="writing-mode: vertical-rl; transform: rotate(180deg);">Conditions</th> <td>Grade C in Computer Science</td> <td>Y</td> <td>–</td> <td>–</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Grade C in Maths</td> <td>–</td> <td>Y</td> <td>Y</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Grade C in Science</td> <td>–</td> <td>–</td> <td>Y</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th rowspan="3" style="writing-mode: vertical-rl; transform: rotate(180deg);">Actions</th> <td>Take Computer Science</td> <td>Y</td> <td>Y</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Take Maths</td> <td></td> <td>Y</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Take Physics</td> <td></td> <td></td> <td>Y</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>			Column										S	T	U	V	W	X	Y	Z	Conditions	Grade C in Computer Science	Y	–	–						Grade C in Maths	–	Y	Y						Grade C in Science	–	–	Y						Actions	Take Computer Science	Y	Y							Take Maths		Y							Take Physics			Y						3
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	Take Physics			Y																																																																										
1(c)	<p>For example:</p> <ul style="list-style-type: none"> • (Column S) combining 1,2,3,4... • ... because they only need CS to take CS // Maths and Science do not matter • (Column T) combining 1,2,5,6... • ... because CS does not matter if it is Y/N • (Column U) combining 1,5... • ...because CS does not matter if it is Y/N 	3																																																																												

Question	Answer	Marks
2(a)	1 mark for each correct line, duration and activity. <pre> graph LR 1((1)) -- "1 A" --> 2((2)) 2 -- "2 B" --> 3((3)) 2 -.- "C" --> 4((4)) 3 -- "1 D" --> 5((5)) 4 -- "3" --> 5 5 -- "12 E" --> 6((6)) 6 -- "2 F" --> 7((7)) 7 -.- "G" --> 9((9)) 7 -- "4" --> 9 8((8)) -- "1 H" --> 9 9 -- "1 I" --> 10((10)) </pre>	7
2(b)	<ul style="list-style-type: none"> Dummy activity 	1

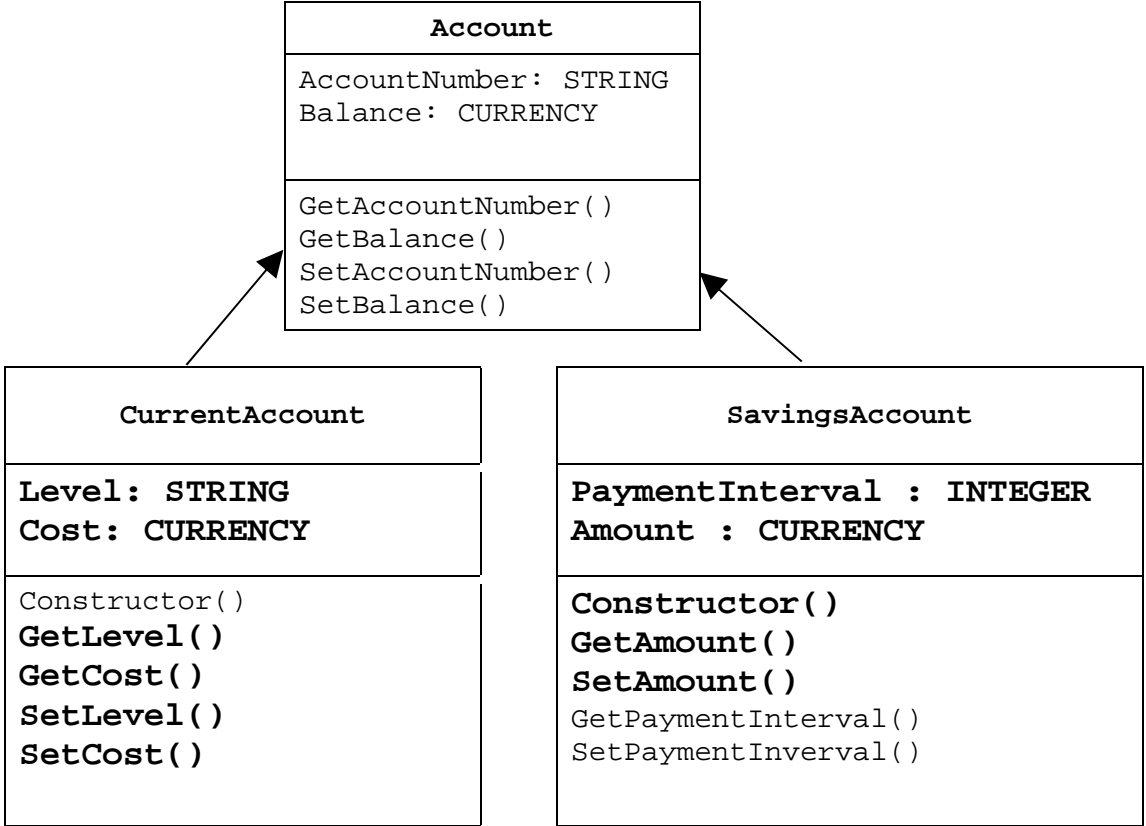
Question	Answer	Marks
3(a)	1 mark per clause <ul style="list-style-type: none"> • room(corridor). • furniture(table). • furniture(lamp). • located(table, corridor). • located(lamp, corridor). 	5
3(b)	<ul style="list-style-type: none"> • master_bedroom • spare_bedroom 	2
3(c)(i)	1 mark per bullet to max 2 <ul style="list-style-type: none"> • The first clause <u>only</u> says the nursery is next to the master bedroom • ... but not that the master bedroom is next to the nursery • The second clause <u>only</u> says the master bedroom is next to the nursery • ... but not that the nursery is next to the master bedroom • Goal to find rooms adjacent to master bedroom would not return nursery • ... Example. FindNextTo(X, master_bedroom) • It is a two-way relationship 	2
3(c)(ii)	1 mark per bullet <ul style="list-style-type: none"> • room(main_bathroom). • nextTo(corridor, main_bathroom). • nextTo(main_bathroom, corridor). 	3

Question	Answer	Marks
3(d)	<p>1 mark per bullet</p> <ul style="list-style-type: none"> • canBeMovedTo(<u>B,A</u>) • Furniture(B) • Room(A) • AND / , • AND NOT / , NOT • Located(B,A) <p>Example:</p> <pre> canBeMovedTo(B,A) { IF {furniture(B)} {AND} {room(A)} AND NOT({located(B,A)}). { { </pre>	6

Question	Answer	Marks
4(a)	<p>1 mark per item in bold</p> <pre> FOR Pointer ← 1 TO (Max - 1) ItemToInsert ← Numbers[Pointer] CurrentItem ← Pointer WHILE (CurrentItem > 0) AND (Numbers[CurrentItem - 1] > ItemToInsert) Numbers[CurrentItem] ← Numbers[CurrentItem - 1] CurrentItem ← CurrentItem - 1 ENDWHILE Numbers[CurrentItem] ← ItemToInsert ENDFOR </pre>	4
4(b)	<ul style="list-style-type: none"> • The size of the array // value of Max • How ordered the items already are 	2

Question	Answer				Marks	
5(a)	Max 10				10	
	Label	Op code	Operand	Comment		Marks
	START:	LDR	#0	// initialise Index Register		
	LOOP:	LDX	LETTERS	// load LETTERS		1
		CMP	LETTERTOFIND	// is LETTERS = LETTERTOFIND ?		1
		JPN	NOTFOUND	// if not, go to NOTFOUND		1
		LDD	FOUND	// increment FOUND		1
		INC	ACC			1
		STO	FOUND			1
	NOTFOUND:	LDD	COUNT	//increment COUNT		1
		INC	ACC			1
		STO	COUNT			1
		CMP	#6	// is COUNT = 6 ?		1
		JPE	ENDP	// if yes, end		1
		INC	IX	// increment Index Register		1
		JMP	LOOP	// go back to beginning of loop		1
	ENDP:	END		// end program		
	LETTERTOFIND:		'x'			
	LETTERS:		'd'			
			'u'			
			'p'			
			'l'			
			'e'			
			'x'			
COUNT:		0				
FOUND:		0				

Question	Answer				Marks		
5(b)	Label	Op Code	Operand		Comment	10	
	START:	LDR	#0	// initialise the Index Register	1		
	LOOP:	LDX	VALUES	// load the value from VALUES	1(loop) + 1(LDX Values)		
		LSR	#3	// divide by 8	1 (LSR) + 1 (#3)		
		STX	VALUES	// store the new value in VALUES	1		
		INC	IX	// increment the Index Register	1		
		LDD	REPS	// increment REPS	1		
		INC	ACC				
		STO	REPS				
		CMP	#6	// is REPS = 6 ?	1		
		JPN	LOOP	// repeat for next value	1		
		END					
		REPS:	0				
		VALUES:	22				
			13				
			5				
			46				
			12				
		33					

Question	Answer	Marks
6(a)	<p>1 mark per bullet</p> <ul style="list-style-type: none"> • Inheritance correctly shown from CurrentAccount and SavingsAccount to Account • Level and cost methods, get and set functions in CurrentAccount • Get and set Amount and constructor in SavingsAccount  <pre> classDiagram class Account { AccountNumber: STRING Balance: CURRENCY GetAccountNumber() GetBalance() SetAccountNumber() SetBalance() } class CurrentAccount { Level: STRING Cost: CURRENCY Constructor() GetLevel() GetCost() SetLevel() SetCost() } class SavingsAccount { PaymentInterval: INTEGER Amount: CURRENCY Constructor() GetAmount() SetAmount() GetPaymentInterval() SetPaymentInterval() } Account < -- CurrentAccount Account < -- SavingsAccount </pre>	3

Question	Answer	Marks
6(b)	<p>1 mark per bullet to max 5</p> <ul style="list-style-type: none"> • Class heading and ending • Identifying inheritance • Declaring AccountNumber, Balance • Use of private/protected for AccountNumber and Balance • One Correct Get Method • One Correct Set Method • Second correct Get and Set Methods <p>Example VB</p> <pre> MustInherit Class Account Private AccountNumber As String Private Balance As Decimal Sub SetAccountNumber(AccNumP As String) AccountNumber = AccNumP End Sub Function GetAccountNumber() As String return AccountNumber End Function Sub SetBalance (BalanceP As Decimal) Balance = BalanceP End Sub Function GetBalance() As Decimal return Balance End Function End Class </pre> <p>or</p> <pre> MustInherit Class Account Private AccountNumber As String </pre>	5

Question	Answer	Marks
6(b)	<pre> Protected AccountNumber As String Get return _AccountNumber End Get Set (ByValue AccountNumberV As String) _AccountNumber = AccountNumberV End Set Private _Balance As Decimal Protected Balance As Decimal Get return _Balance End Get Set (ByValue BalanceV As Integer) _Balance = BalanceV End Set End Class Example Python class Account: def __init__(self, accountNumber, balance): self.__accountNumber = accountNumber self.__balance = balance def getAccountNumber(self): return self.__accountNumber: def setAccountNumber(self, AccountNumber): self.__AccountNumber = AccountNumber def getBalance(self): return self.__balance: def setBalance(self, Balance): self.__Balance = Balance </pre>	

Question	Answer	Marks
6(b)	<pre> Example Pascal type Account := class private AccountNumber, Balance; public constructor Create(AccountNumber, Balance); procedure setAccountNumber(AccountN: String); function getAccountNumber() : String; procedure setBalance(BalanceV: Real); function getBalance() : Real; constructor Account.init(Account, Bal); begin AccountNumber := Account; Balance := Bal; end; procedure SetAccountNumber(AccountN: String); begin AccountNumber := AccountN; end; procedure GetAccountNumber() : String; begin GetAccountNumber := AccountNumber end; procedure SetBalance(Bal: String); begin Balance := Bal; end; procedure GetBalance() : String; begin </pre>	

Question	Answer	Marks
6(b)	<pre> GetBalance := Balance end; end; </pre>	
6(c)	<p>1 mark per bullet to max 5</p> <ul style="list-style-type: none"> • Class declaration and end • Declaration of inheritance • Amount and PaymentInterval as Private/protected with appropriate data types <p>Constructor:</p> <ul style="list-style-type: none"> • Override / Overriding in constructor • Constructor heading and end • ...taking values as parameters • Constructor setting all values using base class • Initialisations of new attributes in the constructor • ... all set to the parameters <p>Example VB</p> <pre> Class SavingsAccount Inherits Account Private Amount As Decimal Private PaymentInterval As Integer Public Overrides Sub New(ByVal AccountNumberValue As String, ByVal BalanceValue As Decimal, ByVal AmountValue As Decimal, ByVal PaymentValue As Integer) Amount = PaymentValue PaymentInterval = PaymentValue End Sub End Class </pre>	5

Question	Answer	Marks
6(c)	<p>or</p> <pre> Class SavingsAccount Inherits Account Private Amount As Decimal Private PaymentInterval As Integer Public Sub New(AccountNumberValue As String, BalanceValue As Decimal, PayInterval As Integer, payAmount As Decimal) MyBase.New(AccountNumberValue, BalanceValue) AccountNumber = AccountNumberValue Balance = BalanceValue Amount = payAmount PaymentInterval = PayInterval End Sub </pre> <p>etc.</p> <p>Example Python</p> <pre> class SavingsAccount(Account): def __init__(self, AccountNumber, Balance, PayInt, AmountP): super().__init__(AccountNumber, Balance) self.__PaymentInterval = PayInt self.__Amount = AmountP </pre> <p>Example Pascal</p> <pre> type SavingsAccount = class(Account); private PaymentInterval : integer; Amount : currency; public constructor Create(AcountNum : String, Bal : Currency, PayInt : Integer, AmountP : Currency); end; constructor SavingsAccount.Create(); override; </pre>	

Question	Answer	Marks
6(c)	<pre>begin inherited Create(AccountNum, Bal) PaymentInterval := PayInt; Amount := AmountP; end;</pre>	