

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International Advanced Level

MARK SCHEME for the May/June 2015 series

9608 COMPUTER SCIENCE

9608/41

Paper 4 (Written Paper), maximum raw mark 75

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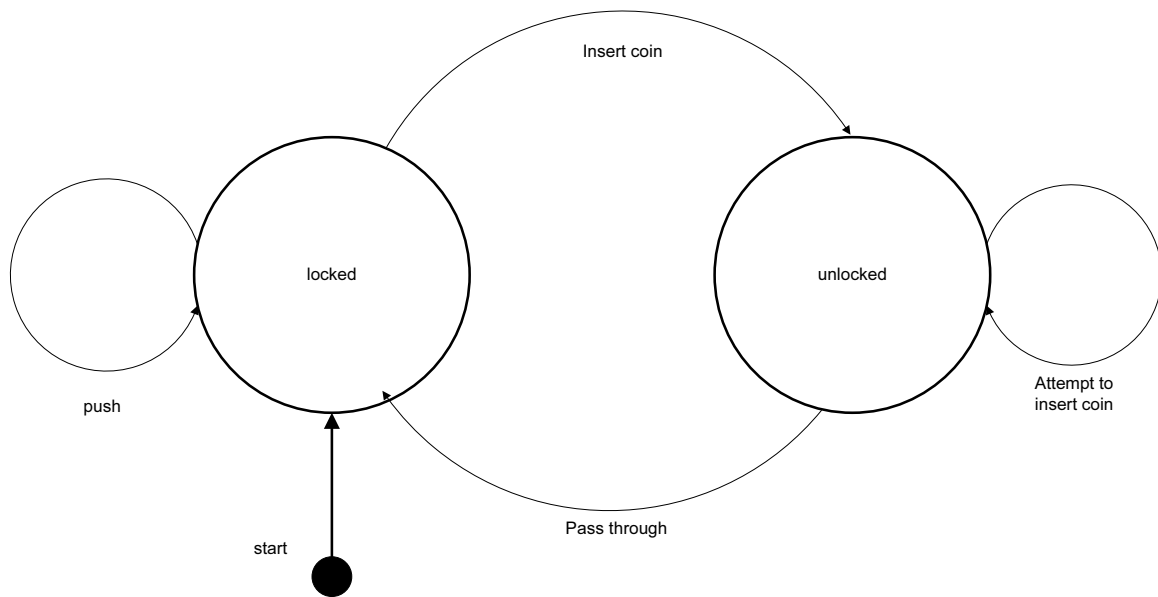
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Page 2	Mark Scheme	Syllabus	Paper
	Cambridge International A Level – May/June 2015	9608	41

1



Mark as follows:

1 mark for both states correct

1 mark for each further label

[5]

- 2 (a) `capital_city(santiago).`
`city_in_country(santiago, chile).`
`country_in_continent(chile,south_america).`
`city_visited(santiago).`

accept in any order

[4]

- (b) `ThisCity =`
`manchester`
`london`

[2]

- (c) `countries_visited(ThisCountry)`
`IF`
`city_visited(ThisCity)`
`AND`
`city_in_country(ThisCity, ThisCountry)`

1

1

2

[4]

Page 3	Mark Scheme	Syllabus	Paper
	Cambridge International A Level – May/June 2015	9608	41

3 (a)

Conditions	goods totalling more than \$20	Y	Y	Y	Y	N	N	N	N
	goods totalling more than \$100	Y	Y	N	N	Y	Y	N	N
	have discount card	Y	N	Y	N	Y	N	Y	N
Actions	No discount				X	X	X	X	X
	5% discount		X	X					
	10% discount	X							
		1 mark	1 mark	1 mark	1 mark				

[4]

(b)

Conditions	goods totalling more than \$20	Y	Y	Y	Y	N			
	goods totalling more than \$100	Y	Y	N	N	-			
	have discount card	Y	N	Y	N	-			
Actions	No discount				X	X			
	5% discount		X	X					
	10% discount	X							

1 mark per column

[5]

Page 4	Mark Scheme	Syllabus	Paper
	Cambridge International A Level – May/June 2015	9608	41

(c) Example Pascal

```
FUNCTION Discount(GoodsTotal: INTEGER; HasDiscountCard: BOOLEAN) :
INTEGER;
```

```

      BEGIN
(1)      IF GoodsTotal > 20
(1)      THEN
(2)      IF GoodsTotal > 100
(2)      THEN
(3)      IF HasDiscountCard = TRUE
(3)      THEN
(3)      Discount := 10
(3)      ELSE
(3)      Discount := 5
(2)      ELSE
(4)      IF HasDiscountCard = TRUE
(4)      THEN
(4)      Discount := 5
(4)      ELSE
(4)      Discount := 0
(1)      ELSE
(1)      Discount := 0;

      END;
```

Example Python

```
def Discount(GoodsTotal, HasDiscountCard) :
```

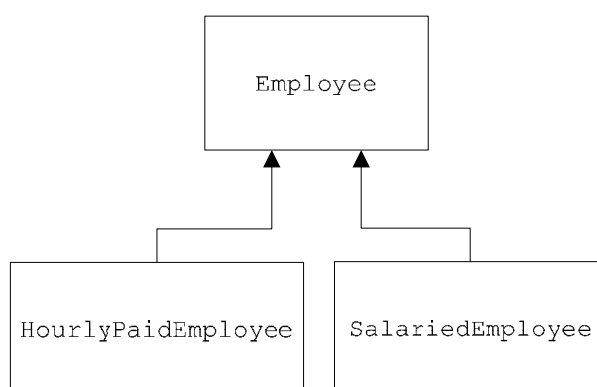
```

(1)      if GoodsTotal > 20:
(2)      if GoodsTotal > 100:
(3)      if HasDiscountCard == True:
(3)      return 10
(3)      else:
(3)      return 5
(2)      else:
(4)      if HasDiscountCard == TRUE:
(4)      return 5
(4)      else:
(4)      return 0
(1)      else:
(1)      return 0
```

[6]

Page 5	Mark Scheme	Syllabus	Paper
	Cambridge International A Level – May/June 2015	9608	41

4 (a)



[3]

Page 6	Mark Scheme	Syllabus	Paper
	Cambridge International A Level – May/June 2015	9608	41

(b) Example Pascal

```

Type
Employee = CLASS
    PUBLIC
        procedure SetEmployeeName
        Procedure SetEmployeeID
        Procedure CalculatePay
    PRIVATE
        EmployeeName : STRING
        EmployeeID : STRING
        AmountPaidThisMonth : Currency
END;
```

Mark as follows:

Class header	(1 mark)
PUBLIC and PRIVATE used correctly	(1 mark)
EmployeeName + EmployeeID	(1 mark)
AmountPaidThisMonth	(1 mark)
Methods x 3	(1 mark)

Example VB

```

Class Employee
    Private EmployeeName As String
    Private EmployeeID As String
    Private AmountPaidThisMonth As Decimal
Public Sub SetEmployeeName()
End Sub
Public Sub SetEmployeeID()
End Sub
Public Sub CalculatePay()
End Sub
```

Example Python

```

Class Employee():
    def __init__(self):
        self.__EmployeeName = ""
        self.__EmployeeID = ""
        self.__AmountPaidThisMonth = 0
    def SetEmployeeName(self, Name):
        self.__EmployeeName = Name
    def SetEmployeeID(self, ID):
        self.__EmployeeID = ID
    def SetAmountPaidThisMonth(self, Paid):
        self.__AmountPaidThisMonth = Paid
```

[max 5]

Page 7	Mark Scheme	Syllabus	Paper
	Cambridge International A Level – May/June 2015	9608	41

(c) (i)	HoursWorked	1	
	HourlyPayRate	1	
	SetHoursWorked	1	
	CalculatePay : Override	1 + 1	
	SetPayRate	1	[max 4]
(ii)	AnnualSalary	1	
	SetSalary	1	
	CalculatePay : Override	1	[max 2]
(d) Polymorphism			[1]

5 (a) (i) `FOR ThisPointer ← 2 TO 10`
`// use a temporary variable to store item which is to`
`// be inserted into its correct location`
`Temp ← NameList[ThisPointer]`
`Pointer ← ThisPointer - 1`

`WHILE (NameList[Pointer] > Temp) AND (Pointer > 0)`
`// move list item to next location`
`NameList[Pointer + 1] ← NameList[Pointer]`
`Pointer ← Pointer - 1`
`ENDWHILE`

`// insert value of Temp in correct location`
`NameList[Pointer + 1] Temp←`
`ENDFOR`

1 mark for each gap filled correctly [7]

(ii)	The outer loop (FOR loop) is executed 9 times	(1 mark)	
	it is not dependant on the dataset	(1 mark)	
	The Inner loop (WHILE loop) is not entered as the condition is already false at the first encounter	(1 mark) (1 mark)	[max 3]
(b) (i)	outer loop is executed 9 times	(1 mark)	
	inner loop is executed 9 times (for each iteration of the outer loop)	(1 mark)	
	not dependant on the dataset	(1 mark)	[max 2]

Page 8	Mark Scheme	Syllabus	Paper
	Cambridge International A Level – May/June 2015	9608	41

```

(ii) NumberOfItems ← 10
    REPEAT
        NoMoreSwaps ← TRUE

        FOR Pointer ← 1 TO NumberOfItems - 1
            IF NameList[Pointer] > NameList[Pointer + 1]
                THEN
                    NoMoreSwaps ← FALSE
                    Temp ← NameList[Pointer]
                    NameList[Pointer] ← NameList[Pointer + 1]
                    NameList[Pointer + 1] ← Temp
            ENDIF
        ENDFOR
        NumberOfItems ← NumberOfItems - 1
    UNTIL NoMoreSwaps = TRUE

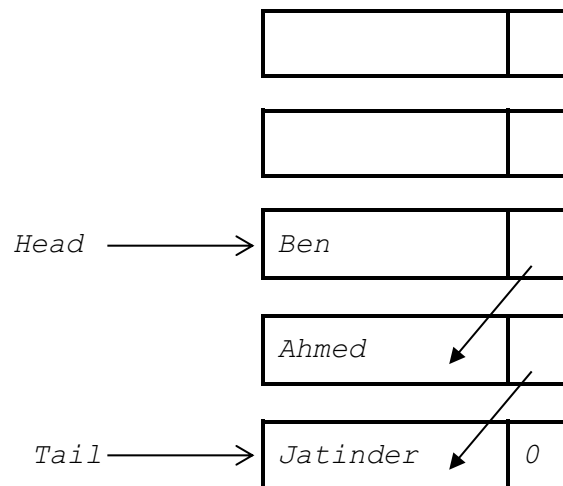
```

Mark as follows:

- change outer loop to a REPEAT/WHILE loop (1 mark)
- FOR loop has variable used for final value (1 mark)
- Initialise Boolean variable to TRUE (1 mark)
- set Boolean variable to FALSE in correct place (1 mark)
- number of items to consider on each pass decrements (1 mark)
- Correct stopping condition for REPEAT loop (1 mark)

[max 5]

6 (a)



1 mark for Head and Tail pointers

1 mark for 3 correct items – linked as shown

1 mark for correct order with null pointer in last nod

[3]

Page 9	Mark Scheme	Syllabus	Paper
	Cambridge International A Level – May/June 2015	9608	41

(b) (i)

Queue			
HeadPointer		Name	Pointer
0	[1]		2
	[2]		3
	[3]		4
TailPointer	[4]		5
	[5]		6
	[6]		7
FreePointer	[7]		8
	[8]		9
	[9]		10
	[10]		0

Mark as follows:

HeadPointer = 0 & TailPointer = 0
FreePointer assigned a value
Pointers[1] to [9] links the nodes together
Pointer[10] = 'Null'

[4]

(ii) **PROCEDURE** RemoveName()
 // Report error if Queue is empty
IF HeadPointer = 0
 {
 THEN
 Error
 }
ELSE
 OUTPUT Queue[HeadPointer].Name
 // current node is head of queue
 CurrentPointer ← HeadPointer
 // update head pointer
 HeadPointer ← Queue[CurrentPointer].Pointer
 //if only one element in queue, then update tail pointer
 {
 IF HeadPointer = 0
 {
 THEN
 TailPointer ← 0
 }
 }
 // link released node to free list
 Queue[CurrentPointer].Pointer ← FreePointer
 FreePointer ← CurrentPointer
ENDIF
ENDPROCEDURE

[max 6]