



Cambridge International AS & A Level

COMPUTER SCIENCE**9608/43**

Paper 4 Written Paper

May/June 2020

MARK SCHEME

Maximum Mark: 60

Published

Students did not sit exam papers in the June 2020 series due to the Covid-19 global pandemic.

This mark scheme is published to support teachers and students and should be read together with the question paper. It shows the requirements of the exam. The answer column of the mark scheme shows the proposed basis on which Examiners would award marks for this exam. Where appropriate, this column also provides the most likely acceptable alternative responses expected from students. Examiners usually review the mark scheme after they have seen student responses and update the mark scheme if appropriate. In the June series, Examiners were unable to consider the acceptability of alternative responses, as there were no student responses to consider.

Mark schemes should usually be read together with the Principal Examiner Report for Teachers. However, because students did not sit exam papers, there is no Principal Examiner Report for Teachers for the June 2020 series.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the June 2020 series for most Cambridge IGCSE™ and Cambridge International A & AS Level components, and some Cambridge O Level components.

This document consists of **15** printed pages.

Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5:

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

GENERIC MARKING PRINCIPLE 6:

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Question	Answer	Marks
1(a)	It is an unplanned event // an event not wanted	1
1(b)	1 mark per example to max 3 e.g. <ul style="list-style-type: none"> • Division by zero • Invalid array index • File does not exist • Run-time error • Invalid input • Invalid argument/value • Stack overflow • Memory leakage • Hardware failure/error 	3
1(c)	1 mark per bullet point to max 2 <ul style="list-style-type: none"> • The program will not crash // more robust // program will continue • Result does not cause further errors/problems later • Appropriate error messages/result • Exceptional conditions are identified • Improve readability 	2

Question	Answer	Marks												
2(a)	<p>1 mark for the first 3 rows 1 mark for the last 2 rows</p> <table border="1" data-bbox="338 316 1151 708"> <thead> <tr> <th data-bbox="338 316 869 379">Feature</th> <th data-bbox="869 316 1151 379">Must be included</th> </tr> </thead> <tbody> <tr> <td data-bbox="338 379 869 443">Incrementation</td> <td data-bbox="869 379 1151 443"></td> </tr> <tr> <td data-bbox="338 443 869 507">General case</td> <td data-bbox="869 443 1151 507">✓</td> </tr> <tr> <td data-bbox="338 507 869 571">Base case</td> <td data-bbox="869 507 1151 571">✓</td> </tr> <tr> <td data-bbox="338 571 869 635">Selection case</td> <td data-bbox="869 571 1151 635"></td> </tr> <tr> <td data-bbox="338 635 869 708">It calls itself</td> <td data-bbox="869 635 1151 708">✓</td> </tr> </tbody> </table>	Feature	Must be included	Incrementation		General case	✓	Base case	✓	Selection case		It calls itself	✓	2
Feature	Must be included													
Incrementation														
General case	✓													
Base case	✓													
Selection case														
It calls itself	✓													
2(b)	<p>1 mark for each of the spaces filled in</p> <pre> PROCEDURE Count (BYVALUE Number : INTEGER) IF MOD(Number, 2) <> 0 THEN Number ← Number - 1 ENDIF OUTPUT Number IF Number > 0 THEN CALL Count (Number - 1) ENDIF ENDPROCEDURE </pre>	5												

Question	Answer	Marks
2(c)	<p>1 mark per bullet point</p> <ul style="list-style-type: none"> • Recursive call • ..with correct parameters • ...in correct working place(s) • Removal of loop • Remainder of program in correct place <pre> PROCEDURE MealsCount(BYREF MealOption1 : INTEGER, MealOption2 : INTEGER) DECLARE MealOption : INTEGER INPUT MealOption IF MealOption = 1 THEN MealOption1 ← MealOption1 + 1 CALL MealsCount(MealOption1, MealOption2) ELSE IF MealOption = 2 THEN MealOption2 ← MealOption2 + 1 CALL MealsCount(MealOption1, MealOption2) ELSE OUTPUT MealOption1, " ", MealOption2 ENDIF ENDIF ENDPROCEDURE </pre>	5

Question	Answer	Marks
3(a)	<p>1 mark for each statement</p> <ul style="list-style-type: none"> • person(elle). • sport(rugby). • plays(elle, rugby). • will_not_play(elle, hockey). 	4

Question	Answer	Marks
3(b)	johann, jessica	1
3(c)	<p>1 mark per bullet point</p> <ul style="list-style-type: none"> • person(Y) • AND // , • sport(X) • AND NOT // , NOT • will_not_play(Y, X) <p>mightplay(Y, X) IF person (Y) AND sport (X) AND NOT(will_not_play(Y, X))</p>	5

Question	Answer	Marks
4(a)	<p>1 mark per bullet point to max 2</p> <ul style="list-style-type: none"> • Can use the properties from the parent/super class (without redeclaring them) • Can use the methods from the parent/super class (without redeclaring them) • Can extend the properties from the parent/super class • Can extend the methods from the parent/super class 	2
4(b)	<p>1 mark per feature to max 2</p> <ul style="list-style-type: none"> • Polymorphism • Encapsulation • Containment • Aggregation • Composition 	2

Question	Answer	Marks
5(a)	<p>1 mark per bullet point</p> <ul style="list-style-type: none"> • Method header and close (where applicable) ... • ... with correct parameters (LessonType, Instructor) • Initialised LessonType and Instructor to parameter values <p>PYTHON</p> <pre>def __init__(self, LType, LInstructor) : self.__ LessonType = LType self.__Instructor = LInstructor</pre> <p>PASCAL</p> <pre>Constructor Lesson.Create(LType, LInstructor); begin LessonType:= LType; Instructor:= LInstructor; end;</pre> <p>VB.net</p> <pre>Public Sub New(ByVal LType As String, ByVal LInstructor As String) LessonType = LType Instructor = LInstructor End Sub</pre>	3

Question	Answer	Marks
5(b)	<p>1 mark per bullet point</p> <ul style="list-style-type: none"> • function header and close (where applicable) • returns Fee <p>PYTHON</p> <pre>def GetLessonType(self) : return self.__LessonType</pre> <p>VB.net</p> <pre>Function GetLessonType () As Single Return LessonType End Function</pre>	2

Question	Answer	Marks
5(c)	<p>1 mark per bullet point</p> <ul style="list-style-type: none"> • Function header and close (where applicable) • Takes a parameter value • Check parameter value is valid ... • ... returns the correct fee • Returns -1 if value not valid <p>PYTHON</p> <pre>def GetFee(self, Level) : if Level == 'B' : return 45 elif Level == 'I' : return 50 elif Level == 'A' : return 55 else : return -1</pre> <p>VB.NET</p> <pre>Public Sub GetFee(PLevel) if PLevel = "B" Then return 45 elseif PLevel = "I" Then return 50 elseif PLevel = "A" Then return 55 else return -1 endif End Sub</pre>	5

Question	Answer	Marks
5(d)	<p>1 mark per bullet point</p> <ul style="list-style-type: none"> • Array declaration with identifier <code>LessonArray</code> and size 9 • Correct data type used <pre>DECLARE LessonArray : ARRAY[0:8] OF Lesson</pre>	2
5(e)	<p>1 mark per bullet point</p> <ul style="list-style-type: none"> • Object is created • Correct parameters passed • Stored in correct index of <code>LessonArray</code> <p>PYTHON <pre>LessonArray[2] = Lesson("Improve Your Serve", "David")</pre></p> <p>VB.net <pre>LessonArray[2] = New Lesson("Improve Your Serve", "David")</pre></p>	3

Question	Answer	Marks
6(a)	<p>1 mark per bullet point to max 4</p> <ul style="list-style-type: none"> • Procedure header and end • Loop 6000 times • Access the UserID and PINNumber for each element in CustomerDetails • Correct initialisation of UserID to "" and PINNumber to 0 <pre> PROCEDURE InitialiseHashTable() FOR x ← 0 TO 5999 CustomerDetails[x].UserID ← "" CustomerDetails[x].PINNumber ← 0 ENDFOR ENDPROCEDURE </pre>	4

Question	Answer	Marks
6(b)	<p>1 mark for each completed missing statement</p> <pre> FUNCTION InsertRecord(NewRecord) RETURNS INTEGER DECLARE Count : INTEGER DECLARE Index : INTEGER Count ← 0 Index ← Hash(NewRecord.UserID) WHILE (CustomerDetails[Index].UserID <> "") AND (Count <= 5999) Index ← Index + 1 Count ← Count + 1 IF Index > 5999 THEN Index ← 0 ENDIF ENDWHILE IF Count > 5999 THEN RETURN -1 ELSE CustomerDetails[Index] ← NewRecord RETURN Index ENDIF ENDFUNCTION </pre>	7

Question	Answer	Marks
7	<p>1 mark per bullet point</p> <ul style="list-style-type: none"> • Name, Address and Telephone Number beneath Customer details • Order Details below booking form • ...with appropriate iteration of entering Order Details • Shirt ID and Colour beneath Order Details • Cost beneath Order Details • ...with Small, Medium and Large below it • ...with selection <p>e.g.</p> <pre> graph TD OF[Order Form] --- CD[Customer Details] OF --- OD[Order Details *] OF --- TC[Total Cost] CD --- N[Name] CD --- A[Address] CD --- TN[Telephone number] OD --- SID[Shirt ID] OD --- CO[Colour] OD --- C[Cost] C --- S[Small °] C --- M[Medium°] C --- L[Large °] </pre>	7
7(b)(i)	Serial	1

Question	Answer	Marks																																																																	
7(b)(ii)	1 mark per bullet point to max 2 <ul style="list-style-type: none"> • Sequential • Random 	2																																																																	
7(c)	1 mark per completed statement PROCEDURE UpdateTelephone(BYREF ThisCustomer : Customer, BYVALUE NewTelephoneNumber : STRING) ThisCustomer.TelephoneNumber ← NewTelephoneNumber ENDPROCEDURE	3																																																																	
7(d)	1 mark per column pair <table border="1" data-bbox="338 683 1554 1185"> <tbody> <tr> <td rowspan="3" style="writing-mode: vertical-rl; transform: rotate(180deg);">Conditions</td> <td>Order over \$50</td> <td>Y</td> <td>Y</td> <td>Y</td> <td>Y</td> <td>N</td> <td>N</td> <td>N</td> <td>N</td> </tr> <tr> <td>Monday</td> <td>Y</td> <td>Y</td> <td>N</td> <td>N</td> <td>Y</td> <td>Y</td> <td>N</td> <td>N</td> </tr> <tr> <td>Loyalty card</td> <td>Y</td> <td>N</td> <td>Y</td> <td>N</td> <td>Y</td> <td>N</td> <td>Y</td> <td>N</td> </tr> <tr> <td rowspan="4" style="writing-mode: vertical-rl; transform: rotate(180deg);">Actions</td> <td>Additional 5% discount</td> <td>Y</td> <td>N</td> <td>Y</td> <td>N</td> <td>Y</td> <td>N</td> <td>Y</td> <td>N</td> </tr> <tr> <td>10% discount</td> <td>Y</td> <td>Y</td> <td>Y</td> <td>Y</td> <td>N</td> <td>N</td> <td>N</td> <td>N</td> </tr> <tr> <td>Free gift</td> <td>Y</td> <td>Y</td> <td>N</td> <td>N</td> <td>N</td> <td>N</td> <td>N</td> <td>N</td> </tr> <tr> <td>Free delivery</td> <td>Y</td> <td>N</td> <td>Y</td> <td>N</td> <td>N</td> <td>N</td> <td>N</td> <td>N</td> </tr> </tbody> </table>	Conditions	Order over \$50	Y	Y	Y	Y	N	N	N	N	Monday	Y	Y	N	N	Y	Y	N	N	Loyalty card	Y	N	Y	N	Y	N	Y	N	Actions	Additional 5% discount	Y	N	Y	N	Y	N	Y	N	10% discount	Y	Y	Y	Y	N	N	N	N	Free gift	Y	Y	N	N	N	N	N	N	Free delivery	Y	N	Y	N	N	N	N	N	4
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