CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Subsidiary Level and GCE Advanced Level

MARK SCHEME for the October/November 2012 series

9691 COMPUTING

9691/21 Paper 2 (Written Paper), maximum raw mark 75

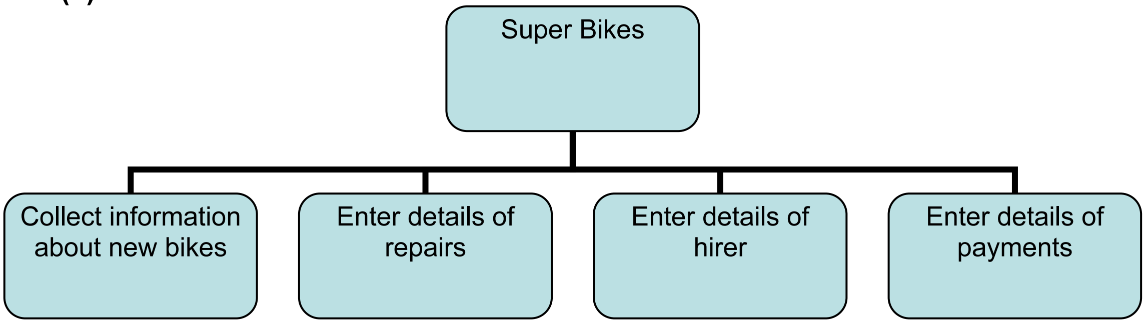
This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began,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

Cambridge will not enter into discussions about these mark schemes.

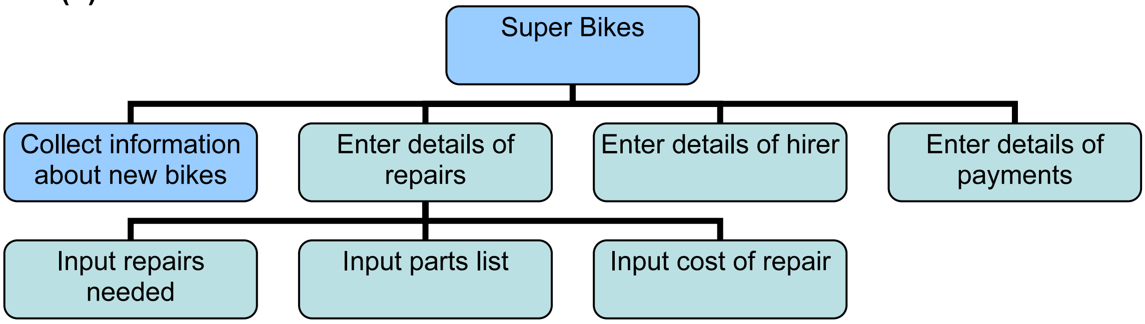
Cambridge is publishing the mark schemes for the October/November 2012 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

1 **(a)**


Super Bikes
Collect information about new bikes
Enter details of repairs
Enter details of hirer
Enter details of payments

1 mark for left 2 blocks, 1 mark for right 2 blocks [2]

(b)



1 mark for 3 blocks under Repairs [1]

(c) – to enable modular testing/maintenance/debugging
– to enable different blocks to be worked on by different staff
– easier to understand // reduce complexity [2]

(d) – the scope
– of a variable is the range of statements for which it is valid
– normally within a subprogram
– enables the same identifier to be used for different purposes without conflict [2]

(e) – OR
– OR [2]

(f) (i) e.g. Pascal

```
VAR BikeIDValid : BOOLEAN;
BikeIDValid := TRUE;
IF length(BikeID) <> 6
   THEN BikeIDValid := FALSE;
IF NOT((Right(BikeID,2)>=’00’)
          AND (Right(BikeID,2)<=’99’))
   THEN BikeIDValid := FALSE;
IF LEFT(BikeID,4) <> ‘BIKE’
   THEN BikeIDValid := FALSE;
IF BikeIDValid
   THEN WriteLn(‘valid’)
   ELSE WriteLn(‘invalid);
```

e.g. VB 2005

```
BOOLEAN BikeIDValid
BikeIDValid = TRUE
IF LEN(CarReg) <> 6 THEN
   BikeIDValid = FALSE
END IF
IF NOT(MID(BikeID,5,2)>=”00”
        AND MID(BikeID,5,2)<=”99”) THEN
   BikeIDValid = FALSE
END IF
IF MID(BikeID,1,4) <> “BIKE” THEN
   BikeIDValid = FALSE
END IF
IF BikeIDValid THEN
   Console.Writeline(“valid”)
ELSE
   Console.Writeline(“invalid”)
END IF
```

e.g. C#

```
bool bikeIDValid = true;
if (bikeID.Length != 6)
  {
    bikeIDValid := false;
  }
if (!((bikeID.Substring(5,2)>=”00”)
          && (bikeID.Substring(5,2)<=”99”)))
  {
    bikeIDValid := false;
   }
if (bikeID.Substring(1,4) != “BIKE”)
  {
    bikeIDValid := false;
  }
if (bikeIDValid)
  {
    Console.Writeline(“valid”);
  }
else
  {
    Console.Writeline(“invalid”);
  }
```

e.g. Python

```
bikeID = input()
bikeIDValid = True
if len(bikeID) != 6:
    bikeIDValid = False
if ((bikeID[4:6] >='00') & (bikeID[4:6] <= '99')) != True:
    bikeIDValid = False
if bikeID[0:4]!='BIKE':
    bikeIDValid = False
if bikeIDValid:
    print ('valid')
else:
    print ('invalid')
```

1 mark for length check (6 characters exactly)
1 mark for correct separating 1st four characters
1 mark for testing first four characters are BIKE
1 mark for separating last two characters
1 mark for testing last two characters are digits
1 mark for initialising Boolean value
1 mark for changing Boolean value if error
1 mark for suitable message
1 mark for meaningful variable names used
1 mark for correct use of specified programming language
1 mark for indentation [10]

(ii) – 2nd to 4th characters are lower case letters // first 4 characters are Bike not BIKE
– in above example at line number 8 (Pascal), 10 (VB), 11 (C#) [2]

(g) (i) white box [1]

(ii) Alpha testing
Who – issue of software to a restricted number of testers within the company
When – it may not be completely finished and could have faults // before beta testing
Purpose – to find faults // to check the logic // to see if it works [3]

2 (a)

Row	Position	Row<=30	Position <=3	BikePlace				
				[1,1]	[1,2]	[1,3]	[2,1]	[2,2]
1	1	TRUE	TRUE	BIKE34				
	2		TRUE		BIKE56			
	3		TRUE			BIKE70		
	4		FALSE					
2	1		TRUE				BIKE51	
	2		TRUE					BIKE19

[6]

(b) (i) e.g. Pascal

```
FOR Row := 1 TO 30 DO
   BEGIN
      FOR Position := 1 TO 3 DO
         BEGIN
            READLN(BikeID)
            BikePlace[Row,Position] := BikeID;
         END;
   END;
```

e.g. VB 2005

```
FOR Row = 1 TO 30
   FOR Position = 1 TO 3
      BikeID = CONSOLE.READLINE()
      BikePlace(Row,Position) = BikeID
   NEXT
NEXT
```

e.g. C#

```
for (int row = 1; row<= 30; row++)
  {
    for (int position=1; position<=3; position++)
       {
        bikeID = Console.ReadLine();
        bikePlace[row,position] = bikeID;
       }
   }
```

e.g. Python

```
for row in range (1,31):
        for position in range (1,4):
            bikeID = input()
            bikePlace[row,position] = bikeID
```

1 mark for correct FOR loops
1 mark for correctly nested loops
1 mark for input in correct place
1 mark for correct lower and upper boundaries for outer loop
1 mark for correct lower and upper boundaries for outer loop
1 mark for assignment to correct array element
**1 mark for indentation*
Check that FOR and assignment statements are properly formed depending on the programming language
** = language independent marks* [7]

(ii) – any word in the vocabulary of a programming language
– which can only have the meaning defined in that language
[2]

(iii) *Any two examples from* ***(i)*** *above (1 mark each)*
e.g. FOR, TO, NEXT, DO, BEGIN, END, int
follow through [2]

(c) (i) 0 (zero) [1]

(ii) Run-time error [1]

(iii) – check the value of the bracket before the division takes place // write error trapping code
– if bracket = 0 arrange for a message to be output // exception code [2]
Accept answers in code

(d) – lists the contents of variables
– at specific points in the program // at breakpoints
– allowing their contents to be compared with expected values [2]

3 – date
– suitable report title
– company name (Super Bikes)
– income and repairs grouped by BikeID
– tabulated or other suitable layout
– headings/labels (must contain income, bike, number of times hired, repairs)
– well spaced out (making use of whole frame)
(if clearly a screen design do not give this mark) [7]

4 (a)

Field Name	Data Type	Size of Field (bytes)
BikeID	String/alphanumeric/text	6
BikeType	String/alphanumeric/text	10-20
DateBought	Date/integer/real/string	8 (accept 10, 12)
NeedsRepair	Boolean	1

Give a tick for each correct cell. Marks are half the number of ticks (round up) [4]

(b) (6 + 20 + 8 + 1)
* 90 / 1024
* 1.1 (or equivalent)
=approx 3.4 KB
1 mark per row above [4]

(c) e.g. Pascal

```
TYPE HireBike = RECORD
                  BikeID: String[6];
                  BikeType: String[10];
                  DateBought: TDateTime;
                  NeedsRepair: Boolean;
               END;
```

e.g. VB 2005

```
STRUCTURE HireBike
   DIM BikeID AS String
   DIM BikeType AS String
   DIM DateBought AS Date
   DIM NeedsRepair AS Boolean
END STRUCTURE
```

e.g. C#

```
struct hireBike
   {
     public string bikeID, bikeType;
     public dateTime dateBought;
     public bool needsRepair;
   }
```

1 mark for correct record structure
1 mark for each field [5]

(d) **(i)** – a function returns a value
– there is no value to be returned from this subroutine

(ii) – Parameter passed by value:
– A local copy of the data is used
– Parameter passed by reference:
– the memory location of the data is used [4]

(iii) – filename
– BikeRecord [1]