

CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Subsidiary Level and GCE Advanced Level

MARK SCHEME for the October/November 2012 series

9691 COMPUTING

9691/23

Paper 2 (Written Paper), maximum raw mark 75

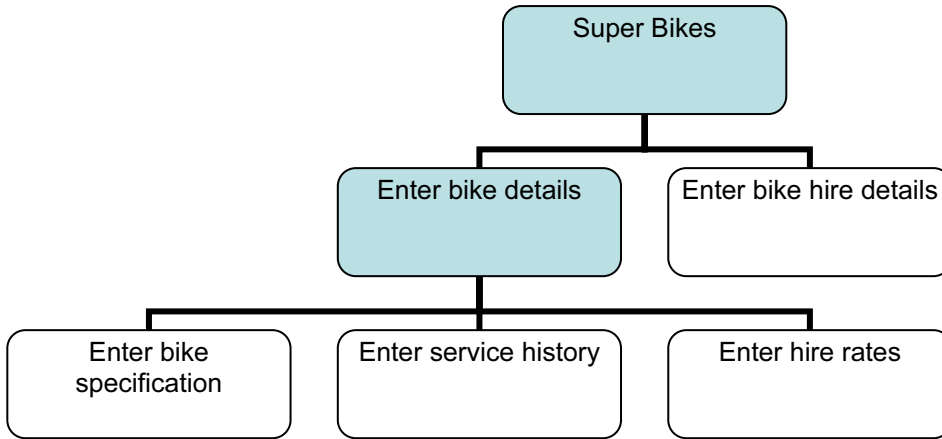
This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began,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

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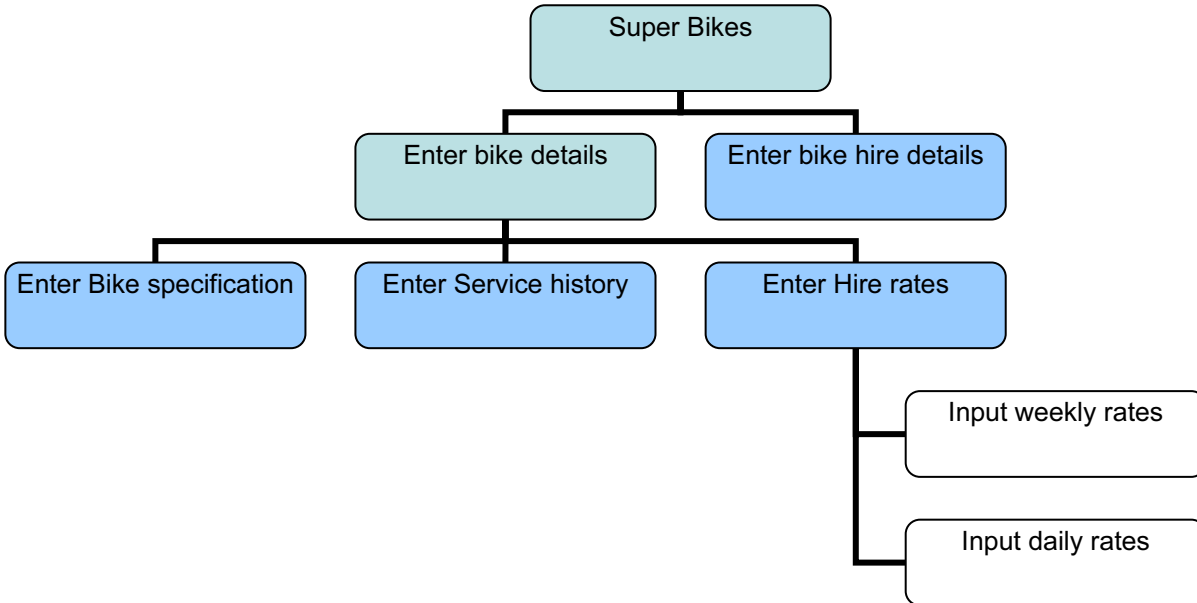
1 (a) Enter bike details



1 mark for correct order
1 mark for correct level

[2]

(b)



1 mark for 2 blocks under Enter Hire Rates

[1]

(c) (i) Invalid

(ii) Invalid

(iii) road is valid

[3]

(d) IF (BikeType="trial") OR (BikeType="scooter") OR (BikeType="road")

[1]

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(e) (i) e.g. Pascal

```

1  VAR BikeRegValid : Boolean;
2  BikeRegValid := TRUE;
3  IF length(BikeReg) <> 5
4    THEN BikeRegValid := FALSE;
5  IF NOT((RIGHT(BikeReg,3)>='000')
6    AND (RIGHT(BikeReg,3)<='999'))
7    THEN BikeRegValid := FALSE;
8  IF LEFT(BikeReg,2) <> 'BK'
9    THEN BikeRegValid := FALSE;
10 IF BikeRegValid
11   THEN writeln('valid')
12   ELSE writeln('invalid');
```

e.g. VB 2005

```

1  BOOLEAN BikeRegValid
2  BikeRegValid = TRUE
3  IF LEN(BikeReg) <> 5 THEN
4    BikeRegValid = FALSE
5  END IF
6  IF NOT(MID(BikeReg,3,3)>="000"
7    AND MID(BikeReg,3,3)<="999") THEN
8    BikeRegValid = FALSE
9  END IF
10 IF MID(BikeReg,1,2) <> "BK" THEN
11   BikeRegValid = FALSE
12 END IF
13 IF BikeRegValid THEN
14   Console.WriteLine("valid")
15 Else Console.WriteLine("invalid")
16 END IF
```

e.g. C#

```

1  bool bikeRegValid = true;
2  if (bikeReg.Length != 5)
3  {
4    bikeRegValid = false;
5  }
6  if (!(bikeReg.Substring(3,3)>="000"
7    && (bikeReg.Substring(3,3)<="999")))
8  {
9    bikeRegValid = false;
10 }
11 if (bikeReg.Substring(1,2) != "BK")
12 {
13   bikeRegValid = false;
14 }
15 if (bikeRegValid)
16 {
17   Console.WriteLine("valid");
18 }
19 else
20 {
21   Console.WriteLine("invalid");
22 }
```

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e.g. Python

```

1     bikeReg = input()
2     bikeRegValid = True
3     if len(bikeReg) != 5:
4         bikeRegValid = False
5     if ((bikeReg[2:5] >='000') & (bikeReg[2:5] <= '999')) != True:
6         bikeRegValid = False
7     if bikeReg[0:2]!='BK':
8         bikeRegValid = False
9     if bikeRegValid:
10        print ('valid')
11    else:
12        print ('invalid')
```

1 mark for checking length is 5 characters

1 mark for correct separating 1st two characters

1 mark for testing first two characters are BK

1 mark for separating last three characters

1 mark for testing last three 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 indentation

[10]

(ii) – digits first 3 characters, rather than last 3 characters

– in above example at line numbers 5/6 (Pascal), 6/7 (VB, C#)

[2]

(f) (i) – regards a block of software as an entity or black box

– tests inputs

– give correct outputs

[3]

(ii) – takes every possible path

– through the block of code

– done by a programmer

[3]

2 (a)

	Position	Row<=30	Position <=4	BikeReg <>"BBB"	BikeSpace				
					[1,1]	[1,2]	[1,3]	[1,4]	[2,1]
1	1	TRUE	TRUE	TRUE	BK707				
	2					BK380			
	3						BK162		
	4							BK747	
	5		FALSE						
2	1		TRUE						BK913

1 mark for second decision in heading
 1 mark for third decision in heading
 1 mark for correct array elements in heading
 1 mark for correct values into array elements
 1 mark for correct values in first 5 columns
 1 mark for correct placing of FALSE

[6]

(b) e.g. Pascal

```

Row := 1;
REPEAT
  Position := 1;
  REPEAT
    READLN(BikeReg);
    IF BikeReg = 'BBB' THEN Exit;
    BikeSpace[Row,Position] := BikeReg;
    Position := Position + 1;
  UNTIL Position > 4;
  Row := Row + 1;
UNTIL Row > 30;
  
```

e.g. VB 2005

```

Row = 1
DO
  Position = 1
  DO
    BikeReg = CONSOLE.READLINE()
    IF BikeReg = "BBB" THEN EXIT
    BikeSpace(Row,Position) = BikeReg
    Position = Position + 1 \ Position += 1
  LOOP UNTIL Position > 4
  Row = Row + 1 \ Row += 1
LOOP UNTIL Row > 30
  
```

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e.g. C#

```

row := 1;
do
{
    position := 1;
    do
    {
        bikeReg = Console.ReadLine();
        if (bikeReg = "BBB")
        {
            exit;
        }
        bikeSpace[row,position] = bikeReg;
        position := position + 1;//position += 1;
    }
    WHILE (position <= 4)
    row := row + 1; // row += 1;
}
WHILE (row <= 30)

```

1 mark for correct repeat loops

1 mark for correctly nested loops

1 mark for input in correct place

1 mark for correct incrementation

1 mark for checking for rogue value

1 mark for assignment to correct array element

1 mark for indentation

[7]

(c) (i) 0 (zero)

[1]

(ii) Run-time error (Allow logic error, arithmetic 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) – set breakpoint at the beginning of the code under scrutiny

– select the variables in the watch window ...

– ... whose values need checking

– ... while stepping through the program code

– a line at a time

[4]

3 – date (month alone sufficient)

–suitable report title

– company name

– tabulated or other suitable layout

– grouped by insurance rating

– total income for each group shown

– well spaced out (making use of whole frame)

(if clearly a screen design do not give this mark)

[7]

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4 (a)

	Data Type	Size of Field (bytes)
BikeReg	String/alphanumeric/text	5
PurchaseCost	Currency/integer/real/decimal	8 (accept 4–8)
InsuranceRating	Char	1
ServiceDue	Boolean	1

[4]

(b) (5 + 8 + 1 + 1)
 * 1000 / 1024
 * 1.1 (or equivalent)
 = 16.1KB (f.t.)

[4]

(c) (i) e.g. Pascal

```
TYPE HireBike = RECORD
    BikeReg: String[5];
    PurchaseCost: Currency;
    InsuranceRating: Char;
    ServiceDue: Boolean;
END;
```

e.g. VB 2005

```
STRUCTURE HireBike
    DIM BikeReg AS String
    DIM PurchaseCost AS Decimal
    DIM InsuranceRating AS Char
    DIM ServiceDue AS Boolean
END STRUCTURE
```

e.g. C#

```
struct hireBike
{
    public string bikeReg;
    public decimal purchaseCost;
    public char insuranceRating;
    public bool serviceDue;
}
```

1 mark for correct record heading
1 mark for correct record structure ending
1 mark for first 2 fields
1 mark each for 3rd and 4th field

[5]

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(ii) e.g. Pascal

```

ASSIGNFILE (FS, 'SuperBikes');
RESET (FS);
BikesForService := 0;
WHILE NOT EOF (FS) DO
BEGIN
    Read (FS, HireBike);
    IF HireBike.ServiceDue
        THEN
            BikesForService:=BikesForService+1;
END;
WRITELN('Number of bikes for service: ',
        BikesForService);
CloseFile (FS);

```

e.g. VB 2005

```

FS = NEW FileStream("SuperBikes",
                   FileMode.open)
BR = NEW BinaryReader (FS)
BikesForService = 0
DO WHILE FS.Position < FS.Length
    HireBike.ServiceDue =
        BR.ReadBoolean ()
    IF HireBike.ServiceDue THEN
        BikesForService = BikesForService + 1
LOOP
WRITELINE("Number of bikes for service: ",
          BikesForService);
BR.Close ()
FS.Close ()

```

e.g. C#

```

fs = new FileStream("SuperBikes", FileMode.Open);
br = new BinaryReader (fs);
bikesForService = 0;
do
{
    hireBike.ServiceDue =br.Readbool ();
    IF (hireBike.ServiceDue)
    {
        bikesForService:=bikesForService+1;
    }
}
while (fs.Position < fs.Length);
Console.WriteLine("Number of bikes
                  for service: ",bikesForService);
br.Close ();
fs.Close;

```

- 1 mark for initialising total*
- 1 mark for assigning file name*
- 1 mark for opening file for reading*
- 1 mark for repeat/while loop*
- 1 mark for reading record*
- 1 mark for testing 'service due' field set to true*
- 1 mark for incrementing total*
- 1 mark for outputting total*
- 1 mark for closing file*

[9]