

CAMBRIDGE INTERNATIONAL EXAMINATIONS**Cambridge International Advanced Level****MARK SCHEME for the October/November 2015 series****9608 COMPUTER SCIENCE****9608/42**

Paper 4 (Written Paper), maximum raw mark 75

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Page 2	Mark Scheme	Syllabus	Paper
	Cambridge International A Level – October/November 2015	9608	42

1 (a) (i)

Activity		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
A																														
B																														
C																														
D																														
E																														
F																														
G																														
H																														
J																														
K																														
L																														
M																														
N																														
Week Number		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29

1 mark for each square

[2]

(ii) week number 18

Allow follow through

[1]

Page 3	Mark Scheme	Syllabus	Paper
	Cambridge International A Level – October/November 2015	9608	42

(b) (i)

Activity	Description	Weeks to complete
A	Write requirement specification	1
B	Produce program design	1
C	Write module code	7
D	Module testing	2
E	Integration testing	2
F	Alpha testing	2
G	Install software and carry out acceptance testing	2
H	Research and order hardware	1
J	Install delivered hardware	3
K	Write technical documentation	4
L	Write user training guide	2
M	Train users on installed hardware and software	1
N	Sign off final system	1

Activity	Week Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
A		■																												
B			■																											
C				■	■	■	■	■	■	■				■	■															
D										■	■			■	■															
E											■	■					■	■												
F																			■	■										
G																								■	■					
H			■																											
J																					■	■	■							
K																	■	■	■	■										
L																								■	■					
M																										■				
N																											■			

1 mark per activity (but 1 mark for activity M and N)

Notes:

C must be after E (1 or 2 later is ok)

D, E, F correct relative to C

J must start in week 20 (allow 21, 22)

G must come after the end of J (f.t.)

K finishes after or at same time as F

L finishes at the same time as G **and after the end of J** (or 1-2 weeks later)M starts **when everything else has finished**. N after or at same time as M

[9]

(ii) week number: 26

Allow f.t.

[1]

Page 4	Mark Scheme	Syllabus	Paper
	Cambridge International A Level – October/November 2015	9608	42

- 2 (a) `parent(ali, ahmed).`
`parent(meena, ahmed).`

Accept statements in either order
 Wrong capitalisation minus 1 mark

[2]

- (b) `P =`
`ahmed`
`aisha`

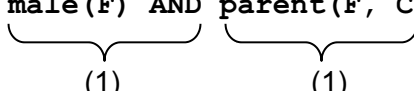
Ignore capitalisation
 Deduct 1 mark for every extra result

[2]

- (c) `mother(M, gina).`

Accept `parent(M, gina) AND female(M) .` Accept a comma instead of `AND`
 Reject `mother(M, gina) IF female(M) AND parent(M, gina) .`
 Ignore capitalisation

[1]

- (d) `father(F, C)`
`IF`
`male(F) AND parent(F, C) .`


[2]

- (e) `brother(X, Y)`
`IF`
`male(X) AND`
`parent(A, X) AND`
`parent(A, Y)`
`AND NOT X=Y.`

[1]

[1]

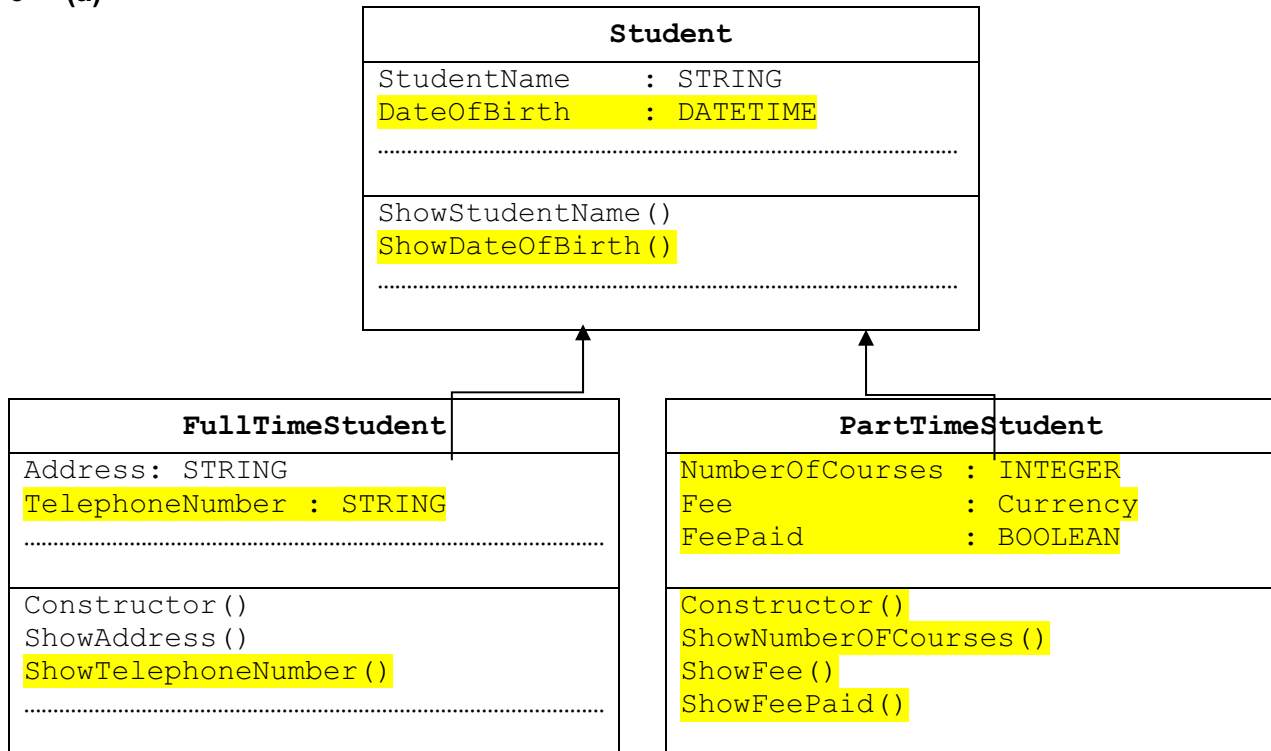
[1]

[1]

Accept any variable for A, but it must be the same in both places
 Accept father/mother instead of parent
 Ignore capitalisation

Page 5	Mark Scheme	Syllabus	Paper
	Cambridge International A Level – October/November 2015	9608	42

3 (a)



Mark as follows:

Base class:

- dateOfBirth declaration and associated method in Student
- constructor

Subclasses:

- telephoneNumber declaration and associated method in FullTimeStudent
- NumberOfCourses declaration and associated method in PartTimeStudent
- fee declaration and associated method in PartTimeStudent
- feepaid declaration and associated method in PartTimeStudent
- constructor method in PartTimeStudent
- inheritance arrows

Ignore data types, ignore other methods/attributes

Ignore brackets after methods

[Max 7]

Page 6	Mark Scheme	Syllabus	Paper
	Cambridge International A Level – October/November 2015	9608	42

(b) (i) Mark as follows (parts to be ignored in grey):

If no programming language stated, map to 1 of the 3 below (or check in Q1ai)

Class header & ending (watch out these may be squashed into the next clip)

Ignore methods

2 attributes with correct data types

No mark if subclass properties shown here

Attributes required:

StudentName

DateOfBirth (accept variations e.g. DoB)

Pascal

```

TYPE Student = CLASS
    PUBLIC
        Procedure ShowStudentName();
        Procedure ShowDateOfBirth();
    PRIVATE
        StudentName : STRING;
        DateOfBirth : TDateTime; // accept string    reject Date
END;
```

Python

```

class Student :
    def __init__(self) :
        self.StudentName = ""
        self.DateOfBirth = "" # date(1,1,2015)
    def ShowStudentName() :
        pass
    def ShowDateOfBirth() :
        pass
```

Ignore __ before attributes

VB.NET

```

Class Student
    Public Sub ShowStudentName()
    End Sub
    Public Sub ShowDateOfBirth()
    End Sub
    Private StudentName As String
    Private DateOfBirth As Date ' accept string
End Class
```

(Ignore: must inherit)

Ignore Private/protected/public

Don't give a mark if using DIM

[2]

Page 7	Mark Scheme	Syllabus	Paper
	Cambridge International A Level – October/November 2015	9608	42

(ii) Mark as follows:

- Class header and showing superclass
- Properties (Do not award this mark if properties from base class included here)
Data types must be correct
- Methods (Do not award this mark if methods from base class included here)
must show heading and ending of procedure/function declaration
Ignore PUBLIC, PRIVATE

Pascal

```
TYPE FullTimeStudent = CLASS (Student)
    PUBLIC
        Procedure ShowAddress();
        Procedure ShowTelephoneNumber();
    PRIVATE
        Address          : STRING;
        TelephoneNumber : STRING; // reject integer
END;
```

Python

```
class FullTimeStudent(Student) :
    def __init__(self) :
        self. Address = ""
        self. TelephoneNumber = ""
    def ShowAddress() :
        pass
    def ShowTelephoneNumber() :
        pass
```

VB.NET

```
Class FullTimeStudent : Inherits Student
    Public Sub ShowAddress()
    End Sub
    Public Sub ShowTelephoneNumber()
    End Sub
    Private Address As String
    Private TelephoneNumber As String ` reject integer
End Class
```

No mark if using DIM

[3]

Page 8	Mark Scheme	Syllabus	Paper
	Cambridge International A Level – October/November 2015	9608	42

- (iii) 1 mark per statement to max 3
 Missing string delimiters: penalise once
 Accept use of constructor

Pascal

```
NewStudent := FullTimeStudent.Create;
NewStudent.StudentName := 'A.Nyone';
NewStudent.DateOfBirth := EncodeDate(1990, 11, 12); // :=
'11/12/1990'
NewStudent.TelephoneNumber := '099111';
```

Alternative

```
NewStudent := FullTimeStudent.Create('A.Nyone', '12/11/1990',
'099111');
```

Python

```
NewStudent = FullTimeStudent()
NewStudent.StudentName = "A.Nyone"
NewStudent.DateOfBirth = "12/11/1990"
NewStudent.TelephoneNumber = "099111"
```

Alternative

```
NewStudent = FullTimeStudent('A.Nyone', '12/11/1990', '099111')
```

VB.NET

```
Dim NewStudent As FullTimeStudent = New FullTimeStudent()
NewStudent.StudentName = "A.Nyone"
NewStudent.DateOfBirth = #11/12/1990#
NewStudent.TelephoneNumber = "099111"
```

Alternative

```
Dim NewStudent As FullTimeStudent = New
FullTimeStudent("A.Nyone", "12/11/1990", "099111")
```

[Max 3]

Page 9	Mark Scheme	Syllabus	Paper
	Cambridge International A Level – October/November 2015	9608	42

4 (a) FUNCTION Hash(**Key** : STRING) RETURNS INTEGER
 DECLARE Number : INTEGER
 Number ← ASCII(LEFTSTRING(**Key**,1))
 // Number ← ASCII(**Key**[1])
 Number ← Number - 64
 RETURN Number
 // Result ← Number // Hash ← Number
 ENDFUNCTION

Accept ASC instead of ASCII

Accept LEFT instead of LEFTSTRING

Key can be a different identifier but must be the same in both places

[5]

(b) (i)

Index	Dictionary Key	Value
1		
2		
3	Computer	Rechner
4	Disk	Platte
5	Error	Fehler
6	File	Datei
7		
8		
:	:	:
:	:	:
1999		
2000		

Ignore spelling mistakes

1 mark for 2 correct pairs entered in correct slots

[2]

(ii) Collision / synonym / space already occupied / same index in array
 Overwrites previous key-value pair

reject error

[Max 2]

(iii) Create an overflow area

The 'home' record has a pointer to others with the same key // linked list

OR

Store the overflow record at the next available address ...

in sequence (= next available)

OR

Re-design the hash function // write a different/another algorithm

to generate a wider range of indexes // enlarging storage space // to create fewer collisions

[2]

Page 10	Mark Scheme	Syllabus	Paper
	Cambridge International A Level – October/November 2015	9608	42

(iv) Mark as follows:

Check whether slot is empty:

```
IF Dictionary[Index,1] <>"" // != '' // > NULL // >
NONE
```

If not: update index: THEN Index ← <some value>

...to find an empty slot (loop / follow pointer / go to overflow area) reject FOR loop

Insert code between lines 20 and 30

```
21 WHILE Dictionary[Index,1] > ""
22   Index ← Index + 1
23   IF Index > 2000
24     THEN
25       Index ← 1
26   ENDIF
27 ENDWHILE
```

[4]

5 (a) (i)

Accumulator		Memory Address			
		509	510	511	512
{	0	7	3	0	0
	7				7
	0				
{	1			1	
	7				
	14				14
{	1				
	2			2	
	14				
{	21				21
	2				
	3			3	

3 marks

1 mark

1 mark

If values changed in column 509 or 510 don't give marks for 511/512

[5]

(ii) stores the counter value for// acts as a control variable/counter
How many times the loop has been performed // control the loop

Ignore re-stating the steps

[2]

(b) LDM #12 (must be instruction before storage)
STO 509 (must be final instruction)

1 mark for each instruction

[2]

Page 11	Mark Scheme	Syllabus	Paper
	Cambridge International A Level – October/November 2015	9608	42

- 6 (a)** 1 mark for structure header/ending
 1 mark for each field correct, take away 1 mark for additional fields
 Python answers will use a class

Pascal

```

TYPE StockItem = RECORD
    ProductCode      : String;    // accept integer
    Price            : Currency;  // accept real
    NumberInStock    : Integer;
END;
```

Python

```

class StockItem :
    def __init__(self) :
        self.ProductCode = ""      # = 0
        self.Price = 0.0           # = 0
        self.NumberInStock = 0
```

VB.NET

```

STRUCTURE StockItem
    Dim ProductCode As String      \ accept integer
    Dim Price As Decimal           \ Double/single
    Dim NumberInStock As Integer
END STRUCTURE
```

VB6

```

Type StockItem
    ProductCode As String          \ accept integer
    Price As Currency              \ Double/single
    NumberInStock As Integer
END Type
```

[4]

Page 12	Mark Scheme	Syllabus	Paper
	Cambridge International A Level – October/November 2015	9608	42

(b) (i)

```

01 TRY
02     OPENFILE "StockFile" FOR READ/RANDOM    // ignore "
03 EXCEPT
04     OUTPUT "File does not exist"
05 ENDTRY

```

[2]

- (ii)** (Line 01) alerts system to check for possible run-time errors (exception)
 (Lines 03, 04) handle the exception without the program crashing // keeps program running// provide alternative statements to execute to avoid run-time error

Accept “exception handling” for 1 mark [Max 2]

(c)

```

WHILE NOT EOF("StockFile")
    READFILE "StockFile", ThisStockItem // accept reading separate
    fields
    OUTPUT ThisStockItem.ProductCode
    OUTPUT ThisStockItem.NumberInStock
ENDWHILE

```

1 mark for loop (accept REPEAT)
 1 mark for EOF("StockFile") // StockFile.Peek <> -1 / NONE/"
 1 mark for READ record
 1 mark for OUTPUT of 2 fields

Ignore opening and closing file [4]