Rugby School

Sixth Form Entrance Examination

Specimen Paper

COMPUTING

Time allowed: 60 minutes

Instructions to Students

- The paper is split into **3** sections.
- Please answer **all** questions from each section.
- Write in full sentences where required in only **blue** or **black** ink.
- Spelling, punctuation and grammar will be assessed as indicated in the relevant questions.
- The total number of marks for this paper is **60**.
- The time allowed for this paper is **60** minutes.

Name: _____

School: _____

Official Use Only	
Section A	/36
Section B	/16
Section C	/8
Total	/60

Section A – Programming [36 marks]

A supermarket is implementing a new system for managing products and stock levels. One part of the system allows the user to enter the details of a new product into the system.

1 The supermarket has recently fitted self-checkouts. The self-checkouts include the following algorithm.

```
01 IF NOT(PaymentIncomplete) AND (BaggingAreaWeight > 0) THEN
02  OUTPUT "Please take your items"
03 ELSE
04  OUTPUT "Thank you for shopping with us, have a nice day"
05 END IF
```

(a) The algorithm is tested when the values of the variables are

PaymentIncomplete = FALSE BaggingAreaWeight = 5

(i) State the value of (BaggingAreaWeight > 0)

…… **[1]**

(ii) State the value of NOT(PaymentInComplete) AND (BaggingAreaWeight > 0)

…… **[1]**

(iii) State the value of NOT(PaymentIncomplete)

…… **[1]**

(iv) State the output of the algorithm

…… **[1]**

(b) Rewrite the algorithm so that when PaymentIncomplete is True and BaggingAreaWeight is more than 0, the output is "Please pay for your items".

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…… **[4]**

(c) The self-checkout program uses the following recursive procedure to print vouchers. The user is issued with one 10p voucher for each £10 they spend and one 5p voucher if they spend £5.

```
01 BEGIN Procedure PrintVoucher(AmountSpent)
02   IF AmountSpent >= 10 THEN
03      PRINT VoucherTen
04      PrintVoucher(AmountSpent-10)
05   ELSE
06      IF AmountSpent >= 5 THEN
07          PRINT VoucherFive
08          PrintVoucher(AmountSpent-5)
09      END IF
10   END IF
11 END Procedure
```

(i) State what is meant by recursion.

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…… **[1]**

(ii) On which lines does recursion happen?

…… **[1]**

(d) State the result of the procedure if it is called with the following arguments.

(i) PrintVoucher(31)

…… **[1]**

(ii) PrintVoucher(76)

…… **[1]**

2 Each of the self-checkouts has a status light to notify customer services of any problems.

(a) The status of each light is stored as a value in an array. The structure of the array is shown in the table below.

Each row represents a status light for one self-checkout. The first column stores whether the green status light is on and the second column stores whether the red status light is on.

	1 (Green)	**2 (Red)**
1	FALSE	TRUE
2	FALSE	TRUE
3	TRUE	FALSE
4	FALSE	TRUE
5	TRUE	FALSE
6	TRUE	FALSE
7	TRUE	FALSE
8	TRUE	FALSE

(i) Explain what is meant by an array.

……

…… **[2]**

(ii) State the value of Status(2,1).

……

…… **[1]**

(b) The following algorithm is used to output the current status of each self-checkout.

```
01 Checkout = 1
02 WHILE Checkout <= 8
03       IF Status(Checkout,1) = TRUE THEN
04            OUTPUT Checkout+" Status OK"
05       ELSE
06            OUTPUT Checkout+" Out of order"
07       END IF
08       Checkout = Checkout + 1
08 END WHILE
```

(i) Explain what is meant by iteration

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…… **[2]**

(ii) Rewrite the algorithm above using a FOR loop.

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…… **[5]**

(c) The supermarket uses the following method to decide whether or not the price of an item should be reduced.

- If the best before date on the item is 2 or more days away then the item should not be reduced.
- If the best before date is between 0 or 1 days away then it should be reduced.

Complete the test table below with three different test cases assuming that today's date is 1st April 2015.

Type of test data	Test data	Expected outcome
Normal		
Borderline		
Invalid		

[6]

(d) Once the user has scanned an item on the self-checkout, the item's details are retrieved and passed to the ProcessItem subroutine.

The subroutine does the following:

- outputs the name and price of the item
- asks the user to place the item in the bagging area every 5 seconds until they have done it
- checks whether the item has been placed in the bagging area by comparing the ItemWeight to the TotalWeight (weight of all the items in the bagging area).

The parameters of the subroutine are, ItemName, ItemPrice and ItemWeight. TotalWeight is a global variable declared outside the subrountine which is constantly updated.

Write the code for the subroutine ProcessItem in a high level language. You should state the name of the language you have used and use good program writing techniques to ensure that your code can be understood by another programmer.

Name of Language ……

Code ………

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Section B – Hardware and Software [16 marks]

3

(a) State two differences between ROM and RAM.

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…… **[2]**

(b) A disk recorder for digital TV signals is controlled by an embedded processor.

(i) Explain why the control software is stored on ROM.

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…… **[2]**

(ii) Explain why it will be necessary to have some RAM.

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…… **[2]**

4

(a)

(i) 1010111011 is an unsigned binary integer. State its denary value.

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…… **[1]**

(ii) 1010111011 is a binary number in sign and magnitude form. State its denary value.

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…… **[2]**

(iii) Explain why sign and magnitude form is rarely used for computer arithmetic.

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…… **[3]**

(b) 10110010 and 00100110 are unsigned binary integers.

(i) Add together the binary numbers. (You must show your working)

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…… **[2]**

(ii) Subtract 00100110 from 10110010. (You must show your working)

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…… **[2]**

Section C – Implications of Computer Use [8 marks]

5

In the recent past, the running of a home was a full-time occupation. The advent of computers and computer technology has meant that some of the jobs needing to be done have been simplified and some have been removed.

Describe the use of computer technology in the home and the way that its use has altered the jobs that need to be done and the lives of the people concerned.

(The quality of written communication will be assessed in your answer to this question)

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[END OF PAPER]